# Table of Contents

**DevOps**

- DevOps .......................................................... 1
  - DevOps overview ............................................. 4
  - Install DevOps .................................................. 6
  - Setting up DevOps tools ....................................... 11
  - Accelerating DevOps change .................................. 14
  - DevOps dashboard and Pipeline UI .......................... 117
  - User-created DevOps integrations ............................ 142
  - DevOps reference .............................................. 164

- DevOps reference .................................................. 200
DevOps

Use the ServiceNow® DevOps application with your DevOps toolchain to provide data insights, accelerate change, and increase visibility in your DevOps environment using a single system.

ServiceNow DevOps approach

Achieve enterprise DevOps

Companies are turning to DevOps to speed up product delivery and innovation. DevOps is integral to delivering differentiation, improving customer responsiveness, and building competitive advantage.

In addition to Now Platform® core features, DevOps integrates with these ServiceNow applications:

• Now Intelligence Performance Analytics
• IT Service Management Change Management
• IT Business Management Agile Development
• Governance, Risk, and Compliance Risk Management

View and download the full infocard for a highlight of the DevOps features.

Automate deployments by accelerating change

Automatically create change requests at any stage for deployments that require change control in your environment. Use change approval policies to automate change request

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approval to continue deployment through the execution pipeline automatically.

**Evaluate and monitor DevOps process and results**
Use the data-driven DevOps Insights dashboard to view change results reports, pipeline value stream, and evaluate the overall DevOps process.

**Visualize interactions and results across a pipeline execution**
Use the DevOps Pipeline UI view to show pipeline stage progression and details for each app.

**Set up user-created integrations for additional planning, coding, and test tools**
Integrate planning, coding, and test tools not included in the integrations provided with the DevOps application.

**Automate deployments by accelerating change**

Change requests are automatically created for stages under change control. You can also enable automatic approval of DevOps changes using workflows, such as Change Approval Policy and DevOps Change Policy.
Evaluate and monitor DevOps process and results

Use the DevOps Insights dashboards to analyze operational and business reports and determine the overall efficiency and growth associated with your development processes.

Visualize interactions and results across a pipeline execution

Quickly view how everything is connected to see exactly what’s happening with the pipeline and when. View the commits, the committers, and other details for a change request in one place.
Set up user-created integrations for additional planning, coding, and test tools

The DevOps application includes tool definitions for integrating some common planning, coding, and test tools. You can also set up user-created integrations for additional tools in your DevOps environment.

Get started

• Work with an implementation specialist to streamline your DevOps setup process. To learn more, visit the Customer Success Center.

• See the DevOps overview for information on how to request DevOps and begin setup.

• Take a DevOps course to learn about DevOps fundamentals and how to implement DevOps. To sign up, visit ServiceNow training and certification.

Applications and features

• DevOps

DevOps

Use the ServiceNow® DevOps application with your DevOps toolchain to provide data insights, accelerate change, and increase visibility in your DevOps environment using a single system.

The DevOps application collects data across the entire set of lifecycle activities to provide visibility for DevOps teams so they can own the end-to-end process (plan, develop, build, test, deploy, and operate). Visibility across the entire DevOps toolchain, versus a single tool, exposes overall performance, including areas in the process that may need improvement.
As a result of this visibility, enterprise governance can be accelerated using DevOps, including automating change decisions.

**ServiceNow DevOps Overview**

To learn more about how your ServiceNow instance supports DevOps, see the [DevOps overview](#) for a general understanding of the application and how it is used.

**Start gaining insight using DevOps**

Connect your tools and configure your pipeline to automate lifecycle activities. View pipeline stage progression and details for each app using the DevOps Pipeline UI. Monitor pipeline modeling and change acceleration benefits in your environment using the DevOps Insights dashboard.

- **Connect existing toolchain**
  Tool support includes Azure DevOps Boards, Jira, and ServiceNow Agile Development 2.0 planning tools, Azure DevOps Repos, GitHub, Bitbucket Server (version 5.10.0), and GitLab SCM coding tools, and Azure DevOps Pipelines, Jenkins, and GitLab CI/CD orchestration tools.

- **Automate deployments**
  Automatically create change requests at any stage for deployments that require change control in your environment, and use change approval policies to automate change request approval to continue deployment through the execution pipeline automatically.

- **Evaluate and monitor improvements**
  Use the data-driven DevOps Insights dashboard to view change results reports, pipeline value stream, and evaluate the overall DevOps process.

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• Visualize interactions and results across a pipeline execution
  Use the DevOps Pipeline UI view to show pipeline stage progression and
details for each app.
• Set up user-created integrations for additional planning, coding, and test tools
  Integrate planning, coding, and test tools not included in the integrations
  provided with the DevOps application.

Understand DevOps concepts
• DevOps overview and getting started
• Install DevOps
• Setting up DevOps tools
• Accelerating DevOps change
• DevOps dashboard and Pipeline UI
• User-created DevOps integrations
• DevOps API

Find DevOps resources
• DevOps release notes
• Ask or answer questions in the Now Community

Get help from DevOps resources
• Search the Known Error Portal for known error articles
• Contact Customer Service and Support
• Upgrade to Paris

DevOps overview
Set up DevOps roles, connections, integrate with external tools, then use the
Insights dashboard to analyze operational and business reports and gain insight
into your DevOps environment.

Use the change acceleration feature of DevOps to automatically create
a change request for a stage in your development pipeline to accelerate
change.
## DevOps integrations

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>• Azure Boards (Azure DevOps Server 2020)&lt;br&gt;• Jira (ver 7.x and 8.x)&lt;br&gt;• ServiceNow Agile Development (ver 2.x)</td>
</tr>
</tbody>
</table>
| Coding             | • Azure Repos (Azure DevOps Server 2020)<br>• Bitbucket Server/Enterprise (ver 5.10.0)<br>• GitHub and GitHub Enterprise (ver 2.x)<br>  
  ◦ Basic authentication<br>  
  ◦ OAuth<br>• GitLab SCM (ver 12.8.0) |
| Orchestration      | • Azure Pipelines (Azure DevOps Server 2020)<br>Jobs supported:<br>  
  ◦ Agent job<br>  
  ◦ Agentless (server) job<br>• Jenkins (ver 2.138)<br>Jobs supported:<br>  
  ◦ Freestyle project<br>  
  ◦ Folder (default is 3 levels)<br>  
  ◦ Pipeline<br>  
  ◦ Multibranch Pipeline<br>• GitLab CI/CD (ver 12.8.0) basic CI pipelines |
DevOps applications

The DevOps application uses these related DevOps applications:

- **DevOps Insights application**
  
  Use the DevOps Insights dashboard to manage and track results.

- **DevOps Integrations application**
  
  Use DevOps Integrations application for Azure DevOps integration with DevOps and Jenkins integration with DevOps (starting with version 1.12), and GitLab integration with DevOps (starting with version 1.16).

DevOps extensions

Use these extensions to model your pipeline in DevOps:

- **ServiceNow DevOps extension for Azure DevOps**
  
  Starting with version 1.12, the ServiceNow DevOps extension on Visual Studio Marketplace is required to integrate your Azure DevOps pipeline with ServiceNow DevOps.

- **Jenkins plugin for ServiceNow DevOps**
  
  A Jenkins plugin is provided to enable change acceleration so your orchestration tool can communicate with ServiceNow DevOps and control certain aspects of pipeline executions. Visit the Ancillary Software section on the ServiceNow Store website to download the Jenkins plugin for ServiceNow DevOps.

DevOps workflow

DevOps integrates with external planning, coding, and orchestration tools and automatically creates change requests at any stage for deployments that require change control.

Change approval policies can be used to automate change request approval to continue deployment through the execution pipeline automatically.
Performance and efficiency in your DevOps environment are monitored and analyzed using the DevOps Insights dashboard. Pipeline executions are visualized on the DevOps Pipeline UI view.

**DevOps Concepts**

These concepts are useful to understand with respect to the DevOps application.

**Pipeline**

A pipeline is a set of steps that begins with planning (plans for the work to be done). An app is the item being worked on, and the work is done via commits to a code repository. Once committed, an orchestration tool picks up the change and sends it through a series of pipeline steps, including production.

Pipeline steps can include quality checks, like functional, security, load, and behavioral tests as well as deployments, and infrastructure provisioning. The result is fully tested development features delivered as quickly as possible to production.

**Integrations**

The DevOps application integrates with external tools by exposing REST endpoints to receive webhook notifications, or direct REST calls from tools.

**API**

The DevOps application includes a DevOps API that allows integration with any coding, planning, or orchestration tools.

**Getting started with DevOps**

Get started using the DevOps application to integrate with your existing DevOps toolchain, manage processes, accelerate changes, and view operational and business insights.

Integrate with external planning, coding, orchestration, and testing tools. Out-of-the-box integrations collect lifecycle events and data from your existing DevOps toolchain.

Tool support includes Azure DevOps Boards, Jira, and ServiceNow Agile Development 2.0 planning tools, Azure DevOps Repos, GitHub, Bitbucket Server (version 5.10.0) and GitLab SCM coding tools, and Azure DevOps Pipelines, Jenkins, and GitLab CI/CD orchestration tools.
• ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime) plugin
• ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest) plugin
• MID Server

*i* Note: You must set up a MID Server for on-premise tools (for example, GitHub, Jira, Jenkins).

**DevOps users**

DevOps integration and system users are automatically created in the DevOps application and are used to integrate with external tools.

• DevOps Integration User [devops.integration.user]

*i* Note: You must configure the password before the DevOps Integration User can configure a tool.

• DevOps System [devops.system] user

**DevOps roles**

Before you can use the DevOps application, an admin user must assign DevOps roles.

• DevOps Administrator [sn_devops.admin] role is required for DevOps administration and setting up tools.

• DevOps integration [sn_devops.integration] role is required for DevOps inbound access to the integration tools in your environment.

• DevOps manager [sn_devops.manager] role is required for DevOps operation management, including monitoring performance in your DevOps environment.

• DevOps viewer [sn_devops.viewer] role is required to access the DevOps navigation menu and view DevOps information.

**Initial DevOps Setup**
Once the DevOps application is installed and roles are assigned, complete the setup configuration.

System admin:

• Configure an HTTP connection in CreateDevOpsTool (DevOps connection and credential alias provided) to automatically connect to your tools
• Add admin credentials to CreateDevOpsTool to allow access to your tools

DevOps admin:

• Create a DevOps tool record (required to connect to and discover tool configuration)
  ◦ Application plans
  ◦ Repositories
  ◦ Orchestration tasks
  ◦ Pipelines
• Model your pipeline in DevOps (associating pipeline steps is required to receive notifications from your tool)
• Set up change acceleration
• Integrate test tools, if applicable

View the DevOps Insights dashboard

Use the DevOps Insights dashboard to manage and track results.

View the DevOps Pipeline UI

Use the DevOps Pipeline UI for a graphical view of pipeline executions.

Install DevOps

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

Before you begin

Role required: admin
About this task

Note: For all new installations of the DevOps application on Quebec, you must set the `com.snc.change_management.change_model.type_compatibility` property to `True`.

To install the DevOps application on a subprod instance, navigate to the app on the ServiceNow Store and click Request Install to send your request.

Procedure
1. Navigate to System Applications > All Available Applications > All.
2. Click the Not Installed tab to view a list of applications available for installation.
3. Locate the DevOps application and click Install.
4. Optional: For Azure DevOps and Jenkins tool support (starting with version 1.12), and for GitLab tool support (starting with version 1.16), Install DevOps Integrations.

Install DevOps Integrations

For Azure DevOps and Jenkins tool support (starting with version 1.12), and for GitLab tool support (starting with version 1.16), install the DevOps Integrations application from ServiceNow Store applications. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Before you begin
Role required: admin

About this task
The DevOps Integrations application is required to integrate with these tools:

- Jenkins (starting with version 1.12)
- Azure DevOps (starting with version 1.12)
  - Azure Boards
  - Azure Repos
  - Azure Pipelines
- GitLab (starting with version 1.16)
- GitLab SCM
- GitLab CI/CD (basic CI pipelines)

⚠️ **Note:** You must Install DevOps before installing DevOps Integrations.

**Procedure**

1. Navigate to System Applications > All Available Applications > All.
2. Click the Not Installed tab to view a list of applications available for installation.
3. Locate the DevOps Integrations application and click Install.

**Install DevOps Insights**

Install the DevOps Insights Standard dashboard application from ServiceNow Store applications. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

**Before you begin**

⚠️ **Note:** You must install the Service Portfolio Management Foundation (com.snc.service_portfolio) plugin before installing the DevOps Insights application to see demo data.

Role required: admin

**About this task**
The DevOps Insights application uses Performance Analytics to track performance metrics over time.

⚠️ **Note:** Starting with version 1.12, the DevOps Insights Standard dashboard is the sole dashboard for the DevOps application. You must install the DevOps Insights application to view the Insights module.

**Procedure**

1. Navigate to System Applications > All Available Applications > All.
2. Click the Not Installed tab to view a list of applications available for installation.
3. Locate the DevOps Insights application and click Install.
4. For new DevOps Insights installations, if you have already been using the DevOps app and you Installed DevOps Insights at a later date, run the [DevOps] Historical Data Collection job to collect historical Insights data.

   Note: This job is a one-time job to collect historical DevOps data, and not meant to be on a schedule. It might take awhile, so plan on running this job during a period of low usage.

   a. Navigate to Performance Analytics > Data Collector > Jobs and open the [DevOps] Historical Data Collection record.
   b. Select Active and set the Run As credentials to System Administrator.
   c. Click Execute Now.

5. Starting with version 1.14, unless the [DevOps] Daily Data Collection job was previously customized, set it up to collect daily Insights data.

   Note: This is a scheduled job (to be run on a regular basis) to collect daily DevOps data. For optimal performance, set this job to run during periods of low usage.

   b. Select Active and set the Run As credentials to System Administrator.
   c. Set the run time of day to a period of low usage.
   d. Click Execute Now.

The DevOps > Insights module is shown with the Standard dashboard within it.

Setting up DevOps tools

Set up your environment to connect DevOps to your tools, discover tool configuration, and import historical data into the DevOps application.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Required DevOps applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azure DevOps</td>
<td>DevOps application and</td>
</tr>
<tr>
<td>• Azure Boards</td>
<td>DevOps Integrations application</td>
</tr>
<tr>
<td>• Azure Repos</td>
<td></td>
</tr>
<tr>
<td>• Azure Pipelines</td>
<td></td>
</tr>
<tr>
<td>Bitbucket Server/Enterprise</td>
<td>DevOps application</td>
</tr>
<tr>
<td>GitHub and GitHub Enterprise</td>
<td>DevOps application</td>
</tr>
<tr>
<td>Tool</td>
<td>Required DevOps applications</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>GitLab</td>
<td>DevOps application and DevOps Integrations application</td>
</tr>
<tr>
<td>• SCM</td>
<td></td>
</tr>
<tr>
<td>• CI/CD</td>
<td></td>
</tr>
<tr>
<td>Jenkins</td>
<td>DevOps application and DevOps Integrations application</td>
</tr>
<tr>
<td>Jira</td>
<td>DevOps application</td>
</tr>
<tr>
<td>ServiceNow Agile Development 2.x</td>
<td>DevOps application</td>
</tr>
</tbody>
</table>

**Connection and credential alias**

Before you set up your tool records in DevOps, your admin configures the DevOps connection and credential alias (CreateDevOpsTool) to gain access to the tools in your environment.

⚠️ **Note:** You only need to configure the CreateDevOpsTool connection and credential alias once to set up all of your tools in DevOps.

**Tool actions**

A common set of actions is required to integrate DevOps with each tool in your environment.
<table>
<thead>
<tr>
<th>Action</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect</td>
<td>DevOps accesses the tool with correct credentials and gets the webhook URL.</td>
</tr>
<tr>
<td>Discover</td>
<td>DevOps discovers all tool information.</td>
</tr>
<tr>
<td>• Planning tool application plans</td>
<td></td>
</tr>
<tr>
<td>• Coding tool repositories</td>
<td></td>
</tr>
<tr>
<td>• Orchestration tool orchestration tasks and pipelines</td>
<td></td>
</tr>
<tr>
<td>Configure</td>
<td>DevOps configures the webhook URL in the source tool so notifications from the tool can be received by DevOps.</td>
</tr>
<tr>
<td>Import</td>
<td>DevOps imports all tool data and enables tracking.</td>
</tr>
<tr>
<td>• Planning tool application plan work item data (and plan versions, features)</td>
<td></td>
</tr>
<tr>
<td>• Coding tool repository branch and commit data</td>
<td></td>
</tr>
<tr>
<td>• Orchestration tool task execution data</td>
<td></td>
</tr>
</tbody>
</table>

**DevOps Retry Policy**

Starting with version 1.19, enable the DevOps Custom HTTP Retry Policy for most tool communication from ServiceNow flows to automatically retry failed requests when a step encounters an intermittent issue, such as a network failure or request rate limit.

Navigate to the action in **Flow Designer > Designer > Actions** and in the REST step, select **Enable Retry Policy**. For the DevOps Custom HTTP Retry Policy to take effect, override the default policy for the alias and select the DevOps retry policy.

To customize the retry configuration, access the DevOps Custom HTTP Retry Policy settings in **IntegrationHub > Retry Policy**.
Manual configuration mode

As an alternative to making a connection using the standard setup process, you can use manual configuration mode to set up a webhook manually.

For example, if you do not have admin privileges for a tool (to allow automatic configuration the webhook URL), you can send an email to the admin of the tool requesting the ServiceNow instance be added to the webhook. Once the instance is added, you can Enter Manual Configuration Mode and change the Connection state field to Connected (to connect manually).

This way you only need read-only permission to the tool. Once the connection is made, click Exit Manual Configuration Mode.

⚠️ Note: The Connection state field can only be edited in manual configuration mode.

All planning, coding, and orchestration tool connections support manual configuration mode.

⚠️ Note: Connection state automatically changes to disconnected if there is a change in configuration, such as URL, credentials, alias, type, or MID Server settings, for example.

Commits and task executions

Run commits in DevOps are associated to a task execution.

⚠️ Note: For a commit to show up as a run commit, the commit record must exist in ServiceNow prior to the job/pipeline run.

In the event that jobs are rerun on the same commit, these conditions apply.

- Azure DevOps does not show any run commits.
- GitLab displays only the last commit as a run commit.
- Jenkins displays only the last commit as a run commit on which it was run. The difference of all commits is not shown.

Multiple commits in a single payload (commit arrays) have these limitations.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Max commits per payload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azure DevOps</td>
<td>25</td>
</tr>
<tr>
<td>GitHub</td>
<td>1000</td>
</tr>
<tr>
<td>GitLab</td>
<td>20</td>
</tr>
</tbody>
</table>
Associating multiple work items to a commit

Starting with version 1.22, multiple work items for a commit are supported in DevOps for Azure DevOps, Bitbucket, GitHub, and GitLab.

Work item syntax in the commit message can be customized to reflect the processes in your organization using the DevopsCommitMessageParserSNC script include in the System Definition > Script Includes module.

Linking work items to a commit using the Azure DevOps user interface is also supported in DevOps.

You can view the list of associated work items in the DevOps Commit record, and in the Pipeline UI.

Deleting DevOps records

Starting with version 1.21, cascade record deletion is implemented to delete all dependent lower level DevOps records whenever a parent or higher level DevOps entity is deleted.

**Note:** Deleting a parent record can trigger the deletion of many child records. See the DevOps record deletion cascade section for more details.

For example, when a Plan record is deleted, all dependent Work Item, Plan Version, and many-to-many relation (like App to Plan, and Work Item to Plan Version) records are deleted.
Create new DevOps tool from the Tools list view

Create a default connection alias, while creating a DevOps tool from the Tools list view. Use base system configuration templates to create connections and credentials under the child connection alias that is created. Eliminate creating a connection alias as a prerequisite before creating a new DevOps tool.

Before you begin

⚠️ Note: This feature works on the Paris release or higher.

Role required: sn_devops.admin

About this task

Starting from the release 1.26, the DevOps application provides base system parent aliases and the following corresponding connection templates:

- Basic Auth
- API Key
- OAuth- Authorization Code

You can use these templates to create connection and credential under the child connection alias that is created while creating the new tool. By default, a new child connection alias is automatically created when you create a new tool. This eliminates the need to create a new alias or use an existing connection alias.

Since a new child alias is created, you do not need to use the base system child aliases that are seeded as part of the DevOps application. This way you do not use up all existing aliases as a new alias is created every time you create a DevOps tool. Based on the tool you select in the form, a corresponding authentication mechanism and Connections and Credentials template displays.

This template based approach also simplifies the process to create certain connection protocols such as OAuth 2.0. For more information see, Create a Connection and Credential alias

Procedure

1. Navigate to a Tools list view. For instance, DevOps > Orchestration Tools.
2. Click New in the header menu.
3. On the form, fill in the fields.
Create new tool

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter a name for the tool you're creating.</td>
</tr>
<tr>
<td>Tool</td>
<td>Click the Search icon to select the tool from the lookup list.</td>
</tr>
<tr>
<td>Connection and Credential Template</td>
<td>Click the Search icon to select the tool from the lookup list or create a template.</td>
</tr>
<tr>
<td></td>
<td>• The options in the lookup list depend on the tool you select.</td>
</tr>
<tr>
<td></td>
<td>• This field does not appear if you select an agile tool integration.</td>
</tr>
</tbody>
</table>

4. Click **Submit**.  
The new tool record is created and the tools list view displays.

5. Open the tool record you just created.  
Creating a child alias after creating a tool may take some time. If the connection alias is not yet created the following information message displays.

<table>
<thead>
<tr>
<th>Important:</th>
<th>No Connection Alias created for the tool. If the tool was just created, it can take few seconds for alias to be created.</th>
</tr>
</thead>
</table>

The **Connection Alias** field is auto-populated with the child alias that is created during tool creation.

6. Click the **Create New Connection & Credential** related link.  
Based on the tool and the template you select, a relevant **Create Connection and Credential** form displays.

7. On the form, fill in the fields and create the connection.

**Results**  
You have successfully created a connection alias while creating a new DevOps tool.
Example:

OAuth 2.0 Connection and Credential template form from the new tool form

Create Connection and Credential

Please Enter the Connection Information

✱ Connection Name:

Test1

✱ Connection URL:

https://<provider-domain-name>.com

Use Mid:

False

Please Enter the Credential Information

✱ Credential Name:

Test1

✱ OAuth Client ID:

Client ID for provider

✱ OAuth Client Secret:

Client Secret for provider

✱ OAuth Redirect URL:

https://d1.service-now.com/oauth_redirect.do

✱ Auth URL:

https://<provider-name>.com/login/oauth/authorize

✱ Token URL:

https://<provider-name>.com/login/oauth/access_token
Azure DevOps integration with DevOps

Integrate Azure DevOps tools with DevOps using the DevOps Integrations application.

⚠️ Note: You must install the DevOps Integrations application to integrate Azure DevOps tools with DevOps.

Azure DevOps tools supported:

- Azure Boards (planning)
- Azure Repos (coding)
- Azure Pipelines (orchestration)
  - Build (CI) pipelines - agent and agentless (server) jobs
  - Release (CD) pipelines

Starting with version 1.24, capture tags from Azure DevOps coding tool commits.

Azure DevOps extension

You can use the ServiceNow DevOps extension for Azure DevOps on Visual Studio Marketplace to integrate your Azure pipeline with the ServiceNowDevOps application.

The ServiceNow DevOps extension includes:

- ServiceNow DevOps service connection
- ServiceNow DevOps Release Gate (starting with version 1.18)
- Azure build (CI) pipeline agent and server job custom tasks

Set DevOps change request details

Starting with version 1.24, set closure code and change request fields from within the Azure pipeline.

Bulk commits in Azure DevOps

Starting with version 1.23, large commits are supported with Azure DevOps.

To support large commits, perform these actions:
• Install the ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream) plugin.

• For optimal performance, disable flow logging by setting the Flow Designer com.snc.process_flow.reporting.level property to Off.

• For MID Server settings, view the MID Server support for Data Stream actions section.

The Azure DevOps data stream can currently process up to 8000-9000 commits per code push. The number of run commits listed for a task execution are limited to 200.

**Azure DevOps test tool integration**

Starting with version 1.15, JUnit test type integration is supported for Azure DevOps.

**Test tool integration** lets you view test results in DevOps for Azure DevOps unit, functional, and performance tests.

**Connect DevOps to Azure DevOps tools**

Configure a connection and credential alias and create an Azure DevOps tool record in DevOps.

⚠️ **Note:** You can create a new tool and simultaneously create a new connection alias. Since the child alias is created during tool creation, you do not an admin role nor do you need to create a new connection alias as a prerequisite. Create the new connection alias as an sn_devops.admin user using **Connections and Credentials template** which are dynamically populated based on the tool you select. For more information, see Create new DevOps tool from the Tools list view.

**Configure connection and credential alias - Azure DevOps**

Before you set up a tool record in DevOps, your admin configures the DevOps CreateDevOpsTool connection and credential alias to allow access to the tools in your environment.

**Before you begin**

Starting with version 1.15, DevOps connection and credential aliases (DevOpsAlias1 through DevOpsAlias10) are used to connect automatically when you set up your DevOps planning, coding, and orchestration tools.

⚠️ **Note:** DevOpsAliases aliases take the place of the sn_devops.GitHub, sn_devops.Jenkins, sn_devops.JIRA, sn_devops.BitBucket aliases in the tool setup.
To connect to more than 10 tools, or if you receive an error saying all DevOpsAlias connection and credential aliases are being used, an admin can create additional aliases in the **sn_devops** application scope.

**Note:** If additional sys_alias records for DevOps are needed, they must be created by an admin in the **sn_devops** application scope.

You can reuse a DevOpsAlias alias no longer in use by inactivating the HTTP connection, if needed.

Role required: **sn_devops.admin**

**About this task**
Your admin must configure an HTTP connection in the CreateDevOpsTool connection and credential alias provided, and add admin credentials to connect automatically when you set up your DevOps planning, coding, and orchestration tools:

- **URL:** https://<instance name>.service-now.com/api/now/table
- **Credentials:** admin

**Note:** Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

You only need to configure the CreateDevOpsTool connection and credential alias once to set up all of your tools in DevOps.

The CreateDevOpsTool connection and credential alias is used with the DevOps Create a Tool subflow in **Flow Designer**. You can view executions in Flow Designer for information regarding flow results.

**Procedure**

1. Navigate to **Connections & Credentials > Connection & Credential Aliases** and open the **CreateDevOpsTool** record.
2. In the Connections related list, create a record and enter a **Name** for the connection.
3. On the Connection form, click the **Credential** field lookup list, and then click **New** to create an admin credential.
a. Click **Basic Auth Credentials** and enter a **Name**.

b. Enter admin username and password (required to access the tools in your DevOps environment).

> Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

4. On the Connection form, enter `https://<instance name>.service-now.com/api/now/table` for the **Connection URL**.

**Create an Azure DevOps tool record in DevOps**

Create an Azure DevOps tool record in DevOps to connect, discover, and import Azure DevOps tool data.

**Before you begin**

Role required: sn_devops.admin

**About this task**

**Actions:**

- **Connect** to Azure DevOps and get the webhook URL when you submit a DevOps tool record.
- **Discover** plans, repositories, orchestration tasks, and pipelines.
- **Configure** webhooks in Azure DevOps.
- **Import** work item, plan version, and feature records, branch and commit records, and task execution and step execution records.

To customize Azure Boards import of work item states or types, use the `DevOpsAzureDevOpsWorkItemHelper` script include.

**Procedure**

1. Create a tool record in DevOps to automatically connect to Azure DevOps and get the webhook URL.

   > Note: You need at least two unused connection and credential aliases to create an Azure DevOps tool (one for a build pipeline and one for a release pipeline).

   a. Navigate to **DevOps > Tools > Create New** and create a record.
   
   b. Enter a **Tool Name** and fill in the tool details.
<table>
<thead>
<tr>
<th>Tool Integration</th>
<th>Azure DevOps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tool URL</strong></td>
<td>Azure DevOps tool URL in the format:</td>
</tr>
<tr>
<td></td>
<td><a href="https://dev.azure.com/organization/project">https://dev.azure.com/organization/project</a></td>
</tr>
<tr>
<td><strong>Tool Username</strong></td>
<td>Azure DevOps username</td>
</tr>
<tr>
<td><strong>Access Token</strong></td>
<td>Personal access token (PAT)</td>
</tr>
</tbody>
</table>

⚠️ **Note:** Only a personal access token is supported.

When you generate a Personal access token (PAT) for Azure DevOps, you must select the scopes to authorize if you are not granting complete access.

---

**MID Server** is optional. Select MID Server for tools on premise attached to a MID Server. Application is automatically set to DevOps and capability is set to REST.

c. **Click Submit.**
   The tool is automatically **Connected Successfully** using a connection alias, and HTTP tool connection (basic authentication credential).

⚠️ **Note:** If you do not have global admin privileges for your tool (to allow automatic configuration of the webhook URL), you may need to have the tool admin user configure it for you (cut and paste the webhook URL into the tool configuration). Once the webhook is configured in the tool, **Enter Manual Configuration Mode** to connect to the tool manually, then exit.

2. **Click Discover** to discover tool configuration, including existing application plans (projects associated with the tool), repositories, orchestration tasks, and pipelines.
   Records are added to the corresponding related lists.

3. **Automatically configure webhook URLs in Azure DevOps.**
   a. **Click Configure.**
   b. **Enter your Integration user (DevOps Integration User) and Password.**
The DevOps Integration User is provided with the DevOps application and is used for inbound authentication from your tool to your ServiceNow instance.

**Note:** You must configure the password before the DevOps Integration User can configure a tool.

Notifications are sent from Azure DevOps tools to DevOps as the DevOps Integration User.

The Track field is automatically set to True in configured plan and repository records.

4. For discovered plans, import historical data from the tool and add an app to tie your tools together.

   a. Open the plan record from the Plans related list and click the Import related link.
      Records are created for the plan in the Work Items, Plan Versions, and Features related lists.
      • Work items related list shows tasks, bugs, and stories.
      • Plan Versions related list shows releases.
      • Features related list shows epics and features.

      **Note:** Historical import of Azure DevOps work items is not supported for Agile Boards CMMI process.

   b. In the Apps related list, click Edit... to select an App to associate with the plan (project), or click New to create one.

      **Note:** A plan must have an associated App record to complete the planning tool setup.

5. For discovered repositories, import historical data for the tool, and associate the repository with an app.
a. Open the repository record from the Repositories related list and click **Import**.
   Imported branch records and commit records from the repository are added to the corresponding related lists.

b. In the **App** field, click the lookup list and select an App record to associate with the repository, or click **New** to create one.
   Imported historical data records are added to the corresponding related lists.

**Example:**

**Azure DevOps tool record in DevOps**

- **Name**: ado
- **Tool**: Azure DevOps
- **Connection alias**: sn_devops.DevOpsAlias1
- **Tool URL**: [https://dev.azure.com/](https://dev.azure.com/)
- **Webhook URL**: [https://<DevOps integration user ID>-integration user password-@<service-now.com>/api/azure_devops/1/1/1/api/v1/devops/tool/code|plan|artifact|orchestration|test?toolId=985a136e80e981b93442c205901303](https://<DevOps integration user ID>-integration user password-@<service-now.com>/api/azure_devops/1/1/1/api/v1/devops/tool/code|plan|artifact|orchestration|test?toolId=985a136e80e981b93442c205901303)

**What to do next**

For Azure pipelines, **Model an Azure pipeline in DevOps** to complete the configuration in DevOps.

- Map each pipeline to a specific app.
- Create pipeline steps and map each step to an Azure pipeline job.
- Configure change control.
Model an Azure pipeline in DevOps

Starting with version 1.12, model an Azure pipeline by mapping the pipeline to an app, and mapping DevOps pipeline steps to Azure pipeline jobs.

Before you begin
Role required: sn_devops.admin

Procedure

1. Map your pipeline to an app in DevOps.
   a. Navigate to DevOps > Apps & Pipelines > Apps and open the application record to associate with the pipeline.
   b. In the Pipelines related list, click Edit... to select a pipeline to associate with the app, or click New to create the pipeline. For a new pipeline, fill in the Orchestration pipeline field using the project name and pipeline name as specified in Azure DevOps Pipelines in path format.
      For example, My Project/My Classic Build Pipeline.
   c. Click Submit.

2. Open the pipeline record again and select the Track check box so events from the pipeline are received.
   i. Note: The Track check box must be selected to integrate the pipeline with DevOps.

