



# Red Hat Ansible Automation Platform 2.4

## Automation Controller User Guide

User Guide for Automation Controller



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## Abstract

This guide describes the use of the Red Hat Ansible Automation Platform Controller (automation controller).

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## PREFACE

Thank you for your interest in Red Hat Ansible Automation Platform automation controller. Automation controller helps teams manage complex multitiered deployments by adding control, knowledge, and delegation to Ansible-powered environments.

The Automation controller User Guide describes all of the functionality available in automation controller. It assumes moderate familiarity with Ansible, including concepts such as playbooks, variables, and tags. For more information about these and other Ansible concepts, see the [Ansible documentation](#).

## MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see [our CTO Chris Wright's message](#).



## PROVIDING FEEDBACK ON RED HAT DOCUMENTATION

If you have a suggestion to improve this documentation, or find an error, please contact technical support at <https://access.redhat.com> to create an issue on the Ansible Automation Platform Jira project using the **docs-product** component.

# CHAPTER 1. AUTOMATION CONTROLLER OVERVIEW

With Ansible Automation Platform users across an organization can share, vet, and manage automation content by means of a simple, powerful, and agentless technical implementation. IT managers can provide guidelines on how automation is applied to individual teams. Automation developers can write tasks that use existing knowledge, without the operational overhead of conforming to complex tools and frameworks. It is a more secure and stable foundation for deploying end-to-end automation solutions, from hybrid cloud to the edge.

Ansible Automation Platform includes automation controller, which enables users to define, operate, scale, and delegate automation across their enterprise.

## 1.1. REAL-TIME PLAYBOOK OUTPUT AND EXPLORATION

Automation controller enables you to watch playbooks run in real time, seeing each host as they check in. You can go back and explore the results for specific tasks and hosts in great detail, search for specific plays or hosts and see just those results, or locate errors that need to be corrected.

## 1.2. "PUSH BUTTON" AUTOMATION

Automation controller enables you to access your favorite projects and re-trigger execution from the web interface. Automation controller asks for input variables, prompts for your credentials, starts and monitors jobs, and displays results and host history.

## 1.3. SIMPLIFIED ROLE-BASED ACCESS CONTROL AND AUDITING

Automation controller enables you to:

- Grant permissions to perform a specific task to different teams or explicit users through *role-based access control* (RBAC). Example tasks include viewing, creating, or modifying a file.
- Keep some projects private, while enabling some users to edit inventories, and others to run playbooks against certain systems, either in check (dry run) or live mode.
- Enable certain users to use credentials without exposing the credentials to them.

Automation controller records the history of operations and who made them, including objects edited and jobs launched.

If you want to give any user or team permissions to use a job template, you can assign permissions directly on the job template. Credentials are full objects in the automation controller RBAC system, and can be assigned to multiple users or teams for use.

Automation controller includes an *auditor* type. A system-level auditor can see all aspects of the systems automation, but does not have permission to run or change automation. An auditor is useful for a service account that scrapes automation information from the REST API.

### Additional resources

- For more information about user roles, see [Role-Based Access Controls](#).

## 1.4. CLOUD AND AUTOSCALING FLEXIBILITY

Automation controller includes a powerful optional provisioning callback feature that enables nodes to request configuration on demand. This is an ideal solution for a cloud auto-scaling scenario and includes the following features:

- It integrates with provisioning servers like Cobbler and deals with managed systems with unpredictable uptimes.
- It requires no management software to be installed on remote nodes.
- The callback solution can be triggered by a call to **curl** or **wget**, and can be embedded in **init** scripts, kickstarts, or preseeds.
- You can control access so that only machines listed in the inventory can request configuration.

## 1.5. THE IDEAL RESTFUL API

The automation controller REST API is the ideal RESTful API for a systems management application, with all resources fully discoverable, paginated, searchable, and well modeled. A styled API browser enables API exploration from the API root at **http://<server name>/api/**, showing off every resource and relation. Everything that can be done in the user interface can be done in the API.

## 1.6. BACKUP AND RESTORE

Ansible Automation Platform can backup and restore your systems or systems, making it easy for you to backup and replicate your instance as required.

## 1.7. ANSIBLE GALAXY INTEGRATION

By including an Ansible Galaxy **requirements.yml** file in your project directory, automation controller automatically fetches the roles your playbook needs from Galaxy, GitHub, or your local source control. For more information, see [Ansible Galaxy Support](#).

## 1.8. INVENTORY SUPPORT FOR OPENSTACK

Dynamic inventory support is available for OpenStack. This enables you to target any of the virtual machines or images running in your OpenStack cloud.

For more information, see [Openstack](#).

## 1.9. REMOTE COMMAND EXECUTION

Use remote command execution to perform a simple tasks, such as adding a single user, updating a single security vulnerability, or restarting a failing service. Any task that you can describe as a single Ansible play can be run on a host or group of hosts in your inventory, enabling you to manage your systems quickly and easily. Because of an RBAC engine and detailed audit logging, you know which user has completed a specific task.

## 1.10. SYSTEM TRACKING

You can collect facts using the fact caching feature. For more information, see [Fact Caching](#).

## 1.11. INTEGRATED NOTIFICATIONS

Keep track of the status of your automation.

You can configure the following notifications:

- stackable notifications for job templates, projects, or entire organizations
- different notifications for job start, job success, job failure, and job approval (for workflow nodes)

The following notification sources are supported:

- [Email](#)
- [Grafana](#)
- [IRC](#)
- [Mattermost](#)
- [PagerDuty](#)
- [Rocket.Chat](#)
- [Slack](#)
- [Twilio](#)
- [Webhook](#) (post to an arbitrary webhook, for integration into other tools)

You can also customize notification messages for each of the preceding notification types.

## 1.12. INTEGRATIONS

Automation controller supports the following integrations:

- Dynamic inventory sources for Red Hat Satellite 6.

For more information, see [Red Hat Satellite 6](#).

- Red Hat Insights integration, enabling Insights playbooks to be used as an Ansible Automation Platform project.

For more information, see [Setting up Insights Remediations](#).

- Automation hub acts as a content provider for automation controller, requiring both an automation controller deployment and an automation hub deployment running alongside each other.

## 1.13. CUSTOM VIRTUAL ENVIRONMENTS

Custom Ansible environment support enables you to have different Ansible environments and specify custom paths for different teams and jobs.

## 1.14. AUTHENTICATION ENHANCEMENTS

Automation controller supports:

- LDAP
- SAML
- token-based authentication

LDAP and SAML support enable you to integrate your enterprise account information in a more flexible manner.

Token-based authentication permits authentication of third-party tools and services with automation controller through integrated OAuth 2 token support.

## 1.15. CLUSTER MANAGEMENT

Run-time management of cluster groups enables configurable scaling.

## 1.16. WORKFLOW ENHANCEMENTS

To model your complex provisioning, deployment, and orchestration workflows, you can use automation controller expanded workflows in several ways:

- **Inventory overrides for Workflows** You can override an inventory across a workflow at workflow definition time, or at launch time. Automation controller enables you to define your application deployment workflows, and then re-use them in multiple environments.
- **Convergence nodes for Workflows** When modeling complex processes, you must sometimes wait for multiple steps to finish before proceeding. Automation controller workflows can replicate this; workflow steps can wait for any number of previous workflow steps to complete properly before proceeding.
- **Workflow Nesting** You can re-use individual workflows as components of a larger workflow. Examples include combining provisioning and application deployment workflows into a single workflow.
- **Workflow Pause and Approval** You can build workflows containing approval nodes that require user intervention. This makes it possible to pause workflows in between playbooks so that a user can give approval (or denial) for continuing on to the next step in the workflow.

For more information, see [Workflows in automation controller](#)

## 1.17. JOB DISTRIBUTION

Take a fact gathering or configuration job running across thousands of machines and divide it into slices that can be distributed across your automation controller cluster for increased reliability, faster job completion, and improved cluster use.

For example, you can change a parameter across 15,000 switches at scale, or gather information across your multi-thousand-node RHEL estate.

For more information, see [Job Slicing](#).

## 1.18. SUPPORT FOR DEPLOYMENT IN A FIPS-ENABLED ENVIRONMENT

Automation controller deploys and runs in restricted modes such as FIPS.

## 1.19. LIMIT THE NUMBER OF HOSTS PER ORGANIZATION

Many large organizations have instances shared among many organizations. To ensure that one organization cannot use all the licensed hosts, this feature enables superusers to set a specified upper limit on how many licensed hosts can be allocated to each organization. The automation controller algorithm factors changes in the limit for an organization and the number of total hosts across all organizations. Inventory updates fail if an inventory synchronization brings an organization out of compliance with the policy. Additionally, superusers are able to over-allocate their licenses, with a warning.

## 1.20. INVENTORY PLUGINS

The following inventory plugins are used from upstream collections:

- **amazon.aws.aws\_ec2**
- **community.vmware.vmware\_vm\_inventory**
- **azure.azurecollection.azure\_rm**
- **google.cloud.gcp\_compute**
- **theforeman.foreman.foreman**
- **openstack.cloud.openstack**
- **ovirt.ovirt.ovirt**
- **awx.awx.tower**

## 1.21. SECRET MANAGEMENT SYSTEM

With a secret management system, external credentials are stored and supplied for use in automation controller so you need not provide them directly.

## CHAPTER 2. AUTOMATION CONTROLLER LICENSING, UPDATES AND SUPPORT

Automation controller is provided as part of your annual Red Hat Ansible Automation Platform subscription.

Ansible is an open source software project and is licensed under the GNU General Public License version 3, as described in the [Ansible Source Code](#)

You must have valid subscriptions attached before installing Ansible Automation Platform.

For more information, see [Attaching Subscriptions](#).

### 2.1. TRIAL AND EVALUATION

You require a license to run automation controller. You can start by using a free trial license.

- Trial licenses for Ansible Automation Platform are available at: <http://ansible.com/license>
- Support is not included in a trial license or during an evaluation of the automation controller software.

### 2.2. COMPONENT LICENSES

To view the license information for the components included in automation controller, refer to **`/usr/share/doc/automation-controller-<version>/README`**.

where **<version>** refers to the version of automation controller you have installed.

To view a specific license, refer to **`/usr/share/doc/automation-controller-<version>/*.txt`**.

where **\*** is the license file name to which you are referring.

### 2.3. NODE COUNTING IN LICENSES

The automation controller license defines the number of Managed Nodes that can be managed as part of a Red Hat Ansible Automation Platform subscription.

A typical license says "License Count: 500", which sets the maximum number of Managed Nodes at 500.

For more information on managed node requirements for licensing, see <https://access.redhat.com/articles/3331481>.




#### NOTE

Ansible does not recycle node counts or reset automated hosts.

## CHAPTER 3. LOGGING INTO AUTOMATION CONTROLLER AFTER INSTALLATION

After you install automation controller, you must log in.

### Procedure

1. With the login information provided after your installation completed, open a web browser and log in to the automation controller by navigating to its server URL at:  
`https://<CONTROLLER_SERVER_NAME>/`
2. Use the credentials specified during the installation process to login:
  - The default username is **admin**.
  - The password for **admin** is the value specified.
3. Click the **More Actions** icon  next to the desired user.
4. Click **Edit**.
5. Edit the required details and click **Save**.



## CHAPTER 4. MANAGING YOUR ANSIBLE AUTOMATION CONTROLLER SUBSCRIPTION

Before you can use automation controller, you must have a valid subscription, which authorizes its use.

### 4.1. SUBSCRIPTION TYPES

Red Hat Ansible Automation Platform is provided at various levels of support and number of machines as an annual subscription.

- **Standard:**
  - Manage any size environment
  - Enterprise 8x5 support and SLA
  - Maintenance and upgrades included
  - Review the SLA at [Product Support Terms of Service](#)
  - Review the [Red Hat Support Severity Level Definitions](#)
- **Premium:**
  - Manage any size environment, including mission-critical environments
  - Premium 24x7 support and SLA
  - Maintenance and upgrades included
  - Review the SLA at [Product Support Terms of Service](#)
  - Review the [Red Hat Support Severity Level Definitions](#)

All subscription levels include regular updates and releases of automation controller, Ansible, and any other components of the Platform.

For more information, contact Ansible through the [Red Hat Customer Portal](#) or at <http://www.ansible.com/contact-us/>.

### 4.2. OBTAINING AN AUTHORIZED ANSIBLE AUTOMATION CONTROLLER SUBSCRIPTION

If you already have a subscription to a Red Hat product, you can acquire an automation controller subscription through that subscription. If you do not have a subscription to Red Hat Ansible Automation Platform and Red Hat Satellite, you can request a trial subscription.

#### Procedure

- If you have a Red Hat Ansible Automation Platform subscription, use your Red Hat customer credentials when you launch the automation controller to access your subscription information. See [Importing a subscription](#).
- If you have a non-Ansible Red Hat or Satellite subscription, access automation controller with one of these methods:

- Enter your username and password on the license page.
- Obtain a subscriptions manifest from the [Subscription Allocations](#) page on the Red Hat Customer Portal. For more information, see [Obtaining a subscriptions manifest](#).
- If you do not have a Red Hat Ansible Automation Platform subscription, go to [Try Red Hat Ansible Automation Platform](#) and request a trial subscription.

### Additional resources

- To understand what is supported with your subscription, see [Automation controller licensing, updates and support](#).
- If you have issues with your subscription, contact your Sales Account Manager or Red Hat Customer Service at: <https://access.redhat.com/support/contact/customerService/>.

## 4.3. OBTAINING A SUBSCRIPTIONS MANIFEST

To upload a subscriptions manifest, first set up your subscription allocations:

### Procedure

1. Navigate to [https://access.redhat.com/management/subscription\\_allocations](https://access.redhat.com/management/subscription_allocations). The **Subscriptions Allocations** page contains no subscriptions until you create one.
2. Click **Create New subscription allocation**.



### NOTE

If **Create New subscription allocation** does not display, or is disabled, you do not have the proper permissions to create subscription allocations. To create a subscription allocation, you must either be an Administrator on the Customer Portal, or have the Manage Your Subscriptions role. Contact an **access.redhat.com** administrator, or organization administrator who can grant you permission to manage subscriptions.

3. Enter a **Name** for your subscription and select **6.15** from the **Type** drop-down menu.

✓ my\_subscription\_manifest has been successfully created ✕

[Subscription Allocations](#) » my\_subscription\_manifest

### my\_subscription\_manifest

Details

Subscriptions

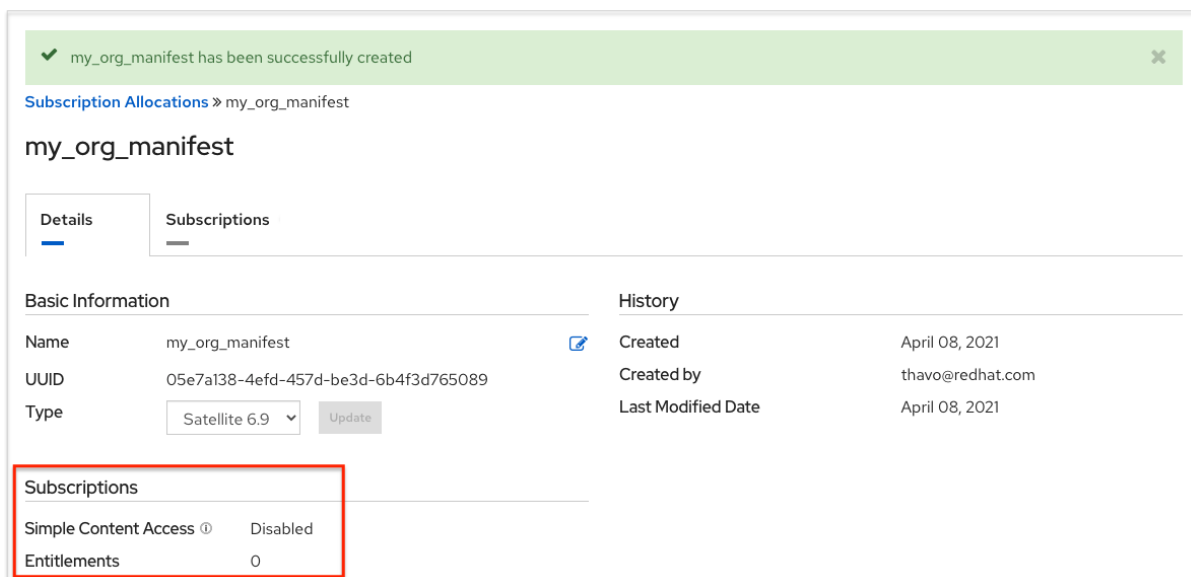
Basic Information		History	
Name	my_subscription_manifest <span style="float: right;">✎</span>	Created	September 12, 2023
UUID	765bc6df-fd78-426f-b726-43d8c569c38c	Created by	rhn-support-ifowler
Type	<div style="border: 1px solid #ccc; padding: 2px; display: inline-block;">Satellite 6.13</div> <span style="margin-left: 10px;">Update</span>	Last Modified Date	September 12, 2023

#### Subscriptions

Simple content access ⓘ	Enabled
Entitlements	0

4. Click **Create**.

When your subscriptions manifest is successfully created, the number indicated next to **Entitlements** indicates the number of entitlements associated with your subscription.



my\_org\_manifest has been successfully created

Subscription Allocations » my\_org\_manifest

my\_org\_manifest

Details Subscriptions

Basic Information

Name	my_org_manifest	Created	April 08, 2021
UUID	05e7a138-4efd-457d-be3d-6b4f3d765089	Created by	thavo@redhat.com
Type	Satellite 6.9 <input type="button" value="Update"/>	Last Modified Date	April 08, 2021

History

Subscriptions

Simple Content Access	Disabled
Entitlements	0

### 4.3.1. Setting up a subscriptions manifest

To obtain a subscriptions manifest, you must add an entitlement to your subscriptions through the **Subscriptions** tab.

#### Procedure

1. Click the **Subscriptions** tab.
2. If there are no subscriptions to display, click **Add Subscriptions**.
3. The following screen enables you to select and add entitlements to put in the manifest file.

Red Hat Ansible Automation Platform for Certified Cloud and Service Providers	12003868	2019-09-05	2021-09-05	4999	<input type="text"/>
Red Hat Ansible Automation, Premium (100 Managed Nodes)	12009552	2019-09-18	2021-09-19	100	<input type="text" value="100"/>
Red Hat Ansible Automation, Premium (100 Managed Nodes, Embedded Billing)	12009552	2019-09-18	2021-09-19	100	<input type="text"/>

You can select multiple Ansible Automation Platform subscriptions in your subscription allocation. Valid Ansible Automation Platform subscriptions commonly go by the name *"Red Hat Ansible Automation..."*.

4. Specify the number of entitlements or managed nodes to put in the manifest file. This enables you to split up a subscription, for example: 400 nodes on a development cluster and 600 nodes for the production cluster, out of a 1000 node subscription.



#### NOTE

You can apply multiple subscriptions to a single installation by adding multiple subscriptions of the same type to a manifest file and uploading them. Similarly, a subset of a subscription can be applied by only allocating a portion of the subscription when creating the manifest.

5. Click **Submit**.  
The allocations you specified, when successfully added, are displayed in the **Subscriptions** tab.
6. Click the **Details** tab to access the subscription manifest file.
7. Click **Export Manifest** to export the manifest file for this subscription. A folder pre-pended with **manifest\_** is downloaded to your local drive. Multiple subscriptions with the same SKU are aggregated.
8. When you have a subscription manifest, go to the Subscription screen.
9. Click **Browse** to upload the entire manifest file.
10. Navigate to the location where the file is saved. Do not open it or upload individual parts of it.

## 4.4. IMPORTING A SUBSCRIPTION

After you have obtained an authorized Ansible Automation Platform subscription, you must import it into the automation controller system before you can use automation controller. .Prerequisites

- You have obtained a subscriptions manifest. For more information, see [Obtaining a subscriptions manifest](#).

### Procedure

1. Launch automation controller for the first time. The **Subscription Management** screen displays.

subscription allocations on the Red Hat Customer Portal.' Below this is a section for 'Red Hat subscription manifest' with a circular icon. It contains a file upload area with the text 'Drag a file here or browse to upload' and two buttons: 'Browse' and 'Clear'. Below the upload area is the text 'Upload a .zip file'. At the bottom of the main content area are three buttons: 'Next' (highlighted in blue), 'Back', and 'Cancel'."/>

2. Retrieve and import your subscription by completing either of the following steps:
  - a. If you have obtained a subscription manifest, upload it by navigating to the location where the file is saved. The subscription manifest is the complete **.zip** file, and not only its component parts.



### NOTE

If the **Browse** option in the **Subscription manifest** option is disabled, clear the **username** and **password** fields to enable it.

The subscription metadata is then retrieved from the RHSM/Satellite API, or from the manifest provided. If many subscription counts were applied in a single installation, automation controller combines the counts but uses the earliest expiration date as the expiry (at which point you must refresh your subscription).

- b. If you are using your Red Hat customer credentials, enter your username and password on

the license page. Use your Satellite username or password if your automation controller cluster nodes are registered to Satellite with Subscription Manager. After you enter your credentials, click **Get Subscriptions**.

Automation controller retrieves your configured subscription service. Then, it prompts you to select the subscription that you want to run and applies that metadata to automation controller. You can log in over time and retrieve new subscriptions if you have renewed.

- Click **Next** to proceed to the **Tracking and Insights** page.  
Tracking and insights collect data to help Red Hat improve the product and deliver a better user experience. For more information about data collection, see [Usability Analytics and Data Collection](#) of the *Automation controller Administration Guide*.

This option is checked by default, but you can opt out of any of the following:

- **User analytics.** Collects data from the controller UI.
- **Insights Analytics.** Provides a high level analysis of your automation with automation controller. It helps you to identify trends and anomalous use of the controller. For opt-in of Automation Analytics to be effective, your instance of automation controller must be running on Red Hat Enterprise Linux. For more information, see the [Automation Analytics](#) section.



#### NOTE

You can change your analytics data collection preferences at any time.

- After you have specified your tracking and Insights preferences, click **Next** to proceed to the End User Agreement.
- Review and check the **I agree to the End User License Agreement** checkbox and click **Submit**. After your subscription is accepted, automation controller displays the subscription details and opens the Dashboard. To return to the Subscription settings screen from the Dashboard, select **Settings** → **Subscription settings** from the **Subscription** option in the navigation panel.
- Optional: To return to the Subscription settings screen from the Dashboard, select **Settings** → **Subscription settings** option in the navigation panel.

[Settings](#) > [Subscription](#)

#### Details



◀ Back to Settings    Subscription Details

<b>Status</b>	<span style="color: green; font-weight: bold;">✔ Compliant</span> <small>The number of hosts you have automated against is below your subscription count.</small>	<b>Hosts automated</b>	0 since 8/3/2022, 11:05:30 AM	<b>Hosts imported</b>	1
<b>Hosts remaining</b>	1	<b>Subscription type</b>	enterprise	<b>Subscription</b>	Red Hat Ansible Automation, Premium (1 Managed Nodes)
<b>Trial</b>	False	<b>Expires on</b>	9/19/2023, 11:59:59 PM	<b>Expires on UTC</b>	9/20/2023, 3:59:59 AM
<b>Days remaining</b>	412	<b>Automation controller version</b>	4.2.0		

If you are ready to upgrade or renew, please [contact us](#).

Edit

## Troubleshooting your subscription

When your subscription expires (you can check this in the Subscription details of the Subscription settings window), you must renew it in automation controller. You can do this by either importing a new subscription, or setting up a new subscription.

If you meet the "Error fetching licenses" message, check that you have the proper permissions required for the Satellite user. The automation controller administrator requires this to apply a subscription.

The Satellite username and password is used to query the Satellite API for existing subscriptions. From the Satellite API, the automation controller receives metadata about those subscriptions, then filters through to find valid subscriptions that you can apply. These are then displayed as valid subscription options in the UI.

The following Satellite roles grant proper access:

- Custom with **view\_subscriptions** and **view\_organizations** filter
- Viewer
- Administrator
- Organization Administrator
- Manager

Use the **Custom** role for your automation controller integration, as it is the most restrictive. For more information, see the [Satellite documentation](#) on managing users and roles.



#### NOTE

The **System Administrator** role is not equal to the **Administrator** user checkbox, and does not offer enough permissions to access the subscriptions API page.

## 4.5. ADD A SUBSCRIPTION MANUALLY

If you are unable to apply or update the subscription information by using the automation controller user interface, you can upload the subscriptions manifest manually in an Ansible playbook.

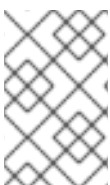
Use the license module in the **ansible.controller** collection:

```
- name: Set the license using a file
  license:
  manifest: "/tmp/my_manifest.zip"
```

For more information, see the [Automation controller license module](#).

## 4.6. ATTACHING SUBSCRIPTIONS

You **must** have valid Ansible Automation Platform subscriptions attached before installing Ansible Automation Platform.



#### NOTE

Attaching subscriptions is unnecessary if your Red Hat account has enabled [Simple Content Access Mode](#). However, you must register to *Red Hat Subscription Management* (RHSM) or Red Hat Satellite before installing Ansible Automation Platform.

## Procedure

1. To find the **pool\_id** of your subscription, enter the following command:

```
# subscription-manager list --available --all | grep "Ansible Automation Platform" -B 3 -A 6
```

The command returns the following:

```
Subscription Name: Red Hat Ansible Automation Platform, Premium (5000 Managed Nodes)
Provides: Red Hat Ansible Engine
Red Hat Single Sign-On
Red Hat Ansible Automation Platform
SKU: MCT3695
Contract: *****
Pool ID: *****
Provides Management: No
Available: 4999
Suggested: 1
```

2. To attach this subscription, enter the following command:

```
# subscription-manager attach --pool=<pool_id>
```

If all nodes have attached, then the repositories are found.

3. To check whether the subscription attached successfully, enter the following command:

```
# subscription-manager list --consumed
```

4. To remove this subscription, enter the following command:

```
#subscription-manager remove --pool=<pool_id>
```

## 4.7. TROUBLESHOOTING: KEEP YOUR SUBSCRIPTION IN COMPLIANCE

Your subscription has two possible statuses:

- **Compliant:** Indicates that your subscription is appropriate for the number of hosts that you have automated within your subscription count.
- **Out of compliance:** Indicates that you have exceeded the number of hosts in your subscription.

Compliance is computed as follows:

```
managed > manifest_limit => non-compliant
managed =< manifest_limit => compliant
```

Where: **managed** is the number of unique managed hosts without deletions, and **manifest\_limit** is the number of managed hosts in the subscription manifest.

Other important information displayed are:

- **Hosts automated:** Host count automated by the job, which consumes the license count.
- **Hosts imported:** Host count considering unique host names across all inventory sources. This number does not impact hosts remaining.
- **Hosts remaining:** Total host count minus hosts automated.
- **Hosts deleted:** Hosts that were deleted, freeing the license capacity.
- **Active hosts previously deleted:** Number of hosts now active that were previously deleted.