3. Create DevOps steps to map to each Azure pipeline job so an orchestration task can be created.
   Steps can be created in one of the following ways.
   • Starting with version 1.18, automatically create and map pipeline steps in DevOps by running your Azure pipeline.
     Pipeline steps are automatically created, mapped, and associated when DevOps receives step notifications from your Azure pipeline during the run.
   • Manually create and map each pipeline step to an Azure pipeline job.
     In the Steps related list, click New to create a DevOps step for each Azure pipeline job (Orchestration stage field).
**Note:** The **Orchestration stage** field value of each step is case-sensitive and must match the original name of the corresponding Azure pipeline job.

<table>
<thead>
<tr>
<th><strong>Name</strong></th>
<th>Name of the pipeline step.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipeline</strong></td>
<td>Pipeline in which the step is configured.</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Pipeline step type.</td>
</tr>
<tr>
<td></td>
<td>◦ Build and Test</td>
</tr>
<tr>
<td></td>
<td>◦ Test</td>
</tr>
<tr>
<td></td>
<td>◦ Deploy</td>
</tr>
<tr>
<td></td>
<td>◦ Deploy and Test</td>
</tr>
<tr>
<td></td>
<td>◦ Manual</td>
</tr>
<tr>
<td></td>
<td>◦ Prod Deploy</td>
</tr>
<tr>
<td><strong>Order</strong></td>
<td>Order in which the steps are run.</td>
</tr>
</tbody>
</table>

**Note:** The step order determines the order of the cards in the Pipeline UI. Starting with version 1.18, the order of the cards in the Pipeline UI is by task execution.

<table>
<thead>
<tr>
<th><strong>Orchestration stage</strong></th>
<th>Azure pipeline job name (case-sensitive).</th>
</tr>
</thead>
</table>

**Note:** For step association with Azure pipeline jobs, the **Orchestration stage** field must be configured.

<table>
<thead>
<tr>
<th><strong>Business service</strong></th>
<th>Configuration service that applies to the step.</th>
</tr>
</thead>
</table>

Once orchestration tasks are created, **associate** each orchestration task in the Orchestration Tasks related list with a DevOps pipeline step.

**4. Optional:** Select the **Change control** check box in a step to enable **change acceleration** and the corresponding configuration fields.

For Azure release (CD) pipelines, enable change control in the first step of the required stage only. Change control for Azure release (CD) pipelines is supported only in pre-deployment gates.
Note: ServiceNow Change Management must be installed for change acceleration.

<table>
<thead>
<tr>
<th>Change receipt</th>
<th>(Optional) Starting with version 1.20, select to enable change receipt for the step so the pipeline doesn’t pause when a change request is created. All pipeline data is included in the change, but approval is not required for the pipeline to proceed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change approval group</td>
<td>(Optional) Approval group for the change request. The change approval group becomes the Assignment group in the DevOps change request. Note: Ensure that the selected group has members and a group manager so the approver field is not empty.</td>
</tr>
<tr>
<td>Change type</td>
<td>Change request type to create. • Normal (default) • Standard • Emergency</td>
</tr>
<tr>
<td>(Optional) Template</td>
<td>(Optional) List of templates to use to auto populate fields for Normal or Emergency change requests. Select a template or create a new one.</td>
</tr>
<tr>
<td>Change controlled branches</td>
<td>(Optional) (Multibranch only) Comma-separated list of branches under change control. Wildcards are supported.</td>
</tr>
</tbody>
</table>
You can set up change control in your Azure DevOps YAML or Classic Azure pipeline using the Azure Invoke REST API or the ServiceNow DevOps extension for Azure DevOps.

5. Navigate to DevOps > Tools > Orchestration Tools and in the Azure tool record, copy the DevOps Webhook URL field value. The webhook URL contains the DevOps location for Azure DevOps Pipelines to send messages, including the sys_id for the tool:

https://<devops.integration.user>:<password>@<your-instance>.service-now.com/api/sn_devops/v1/devops/tool/event/{sys_id of the record azure tool that was created}

Example:
What to do next
Configure the Azure pipeline for DevOps

Configuring the Azure pipeline for DevOps
Change control, artifacts, and packages can be configured in the Azure pipeline for integration with DevOps.
You can configure change control in Azure pipelines two ways.
• Use the Azure Invoke REST API.
• Use the ServiceNow DevOps extension for Azure DevOps.

The ServiceNow DevOps extension for Azure DevOps includes:
• ServiceNow DevOps service connection
• ServiceNow DevOps Release Gate (starting with version 1.18)
• Azure build (CI) pipeline agent and server job custom tasks

Configuring change control using the Azure Invoke REST API
You can use the Azure Invoke REST API in your YAML or Classic Azure pipeline to configure change control for DevOps.

For Azure Invoke REST API details, visit the Microsoft documentation site and search for Invoke HTTP REST API task - Azure Pipelines.

Generic service connection
Using the Azure Invoke REST API requires the creation of a generic service connection in Azure DevOps.
YAML Azure pipeline

In Azure DevOps, a server task must be created with the service connection as the change control endpoint.

Invoke REST API payload requirements

<table>
<thead>
<tr>
<th>Azure pipeline type</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build</td>
<td>• buildNumber</td>
</tr>
<tr>
<td></td>
<td>• isMultiBranch</td>
</tr>
<tr>
<td></td>
<td>• branchName</td>
</tr>
<tr>
<td>Release</td>
<td>• releaseNumber</td>
</tr>
<tr>
<td></td>
<td>• projectName</td>
</tr>
</tbody>
</table>
Note: For release pipelines, set the Pre-deployment conditions > Advanced > Completion event field to Callback.

Build pipeline:

- task: InvokeRESTAPI@1
  inputs:
    connectionType: 'connectedServiceName'
    serviceConnection: 'chang1'
    method: 'POST'
    body: |
    {
      "buildNumber": "$(build.buildId)",
      "isMultiBranch": "true",
      "branchName": "$(build.sourceBranchName)"
    }
  waitForCompletion: 'true'

Release pipeline:

- task: InvokeRESTAPI@1
  inputs:
    connectionType: 'connectedServiceName'
    serviceConnection: 'chang1'
    method: 'POST'
    body: |
    {
      "releaseNumber": "$(Release.ReleaseId)",
      "projectName": "$(System.TeamProject)"
    }
  waitForCompletion: 'true'

Classic Azure pipeline

For a Classic Azure pipeline, an Invoke REST API server task must be added.
Use the ServiceNow DevOps extension for Azure DevOps

Install and configure ServiceNow DevOps extension for Azure DevOps to send build and release notifications from your Azure pipeline to ServiceNow DevOps application.

About this task
You can use ServiceNow DevOps extension on Visual Studio Marketplace to integrate your Azure pipeline with the ServiceNowDevOps application.

- **ServiceNow DevOps** service connection
  Required to connect the Azure pipeline to ServiceNow

- **Starting with version 1.18, ServiceNow DevOps Release Gate**
  Required to enable change control in Azure release (CD) pipelines (in pre-deployment conditions only)

Azure build (CI) pipeline custom tasks:

- **Agentless (server) job**
  - **ServiceNow DevOps Server Job Notification** custom task
    Required (in DevOps versions 1.16 and earlier) for agentless (server) jobs to send notifications from the Azure pipeline to ServiceNow DevOps.

    ✓ Note: Starting with version 1.17, job notification tasks are only required when using the ServiceNow DevOps Change Acceleration task.

  - **ServiceNow DevOps Server Change Acceleration** custom task
    Required for agentless (server) jobs to automatically create a change request in ServiceNow Change Management as part of the Azure pipeline.

    ✓ Note: Starting with version 1.19, the ServiceNow DevOps Server Change Acceleration task does not require ServiceNow DevOps Server Job Notification tasks.

    ◦ Starting with version 1.13, ServiceNow DevOps Server Package Registration custom task
      Required for agentless (server) jobs to register a package in the ServiceNow instance

    ◦ Starting with version 1.13, ServiceNow DevOps Server Artifact Registration custom task
      Required for agentless (server) jobs to register an artifact in the ServiceNow instance

- **Agent job**
- **ServiceNow DevOps Agent Job Notification** custom task
  Required (in DevOps versions 1.16 and earlier) for agent jobs to send notifications from the Azure pipeline to ServiceNow DevOps.

  🔄 Note: Starting with version 1.17, job notification tasks only required when using the **ServiceNow DevOps Change Acceleration** task.

- **ServiceNow DevOps Agent Package Registration** custom task
  Required for agent jobs to register a package in the ServiceNow instance

- **ServiceNow DevOps Agent Artifact Registration** custom task
  Required for agent jobs to register an artifact in the ServiceNow instance

### Procedure

1. Go to [Visual Studio Marketplace](https://marketplace.visualstudio.com), search for the **ServiceNow DevOps** extension, and click **Get it free**.

   ![ServiceNow DevOps](https://marketplace.visualstudio.com/media/extensionlist/deployments/57f52343-09e6-43f8-8e72-d4203f0a5f09/22.png)

   - **Overview**
     - This extension allows you to integrate Azure Pipelines with ServiceNow DevOps.
   
   - **Q & A**
   
   - **Rating & Review**

   This extension allows you to integrate with ServiceNow DevOps. This extension contains custom tasks including agent and server job notifications along with a server change acceleration task to create ServiceNow change requests as part of the Azure pipeline.

2. In Azure DevOps Pipelines, navigate to the service connections section in your project settings and create a **New service connection** using the **ServiceNow DevOps** service connection.

<table>
<thead>
<tr>
<th>ServiceNow URL</th>
<th>https://&lt;your-instance&gt;.service-now.com/</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Tool ID</th>
<th>The sys_id of the orchestration tool. You can copy this value from the webhook URL (toolid value), or obtain it directly</th>
</tr>
</thead>
</table>
using the `copy sys_id` command on the Orchestration Tool form.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Username</td>
<td>devops.integration.user</td>
</tr>
<tr>
<td>Password</td>
<td>Password for DevOps Integration User.</td>
</tr>
<tr>
<td>Service connection name</td>
<td>DevOps Connection</td>
</tr>
<tr>
<td>Grant access permission to all pipelines</td>
<td>Select check box.</td>
</tr>
</tbody>
</table>

Example:

![Azure pipeline: ServiceNow DevOps service connection](image)

**Set up an Azure build (CI) pipeline in DevOps**

Use the ServiceNow DevOps extension for Azure DevOps to configure job notifications, change control, and artifacts and packages in your Azure build (CI) pipeline.

**Procedure**

1. For DevOps versions 1.16 and earlier, in Azure DevOps Pipelines, navigate to the Tasks section of your Azure pipeline jobs and **Add (+)** the appropriate ServiceNow DevOps job notification custom task at the beginning and end of each job in your build (CI) pipeline.
Note: ServiceNow DevOps job notification custom tasks must be added twice per job (to indicate both the beginning, and end of each job) for notifications to be sent to DevOps successfully.

- For **Build** and **Test** job types, use the **ServiceNow DevOps Agent Job Notification** custom task.
- For **Server** job type, use the **ServiceNow DevOps Server Job Notification** custom task.

2. For DevOps versions 1.16 and earlier, in Azure DevOps Pipelines, configure ServiceNow DevOps job notification custom tasks.

<table>
<thead>
<tr>
<th>Display name</th>
<th>ServiceNow Job Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServiceNow endpoint</td>
<td>My Connection</td>
</tr>
<tr>
<td>Upstream Job</td>
<td>Indicates the previous job in line. For example, the job before Test may be Build.</td>
</tr>
<tr>
<td>Job Execution Phase</td>
<td>Indicates where this ServiceNow Job Notification custom task is placed in the list of job tasks.</td>
</tr>
<tr>
<td></td>
<td>• <strong>STARTED</strong></td>
</tr>
<tr>
<td></td>
<td>First task in the job.</td>
</tr>
<tr>
<td></td>
<td>• <strong>COMPLETED</strong></td>
</tr>
<tr>
<td></td>
<td>Last task in the job.</td>
</tr>
</tbody>
</table>

Note: The ServiceNow Job Notification custom task must be added to the task list as both the first task of the job and the last task of the job.

3. Optional: In Azure DevOps Pipelines, **Add (+)** the **ServiceNow DevOps Server Change Acceleration** custom task to the Tasks section of your Azure pipeline agentless (server) job to configure change acceleration.

Note: The **ServiceNow DevOps Server Change Acceleration** task must be between the **ServiceNow DevOps Server Job Notification** tasks.

Starting with version 1.19, the server job notification tasks are no longer required when using the change acceleration task.
<table>
<thead>
<tr>
<th>Display name</th>
<th>ServiceNow Change Acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServiceNow endpoint</td>
<td>My Connection</td>
</tr>
<tr>
<td>Upstream job executed</td>
<td>Indicates the previous job in line. (Optional) For example, the job before Server may be Test.</td>
</tr>
<tr>
<td>Change request details</td>
<td>(Optional) Starting with version 1.24, set closure code and change request fields from within the pipeline. Click the information icon to view sample input.</td>
</tr>
</tbody>
</table>

4. **Optional:** In Azure DevOps Pipelines, **Add (+)** the ServiceNow DevOps server or agent artifact and package registration custom tasks to the Tasks section of your Azure pipeline server or agent job to configure artifacts and packages. See [DevOps change acceleration for releases](#) for more information regarding artifacts.

**Example:**

**Azure pipeline: ServiceNow DevOps job notification custom tasks**

![ServiceNow DevOps Agent Job Notification](image)

Add as the first and last task in each agent job to send notifications to ServiceNow DevOps.

[Add](#)

![ServiceNow DevOps Server Job Notification](image)

Add as the first and last task in each server job to send notifications to ServiceNow DevOps.

[Add](#)
```yaml
trigger:
  - master
name: $(Date:yyyyMMdd)$(Rev:.r)

stages:
  - stage: Build
    jobs:
      - job: 'Build'
        steps:

Settings
- task: ServiceNow DevOps Agent Job Notification@2
  inputs:
    connectedServiceName: 'devopsdev'
    Phase: 'STARTED'

Settings
- task: Bash@3
  inputs:
    targetType: 'inline'
    script: |
    # Write your commands here
    echo 'Hello world'

Settings
- task: ServiceNow DevOps Agent Job Notification@2
  inputs:
    connectedServiceName: 'devopsdev'
    Phase: 'COMPLETED'
```

Azure pipeline: ServiceNow DevOps Change Acceleration custom task

Add a server job to create a change request as part of the Azure pipeline.
Set up an Azure release (CD) pipeline in DevOps

Starting with version 1.18, use the ServiceNow DevOps extension for Azure DevOps to configure change control, and artifacts and packages in your Azure release (CD) pipeline.

**About this task**

> **Note:** Change control in Azure release (CD) pipelines is supported in pre-deployment gates only. Pre-deployment gate change requests are mapped to the step execution of the first job in that stage.

Phases in an Azure release pipeline are mapped to a step. The step name for a multi-config or multi-agent job must include the phase name only, and not the actual job name derived at pipeline execution run time.

Task executions for skipped jobs are marked as failed.

**Procedure**

1. In Azure DevOps Pipelines, navigate to your release pipeline and open the Pre-deployment conditions window.
2. Enable the Gates setting and click **Add**.
3. Click the **ServiceNow DevOps Release Gate** and select the ServiceNow endpoint.
4. Exit the release gate configuration, and expand the Evaluation options section to configure the timing fields.

<table>
<thead>
<tr>
<th>Time between re-evaluation of gates</th>
<th>Re-evaluation interval in minutes, hours, or days.</th>
</tr>
</thead>
</table>

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If the change request is canceled or rejected, the Azure pipeline release gate keeps re-evaluating the change request status at the configured interval until timeout. No user intervention is required for further attempts of re-evaluation after the change request has already been approved, rejected, or canceled.

<table>
<thead>
<tr>
<th>Timeout after which gates fail</th>
<th>Timeout value in minutes, hours, or days.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If the pre-deployment conditions fail, the subsequent jobs of the stage are marked as failed, and the start and end time defaults to the current system time.</td>
</tr>
</tbody>
</table>

5. **Optional**: Configure artifacts in your Azure release (CD) pipeline. To set up artifacts using the build pipeline as the source, these names must match.

- Repository name, and build pipeline name (for example, DeployableRepo).
- Name property of the build pipeline artifact, and source alias property of the release pipeline artifact (for example, BuildDrop).

In addition to the build pipeline, you can select artifacts from any other eight sources. To track commit & work item details, follow these rules.

- When the source is the build pipeline, the semantic version property of the artifacts should be in the format `MAJOR.MINOR.PATCH` (for example 5.1.3).
- When the source is not the build pipeline, define a semantic version by implementing the `DevOpsArtifactSemanticVersionAPI` extension interface.

See [DevOps change acceleration for releases](https://servicenow.com/DevOps) for more information regarding artifacts.

**Example:**

![ServiceNow DevOps extension for Azure DevOps - Release Gate](https://servicenow.com/DevOps)
Azure release pipeline pre-deployment gate configuration

- Gates
  - Define gates to evaluate before the deployment.
  - The delay before evaluation: 0 minutes

Deployment gates

- ServiceNow DevOps Release Gate
  - Evaluation options
    - The time between re-evaluation of gates: 5 minutes
    - Minimum duration for steady results after a successful gates evaluation: 0 minutes
    - The timeout after which gates fail: 15 minutes

Gates and approvals

- Before gates, ask for approvals
- On successful gates, ask for approvals
- Ignore gates outcome and ask for approvals

Artifact setup - build pipeline source

- master
- DeployableRepo / azure-pipelines.yml

```yaml
- task: ServiceNow-DevOps-Agent-Artifact-Registration@1
  inputs:
  - connectedServiceName: Artifacts payload
  - artifactsPayload:
    - "artifacts": [
      {
        "name": "BuildDrop",
        "version": "1.0(Build.BuildId)",
        "semanticVersion": "1.0(Build.BuildId).0",
        "BuildNumber": "{{Build.BuildNumber}}",
        "repositoryName": "DeployableRepo"
      }
    ]
```

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Associate Azure pipeline steps in DevOps

For manually created DevOps steps, associate each orchestration task in the Orchestration Tasks related list with a DevOps pipeline step to track the activity of each stage in your Azure pipeline.

**Before you begin**
Role required: sn_devops.admin

**Procedure**

1. Navigate to DevOps > Tools > Orchestration Tools, and open the Azure DevOps tool record.

2. In the Orchestration Tasks related list, enter the corresponding DevOps pipeline step in the Step field of each orchestration task.

**Note:** The Track field is set to True by default when you discover orchestration tasks and pipelines. Tracking is required to receive job notifications from Azure DevOps.

Azure pipeline job run notifications are sent to the DevOps application. Each task execution notification corresponds to an orchestration task and, since orchestration tasks are mapped to a certain step in your DevOps pipeline, you can track the activity in each stage of your pipeline.
Example: DevOps associate steps

Azure DevOps PAT scopes for DevOps
Scope access levels are required when using a personal access token to access Azure DevOps during setup.

Mandatory scope access level settings.

- User Profile: Read
- Project & Team: Read

**Note:** Read-level access must be set for User Profile and Project & Team scopes to access Azure DevOps for tool setup.

Other scope access level settings are based on the capability you have configured. Set the corresponding access level for seamless functionality.

Scope access level settings per capability

<table>
<thead>
<tr>
<th>Capability</th>
<th>Scope</th>
<th>Access level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boards</td>
<td>Work item</td>
<td>Read</td>
</tr>
<tr>
<td>Repos</td>
<td>Code</td>
<td>Read</td>
</tr>
<tr>
<td>Build pipelines</td>
<td>Build</td>
<td>Read &amp; Execute</td>
</tr>
</tbody>
</table>
Scope access level settings per capability (continued)

<table>
<thead>
<tr>
<th>Capability</th>
<th>Scope</th>
<th>Access level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release pipelines</td>
<td>Release</td>
<td>Read</td>
</tr>
<tr>
<td>Release gates</td>
<td>Token administration</td>
<td>Read &amp; Manage</td>
</tr>
<tr>
<td>Test build and release pipelines</td>
<td>Test management</td>
<td>Read</td>
</tr>
</tbody>
</table>

**DevOps work item import for Azure Boards**

Azure Boards work items are mapped to default ServiceNow DevOps states and types during import. You can use the DevOpsAzureDevOpsWorkItemHelper script include to customize the mappings.

**Default Azure Boards work item mapping**

Native State and Native Type fields of the work item contain the original state and type values from the source tool.

**Work item type mapping**

<table>
<thead>
<tr>
<th>ServiceNow DevOps</th>
<th>Azure Boards Basic</th>
<th>Azure Boards Agile</th>
<th>Azure Boards Scrum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>Task</td>
<td>Task</td>
<td>Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test case</td>
<td>Impediment</td>
</tr>
<tr>
<td>Bug</td>
<td>Issue</td>
<td>Bug</td>
<td>Bug</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Issue</td>
<td></td>
</tr>
<tr>
<td>Story</td>
<td>--</td>
<td>User story</td>
<td>Product backlog item</td>
</tr>
<tr>
<td>Epic</td>
<td>Epic</td>
<td>Epic</td>
<td>Epic</td>
</tr>
<tr>
<td>Feature</td>
<td>--</td>
<td>Feature</td>
<td>Feature</td>
</tr>
</tbody>
</table>

ℹ️ Note: Historical import of Azure DevOps work items is not supported for Agile Boards CMMI process.
### Work item state mapping

<table>
<thead>
<tr>
<th>ServiceNow DevOps</th>
<th>Azure Boards Basic</th>
<th>Azure Boards Agile</th>
<th>Azure Boards Scrum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned</td>
<td>To Do</td>
<td>New</td>
<td>New Open Approved Committed To do</td>
</tr>
<tr>
<td>WIP</td>
<td>Doing</td>
<td>Active Design</td>
<td>In Progress Design</td>
</tr>
<tr>
<td>Complete</td>
<td>Done</td>
<td>Ready Closed</td>
<td>Done Ready Closed</td>
</tr>
<tr>
<td>Deleted</td>
<td>Deleted</td>
<td>Completed Deleted</td>
<td>Removed</td>
</tr>
</tbody>
</table>

**Note:** When an imported Azure Boards work item type or state is not recognized, the value is set to **Other**.

### Customize Azure Boards state and type mappings

Access the `DevOpsAzureDevOpsWorkItemHelper` script include in the **System Definition > Script Includes** module.

This script example adds new states and types for custom processes MyScrum and CustomBasic. CustomBasic inherits the state and type defined for Basic process.

```javascript
var DevOpsAzureDevOpsWorkItemHelper = Class.create();

DevOpsAzureDevOpsWorkItemHelper.prototype =
Object.extendsObject(DevOpsAzureDevOpsWorkItemHelperSNC, {  

setDefaultProcess: function (projectProcess) {

DevOpsAzureDevOpsWorkItemHelperSNC.prototype.setDefaultProcess.call(this, projectProcess);

//set custom states and types
var newStates, newWITypes;
```
if (projectProcess == 'NPScrum') {
    // no parent process set. So type and states available will be limited to newStates
    // and newWITypes
    newStates = {
        'Delayed': 'planned',
        'Approved': 'wip'
    };
    newWITypes = {
        'Request': 'story',
        'Incident': 'task'
    };
}
else if (projectProcess == 'CustomBasic') {
    // set parent process to Basic to inherit basic states and types
    this.setParentProcess('Basic');
    newStates = {
        'Auto-Approved': 'wip'
    };
    newWITypes = {
        'UserStory': 'story'
    };
}

this.setStates(newStates);
this.setWorkItemTypes(newWITypes);

},

  type: 'DevOpsAzureDevOpsWorkItemHelper'
});

Track specific pipelines in Azure DevOps

Enable and configure specific pipelines in Azure DevOps that you want to track. Select the pipelines you want to monitor and receive job notifications from Azure DevOps.

Before you begin

• Connect DevOps to Azure DevOps tools.
• Ensure that you have modeled, configured, and associated Azure pipelines to DevOps.
• Review how to configure form layouts. For more information, see Configuring the form layout
Role required: admin, personalize_form

About this task
By default, the Track Specific Pipeline field is set to False when you discover Azure DevOps orchestration tasks and pipelines. The Track flag for all Azure DevOps pipelines are also disabled. This leads to all pipelines sending job notifications to DevOps and increased processing times, which could cause the pipeline you really want to track to be delayed. Enable the Track Specific Pipeline check box to process only notifications for the pipeline events that you specify to track, and ignore all other pipeline notifications.

Procedure
1. Navigate to DevOps > Tools > Orchestration Tools, and open the Azure DevOps tool record.
2. Click the Additional Actions icon (≡), and select Configure > Form Layout.
3. Use the slushbucket, and move the Track Specific Pipeline field to the selected list.
4. Click Save.
   You are redirected back to the DevOps Tool > Azure DevOps form, and the Track Specific Pipeline check box appears.
5. Select the Track Specific Pipeline check box.
6. Navigate to the Pipelines related list.
7. Click the Update Personalized List icon (⚙).
8. In the Personalize List Columns form, use the slushbucket to move the Track field to the Selected list.
9. Click **OK**.
   You are redirected back to the Pipelines related list, where the **Track** field now appears.

10. Navigate to the pipeline step which you want to track, double-click the **Track** field.

11. Change the **Track** field's value to **true**, and click **Save**.

**Results**

Only the pipelines that have **Track** field set to **true** in the Pipelines related list are now being tracked and sent to the Inbound Events table [sn_devops_inbound_event_list.do]. All pipelines that have the **Track** field set to **false** are ignored.

**Note:**

- If the **Track Specific Pipeline** check box is selected only those pipelines that have the **Track** field value set to **true** are tracked and sent to the Inbound Events table. If **Track** field is set to **false** for all pipelines none of the pipelines are tracked.

- If the **Track Specific Pipeline** check box is unselected, all events of the pipeline are tracked and sent to the Inbound Events table.
**Bitbucket integration with DevOps**

Integrate Bitbucket coding tool with DevOps by configuring a connection and credential alias, and creating a tool record in DevOps.

ℹ️ **Note:** You can create a new tool and simultaneously create a new connection alias. Since the child alias is created during tool creation, you do not an admin role nor do you need to create a new connection alias as a prerequisite. Create the new connection alias as an sn_devops.admin user using **Connections and Credentials template** which are dynamically populated based on the tool you select. For more information, see Create new DevOps tool from the Tools list view.

**Configure connection and credential alias - Bitbucket**

Before you set up a tool record in DevOps, your admin configures the DevOps CreateDevOpsTool connection and credential alias to allow access to the tools in your environment.

**Before you begin**

Starting with version 1.15, DevOps connection and credential aliases (DevOpsAlias1 through DevOpsAlias10) are used to connect automatically when you set up your DevOps planning, coding, and orchestration tools.

ℹ️ **Note:** DevOpsAlias aliases take the place of the sn_devops.GitHub, sn_devops.Jenkins, sn_devops.JIRA, sn_devops.BitBucket aliases in the tool setup.

To connect to more than 10 tools, or if you receive an error saying all DevOpsAlias connection and credential aliases are being used, an admin can create additional aliases in the **sn_devops** application scope.

ℹ️ **Note:** If additional sys_alias records for DevOps are needed, they must be created by an admin in the **sn_devops** application scope.

You can reuse a DevOpsAlias alias no longer in use by inactivating the HTTP connection, if needed.

Role required: sn_devops.admin

**About this task**

Your admin must configure an HTTP connection in the CreateDevOpsTool connection and credential alias provided, and add admin credentials to connect automatically when you set up your DevOps planning, coding, and orchestration tools:
• URL: https://<instance name>.service-now.com/api/now/table
• Credentials: admin

Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

You only need to configure the CreateDevOpsTool connection and credential alias once to set up all of your tools in DevOps.

The CreateDevOpsTool connection and credential alias is used with the DevOps Create a Tool subflow in Flow Designer. You can view executions in Flow Designer for information regarding flow results.

Procedure
1. Navigate to Connections & Credentials > Connection & Credential Aliases and open the CreateDevOpsTool record.
2. In the Connections related list, create a record and enter a Name for the connection.
3. On the Connection form, click the Credential field lookup list, and then click New to create an admin credential.
   a. Click Basic Auth Credentials and enter a Name.
   b. Enter admin username and password (required to access the tools in your DevOps environment).

   Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

4. On the Connection form, enter https://<instance name>.service-now.com/api/now/table for the Connection URL.

Create a Bitbucket tool record in DevOps
Create a Bitbucket tool record in DevOps to connect and discover repositories.

Before you begin
Role required: sn_devops.admin

About this task
Actions:
• **Connect** to Bitbucket and get the webhook URL when you submit a DevOps tool record.

• **Discover** repositories.

• **Configure** the webhook in the Bitbucket repository.

• **Import** branch and commit records.

Starting with version 1.13, capture tags from Bitbucket coding tool commits.

**Procedure**

1. Create a tool record in DevOps to automatically connect to Bitbucket and get the webhook URL.

   a. Navigate to **DevOps > Tools > Create New** and create a record.

   b. Enter a **Tool Name** and fill in the tool details.

<table>
<thead>
<tr>
<th>Tool Integration</th>
<th>Bitbucket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool URL</td>
<td>Bitbucket tool URL</td>
</tr>
<tr>
<td></td>
<td>For example:</td>
</tr>
<tr>
<td></td>
<td><a href="https://bitbucket.com">https://bitbucket.com</a></td>
</tr>
<tr>
<td>Tool Username</td>
<td>Bitbucket username</td>
</tr>
<tr>
<td>Tool Password / Access Token</td>
<td>Bitbucket password or access token</td>
</tr>
</tbody>
</table>

   **MID Server** is optional. Select MID Server for tools on premise attached to a MID Server. Application is automatically set to DevOps and capability is set to REST.

   c. Click **Submit**.

      The tool is automatically **Connected Successfully** using a connection alias, and HTTP tool connection (basic authentication credential).

      **Note:** If you do not have global admin privileges for your tool (to allow automatic configuration of the webhook URL), you may need to have the tool admin user configure it for you (cut and paste the webhook URL into the tool configuration). Once the webhook is configured in the tool, **Enter Manual Configuration Mode** to connect to the tool manually, then exit.

2. Click **Discover** to discover existing repositories for the coding tool.
Repository records are added to the Repositories related list.

3. Automatically configure the webhook URL in a Bitbucket repository to send notifications to the DevOps tool.

   a. Open the discovered repository record from the Repositories related list and click Configure.

   b. Enter your Integration user (DevOps Integration User) and Password. The DevOps Integration User is provided with the DevOps application and is used for inbound authentication from your tool to your ServiceNow instance.

      ✋ Note: You must configure the password before the DevOps Integration User can configure a tool.

      Notifications are sent from the repository to DevOps as the DevOps Integration User.

      The Track field is automatically set to True in the repository record.

4. Click Import to import historical data from the repository.

      ✋ Note: Import by date range is not supported for Bitbucket coding tool.

      Imported branch records and commit records from the repository are added to the corresponding related lists.

5. In the App field, click the lookup list and select an App record to associate with the repository, or click New to create one.
Example:

**Bitbucket tool record in DevOps**

- **Name**: Bitbucket
- **Connection alias**: sn_develops_insights_bitbucket
- **Tool URL**: http://bitbucket
- **Webhook URL**: https://<DevOps integration user ID>+<integration user password>=|service-now.com/api/1.0/developers/toolkit/4/f2e5df4d01bf3a6103d0a6662395621383

**GitHub integration with DevOps**

Integrate GitHub coding tool with DevOps by configuring a connection and credential alias, and creating a tool record in DevOps.

Both GitHub and GitHub Enterprise are supported.

Connect using:

- Basic authentication
- OAuth 2.0 credentials (Starting with version 1.17)

**Note:** You can create a new tool and simultaneously create a new connection alias. Since the child alias is created during tool creation, you do not need to create a new connection alias as a prerequisite. Create the new connection alias as an sn_develops.admin user using **Connections and Credentials template** which are dynamically populated based on the tool you select. For more information, see Create new DevOps tool from the Tools list view.

**Connect DevOps to GitHub**

Configure a connection and credential alias and create a GitHub tool record in DevOps.
Configure connection and credential alias - GitHub

Before you set up a tool record in DevOps, your admin configures the DevOps CreateDevOpsTool connection and credential alias to allow access to the tools in your environment.

**Before you begin**
Starting with version 1.15, DevOps connection and credential aliases (DevOpsAlias1 through DevOpsAlias10) are used to connect automatically when you set up your DevOps planning, coding, and orchestration tools.

⚠️ **Note:** DevOpsAlias aliases take the place of the sn_devops.GitHub, sn_devops.Jenkins, sn_devops.JIRA, sn_devops.BitBucket aliases in the tool setup.