For example, if you have a subscription capacity of 10 hosts:

- Starting with 9 hosts, 2 hosts were added and 3 hosts were deleted, you now have 8 hosts (compliant).
- 3 hosts were automated again, now you have 11 hosts, which puts you over the subscription limit of 10 (non-compliant).
- If you delete hosts, refresh the subscription details to see the change in count and status.

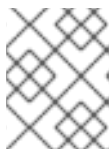
## 4.8. VIEWING THE HOST ACTIVITY

### Procedure

1. In the navigation panel, select **Host Metrics** to view the activity associated with hosts, such as those that have been automated and deleted.  
Each unique hostname is listed and sorted by the user's preference.

#### Host Metrics

Hostname	First automated	Last automated	Automation	Deleted
<input type="checkbox"/> host-1	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0
<input type="checkbox"/> host-2	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0
<input type="checkbox"/> host-3	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0
<input type="checkbox"/> host-4	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0
<input type="checkbox"/> host-5	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0



### NOTE

A scheduled task automatically updates these values on a weekly basis and deletes jobs with hosts that were last automated more than a year ago.

2. Delete unnecessary hosts directly from the Host Metrics view by selecting the desired hosts and clicking **Delete**.  
These are soft-deleted, meaning their records are not removed, but are not being used and thereby not counted towards your subscription.



## 4.9. HOST METRIC UTILITIES

Automation controller provides a way to generate a CSV output of the host metric data and host metric summary through the Command Line Interface (CLI). You can also soft delete hosts in bulk through the API.

### 4.9.1. awx-manage utility

The **awx-manage** utility supports the following options:

```
awx-manage host_metric --csv
```

This command produces host metric data, a host metrics summary file, and a cluster info file. To package all the files into a single tarball for distribution and sharing use:

```
awx-manage host_metric --tarball
```

To specify the number of rows (<n>) to output to each file:

```
awx-manage host_metric --tarball --rows_per_file <n>
```

The following is an example of a configuration file:



```

/tmp/dc---/1894481089/config.json
File Edit View Encoding About
{"platform": {"system": "Linux", "dist": ["CentOS Stream", "9", ""], "release": "6.2.7-200.fc37.x86_64", "type": "traditional"}, "install_uuid": "576168fc-ec61-4333-a985-a66", "license_expiry": 119126884, "pendo_tracking": "off", "authentication_backends": ["awx.sso.backends.TACACSPPlusBackend", "awx.main.backends.AWXModelBackend"], "logging_aggreg
1/1 1.3 K (100 %) Encoding: UTF-8 /tmp/dc---/1894481089/config.json

```

Automation Analytics receives and uses the JSON file.

### 4.9.2. API endpoint functions

The API lists only non-deleted records and are sortable by **last\_automation** and **used\_in\_inventories** columns.

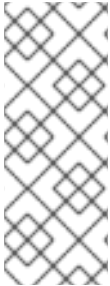
You can use the host metric API endpoint, **api/v2/host\_metric** to soft delete hosts:

```
api/v2/host_metric <n> DELETE
```

A monthly scheduled task automatically deletes jobs that uses hosts from the Host Metric table that were last automated more than a year ago.

## CHAPTER 5. THE USER INTERFACE

The automation controller *User Interface* (UI) provides a graphical framework for your IT orchestration requirements. The navigation panel provides quick access to automation controller resources, such as **Projects**, **Inventories**, **Job Templates**, and **Jobs**.




### NOTE

The automation controller UI is also available as a technical preview and is subject to change in future releases. To preview the new UI, click the **Enable Preview of New User Interface** toggle to **On** from the **Miscellaneous System** option of the **Settings** menu.

After saving, logout and log back in to access the new UI from the preview banner. To return to the current UI, click the link on the top banner where indicated.

Access your user profile, the **About** page, view related documentation, or log out using the icons in the page header.

You can view the activity stream for that user by clicking the **Activity Stream**  icon.

### 5.1. VIEWS

The automation controller UI provides several options for viewing information.

- [Dashboard view](#)
- [Jobs view](#)
- [Schedules view](#)
- [Activity Stream](#)
- [Workflow Approvals](#)
- [Host Metrics](#)

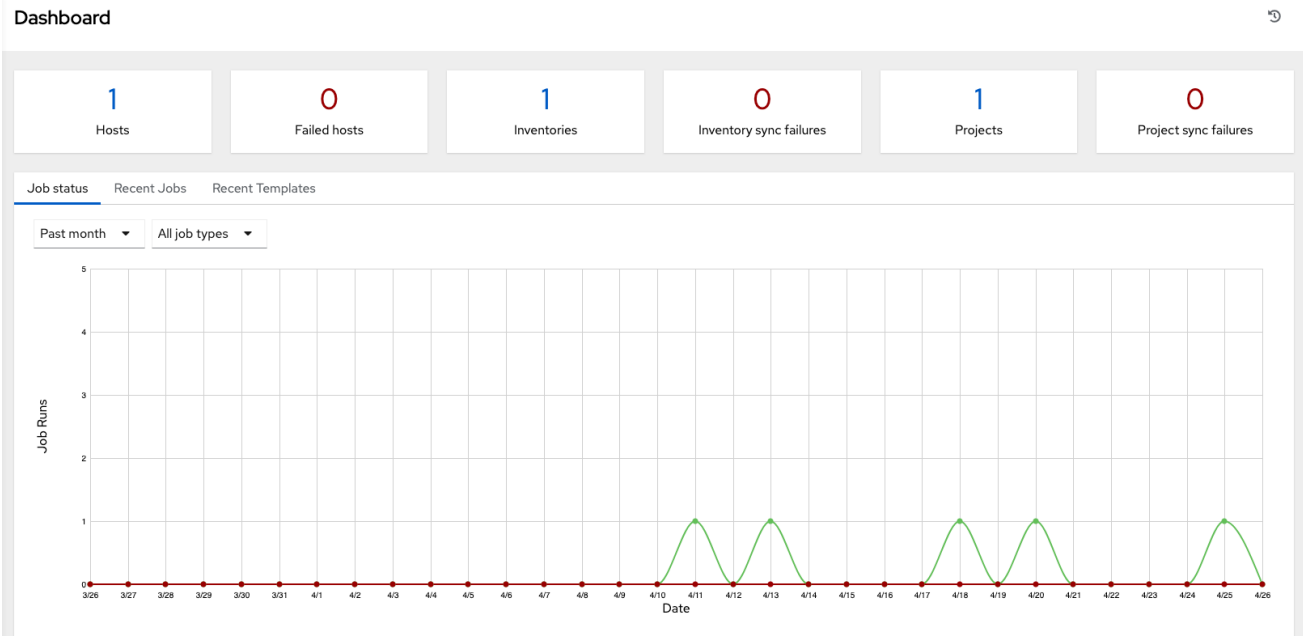
#### 5.1.1. Dashboard View

Use the navigation menu to complete the following tasks:

- Display different views
- Navigate to your resources
- Grant access to users
- Administer automation controller features in the UI

#### Procedure

- From the navigation panel, select **Views** to hide or display the **Views** options.
- The dashboard displays a summary of your current **Job status**.
  - You can filter the job status within a period of time or by job type.



- You can also display summaries of **Recent Jobs** and **Recent Templates**.

The **Recent Jobs** tab displays which jobs were most recently run, their status, and the time at which they were run.

Job status **Recent Jobs** Recent Templates

Name    1-1 of 1 < >

Name	Status	Start Time	Finish Time	Actions
> <input type="checkbox"/> 1 - Cleanup Activity Stream	<span style="color: green;">✔ Successful</span>	7/13/2021, 11:15:09 AM	7/13/2021, 11:15:12 AM	

1-1 of 1 items << < 1 of 1 page > >>

The **Recent Templates** tab displays a summary of the most recently used templates. You can also access this summary by selecting **Templates** from the navigation menu.

Job status Recent Jobs **Recent Templates**

Name    1-1 of 1 < >

Name	Type	Last Ran	Actions
> <input type="checkbox"/> Demo Job Template	Job Template		<input type="button" value="🔊"/> <input type="button" value="✎"/> <input type="button" value="🗑️"/>

1-1 of 1 items << < 1 of 1 page > >>



## NOTE

Click **Dashboard** on the navigation panel, or the **Ansible Automation Platform** logo at any time to return to the Dashboard.

### 5.1.2. Jobs view

- From the navigation panel, select **Jobs**. This view displays the jobs that have run, including projects, templates, management jobs, SCM updates, and playbook runs.

## Jobs



Name	Status	Type	Start Time	Finish Time	Actions
121 – Cleanup Expired OAuth 2 Tokens	Successful	Management Job	9/13/2023, 3:26:49 AM	9/13/2023, 3:26:51 AM	
120 – Cleanup Expired Sessions	Successful	Management Job	9/13/2023, 3:26:39 AM	9/13/2023, 3:26:41 AM	
117 – test1 - tests1	Failed	Inventory Sync	9/12/2023, 6:56:52 PM	9/12/2023, 6:56:59 PM	
118 – My Git	Successful	Source Control Update	9/12/2023, 6:56:40 PM	9/12/2023, 6:56:52 PM	

### 5.1.3. Schedules view

This view shows all the scheduled jobs that are configured.

## Schedules










Name	Type	Next Run	Actions
Cleanup Activity Schedule	Management Job	Next Run 7/20/2021, 11:15:02 AM	On
Cleanup Expired OAuth 2 Tokens	Management Job		On
Cleanup Expired Sessions	Management Job		On
Cleanup Job Schedule	Management Job	Next Run 7/18/2021, 11:15:02 AM	On


### 5.1.4. Activity Stream

- From the navigation panel, select **Activity Stream** to display Activity Streams. Most screens have an Activity Stream icon.

**Activity Stream** Dashboard (all activity) ▾

Keyword   1 - 20 of 32 < >

Time ↓	Initiated by ↑	Event	Actions
7/12/2021, 4:51:43 PM	admin	created inventory <a href="#">New inventory</a>	
7/12/2021, 1:22:11 PM	admin	created setting	
7/12/2021, 1:22:11 PM	admin	created setting	
7/12/2021, 1:22:11 PM	admin	created setting	
7/12/2021, 1:22:11 PM	admin	created setting	
7/12/2021, 1:22:11 PM	admin	created setting	
7/12/2021, 1:22:11 PM	admin	created setting	

An Activity Stream shows all changes for a particular object. For each change, the Activity Stream shows the time of the event, the user that initiated the event, and the action. The information displayed varies depending on the type of event. Click the **Examine**  icon to display the event log for the change.

**Event detail** ✕

**Time** 9/12/2023, 10:25:18 PM      **Initiated by** admin      **Setting category** saml

**Setting name** SOCIAL\_AUTH\_SAML\_SP\_PRIVATE\_KEY

**Action** updated setting [SOCIAL\\_AUTH\\_SAML\\_SP\\_PRIVATE\\_KEY](#)

**Changes** YAML JSON ✕

```

1 - {
2 -   "value": [
3 -     "hidden",
4 -     "hidden"
5 -   ]
6 - }
```

You can filter the Activity Stream by the initiating user, by system (if it was system initiated), or by any related object, such as a credential, job template, or schedule.

The Activity Stream on the main Dashboard shows the Activity Stream for the entire instance. Most pages permit viewing an activity stream filtered for that specific object.

### 5.1.5. Workflow Approvals

- From the navigation panel, select **Workflow Approvals** to see your workflow approval queue. The list contains actions that require you to approve or deny before a job can proceed.

### 5.1.6. Host Metrics

- From the navigation panel, select **Host Metrics** to see the activity associated with hosts, which includes counts on those that have been automated, used in inventories, and deleted.

### Host Metrics

Hostname	First automated	Last automated	Automation	Deleted
host-1	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0
host-2	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0
host-3	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0
host-4	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0
host-5	4/18/2023, 8:08:41 AM	4/18/2023, 8:08:41 AM	1	0

For further information, see [Troubleshooting: Keeping your subscription in compliance](#) .

## 5.2. RESOURCES MENU

The **Resources** menu provides access to the following components of automation controller:

- [Templates](#)
- [Credentials](#)
- [Projects](#)
- [Inventories](#)
- [Hosts](#)

## 5.3. ACCESS MENU

The **Access** menu enables you to configure who has permissions to automation controller resources:

- [Organizations](#)
- [Users](#)
- [Teams](#)

## 5.4. ADMINISTRATION

The **Administration** menu provides access to the administrative options of automation controller. From here, you can create, view, and edit:

- [Credential types](#)
- [Notifications](#)
- [Management\\_jobs](#)

- [Instance groups](#)
- Instances
- [Applications](#)
- [Execution environments](#)
- Topology view

## 5.5. THE SETTINGS MENU

Configure global and system-level settings using the **Settings** menu. The **Settings** menu provides access to automation controller configuration settings.