To connect to more than 10 tools, or if you receive an error saying all DevOpsAlias connection and credential aliases are being used, an admin can create additional aliases in the sn_devops application scope.

⚠️ **Note:** If additional sys_alias records for DevOps are needed, they must be created by an admin in the sn_devops application scope.

You can reuse a DevOpsAlias alias no longer in use by inactivating the HTTP connection, if needed.

Role required: sn_devops.admin

**About this task**
Your admin must configure an HTTP connection in the CreateDevOpsTool connection and credential alias provided, and add admin credentials to connect automatically when you set up your DevOps planning, coding, and orchestration tools:

- **URL:** https://<instance name>.service-now.com/api/now/table
- **Credentials:** admin

⚠️ **Note:** Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

You only need to configure the CreateDevOpsTool connection and credential alias once to set up all of your tools in DevOps.

The CreateDevOpsTool connection and credential alias is used with the DevOps Create a Tool subflow in Flow Designer. You can view executions in Flow Designer for information regarding flow results.
Procedure
1. Navigate to Connections & Credentials > Connection & Credential Aliases and open the CreateDevOpsTool record.
2. In the Connections related list, create a record and enter a Name for the connection.
3. On the Connection form, click the Credential field lookup list, and then click New to create an admin credential.
   a. Click Basic Auth Credentials and enter a Name.
   b. Enter admin username and password (required to access the tools in your DevOps environment).
   
   Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.
4. On the Connection form, enter https://<instance name>.service-now.com/api/now/table for the Connection URL.

Create a GitHub tool record in DevOps
Create a GitHub tool record in DevOps to connect and discover repositories.

Before you begin
Role required: sn_devops.admin

About this task
Actions:
• Connect to GitHub and get the webhook URL when you submit a DevOps tool record.
• Discover repositories.
• Configure the webhook in the GitHub repository.
• Import branch and commit records.

Starting with version 1.17, using OAuth 2.0 credentials with GitHub integration is supported.

Starting with version 1.13, capture tags from GitHub coding tool commits.
Procedure

1. Create a tool record in DevOps to automatically connect to GitHub and get the webhook URL.

   a. Navigate to DevOps > Tools > Create New and create a record.

   b. Enter a Tool Name and fill in the tool details.

<table>
<thead>
<tr>
<th>Tool Integration</th>
<th>GitHub</th>
</tr>
</thead>
<tbody>
<tr>
<td>(GitHub Enterprise is for on-premise configuration.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool URL</th>
<th>GitHub tool URL.</th>
</tr>
</thead>
<tbody>
<tr>
<td>For example:</td>
<td></td>
</tr>
<tr>
<td><a href="https://api.github.com">https://api.github.com</a></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GitHub credential type</th>
<th>• Basic Auth</th>
</tr>
</thead>
<tbody>
<tr>
<td>(starting with version 1.17)</td>
<td>◦ GitHub username</td>
</tr>
<tr>
<td></td>
<td>◦ Personal access token</td>
</tr>
</tbody>
</table>

Note: Only a personal access token is supported with basic authentication. When you generate a Personal access token (PAT) for GitHub, you must select the scopes to authorize if you are not granting complete access.

<table>
<thead>
<tr>
<th>• OAuth</th>
<th>GitHub Tool Credential</th>
</tr>
</thead>
<tbody>
<tr>
<td>See Setting up GitHub OAuth 2.0 credentials for DevOps.</td>
<td></td>
</tr>
</tbody>
</table>

MID Server is optional. Select MID Server for tools on premise attached to a MID Server. Application is automatically set to DevOps and capability is set to REST.

c. Click Submit.
The tool is automatically **Connected Successfully** using a connection alias, and HTTP tool connection (basic authentication or OAuth credential).

**Note:** If you do not have global admin privileges for your tool (to allow automatic configuration of the webhook URL), you may need to have the tool admin user configure it for you (cut and paste the webhook URL into the tool configuration). Once the webhook is configured in the tool, **Enter Manual Configuration Mode** to connect to the tool manually, then exit.

2. Click **Discover** to discover existing repositories for the coding tool. Repository records are added to the Repositories related list.

3. Automatically configure the webhook URL in a GitHub repository to send notifications to the DevOps tool.

   a. Open the discovered repository from the Repositories related list and click **Configure**.

   b. Enter your **Integration user** (DevOps Integration User) and **Password**. The DevOps Integration User is provided with the DevOps application and is used for inbound authentication from your tool to your ServiceNow instance.

      **Note:** You must configure the password before the DevOps Integration User can configure a tool.

      Notifications are sent from the repository to DevOps as the DevOps Integration User.

      The **Track** field is automatically set to **True** in the repository record.

4. Click **Import** to import historical data from the repository. Imported branch records and commit records from the repository are added to the corresponding related lists.

5. In the **App** field, click the lookup list and select an App record to associate with the repository, or click **New** to create one.
Setting up GitHub OAuth 2.0 credentials for DevOps

Starting with version 1.17, integrate your GitHub account with your ServiceNow instance by creating a custom OAuth application in GitHub and authenticating requests from ServiceNow DevOps.

You can set up OAuth 2.0 credentials for GitHub Apps and Oauth Apps.

- GitHub Apps
  - JWT
  - Authorization Code
- OAuth Apps

OAuth 2.0 credentials for GitHub Apps - JWT

Starting with version 1.17, configure your GitHub account, generate and attach the JKS certificate, create a JWT signing key and provider, register GitHub, and create a credential record for the GitHub App provider.

Role required: oauth_admin

Configure the GitHub App in your GitHub account (JWT)

Create a custom GitHub App from your GitHub account to enable OAuth 2.0 authentication with your ServiceNow instance.
Before you begin
GitHub requirements:
• GitHub account
• GitHub App configured to integrate with ServiceNow

About this task
Complete these steps from your GitHub account. See Building GitHub Apps on the GitHub Developer site for instructions on creating and configuring custom applications.

Procedure
1. From your GitHub account, create your GitHub App by navigating to Developer Settings > GitHub Apps.
2. In the Homepage URL field, enter https://<instance-name>.service-now.com.
3. In the User authorization callback URL field, enter https://<instance-name>.service-now.com/oauth_redirect.do.
4. In the Identifying and authorizing users section, uncheck the Expire user authorization tokens field.
5. In the Webhook section, uncheck the Active field.
6. Leave the remaining fields empty (default).
7. In the Repository permissions section, configure these settings.

<table>
<thead>
<tr>
<th>Contents</th>
<th>Read-only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metadata</td>
<td>Read-only</td>
</tr>
<tr>
<td>Webhooks</td>
<td>Read and write</td>
</tr>
</tbody>
</table>

8. Leave the remaining permissions as No access (default).
9. After creating the GitHub App, generate a new private key and save it to your machine.
10. Install the newly created GitHub App on the accounts of your choice.

Generate the JKS certificate for GitHub
Generate a JKS certificate for the JWT authentication of ServiceNow DevOps requests for GitHub.

Before you begin
Role required: admin
Procedure

1. Make a copy of the GitHub App private key previously generated, and rename it to use the .key extension.

2. Create a CA signed certificate using the GitHub App private key:

   ```
   openssl req -new -x509 -key <file-name>.key -out <certificate-name>.pem -days 1095
   ```

3. Enter the required details.

4. Create the PKCS 12 file using the GitHub App private key and CA signed certificate:

   ```
   openssl pkcs12 -export -in <certificate-name>.pem -inkey <file-name>.key -certfile <certificate-name>.pem -out <PKCS-12-file-name>.p12
   ```

5. Provide the export password.

6. Create the JKS file:

   ```
   keytool -importkeystore -srckeystore <PKCS-12-file-name>.p12 -srcstoretype pkcs12
   -destkeystore <JKS-certificate-filename>.jks -deststoretype JKS
   ```

7. Provide the destination and source keystore passwords.

Attach the GitHub Java Key Store certificate to your instance

Enable the JWT Bearer Grant token authentication by attaching the valid GitHub Java KeyStore (JKS) certificate to your instance.

Before you begin

Ensure the availability of a valid Java KeyStore certificate.

Role required: admin

Procedure

1. Navigate to System Definition > Certificates.

2. Click New.

3. Complete the form.

X.509 Certificate form fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter a name to uniquely identify the record. For example, My GitHub App Certificate.</td>
</tr>
<tr>
<td>Notify on expiration</td>
<td>Define users to be notified when the certificate expires.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Warn in days to expire</td>
<td>Enter the number of days to send a notification before the certificate expires.</td>
</tr>
<tr>
<td>Active</td>
<td>Enable</td>
</tr>
<tr>
<td>Type</td>
<td>Select Java Key Store.</td>
</tr>
<tr>
<td>Expires in days</td>
<td>Enter the number of days until the certificate expires.</td>
</tr>
<tr>
<td>Key store password</td>
<td>Enter a password associated with the certificate (hint: the destination keystore password previously created).</td>
</tr>
<tr>
<td>Short description</td>
<td>Enter a summary about the certificate.</td>
</tr>
</tbody>
</table>

4. Click the attachments icon (🔍) and attach a JKS certificate.

5. Click Validate Stores/Certificates.

Create a JWT signing key for the GitHub JKS certificate
Create a JSON Web Token (JWT) signing key to assign to your GitHub Java KeyStore certificate.

Procedure
1. Navigate to System OAuth > JWT Keys.
2. Click New.
3. Complete the form.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter a name to uniquely identify the JWT signing key. For example, My GitHub App JWT Key.</td>
</tr>
<tr>
<td>Signing Keystore</td>
<td>Select the valid JKS certificate attached in the previous task. For example, My GitHub App Certificate.</td>
</tr>
<tr>
<td>Key Id</td>
<td>Enter a key Id to identify which key is used when multiple keys are used to sign tokens.</td>
</tr>
<tr>
<td>Signing Algorithm</td>
<td>Select an algorithm to sign with the JWT key (hint: RSA 256).</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Signing Key</td>
<td>Enter a password associated with the signing key (hint: the source keystore password previously created).</td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>Enable.</td>
</tr>
</tbody>
</table>

4. Click **Submit**.

**Create a JWT provider for your GitHub signing key**

Add a JSON Web Token (JWT) provider to your ServiceNow instance for GitHub.

**Procedure**

1. Navigate to **System OAuth > JWT Providers**.
2. Click **New**.
3. On the **JWT Provider** form, fill the values.

<table>
<thead>
<tr>
<th>JWT Provider form fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
</tr>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Expiry Interval (sec)</td>
</tr>
<tr>
<td>Signing Configuration</td>
</tr>
</tbody>
</table>

4. Right-click the form header, and click **Save**.

5. Enter your GitHub App **App ID** (available in the **About** section of your GitHub App configuration in GitHub) as the value of the **iss** claim, in the Standard Claims related list.

6. Leave **aud** and **sub** values blank (default).

**Register GitHub as an OAuth Provider (JWT)**

Use the information generated during GitHub App account configuration to register GitHub as an OAuth provider and allow the instance to request OAuth 2.0 tokens.
Procedure

1. Navigate to System OAuth > Application Registry.

2. Click New.
   The system displays the message What kind of OAuth application?

3. Select Connect to a third party OAuth Provider.
   The system displays an empty Application Registries form.

4. Complete the form.

<table>
<thead>
<tr>
<th>Field</th>
<th>Value required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter any name to uniquely identify the record. For example, enter My GitHub App Provider.</td>
</tr>
<tr>
<td>Client ID</td>
<td>Enter the client ID of your GitHub App (hint: available in the About section of your GitHub App configuration in GitHub).</td>
</tr>
<tr>
<td>Client Secret</td>
<td>Enter the client secret of your GitHub App (hint: available in the About section of your GitHub App configuration in GitHub).</td>
</tr>
<tr>
<td>OAuth API script</td>
<td>Select OAuthDevOpsGitHubHandler.</td>
</tr>
<tr>
<td>Default Grant type</td>
<td>Select JWT Bearer.</td>
</tr>
<tr>
<td>Authorization URL</td>
<td>Enter <a href="https://github.com/login/oauth/authorize">https://github.com/login/oauth/authorize</a>. If using on-premise deployment, use the proper GitHub host URL.</td>
</tr>
<tr>
<td>Token URL</td>
<td>Enter <a href="https://github.com/login/oauth/access_token">https://github.com/login/oauth/access_token</a>. If using on-premise deployment, use the proper GitHub host URL.</td>
</tr>
</tbody>
</table>

5. Leave the rest of the form fields as default.

6. Right-click the form header, and click Save.
   • The system validates the OAuth credentials and populates the Redirect URL (Hint: It should match the User authorization callback URL previously provided in your GitHub App configuration).
   • The system populates OAuth Entity Profile with Grant Type as JWT Bearer. For example, OAuth Entity Profile is created with default Name, My GitHub App Provider default_profile.
7. Open the default profile created in the **OAuth Entity Profiles** related list.

8. Populate the **JWT Provider** field with the JWT provider previously created, uncheck the **Is default** flag and save the form.

9. Back on the **Application Registry** form, in the **OAuth Entity Profiles** related list, create a new OAuth Entity Profile with the **Is default** flag set to True, and **Grant type** set to Authorization code.

**Create a credential record for GitHub App provider (JWT)**

Create a credential record to the GitHub App provider previously created to authorize actions.

**Procedure**

1. Navigate to **Connections & Credentials > Credentials**.

2. Click **New**.

   The system displays the message **What type of Credentials would you like to create?**.

3. Select **OAuth 2.0 Credentials**.

   The pop-up window displays an empty OAuth 2.0 Credentials form.

4. Fill in these values.

<table>
<thead>
<tr>
<th>Field</th>
<th>Value required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter any name to uniquely identify the record. For example, enter <strong>My GitHub App Credential</strong>.</td>
</tr>
<tr>
<td>Active</td>
<td>Enable</td>
</tr>
<tr>
<td>OAuth Entity Profile</td>
<td>Select the default OAuth Entity profile you created where <strong>Grant type</strong> is <strong>Authorization Code</strong>.</td>
</tr>
<tr>
<td>Applies to</td>
<td>Select the MID Servers that can use this credential. For example, select <strong>All MID Servers</strong>.</td>
</tr>
<tr>
<td>Order</td>
<td>Select the order to apply this credential. For example, enter <strong>100</strong>.</td>
</tr>
</tbody>
</table>

5. Save the record.

6. Click the **Get OAuth Token** related link to generate the OAuth token.
OAuth 2.0 credentials for GitHub Apps - Authorization Code

Starting with version 1.17, configure your GitHub account, register GitHub, and create a credential record for the GitHub App provider.

Role required: oauth_admin

Configure the GitHub App in your GitHub account (Authorization Code)

Create a custom GitHub App from your GitHub account to enable OAuth 2.0 authentication with your ServiceNow instance.

Before you begin

GitHub requirements:

• GitHub account
• GitHub App configured to integrate with ServiceNow

About this task

Complete these steps from your GitHub account. See Building GitHub Apps on the GitHub Developer site for instructions on creating and configuring custom applications.

Procedure

1. From your GitHub account, create your GitHub App by navigating to Developer Settings > GitHub Apps.
2. In the Homepage URL field, enter https://<instance-name>.service-now.com.
3. In the User authorization callback URL field, enter https://<instance-name>.service-now.com/oauth_redirect.do.
4. In the Identifying and authorizing users section, uncheck the Expire user authorization tokens field.
5. In the Webhook section, uncheck the Active field.
6. Leave the remaining fields empty (default).
7. In the Repository permissions section, configure these settings.

<table>
<thead>
<tr>
<th>Contents</th>
<th>Read-only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metadata</td>
<td>Read-only</td>
</tr>
<tr>
<td>Webhooks</td>
<td>Read and write</td>
</tr>
</tbody>
</table>

8. Leave the remaining permissions as No access (default).
9. Install the newly created GitHub App on the accounts of your choice.
Register GitHub as an OAuth Provider (Authorization Code)

Use the information generated during GitHub App account configuration to register GitHub as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Procedure

1. Navigate to **System OAuth > Application Registry**.
2. Click **New**.
   - The system displays the message **What kind of OAuth application?**
3. Select **Connect to a third party OAuth Provider**.
   - The system displays an empty Application Registries form.
4. Complete the form.

<table>
<thead>
<tr>
<th>Field</th>
<th>Value required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter any name to uniquely identify the record. For example, enter <strong>My GitHub App Provider</strong>.</td>
</tr>
<tr>
<td>Client ID</td>
<td>Enter the client ID of your GitHub App (hint: available in the <strong>About</strong> section of your GitHub App configuration in GitHub).</td>
</tr>
<tr>
<td>Client Secret</td>
<td>Enter the client secret of your GitHub App (hint: available in the <strong>About</strong> section of your GitHub App configuration in GitHub).</td>
</tr>
<tr>
<td>OAuth API script</td>
<td>Select <strong>OAuthDevOpsGitHubHandler</strong>.</td>
</tr>
<tr>
<td>Default Grant type</td>
<td>Select <strong>Authorization Code</strong>.</td>
</tr>
<tr>
<td>Authorization URL</td>
<td>Enter <strong><a href="https://github.com/login/oauth/authorize">https://github.com/login/oauth/authorize</a></strong>. For an on-premise deployment, use the proper GitHub host URL.</td>
</tr>
<tr>
<td>Token URL</td>
<td>Enter <strong><a href="https://github.com/login/oauth/access_token">https://github.com/login/oauth/access_token</a></strong>. For an on-premise deployment, use the proper GitHub host URL.</td>
</tr>
</tbody>
</table>

5. Leave the rest of the form fields as default.
6. Right-click the form header, and click **Save**.
The system validates the OAuth credentials and populates the Redirect URL (Hint: It should match the User authorization callback URL previously provided in your GitHub App configuration).

The system populates OAuth Entity Profile with Grant Type as Authorization Code. For example, OAuth Entity Profile is created with default Name, My GitHub App Provider default_profile

Create a credential record for GitHub App provider (Authorization Code)
Create a credential record to the GitHub App provider previously created to authorize actions.

Procedure
1. Navigate to Connections & Credentials > Credentials.
2. Click New.
   The system displays the message What type of Credentials would you like to create?.
3. Select OAuth 2.0 Credentials.
   The pop-up window displays an empty OAuth 2.0 Credentials form.
4. Fill in these values.

<table>
<thead>
<tr>
<th>Field</th>
<th>Value required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter any name to uniquely identify the record. For example, enter My GitHub App Credential.</td>
</tr>
<tr>
<td>Active</td>
<td>Enable</td>
</tr>
<tr>
<td>OAuth Entity Profile</td>
<td>Select the default OAuth Entity profile you created previously.</td>
</tr>
<tr>
<td>Applies to</td>
<td>Select the MID Servers that can use this credential. For example, select All MID Servers.</td>
</tr>
<tr>
<td>Order</td>
<td>Select the order to apply this credential. For example, enter 100.</td>
</tr>
</tbody>
</table>

5. Save the record.
6. Click the Get OAuth Token related link to generate the OAuth token.

OAuth 2.0 credentials for OAuth Apps
Starting with version 1.17, configure your GitHub account, register GitHub, and create a credential record for the GitHub App Oath provider.
Role required: oauth_admin

**Configure the OAuth App in your GitHub account**

Create a custom OAuth App from your GitHub account to enable OAuth 2.0 authentication with your ServiceNow instance.

**Before you begin**

GitHub requirements:
- GitHub account
- GitHub OAuth App configured to integrate with ServiceNow

**About this task**

Complete these steps from your GitHub account. See Building OAuth Apps on the GitHub Developer site for instructions on creating and configuring custom applications.

**Procedure**

1. From your GitHub account, create your OAuth App by navigating to Developer Settings > OAuth Apps.
2. In the Homepage URL field, enter https://<instance-name>.service-now.com.

**Register GitHub as an OAuth Provider**

Use the information generated during GitHub OAuth App account configuration to register GitHub as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

**Procedure**

1. Navigate to System OAuth > Application Registry.
2. Click New.
   - The system displays the message What kind of OAuth application?
3. Select Connect to a third party OAuth Provider.
   - The system displays an empty Application Registries form.
4. Complete the form.
<table>
<thead>
<tr>
<th>Field</th>
<th>Value required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter any name to uniquely identify the record. For example, enter <em>My GitHub OAuth App Provider</em>.</td>
</tr>
<tr>
<td>Client ID</td>
<td>Enter the client ID of your OAuth App.</td>
</tr>
<tr>
<td>Client Secret</td>
<td>Enter the client secret of your OAuth App.</td>
</tr>
<tr>
<td>OAuth API script</td>
<td>Select <em>OAuthDevOpsGitHubHandler</em>.</td>
</tr>
<tr>
<td>Default Grant type</td>
<td>Select <em>Authorization Code</em>.</td>
</tr>
<tr>
<td>Authorization URL</td>
<td>Enter <code>https://github.com/login/oauth/authorize</code>. For an on-premise deployment, use the proper GitHub host URL.</td>
</tr>
<tr>
<td>Token URL</td>
<td>Enter <code>https://github.com/login/oauth/access_token</code>. For an on-premise deployment, use the proper GitHub host URL.</td>
</tr>
</tbody>
</table>

5. Leave the rest of the form fields as default.

6. Right-click the form header, and click **Save**.
   - The system validates the OAuth credentials and populates the **Redirect URL** (Hint: It should match the **Authorization callback URL** previously provided in your OAuth App configuration).
   - The system populates **OAuth Entity Profile** with **Grant Type** as **Authorization Code**. For example, **OAuth Entity Profile** is created with default **Name**, *My GitHub OAuth App Provider default_profile*

7. In the **OAuth Entity Scopes** related list, create an entry where **Name** is set to **scope** and **OAuth scope** is set to **repo**, and save the form.

8. In the **OAuth Entity Profiles** related list, open the default profile.

9. In the **OAuth Entity Profiles Scopes** related list, select the **OAuth Entity Scope** you created, and save the form.

**Create a credential record for OAuth App provider**

Create a credential record to the GitHub App OAuth provider previously created to authorize actions.
**Procedure**

1. Navigate to **Connections & Credentials > Credentials**.

2. Click **New**.
   
   The system displays the message **What type of Credentials would you like to create?**.

3. Select **OAuth 2.0 Credentials**.
   
   The pop-up window displays an empty OAuth 2.0 Credentials form.

4. Fill in these values.

<table>
<thead>
<tr>
<th>Field</th>
<th>Value required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter any name to uniquely identify the record. For example, enter <strong>My OAuth App Credential</strong>.</td>
</tr>
<tr>
<td>Active</td>
<td>Enable</td>
</tr>
<tr>
<td>OAuth Entity Profile</td>
<td>Select the default OAuth Entity profile you created previously.</td>
</tr>
<tr>
<td>Applies to</td>
<td>Select the MID Servers that can use this credential. For example, select <strong>All MID Servers</strong>.</td>
</tr>
<tr>
<td>Order</td>
<td>Select the order to apply this credential. For example, enter <strong>100</strong>.</td>
</tr>
</tbody>
</table>

5. Save the record.

6. Click the **Get OAuth Token** related link to generate the OAuth token.

**GitLab integration with DevOps**

Integrate GitLab tools with DevOps using the DevOps Integrations application.

ℹ️ **Note:** You must install the DevOps Integrations application to integrate GitLab tools with DevOps.

GitLab tools supported:

- GitLab SCM (coding)
- GitLab CI/CD (orchestration) basic CI pipelines

ℹ️ **Note:** Multi-project pipelines are not supported.

Starting with version 1.24, tags are captured from GitLab coding tool commits.
Limitations

- A pipeline must run to completion one time before change control is enforced.
- If a manual job in GitLab is canceled, or times out before completion, the corresponding change remains in **Open** state until it is manually reconciled.
- Pipeline discovery is limited to the first 100 results using the current filter. To discover additional pipelines, modify the project filter to expand the results for the discovery request.
- Historical import of commits or events is not supported.
  Those created or updated after the project has been discovered and configured are tracked normally.
  GitLab Issues is not supported.

**Bulk commits in GitLab**

Starting with version 1.24, bulk commits are supported with GitLab.

To support large commits, perform these actions:

- Install the ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream) plugin.
- For optimal performance, disable flow logging by setting the Flow Designer `com.snc.process_flow.reporting.level` property to **Off**.
- For MID Server settings, view the **MID Server support for Data Stream actions** section.

GitLab code push webhook sends a maximum of 20 commits in a notification.
If the number of commits in the push are less than 20, a single inbound event is created and processed in the ServiceNow instance.
If the number of pushed commits are equal or greater than 20, multiple inbound events are created from the original event with each new event containing a batch of 19 commits. The original inbound event is marked as ignored.
Currently, GitLab Data stream action can process up to 10,000 commits in a single push.

**GitLab test tool integration**

Starting with version 1.23, JUnit test type integration is supported for GitLab.

**Test tool integration** lets you view test results in DevOps for GitLab unit, functional, and performance tests.
Connect DevOps to GitLab tools

Configure a connection and credential alias and create a GitLab tool record in DevOps.

⚠️ Note: You can create a new tool and simultaneously create a new connection alias. Since the child alias is created during tool creation, you do not need to create a new connection alias as a prerequisite. Create the new connection alias as an sn_devops.admin user using Connections and Credentials template which are dynamically populated based on the tool you select. For more information, see Create new DevOps tool from the Tools list view.

Configure connection and credential alias - GitLab

Before you set up a tool record in DevOps, your admin configures the DevOps CreateDevOpsTool connection and credential alias to allow access to the tools in your environment.

Before you begin

Starting with version 1.15, DevOps connection and credential aliases (DevOpsAlias1 through DevOpsAlias10) are used to connect automatically when you set up your DevOps planning, coding, and orchestration tools.


To connect to more than 10 tools, or if you receive an error saying all DevOpsAlias connection and credential aliases are being used, an admin can create additional aliases in the sn_devops application scope.

⚠️ Note: If additional sys_alias records for DevOps are needed, they must be created by an admin in the sn_devops application scope.

You can reuse a DevOpsAlias alias no longer in use by inactivating the HTTP connection, if needed.

Role required: sn_devops.admin

About this task

Your admin must configure an HTTP connection in the CreateDevOpsTool connection and credential alias provided, and add admin credentials to connect automatically when you set up your DevOps planning, coding, and orchestration tools:
• **URL:** https://<instance name>.service-now.com/api/now/table
• **Credentials:** admin

ℹ️ **Note:** Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

You only need to configure the CreateDevOpsTool connection and credential alias once to set up all of your tools in DevOps.

The CreateDevOpsTool connection and credential alias is used with the DevOps Create a Tool subflow in Flow Designer. You can view executions in Flow Designer for information regarding flow results.

**Procedure**

1. Navigate to Connections & Credentials > Connection & Credential Aliases and open the CreateDevOpsTool record.

2. In the Connections related list, create a record and enter a **Name** for the connection.

3. On the Connection form, click the **Credential** field lookup list, and then click **New** to create an admin credential.

   a. Click **Basic Auth Credentials** and enter a **Name**.

   b. Enter admin username and password (required to access the tools in your DevOps environment).

      ℹ️ **Note:** Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

4. On the Connection form, enter https://<instance name>.service-now.com/api/now/table for the **Connection URL**.

**Create a GitLab tool record in DevOps**

Create a GitLab tool record in DevOps to connect, discover, and import GitLab tool data.

**Before you begin**

Role required: sn_devops.admin
About this task

- **Connect** to GitLab and get the webhook URL when you submit a DevOps tool record.
- **Discover** repositories, orchestration tasks, and pipelines.
- **Configure** webhooks in GitLab (starting with version 1.18).
- **Import** branch records, task execution and step execution records.

⚠️ **Note:** Import of GitLab commits is not supported.

Procedure

1. Create a tool record in DevOps to automatically connect to GitLab and get the webhook URL.

   a. Navigate to **DevOps > Tools > Create New** and create a record.

   b. Enter a **Tool Name** and fill in the tool details.

<table>
<thead>
<tr>
<th>Tool Integration</th>
<th>GitLab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool URL</td>
<td>GitLab tool URL.</td>
</tr>
<tr>
<td></td>
<td>For example:</td>
</tr>
<tr>
<td></td>
<td><a href="https://gitlab.com">https://gitlab.com</a></td>
</tr>
<tr>
<td>Tool Username</td>
<td>GitLab username</td>
</tr>
<tr>
<td>Tool Password / Access Token</td>
<td>GitLab access token</td>
</tr>
</tbody>
</table>

⚠️ **Note:** Only personal access token is supported.

If you are not granting complete access, select scope:

- **api**: Grants complete read/write access to the API, including all groups and projects, the container registry, and the package registry.

**MID Server** is optional. Select MID Server for tools on premise attached to a MID Server. Application is automatically set to DevOps and capability is set to REST.
c. Click Submit. The tool is automatically Connected Successfully using a connection alias and HTTP tool connection (basic authentication credential), and an API key credential is created.

Note: If you do not have global admin privileges for your tool (to allow automatic configuration of the webhook URL), you may need to have the tool admin user configure it for you (cut and paste the webhook URL into the tool configuration). Once the webhook is configured in the tool, Enter Manual Configuration Mode to connect to the tool manually, then exit.

2. Click Discover to discover tool configuration, including existing repositories, orchestration tasks, and pipelines, and fill in the fields in the project Search Filter window.

Note: GitLab repos and pipelines discovered are determined by these filter conditions, and are limited to the first 100 results. To discover additional repos, modify the project filter to expand the results.

<table>
<thead>
<tr>
<th>Filter Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned by me (recommended)</td>
<td>Searches for the repositories in the project that the current user owns.</td>
</tr>
<tr>
<td>Currently member of</td>
<td>Searches for the repositories in the project that the current user is a member of.</td>
</tr>
<tr>
<td>Search</td>
<td>Searches for the repositories in projects with the specified text string.</td>
</tr>
</tbody>
</table>

Note: GitLab repositories and pipelines discovered are also determined by the credentials (level of access) configured in the connection.

Records are added to the corresponding related lists.

3. Starting with version 1.18, automatically configure webhook URLs in GitLab.

a. Click Configure.

b. In the GitLab Configure window, select the applicable projects (containing existing repos and pipelines) to configure webhooks for, and click Continue.

c. Enter your Integration user (DevOps Integration User) and Password.

The DevOps Integration User is provided with the DevOps application and is used for inbound authentication from your tool to your ServiceNow instance.
Note: You must configure the password before the DevOps Integration User can configure a tool.

Notifications are sent from GitLab tools to DevOps as the DevOps Integration User.

The Track field is automatically set to True in configured repository records.

4. For discovered repositories, import historical data for the tool, and associate the repository with an app.

a. Open the repository record from the Repositories related list and click Import.
   Imported branch records and commit records from the repository are added to the corresponding related lists.

b. In the App field, click the lookup list and select an App record to associate with the repository, or click New to create one.

Note: Import of GitLab commits is not supported.

Imported historical data records are added to the corresponding related lists.

Example:

GitLab tool record in DevOps
What to do next
For GitLab pipelines, Model a GitLab basic CI pipeline in DevOps to complete
the configuration in DevOps.

• Map each pipeline to a specific app.
• Create pipeline steps and map each step to a GitLab pipeline job.
• Configure change control.

Model a GitLab basic CI pipeline in DevOps
Starting with version 1.16, model a GitLab basic CI pipeline by mapping the
pipeline to an app, and mapping DevOps pipeline steps to GitLab pipeline jobs.

Before you begin
Role required: sn_devops.admin

Procedure
1. Map your pipeline to an app.
   a. Navigate to DevOps > Apps & Pipelines > Apps and open the application
      record to associate with the pipeline.
   b. In the Pipelines related list, click Edit... to select a pipeline to associate with
      the app, or click New to create the pipeline.
      For a new pipeline, fill in the Orchestration pipeline field using the group
      name, subgroup name (if applicable), and project name as specified in
      GitLab.
      For example, My Group/My SubGroup/My Project.
      If a project is not under a group, simply specify My Project.
   c. Click Submit.

2. Open the pipeline record again and create DevOps steps to map to each
   GitLab pipeline job so an orchestration task can be created.
   Steps can be created in one of the following ways.
   • Starting with version 1.18, automatically create and map pipeline steps in
     DevOps by running your GitLab pipeline.
     Pipeline steps are automatically created, mapped, and associated when
     DevOps receives step notifications from your GitLab pipeline during the run.
   • Manually create and map each pipeline step to a GitLab pipeline job.
In the Steps related list, click **New** to create a DevOps step for each GitLab pipeline job (**Orchestration stage** field).

! **Note:** The **Orchestration stage** field value of each step is case-sensitive and must match the original name of the corresponding GitLab pipeline job.

<table>
<thead>
<tr>
<th>Name</th>
<th>Name of the pipeline step.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline</td>
<td>Pipeline in which the step is configured.</td>
</tr>
<tr>
<td>Type</td>
<td>Pipeline step type.</td>
</tr>
<tr>
<td></td>
<td>◦ Build and Test</td>
</tr>
<tr>
<td></td>
<td>◦ Test</td>
</tr>
<tr>
<td></td>
<td>◦ Deploy</td>
</tr>
<tr>
<td></td>
<td>◦ Deploy and Test</td>
</tr>
<tr>
<td></td>
<td>◦ Manual</td>
</tr>
<tr>
<td></td>
<td>◦ Prod Deploy</td>
</tr>
<tr>
<td>Order</td>
<td>Order in which the steps are run.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> The step order determines the order of the cards in the Pipeline UI. Starting with version 1.18, the order of the cards in the Pipeline UI is by task execution.</td>
</tr>
<tr>
<td>Orchestration stage</td>
<td>GitLab pipeline job name (case-sensitive).</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> For step association with GitLab CI pipeline jobs, the <strong>Orchestration stage</strong> field must be configured.</td>
</tr>
<tr>
<td>Business service</td>
<td>Configuration service that applies to the step.</td>
</tr>
</tbody>
</table>

Once orchestration tasks are created, **associate** each orchestration task in the Orchestration Tasks related list with a DevOps pipeline step.

3. **Optional:** Select the **Change control** check box in a step to enable change acceleration and the corresponding configuration fields.
**Note:** ServiceNow Change Management must be installed for change acceleration.

| Change receipt | (Optional) Starting with version 1.20, select to enable change receipt for the step so the pipeline doesn't pause when a change request is created. All pipeline data is included in the change, but approval is not required for the pipeline to proceed. |
| Change approval group | (Optional) Approval group for the change request. The change approval group becomes the Assignment group in the DevOps change request. **Note:** Ensure that the selected group has members and a group manager so approver field is not empty. |
| Change type | Change request type to create.  
  • Normal (default)  
  • Standard  
  • Emergency |
| (Optional) Template | (Optional) List of templates to use to auto populate fields for Normal or Emergency change requests. Select a template or create a new one. **Note:** This field is shown only when Change type is Normal or Emergency. |
| (Optional) Standard change template | List of standard change templates to use for Standard change requests. **Note:** This field is required for Standard change type. **Note:** This field is shown only when Change type is Standard. |
| Change controlled branches | (Optional) (Multibranch only) Comma-separated list of branches under change control. Wildcards are supported. |

You can set up change control in GitLab for manual GitLab jobs.
4. For versions 1.17 and earlier, navigate to DevOps > Tools > Orchestration Tools and in the GitLab tool record, copy the DevOps Webhook URL field value. The webhook URL contains the DevOps location for GitLab CI pipelines to send messages, including the sys_id for the tool:

http://<devops.integration.user>:<integration user password>@<your-instance>.service-now.com/api/sn_devops/v1/devops/tool/{code | plan | artifact | orchestration | test}?toolId={sys_id of the GitLab tool record}.

Example:

What to do next
Configure the GitLab pipeline for DevOps

Configuring the GitLab pipeline for DevOps

Webhooks are required in GitLab to send job and push notifications to DevOps. Change control can be configured in GitLab for a manual job.

Configure webhooks in GitLab

Version 1.17 and earlier, configure webhooks in GitLab to send job and push notifications to the DevOps application.

Before you begin
Verify that you have copied the Webhook URL field from the DevOps GitLab tool form into your clipboard.

Role required: sn_devops.admin

About this task
Create webhooks for these two triggers in GitLab for every project you want to track.
• Push events
• Job events

In GitLab, navigate to **Project > Settings > Webhooks** to create webhooks.

**Procedure**

1. Create a webhook for push events in GitLab.
   
   **a.** Paste the DevOps GitLab tool webhook in the **URL** field, and modify the URL to specify only the `code` parameter.
   That is, replace `{code | plan | artifact | orchestration | test}` with `code`.
   For example:
   
   ```
   http://<devops.integration.user>:<integration user password>@<your-instance>.service-now.com/api/sn_devops/v1/devops/tool/code?toolId={sys_id of the GitLab tool record}.
   ```

   **Note:** Your integration username and password must be specified in the URL.

   **b.** Select the **Push events** check box.

2. Create a webhook for job events in GitLab.

   **a.** For job events, paste the DevOps GitLab tool webhook in the **URL** field, and modify the URL to specify only the `orchestration` parameter.
   That is, replace `{code | plan | artifact | orchestration | test}` with `orchestration`.
   For example:
   
   ```
   http://<devops.integration.user>:<integration user password>@<your-instance>.service-now.com/api/sn_devops/v1/devops/tool/orchestration?toolId={sys_id of the GitLab tool record}.
   ```
**Note:** Your integration username and password must be specified in the URL.

b. **Select the Job events check box.**

Example:

**GitLab webhooks for DevOps integration**

![GitLab webhooks screenshot](image-url)
**Change acceleration in GitLab**

Change acceleration is supported in DevOps for manual GitLab jobs. The GitLab job under change control must have these instructions for the pipeline execution to be resumed or canceled via the change request:

- **when**: manual
- **allow_failure**: false

For example:

```yaml
deploy:
  stage: deploy
tag:
    - local-runner1
  when: manual
  allow_failure: false
  script:
    - echo 'Deploy'
```

Refer to [GitLab CI/CD pipeline configuration reference](https://docs.gitlab.com/ee/ci/pipelines/#allow-failure) for more information on how to configure a GitLab job.

Additional considerations:

- If **allow_failure** is set to **true**, the pipeline continues even when the change is rejected.
- A user with the appropriate role access in GitLab can unblock and continue a pipeline regardless of the change request state.

**GitLab change acceleration behavior**

<table>
<thead>
<tr>
<th>Manual execution</th>
<th>Change acceleration in step</th>
<th>Change request approved</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>If the manual job is under change control, the change is automatically created.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
### GitLab change acceleration behavior (continued)

<table>
<thead>
<tr>
<th>Manual execution</th>
<th>Change acceleration in step</th>
<th>Change request approved</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>No</td>
<td>The manual job is automatically rejected/failed.</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>N/A</td>
<td>The manual job waits for manual intervention from the pipeline owner via the GitLab UI (default behavior).</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>The job runs, and the change request is created with the applicable related list data. However, approval or rejection of the change request has no impact on the pipeline run.</td>
</tr>
</tbody>
</table>

**Note:** Parallel jobs are displayed sequentially, based on the order in which the jobs are queued for execution.

### Associate GitLab pipeline steps in DevOps

For manually created DevOps steps, associate each orchestration task in the Orchestration Tasks related list with a DevOps pipeline step to track the activity of each stage in your GitLab pipeline.

**Before you begin**

Role required: sn_devops.admin
Procedure

1. Navigate to **DevOps > Tools > Orchestration Tools**, and open the GitLab tool record.

2. In the Orchestration Tasks related list, enter the corresponding DevOps pipeline step in the **Step** field of each orchestration task.

   **Note:** The **Track** field is set to **True** by default when you discover orchestration tasks and pipelines. Tracking is required to receive job notifications from GitLab.

GitLab pipeline job run notifications are sent to the DevOps application. Each task execution notification corresponds to an orchestration task and, since orchestration tasks are mapped to a certain step in your DevOps pipeline, you can track the activity in each stage of your pipeline.

**Example:**

**DevOps associate steps**

<table>
<thead>
<tr>
<th>DevOps Tool</th>
<th>Gitlab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection alias</td>
<td>or_devops_DevOpsApp9</td>
</tr>
<tr>
<td>Tool URL</td>
<td>https://</td>
</tr>
</tbody>
</table>

**Note:** The **Track** field is set to **True** by default when you discover orchestration tasks and pipelines. Tracking is required to receive job notifications from GitLab.

GitLab pipeline job run notifications are sent to the DevOps application. Each task execution notification corresponds to an orchestration task and, since orchestration tasks are mapped to a certain step in your DevOps pipeline, you can track the activity in each stage of your pipeline.

**Jenkins integration with DevOps**

Integrate Jenkins orchestration tool with DevOps using the DevOps Integrations application.

**Note:** You must install the **DevOps Integrations application** and the Jenkins plugin for ServiceNow DevOps to integrate Jenkins with DevOps.
Connecting DevOps to Jenkins requires configuring a connection and credential alias, and creating a Jenkins tool record in DevOps.

Setting up the DevOps connection for Jenkins

Once you have connected DevOps to Jenkins, complete the integration by configuring the Jenkins pipeline for DevOps, and modeling the Jenkins pipeline in DevOps.

Modeling the Jenkins scripted pipeline in Devops

**Jenkins plugin for ServiceNow DevOps**

The Jenkins plugin for ServiceNow DevOps is provided to enable change acceleration so your orchestration tool can communicate with ServiceNow DevOps and control certain aspects of pipeline executions.

Visit the Ancillary Software section on the ServiceNow Store website to download the Jenkins plugin for ServiceNow DevOps.

**Set DevOps change request details**

Starting with version 1.24, set closure code and change request fields from within the Jenkins pipeline.

**Jenkins test tool integration**

Starting with version 1.15, JUnit test type integration is supported for Jenkins.

**Test tool integration** lets you view test results in DevOps for Jenkins unit, functional, and performance tests.

**Connect DevOps to Jenkins**

Configure a connection and credential alias and create a Jenkins tool record in DevOps.

**Note:** You can create a new tool and simultaneously create a new connection alias. Since the child alias is created during tool creation, you do not need to create a new connection alias as a prerequisite. Create the new connection alias as an sn_devops.admin user using Connections and Credentials template which are dynamically populated based on the tool you select. For more information, see Create new DevOps tool from the Tools list view.

**Configure connection and credential alias - Jenkins**

Before you set up a tool record in DevOps, your admin configures the DevOps CreateDevOpsTool connection and credential alias to allow access to the tools in your environment.
Before you begin
Starting with version 1.15, DevOps connection and credential aliases (DevOpsAlias1 through DevOpsAlias10) are used to connect automatically when you set up your DevOps planning, coding, and orchestration tools.


To connect to more than 10 tools, or if you receive an error saying all DevOpsAlias connection and credential aliases are being used, an admin can create additional aliases in the sn_devops application scope.

ℹ️ Note: If additional sys_alias records for DevOps are needed, they must be created by an admin in the sn_devops application scope.

You can reuse a DevOpsAlias alias no longer in use by inactivating the HTTP connection, if needed.

Role required: sn_devops.admin

About this task
Your admin must configure an HTTP connection in the CreateDevOpsTool connection and credential alias provided, and add admin credentials to connect automatically when you set up your DevOps planning, coding, and orchestration tools:

- URL: https://<instance name>.service-now.com/api/now/table
- Credentials: admin

ℹ️ Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

You only need to configure the CreateDevOpsTool connection and credential alias once to set up all of your tools in DevOps.

The CreateDevOpsTool connection and credential alias is used with the DevOps Create a Tool subflow in Flow Designer. You can view executions in Flow Designer for information regarding flow results.

Procedure
1. Navigate to Connections & Credentials > Connection & Credential Aliases and open the CreateDevOpsTool record.
2. In the Connections related list, create a record and enter a Name for the connection.
3. On the Connection form, click the Credential field lookup list, and then click New to create an admin credential.

   a. Click Basic Auth Credentials and enter a Name.

   b. Enter admin username and password (required to access the tools in your DevOps environment).

      i Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

4. On the Connection form, enter https://<instance name>.service-now.com/api/now/table for the Connection URL.

Create a Jenkins tool record in DevOps

Create a Jenkins tool record in DevOps to connect, discover, and import orchestration tasks and pipelines.

Before you begin
Role required: sn_devops.admin

About this task
Actions:

• Connect to Jenkins and get the webhook URL when you submit a DevOps tool record.

• Discover orchestration tasks and pipelines.

• Import task execution and step execution records.

Procedure

1. Create a tool record in DevOps to automatically connect to Jenkins and get the webhook URL.

   a. Navigate to DevOps > Tools > Create New and create a record.

   b. Enter a Tool Name and fill in the tool details.

      i Note: Freestyle project, Pipeline, Multibranch Pipeline, and Folder type jobs are supported. Default number of levels for Folder type is three.
Tool URL | Jenkins tool URL  
---|---
For example:  
https://jenkins.com

Tool Username | Jenkins username

Tool Password / Access Token | Jenkins password or access token

**MID Server** is optional. Select MID Server for tools on premise attached to a MID Server. Application is automatically set to DevOps and capability is set to REST.

c. Click **Submit**.

- **Note:** Only one Jenkins connection per connection alias is supported. You must create a new connection alias for a second Jenkins connection.

The tool is automatically **Connected Successfully** using a connection alias, and HTTP tool connection (basic authentication credential).

- **Note:** If you do not have global admin privileges for your tool (to allow automatic configuration of the webhook URL), you may need to have the tool admin user configure it for you (cut and paste the webhook URL into the tool configuration). Once the webhook is configured in the tool, **Enter Manual Configuration Mode** to connect to the tool manually, then exit.

2. Click **Discover** to discover the existing orchestration tasks (Jenkins stages) and pipelines.

Records are added to the corresponding related lists.

3. Open a discovered record from the Orchestration Tasks related list and click the **Import** related link to import historical data from the orchestration task.

Imported task execution records and step execution records are added to the corresponding related lists.
Example:

### Jenkins tool record in DevOps

<table>
<thead>
<tr>
<th>Name</th>
<th>Jenkins</th>
<th>Connection state</th>
<th>Last discovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>Jenkins</td>
<td>Connected</td>
<td>2020-05-15 13:09:34</td>
</tr>
</tbody>
</table>

| Tool URL | https://jenkins       | Webhook URL      | service-now.com/api/sn_devops/v1/devops/tool/credentials/store?format=xml&key=store&repository=plan| artifact (orchestration) | test? toolId=8087f17659c1c0c9d34dc50f9964b9c5 |

| Update | Discover | Enter Manual Configuration Mode |

### What to do next

**Model a Jenkins pipeline in DevOps** to complete the configuration in DevOps.

- Map each pipeline to a specific app.
- Create pipeline steps and map each step to a Jenkins pipeline stage.
- Configure change control.

### Model a Jenkins pipeline in DevOps

Model a Jenkins pipeline by mapping the pipeline to an app, and mapping DevOps pipeline steps to Jenkins stages.

### Before you begin

The Jenkins plugin for ServiceNow DevOps is provided to enable change acceleration so your orchestration tool can communicate with ServiceNow DevOps and control certain aspects of pipeline executions.

Visit the Ancillary Software section on the ServiceNow Store website to download the Jenkins plugin for ServiceNow DevOps.

Role required: sn_devops.admin

### About this task

Both scripted pipelines (Jenkinsfile) and freestyle jobs are supported.
For Jenkinsfile pipelines, pipeline steps are created, mapped, and associated to orchestration tasks automatically, instead of manually.

**Procedure**

1. Map your pipeline to an app in DevOps.
   
   a. Navigate to **DevOps > Apps & Pipelines > Apps** and open the application record to associate with the pipeline.
   
   b. In the Pipelines related list, click **Edit...** to select a pipeline to associate with the app, or click **New** to create the pipeline. For a new pipeline, fill in the **Orchestration pipeline** field using the full project name as specified in Jenkins.
   
   c. Click **Submit**.
   
2. Open the pipeline record again and select the **Track** check box so events from the pipeline are received.

   **Note:** The **Track** check box must be selected to integrate the pipeline with DevOps.

3. Create DevOps steps to map to each Jenkins pipeline stage so an orchestration task can be created. Steps can be created in one of the following ways.

   - Starting with version 1.19, for declarative or scripted pipelines, run your Jenkins pipeline to automatically create and map pipeline steps in DevOps. Pipeline steps are automatically created, mapped, and associated when DevOps receives step notifications from your Jenkins pipeline during the run.
   
   - For freestyle jobs, manually create and map each pipeline step to a Jenkins pipeline job.

   In the Steps related list, click **New** to create a DevOps step for each Jenkins pipeline stage (**Orchestration stage** field)

   **Note:** The **Orchestration stage** field value of each step is case-sensitive and must match the original name of the corresponding Jenkins pipeline stage.

<table>
<thead>
<tr>
<th>Name</th>
<th>Name of the pipeline step.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline</td>
<td>Pipeline in which the step is configured.</td>
</tr>
<tr>
<td>Type</td>
<td>Pipeline step type.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Order</th>
<th>Order in which the steps are run.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Note:</strong> The step order determines the order of the cards in the Pipeline UI. Starting with version 1.18, the order of the cards in the Pipeline UI is by task execution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Orchestration stage</th>
<th>Jenkins pipeline stage name (case-sensitive).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Note:</strong> For step association with Jenkins pipeline stages, the Orchestration stage field must be configured.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Business service</th>
<th>Configuration service that applies to the step.</th>
</tr>
</thead>
</table>

Once orchestration tasks are created, associate each orchestration task in the Orchestration Tasks related list with a DevOps pipeline step.

4. **Optional:** Select the Change control check box in a step to enable change acceleration and the corresponding configuration fields.

**Note:** ServiceNow Change Management must be installed for change acceleration.

<table>
<thead>
<tr>
<th>Change receipt</th>
<th>(Optional) Starting with version 1.20, select to enable change receipt for the step so the pipeline doesn’t pause when a change request is created. All pipeline data is included in the change, but approval is not required for the pipeline to proceed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change approval group</td>
<td>(Optional) Approval group for the change request. The change approval group becomes the Assignment group in the DevOps change request.</td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Ensure that the selected group has members and a group manager so the approver field is not empty.</td>
</tr>
<tr>
<td>Change type</td>
<td>Change request type to create.</td>
</tr>
<tr>
<td></td>
<td>• Normal (default)</td>
</tr>
<tr>
<td></td>
<td>• Standard</td>
</tr>
<tr>
<td></td>
<td>• Emergency</td>
</tr>
<tr>
<td>(Optional) Template</td>
<td>(Optional) List of templates to use to auto populate fields for Normal or Emergency change requests.</td>
</tr>
<tr>
<td></td>
<td>Select a template or create a new one.</td>
</tr>
<tr>
<td>(Optional) Standard change template</td>
<td>List of standard change templates to use for Standard change requests.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This field is shown only when Change type is Standard.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This field is required for Standard change type.</td>
</tr>
<tr>
<td>Change controlled branches</td>
<td>(Optional) (Multibranch only) Comma-separated list of branches under change control. Wildcards are supported.</td>
</tr>
</tbody>
</table>

5. Navigate to **DevOps > Tools > Orchestration Tools** and in the Jenkins tool record, copy the DevOps **Webhook URL** field value. The webhook URL contains the DevOps location for Jenkins to send messages, including the sys_id for the tool:

https://<devops.integration.user>:<password>@<your-instance>.service-now.com/api/sn_devops/v1/devops/tool/event/{sys_id of the record}
Example:

DevOps app

DevOps pipeline
What to do next

Configure the Jenkins pipeline for DevOps

Configuring the Jenkins pipeline for DevOps

Jenkins tool integration includes configuring the Jenkins pipeline.

Configure Jenkins to send notifications to DevOps

Configure Jenkins to send build notifications to the DevOps application.

Before you begin

Role required: sn_devops.admin

Procedure

1. In Jenkins, navigate to Manage Jenkins > Configure System, select the ServiceNow DevOps Enabled check box in the ServiceNow DevOps Configuration section, and fill in the fields.

When enabled, Jenkins starts sending events to DevOps as inbound events.

Note: Values are case-sensitive.
<table>
<thead>
<tr>
<th>Field</th>
<th>URL format/value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instance URL</td>
<td>https://&lt;your-instance&gt;.service-now.com</td>
</tr>
<tr>
<td>API Version</td>
<td>v1</td>
</tr>
<tr>
<td>Orchestration Tool ID</td>
<td>The sys_id of the orchestration tool. You can copy this value from the webhook URL (toolid value), or obtain it directly using the Copy sys_id command on the Orchestration Tool form.</td>
</tr>
<tr>
<td>Artifact Tool ID</td>
<td>The sys_id of the artifact tool.</td>
</tr>
<tr>
<td>Username</td>
<td>devops.integration.user</td>
</tr>
<tr>
<td>Password</td>
<td>Password for DevOps Integration User.</td>
</tr>
<tr>
<td>Debug Mode</td>
<td>Select check box.</td>
</tr>
</tbody>
</table>

2. Click **Test Connection**. Verify that the connection successful message is shown.

3. **Optional**: Set the ServiceNow job-level properties in the **View Configuration > General** tab for the job.

<table>
<thead>
<tr>
<th>ServiceNow DevOps Enabled</th>
<th>(Optional) Clear the check box to disable build notifications for a specific job. Default is selected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignore ServiceNow DevOps errors</td>
<td>Select the check box to prevent job failure if there is an error, incorrect snDevOpsStep ID, for example. Default is not selected.</td>
</tr>
</tbody>
</table>

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### Change Request Details (only used for freestyle/maven projects)

Starting with version 1.24, set closure code and change request fields from within the pipeline.

**Note:** These properties can be set in a scripted or declarative pipeline, but if they are also set here, these check boxes take precedence.

4. For change control, navigate to **Manage Jenkins > Configure System > Jenkins Location**, and provide the hostname in the **Jenkins URL** field.

**Note:** The Jenkins URL location is required for change acceleration functionality.

**Example:**

**Set up Jenkins to send notifications to DevOps**

<table>
<thead>
<tr>
<th>ServiceNow DevOps Enabled</th>
<th>Instance URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td><a href="https://devops.service-now.com">https://devops.service-now.com</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>API/Version</th>
<th>Orchestration Tool ID</th>
<th>Artfact Tool ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>v1</td>
<td>b4db611dbb8010dd5475601f961912</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Username</th>
<th>Password</th>
<th>Debug Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>devops.integration.user</td>
<td>.......</td>
<td><img src="image" alt="Debug Mode" /></td>
</tr>
</tbody>
</table>

**Job-level settings example (starting with version 1.24, change request details)**

**Jenkins location**

<table>
<thead>
<tr>
<th>Jenkins Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jenkins URL</td>
</tr>
<tr>
<td>System Admin e-mail address</td>
</tr>
</tbody>
</table>
Using a declarative or scripted pipeline in DevOps

When you use a Jenkinsfile, steps are created, mapped, and associated to orchestration tasks automatically instead of manually.

Jenkinsfile is a text file that contains the definition of a Jenkins pipeline and is checked into source control.

Each root-level stage configured in the Jenkinsfile is discovered as a separate orchestration task in DevOps that is mapped to an individual step.

Note: The Track field for the pipeline must be set to True in DevOps to receive job notifications from Jenkins.

DevOps Jenkinsfile commands

Note: Starting with version 1.19, the snDevOpsStep command is no longer required to set up Jenkins pipeline steps because the steps are created automatically when the pipeline is run.

• snDevOpsStep(enabled:{true/false}, ignoreErrors:{true/false})
  Where:
  ◦ enabled specifies the setting for build notifications property (true/false)
  ◦ ignoreErrors specifies the setting to prevent job failure if there is an error (true/false)

Note: Step properties can also be set using check boxes in Jenkins (job configuration), which take precedence over the values specified here.

• snDevOpsChange(ignoreErrors:{true/false},changeRequestDetails:{setCloseCode:{true/false},attributes:})
  Where ignoreErrors specifies the setting to prevent job failure if there is an error (true/false)
  Where changeRequestDetails specifies closure code and change request fields from within the pipeline (starting with version 1.24)
  Enables change control for each root-level stage that is mapped to a DevOps step.

• Starting with version 1.11, snDevOpsArtifact
  Registers artifacts when configuring DevOps change acceleration for releases.

• Starting with version 1.11, snDevOpsPackage
  Creates a package for artifacts when configuring DevOps change acceleration for releases.
**Note:** Stage mapping is only supported for stages at the root level, not nested or parallel stages.

### Example Jenkinsfile

```groovy
node {
    stage("build") {
        snDevOpsStep(enabled:false)
        ...
    }
    stage("test") {
        snDevOpsStep(ignoreErrors:false)
        ...
    }
    stage("deploy") {
        snDevOpsStep()
        snDevOpsChange()
    }
}
```

### Change request details example (starting with version 1.24)

```groovy
stage('Deploy'){
    agent any
    steps{
        snDevOpsChange(changeRequestDetails: ""
        "setCloseCode": false,
        "attributes": {
            "sys_created_by": "",
            "sys_updated_by": "",
            "watch_list": [{
                "name": "DevOps System"
            }, ""],
            "work_notes_list": [""],
            "category": "Service",
            "sys_created_on": "2021-02-09 18:58:41",
            "priority": "2",
            "work_start": "2021-01-05 08:00:00",
            "work_end": "2021-01-05 08:00:00",
            "comments": "This update for work notes is from jenkins file",
            "work_notes": "Update this to work_notes",
            "start_date": "2021-01-05 08:00:00",
            "end_date": "2021-01-05 08:00:00"
        }
    }
}
```
Note: Historical import of a declarative or scripted pipeline is not supported.

Parallel and sub-stage support
When a stage (or set of parallel stages) is nested within a pipeline stage defined by the `snDevOpsStep()` command, these rules apply:

- Any action from the nested stage is processed as part of the parent root-level stage
- Only one change request is created (at the parent root level) even if multiple stages nested under the parent root-level stage trigger a change
- Orchestration tasks created are always associated with the parent root-level stage (not the nested stage)

Example: Sub stage
In this sub-stage example, if a change request gets created from the sub stage (deploy PROD), the details of the parent root-level stage (deploy) are used in the change request, and orchestration tasks are also associated with the parent root-level stage (deploy).

```java
stage("deploy") {
    stages{
        stage('deploy UAT') {
            when{
                branch 'dev'
            }
            steps{
                snDevOpsStep ()
                echo "deploy in UAT"
            }
        }
        stage('deploy PROD') {
            when{
                branch 'master'
            }
            steps{
                snDevOpsStep ()
                echo "deploy in prod"
                snDevOpsChange()
            }
        }
    }
}
```
Example: Parallel stage

In this parallel stage example, if a change request is created from a sub stage (UAT test-1 and/or UAT static code test), only the first change request is created (using the details of the parent root-level stage, UAT test) regardless of whether both sub stages (UAT test-1 and UAT static code test) get triggered.

There is no indication of which parallel stage generated the change, and orchestration tasks are associated with the parent root-level stage (UAT test).

```java
stage('UAT test') {
  parallel {
    stage('UAT test-1') {
      steps {
        snDevOpsStep()
        snDevOpsChange()
        // 'UAT test-1' tasks
      }
      post {
        success {
          // post success tasks. E.g.: junit '**/target/surefire-reports/*.xml'
        }
      }
    }
    stage('UAT static code test') {
      steps {
        snDevOpsStep()
        snDevOpsChange()
        // 'UAT static code test' tasks
      }
    }
  }
}
```

Associate pipeline steps and Jenkins freestyle jobs in DevOps

For manually created DevOps steps, associate each orchestration task in the Orchestration Tasks related list with a DevOps pipeline step to track the activity of each stage in your Jenkins freestyle pipeline.

Before you begin
Role required: sn_devops.admin
Procedure

1. Navigate to DevOps > Tools > Orchestration Tools and open the Jenkins tool record.

2. In the Orchestration Tasks related list, enter the corresponding DevOps pipeline step in the **Step** field of each orchestration task.

   **Note:** The **Track** field for the pipeline must be set to **True** in DevOps to receive job notifications from Jenkins.

Jenkins job run notifications are sent to the DevOps application. Each task execution notification corresponds to an orchestration task and, since orchestration tasks are mapped to a certain step in your DevOps pipeline, you can track the activity in each stage of your pipeline.

Example:

![DevOps associate steps](image)

**Jira integration with DevOps**

Integrate Jira planning tool with DevOps by configuring a connection and credential alias, and creating a tool record in DevOps.

**Note:** You can create a new tool and simultaneously create a new connection alias. Since the child alias is created during tool creation, you do not an admin role nor do you need to create a new connection alias as a prerequisite. Create the new connection alias as an sn_devops.admin user using Connections and Credentials template which are dynamically populated based on the tool you select. For more information, see Create new DevOps tool from the Tools list view.

**Configure connection and credential alias - Jira**

Before you set up a tool record in DevOps, your admin configures the DevOps CreateDevOpsTool connection and credential alias to allow access to the tools in your environment.

**Before you begin**

Starting with version 1.15, DevOps connection and credential aliases (DevOpsAlias1 through DevOpsAlias10) are used to connect automatically when you set up your DevOps planning, coding, and orchestration tools.

To connect to more than 10 tools, or if you receive an error saying all DevOpsAlias connection and credential aliases are being used, an admin can create additional aliases in the sn_devops application scope.

Note: If additional sys_alias records for DevOps are needed, they must be created by an admin in the sn_devops application scope.

You can reuse a DevOpsAlias alias no longer in use by inactivating the HTTP connection, if needed.

Role required: sn_devops.admin

About this task
Your admin must configure an HTTP connection in the CreateDevOpsTool connection and credential alias provided, and add admin credentials to connect automatically when you set up your DevOps planning, coding, and orchestration tools:

- URL: https://<instance name>.service-now.com/api/now/table
- Credentials: admin

Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

You only need to configure the CreateDevOpsTool connection and credential alias once to set up all of your tools in DevOps.

The CreateDevOpsTool connection and credential alias is used with the DevOps Create a Tool subflow in Flow Designer. You can view executions in Flow Designer for information regarding flow results.

Procedure
1. Navigate to Connections & Credentials > Connection & Credential Aliases and open the CreateDevOpsTool record.
2. In the Connections related list, create a record and enter a Name for the connection.
3. On the Connection form, click the Credential field lookup list, and then click New to create an admin credential.
a. Click **Basic Auth Credentials** and enter a **Name**.

b. Enter admin username and password (required to access the tools in your DevOps environment).

**Note:** Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

4. On the **Connection form**, enter `https://<instance name>.service-now.com/api/now/table` for the **Connection URL**.

### Create a Jira tool record in DevOps

Create a Jira tool record in DevOps to connect and discover application plans.

**Before you begin**

Role required: sn_devops.admin

**About this task**

**Actions:**

- **Connect** to Jira, get the webhook URL, and configure the webhook in Jira when you submit a DevOps tool record.
- **Discover** plans.
- **Import** work item, plan version, and feature records.

**Procedure**

1. Create a tool record in DevOps to automatically connect to Jira and get the webhook URL.

   a. Navigate to **DevOps > Tools > Create New** and create a record.

   b. Enter a **Tool Name** and fill in the tool details.

<table>
<thead>
<tr>
<th>Tool Integration</th>
<th>Jira</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool URL</td>
<td>Jira tool URL.</td>
</tr>
<tr>
<td></td>
<td>For example:</td>
</tr>
<tr>
<td></td>
<td><a href="https://jira.com">https://jira.com</a></td>
</tr>
<tr>
<td>Tool Username</td>
<td>Jira username</td>
</tr>
<tr>
<td>Tool Password / Access Token</td>
<td>Jira password or access token</td>
</tr>
</tbody>
</table>
**MID Server** is optional. Select MID Server for tools on premise attached to a MID Server. Application is automatically set to DevOps and capability is set to REST.

c. Click **Submit**.
The tool is automatically **Connected Successfully** using a connection alias, and HTTP tool connection (basic authentication credential).

ℹ️ **Note:** If you do not have global admin privileges for your tool (to allow automatic configuration of the webhook URL), you may need to have the tool admin user configure it for you (cut and paste the webhook URL into the tool configuration). Once the webhook is configured in the tool, **Enter Manual Configuration Mode** to connect to the tool manually, then exit.

2. Click **Discover** to discover existing application plans (projects associated with the tool).
   Plan records are added to the Plans related list.

3. Automatically configure the webhook URL in Jira.

   a. Click **Configure**.

   b. Enter your **Integration user** (DevOps Integration User) and **Password**.
      The DevOps Integration User is provided with the DevOps application and is used for inbound authentication from your tool to your ServiceNow instance.

      ℹ️ **Note:** You must configure the password before the DevOps Integration User can configure a tool.

      Notifications are sent from the Jira tool to DevOps as the DevOps Integration User.

4. Open the discovered application plan from the Plans related list and click the **Import** related link to import historical data from the application.
   Imported work item records, plan version records, and feature records are added to the corresponding related lists.
   • Work items related list shows tasks, bugs, and stories.
     - **Native State** and **Native Type** fields of the work item contain the original state and type values from the source tool.
   • Plan Versions related list shows releases.
   • Features related list shows epics and features.
5. In the Apps related list, click **New** to create an App record to associate with the plan (project).

**Note:** A plan must have an associated App record to complete the planning tool setup.

**Example:**

**Jira tool record in DevOps**

![Jira tool record in DevOps](image)

**ServiceNow Agile Development 2.0 integration with DevOps**

Integrate Agile Development 2.0 planning tool with DevOps by configuring a connection and credential alias, and creating a tool record in DevOps.