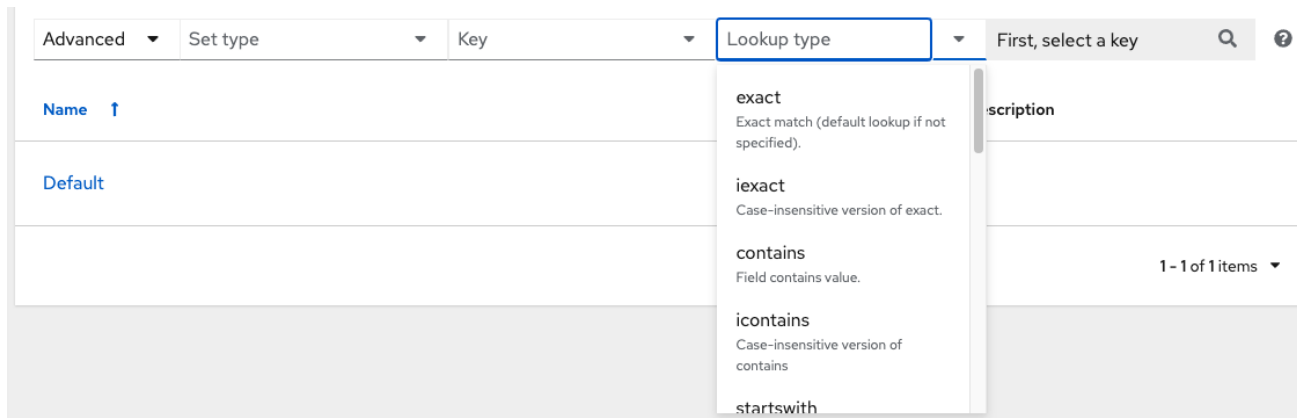
The **Settings** page enables administrators to configure the following:

- Authentication
- Jobs
- System-level attributes
- Customize the UI
- Product license information

## CHAPTER 6. SEARCH

Use automation controller's search tool for search and filter capabilities across multiple functions. An expandable list of search conditions is available from the **Advanced** option from the **Name** menu in the search field.

From there, use the combination of **Set Type**, **Key**, and **Lookup type** to filter.



### 6.1. RULES FOR SEARCHING

These searching tips assume that you are not searching hosts. Most of this section still applies to hosts but with some subtle differences.

- The typical syntax of a search consists of a field (left-hand side) and a value (right-hand side).
- A colon is used to separate the field that you want to search from the value.
- If the search has no colon (see example 3) it is treated as a simple string search where **search=foobar** is sent.

The following are examples of syntax used for searching:

1. **name:localhost** In this example, the user is searching for the string `localhost` in the name attribute. If that string does not match something from **Fields** or **Related Fields**, the entire search is treated as a string.
2. **organization.name:Default** This example shows a Related Field Search. The period in **organization.name** separates the model from the field. Depending on how deep or complex the search is, you can have multiple periods in that part of the query.
3. **foobar** This is a simple string (key term) search that finds all instances of the search term using an **icontains** search against the name and description fields. If you use a space between terms, for example **foo bar**, then results that contain both terms are returned. If the terms are wrapped in quotes, for example, **"foo bar"**, automation controller searches for the string with the terms appearing together.

Specific name searches search against the API name. For example, **Management job** in the user interface is **system\_job** in the API. **organization:Default** This example shows a Related Field search but without specifying a field to go along with the organization. This is supported by the API and is analogous to a simple string search but carried out against the organization (does an **icontains** search against both the name and description).



### 6.1.1. Values for search fields

To find values for certain fields, refer to the API endpoint for extensive options and their valid values. For example, if you want to search against `/api/v2/jobs > type` field, you can find the values by performing an **OPTIONS** request to `/api/v2/jobs` and look for entries in the API for **"type"**. Additionally, you can view the related searches by scrolling to the bottom of each screen. In the example for `/api/v2/jobs`, the related search shows:

```
"related_search_fields": [
  "modified_by__search",
  "project__search",
  "project_update__search",
  "credentials__search",
  "unified_job_template__search",
  "created_by__search",
  "inventory__search",
  "labels__search",
  "schedule__search",
  "webhook_credential__search",
  "job_template__search",
  "job_events__search",
  "dependent_jobs__search",
  "launch_config__search",
  "unifiedjob_ptr__search",
  "notifications__search",
  "unified_job_node__search",
  "instance_group__search",
  "hosts__search",
  "job_host_summaries__search"
```

The values for Fields come from the keys in a **GET** request. **url**, **related**, and **summary\_fields** are not used. The values for Related Fields also come from the **OPTIONS** response, but from a different attribute. Related Fields is populated by taking all the values from **related\_search\_fields** and stripping off the **\_\_search** from the end.

Any search that does not start with a value from Fields or a value from the Related Fields, is treated as a generic string search. Searching for **localhost**, for example, results in the UI sending **?search=localhost** as a query parameter to the API endpoint. This is a shortcut for an **icontains** search on the name and description fields.

### 6.1.2. Searching using values from related fields

Searching a Related Field requires you to start the search string with the Related Field. The following example describes how to search using values from the Related Field, *organization*.

The left-hand side of the search string must start with **organization**, for example, **organization:Default**. Depending on the related field, you can provide more specific direction for the search by providing secondary and tertiary fields. An example of this is to specify that you want to search for all job templates that use a project matching a certain name. The syntax on this would look like: **job\_template.project.name:"A Project"**.



## NOTE

This query executes against the **unified\_job\_templates** endpoint which is why it starts with **job\_template**. If you were searching against the **job\_templates** endpoint, then you would not need the **job\_template** portion of the query.

### 6.1.3. Other search considerations







Be aware of the following issues when searching in automation controller:

- There is currently no supported syntax for **OR** queries. All search terms are **AND**ed in the query parameters.
- The left-hand portion of a search parameter can be wrapped in quotes to support searching for strings with spaces. For more information, see [Tips for searching](#).
- Currently, the values in the Fields are direct attributes expected to be returned in a **GET** request. Whenever you search against one of the values, automation controller carries out an **\_\_icontains** search. So, for example, **name:localhost** sends back **? name\_\_icontains=localhost**. Automation controller currently performs this search for every Field value, even **id**.

## 6.2. SORT

Where applicable, use the arrows in each column to sort by ascending order. The following is an example from the schedules list:

Schedules ↻

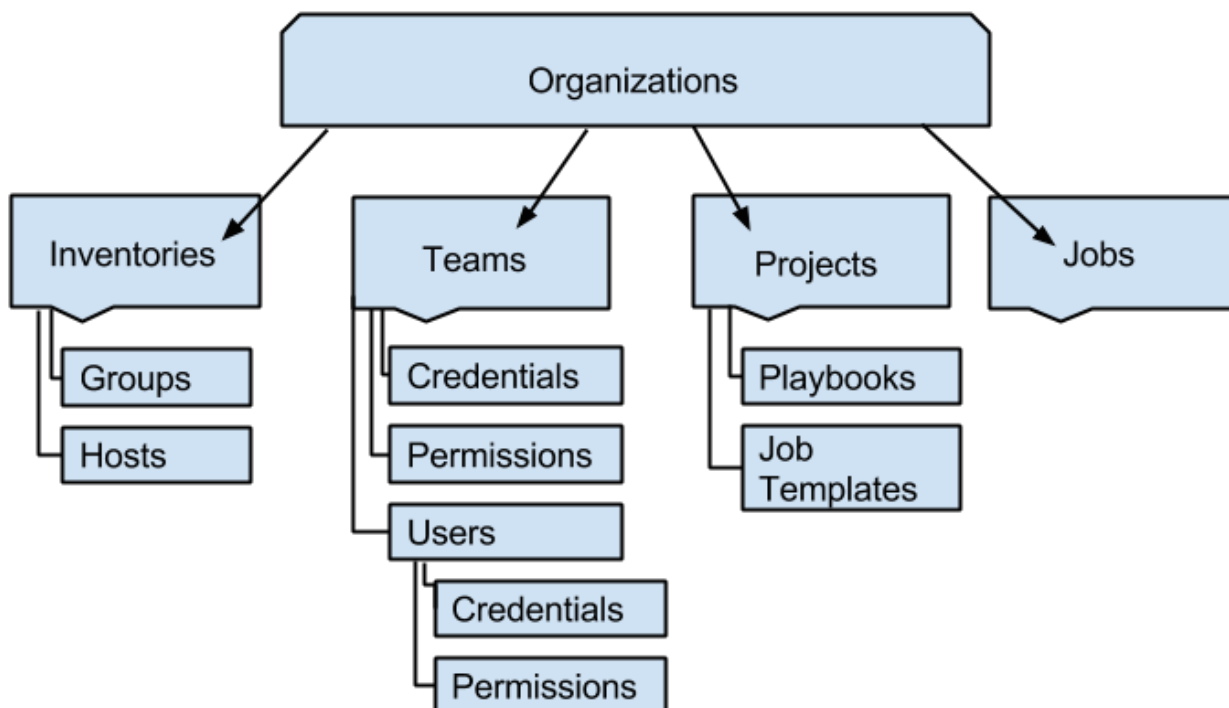
Name 	Type	Next Run 	Actions
<input type="checkbox"/> <a href="#">Cleanup Activity Schedule</a>	Management Job	Next Run 7/20/2021, 11:15:02 AM	<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Cleanup Expired OAuth 2 Tokens</a>	Management Job		<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Cleanup Expired Sessions</a>	Management Job		<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Cleanup Job Schedule</a>	Management Job	Next Run 7/18/2021, 11:15:02 AM	<input checked="" type="checkbox"/> On 

1 - 4 of 4 items 1 of 1 page

The direction of the arrow indicates the sort order of the column.

## CHAPTER 7. ORGANIZATIONS

An organization is a logical collection of users, teams, projects, and inventories. It is the highest level object in the controller object hierarchy.



From the navigation menu, select **Organizations** to display the existing organizations for your installation.

**Organizations** 🔍

Name

1-1 of 1 < >

Name <span style="font-size: 0.8em;">↑</span>	Members	Teams	Actions
<input type="checkbox"/> Default	0	0	<input type="button" value="✎"/>

1-1 of 1 items << < 1 of 1 page > >>

Organizations can be searched by **Name** or **Description**.

Modify organizations using the  icon. Click **Delete** to remove a selected organization.

### 7.1. CREATING AN ORGANIZATION



## NOTE

Automation controller automatically creates a default organization. If you have a Self-support level license, you have only the default organization available and must not delete it.

You can use the default organization as it is initially set up and edit it later.

1. Click **Add** to create a new organization.

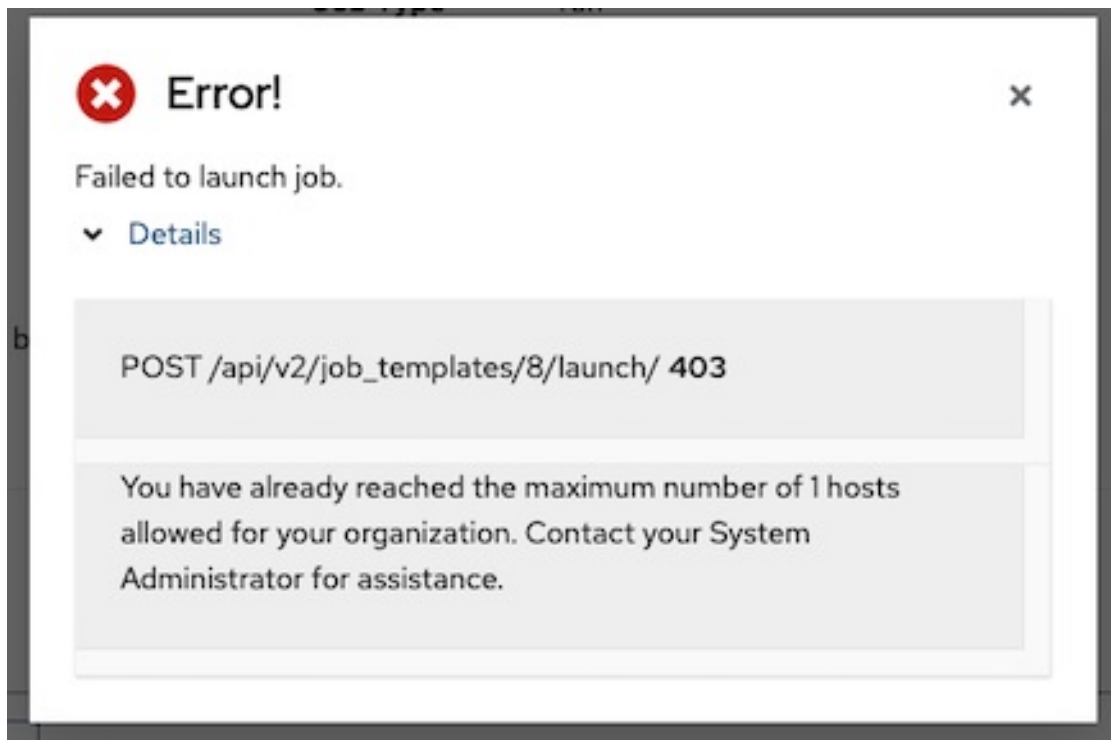
Organizations  
Create New Organization ↻

<b>Name *</b> <input type="text"/>	<b>Description</b> <input type="text"/>	<b>Max Hosts</b> ⓘ <input type="text" value="0"/>
<b>Instance Groups</b> ⓘ <input type="text" value="Q"/>	<b>Default Execution Environment</b> ⓘ <input type="text" value="Q"/>	<b>Galaxy Credentials</b> <input type="text" value="Q Ansible Galaxy x"/>

2. You can configure several attributes of an organization:

- Enter the **Name** for your organization (required).
- Enter a **Description** for the organization.
- **Max Hosts** is only editable by a superuser to set an upper limit on the number of license hosts that an organization can have. Setting this value to **0** signifies no limit. If you try to add a host to an organization that has reached or exceeded its cap on hosts, an error message displays:

The inventory sync output view also shows the host limit error.



Click **Details** for additional information about the error.

- Enter the name of the **Instance Groups** on which to run this organization.

- Enter the name of the execution environment or search for one that exists on which to run this organization. For more information, see [Upgrading to Execution Environments](#).
  - Optional: Enter the **Galaxy Credentials** or search from a list of existing ones.
3. Click **Save** to finish creating the organization.

When the organization is created, automation controller displays the Organization details, and enables you to manage access and execution environments for the organization.

Organizations > Honey Dog, Inc.