**Note:** You can create a new tool and simultaneously create a new connection alias. Since the child alias is created during tool creation, you do not an admin role nor do you need to create a new connection alias as a prerequisite. Create the new connection alias as an sn_devops.admin user using **Connections and Credentials template** which are dynamically populated based on the tool you select. For more information, see Create new DevOps tool from the Tools list view.

**Configure connection and credential alias - Agile Development 2.0**

Before you set up a tool record in DevOps, your admin configures the DevOps CreateDevOpsTool connection and credential alias to allow access to the tools in your environment.
Before you begin

Starting with version 1.15, DevOps connection and credential aliases (DevOpsAlias1 through DevOpsAlias10) are used to connect automatically when you set up your DevOps planning, coding, and orchestration tools.


To connect to more than 10 tools, or if you receive an error saying all DevOpsAlias connection and credential aliases are being used, an admin can create additional aliases in the sn_devops application scope.

Note: If additional sys_alias records for DevOps are needed, they must be created by an admin in the sn_devops application scope.

You can reuse a DevOpsAlias alias no longer in use by inactivating the HTTP connection, if needed.

Role required: sn_devops.admin

About this task

Your admin must configure an HTTP connection in the CreateDevOpsTool connection and credential alias provided, and add admin credentials to connect automatically when you set up your DevOps planning, coding, and orchestration tools:

• URL: https://<instance name>.service-now.com/api/now/table
• Credentials: admin

Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

You only need to configure the CreateDevOpsTool connection and credential alias once to set up all of your tools in DevOps.

The CreateDevOpsTool connection and credential alias is used with the DevOps Create a Tool subflow in Flow Designer. You can view executions in Flow Designer for information regarding flow results.

Procedure

1. Navigate to Connections & Credentials > Connection & Credential Aliases and open the CreateDevOpsTool record.

2. In the Connections related list, create a record and enter a Name for the connection.
3. On the Connection form, click the **Credential** field lookup list, and then click **New** to create an admin credential.

   **a.** Click **Basic Auth Credentials** and enter a **Name**.

   **b.** Enter admin username and password (required to access the tools in your DevOps environment).

   📌 **Note:** Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

4. On the Connection form, enter `https://<instance name>.service-now.com/api/now/table` for the **Connection URL**.

### Create an Agile Development 2.0 tool record in DevOps

Create an Agile Development 2.0 tool record in DevOps to connect and discover application plans.

**Before you begin**

Role required: sn_devops.admin

**About this task**

**Actions:**

- **Connect** to Agile Development 2.0, get the webhook URL, and configure the webhook in Agile Development 2.0 when you submit a DevOps tool record.
- **Discover** plans.
- **Import** work item, plan version, and feature records.

**Procedure**

1. Create a tool record in DevOps to automatically connect to Jira and get the webhook URL.

   **a.** Navigate to **DevOps > Tools > Create New** and create a record.

   **b.** Enter a **Tool Name** and fill in the tool details.

<table>
<thead>
<tr>
<th>Tool Integration</th>
<th>Agile Development 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool Username</td>
<td>Agile username</td>
</tr>
<tr>
<td>Tool Password / Access Token</td>
<td>Agile password or access token</td>
</tr>
</tbody>
</table>
MID Server is optional. Select MID Server for tools on premise attached to a MID Server. Application is automatically set to DevOps and capability is set to REST.

c. Click Submit.
The tool is automatically Connected Successfully using a connection alias, and HTTP tool connection (basic authentication credential).

Note: If you do not have global admin privileges for your tool (to allow automatic configuration of the webhook URL), you may need to have the tool admin user configure it for you (cut and paste the webhook URL into the tool configuration). Once the webhook is configured in the tool, Enter Manual Configuration Mode to connect to the tool manually, then exit.

2. Click Discover to discover existing application plans (projects associated with the tool).
   Plan records are added to the Plans related list.

3. Automatically configure the webhook URL in Agile Development 2.0.

   a. Click Configure.

   b. Enter your Integration user (DevOps Integration User) and Password.
The DevOps Integration User is provided with the DevOps application and is used for inbound authentication from your tool to your ServiceNow instance.

Note: You must configure the password before the DevOps Integration User can configure a tool.

Notifications are sent from the Agile Development 2.0 tool to DevOps as the DevOps Integration User.

4. Open the discovered application plan from the Plans related list and click the Import related link to import historical data from the application.
Imported work item records, plan version records, and feature records are added to the corresponding related lists.

- Work items related list shows tasks, bugs, and stories.
  **Native State** and **Native Type** fields of the work item contain the original state and type values from the source tool.
- Plan Versions related list shows releases.
- Features related list shows epics and features.
5. On the Apps related list, click **New** to create an App record to associate with the plan (project).

**Note:** A plan must have an associated App record to complete the planning tool setup.

**Example:**

**Agile tool record in DevOps**

<table>
<thead>
<tr>
<th>Name</th>
<th>ITBM - Agile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tool</strong></td>
<td>Agile Development 2.0</td>
</tr>
<tr>
<td>Connection alias</td>
<td>Agile</td>
</tr>
</tbody>
</table>

**Webhook URL:**

https://<DevOps integration user ID>-<integration user password>-<ServiceNow.com/ps/ae_devops/p1_devops/app/event/4008a183b70330e071f65d996197e>

**Tool Connections:**

- ITBM - Agile
- HTTP(s) Connection

**Connections:**

- Name: ITBM - Agile
- Connection type: HTTP(s)
- Active: true
- Connection alias: Agile
- Credentialed: Agile
- Domain: global

---

### Accelerating DevOps change

Enable the Change Acceleration feature of DevOps for automatic change request creation in your pipeline, and use change approval policies to automate approval under certain conditions.

**Note:** ServiceNow Change Management must be installed for change acceleration.

Enable and set up change control when you model your pipeline in DevOps:

- Model an Azure pipeline in DevOps
- Model a GitLab basic CI pipeline in DevOps
- Model a Jenkins pipeline in DevOps

You can view details for active change requests by navigating to **DevOps > Orchestrate > Pipeline Change Requests**.
Change control process

When change control is enabled for a job in your DevOps development pipeline, a change request is automatically created and set to Assess state to request approval for the execution of the current stage or job.

Starting with version 1.20, pipeline steps can be configured to create change receipts, which do not pause the pipeline. Change receipts include all pipeline data, but do not require approval to proceed in the pipeline.

Change requests can be approved automatically by configuring conditions in a change approval policy. The DevOps change approval policy (DevOps Change Policy) and workflow (Change Request - DevOps) are provided with the DevOps application.

The difference in the DevOps workflow (Change Request - DevOps) from the Normal workflow (Change Request - Normal) is that the change approval policy in the DevOps workflow is the DevOps Change Policy instead of the Normal Change Policy and, therefore, does not use Technical approvals nor Risk approvals activities that are part of the Normal workflow.

Once approved, either automatically or manually, change requests move to Implement state and the job is run. Once the job is run, the change request is moved to Closed with Close code as Successful on a successful job run, or Unsuccessful on error in the job run.

If a change request is not approved and moved into canceled state or closed state, the associated Jenkins job is marked as failed and a console message is shown:

[ServiceNow DevOps] Job was not approved for execution

Automatic approval of change requests using Change Policy workflows

You can enable automatic approval of DevOps changes using the Change Approval Policy workflow and the DevOps Change Policy workflow.

Change Approval Policy workflow

A change request is automatically approved for low risk changes, when calculated risk and impact are below threshold values (set on the Step form for the pipeline). The state is moved to Implement.

When calculated risk and impact values are at or above threshold values, the normal change stays in the Assess state until approved.
Note: If the **Standard change template** field on the Step form is set, and the calculated risk and impact are below threshold values, a standard change request is created. Otherwise the change is always normal.

**DevOps Change Policy workflow**

A change request is automatically approved when certain conditions in the DevOps auto approval cycle are met. The state is moved to Implement. DevOps Change Policy approval is useful for less critical changes that do not require manual approval.

Change Approval Policy is mapped to DevOps Change Policy (instead of Normal Workflow Policy), and Risk Approvals is mapped to DevOps Change Policy.

This policy is inactive by default.

**DevOps Demo Change Policy workflow**

Starting with version 1.14, when demo data is installed, Flow Designer #DevOps# Demo# Change Automation flow# is available where# normal type change requests can be auto-approved based on the decision policies.

As a part of demo data, the decision policies available are:

- Low risk auto approval policy, where the failed test value is zero##.
- High risk manual approval policy, where the failed test value is greater than zero#.

See DevOps Demo Change Automation flow for more details.

**Custom change request templates**

Starting with version 1.14, when you enable change control in the ServiceNow DevOps step, you can select a custom template to populate fields automatically while creating the change request. The change request **Category** field is automatically set to DevOps.

Note: Do not configure the **Category** and **changeType** fields from the custom template.

The type of change request corresponds to the change request table in global scope.

**DevOps Model Change Request flow**

Starting with version 1.14, customize the DevOps Model Change Request flow using a flow or a script.
Once the change request is approved, rejected, or canceled, the state of the step execution can be updated by calling Flow Designer action **Update the state of step execution table** even before implementing the change request. If a change request is not approved, and moved into canceled or rejected state, the associated job is marked as canceled or failed and a console message is shown.

Flow Designer action **Update the state of step execution table** serves as a trigger for **Change Control Callback** flow, which is used to notify the change decision to the orchestration tool. Hence, calling the Flow Designer action **Update the state of step execution table** is mandatory.

**Automatic change request related lists**

For a change request automatically created by DevOps, the **Category** field is automatically set to DevOps, and these related lists are added:

- **Commits**
  - Commits associated with the change request.

- **Work Items**
  - Work items associated with the change request.

- **Test Results (build test summaries), starting with version 1.13**
  - List of build test summaries for the tests run after the associated package was created and linked.
    - If there is no package, or the change request is created before package creation, then the list of build test summaries includes tests that were run after any associated artifacts were created and linked.
    - If no package or artifact versions are linked to the pipeline execution, then the list is empty.

- **Artifact Versions, starting with version 1.13**
  - List of artifact versions associated to the package linked to pipeline execution for packages created before the change request is approved.
    - If no package is linked to the pipeline execution, then the list is empty.

- **Test Summaries (replaces Test Results related list), starting with version 1.15**
  - List of test summaries for a pipeline execution associated with an artifact, package, or task execution before the change request.
  
  See **Test Results** for more details.
Note: Implementation details from the orchestration tool are automatically added to the Work notes field on the change request form. Detail added to the work notes is limited to 5 KB of the task execution log for the step.

Custom change request process

These DevOps change properties are available to customize your change request flow.

- DevOps change request implement state
- DevOps change request post implement state
- DevOps change request cancel state
- DevOps change request approval text

To customize your change request flow, you must first create a System Definition > Choice List. For example, DevOps_Implement (value - 10).

Then, add the choice list to System Definition > Script Include > ChangeRequestStateHandlerSNC.

Once you have created the choice list and added it to the script include, you can update DevOps change properties with the new choice list values. For example, DevOps change request implement state -10.

DevOps Risk Condition

You can use the DevOps risk and impact calculation based on committer risk score.

This condition is inactive by default.

Test Results related list

Lists the tests that were run in a pipeline after a package was created. If no package was created, then the list includes the tests that were run after an artifact version was created.
Scenarios:

**A package is created in the pipeline, but no artifact versions are registered.**

- If the change request is created in the package creation stage:
  No test results are displayed because a package is not yet linked to the pipeline execution.

- If the change request is created in a stage after the package creation stage:
  Build test summaries include those associated with stages after the package creation stage, up to the change-controlled stage.

**Artifact versions are registered, but no package is created.**

- If the change request is created in the artifact version stage:
  No test results will be displayed, because no tests are associated until the task execution is completed.

- If the change request is created in a stage after the artifact version stage:
  Build test summaries include those in the artifact version stage, as well as the stages afterward, up to the change-controlled stage.

**Both artifact versions and package are created in the pipeline.**

- If the change request is part of the stage after artifact version and package creation stages:
  Build test summaries include those associated with the package creation stage, as well as the stages afterward, up to the change-controlled stage.

- If the change request is part of the package creation stage, and artifact versions are created as part of an earlier stage; or
  the change request is created in a stage (not package creation) after the artifact version stage, but before package creation stage; or
  the change request is part of the package creation stage and artifact versions are created as part of an earlier stage:
  Build test summaries include those associated with the artifact version stage, as well as stages afterward, up to the change-controlled stage.
Pipeline executions view

You can view pipeline activity by navigating to DevOps > Orchestrate > Pipeline Executions.

DevOps change acceleration for releases

Starting with version 1.11, DevOps change acceleration for releases lets you view all commits and work items in the change request for the DevOps release when approving, rather than having commits spread across multiple task executions.

When you associate commits with an artifact version (CI pipeline), and define an artifact package (CD pipeline), all artifact versions generated since the last time the app was deployed to production are included in the list of commits for the change. Consolidation of these items is helpful, especially when there are multiple CI builds before the deployment.

DevOps change request attributes:

• **Category** DevOps
• Commits and Work Items related lists
Artifact setup
1. (Optional) Create an artifact tool record in DevOps.
   - Note: An artifact tool is not necessary unless a webhook or user-created integration subflow configuration is required to look up artifact versions.

2. Register artifacts in the CI pipeline.

3. Create a package in the CD pipeline.
   - Note: The package creation step must be before the Prod Deploy step.

Artifact registration
Configure artifact registration in a scripted pipeline or freestyle job using the DevOps API /artifact/registration endpoint. Multiple artifact versions are supported.

For Jenkins pipeline:

- Scripted and declarative pipeline (`snDevOpsArtifact` Jenkinsfile command)
  For example:

```
snDevOpsArtifact(artifactsPayload: """"{"artifacts": [{"name": "sa-web.jar", "version": "1.9", "semanticVersion": "1.9.0", "repositoryName": "services-1031"}], "branchName": "master"}"")
```

- Freestyle job (Register Artifact build step)
  For example:

```
{"artifacts":[{"name":"sentiment-analysis-web2","version":"1.9","semanticVersion":"1.9.0","repositoryName":"maven-releases"}]}
```

Artifact package creation
Configure artifact package creation in a scripted pipeline or freestyle job using the DevOps API /package/registration endpoint.

- Note: Package name must be specified.

For Jenkins pipeline:

- Freestyle job (Create Package build step)
  For example:

```
{"artifacts":[{"name":"sentiment-analysis-web2","version":"1.9","repositoryName":"maven-releases"}]}
```
• Declarative and scripted pipeline (`snDevOpsPackage Jenkinsfile command`)
  Package with more than one artifact (from different repos) in the payload, for example:

```java
snDevOpsPackage(name: "sentimentpackage", artifactsPayload: "{"artifacts": [{"name": "sa-web.jar", "version": "1.9", "repositoryName": "services-1031"}, {"name": "sa-db.jar", "version": "1.3.2", "repositoryName": "services-1032"}], "branchName": "master"}"
```

**Note:** When an artifact version is not available during the build, build details (pipelineName or projectName, taskExecutionNumber, stageName, branchName) are used to look up the artifact version in the task execution.

Jenkins plugin step `includeBuildInfo` can be used to include build details in the API call.

**Artifact workflow and objects**

The orchestration tool job publishes the new artifact (consisting of versions) to the artifact repository. Each artifact version is associated with a task execution.
(consisting of the related code commits). A package is created for the release (consisting of specific artifact versions flagged for deployment) and, once the deployment stage completes, the package is marked as deployed to production.

These objects are part of the artifact structure.

**Artifact tool**

Used to support artifact repository managers such as JFrog Artifactory and Nexus, for example.

ℹ️ **Note:** An artifact tool is not necessary unless a webhook or user-created integration subflow configuration is required to look up artifact versions.

**Artifact repository**

Target for artifacts generated in a build, and also a source of artifacts required by a build.

Can be created manually, or through the RegisterArtifact API as new artifacts are published under new repositories in a tool.

**Artifact**

Artifact name for which different builds (artifact versions) are generated.

Can be created manually, or through the RegisterArtifact API. Artifacts (versions) are associated with a task execution and published to an artifact repository.

**Artifact version**

Specific version of the artifact. Deployable component of an application generated by a CI build. When provided, semantic version is used.

Can be created through discovery, or through the RegisterArtifact API. Artifacts (versions) are associated with a task execution and published to a tracked artifact repository.

**Semantic version**

Optional attribute of an artifact version that, when provided, is used to determine commits for a change.

Semantic version format is (MAJOR.MINOR.PATCH).

**Package**

Collection of artifact versions used as input to a CD pipeline, or for associating test results.
Package creation is triggered by the CreatePackage API call from the orchestration tool and contains the name, version, and repository name of all the artifact versions included in the package. A check box indicates whether the package has been deployed to production.

DevOps change acceleration for releases

DevOps change request – category DevOps

This is an automated change request generated by the DevOps application.

DevOps change request – commits and work items
### DevOps artifact version list

<table>
<thead>
<tr>
<th>Name</th>
<th>Version</th>
<th>Semantic version</th>
<th>Artifact</th>
<th>Built by</th>
<th>Built on</th>
</tr>
</thead>
<tbody>
<tr>
<td>globex-web</td>
<td>2.27.0</td>
<td>2.27.0</td>
<td>globex-web</td>
<td>10001112</td>
<td>2020-02-20 13:28:20</td>
</tr>
<tr>
<td>globex-web</td>
<td>2.28.0</td>
<td>2.28.0</td>
<td>globex-web</td>
<td>10001114</td>
<td>2020-02-20 13:28:20</td>
</tr>
<tr>
<td>globex-web</td>
<td>2.29.0</td>
<td>2.29.0</td>
<td>globex-web</td>
<td>10001116</td>
<td>2020-02-20 13:28:20</td>
</tr>
</tbody>
</table>

### DevOps artifact version – commits

[Image of DevOps artifact version – commits]

### DevOps artifact version – packages

[Image of DevOps artifact version – packages]
How commits are determined for a release in DevOps

Starting with version 1.11, the DevOps artifact package and its associated artifact versions are used to determine which commits are included in a DevOps change.

All commits for artifact versions in the package that were generated after the last deployment date (up to the version currently being deployed) are included in the change request. Previous major versions are not included.

*Note:* Patch and hotfix versions are excluded.

When provided, semantic version is used to determine commits for a change. Format is (MAJOR.MINOR.PATCH). For example, semantic version 2.0.1 is read:

- Major version 2
- Minor version 0
- Patch/hotfix version 1

Failed task executions between the previous and current artifact versions that did not build an artifact but have associated commits are also associated to the created artifact version.

**Example: Commits and packages**

This example consists of:

- Three build pipelines (A, B, and C)
- A release pipeline (ABC) under change control, with four packages:
  1. Build pipeline A (major version 1)
  2. Build pipelines A and B (major version 1)
3. Build pipelines B and C (major version 1)
4. Build pipelines A, B, and C (major version 1)

**Package 1 (A 1.1.0)**

<table>
<thead>
<tr>
<th>Commit</th>
<th>Build pipeline</th>
<th>Semantic version</th>
<th>Included in package</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>1.0.0</td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>1.0.1</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>1.1.0</td>
<td>X</td>
</tr>
</tbody>
</table>

**Note:** Commit 2 (build A, semantic version 1.0.1) is not included in the package because the semantic version syntax indicates a patch or hotfix.

**Package 2 (A 1.2.0, B 1.1.0)**

<table>
<thead>
<tr>
<th>Commit</th>
<th>Build pipeline</th>
<th>Semantic version</th>
<th>Included in package</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>A</td>
<td>1.1.1</td>
<td>--</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>1.2.0</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>A</td>
<td>1.2.0</td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>1.0.0</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>B</td>
<td>1.0.0</td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>B</td>
<td>1.1.0</td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>B</td>
<td>1.1.0</td>
<td>X</td>
</tr>
</tbody>
</table>

**Note:** Commit 4 (build A, semantic version 1.1.1) is not included because the semantic version syntax indicates a patch or hotfix.

**Package 3 (B 1.2.0, C 1.0.0)**

<table>
<thead>
<tr>
<th>Commit</th>
<th>Build pipeline</th>
<th>Semantic version</th>
<th>Included in package</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>A</td>
<td>1.3.0</td>
<td>--</td>
</tr>
<tr>
<td>12</td>
<td>B</td>
<td>1.2.0</td>
<td>X</td>
</tr>
<tr>
<td>13</td>
<td>B</td>
<td>1.2.0</td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>C</td>
<td>1.0.0</td>
<td>X</td>
</tr>
</tbody>
</table>
**Package 3 (B 1.2.0, C 1.0.0) (continued)**

<table>
<thead>
<tr>
<th>Commit</th>
<th>Build pipeline</th>
<th>Semantic version</th>
<th>Included in package</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>C</td>
<td>1.0.0</td>
<td>X</td>
</tr>
<tr>
<td>16</td>
<td>C</td>
<td>1.0.0</td>
<td>X</td>
</tr>
</tbody>
</table>

**Note:** Commit 11 (build A, semantic version 1.3.0) is not included because the package does not specify build A.

**Package 4 (A 1.4.0, B 1.3.0, C 1.2.0)**

<table>
<thead>
<tr>
<th>Commit</th>
<th>Build pipeline</th>
<th>Semantic version</th>
<th>Included in package</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>A</td>
<td>1.4.0</td>
<td>X</td>
</tr>
<tr>
<td>18</td>
<td>A</td>
<td>1.4.0</td>
<td>X</td>
</tr>
<tr>
<td>19</td>
<td>B</td>
<td>1.3.0</td>
<td>X</td>
</tr>
<tr>
<td>20</td>
<td>B</td>
<td>1.3.0</td>
<td>X</td>
</tr>
<tr>
<td>21</td>
<td>C</td>
<td>1.1.0</td>
<td>X</td>
</tr>
<tr>
<td>22</td>
<td>C</td>
<td>1.1.0</td>
<td>X</td>
</tr>
<tr>
<td>23</td>
<td>C</td>
<td>1.2.0</td>
<td>X</td>
</tr>
<tr>
<td>24</td>
<td>C</td>
<td>1.2.0</td>
<td>X</td>
</tr>
</tbody>
</table>

**Note:** Commit 11 is also included in this package because it is part of the changes in major version 1 of build A since the last package (including major version 1 of build A), package #2, was deployed to production.

**Setting up a DevOps artifact tool record**

Starting with version 1.11, set up a DevOps artifact tool connection to discover artifact repositories when webhook or user-created integration subflow configuration is required to look up artifact versions.

**Configure connection and credential alias - artifact tool**

Before you set up your tool records in DevOps, your admin configures the DevOps CreateDevOpsTool connection and credential alias to allow access to the tools in your environment.
Before you begin
Starting with version 1.15, DevOps connection and credential aliases (DevOpsAlias1 through DevOpsAlias10) are used to connect automatically when you set up your DevOps planning, coding, and orchestration tools.


To connect to more than 10 tools, or if you receive an error saying all DevOpsAlias connection and credential aliases are being used, an admin can create additional aliases in the sn_devops application scope.

Note: If additional sys_alias records for DevOps are needed, they must be created by an admin in the sn_devops application scope.

You can reuse a DevOpsAlias alias no longer in use by inactivating the HTTP connection, if needed.

Role required: sn_devops.admin

About this task
Your admin must configure an HTTP connection in the CreateDevOpsTool connection and credential alias provided, and add admin credentials to connect automatically when you set up your DevOps planning, coding, and orchestration tools:

• URL: https://<instance name>.service-now.com/api/now/table
• Credentials: admin

Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

You only need to configure the CreateDevOpsTool connection and credential alias once to set up all of your tools in DevOps.

The CreateDevOpsTool connection and credential alias is used with the DevOps Create a Tool subflow in Flow Designer. You can view executions in Flow Designer for information regarding flow results.

Procedure
1. Navigate to Connections & Credentials > Connection & Credential Aliases and open the CreateDevOpsTool record.
2. In the Connections related list, create a record and enter a Name for the connection.
3. On the Connection form, click the Credential field lookup list, and then click **New** to create an admin credential.

   a. Click **Basic Auth Credentials** and enter a **Name**.

   b. Enter admin username and password (required to access the tools in your DevOps environment).

   ✋ Note: Starting with version 1.15, admin role is not necessary. A user with connection_admin role can configure an HTTP connection.

4. On the Connection form, enter https://<instance name>.service-now.com/api/now/table for the **Connection URL**.

Create an artifact tool record in DevOps

Create an artifact tool record in DevOps to discover artifact repositories when webhook or user-created integration subflow configuration is required to look up artifact versions.

**Before you begin**

Role required: sn_devops.admin

**About this task**

modx Note: An artifact tool is not necessary unless a webhook or user-created integration subflow configuration is required to look up artifact versions.

**Procedure**

1. Navigate to **DevOps > Tools > Create New** and create a record.
2. Enter a **Name**, **Tool Integration**, and **Tool URL**.

   ✋ Note: If you do not have global admin privileges for your tool (to allow automatic configuration of the webhook URL), you may need to have the tool admin user configure it for you (cut and paste the webhook URL into the tool configuration). Once the webhook is configured in the tool, **Enter Manual Configuration Mode** to connect to the tool manually, then exit.

   After submitting, the artifact tool is automatically **Connected Successfully** using a connection alias, and HTTP tool connection (basic authentication credential).
Example:

**DevOps artifact tool setup**

Configuring DevOps change request details within the pipeline

Starting with version 1.24, set closure code and change request fields from within Azure and Jenkins pipelines.

ℹ️ **Note:** Configuring change request details from within a GitLab pipeline is not supported.

Closure information and change request attributes are contained with the `changeRequestDetails` object.

**Closure code**

Set the `setCloseCode` parameter to `true/false` based on the desired behavior.

If set to true, standard change request behavior occurs once the job or pipeline has completed.

If set to false, once the job or pipeline has completed the change request is not closed:

- Closure Information in the change request is not set (Close code and Close notes are left blank).
- A link to the step execution is added to the Work notes.

**Change request fields**

Set change request field values within the pipeline for the change request template specified.

- Use the `attributes` parameter to set field values.
- Use the `DevOps - POST /devops/orchestration/changeControl` endpoint of the DevOps API.
Note: If a specified field has a dependent field that is mandatory, you must set that attribute as well.

If the attribute for the dependent mandatory field is not set, change request and related step execution are canceled, and work notes are updated.

Field values within the attributes: parameter are key-value pairs. Meaning, the key is the field name within the template and the value is the information to populate in the field.

All fields in the Change Request [change_request] table are supported except where specified.

### Change request fields supported

<table>
<thead>
<tr>
<th>Unsupported fields</th>
<th>Supported fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>• type</td>
<td>All remaining fields in the Change Request [change_request] table.</td>
</tr>
<tr>
<td>• risk</td>
<td></td>
</tr>
<tr>
<td>• impact</td>
<td></td>
</tr>
<tr>
<td>• number</td>
<td></td>
</tr>
<tr>
<td>• sys_id</td>
<td></td>
</tr>
<tr>
<td>• cmdb_ci</td>
<td></td>
</tr>
<tr>
<td>• template</td>
<td></td>
</tr>
<tr>
<td>• business_service</td>
<td></td>
</tr>
<tr>
<td>• assignment_group</td>
<td></td>
</tr>
<tr>
<td>• risk_impact_analysis</td>
<td></td>
</tr>
<tr>
<td>• standard_change_template</td>
<td></td>
</tr>
</tbody>
</table>

Note: The attribute name must match the change request field name, and the value specified must be valid.

### Sample JSON payload

```json
{
  "callbackURL":"http://192.168.0.4:3000/jenkins/sn-devops/pipeline_839b7605-b98d-4831-bc87-96829de7da37",
  "orchestrationTaskURL":"http://192.168.0.4:3000/jenkins/job/java_sample_tests#deploy/",
}
"isMultiBranch":"false",
"orchestrationTaskName":"java_sample_tests#deploy",
"orchestrationTaskDetails":{
    "triggerType":"upstream",

    "upstreamTaskExecutionURL":"http://192.168.0.4:3000/jenkins/job/java_sample_tests/129/execution/node/35/wfapi/describe",

    "taskExecutionURL":"http://192.168.0.4:3000/jenkins/job/java_sample_tests/129/execution/node/50/wfapi/describe"
},

"changeRequestDetails":{
    "setCloseCode":false,
    "attributes":{
        "sys_created_by":"1832fbed701120035ae23c7ce610369",
        "sys_updated_by":"56826bf03710200044e0bfc8bcbe5dca",
        "requested_by":{
            "name":"Abel Tuter"
        },
        "watch_list":[
            {
                "name":"Abel Tuter"
            },
            {
                "name":"Aileen Mottern"
            },
            {
                "name":"Alejandra Prenatt"
            },
            "56826bf03710200044e0bfc8bcbe5dca"
        ],
        "work_notes_list":[
            "56826bf03710200044e0bfc8bcbe5dca",
            "46c6f9efa9fe198101ddf5eed9adf6e7",
            "d8f57f140b20220050192f15d6673a98"
        ],
        "assigned_to":"1832fba1d701120035ae23c7ce610369",
        "category":"Service",
        "sys_created_on":"2021-02-09 18:58:41",
        "priority":"2",
    }
}
}
Pipeline examples

Change request details - Azure pipeline

Job-level settings - Jenkins
Using DevOps Model Change Request flow

Starting with version 1.14, customize or recreate the DevOps Model Change Request flow based on your requirements using a flow or a script.

In the DevOps Model Change Request flow, the state of step execution is changed based on the change approval. However, you can customize or recreate this flow based on your requirements.

After the change request state is moved to approve, canceled, or rejected (either manually or by using a change policy), call the **Update state of step execution based on change approval** Flow Designer action to update the State field of step execution record.

You can use either a flow or a script to call the action.

**Calling the Flow Designer action using a flow**

Calling the **Update state of step execution based on change approval** Flow Designer action is required to update the state of the step execution record according to the approval field in the change request record.

This action serves as a trigger for the **Change Control Callback** flow, which is used to notify the change decision to the orchestration tool.
Calling the Flow Designer action using a script

Method to call the Flow Designer action from a script:

```javascript
sn_fd.FlowAPI.executeAction('sn_devops.name_of_FD_action', inputs);
```
Default Change Handler subflow
Use the Default Change Handler subflow to populate these change request fields with default values.

- Requested by
- Justification
- Implementation Plan
- Backout plan
- Test Plan
- Short Description
- Description
- Start Date
- End Date
- Risk Impact Analysis

The Default Change Handler subflow overrides the field values that were populated using a template while creating the change request record.

If desired, you can write a custom subflow in place of this flow by modifying the [sn_devops.change_request_handler_subflow] DevOps property.

DevOps# Demo# Change Automation flow
When demo data is installed, Flow Designer DevOps# Demo# Change Automation flow# is available where# normal type change requests can be auto-approved based on the decision policies.

As a part of demo data, the decision policies available are:
• Low risk auto approval policy, where the failed test count is zero.
• High risk manual approval policy, where the failed test count is greater than zero.

As a part of the demo flow, Flow Designer actions available are:

• DevOps Set Change Window
  Action used to set the change request start date.
• Get Change Policy User/Group
  Action used to fetch the user/group based on the change request approval policy.
• DevOps Create Auto Approval Record
  Action used by the user to create Auto-Approve/Auto-Reject approval records.
DevOps dashboard and Pipeline UI

Use the DevOps Insights dashboard to evaluate the results of your overall DevOps process. Use the DevOps Pipeline UI view to visualize your pipeline executions.
DevOps Insights dashboard

The DevOps Insights dashboard consists of a flexible graphical view that you can tailor to your needs, which is helpful for DevOps administrators when planning and providing updates.

ℹ️ Note: You must Install DevOps Insights to view the Insights Standard dashboard.

Use this dashboard to analyze operational and business reports and determine the overall efficiency and growth associated with your development processes.

- Monitor activities, KPIs, and metrics in a central dashboard.
- Track performance over time using ServiceNow Performance Analytics.
- Access breakdowns by pipeline, app, step, or team.

DevOps Pipeline UI view

The Pipeline UI view lets you visualize interactions and results across a pipeline execution. This graphical view shows pipeline step progression and other details, including change requests, step execution, artifact versions, test summaries, and commits.

DevOps Insights Standard dashboard

Use the DevOps Insights application with ServiceNow Performance Analytics to gain insight into your DevOps environment.

ℹ️ Note: Starting with version 1.14, unless these jobs were previously customized, you must select Active and set the Run As credentials to System Administrator to collect daily or historical Insights data:

- [DevOps] Daily Data Collection (Daily) (inactive by default)

ℹ️ Note: This is a scheduled job (to be run on a regular basis) to collect daily DevOps data. For optimal performance, set this job to run during periods of low usage.

- [DevOps] Historical Data Collection (On Demand) (inactive by default)

For new DevOps Insights installations, if you have already been using the DevOps app and you installed DevOps Insights at a later date, run the Historical Data Collection job to collect historical Insights data.

ℹ️ Note: This job is a one-time job to collect historical DevOps data, and not meant to be on a schedule. It might take awhile, so plan on running this job during a period of low usage.
Reports in the dashboard tabs get updated when the dashboard is refreshed.

Change Acceleration

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Changes Submitted - Yearly</td>
<td>Change Request</td>
<td>Total DevOps changes submitted yearly.</td>
</tr>
<tr>
<td>Avg Time to Close - Last 30 days</td>
<td>Change Request</td>
<td>Average time to close DevOps changes in the last 30 days.</td>
</tr>
<tr>
<td>Change Approval Rate - Last 30 days</td>
<td>Change Request</td>
<td>DevOps average change success rate for change requests in the last 30 days:</td>
</tr>
</tbody>
</table>

Note: This widget uses average aggregation and does not support multi-element selection.
<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change Request Volume</td>
<td>Change Request</td>
<td>Volume of change requests created for DevOps in the last 7 days. Compare the number of change requests created after you transition to DevOps so you can see the advantage of running DevOps in your environment.</td>
</tr>
</tbody>
</table>
| Non-DevOps Change Approval Rate - Last 30 days | Change Request | Non-DevOps change approval rate for change requests in the last 30 days: 
\[
\frac{[[\text{Non-DevOps Change Approval}]]}{[[\text{Non-DevOps Change}]]} \times 100
\]

**Note:** Filter is not applicable to this widget. |
<p>| Pending Changes per Pipeline                | Step Execution | Number of change requests that have not been closed for each pipeline.                                                                                                                                          |</p>
<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change Acceleration (continued)</td>
<td></td>
<td>See the blockages in each pipeline that are keeping the change request from being completed so you can investigate the cause.</td>
</tr>
<tr>
<td>Average Time to Close Changes</td>
<td>Change Request</td>
<td>Average time to close DevOps changes by app.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compare DevOps change request statistics with non-DevOps change requests to see that DevOps change requests are getting resolved faster.</td>
</tr>
<tr>
<td>Changes Awaiting Approval</td>
<td>Change Request</td>
<td>Number of DevOps changes awaiting approval by date range.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compare DevOps change request statistics with non-DevOps change requests to see that DevOps change requests are getting resolved faster.</td>
</tr>
<tr>
<td>Non-DevOps Changes Awaiting Approval</td>
<td>Change Request</td>
<td>Number of Non-DevOps changes awaiting approval by date range.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compare DevOps change request statistics with non-DevOps change requests to see that DevOps change requests are getting resolved faster.</td>
</tr>
</tbody>
</table>
**Accelerate Metrics**

Starting with version 1.15, the Accelerate Metrics tab shows deployment frequency, lead time, MTTR, and change failure rate info.

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deployment Frequency - Monthly</td>
<td>Step Execution</td>
<td>Number of successful production deployments in a month.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applies to steps of type <strong>Prod Deploy</strong> that are in completed state.</td>
</tr>
<tr>
<td>Average Lead Time</td>
<td>Pipeline Execution</td>
<td>Average of: ([Time the code is successfully pushed to production] - [Earliest commit time])</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applies to steps of type <strong>Prod Deploy</strong> that are in completed state.</td>
</tr>
</tbody>
</table>
### Accelerate Metrics (continued)

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
</table>
| Mean Time to Resolve - Last 30 days  | Database view joined by Incident, Change Request, Step Execution, Step, Pipeline, and App lists. | Average resolve time for an incident caused by a DevOps change in the last 30 days.  

**Note:** This widget uses average aggregation and does not support multi-element selection. |
| Change Failure Rate - Monthly        | Change Request                                                              | Average change failure rate in a month.  

**Note:** This widget uses formula and does not support multi-element selection. |
| Deployment Frequency                 | Step Execution                                                              | Number of successful production deployments in the last 30 days.  

Applies to steps of type `Prod Deploy` that are in completed state. |
| Change Failure Rate                  | Change Request                                                              | Average change failure rate in the last 30 days.  

**Note:** This widget uses formula and does not support multi-element selection. |
| Mean Time to Resolve Trend           | Database view joined by Incident, Change Request, Step Execution,           | Daily average resolve time for an incident caused by a DevOps change.  

Note: This widget uses average aggregation and does not support multi-element selection. |
**Operational Stability**
Starting with version 1.14, the Operational Stability tab shows:

- Service availability
  Average service availability and daily service availability
- Mean time to resolve (MTTR)
  Mean time to resolve and daily mean time to resolve

**Note:** You must install the Service Portfolio Management Foundation (com.snc.service_portfolio) plugin to see service availability widgets.

Demo data is also provided for the service availability widgets.

**Note:** You must install the Service Portfolio Management Foundation (com.snc.service_portfolio) plugin before installing the DevOps Insights application to see demo data.
Operational Stability

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
</table>
| Mean Time to Resolve - Last 30 days          | Database view joined by Incident, Change Request, Step Execution, Step, Pipeline, and App lists. | Average resolve time for an incident caused by a DevOps change in the last 30 days.  

**Note:** This widget uses average aggregation and does not support multi-element selection. |
<p>| Incidents - Monthly                          | Incident                                                                  | Number of incidents in a month (based on pipeline steps of type <strong>Prod Deploy</strong>) linked to business service in CMDB. This report provides an indication of environment stability. |
| Average Service Availability - Last 30 days   | Database view joined by Service Availability, Service Offering, Business   | Average service availability in the last 30 days (based on pipeline steps of type <strong>Prod Deploy</strong>) linked to business service in CMDB. This report provides an indication of environment stability. |</p>
<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outages - Monthly</td>
<td>Outage</td>
<td>Number of outages in a month (based on pipeline steps of type <strong>Prod Deploy</strong>) linked to business service in CMDB. This report provides an indication of environment stability.</td>
</tr>
<tr>
<td>Mean Time to Resolve Trend</td>
<td>Database view joined by Incident, Change Request, Step Execution, Step, Pipeline, and App lists.</td>
<td>Daily average resolve time for an incident caused by a DevOps change.</td>
</tr>
<tr>
<td>Service Availability Trend</td>
<td>Database view joined by Service Availability, Service Offering, Business Service, Step, Pipeline, and App lists.</td>
<td>Daily average service availability (based on pipeline steps of type <strong>Prod Deploy</strong>) linked to application service in CMDB. This report provides an indication of environment stability.</td>
</tr>
<tr>
<td>Incidents Trend</td>
<td>Incident</td>
<td>Daily number of incidents (based on pipeline steps of type <strong>Prod Deploy</strong>) linked to business service in CMDB.</td>
</tr>
</tbody>
</table>
Operational Stability (continued)

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>This report provides an indication of environment stability.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Outage Trend

| Outage Trend | Outage       | Daily number of outages (based on pipeline steps of type **Prod Deploy**) linked to business service in CMDB. This report provides an indication of environment stability. |

Development

Commit Frequency

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commit Frequency</td>
<td>Commit</td>
<td>Number of commits measured daily. Smaller more frequent commits are preferred.</td>
</tr>
<tr>
<td>Report</td>
<td>Source list</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Average Branches per Repository</td>
<td>Branches, Repository</td>
<td>Average branches per repository on a given day.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: This widget uses formula and does not support multi-element selection.</td>
</tr>
<tr>
<td>Average Commits per Pipeline Execution</td>
<td>Commit, Pipeline Execution</td>
<td>Average commits per pipeline on in the last 30 days:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[[Total number of commits]] / [[Number of pipeline executions]]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: This widget uses average aggregation and does not support multi-element selection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A low number is preferable, which indicates a concentrated effort, versus switching from task to task without completion.</td>
</tr>
<tr>
<td>Commits without Work Item</td>
<td>Commit</td>
<td>Commits made that are not tied to a work item, grouped by committer, in the last 30 days.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This report is useful for investigating and</td>
</tr>
</tbody>
</table>
Development (continued)

<table>
<thead>
<tr>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
</table>

| resolving why a commit is not tied to a work item, since all commits should be tied to a work item. |

| Work Items | Work Item | Number of work items that are complete or working in progress in the last 30 days. |

Note: Filter is not applicable to this widget.

Commit Insights
## Commit Insights

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Committers</td>
<td>Commit</td>
<td>Committers that submitted commits in the last 30 days. Shows how many active committers there are.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> This widget uses count distinct aggregation and does not support multi-element selection.</td>
</tr>
<tr>
<td>Average Commits per Committer</td>
<td>Commit</td>
<td>Total number of commits in the last 30 days / Active committers. Shows how often committers are committing. A higher value is more favorable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> This widget uses formula and does not support multi-element selection.</td>
</tr>
<tr>
<td>Average Files Added per Commit</td>
<td>Commit, Commit Details</td>
<td>Total number of files added in the last 30 days / Total number of commits in the last 30 days. Shows how few files are committed at a time. A lower value is more favorable.</td>
</tr>
</tbody>
</table>
### Commit Insights (continued)

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Commits Reverted</td>
<td>Commit</td>
<td>Commits reverted in the last 30 days / Total number of commits in the last 30 days. Shows how many commits have been reverted. A lower value is more favorable.</td>
</tr>
<tr>
<td>Top Committers</td>
<td>Commit</td>
<td>Committers with the highest number of commits in the last 30 days. Provides visibility into the users that commit the most.</td>
</tr>
<tr>
<td>Top Reverters</td>
<td>Commit</td>
<td>Committers with the highest number of reverts in the last 30 days. Provides visibility into the users that revert commits the most.</td>
</tr>
<tr>
<td>Commits Added per App</td>
<td>Commit, Commit Details</td>
<td>Number of commits added per app in the last 30 days.</td>
</tr>
</tbody>
</table>
Commit Insights (continued)

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Provides visibility into the development activity for each app.</td>
</tr>
<tr>
<td><img src="https://example.com/note-icon.png" alt="Note" /></td>
<td></td>
<td>Note: Filter is not applicable to this widget.</td>
</tr>
</tbody>
</table>

Deployments

Deployment frequency lets you know how often you are delivering value based on production deployments. Typically, more frequent deployments are desired.

![Deployment Frequency - Monthly](https://example.com/deployment-graph.png)

![Failed Deployments](https://example.com/failed-deployments-graph.png)

![Deployment Success Rate](https://example.com/success-rate-graph.png)

![Average Lead Time](https://example.com/lead-time-graph.png)

Successful Production Deployments

Failed Production Deployments

Commit-to-Deploy Lead Time

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deployment Frequency - Monthly</td>
<td>Step Execution</td>
<td>Number of successful production deployments in a month.</td>
</tr>
</tbody>
</table>
### Deployments (continued)

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed Deployments</td>
<td>Step Execution</td>
<td>Number of failed production deployments in the last 30 days. Applies to steps of type <strong>Prod Deploy</strong> that are in failed or user-canceled state.</td>
</tr>
<tr>
<td>Deployment Success Rate</td>
<td>Step Execution</td>
<td>Deployments success rate over the last 30 days. Deployment Success Rate = (Number of Successful Deployments in the last 30 days / Total Number of Deployments in the last 30 days) * 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applies to steps of type <strong>Prod Deploy</strong> in completed state.</td>
</tr>
<tr>
<td>Average Lead Time</td>
<td>Pipeline Execution</td>
<td>Average of: (Time the code is successfully pushed to production) - (Earliest commit time)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applies to steps of type <strong>Prod Deploy</strong> that are in completed state.</td>
</tr>
</tbody>
</table>

**Note:** This widget uses formula and does not support multi-element selection.
## Deployments (continued)

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
</table>
| ![Note: This widget uses average aggregation and does not support multi-element selection.](image) | ![Step Execution](image) | Successful Production Deployments  
Frequency of successful production deployments over time broken down by app.  
More frequent production deployments are preferred. |
| ![Failed Production Deployments](image) | ![Step Execution](image) | Failed Production Deployments  
Frequency of failed production deployments over time broken down by app. |
| ![Commit-to-Deploy Lead Time](image) | ![Pipeline Execution](image) | Commit-to-Deploy Lead Time  
Duration from the earliest commit time to production deployment (for a successful pipeline execution).  
Minimizing the time it takes from committing code to successfully running it in production is preferable.  
When the lead time is high, you can investigate the pipeline to identify the slowest steps. For example, a manual change approval process could increase lead time. |
System Health

Task Execution Success Rate

![Graph showing Task Execution Success Rate]

<table>
<thead>
<tr>
<th>Report</th>
<th>Source list</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task Execution Success Rate</td>
<td>Task Executions</td>
<td>Success rate for tasks run by the execution tools over time:</td>
</tr>
</tbody>
</table>
|                         |                   | \[
|                         |                   | \frac{\text{Task Execution Success}}{\text{Task Execution}} \times 100\].     |
|                         |                   | **Note:** This widget does not support multi-element selection.            |
| Number of Task Executions | Task Executions   | Default number of tasks executions in the last 30 days.                      |
| Number of API calls     | Event             | Default number of API calls in the last 30 days.                           |
DevOps Pipeline UI

Use the Pipeline UI to visualize interactions and results across a pipeline execution. This graphical view shows pipeline step progression and other details for each pipeline.

From DevOps, get a quick view of how everything is connected to see exactly what is happening with the pipeline and when. From the ServiceNow Change Management application, you can access the Pipeline UI and quickly see the commits, the committers, and other details for the change request in one place.

Starting with version 1.19, the Pipeline UI shows the pipeline steps that ran instead of the steps configured in DevOps.

You can access the Pipeline UI using the related link from within certain DevOps forms, and also from a DevOps change request form:

- DevOps Pipeline form
- DevOps Pipeline Execution form
- Change Request form created by DevOps

Note: You must reload the view to update the status buttons in the pipeline execution History.

Step run states (task execution status)

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Successful. All step executions associated to the pipeline execution passed.</td>
</tr>
<tr>
<td>Grey</td>
<td>Not yet run.</td>
</tr>
<tr>
<td>Yellow</td>
<td>Waiting (pending, building, validating). At least one step execution is waiting.</td>
</tr>
<tr>
<td>Red</td>
<td>Failed. At least one step execution failed.</td>
</tr>
</tbody>
</table>
Step run states (task execution status) (continued)

Task execution end date is populated even when the change is rejected.

Note: The order the cards appear in the Pipeline UI is determined by the Order field in each pipeline step when you modeled your pipeline in DevOps. Skipped stages are not shown.

Starting with version 1.18, the order the cards appear in the Pipeline UI is by task execution.

<table>
<thead>
<tr>
<th>UI feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline steps</td>
<td>Timing.</td>
</tr>
<tr>
<td></td>
<td>• Start</td>
</tr>
<tr>
<td></td>
<td>• Last run</td>
</tr>
<tr>
<td></td>
<td>• Duration for each step</td>
</tr>
<tr>
<td></td>
<td>When the downstream task execution starts immediately after the upstream task execution, the duration is 0 seconds.</td>
</tr>
<tr>
<td></td>
<td>• Wait times in between task executions.</td>
</tr>
<tr>
<td></td>
<td>Wait time is calculated as:</td>
</tr>
<tr>
<td></td>
<td>Start time of the task execution minus the end time of the upstream task execution.</td>
</tr>
<tr>
<td>View change request</td>
<td>Change request record.</td>
</tr>
<tr>
<td>UI feature</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Click directly into the change request of the step that was created by DevOps to view details of the change and take action.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Starting with version 1.21, commits reverted in the same pipeline execution are not shown in the commit list.</td>
</tr>
<tr>
<td>Pipeline history</td>
<td>Pipeline Execution.</td>
</tr>
<tr>
<td></td>
<td>Click a history tile to view the previous step details for a pipeline execution.</td>
</tr>
</tbody>
</table>
| Artifacts      | • Artifact versions  
|                |   ◦ Work items  
|                |   ◦ Commits  
|                |   ◦ Packages  
|                | • Commits  
|                | • Work items  
|                | **Note:** Starting with version 1.21, commits reverted in the same pipeline execution are not shown in the commit list.                     |
| Quality        | Build Test Summary.                                                                                                                         |
|                | View the build test results to see what tests passed or failed.                                                                            |
|                | Starting with version 1.15, the quality card contains test summaries:  
|                |   • Test type and test category in the format:  
|                |     test type/test category  
|                |   • Native ID of the step  
|                |   • Test pass percentage (unit and functional tests only)  

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## UI feature

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Throughput (performance tests only)</td>
</tr>
<tr>
<td>• Step name</td>
</tr>
</tbody>
</table>

Starting with version 1.16, click directly into DevOps change requests, step executions, artifacts, artifact versions, work items, and test summaries in flyout windows.

### Pipeline UI - Artifact version flyout

User-created DevOps integrations

User-created integrations are for integrating additional planning, coding, and test tools not included in the integrations provided with the DevOps application. The DevOps application includes tool definitions for integrating some common planning, coding, and test tools, but you can also set up user-created integrations for additional tools in your DevOps environment.

**Note:** User-created integrations for orchestration tools is not supported.

**DevOps integration objects**

DevOps tool integration consists of these objects.
**Tool capability actions**

- **Starting with version 1.9, Connect action:**
  
  When connecting, the subflow for the specific tool is called and the connection state is updated. The connection status message is shown on the form.

  See **Connect capability subflow** for more details.

- **Starting with version 1.9, Discover action:**
  
  When discovering, an import request record is created and the subflow for the specific tool is called (as defined in the Integration Capability record). **Detail** and **Status** fields in the Import Request record are updated with the number of items discovered, updated, and failed.

  The transformed payload consists of an array of objects as a JSON string. Elements vary depending on the tool type.

  See **Discover capability subflow** for more details.

  **Note:** Pagination is not supported in the Discover action for user-created integrations.

- **Starting with version 1.12, Import action:**
  
  Import action does not support historical import functionality.

- **Starting with version 1.12, Lookup action:**
  
  The Lookup main flow is provided to support artifact tool type in a subflow created by your integration developer.

- **Notification (webhook) action:**
  
  The source tool is configured manually (by your integration developer) to send raw data to the ServiceNow instance. The raw payload is then transformed into a standard JSON object using a subflow.
See the Notification capability subflow and the DevOps - POST /devops/tool/ {capability} endpoint of the DevOps API for more details.

Note: Starting with version 1.11, if a subflow is not specified, default handling of notifications occurs (original payload is automatically copied to transformed payload).

This behavior is useful when the transactional data of the tool is supported by ServiceNow DevOps as is.

See the expected standard payloads in the Notification capability subflow for more details.

DevOps integration configuration overview

Tool integration configuration can be completed by your integration developer and your DevOps admin.

Integration developer

- Create a tool integration record in DevOps to define the tool you are integrating (source tool).
- Create a Flow Designer subflow to collect and transform data from the tool you are integrating (source tool).
- Create a tool capability mapping record in DevOps to map the tool integration record to the tool type capability.

Note: Notifications (webhook) capability is supported. Starting with version 1.9, connect and discover capabilities are also supported.

- Create an integration capability record in DevOps to specify the action for the tool type capability.

DevOps admin

- Create a (planning, coding, or test) tool record in DevOps to connect to the tool you are integrating (source tool).

Note: The tool integration record must be specified in the Tool field of the tool record.

- Configure the source tool with the webhook and credentials.
Inbound events

An inbound event serves as a staging area for the notifications flow that supports reprocessing of failed payloads. Meaning, a record in an error state from a failed integration or transformation can be retried.

If an Inbound Event record is in the Error state, the flow was not able to insert the record successfully into the core DevOps tables.

Common errors can be resolved with these actions.

**Inbound event error states**

<table>
<thead>
<tr>
<th>Error</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing required fields</td>
<td>The transformed payload does not match the standard payload.</td>
</tr>
<tr>
<td></td>
<td>Refer to the standard and JSON payloads provided.</td>
</tr>
<tr>
<td>Repository not marked for tracking</td>
<td>The commit cannot be inserted.</td>
</tr>
<tr>
<td></td>
<td>The DevOps admin needs to track the repository.</td>
</tr>
<tr>
<td>[Subflow] has not been published within application scope [app_scope]</td>
<td>The subflow is created but not published yet.</td>
</tr>
<tr>
<td>Timeout exception</td>
<td>The subflow takes more time than the value set in the property:</td>
</tr>
<tr>
<td></td>
<td>com.glide.hub.flow_api.default_execution_time</td>
</tr>
<tr>
<td></td>
<td>See FlowAPI.executeSubflowQuick(String name, Map inputs, Number timeout) for more details.</td>
</tr>
</tbody>
</table>

**Note:** Starting with version 1.10, the execution of the subflow exceeds the value set in the **Timeout** field in the Integration Capability record.

| Did not find a matching subflow for notification capability and [tool_integration_sys_id] tool integration | The flow was not able to find the matching subflow. Verify the integration setup procedure. |
### Inbound event error states (continued)

<table>
<thead>
<tr>
<th>Error</th>
<th>Action</th>
</tr>
</thead>
</table>
| Payload does not match the expected capability. | The **Original payload** (payload being sent) is a different **Capability** type than the tool type capability configured in your tool capability mapping.  
The payload type must match the tool type capability configured in your tool integration. |

> **Note:** An inbound event record is not created when any of the following conditions occur:

- Source tool has not passed the tool ID as a query parameter.
- Source tool has passed on a tool ID, but there is no matching tool ID in the instance.

### Tool mappings

A tool can be mapped to multiple capabilities.

<table>
<thead>
<tr>
<th>Tool Integration</th>
<th>Tool Type Capability</th>
<th>Tool Capability Mapping</th>
</tr>
</thead>
</table>
| Agile Development 2.0 | Plan, Code, Orchestration, Artifact, Test | Plan  
  - Agile Development 2.0 - Plan  
  - Azure DevOps - Plan  
  - Jira - Plan |
| Azure DevOps | Code  
  - Azure DevOps - Code  
  - Bitbucket - Code  
  - GitHub - Code  
  - GitHub Enterprise - Code  
  - GitLab - Code |
| Bitbucket | Code  
  - Azure DevOps - Code  
  - Bitbucket - Code  
  - GitHub - Code  
  - GitHub Enterprise - Code  
  - GitLab - Code |
| GitHub | Code  
  - Azure DevOps - Code  
  - Bitbucket - Code  
  - GitHub - Code  
  - GitHub Enterprise - Code  
  - GitLab - Code |
| GitHub Enterprise | Code  
  - Azure DevOps - Code  
  - Bitbucket - Code  
  - GitHub - Code  
  - GitHub Enterprise - Code  
  - GitLab - Code |
| GitLab | Code  
  - Azure DevOps - Code  
  - Bitbucket - Code  
  - GitHub - Code  
  - GitHub Enterprise - Code  
  - GitLab - Code |
| Jenkins | Code  
  - Azure DevOps - Code  
  - Bitbucket - Code  
  - GitHub - Code  
  - GitHub Enterprise - Code  
  - GitLab - Code |
| Jira | Code  
  - Azure DevOps - Code  
  - Bitbucket - Code  
  - GitHub - Code  
  - GitHub Enterprise - Code  
  - GitLab - Code |

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### Tool Integration

<table>
<thead>
<tr>
<th>Tool Type Capability</th>
<th>Tool Capability Mapping</th>
</tr>
</thead>
</table>
|                      | • Azure DevOps - Orchestration  
|                      | • Jenkins - Orchestration  
|                      | • GitLab - Orchestration  
|                      | Test                      |
|                      | • Azure DevOps - Test  
|                      | • Jenkins - Test |

A tool capability mapping can be mapped to multiple actions.

### Tool Capability Mapping

<table>
<thead>
<tr>
<th>Tool Capability Mapping</th>
<th>Tool Action</th>
<th>Integration Capability</th>
</tr>
</thead>
</table>
| • Agile Development 2.0 - Plan | • Connect  
|                          | • Discover  
|                          | • Import  
|                          | • Lookup  
|                          | • Notification  |
| • Azure DevOps - Plan | Agile Development 2.0  
| • Azure DevOps - Code | • Azure DevOps - Plan - Connect  
|                          | • Azure DevOps - Plan - Discover  
| • Azure DevOps - Orchestration | • Azure DevOps - Plan - Import  
| • Bitbucket - Code | • Azure DevOps - Plan - Notification  
| • GitHub - Code | Azure DevOps  
| • GitHub Enterprise - Code | • Azure DevOps - Plan - Connect  
|                          | • Azure DevOps - Plan - Discover  
|                          | • Azure DevOps - Plan - Notification  
| • GitLab - Code | • Azure DevOps - Code - Discover  
| • GitLab - Orchestration | • Azure DevOps - Code - Notification  
|                          | • Azure DevOps - Orchestration - Discover  
| • Bitbucket | • Azure DevOps - Orchestration - Notification  

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<table>
<thead>
<tr>
<th>Tool Capability Mapping</th>
<th>Tool Action</th>
<th>Integration Capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Jenkins - Orchestration</td>
<td></td>
<td>• Bitbucket - Code - Connect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bitbucket - Code - Discover</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bitbucket - Code - Import</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bitbucket - Code - Notification</td>
</tr>
<tr>
<td>• Jira - Plan</td>
<td></td>
<td>GitHub</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitHub - Code - Connect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitHub - Code - Discover</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitHub - Code - Import</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitHub - Code - Notification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GitHub Enterprise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitHub - Code - Connect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitHub - Code - Discover</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitHub - Code - Import</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitHub - Code - Notification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GitLab</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitLab - Code - Connect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitLab - Code - Discover</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitLab - Code - Notification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GitLab - Orchestration - Notification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jenkins</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jenkins - Orchestration - Connect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jenkins - Orchestration - Discover</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jenkins - Orchestration - Import</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jenkins - Orchestration - Notification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jira</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jira - Plan - Connect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jira - Plan - Discover</td>
</tr>
</tbody>
</table>
Multiple test types can be mapped to each tool integration.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Tool Integration</th>
<th>Test Type Mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit:</td>
<td></td>
<td><strong>Azure DevOps</strong></td>
</tr>
<tr>
<td>• JUnit</td>
<td>• Azure DevOps</td>
<td>• Azure DevOps - JUnit</td>
</tr>
<tr>
<td></td>
<td>• Jenkins</td>
<td>• Azure DevOps - Integration</td>
</tr>
<tr>
<td>Functional:</td>
<td></td>
<td>• Azure DevOps - Regression</td>
</tr>
<tr>
<td>• Integration</td>
<td>• Azure DevOps</td>
<td>• Azure DevOps - Smoke</td>
</tr>
<tr>
<td>• Regression</td>
<td>• Azure DevOps</td>
<td>• Azure DevOps - System</td>
</tr>
<tr>
<td>• Smoke</td>
<td>• Azure DevOps</td>
<td>• Azure DevOps - User Acceptance</td>
</tr>
<tr>
<td>• System</td>
<td>• Azure DevOps</td>
<td>• Azure DevOps - Load</td>
</tr>
<tr>
<td>• User Acceptance</td>
<td></td>
<td><strong>Jenkins</strong></td>
</tr>
<tr>
<td>Performance:</td>
<td></td>
<td>• Jenkins - JUnit</td>
</tr>
<tr>
<td>• Load</td>
<td></td>
<td>• Jenkins - Integration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jenkins - Regression</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jenkins - Smoke</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jenkins - System</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jenkins - User Acceptance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jenkins - Load</td>
</tr>
</tbody>
</table>

**DevOps test tool integration**

Test tool integration lets you view test results in DevOps for Jenkins, Azure DevOps, and GitLab unit, functional, and performance tests.

Starting with version 1.15, JUnit test type integration is supported for Jenkins and Azure DevOps.
Starting with version 1.23, JUnit test type integration is supported for GitLab.

Note: For other test types, use the DevOps - POST /devops/tool/{capability} endpoint of the DevOps API.

Starting with version 1.20:

• Selenium tests run and published using TestNG are reported by the Jenkins plugin for ServiceNow DevOps.
• Test type categorization is supported.
• Additional tests results reported by tools, such as Apache JMeter, can be processed in DevOps using custom Flow Designer subflows (no pipeline changes required).

<table>
<thead>
<tr>
<th>Category</th>
<th>Test type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>JUnit (default)</td>
</tr>
<tr>
<td></td>
<td>You can change the default test type by modifying the [sn_devops.default_test_type] DevOps property.</td>
</tr>
<tr>
<td>Functional</td>
<td>• Integration</td>
</tr>
<tr>
<td></td>
<td>• Regression</td>
</tr>
<tr>
<td></td>
<td>• Smoke</td>
</tr>
<tr>
<td></td>
<td>• System</td>
</tr>
<tr>
<td></td>
<td>• User Acceptance</td>
</tr>
<tr>
<td>Performance</td>
<td>Load</td>
</tr>
</tbody>
</table>

Test type mapping

The test type mapping connects the test type and entity being tested with the DevOps tool (DevOps > Integrations > Test Type Mappings module.)

An accurate test type mapping ensures that the test type always appears as intended in the test summary results.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test type</td>
<td>• JUnit</td>
</tr>
<tr>
<td></td>
<td>• Integration</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>• Regression</td>
<td></td>
</tr>
<tr>
<td>• Smoke</td>
<td></td>
</tr>
<tr>
<td>• System</td>
<td></td>
</tr>
<tr>
<td>• User Acceptance</td>
<td></td>
</tr>
<tr>
<td>• Load</td>
<td></td>
</tr>
<tr>
<td>DevOps Entity Id</td>
<td>DevOps table name that contains the entity linked to the test results (in the test report payload).</td>
</tr>
<tr>
<td>Table name</td>
<td>DevOps table name that contains the entity linked to the test results (in the test report payload).</td>
</tr>
<tr>
<td>• Step [sn_devops_step]</td>
<td></td>
</tr>
<tr>
<td>• Pipeline [sn_devops_pipeline]</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Only DevOps Step and</td>
<td>Only DevOps Step and Pipeline tables are supported.</td>
</tr>
<tr>
<td>Pipeline tables are supported.</td>
<td></td>
</tr>
<tr>
<td>Document</td>
<td>Name of the entity specified in the selected table.</td>
</tr>
<tr>
<td></td>
<td>For example, the name of the step, pipeline, artifact, or package.</td>
</tr>
<tr>
<td>Test File Paths</td>
<td>Path to the generated test result file on the Jenkins server.</td>
</tr>
<tr>
<td>(Jenkins tests only)</td>
<td>Path to the generated test result file on the Jenkins server.</td>
</tr>
<tr>
<td></td>
<td>This is useful so test reports with attributes that don’t conform to JUnit or TestNG implementation, such as JMeter for example, can still be</td>
</tr>
<tr>
<td></td>
<td>leveraged by DevOps.</td>
</tr>
<tr>
<td></td>
<td>Separate multiple files by a comma.</td>
</tr>
</tbody>
</table>
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool integration</td>
<td>Tool that's running the test.</td>
</tr>
<tr>
<td>DevOps Table</td>
<td>DevOps table that corresponds to the table name in the DevOps Entity Id setting.</td>
</tr>
</tbody>
</table>

#### Transforming a raw test payload

You can transform a raw test report (a report containing attributes that do not conform to JUnit or TestNG implementation), such as JMeter for example, by configuring the **DevOps Test Subflow Policy** decision table to call a custom subflow (Decision Tables > Decision Tables module).

**Note:** You must create the custom Flow Designer subflow that transforms the raw test payload.

If there is more than one test type in a performance stage, you can use the **DevOps Test Type Policy** decision table to configure the test type for each test so the test result payloads are transformed correctly.
<table>
<thead>
<tr>
<th>Decision table</th>
<th>Purpose</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>DevOps Test Subflow Policy</td>
<td>To automatically call a custom subflow that transforms the raw payload received by the tool. Decision inputs: Test Result Payload, Test Type</td>
<td>Create a decision that specifies the custom subflow to call when the raw payload is received. Set the conditions to contain fields that would be included in the raw payload. For example, to call Jenkins BZ Performance Test custom subflow: Conditions: * Test Type is Load (Load is the test type configured for performance tests) * Test Result Payload contains throughput * Test Result Payload contains concurrency Answer: Flow: Jenkins BZ Performance Test</td>
</tr>
<tr>
<td>DevOps Test Type Policy</td>
<td>To automatically set test types when more than one type of test is configured in a performance test stage.</td>
<td>Create a decision for each type of test in the performance test stage to set the test type. Load test:</td>
</tr>
</tbody>
</table>
### DevOps decision tables (continued)

<table>
<thead>
<tr>
<th>Decision table</th>
<th>Purpose</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This is necessary so the results for the second test type get transformed correctly. For example, when both a Load performance test and a JUnit performance test are mapped in the same DevOps step, the JUnit test results won't get formatted correctly unless a decision is created. Decision inputs: • Step • Test Result Payload • Tool Integration • Pipeline</td>
<td>• Conditions: ◦ Step is Perf Tests ◦ Test Result Payload contains throughput ◦ Test Result Payload contains concurrency • Answer: TestType: Load</td>
</tr>
<tr>
<td></td>
<td>JUnit test:</td>
<td>• Conditions: ◦ Step is Perf Tests ◦ Test Result Payload does not contain throughput ◦ Test Result Payload does not contain concurrency • Answer: TestType: JUnit</td>
</tr>
</tbody>
</table>
DevOps multiple performance test types