## Details

◀ Back to Organizations   Details   Access   Teams   Execution Environments   Notifications

<b>Name</b>	Honey Dog, Inc.	<b>Description</b>	A capable company making capable things	<b>Max Hosts</b>	1
<b>Created</b>	7/14/2021, 5:02:59 PM by <a href="#">admin</a>	<b>Last Modified</b>	7/14/2021, 7:33:56 PM by <a href="#">admin</a>		

**Galaxy Credentials**   Galaxy Api Token: An...

[Edit](#)   [Delete](#)

From the **Details** tab, you can edit or delete the organization.



### NOTE

If you attempt to delete items that are used by other work items, a message lists the items that are affected by the deletion and prompts you to confirm the deletion. Some screens contain items that are invalid or have been deleted previously, and will fail to run.

The following is an example of such a message:

**!** Delete Organization
✕

Are you sure you want to delete:  
**Honey Dog, Inc.**

**⚠ This organization is currently being by other resources. Are you sure you want to delete it?**

Teams **4**

Inventories **1**

**Delete**
Cancel

## 7.2. ACCESS TO ORGANIZATIONS

- Select **Access** when viewing your organization to display the users associated with this organization, and their roles.

Organizations > Honey Dog, Inc.

## Access

◀ Back to Organizations   Details   **Access**   Teams   Execution Environments   Notifications

Username ▾   1 - 4 of 4 ▾ < >

Username	First name	Last name	Roles
<a href="#">admin</a>			User Roles <input type="button" value="System Administrator"/>
<a href="#">austin78</a>	Austin	Austin	User Roles <input type="button" value="Member x"/> <input type="button" value="System Auditor"/>
<a href="#">jgarcia</a>	Jerry	Jerry	User Roles <input type="button" value="Member x"/>
<a href="#">jdoge</a>	Josie	Josie	User Roles <input type="button" value="Project Admin x"/>

1 - 4 of 4 items ▾ << < 1 of 1 page > >>

Use this page to complete the following tasks:

- Manage the user membership for this organization. Click **Users** on the navigation panel to manage user membership on a per-user basis from the **Users** page.
- Assign specific users certain levels of permissions within your organization.
- Enable them to act as an administrator for a particular resource. For more information, see [Role-Based Access Controls](#).

Click a user to display that user's details. You can review, grant, edit, and remove associated permissions for that user. For more information, see [Users](#).

### 7.2.1. Add a User or Team

To add a user or team to an organization, the user or team must already exist.

For more information, see [Creating a User](#) and [Creating a Team](#).

To add existing users or team to the Organization:

#### Procedure

1. In the **Access** tab of the **Organization** page, click **Add**.
2. Select a user or team to add.
3. Click **Next**.
4. Select one or more users or teams from the list by clicking the checkbox next to the name to add them as members.
5. Click **Next**.

### Add Roles

- Select a Resource Type
 

Choose the type of resource that will be receiving new roles. For example, if you'd like to add new roles to a set of users please choose Users and click Next. You'll be able to select the specific resources in the next step.

Users      Teams
- Select Items from List
- Select Roles to Apply

### Add User Roles

- Select a Resource Type
- Select Items from List
 

Choose the resources that will be receiving new roles. You'll be able to select the roles to apply in the next step. Note that the resources chosen here will receive all roles chosen in the next step.

Selected: jdoge x jgarcia x

Username

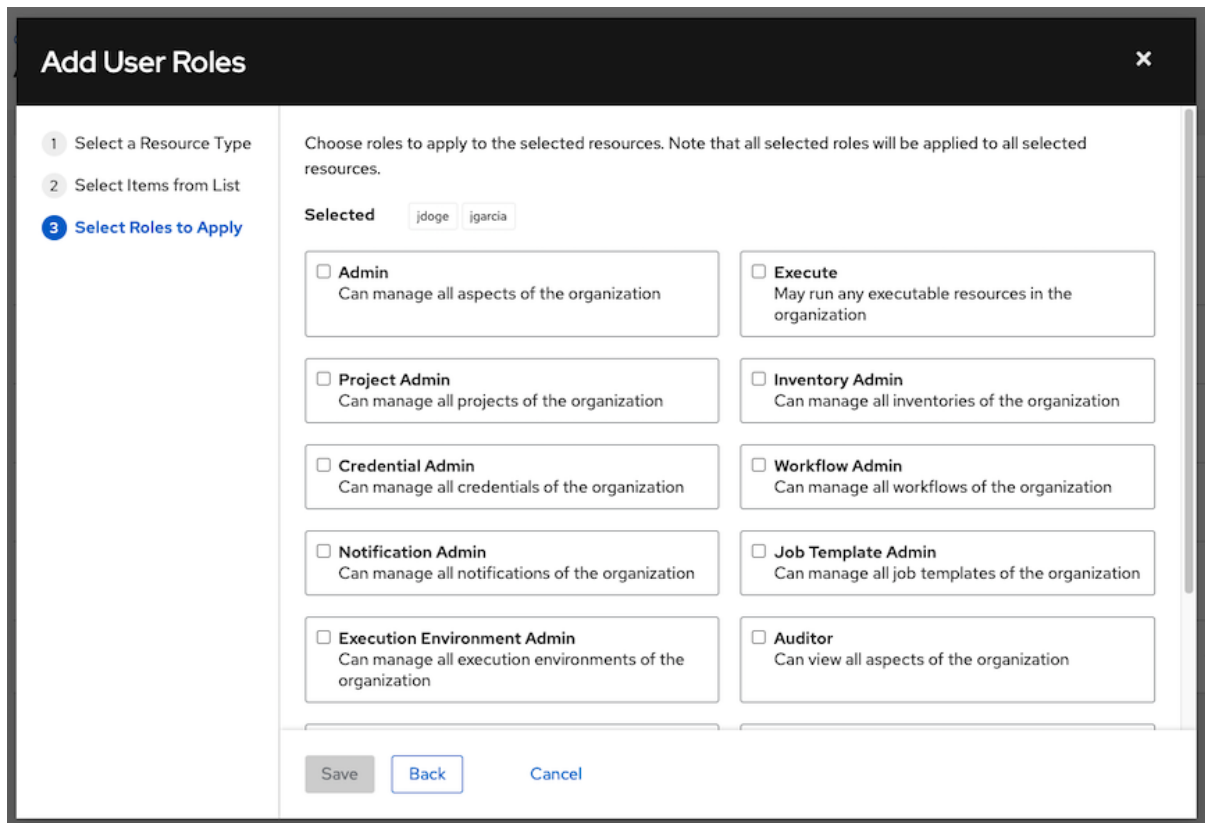
	Username ↑	First Name ↓	Last Name ↓
<input type="checkbox"/>	austin78	Austin	Texas
<input checked="" type="checkbox"/>	jdoge	Josie	Doge
<input checked="" type="checkbox"/>	jgarcia	Jerry	Garcia

« < 1 of 1 page > »

Next    Back    Cancel
- Select Roles to Apply

In this example, two users have been selected.

- Select the role you want the selected user or team to have. Scroll down for a complete list of roles. Different resources have different options available.



- Click **Save** to apply the roles to the selected user or team, and to add them as members. The **Add Users** or **Add Teams** window displays the updated roles assigned for each user and team.



## NOTE

A user or team with associated roles retains them if they are reassigned to another organization.

- To remove roles for a particular user, click the disassociate **X** icon next to its resource. This launches a confirmation dialog, asking you to confirm the disassociation.

## 7.2.2. Work with Notifications

Selecting the **Notifications** tab enables you to review any notification integrations you have set up.

Organizations > Honey Dog, Inc.

### Notifications



<a href="#">Back to Organizations</a> <a href="#">Details</a> <a href="#">Access</a> <a href="#">Teams</a> <a href="#">Execution Environments</a> <a href="#">Notifications</a>			
Name	Type	Options	
<a href="#">Email notification for job starts</a>	Email	<input type="checkbox"/> Approval	<input type="checkbox"/> Start <input type="checkbox"/> Success <input type="checkbox"/> Failure
<a href="#">Slack notifications</a>	Slack	<input type="checkbox"/> Approval	<input type="checkbox"/> Start <input type="checkbox"/> Success <input type="checkbox"/> Failure
<a href="#">SMS notification to self</a>	Pagerduty	<input type="checkbox"/> Approval	<input type="checkbox"/> Start <input type="checkbox"/> Success <input type="checkbox"/> Failure
<a href="#">Webhook notification</a>	Webhook	<input type="checkbox"/> Approval	<input type="checkbox"/> Start <input type="checkbox"/> Success <input type="checkbox"/> Failure

1 - 4 of 4 items    1 of 1 page



Use the toggles to enable or disable the notifications to use with your particular organization. For more information, see [Enable and Disable Notifications](#).

If no notifications have been set up, select **Notifications** from the navigation panel.

For information on configuring notification types, see [Notification Types](#).

## CHAPTER 8. MANAGING USERS IN AUTOMATION CONTROLLER

Users associated with an organization are shown in the **Access** tab of the organization.

Other users can be added to an organization, including a **Normal User**, **System Auditor**, or **System Administrator**, but they must be created first.

You can sort or search the User list by **Username**, **First Name**, or **Last Name**. Click the headers to toggle your sorting preference.

You can view user permissions and user type beside the user name on the **Users** page.

### 8.1. CREATING A USER

To create new users in automation controller and assign them a role.

#### Procedure

1. On the **Users** page, click **Add**.  
The **Create User** dialog opens.
2. Enter the appropriate details about your new user. Fields marked with an asterisk (\*) are required.



#### NOTE

If you are modifying your own password, log out and log back in again for it to take effect.

You can assign three types of users:

- **Normal User:** Normal Users have read and write access limited to the resources (such as inventory, projects, and job templates) for which that user has been granted the appropriate roles and privileges.
- **System Auditor:** Auditors inherit the read-only capability for all objects within the environment.
- **System Administrator:** A System Administrator (also known as a Superuser) has full system administration privileges – with full read and write privileges over the entire installation. A System Administrator is typically responsible for managing all aspects of and delegating responsibilities for day-to-day work to various users.

The screenshot shows a 'Create User' form with the following fields and values:

- First Name:** New
- Last Name:** User
- Email:** newbie@mail.com
- Username \*:** newbie
- Password \*:** [masked]
- Confirm Password \*:** [masked]
- User Type \*:** Normal User (selected from a dropdown menu that also includes System Auditor and System Administrator)
- Organization \*:** Default

Buttons: Save, Cancel

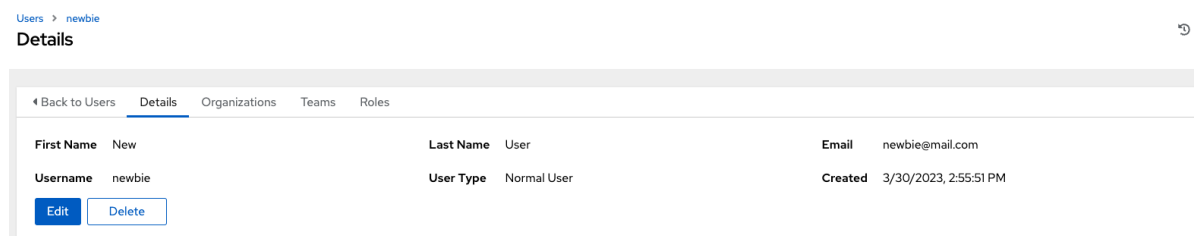


## NOTE


A default administrator with the role of **System Administrator** is automatically created during the installation process and is available to all users of automation controller. One **System Administrator** must always exist. To delete the **System Administrator** account, you must first create another **System Administrator** account.

3. Click **Save**.

When the user is successfully created, the **User** dialog opens.



4. Click **Delete** to delete the user, or you can delete users from a list of current users. For more information, see [Deleting a user](#).

The same window opens whether you click the user's name, or the Edit  icon beside the user. You can use this window to review and modify the User's **Organizations**, **Teams**, **Roles**, and other user membership details.



## NOTE

If the user is not newly-created, the details screen displays the last login activity of that user.

If you log in as yourself, and view the details of your user profile, you can manage tokens from your user profile.

For more information, see [Adding a user token](#).

## 8.2. DELETING A USER

Before you can delete a user, you must have user permissions. When you delete a user account, the name and email of the user are permanently removed from automation controller.

### Procedure

1. From the navigation panel, select **Access**.
2. Click **Users** to display a list of the current users.
3. Select the check box for the user that you want to remove.
4. Click **Delete**.
5. Click **Delete** in the confirmation warning message to permanently delete the user.

## 8.3. DISPLAYING USER ORGANIZATIONS

Select a specific user to display the **Details** page, select the **Organizations** tab to display the list of organizations of which that user is a member.



## NOTE

Organization membership cannot be modified from this display panel.

Users > austin78

### Organizations

← Back to Users Details **Organizations** Teams Roles Tokens

Name   1-1 of 1 < >

Name ↑	Description
<a href="#">Honey Dog, Inc.</a>	A capable company making capable things

1-1 of 1 items << < 1 of 1 page > >>

## 8.4. DISPLAYING A USER'S TEAMS

From the **Users > Details** page, select the **Teams** tab to display the list of teams of which that user is a member.



## NOTE

You cannot modify team membership from this display panel. For more information, see [Teams](#).

Until you create a team and assign a user to that team, the assigned teams details for that user is displayed as empty.

## 8.5. DISPLAYING A USER'S ROLES

From the **Users > Details** page, select the **Roles** tab to display the set of roles assigned to this user. These offer the ability to read, change, and administer projects, inventories, job templates, and other elements.

Users > newbie

### Roles

← Back to Users Details Organizations Teams **Roles**

Role    1-1 of 1 < >

Name	Type	Role
<a href="#">Default</a>	Organization	<input type="button" value="Member x"/>

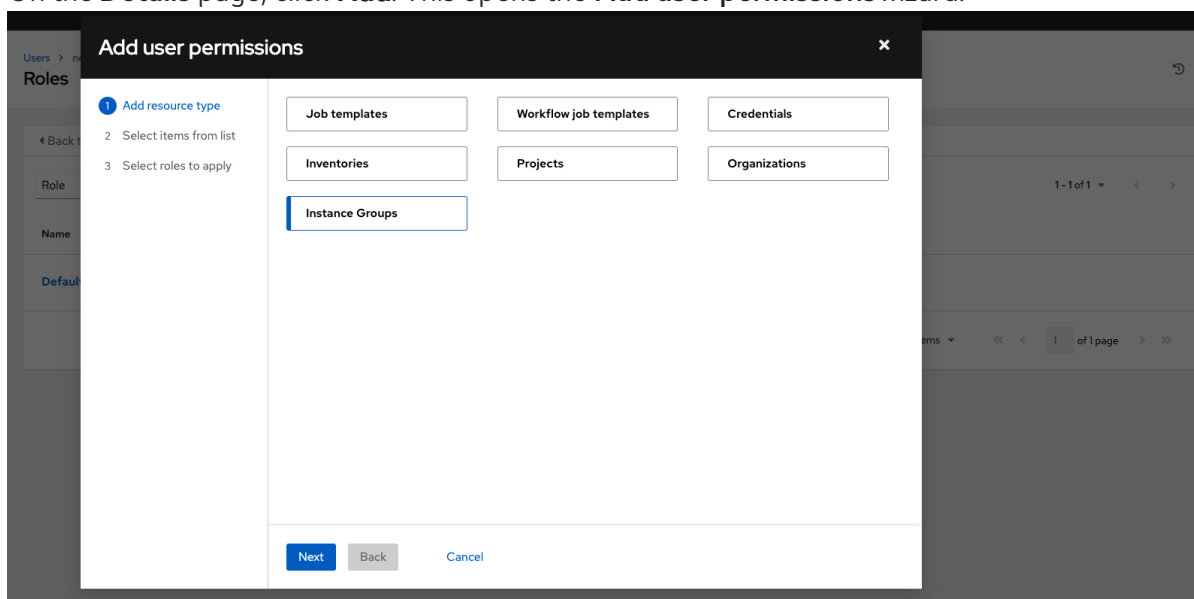
1-1 of 1 items << < 1 of 1 page > >>

### 8.5.1. Adding and removing user permissions

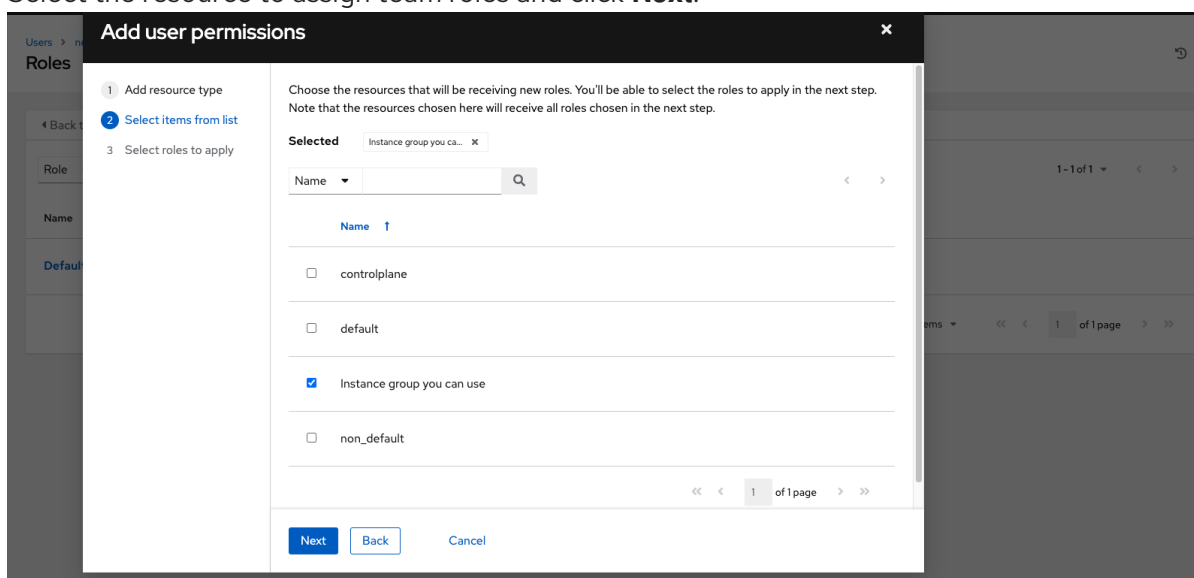
To add permissions to a particular user:

## Procedure

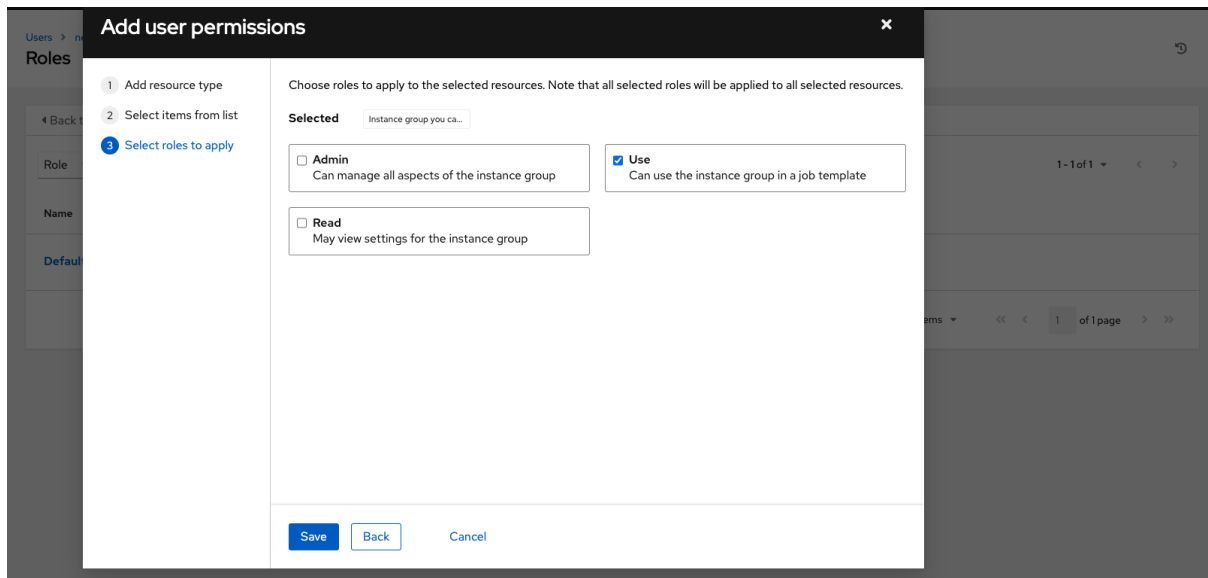
1. From the **Users** list view, click on the name of a user.
2. On the **Details** page, click **Add**. This opens the **Add user permissions** wizard.



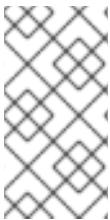
3. Select the object to assign permissions, for which the user will have access.
4. Click **Next**.
5. Select the resource to assign team roles and click **Next**.



6. Select the resource you want to assign permissions to. Different resources have different options available.



7. Click **Save**.
8. The **Roles** page displays the updated profile for the user with the permissions assigned for each selected resource.



## NOTE

You can also add teams, individual, or multiple users and assign them permissions at the object level. This includes templates, credentials, inventories, projects, organizations, or instance groups. This feature reduces the time for an organization to onboard many users at one time.

### To remove permissions:

- Click the **X** icon next to the resource. This launches a confirmation dialog asking you to confirm the disassociation.

## 8.6. CREATING TOKENS FOR A USER


The **Tokens** tab is only present for the user you created for yourself.

Before you add a token for your user, you might want to [Create an application](#) if you want to associate your token with it.

You can also create a *Personal Access Token (PAT)* without associating it with any application.

### Procedure

1. Select your user from the **Users** list view to configure your OAuth 2 tokens.
2. Select the **Tokens** tab from your user's profile.
3. Click **Add** to open the **Create Token** window.
4. Enter the following information:
  - **Application:** Enter the name of the application with which you want to associate your token.



Alternatively, you can search for the application name clicking the  icon. This opens a separate window that enables you to choose from the available options. Use the Search bar to filter by name if the list is extensive.

Leave this field blank if you want to create a PAT that is not linked to any application.

- Optional: **Description:** Provide a short description for your token.
  - **Scope:** Specify the level of access you want this token to have.
5. Click **Save** or **Cancel** to abandon your changes.
  6. After the token is saved, the newly created token for the user is displayed.

### Token information ✕

i This is the only time the token value and associated refresh token value will be shown.

<b>Token</b>	<span style="font-size: 1.2em;">&gt;</span> CkrG6WImDnOiIPGAfszpYmRBrpY5m	
<b>Refresh Token</b>	<span style="font-size: 1.2em;">&gt;</span> IMyxhcMhUTHK67anXmHSnP3sPsw9VP	
<b>Expires</b>	12/5/3020, 4:23:52 PM	



### IMPORTANT

This is the only time the token value and associated refresh token value are ever shown.

## CHAPTER 9. MANAGING TEAMS

A **Team** is a subdivision of an organization with associated users, projects, credentials, and permissions. Teams offer a means to implement role-based access control schemes and delegate responsibilities across organizations. For example, you can grant permissions to a whole team rather than to each user on the team.

From the navigation panel, select **Access** → **Teams**.

Name	Organization	Actions
Engineering	Honey Dog, Inc.	
IT	Honey Dog, Inc.	
Production Operations	Honey Dog, Inc.	
Sales & Marketing	Honey Dog, Inc.	

You can sort and search the team list and searched by **Name** or **Organization**.

Click the Edit icon next to the entry to edit information about the team. You can also review **Users** and **Permissions** associated with this team.

### 9.1. CREATING A TEAM

You can create as many teams of users as you need for your organization. You can assign permissions to each team, just as with users. Teams can also assign ownership for credentials, minimizing the steps to assign the same credentials to the same user.

#### Procedure

1. On the **Teams** page, click **Add**.
2. Enter the appropriate details into the following fields:
  - **Name**
  - Optional: **Description**
  - **Organization**: You must select an existing organization
3. Click **Save**. The **Details** dialog opens.
4. Review and edit your team information.



Teams > Production Operations

## Details

◀ Back to Teams   Details   Access   Roles

<b>Name</b>	Production Operations	<b>Description</b>	ProOps Team	<b>Organization</b>	Honey Dog, Inc.
<b>Created</b>	7/14/2021, 10:34:06 PM	<b>Last Modified</b>	7/14/2021, 10:34:06 PM		

[Edit](#) [Delete](#)

### 9.1.1. Adding or removing a user to a team

To add a user to a team, the user must already have been created. For more information, see [Creating a user](#). Adding a user to a team adds them as a member only. Use the **Access** tab to specify a role for the user on different resources.

#### Procedure

1. In the **Access** tab of the **Details** page click **Add**.
2. Follow the prompts to add a user and assign them to roles.
3. Click **Save**.

### 9.1.2. Removing roles for a user

#### Procedure

- To remove roles for a particular user, click the **X** icon next to its resource.

This launches a confirmation dialog, asking you to confirm the disassociation.

### 9.1.3. Team access

The **Access** tab displays the list of users that are members a specific team.

Teams > Engineering

## Access

◀ Back to Teams   Details   Access   Roles

Username   1 - 4 of 4

Username	First name	Last name	Roles
admin			User Roles System Administrator
austin78	Austin	Austin	User Roles System Auditor
jpgarcia	Jerry	Jerry	User Roles Auditor X
jdoge	Josie	Josie	User Roles Auditor X

1 - 4 of 4 items 1 of 1 page

You can search this list by **Username**, **First Name**, or **Last Name**. For more information, see [Users](#).

## 9.1.4. Team roles and permissions

Select **Details** → **Roles** to display a list of the permissions that are currently available for this team.