```javascript
stage('Checkout') {
  snDevOpsStep()
  snDevOpsChange()
  node {
    echo 'Checking out..'
    checkout scm
  }
}

stage('Tests'){
  snDevOpsStep()
  node {
    sh 'mvn clean test'
    step([${class: 'Publisher', reportFilenamePattern: '**/testng-results.xml'}])
  }
}

stage('Perf Tests'){
  snDevOpsStep()
  node {
    bzt "load_test1.yml"
    ||unit "**/xunit.xml"
  }
}
```

DevOps multiple test type mappings

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Tool Integration</th>
<th>Name</th>
<th>DevOps Entity Id</th>
<th>DevOps Table</th>
<th>Test File Paths</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUnit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jenkins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**/aggregate-results.xml</td>
</tr>
</tbody>
</table>

DevOps decision table decision

- **Label** to use for this Decision condition:
  - **Label**: automation-perfTests-load

- **Application**: DevOps
  - **Order**: 0
  - **Answer**: Flow: Jenkins E2 Performance Test

- **All of the following conditions must be true, for this answer to be used**
  - **Test Type** is Load
  - **Test Result Payload** contains throughput
  - **Test Result Payload** contains concurrency
Test summary results
You can view test summary results these ways.

- **DevOps > Test Results** module (Test Summaries and Performance Test Summaries).
- DevOps change request - Test Results related list.
- DevOps Pipeline UI - Quality tile.

### DevOps performance test summary example

![Performance test summary example](image)

### Expected standard JSON Notification capability payload - Test tool Functional:

```json
{
    "name": "CorpSite-selenium#55",
    "duration": 78.802,
    "passedTests": 4,
    "failedTests": 0,
    "skippedTests": 0,
    "blockedTests": 0,
    "totalTests": 4,
    "startTime": "2020-06-30T18:12:31Z",
    "finishTime": "2020-06-30T18:12:31Z",
    "passingPercent": 100,

    // Use Artifact OR Package OR Build + Stage + PipelineName Attributes
    "packages": [{"name": "CorpSite-pkg1"}],
    "artifacts": [{"name": "CorpSite-artifact", "version": "1.0.0"}],
    "buildNumber": "55",
    "stageName": "test",
}
```
Configure a test tool in DevOps

Configure a test tool in DevOps to view unit, functional, and performance test results.

Before you begin
Role required: sn_devops.admin

Procedure

1. Navigate to DevOps > Integrations > Test Type Mappings and create a record to map the test type to the integration tool.

2. In the Test Type Mapping record, use the search icon (🔍) to select Test type and Tool integration field values.
3. Starting with version 1.20, click the search icon (🔍) in the **DevOps Entity Id** field, and fill in the test details.

<table>
<thead>
<tr>
<th>Table name</th>
<th>DevOps table name that contains the entity linked to the test results.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document</td>
<td>Name of the entity specified in the selected table.</td>
</tr>
</tbody>
</table>

**DevOps test mapping entity ID**

See the [Test type mapping](#) section for more details.

4. **Optional:** Starting with version 1.20, to capture the raw test payload of non-JUnit or -TestNG tests, enter an .xml filename and path (comma separate multiple files).

(Optional) You can transform a raw payload using decision tables and a custom Flow Designer subflow.

ℹ️ **Note:** You must create the custom subflow that transforms the raw payload.

See the [Transforming a raw test payload](#) section for more details on configuring decision tables.
5. Run the test and view test results by navigating to **DevOps > Test Results** (Test Summaries and Performance Test Summaries).

### DevOps Test Summaries example

<table>
<thead>
<tr>
<th>Name</th>
<th>Tool</th>
<th>Test type</th>
<th>Passing %</th>
<th>Passed tests</th>
<th>Failed tests</th>
<th>Blocked tests</th>
<th>Skipped tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>test</td>
<td>local Jenkins</td>
<td>Integration</td>
<td>100</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>test</td>
<td>local Jenkins</td>
<td>Integration</td>
<td>100</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Example:**

```java
1. stage('Checkout') {
2.   snDevOpsStep()
3.   snDevOpsChange()
4.   node {
5.     echo 'Checking out..
6.     checkout scm
7.   }
8. }
9. stage('Tests'){
10.  snDevOpsStep()
11.  node {
12.    sh 'mvn clean test'
13.    step([$class: 'Publisher', reportFilenamePattern: '**/testing-results.xml'])
14. }
15. }
16. stage('Perf Tests'){
17.  snDevOpsStep()
18.  node {
19.    bzt "load_test1.yml"
20. //junit "**/xunit.xml"
21. }
22. }
```

### Create a DevOps tool integration

To create a DevOps tool integration, your integration developer configures DevOps tool integration settings, and a Flow Designer subflow to collect and transform data from the source tool. Then your DevOps admin configures your DevOps tool connections.
Before you begin

Note: When creating an integration as a scoped app, the system admin must assign these roles to the integration developer so the integration developer is able to create tool integration and integration capability records for the specific scope.

- Developer role for the scoped app
- DevOps admin role

Role required: sn_devops.admin

About this task

Creating a DevOps tool integration procedure involves configuration by both your integration developer and your DevOps admin.

- Your integration developer creates a tool integration record in DevOps, a Flow Designer subflow, a tool capability mapping, and an integration capability record in DevOps to map the capabilities and actions together.

  Note: Notification, connect, and discover capabilities are supported.

- Your DevOps admin sets up DevOps connections (planning or coding tool), and configures the source tool with the webhook and credentials.

This procedure provides detailed steps to create your DevOps tool integration.

Procedure

1. Integration developer:
   Configure the source tool integration capabilities and actions, and a subflow.

   a. Navigate to DevOps > Integrations > Tool Integrations and create a record to define the tool you are integrating (source tool).

      Note: Do not edit the tool integration records provided with the DevOps application.

<table>
<thead>
<tr>
<th>DevOps tool integration</th>
<th>Sample Code Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool label</td>
<td>Code Tool [sn_devops_tool]</td>
</tr>
<tr>
<td>Use packageable integrations</td>
<td>Selected</td>
</tr>
<tr>
<td>Integration version</td>
<td>1.0</td>
</tr>
</tbody>
</table>
b. Navigate to **Flow Designer > Designer** and create a subflow to collect and transform data from the tool you are integrating (source tool).

**Note:** The **Run As** field must be set to System User, and the **Inputs** label must be set to current variable.

### Notification subflow properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Code Tool Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Sample Integration App</td>
</tr>
<tr>
<td>Accessible From</td>
<td>All application scopes</td>
</tr>
<tr>
<td>Description</td>
<td>Code tool for integration app</td>
</tr>
<tr>
<td>Run As</td>
<td>System User</td>
</tr>
</tbody>
</table>

The subflow must contain Get More Data via API calls, and/or transform the original payload. Copy the transformed payload into the inbound events record.

**Note:** Do not edit the DevOps main flow.

c. Navigate to **DevOps > Integrations > Tool Capability Mappings** and create a record to map the tool integration record to the tool type capability.

### DevOps tool capability mapping

<table>
<thead>
<tr>
<th>Tool integration</th>
<th>Sample tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool type capability</td>
<td>Code</td>
</tr>
</tbody>
</table>

d. Navigate to **DevOps > Integrations > Integration Capabilities** and create a record to specify the action for the tool capability mapping.

**Note:** Do not edit the integration capability records provided with the DevOps application.

### DevOps integration capability

<table>
<thead>
<tr>
<th>Tool integration</th>
<th>Sample Code Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capability mapping</td>
<td>Sample Code Tool-Code</td>
</tr>
</tbody>
</table>
### Note:
Do not edit tool type capability records.

<table>
<thead>
<tr>
<th>Action</th>
<th>Notification</th>
</tr>
</thead>
</table>

### Note:
Do not edit tool action records.

<table>
<thead>
<tr>
<th>Active</th>
<th>Selected</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Timeout (ms)</th>
<th>Timeout for the corresponding subflow. If execution of the subflow exceeds this value, a timeout exception occurs.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Note:</strong> Starting with version 1.10.</td>
<td>Value is in milliseconds (ms). Default is 45,000 (45 seconds).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subflow name</th>
<th>x_snc_sample_integ.code_tool_notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The name is prefixed by the scope name and a dot (.) before the actual subflow name.</td>
</tr>
<tr>
<td></td>
<td>For example, given:</td>
</tr>
<tr>
<td></td>
<td>• connect_code_tool subflow</td>
</tr>
<tr>
<td></td>
<td>• my_app_scope scope</td>
</tr>
<tr>
<td></td>
<td>The value for this field is</td>
</tr>
<tr>
<td></td>
<td>my_app_scope.connect_code_tool.</td>
</tr>
</tbody>
</table>

### Note:
Starting with version 1.11, if the Subflow name field is left blank for a Notification capability, default handling of notifications occurs. See Notification tool capability action.

<table>
<thead>
<tr>
<th>Domain</th>
<th>global</th>
</tr>
</thead>
</table>

---

2. DevOps admin:

Configure the connection from DevOps to the source tool.

Refer to [Setting up DevOps tools](#) for more details on completing this step.
a. The tool record must contain:
   • Reference to the tool integration record created by the integration developer (in the Tool field)
   • Tool label
   • Connection alias (connection and credential)

b. Copy the notification (webhook) created on the DevOps planning tool to the source tool service hook of the notification endpoint and set the credentials to devops.integration.user.

You can view the state of integration events in the Inbound Event list (DevOps > Administration > Inbound Events).

The inbound event record state is set to Processed once the object has been inserted into the DevOps Core table. Event states include New, In Progress, Processed, Unmatched, and Error.

3. If the tool integration record and the subflow are created in a different scope, the DevOps admin must create two new Cross scope privileges records to allow the app to access the inbound events table.

Navigate to System Applications > Application Cross-Scope Access and create read and write cross scope privileges records to allow your app to access the inbound events table.

<table>
<thead>
<tr>
<th>Field</th>
<th>Read</th>
<th>Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Scope</td>
<td>Auto populated based on the current application</td>
<td></td>
</tr>
<tr>
<td>Target Scope</td>
<td>DevOps</td>
<td></td>
</tr>
<tr>
<td>Target Name</td>
<td>sn_devops_inbound_event</td>
<td></td>
</tr>
<tr>
<td>Target Type</td>
<td>Table</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Read</td>
<td>Write</td>
</tr>
<tr>
<td>Status</td>
<td>Allowed</td>
<td></td>
</tr>
</tbody>
</table>
Example:

DevOps tool integration

Flow Designer subflow properties

Subflow Properties

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Flow Designer subflow

Inputs & Outputs

Subflow Inputs & Outputs

Inputs

<table>
<thead>
<tr>
<th>Label</th>
<th>Type</th>
<th>Mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Outputs

<table>
<thead>
<tr>
<th>Label</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Actions

1. Planview transformer

Click to add an Action, Flow Logic, or Subflow

Flow Designer DevOps Integration - Notification flow

TRIGGER

Inbound Event Created or Updated where (State is one of new,entry)

Actions

1. DevOps integration - Initialize

2. DevOps Call Subflow for notifications capability

3. DevOps integration - Process Enriched Payload

Click to add an Action, Flow Logic, or Subflow

Data

Trigger - Record Created or Updated

Inbound Event Table

Run Start Time

1. DevOps integration - Initialize

2. DevOps Call Subflow for notifications capability

3. DevOps integration - Process Enriched Payload

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# DevOps tool capability mapping

## Integration capability

<table>
<thead>
<tr>
<th>Tool Integration</th>
<th>Capability mapping</th>
<th>Action</th>
<th>Active</th>
<th>Timeout (ms)</th>
<th>Sub flow name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azure DevOps</td>
<td></td>
<td>Discover</td>
<td>![on]</td>
<td>45,000</td>
<td>sn_devops_ints.azure_devops_discover_boards</td>
</tr>
</tbody>
</table>

## Planning tool

<table>
<thead>
<tr>
<th>Name</th>
<th>Tool</th>
<th>Connection alias</th>
<th>Tool URL</th>
<th>Connection state</th>
<th>Last discovery</th>
<th>Webhook URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>PlanView</td>
<td>Planview</td>
<td>sn_devops.planview</td>
<td></td>
<td>Disconnected</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Creating DevOps subflows

For user-created integrations, create a DevOps Flow Designer subflow to collect and transform data from the tool you are integrating.

ServiceNow Flow Designer is a Now Platform feature your integration developer can use to automate processes using a sequence of actions. Trigger conditions start the flow, and variables pass information between actions.

See Flow Designer Subflows for information on how to create a subflow.

Notification capability subflow

<table>
<thead>
<tr>
<th>Item</th>
<th>Expected value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
<td>Label: current</td>
</tr>
<tr>
<td></td>
<td>Type: Reference.Inbound Event</td>
</tr>
<tr>
<td>Outputs</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Transform the original payload, and save the final payload in the transformed_payload field.

Expected standard JSON Notification capability payload - Planning tool

ℹ️ Note: The version attribute in the JSON payload is optional. Even if you do not provide the version attribute, the payload is processed successfully.

```json
{
    "id": "STR1234",
    "type": "Story",
    "shortDescription": "Planning API Spec",
    "state": "In-progress",
    "createdDateTime": "1970-01-01T08:15:30-05:00",
    "assignedTo": {
        "name": "Leo Neo",
        "userName": "lenn",
    }
}```
"id": "3fa85f64-5717-4562-b3fc-2c963f66afa6",
"email": "lenn@smithworksinc.com"
},

// The Version attribute is optional
"version": {
  "id": "REL1234",
  "shortDescription": "APIs Release",
  "createdDateTime": "1970-01-01T08:15:30-05:00",
  "app": {
    "id": "PRODUCT1234",
    "shortDescription": "Mobile UI",
    "createdDateTime": "1970-01-01T08:15:30-05:00",
    "url": "https://jira.com/mycompany/browse/PRODUCT-125"
  },
  "url": "https://jira.com/mycompany/browse/REL-125"
},

"app": {
  "id": "PRODUCT1234",
  "shortDescription": "Mobile UI",
  "createdDateTime": "1970-01-01T08:15:30-05:00",
  "url": "https://jira.com/mycompany/browse/PRODUCT-125"
},

"url": "https://jira.com/mycompany/browse/HALOKEY-25"

Expected standard JSON Notification capability payload - Coding tool

```json
{
  "id": "3fa85f64-5717-4562-b3fc-2c963f66afa6",
  "url": "https://github.com/mycompany/mobileplatform/commit/3fa85f6457174562b3fc2c963f66afa6",
  "committedDate": "1970-01-01T08:15:30-05:00",
  "repository": {
    "name": "Platform-Mobile",
    "url": "https://github.com/mycompany/mobileplatform"
  },
  "branch": {
    "name": "master",
    "path": "refs/heads/master"
  },
  "committer": {
    "email": "lenn@smithworksinc.com"
  }
}
```
Expected standard JSON Notification capability payload - Orchestration tool

```json
{
    "toolId": "bc1d9454dbdb0810ae77f3c61d9619d1",
    "buildNumber": "100",
    "nativeId": "HILR/Prod #100",
    "name": "HILR/Prod",
    "id": "HILR/Prod #100",
    "url": "https://dev.azure.com/lenn/CorpSite-ADO/_build/results?buildId=100#Prod/",
    "isMultiBranch": "false",
    "orchestrationTaskUrl": "https://dev.azure.com/lenn/CorpSite-ADO/_build?name=HILR#Prod",
    "orchestrationTaskName": "CorpSite-ADO/HILR#Prod",
    "upstreamTaskUrl": "https://dev.azure.com/lenn/CorpSite-ADO/_build/results?buildId=100#UAT/",
    "upstreamId": "CorpSite-ADO/HILR#UAT",
    "result": "building",
    "startDateTime": "2020-03-20 22:59:27"
}
```
Expected standard JSON Notification capability payload - Test tool

Functional:

```json
{
  "name": "CorpSite-selenium#55",
  "duration": 78.802,
  "passedTests": 4,
  "failedTests": 0,
  "skippedTests": 0,
  "blockedTests": 0,
  "totalTests": 4,
  "startTime": "2020-06-30T18:12:31Z",
  "finishTime": "2020-06-30T18:12:31Z",
  "passingPercent": 100,

  // Use Artifact OR Package OR Build + Stage + PipelineName Attributes
  "packages": [{"name": "CorpSite-pkg1"}],
  "artifacts": [{"name": "CorpSite-artifact", "version": "1.0.0"}],
  "buildNumber": "55",
  "stageName": "test",
  "pipelineName": "CorpSite-selenium",
}
```

Performance:

```json
{
  "name": "Performance Tests",
  "url": "http://abc.com",
  "startTime": "2020-06-30T18:12:31Z",
  "finishTime": "2020-06-30T18:12:31Z",
  "duration": 78.802,
  "maximumVirtualUsers": "",
  "throughput": "",
  "maximumTime": "",
  "minimumTime": "",
  "averageTime": "",
  "ninetyPercent": "",
  "standardDeviation": "",

  // Use Artifact OR Package OR Build + Stage + PipelineName Attributes
  "packages": [{"name": "CorpSite-pkg1"}],
  "artifacts": [{"name": "CorpSite-artifact", "version": "1.0.0"}],
```
Expected standard JSON Notification capability payload - Artifact tool

Pipelines:

```json
{
  "artifacts": [
    {
      "name": "acm.jar",
      "version": "1.82",
      "semanticVersion": "1.82.0",
      "repositoryName": "acm-repo"
    }
  ],
  "pipelineName": "testMultiBranch/master",
  "taskExecutionNumber": "82",
  "stageName": "buildmbmaster",
  "branchName": "master"
}
```

Jenkins Freestyle/Maven Project:

```json
{
  "artifacts": [
    {
      "name": "mav1.jar",
      "version": "1.11",
      "semanticVersion": "1.11.0",
      "repositoryName": "mav-repo"
    }
  ],
  "projectName": "maven-test-proj",
  "taskExecutionNumber": "11"
}
```
Connect capability subflow
Starting with version 1.9, connect capability is supported.

<table>
<thead>
<tr>
<th>Item</th>
<th>Expected value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
<td>Label: current&lt;br&gt;Type: Reference.DevOps Tool&lt;br&gt;Tool record for which the <strong>Connect</strong> button action is clicked.</td>
</tr>
<tr>
<td>Outputs</td>
<td>• Label: connected&lt;br&gt;Flag indicating the success or failure of the connection made to the target tool (true/false).&lt;br&gt;• Label: errormessage</td>
</tr>
<tr>
<td>See subflow outputs.</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Expected value</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>String message displayed on the form for connection failure. The</td>
<td>The variable is an empty string if the connection is successful.</td>
</tr>
<tr>
<td>variable is an empty string if the connection is successful.</td>
<td></td>
</tr>
</tbody>
</table>

Connect errors shown on the DevOps tool form:

**Connection failed**

Subflow was executed successfully but the connection could not be made.

**Error: Failed to get failure details from the tool specific connect flow**

Subflow execution failed for an unknown reason.

**Error updating the tool connect status**

The connection_state attribute could not be updated for an unknown reason.

DevOps Connect capability flow diagram example - Orchestration tool

Discover capability subflow

Starting with version 1.9, discover capability is supported.
<table>
<thead>
<tr>
<th>Item</th>
<th>Expected value</th>
</tr>
</thead>
</table>
| Inputs           | Label: current  
Type: Reference.DevOps Tool                                               |
| Outputs          | ![Note](https://jira.com/vult/browse/REL1234567)  
Type: Array of objects as JSON string.  
(JSON.stringify([{},{}]))   |
|                  | Planning tool:  
```json
[  
  {  
    "id": "REL1234567",  
    "name": "REL NUMBERS",  
    "url": "https://jira.com/vult/browse/REL1234567",  
    "nativeId": "1790e6cc-085b-4529-9cb8-47f393182226"  
  },  
  {  
    "id": "TOR67",  
    "name": "TOR 67",  
    "url": "https://jira.com/welp/browse/TOR67",  
    "nativeId": "482ce864-085b-4529-9cb8-47f393767eb2"  
  }
]```  |
|                  | Coding tool:  
```json
[  
  {  
    "name": "nvm_repo",  
    "url": "https://github.com/nvm_repo/"  
  },  
  {  
    "name": "golang_util",  
    "url": "https://github.com/golang_util/"  
  }
]```  |

See subflow outputs.
The Discover main flow is triggered during import request record creation. An import request has these states and messages.

<table>
<thead>
<tr>
<th>State</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requested</td>
<td><img src="https://example.com/table" alt="Table content" /></td>
</tr>
<tr>
<td>Processing</td>
<td><img src="https://example.com/table" alt="Table content" /></td>
</tr>
<tr>
<td>Completed</td>
<td><img src="https://example.com/table" alt="Table content" /></td>
</tr>
<tr>
<td>Error</td>
<td><img src="https://example.com/table" alt="Table content" /></td>
</tr>
<tr>
<td>Paused</td>
<td><img src="https://example.com/table" alt="Table content" /></td>
</tr>
<tr>
<td>Canceled</td>
<td><img src="https://example.com/table" alt="Table content" /></td>
</tr>
<tr>
<td>Unmatched</td>
<td><img src="https://example.com/table" alt="Table content" /></td>
</tr>
</tbody>
</table>

**Expected standard JSON Discover capability payload - Planning tool**

```json
[
  {
    "id":"REL1234567",
    "name": "REL NUMBERS",
    "url":"https://jira.com/vult/browse/REL1234567",
    "nativeId": "1790e6cc-085b-4529-9cb8-47f393182226"
  },
  {
    "id":"TOR67",
    "name": "TOR 67",
  }
]```
Expected standard JSON Discover capability payload - Coding tool

```json
[
  {
    "name": "nvm_repo",
    "url": "https://github.com/nvm_repo/",
    "externalCreatedDate": "2019-06-19 00:37:16"
  },
  {
    "name": "golang_util",
    "url": "https://github.com/golang_util/",
    "externalCreatedDate": "2019-06-19 00:37:16"
  }
]
```

Expected standard JSON Discover capability payload - Orchestration tool

```json
{
  "orchestrationTasks": [
    {
      "name": "Build_APC_1",
      "url": "https://jenkins.wsf.xyz/job/Build_APC_1",
      "projectName": "Build_APC_1"
    },
    {
      "name": "CI_CD_Jenkins",
      "url": "https://pt1.jenkins.com/job/CI_CD_Jenkins",
      "projectName": "CI_CD_Jenkins"
    },
    {
      "name": "CI_deploy",
      "url": "https://pt2.jenkins.com/job/CI_deploy",
      "projectName": "CI_deploy"
    }
  ],
  "pipelines": [
    {
      "name": "Build_APC_1",
      "url": "https://jenkins.wsf.xyz/job/Build_APC_1",
      "projectName": "Build_APC_1"
    }
  ]
}```
DevOps Discover capability flow diagram example - Planning tool
Update Import Request Flow Designer action

You can use the Update Import Request action in your Discover subflow to modify the Import Request record state, if desired.

<table>
<thead>
<tr>
<th>Input label</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>current</td>
<td>Reference.Import Request</td>
</tr>
<tr>
<td>state</td>
<td>(String)</td>
</tr>
<tr>
<td></td>
<td>• requested</td>
</tr>
<tr>
<td></td>
<td>• processing</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Flow execution is stopped (once the return is received from the subflow) when the state is set to processing.</td>
</tr>
<tr>
<td></td>
<td>• completed</td>
</tr>
<tr>
<td></td>
<td>• error</td>
</tr>
<tr>
<td></td>
<td>• paused</td>
</tr>
<tr>
<td></td>
<td>• canceled</td>
</tr>
<tr>
<td></td>
<td>• unmatched</td>
</tr>
<tr>
<td>details</td>
<td>(String)</td>
</tr>
</tbody>
</table>

DevOps reference

Reference additional details relating to DevOps functionality.

Agile product and DevOps

An agile product represents an item under development that organizes themes, epics, and stories into a single context.

An agile product (application model) is mapped to a plan in DevOps that associates work items.

<table>
<thead>
<tr>
<th>Agile table</th>
<th>DevOps table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Model</td>
<td>Plan</td>
</tr>
<tr>
<td>[cmdb_application_product_model]</td>
<td>[sn_devops_plan]</td>
</tr>
<tr>
<td>Extends table:</td>
<td></td>
</tr>
<tr>
<td>Agile table</td>
<td>DevOps table</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Product Model [cmdb_model]</td>
<td></td>
</tr>
<tr>
<td>Epic [rm_epic]</td>
<td>Work Item [sn_devops_work_item] Type: Epic</td>
</tr>
<tr>
<td>Story [rm_story]</td>
<td>Type: Story</td>
</tr>
<tr>
<td>Defect [rm_defect]</td>
<td>Type: Bug</td>
</tr>
</tbody>
</table>

DevOps plan tables are extended from the Base Planning Item [sn_devops_base_planning_item] table.

**Business application and DevOps**

A business application represents software (software models) used to perform a business function. Software is stored in the Software Model [cmdb_software_product_model] table.

A business application can be associated with an app in DevOps.

A DevOps app ties together plans, repositories, and pipelines that are related to the application.

**DevOps modules**

**Insights**

Analyze operational and business reports including change acceleration, system health, and development to gain insight into your DevOps environment.

**Tools**

Create and set up initial configuration connections including planning tools to connect to applications, coding tools to connect to repositories, orchestration tools to connect to tasks, artifact tools to use change acceleration for releases, and test tools.

**Apps & Pipelines**

Manage apps and create pipelines.

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Plan
Access your integrated plans, features (mapped from epics), and versions.

Develop
Access your work items (mapped from your planning application stories), and integrated coding tool repositories. Review development activity including branches, commits, tags (tied to commits), commit details, and committers.

Orchestrate
Access your integrated orchestration tasks and task executions. Review pipeline change requests, registered callbacks, and pipeline executions.

Artifact
Access artifacts and packages to view all commits and work items in a change request for a DevOps release.

Test Results
View test summaries and performance test summaries from your integrated test tools.

Test
View build test summaries and test results.

Administration
Access administrative content such as DevOps properties, error log, inbound events, and payloads. You can also access quick start tests.

Integrations
Create and access DevOps tool integration setup.

Use a token to connect to a DevOps tool
Connect to a DevOps tool, such as GitHub or Jenkins, with basic authentication using a token instead of using a user name and password.

Before you begin
Role required: sn_devops.admin

About this task
Connecting using token-based authentication is useful not only to keep from having to enter your user name and password in a third-party tool, but you can also set specific privileges per token. And, if needed, tokens can be easily
revoked, which makes them a more flexible option if the sole purpose is for connecting a tool.

There are three parts to setting up a connection using a token:

• Generate a token in the tool (Jira, GitHub, or Jenkins)
• Set up basic authentication credentials in DevOps
• Use DevOps to connect to the tool

Procedure
1. Generate and copy a token in GitHub for a coding tool connection, or Jenkins for an orchestration tool connection.
   • Log in to GitHub and navigate to Settings > Developer settings.
     a. Select Personal access tokens and click Generate new token.
     b. Enter ServiceNow DevOps Coding Tool for the description and select repo for the scope.
     c. Click Generate Token.
   • Log in to Jenkins and navigate to Configure > API Token and click Add new Token.
     a. Enter ServiceNow Token for the name.
     b. Click Generate.

   Note: You must copy the token at this time (for use in the DevOps coding configuration) because you do not have access to the token once the GitHub screen is closed.

2. Create an application connection to DevOps tools using basic authentication.
   a. Navigate to Connections and Credentials > Credentials and create a new record.
   b. Select HTTP(s) Connection and create a new Credential record using Basic Auth Credentials.
   c. Enter a name, corresponding GitHub or Jenkins user name, and the token generated in the tool previously and click Submit.

3. Create a DevOps coding tool connection to connect to GitHub, or an orchestration tool connection to connect to Jenkins.
a. For GitHub, navigate to DevOps > Configure > Coding Tools and create a record.

b. For Jenkins, navigate to DevOps > Configure > Orchestration Tools and create a record.

c. Enter a name and select the corresponding tool (GitHub or Jenkins) for the Type field.

d. Use the connection Connection alias lookup list to select the basic authentication connection created previously and click Submit.

e. Open the new coding or orchestration tool record from the list and click Connect.
   The successful connection status message is shown.

Example:
DevOps connections setup using a token
Tracking DevOps notifications

Turn on tracking for a DevOps planning tool app, coding tool repository, or orchestration tool task to receive specific event notifications.

Track DevOps notifications to focus on specific events when you have multiple DevOps items configured for each tool. When tracking is enabled, you can see specific event details, such as code commits, for all events moving forward.

You can track events for these tool types:

- Planning applications
- Coding repositories
- Orchestration tasks

Note: To enable the tracking feature, select the Track check box in the individual record (app, repository, or orchestration task). Tracking is automatically enabled after import.

Event payloads

Notifications for a tracked apps, repositories, and orchestration tasks are shown in the Event Payloads > All Payloads Events list.

You can view all payloads, or only unmatched payloads from the navigation menu. The unmatched payloads Events list shows events for tools not matched to a DevOps ID.

Event payload states

<table>
<thead>
<tr>
<th>Event State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready</td>
<td>The event was received.</td>
</tr>
<tr>
<td>Processing</td>
<td>Tracking is enabled and the event is being processed.</td>
</tr>
</tbody>
</table>
### Event payload states (continued)

<table>
<thead>
<tr>
<th>Event State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processed</td>
<td>The tracked event has completed processing.</td>
</tr>
<tr>
<td>Not Connected</td>
<td>The tool for this event is not connected.</td>
</tr>
<tr>
<td></td>
<td>In this case, the event cannot be processed.</td>
</tr>
<tr>
<td>Ignored</td>
<td>The track feature is not enabled for the tool in the event.</td>
</tr>
<tr>
<td></td>
<td>In this case, the event is ignored.</td>
</tr>
<tr>
<td>Error</td>
<td>Event processing failed.</td>
</tr>
<tr>
<td></td>
<td>Processing can fail if, for example, there is an incorrect link for a tool item.</td>
</tr>
</tbody>
</table>

### DevOps record deletion cascade

Starting with version 1.21, cascade record deletion is implemented to delete all dependent lower level DevOps records whenever a parent or higher level DevOps entity is deleted.

For example, when a Plan record is deleted, all dependent Work Item, Plan Version, and many-to-many relation (like App to Plan, and Work Item to Plan Version) records are deleted.

DevOps cascade deletion is implemented for these tables.