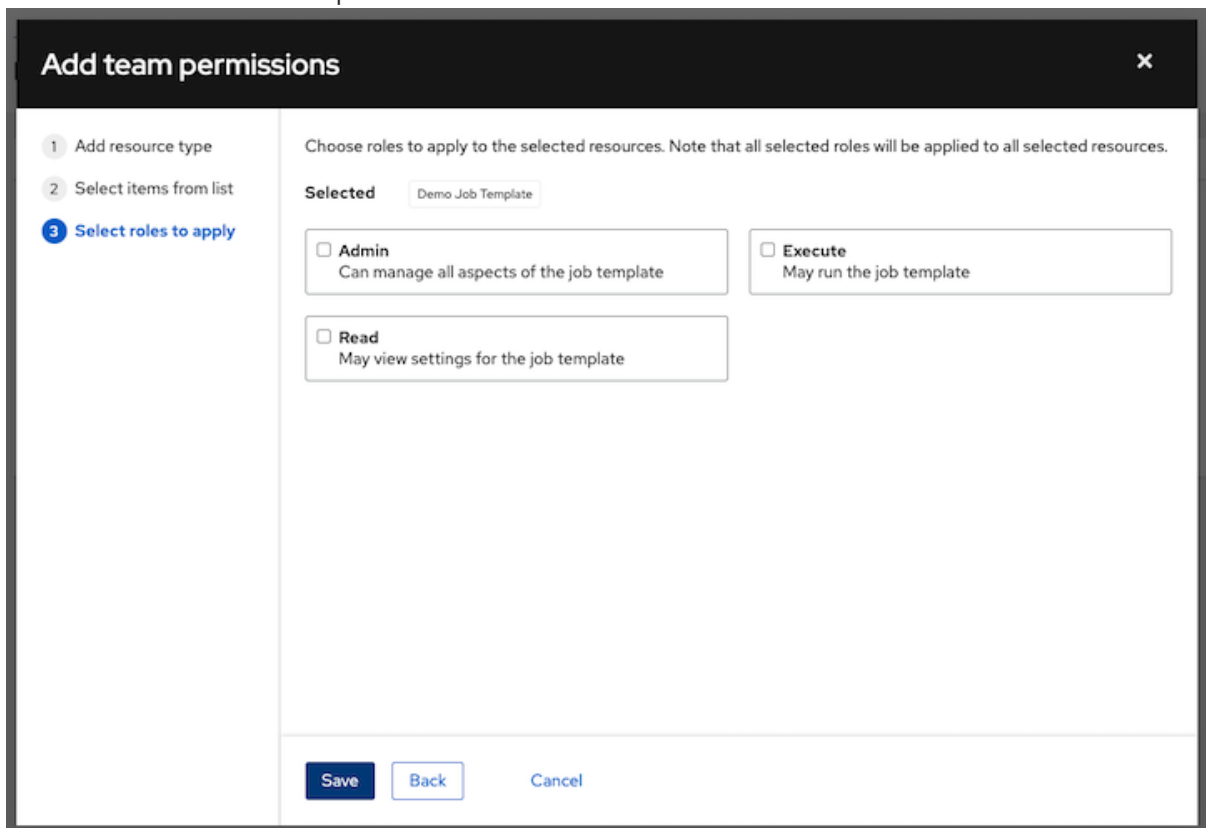
## 9.1.5. Adding and removing team permissions

By default, all teams that you create have read permissions. You can assign additional permissions, such as edit and administer projects, inventories, and other elements.

You can set permissions through an inventory, project, job template, or within the [Organizations](#) view.

### Procedure

1. From the **Team** list view, click the required user.
2. On the **Details** page, click **Add**. This opens the **Add team permissions** wizard.
3. Select the object to which the team requires access.
4. Click **Next**.
5. Select the resource to assign team roles.
6. Click **Next**.
7. Click the checkbox beside the role to assign that role to your chosen type of resource. Different resources have different options available.



**Add team permissions** X

1 Add resource type  
2 Select items from list  
3 **Select roles to apply**

Choose roles to apply to the selected resources. Note that all selected roles will be applied to all selected resources.

**Selected** Demo Job Template

**Admin**  
Can manage all aspects of the job template

**Execute**  
May run the job template

**Read**  
May view settings for the job template

**Save** **Back** Cancel

8. Click **Save**.
9. The updated profile for the user with the roles assigned for each selected resource is displayed.

Teams > Engineering

## Roles

◀ Back to Teams   Details   Access   Roles

Role    1 - 4 of 4

Resource Name	Type	Role
Demo Job Template	Job Template	Admin <input type="button" value="X"/>
Honey Dog, Inc.	Organization	Execute <input type="button" value="X"/>
Honey Dog, Inc.	Organization	Project Admin <input type="button" value="X"/>
Honey Dog, Inc.	Organization	Execution Environme... <input type="button" value="X"/>

1 - 4 of 4 items   1 of 1 page

### 9.1.5.1. Removing team permissions

- To remove Permissions for a particular resource, click the **X** icon next to its resource. This launches a confirmation dialog, asking you to confirm the disassociation.



#### NOTE

You can also add teams, individual, or many users and assign them permissions at the object level. This includes projects, inventories, job templates, and workflow templates. This feature reduces the time for an organization to onboard many users at one time.

## CHAPTER 10. MANAGING USER CREDENTIALS

Credentials authenticate the automation controller user when launching jobs against machines, synchronizing with inventory sources, and importing project content from a version control system.

You can grant users and teams the ability to use these credentials, without exposing the credential to the user. If a user moves to a different team or leaves the organization, you do not have to re-key all of your systems just because that credential was available in automation controller.



### NOTE

Automation controller encrypts passwords and key information in the database and never makes secret information visible through the API. For further information, see the [Automation controller Administration Guide](#).

### 10.1. HOW CREDENTIALS WORK

Automation controller uses SSH to connect to remote hosts. To pass the key from automation controller to SSH, the key must be decrypted before it can be written to a named pipe. Automation controller uses that pipe to send the key to SSH, so that the key is never written to disk. If passwords are used, automation controller handles them by responding directly to the password prompt and decrypting the password before writing it to the prompt.

### 10.2. CREATING NEW CREDENTIALS

Credentials added to a team are made available to all members of the team. You can also add credentials to individual users.

As part of the initial setup, two credentials are available for your use: Demo Credential and Ansible Galaxy. Use the Ansible Galaxy credential as a template. You can copy this credential, but not edit it. Add more credentials as needed.

#### Procedure

1. From the navigation panel, select **Resources** → **Credentials**.
2. Click **Add**.
3. Enter the following information:
  - The name for your new credential.
  - Optional: a description for the new credential.
  - Optional: The name of the organization with which the credential is associated.



### NOTE

A credential with a set of permissions associated with one organization persists if the credential is reassigned to another organization.

4. In the **Credential Type** field, enter or select the credential type you want to create.

5. Enter the appropriate details depending on the type of credential selected, as described in [Credential types](#).
6. Click **Save**.

## 10.3. ADDING NEW USERS AND JOB TEMPLATES TO EXISTING CREDENTIALS

### Procedure

1. From the navigation panel, select **Resources** → **Credentials**.
2. Select the credential that you want to assign to additional users.
3. Click the **Access** tab. You can see users and teams associated with this credential and their roles.
4. Choose a user and click **Add**. If no users exist, add them from the **Users** menu. For more information, see [Users](#).
5. Select **Job Templates** to display the job templates associated with this credential, and which jobs have run recently by using this credential.
6. Choose a job template and click **Add** to assign the credential to additional job templates. For more information about creating new job templates, see the [Job templates](#) section.

## 10.4. CREDENTIAL TYPES

Automation controller supports the following credential types:

- [Amazon Web Services](#)
- [Ansible Galaxy/Automation Hub API Token](#)
- [Centrify Vault Credential Provider Lookup](#)
- [Container Registry](#)
- [CyberArk Central Credential Provider Lookup](#)
- [CyberArk Conjur Secrets Manager Lookup](#)
- [GitHub Personal Access Token](#)
- [GitLab Personal Access Token](#)
- [Google Compute Engine](#)
- [GPG Public Key](#)
- [HashiCorp Vault Secret Lookup](#)
- [HashiCorp Vault Signed SSH](#)
- [Insights](#)

- [Machine](#)
- [Microsoft Azure Key Vault](#)
- [Microsoft Azure Resource Manager](#)
- [Network](#)
- [OpenShift or Kubernetes API Bearer Token](#)
- [OpenStack](#)
- [Red Hat Ansible Automation Platform](#)
- [Red Hat Satellite 6](#)
- [Red Hat Virtualization](#)
- [Source Control](#)
- [Thycotic DevOps Secrets Vault](#)
- [Thycotic Secret Server](#)
- [Vault](#)
- [VMware vCenter](#)

The credential types associated with Centrify, CyberArk, HashiCorp Vault, Microsoft Azure Key Vault, and Thycotic are part of the credential plugins capability that enables an external system to lookup your secrets information.

For more information, see [Secrets Management System](#).

### 10.4.1. Amazon Web Services credential type

Select this credential to enable synchronization of cloud inventory with Amazon Web Services.

Automation controller uses the following environment variables for AWS credentials:

```
AWS_ACCESS_KEY_ID  
AWS_SECRET_ACCESS_KEY  
AWS_SECURITY_TOKEN
```

These are fields prompted in the user interface.

Amazon Web Services credentials consist of the AWS **Access Key** and **Secret Key**.

Automation controller provides support for EC2 STS tokens, also known as Identity and Access Management (IAM) STS credentials. *Security Token Service* (STS) is a web service that enables you to request temporary, limited-privilege credentials for AWS IAM users.



#### NOTE

If the value of your tags in EC2 contain Booleans (**yes/no/true/false**), you must quote them.



## WARNING

To use implicit IAM role credentials, do not attach AWS cloud credentials in automation controller when relying on IAM roles to access the AWS API.

Attaching your AWS cloud credential to your job template forces the use of your AWS credentials, not your IAM role credentials.

### Additional resources

For more information about the IAM/EC2 STS Token, see [Temporary security credentials in IAM](#).

#### 10.4.1.1. Access Amazon EC2 credentials in an Ansible Playbook

You can get AWS credential parameters from a job runtime environment:

```
vars:
  aws:
    access_key: '{{ lookup("env", "AWS_ACCESS_KEY_ID") }}'
    secret_key: '{{ lookup("env", "AWS_SECRET_ACCESS_KEY") }}'
    security_token: '{{ lookup("env", "AWS_SECURITY_TOKEN") }}'
```

#### 10.4.2. Ansible Galaxy/Automation Hub API token credential type

Select this credential to access Ansible Galaxy or use a collection published on an instance of private automation hub.

Entering the Galaxy server URL on this screen.

Populate the **Galaxy Server URL** field with the contents of the **Server URL** field at [Red Hat Hybrid Cloud Console](#). Populate the **Auth Server URL** field with the contents of the **SSO URL** field at [Red Hat Hybrid Cloud Console](#).

### Additional resources

For more information, see [Using Collections with automation hub](#).

#### 10.4.3. Centrifv Vault Credential Provider Lookup credential type

This is considered part of the secret management capability. For more information, see [Centrifv Vault Credential Provider Lookup](#).

#### 10.4.4. Container Registry credential type

Select this credential to enable automation controller to access a collection of container images. For more information, see [What is a container registry?](#).

You must specify a name. The **Authentication URL** field is pre-populated with a default value. You can change the value by specifying the authentication endpoint for a different container registry.

### 10.4.5. CyberArk Central Credential Provider Lookup credential type

This is considered part of the secret management capability.

For more information, see [CyberArk Central Credential Provider \(CCP\) Lookup](#).

### 10.4.6. CyberArk Conjur Secrets Manager Lookup credential type

This is considered part of the secret management capability.

For more information, see [CyberArk Conjur Secrets Manager Lookup](#).

### 10.4.7. GitHub Personal Access Token credential type

Select this credential to enable you to access GitHub by using a *Personal Access Token* (PAT), which you can get through GitHub.

For more information, see [Working with Webhooks](#).

GitHub PAT credentials require a value in the **Token** field, which is provided in your GitHub profile settings.

Use this credential to establish an API connection to GitHub for use in webhook listener jobs, to post status updates.

### 10.4.8. GitLab Personal Access Token credential type

Select this credential to enable you to access GitLab by using a *Personal Access Token* (PAT), which you can get through GitLab.

For more information, see [Working with Webhooks](#).

GitLab PAT credentials require a value in the **Token** field, which is provided in your GitLab profile settings.

Use this credential to establish an API connection to GitLab for use in webhook listener jobs, to post status updates.

### 10.4.9. Google Compute Engine credential type

Select this credential to enable synchronization of a cloud inventory with Google Compute Engine (GCE).

Automation controller uses the following environment variables for GCE credentials:

```
GCE_EMAIL  
GCE_PROJECT  
GCE_CREDENTIALS_FILE_PATH
```

These are fields prompted in the user interface:

GCE credentials require the following information:

- **Service Account Email Address** The email address assigned to the Google Compute Engine service account.



- Optional: **Project:** Provide the GCE assigned identification or the unique project ID that you provided at project creation time.
- Optional: **Service Account JSON File:** Upload a GCE service account file. Click **Browse** to browse for the file that has the special account information that can be used by services and applications running on your GCE instance to interact with other Google Cloud Platform APIs. This grants permissions to the service account and virtual machine instances.
- **RSA Private Key:** The PEM file associated with the service account email.

#### 10.4.9.1. Access Google Compute Engine credentials in an Ansible Playbook

You can get GCE credential parameters from a job runtime environment:

```
vars:
  gce:
    email: '{{ lookup("env", "GCE_EMAIL") }}'
    project: '{{ lookup("env", "GCE_PROJECT") }}'
    pem_file_path: '{{ lookup("env", "GCE_PEM_FILE_PATH") }}'
```

#### 10.4.10. GPG Public Key credential type

Select this credential type to enable automation controller to verify the integrity of the project when synchronizing from source control.

For more information about how to generate a valid keypair, use the CLI tool to sign content, and how to add the public key to the controller, see [Project Signing and Verification](#).

#### 10.4.11. HashiCorp Vault Secret Lookup credential type

This is considered part of the secret management capability.

For more information, see [HashiCorp Vault Secret Lookup](#).

#### 10.4.12. HashiCorp Vault Signed SSH credential type

This is considered part of the secret management capability.

For more information, see [HashiCorp Vault Signed SSH](#).

#### 10.4.13. Insights credential type

Select this credential type to enable synchronization of cloud inventory with Red Hat Insights.

Insights credentials are the Insights **Username** and **Password**, which are the user's Red Hat Customer Portal Account username and password.