- Pipeline, Pipeline Execution, Step, Orchestration Task, Task Execution
- Repository, Commit, Branch, Tag
- Plan, Work item, Plan Version
- DevOps Tool, Artifact Repository, Artifact, Test Summary / Performance test summary

### Delete action on a DevOps form

A user with the sn_devops.admin role can delete a DevOps record, but only if it meets the defined ACL criteria.
**Note:** To see the **Delete** button on a form, you must have the `sn_devops.admin` role, and the current record must meet the criteria defined in the scripted ACL.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Scripted ACL criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline</td>
<td>A Pipeline record can be deleted only if no other pipeline executions from other pipelines are dependent on the artifact versions generated by the pipeline executions of this pipeline.</td>
</tr>
<tr>
<td>Pipeline Execution</td>
<td>A Pipeline Execution record can be deleted only if no other pipeline executions are dependent on the artifact versions generated by this pipeline execution.</td>
</tr>
<tr>
<td>Task Execution</td>
<td>A Task Execution record can be deleted if ALL of these conditions are met.</td>
</tr>
<tr>
<td></td>
<td>• There are no step executions referencing it.</td>
</tr>
<tr>
<td></td>
<td>• There are no downstream task executions referencing it.</td>
</tr>
<tr>
<td></td>
<td>• There are no pipeline executions dependent on the artifact versions built by this task execution.</td>
</tr>
<tr>
<td>Step</td>
<td>A Step record can be deleted only if there are no orchestration tasks or step executions referencing this step.</td>
</tr>
<tr>
<td>Orchestration Task</td>
<td>If the orchestration task has a step associated, it can be deleted only if there are no task executions referencing this orchestration task.</td>
</tr>
<tr>
<td></td>
<td>If the orchestration task does not have a step associated (example Jenkins freestyle job), it can be deleted only if no other pipeline executions are dependent on the artifact versions.</td>
</tr>
</tbody>
</table>

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207
<table>
<thead>
<tr>
<th>Entity</th>
<th>Scripted ACL criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repository</td>
<td>A Repository record can be deleted only if none of the commits of this repository are associated to the artifact versions (Artifact Version to Commit table) or task executions (Run Commit table). Therefore, before cleaning up the repository, delete the dependent pipeline entities.</td>
</tr>
<tr>
<td>Branch</td>
<td>A Branch record can be deleted only if there are no commits associated to it in the Branch To Commit table.</td>
</tr>
<tr>
<td>Tag</td>
<td>A Tag record cannot be deleted by a sn_devops.admin.</td>
</tr>
<tr>
<td>Commit</td>
<td>A Commit record can be deleted if ALL of these conditions are met.</td>
</tr>
<tr>
<td></td>
<td>• The commit is not associated to the artifact version (Artifact Version to Commit table).</td>
</tr>
<tr>
<td></td>
<td>• The commit is not associated to task executions (Run Commit table).</td>
</tr>
<tr>
<td></td>
<td>• The commit is not being referenced by other commits as a revert commit.</td>
</tr>
<tr>
<td>Plan</td>
<td>A Plan record can be deleted only if none of the work items of this plan are associated or referenced by any commits.</td>
</tr>
<tr>
<td>Work Item</td>
<td>A Work Item record can be deleted if ALL of these conditions are met.</td>
</tr>
<tr>
<td>Entity</td>
<td>Scripted ACL criteria</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------</td>
</tr>
</tbody>
</table>
| Entity | • The work item is not being referenced by another work item as parent.  
|        | • There are no commits referencing or associated to this work item. |
| Plan Version | A Plan Version record can be deleted only if there are no work items associated to it in the Work Item To Plan Version table. |
| Test Summary / Performance Test Summary | A Test Summary record can be deleted only if it doesn't have an associated related record (Artifact version/Package/Task Execution) in the Test Summary Relations table. |
| Artifact | An Artifact Record can be deleted only if all the artifact versions belonging to it are deletable. |
| Artifact Repository | An Artifact Repository record can be deleted only if all the artifacts belonging to it are deletable. |
| Artifact Version | An Artifact Version record can be deleted only if it's built by task execution field is empty. |
| Artifact Staged Request | An Artifact Staged Request record can be deleted when it is either an orphaned record, or the state is Processed / Error. |
| Package | A Package record can be deleted if ALL of these conditions are met.  
|        | • There are no pipeline executions referenced to it.  
<p>|        | • The built by task execution value on the Package record is null. |
| DevOps Tool | A DevOps Tool record cannot be deleted by a sn_devops.admin. |</p>
<table>
<thead>
<tr>
<th>Entity</th>
<th>Scripted ACL criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build Test Summary</td>
<td>These entities cannot be deleted by a sn_devops.admin.</td>
</tr>
<tr>
<td>Build Test Result</td>
<td></td>
</tr>
<tr>
<td>Commit Details</td>
<td></td>
</tr>
<tr>
<td>Event</td>
<td></td>
</tr>
<tr>
<td>Inbound Event</td>
<td></td>
</tr>
</tbody>
</table>

### DevOps record delete cascade

Deleting a record in a parent table cascade deletes all the child records in the hierarchy.

<table>
<thead>
<tr>
<th>Parent record being deleted</th>
<th>Cascade deleted child records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline</td>
<td>Step</td>
</tr>
<tr>
<td></td>
<td>• Orchestration Task</td>
</tr>
<tr>
<td>Pipeline Execution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Step Execution</td>
</tr>
<tr>
<td></td>
<td>• Callback</td>
</tr>
<tr>
<td></td>
<td>• Task Execution</td>
</tr>
<tr>
<td></td>
<td>◦ Package</td>
</tr>
<tr>
<td></td>
<td>◦ Run Commit</td>
</tr>
<tr>
<td></td>
<td>◦ Test Summary Relations</td>
</tr>
<tr>
<td></td>
<td>◦ Build Test Summary</td>
</tr>
<tr>
<td></td>
<td>• Build Test Result</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Version</td>
</tr>
<tr>
<td></td>
<td>• Artifact Staged Request</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version To Commit</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version To Package</td>
</tr>
<tr>
<td>Pipeline Execution</td>
<td>Step Execution</td>
</tr>
<tr>
<td></td>
<td>Callback</td>
</tr>
<tr>
<td></td>
<td>Task Execution</td>
</tr>
<tr>
<td>Parent record being deleted</td>
<td>Cascade deleted child records</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td></td>
<td>• Package</td>
</tr>
<tr>
<td></td>
<td>• Run Commit</td>
</tr>
<tr>
<td></td>
<td>• Test Summary Relations</td>
</tr>
<tr>
<td></td>
<td>• Build Test Summary</td>
</tr>
<tr>
<td></td>
<td>◦ Build Test Result</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Staged Request</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Version To Commit</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Version To Package</td>
</tr>
<tr>
<td>Step</td>
<td>None.</td>
</tr>
<tr>
<td></td>
<td>A Step record can be deleted</td>
</tr>
<tr>
<td></td>
<td>only if there are no</td>
</tr>
<tr>
<td></td>
<td>Orchestration Task or</td>
</tr>
<tr>
<td></td>
<td>Step Execution records</td>
</tr>
<tr>
<td></td>
<td>associated to it.</td>
</tr>
<tr>
<td>Orchestration Task</td>
<td>Task Execution</td>
</tr>
<tr>
<td></td>
<td>• Package</td>
</tr>
<tr>
<td></td>
<td>• Run Commit</td>
</tr>
<tr>
<td></td>
<td>• Test Summary Relations</td>
</tr>
<tr>
<td></td>
<td>• Build Test Summary</td>
</tr>
<tr>
<td></td>
<td>◦ Build Test Result</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Staged Request</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Version To Commit</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Version To Package</td>
</tr>
<tr>
<td>Repository</td>
<td>Tag</td>
</tr>
<tr>
<td></td>
<td>Branch</td>
</tr>
<tr>
<td></td>
<td>• Branch to Commit</td>
</tr>
<tr>
<td></td>
<td>Commit</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Parent record being deleted</th>
<th>Cascade deleted child records</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Commit Details</td>
</tr>
<tr>
<td></td>
<td>• Branch to Commit</td>
</tr>
<tr>
<td></td>
<td>• Tag</td>
</tr>
<tr>
<td>Branch</td>
<td>Branch to Commit</td>
</tr>
<tr>
<td>Tag</td>
<td>No dependent child records.</td>
</tr>
<tr>
<td>Commit</td>
<td>Commit Details</td>
</tr>
<tr>
<td></td>
<td>Branch to Commit</td>
</tr>
<tr>
<td></td>
<td>Tag</td>
</tr>
<tr>
<td>Plan</td>
<td>Work Item</td>
</tr>
<tr>
<td></td>
<td>App to Plan</td>
</tr>
<tr>
<td></td>
<td>Plan Version</td>
</tr>
<tr>
<td></td>
<td>• Work Item to Plan Version</td>
</tr>
<tr>
<td>Work Item</td>
<td>Work Item to Plan Version</td>
</tr>
<tr>
<td>Plan Version</td>
<td>Work Item to Plan Version</td>
</tr>
<tr>
<td>Test Summary / Performance Test</td>
<td>Test Summary Relations</td>
</tr>
<tr>
<td>Summary</td>
<td></td>
</tr>
<tr>
<td>Artifact</td>
<td>Artifact Version</td>
</tr>
<tr>
<td></td>
<td>• Artifact Staged Request</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version to Commit</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version to Package</td>
</tr>
<tr>
<td>Artifact Repository</td>
<td>Artifact</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Staged Request</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Version to Commit</td>
</tr>
<tr>
<td></td>
<td>◦ Artifact Version to Package</td>
</tr>
<tr>
<td>DevOps Tool</td>
<td>Event</td>
</tr>
<tr>
<td></td>
<td>Inbound Event</td>
</tr>
<tr>
<td></td>
<td>Test Summary / Performance Test Summary</td>
</tr>
<tr>
<td></td>
<td>• Test Summary Relations</td>
</tr>
<tr>
<td>Parent record being deleted</td>
<td>Cascade deleted child records</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>Plan</td>
</tr>
<tr>
<td></td>
<td>• Work Item</td>
</tr>
<tr>
<td></td>
<td>• App to Plan</td>
</tr>
<tr>
<td></td>
<td>• Plan Version</td>
</tr>
<tr>
<td></td>
<td>• Work Item to Plan Version</td>
</tr>
<tr>
<td></td>
<td>Artifact Repository</td>
</tr>
<tr>
<td></td>
<td>• Artifact</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version</td>
</tr>
<tr>
<td></td>
<td>• Artifact Staged Request</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version to Commit</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version to Package</td>
</tr>
<tr>
<td></td>
<td>Repository</td>
</tr>
<tr>
<td></td>
<td>• Tag</td>
</tr>
<tr>
<td></td>
<td>• Branch</td>
</tr>
<tr>
<td></td>
<td>• Branch to Commit</td>
</tr>
<tr>
<td></td>
<td>• Commit</td>
</tr>
<tr>
<td></td>
<td>• Commit Details</td>
</tr>
<tr>
<td></td>
<td>• Branch to Commit</td>
</tr>
<tr>
<td></td>
<td>• Tag</td>
</tr>
<tr>
<td></td>
<td>Pipeline</td>
</tr>
<tr>
<td></td>
<td>• Step</td>
</tr>
<tr>
<td></td>
<td>• Orchestration Task</td>
</tr>
<tr>
<td></td>
<td>• Pipeline Execution</td>
</tr>
<tr>
<td></td>
<td>• Step Execution</td>
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<tr>
<td></td>
<td>• Callback</td>
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<tr>
<td></td>
<td>• Task Execution</td>
</tr>
<tr>
<td></td>
<td>• Package</td>
</tr>
<tr>
<td></td>
<td>• Run Commit</td>
</tr>
<tr>
<td></td>
<td>• Test Summary Relations</td>
</tr>
</tbody>
</table>
## DevOps record delete cascade exceptions

These records are always deleted in the foreground.

<table>
<thead>
<tr>
<th>Parent record being deleted</th>
<th>Cascade deleted child records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artifact Version</td>
<td>These records are deleted along with Artifact Version.</td>
</tr>
<tr>
<td></td>
<td>• Artifact Staged Request</td>
</tr>
<tr>
<td></td>
<td>🔄 <strong>Note:</strong> For existing releases upgraded to version 1.21, Artifact Staged Request records are not deleted, and the Artifact Version reference is set to empty.</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version To Commit</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version to Package</td>
</tr>
<tr>
<td>Build Test Summary</td>
<td>These records are deleted along with Build Test Summary.</td>
</tr>
<tr>
<td></td>
<td>• Build Test Result</td>
</tr>
<tr>
<td></td>
<td>🔄 <strong>Note:</strong> For existing releases upgraded to version 1.21, you must delete any dependent Build Test Result records before deleting the Build Test Summary record.</td>
</tr>
<tr>
<td>Package</td>
<td>These records are deleted along with Package.</td>
</tr>
<tr>
<td>Parent record being deleted</td>
<td>Cascade deleted child records</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td></td>
<td>• Artifact Staged Request</td>
</tr>
<tr>
<td></td>
<td>Note: For existing releases upgraded to version 1.21, Artifact Staged Request records are not deleted, and the Package reference is set to empty.</td>
</tr>
<tr>
<td></td>
<td>• Artifact Version to Package</td>
</tr>
</tbody>
</table>

**Foreground deletion threshold property**

Deletion of DevOps records occurs in the foreground (synchronously) by default. Meaning, other UI actions cannot be performed during synchronous deletion. Since the deletion of a parent record can result in the deletion of multiple child records, you can set a threshold value so the remaining records are deleted in the background.

Note: Artifact Version, Build Test Summary, and Package records are always deleted in the foreground.

To set the DevOps Cascade delete threshold property, navigate to DevOps > Administration > Properties. Define the total number of records that can be cascade deleted in the foreground, after which the remaining records are deleted in the background. Default is 1000.

Note: The records of tables in a hierarchy are deleted in a bottom-up manner. For example, it may be possible that even after triggering the delete action on a Repository record, it will still be available for read, write, and update in the system until deletion is complete.

DevOps record deletions do not trigger any business rules or workflows.

**DevOps record deletion UI**

Cascade delete of a DevOps record triggers multiple confirmation approvals.
Data archiving and table cleanup of inbound events data

Use table cleaners on the inbound events table to purge event data records beyond a specified period. Configure a retention policy with table rotation on the auto-flush form to manage table size growth and archiving data beyond the specified duration.

Overview

Starting from DevOps v1.25, a new data management feature allows you to enable archiving and purging of inbound event data. Database rotation and table cleanup configurations are enabled to ensure that eight weeks of event data is retained. Instance performance is preserved using Now Platform features such as Database rotation, table rotation, and table cleanup. Starting with DevOps version 1.26, a scheduled job is auto-enabled two weeks after you upgrade to DevOps v1.26.
Table rotation on processed inbound events table

A new Devops processed inbound events [sn_devops_processed_inbound_event_list.do] table is added in the DevOps v1.25 release. The processed events table contains copies of event data from the DevOps inbound events [sn_devops_inbound_list.do] table, that is in state 'processed' and 'ignored'.

The processed inbound events table has the table rotation feature enabled. In all, there are eight preconfigured shards, each containing a week's event data from the DevOps inbound event table. By default, once you have 56 days (7 days (Duration) *8 shards (Rotations) of data in the processed inbound table, table rotation is activated. For more information on applying table rotation, see Apply table rotation.

**Tip:** To modify table rotation configuration, navigate to System Definitions > Table Rotation and open the record for DevOps processed inbound events table.

Scheduled jobs and Table cleaners

**Important:** Starting with DevOps version 1.26, a scheduled job is auto-enabled two weeks after you upgrade. The scheduled job will run every seven days and is deactivated after the last update.

- Scheduled jobs activate tables cleaners on the inbound events if either of the following scenarios are met:
  - A week after you upgrade to version 1.26, and the processed inbound table has records older than seven weeks.
  - Two weeks after you upgrade to version 1.26.

The table cleanup feature for the inbound events table [sn_devops_inbound_table] has two cleaners that are part of the base system upgrade.

1. Table cleaners are activated and run on the inbound events [sn_devops_inbound_table_list.do] for events in the following states.
   - Processed
   - Ignored
   based on the value specified in the Age in seconds field against the value in sys_created_on field.

2. Table cleaners are activated and run on the inbound events table [sn_devops_inbound_table_list] for events in the following states.
New

Retry

In-progress

based on the value specified in the **Age in seconds** field against the value in **sys_created_on** field.

Note: By default, table cleaners are run on the inbound events table for these states, 56 days after you upgrade to v1.26, or from the time the schedules jobs are activated. The default value in the **Age in Seconds** field is 4,838,400 seconds (56*24*60*60).

**Auto-updates to table cleaner frequency**

Events in states **processed** and **ignored** are backed up and copied to the processed inbound events [sn_devops_processed_inbound_event_list] table. By default, the process cleaners are auto-updated to an interval of 30 minutes or 1800 seconds, on the inbound events table, if either of the following conditions are met:

- 56 days have passed since you've upgraded to v1.26.
- Two weeks have passed since the scheduled job is active and the processed inbound event table has event data older than 7 weeks.

**Quick start tests for DevOps**

Starting with version 1.10, validate that DevOps still works after you make any configuration change such as apply an upgrade or develop an application in version 1.10, 1.11, and 1.12. Copy and customize these quick start tests to pass when using your instance-specific data.

DevOps quick start tests are available when you install the DevOps application from ServiceNow Store.

**DevOps test suite**

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
<th>Release version</th>
</tr>
</thead>
<tbody>
<tr>
<td>DevOps Orchestration Flow with CR</td>
<td>Verify the Flow Designer flow for a DevOps orchestration tool that</td>
<td>Madrid</td>
</tr>
</tbody>
</table>
DevOps test suite (continued)

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
<th>Release version</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>includes a change request.</td>
<td></td>
</tr>
<tr>
<td>DevOps Orchestration Tool Flow</td>
<td>Verify the Flow Designer flow for a DevOps orchestration tool.</td>
<td>Madrid</td>
</tr>
<tr>
<td>DevOps Plan Tool Flow</td>
<td>Verify the Flow Designer flow for a DevOps planning tool.</td>
<td>Madrid</td>
</tr>
</tbody>
</table>

Related information

Quick start tests

DevOps troubleshooting

Troubleshooting actions can help resolve common issues when setting up or running the DevOps application.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Import request not progressing</td>
<td>If an import request remains in the Requested state for too long while performing an import for a tool (such as Jenkins, Jira, or GitHub), delete the import request and try again.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> You must delete the existing request to retry importing the same range.</td>
</tr>
<tr>
<td>Tool connection fails</td>
<td>Remove the trailing slash ('/') in the <strong>Connection URL</strong> field on the HTTP Connection form.</td>
</tr>
<tr>
<td>No change request is created for a Jenkins job under change control</td>
<td>Verify that:</td>
</tr>
<tr>
<td><strong>Issue</strong></td>
<td><strong>Action</strong></td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>• The tool integration in your instance</td>
<td>is set up properly.</td>
</tr>
<tr>
<td>• The task has been synced in your instance.</td>
<td></td>
</tr>
<tr>
<td>• Tasks and app steps have been</td>
<td>configured in your instance.</td>
</tr>
<tr>
<td>Change request creation is not</td>
<td>supported if the task is under change control:</td>
</tr>
<tr>
<td>• Is not part of a pipeline (is a</td>
<td>standalone task, for example).</td>
</tr>
<tr>
<td>• Is the first in the pipeline.</td>
<td></td>
</tr>
<tr>
<td>• Is within the pipeline, but the user</td>
<td>manually triggers, or does SCM checkout directly on the task under change</td>
</tr>
<tr>
<td>manually triggers, or does SCM checkout</td>
<td>control (thus not triggering the pipeline from the beginning).</td>
</tr>
<tr>
<td>directly on the task under change</td>
<td></td>
</tr>
<tr>
<td>control (thus not triggering the</td>
<td></td>
</tr>
<tr>
<td>pipeline from the beginning).</td>
<td></td>
</tr>
<tr>
<td>**Jenkins does not block the job under</td>
<td>Verify that the Jenkins location is configured:</td>
</tr>
<tr>
<td>change control (does not wait for</td>
<td>Navigate to <strong>Jenkins &gt; Manage</strong></td>
</tr>
<tr>
<td>change request approval)</td>
<td><strong>Jenkins</strong> &gt; <strong>Manage</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Configure System</strong> and provide the hostname for the Jenkins URL field in</td>
</tr>
<tr>
<td></td>
<td>the Jenkins Location section.</td>
</tr>
<tr>
<td><strong>Note:</strong> To avoid caching issues, click</td>
<td><strong>Save</strong> even if the Jenkins URL field already contains a value when you</td>
</tr>
<tr>
<td><strong>Save</strong> even if the Jenkins URL field</td>
<td>first open the form.</td>
</tr>
<tr>
<td>already contains a value when you first open</td>
<td></td>
</tr>
<tr>
<td>the form.</td>
<td></td>
</tr>
<tr>
<td>**Events occurring in the payload log with</td>
<td>If any of the following changes for a connection made manually (using</td>
</tr>
<tr>
<td>state Not Connected**</td>
<td>manual configuration mode), the connection is automatically disconnected.</td>
</tr>
<tr>
<td></td>
<td>• Alias associated with the tool</td>
</tr>
<tr>
<td></td>
<td>• Type of tool</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• New active HTTP connection for the same domain added to the alias</td>
<td></td>
</tr>
<tr>
<td>• Existing HTTP connection for the same domain activated</td>
<td></td>
</tr>
<tr>
<td>• Connection URL of the HTTP connection</td>
<td></td>
</tr>
<tr>
<td>• Credentials of the HTTP connection</td>
<td></td>
</tr>
<tr>
<td>• Use MID Server setting in the HTTP connection</td>
<td></td>
</tr>
<tr>
<td>Enter manual configuration mode and reconnect.</td>
<td></td>
</tr>
</tbody>
</table>

**Properties installed with DevOps**

Use these properties to configure settings in the DevOps application.

Role required: sn_devops.admin

These properties apply to the DevOps application ([DevOps > Administration > Properties](#)).

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>[sn_devops.github.api_url]</td>
<td>GitHub API URL.</td>
<td><a href="https://api.github.com">https://api.github.com</a></td>
</tr>
<tr>
<td>[sn_devops.import.max.retry.retries.per.page]</td>
<td>Maximum retries per page while importing.</td>
<td>3</td>
</tr>
<tr>
<td>[sn_devops.committer.score.default]</td>
<td>Default committer score.</td>
<td>50</td>
</tr>
<tr>
<td>[sn_devops.committer.score.multiply.factor]</td>
<td>Multiply factor for committer score.</td>
<td>1</td>
</tr>
<tr>
<td>[sn_devops.enable_debug]</td>
<td>Enable Debug Flag. DevOps Debug Logger.</td>
<td>Yes</td>
</tr>
<tr>
<td>[sn_devops.import.max.processing.time.seconds.per.page]</td>
<td>Maximum time processing per page (in seconds), while importing.</td>
<td>600</td>
</tr>
<tr>
<td>Property</td>
<td>Description</td>
<td>Default</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>[sn_devops.supported_webhook_capabilities]</td>
<td>Supported Webhook Capabilities.</td>
<td>code, plan, orchestration, artifact, test</td>
</tr>
<tr>
<td>[sn_devops.import.coding_tool.commits.per_page]</td>
<td>Coding tool commits per page.</td>
<td>100</td>
</tr>
<tr>
<td>[sn_devops.import.coding_tool.repos.per_page]</td>
<td>Coding tool repos per page.</td>
<td>100</td>
</tr>
<tr>
<td>[sn_devops.cascade_delete_threshold]</td>
<td>Delete threshold (recommended foreground limit 1000).</td>
<td>1000</td>
</tr>
<tr>
<td>[sn_devops.github.api_version_path]</td>
<td>GitHub API version path.</td>
<td>/api/v3</td>
</tr>
<tr>
<td>[sn_devops.import.orchestration_tool.executions.per_page]</td>
<td>Orchestration tool executions per page.</td>
<td>50</td>
</tr>
<tr>
<td>[sn_devops.github.url]</td>
<td>GitHub URL.</td>
<td><a href="https://github.com">https://github.com</a></td>
</tr>
<tr>
<td>[sn_devops.import.orchestration_tool.executions.maximum]</td>
<td>Maximum orchestration tool executions while importing.</td>
<td>1000</td>
</tr>
<tr>
<td>[sn_devops.import.save.payloads.as.attachments]</td>
<td>To save payloads as attachments on the Import Request Page record, set the Value field to true. Anything else is considered false.</td>
<td>false</td>
</tr>
<tr>
<td>[sn_devops.default_test_type]</td>
<td>Default test type</td>
<td>JUnit</td>
</tr>
<tr>
<td>[sn_devops.import.coding_tool.branches.per_property]</td>
<td>Coding tool branches per property.</td>
<td>19</td>
</tr>
<tr>
<td>[sn_devops.import.planning_tool.issues.per_page]</td>
<td>Planning tool issues per page.</td>
<td>100</td>
</tr>
<tr>
<td>[sn_devops.discovered.user.auto.assign.role]</td>
<td>The provided sn_devops role in the value field is automatically added to users who are active DevOps users (for example, making a commit).</td>
<td>sn_devops.viewer</td>
</tr>
<tr>
<td>Property</td>
<td>Description</td>
<td>Default</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>sn_devops.change_request.implement_state</td>
<td>DevOps change request implement state.</td>
<td>Default is -1 (Implement).</td>
</tr>
<tr>
<td>sn_devops.change_request.post_implement_state</td>
<td>DevOps change request post implement state.</td>
<td>Default is 0 (Review).</td>
</tr>
<tr>
<td>sn_devops.change_request.cancel_state</td>
<td>DevOps change request cancel state.</td>
<td>Default is 4 (Canceled).</td>
</tr>
<tr>
<td>sn_devops.change_request_handler_subflow</td>
<td>DevOps Change Request Handler subflow.</td>
<td>sn_devops.default_change_handler_subflow</td>
</tr>
<tr>
<td>sn_devops.change_request.approved_approval</td>
<td>DevOps change request approval text.</td>
<td>Approved</td>
</tr>
<tr>
<td>sn_devops.import.planning_tool.itbm.issues.max.limit</td>
<td>ITBM Agile planning tool issues import max limit.</td>
<td>1000</td>
</tr>
</tbody>
</table>

**Components installed with DevOps**

Several types of components are installed with DevOps, including tables, users, roles, and scheduled jobs.

Demo data is available for this application.
### Users installed

<table>
<thead>
<tr>
<th>User</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>devops.integration.user</td>
<td>DevOps Integration User</td>
</tr>
<tr>
<td>devops.system</td>
<td>DevOps System user</td>
</tr>
</tbody>
</table>

**Note:** You must configure the password before the DevOps Integration User can configure a tool.

### Roles installed

<table>
<thead>
<tr>
<th>Role title [name]</th>
<th>Description</th>
<th>Contains roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>DevOps Administrator [sn_devops.admin]</td>
<td>Sets up and configures the DevOps application.</td>
<td>• sn_devops.manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• connection_admin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• action_designer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• credential_admin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• flow_designer</td>
</tr>
<tr>
<td>DevOps integration [sn_devops.integration]</td>
<td>Has inbound access to the tools in your environment to allow integration with the DevOps application.</td>
<td>• None.</td>
</tr>
<tr>
<td>DevOps manager [sn_devops.manager]</td>
<td>Oversees the operation of the DevOps application and monitors performance in your DevOps environment.</td>
<td>• sn_devops.viewer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• cmdb_read</td>
</tr>
<tr>
<td>DevOps viewer [sn_devops.viewer]</td>
<td>Has access to the DevOps application to use in their environment.</td>
<td>None.</td>
</tr>
</tbody>
</table>
### Scheduled jobs installed

<table>
<thead>
<tr>
<th>Scheduled Job</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[DevOps] Historical Data Collection</td>
<td>Collects data from DevOps tools on demand.</td>
</tr>
<tr>
<td><strong>Note:</strong> You must run this scheduled</td>
<td>You must run this scheduled job to see historical DevOps data after installation of the DevOps Insights application.</td>
</tr>
<tr>
<td>job to see historical DevOps data after installation of the DevOps Insights application.</td>
<td></td>
</tr>
<tr>
<td>[DevOps] Daily Data Collection</td>
<td>Collects data from DevOps tools daily.</td>
</tr>
</tbody>
</table>

### Tables installed

<table>
<thead>
<tr>
<th>Name</th>
<th>Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>API Schema Definition</td>
<td>[sn_devops_api_schema_definition]</td>
</tr>
<tr>
<td>App</td>
<td>[sn_devops_app]</td>
</tr>
<tr>
<td>Artifact</td>
<td>[sn_devops_artifact]</td>
</tr>
<tr>
<td>Artifact Repository</td>
<td>[sn_devops_artifact_repository]</td>
</tr>
<tr>
<td>Artifact Staged Request</td>
<td>[sn_devops_artifact_staging]</td>
</tr>
<tr>
<td>Artifact Version</td>
<td>[sn_devops_artifact_version]</td>
</tr>
<tr>
<td>Base Planning Item</td>
<td>[sn_devops_base_planning_item]</td>
</tr>
<tr>
<td>Branch</td>
<td>[sn_devops_branch]</td>
</tr>
<tr>
<td>Build Test Result</td>
<td>[sn_devops_build_test_result]</td>
</tr>
<tr>
<td>Build Test Summary</td>
<td>[sn_devops_build_test_summary]</td>
</tr>
<tr>
<td>Callback</td>
<td>[sn_devops_callback]</td>
</tr>
<tr>
<td>Commit</td>
<td>[sn_devops_commit]</td>
</tr>
<tr>
<td>Committer</td>
<td>[sn_devops_committer]</td>
</tr>
<tr>
<td>Commit Details</td>
<td>[sn_devops_commit_details]</td>
</tr>
<tr>
<td>Contributor Score Change Factor</td>
<td>[sn_devops_contributor_score_chg_factor]</td>
</tr>
<tr>
<td>Environment</td>
<td>[sn_devops_environment]</td>
</tr>
<tr>
<td>Event</td>
<td>[sn_devops_event]</td>
</tr>
<tr>
<td>Name</td>
<td>Table</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Event Processor</td>
<td>[sn_devops_event_processor]</td>
</tr>
<tr>
<td>Import Filter</td>
<td>[sn_devops_import_filter]</td>
</tr>
<tr>
<td>Import Request</td>
<td>[sn_devops_import_request]</td>
</tr>
<tr>
<td>Import Request Page</td>
<td>[sn_devops_import_request_page]</td>
</tr>
<tr>
<td>Inbound Event</td>
<td>[sn_devops_inbound_event]</td>
</tr>
<tr>
<td>Integration Capability</td>
<td>[sn_devops_integration_capability]</td>
</tr>
<tr>
<td>Extends table Application File.</td>
<td></td>
</tr>
<tr>
<td>App to Plan</td>
<td>[sn_devops_m2m_app_plan]</td>
</tr>
<tr>
<td>Deployed Artifact to TaskExecution</td>
<td>[sn_devops_m2m_artifact_execution]</td>
</tr>
<tr>
<td>Artifact Version to Commit</td>
<td>[sb_devops_m2m_artifact_version_commit]</td>
</tr>
<tr>
<td>Artifact Version to Package</td>
<td>[sn_devops_m2m_artifact_version_package]</td>
</tr>
<tr>
<td>Branch To Commit</td>
<td>[sn_devops_m2m_branch_commit]</td>
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<tr>
<td>Run Commit</td>
<td>[sn_devops_m2m_commit_execution]</td>
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<tr>
<td>Work Item To Plan Version</td>
<td>[sn_devops_m2m_work_item_plan_version]</td>
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<tr>
<td>Orchestration Task</td>
<td>[sn_devops_orchestration_task]</td>
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<tr>
<td>Orchestration Task Definition</td>
<td>[sn_devops_orchestration_task_definition]</td>
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<tr>
<td>Package</td>
<td>[sn_devops_package]</td>
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<td>Extends table Configuration Item.</td>
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<tr>
<td>Participant</td>
<td>[sn_devops_participant]</td>
</tr>
<tr>
<td>Pipeline</td>
<td>[sn_devops_pipeline]</td>
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<tr>
<td>Pipeline Execution</td>
<td>[sn_devops_pipeline_execution]</td>
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<tr>
<td>Plan</td>
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<tr>
<td>Plan Version</td>
<td>[sn_devops_plan_version]</td>
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<tr>
<td>Extends table Base Planning Item.</td>
<td></td>
</tr>
<tr>
<td>Repository</td>
<td>[sn_devops_repository]</td>
</tr>
<tr>
<td>Step</td>
<td>[sn_devops_step]</td>
</tr>
<tr>
<td>Name</td>
<td>Table</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Step Execution</td>
<td>[sn_devops_step_execution]</td>
</tr>
<tr>
<td>Tag</td>
<td>[sn_devops_tag]</td>
</tr>
<tr>
<td>Task Execution</td>
<td>[sn_devops_task_execution]</td>
</tr>
<tr>
<td>Test Execution</td>
<td>[sn_devops_test_execution]</td>
</tr>
<tr>
<td>Test Result</td>
<td>[sn_devops_test_result]</td>
</tr>
<tr>
<td>Test Type</td>
<td>[sn_devops_test_type]</td>
</tr>
<tr>
<td>DevOps Tool</td>
<td>[sn_devops_tool]</td>
</tr>
<tr>
<td>Tool Action</td>
<td>[sn_devops_tool_action]</td>
</tr>
<tr>
<td>Tool Capability Mapping</td>
<td>[sn_devops_tool_capability_mapping]</td>
</tr>
<tr>
<td>DevOps Tool Integration</td>
<td>[sn_devops_tool_integration]</td>
</tr>
<tr>
<td></td>
<td>Extends table Application File.</td>
</tr>
<tr>
<td>Tool Type Capability</td>
<td>[sn_devops_tool_type_capability]</td>
</tr>
<tr>
<td>Work Item</td>
<td>[sn_devops_work_item]</td>
</tr>
<tr>
<td></td>
<td>Extends table Base Planning Item.</td>
</tr>
</tbody>
</table>