The **extra\_vars** and **env** injectors for Insights are as follows:

```
ManagedCredentialType(
  namespace='insights',
  ....
  ....
  ....
```

```
injectors={
  'extra_vars': {
    "scm_username": "{{username}}",
    "scm_password": "{{password}}",
  },
  'env': {
    'INSIGHTS_USER': '{{username}}',
    'INSIGHTS_PASSWORD': '{{password}}',
  },
}
```

#### 10.4.14. Machine credential type

Machine credentials enable automation controller to call Ansible on hosts under your management. You can specify the SSH username, optionally give a password, an SSH key, a key password, or have automation controller prompt the user for their password at deployment time. They define SSH and user-level privilege escalation access for playbooks, and are used when submitting jobs to run playbooks on a remote host.

The following network connections use **Machine** as the credential type: **httpapi**, **netconf**, and **network\_cli**

Machine and SSH credentials do not use environment variables. They pass the username through the ansible **-u** flag, and interactively write the SSH password when the underlying SSH client prompts for it.

Machine credentials require the following inputs:

- **Username:** The username to use for SSH authentication.
- **Password:** The password to use for SSH authentication. This password is stored encrypted in the database, if entered. Alternatively, you can configure automation controller to ask the user for the password at launch time by selecting **Prompt on launch**. In these cases, a dialog opens when the job is launched, promoting the user to enter the password and password confirmation.
- **SSH Private Key:** Copy or drag-and-drop the SSH private key for the machine credential.
- **Private Key Passphrase:** If the SSH Private Key used is protected by a password, you can configure a Key Passphrase for the private key. This password is stored encrypted in the database, if entered. You can also configure automation controller to ask the user for the key passphrase at launch time by selecting **Prompt on launch**. In these cases, a dialog opens when the job is launched, prompting the user to enter the key passphrase and key passphrase confirmation.
- **Privilege Escalation Method** Specifies the type of escalation privilege to assign to specific users. This is the same as specifying the **--become-method=BECOME\_METHOD** parameter, where **BECOME\_METHOD** is any of the existing methods, or a custom method you have written. Begin entering the name of the method, and the appropriate name auto-populates.
- **empty selection:** If a task or play has **become** set to **yes** and is used with an empty selection, then it will default to **sudo**.
- **sudo:** Performs single commands with superuser (root user) privileges.
- **su:** Switches to the superuser (root user) account (or to other user accounts).

- **pbrun**: Requests that an application or command be run in a controlled account and provides for advanced root privilege delegation and keylogging.
- **pfexec**: Executes commands with predefined process attributes, such as specific user or group IDs.
- **dzdo**: An enhanced version of sudo that uses RBAC information in Centrify's Active Directory service. For more information, see Centrify's [site on DZDO](#).
- **pmsudo**: Requests that an application is run in a controlled account. See [Privilege Manager for Unix 6.0](#).
- **runas**: Enables you to run as the current user.
- **enable**: Switches to elevated permissions on a network device.
- **doas**: Enables your remote/login user to run commands as another user through the `doas` ("Do as user") utility.
- **ksu**: Enables your remote/login user to run commands as another user through Kerberos access.
- **machinectl**: Enables you to manage containers through the **systemd** machine manager.
- **sesu**: Enables your remote/login user to run commands as another user through the CA Privileged Access Manager.



#### NOTE

Custom **become** plugins are available from Ansible 2.8+. For more information, see [Understanding Privilege Escalation](#) and the list of [Become plugins](#)

- **Privilege Escalation Username**: You see this field only if you selected an option for privilege escalation. Enter the username to use with escalation privileges on the remote system.
- **Privilege Escalation Password**: You see this field only if you selected an option for privilege escalation. Enter the password to use to authenticate the user through the selected privilege escalation type on the remote system. This password is stored encrypted in the database. You can also configure automation controller to ask the user for the password at launch time by selecting **Prompt on launch**. In these cases, a dialog opens when the job is launched, promoting the user to enter the password and password confirmation.



#### NOTE

You must use sudo password must in combination with SSH passwords or SSH Private Keys, because automation controller must first establish an authenticated SSH connection with the host before invoking **sudo** to change to the sudo user.



#### WARNING

Credentials that are used in scheduled jobs must not be configured as **Prompt on launch**.

### 10.4.14.1. Access machine credentials in an ansible playbook

You can get username and password from Ansible facts:

```
vars:
  machine:
    username: '{{ ansible_user }}'
    password: '{{ ansible_password }}'
```

### 10.4.15. Microsoft Azure Key Vault credential type

This is considered part of the secret management capability.

For more information, see [Microsoft Azure Key Vault](#).

### 10.4.16. Microsoft Azure Resource Manager credential type

Select this credential type to enable synchronization of cloud inventory with Microsoft Azure Resource Manager.

Microsoft Azure Resource Manager credentials require the following inputs:

- **Subscription ID:** The Subscription UUID for the Microsoft Azure account.
- **Username:** The username to use to connect to the Microsoft Azure account.
- **Password:** The password to use to connect to the Microsoft Azure account.
- **Client ID:** The Client ID for the Microsoft Azure account.
- **Client Secret:** The Client Secret for the Microsoft Azure account.
- **Tenant ID:** The Tenant ID for the Microsoft Azure account.
- **Azure Cloud Environment** The variable associated with Azure cloud or Azure stack environments.

These fields are equal to the variables in the API.

To pass service principal credentials, define the following variables:

```
AZURE_CLIENT_ID
AZURE_SECRET
AZURE_SUBSCRIPTION_ID
AZURE_TENANT
AZURE_CLOUD_ENVIRONMENT
```

To pass an Active Directory username and password pair, define the following variables:

```
AZURE_AD_USER
AZURE_PASSWORD
AZURE_SUBSCRIPTION_ID
```

You can also pass credentials as parameters to a task within a playbook. The order of precedence is parameters, then environment variables, and finally a file found in your home directory.

To pass credentials as parameters to a task, use the following parameters for service principal credentials:

```
client_id
secret
subscription_id
tenant
azure_cloud_environment
```

Alternatively, pass the following parameters for Active Directory username/password:

```
ad_user
password
subscription_id
```

#### 10.4.16.1. Access Microsoft Azure resource manager credentials in an ansible playbook

You can get Microsoft Azure credential parameters from a job runtime environment:

```
vars:
  azure:
    client_id: '{{ lookup("env", "AZURE_CLIENT_ID") }}'
    secret: '{{ lookup("env", "AZURE_SECRET") }}'
    tenant: '{{ lookup("env", "AZURE_TENANT") }}'
    subscription_id: '{{ lookup("env", "AZURE_SUBSCRIPTION_ID") }}'
```

#### 10.4.17. Network credential type



##### NOTE

Select the Network credential type if you are using a *local* connection with *provider* to use Ansible networking modules to connect to and manage networking devices.

When connecting to network devices, the credential type must match the connection type:

- For **local** connections using **provider**, credential type should be **Network**.
- For all other network connections (**httpapi**, **netconf**, and **network\_cli**), the credential type should be **Machine**.

For more information about connection types available for network devices, see [Multiple Communication Protocols](#).

Automation controller uses the following environment variables for Network credentials:

```
ANSIBLE_NET_USERNAME
ANSIBLE_NET_PASSWORD
```

Provide the following information for network credentials:

- **Username:** The username to use in conjunction with the network device.

- **Password:** The password to use in conjunction with the network device.
- **SSH Private Key:** Copy or drag-and-drop the actual SSH Private Key to be used to authenticate the user to the network through SSH.
- **Private Key Passphrase:** The passphrase for the private key to authenticate the user to the network through SSH.
- **Authorize:** Select this from the Options field to control whether or not to enter privileged mode.
- If **Authorize** is checked, enter a password in the **Authorize Password** field to access privileged mode.

For more information, see [Porting Ansible Network Playbooks with New Connection Plugins](#).

### 10.4.18. Access network credentials in an ansible playbook

You can get the username and password parameters from a job runtime environment:

```
vars:
  network:
    username: '{{ lookup("env", "ANSIBLE_NET_USERNAME") }}'
    password: '{{ lookup("env", "ANSIBLE_NET_PASSWORD") }}'
```

### 10.4.19. OpenShift or Kubernetes API Bearer Token credential type

Select this credential type to create instance groups that point to a Kubernetes or OpenShift container.

For more information, see [Container and Instance Groups](#) in the *Automation controller Administration Guide*.

Provide the following information for container credentials:

- **OpenShift or Kubernetes API Endpoint** (required): The endpoint used to connect to an OpenShift or Kubernetes container.
- **API Authentication Bearer Token** (required): The token used to authenticate the connection.
- Optional: **Verify SSL:** You can check this option to verify the server's SSL/TLS certificate is valid and trusted. Environments that use internal or private *Certificate Authority* (CA) must leave this option unchecked to disable verification.
- **Certificate Authority Data:** Include the **BEGIN CERTIFICATE** and **END CERTIFICATE** lines when pasting the certificate, if provided.

A container group is a type of instance group that has an associated credential that enables connection to an OpenShift cluster. To set up a container group, you must have the following items:

- A namespace you can start into. Although every cluster has a default namespace, you can use a specific namespace.
- A service account that has the roles that enable it to start and manage pods in this namespace.
- If you use execution environments in a private registry, and have a container registry credential associated with them in automation controller, the service account also requires the roles to get, create, and delete secrets in the namespace.

If you do not want to give these roles to the service account, you can pre-create the **ImagePullSecrets** and specify them on the pod spec for the container group. In this case, the execution environment must not have a Container Registry credential associated, or automation controller attempts to create the secret for you in the namespace.

- A token associated with that service account (OpenShift or Kubernetes Bearer Token)
- A CA certificate associated with the cluster

#### 10.4.19.1. Creating a service account in an Openshift cluster

Creating a service account in an Openshift or Kubernetes cluster to be used to run jobs in a container group through automation controller. After you create the service account, its credentials are provided to automation controller in the form of an Openshift or Kubernetes API bearer token credential.

After you create a service account, use the information in the new service account to configure automation controller.

##### Procedure

1. To create a service account, download and use the [sample service account](#) and change it as required to obtain the previous credentials.
2. Apply the configuration from the [sample service account](#):

```
oc apply -f containergroup-sa.yml
```

3. Get the secret name associated with the service account:

```
export SA_SECRET=$(oc get sa containergroup-service-account -o json | jq  
'secrets[0].name' | tr -d '"')
```

4. Get the token from the secret:

```
oc get secret $(echo ${SA_SECRET}) -o json | jq '.data.token' | xargs | base64 --decode >  
containergroup-sa.token
```

5. Get the CA cert:

```
oc get secret $SA_SECRET -o json | jq '.data["ca.crt"]' | xargs | base64 --decode >  
containergroup-ca.crt
```

6. Use the contents of **containergroup-sa.token** and **containergroup-ca.crt** to provide the information for the [OpenShift or Kubernetes API Bearer Token](#) required for the container group.

#### 10.4.20. OpenStack credential type

Select this credential type to enable synchronization of cloud inventory with OpenStack.

Provide the following information for OpenStack credentials:

- **Username:** The username to use to connect to OpenStack.

- **Password (API Key):** The password or API key to use to connect to OpenStack.
- **Host (Authentication URL):** The host to be used for authentication.
- **Project (Tenant Name):** The Tenant name or Tenant ID used for OpenStack. This value is usually the same as the username.
- Optional: **Project (Domain Name):** Provide the project name associated with your domain.
- Optional: **Domain name:** Provide the FQDN to be used to connect to OpenStack.

If you are interested in using OpenStack Cloud Credentials, see [Use Cloud Credentials with a cloud inventory](#), which includes a sample playbook.

### 10.4.21. Red Hat Ansible Automation Platform credential type

Select this credential to access another automation controller instance.

Ansible Automation Platform credentials require the following inputs:

- **Red Hat Ansible Automation Platform:** The base URL or IP address of the other instance to connect to.
- **Username:** The username to use to connect to it.
- **Password:** The password to use to connect to it.
- **OAuth Token:** If username and password are not used, provide an OAuth token to use to authenticate.

The **env** injectors for Ansible Automation Platform are as follows:

```
ManagedCredentialType(
  namespace='controller',

  ....

  ....

  injectors={
    'env': {
      'TOWER_HOST': '{{host}}',
      'TOWER_USERNAME': '{{username}}',
      'TOWER_PASSWORD': '{{password}}',
      'TOWER_VERIFY_SSL': '{{verify_ssl}}',
      'TOWER_OAUTH_TOKEN': '{{oauth_token}}',
      'CONTROLLER_HOST': '{{host}}',
      'CONTROLLER_USERNAME': '{{username}}',
      'CONTROLLER_PASSWORD': '{{password}}',
      'CONTROLLER_VERIFY_SSL': '{{verify_ssl}}',
      'CONTROLLER_OAUTH_TOKEN': '{{oauth_token}}',
    }
  }
```

#### 10.4.21.1. Access automation controller credentials in an Ansible Playbook

You can get the host, username, and password parameters from a job runtime environment:



```
vars:
  controller:
    host: '{{ lookup("env", "CONTROLLER_HOST") }}'
    username: '{{ lookup("env", "CONTROLLER_USERNAME") }}'
    password: '{{ lookup("env", "CONTROLLER_PASSWORD") }}'
```

### 10.4.22. Red Hat Satellite 6 credential type

Select this credential type to enable synchronization of cloud inventory with Red Hat Satellite 6.

Automation controller writes a Satellite configuration file based on fields prompted in the user interface. The absolute path to the file is set in the following environment variable:

```
FOREMAN_INI_PATH
```

Satellite credentials have the following required inputs:

- **Satellite 6 URL:** The Satellite 6 URL or IP address to connect to.
- **Username:** The username to use to connect to Satellite 6.
- **Password:** The password to use to connect to Satellite 6.

### 10.4.23. Red Hat Virtualization credential type

Select this credential to enable automation controller to access Ansible's **oVirt4.py** dynamic inventory plugin, which is managed by *Red Hat Virtualization*.

Automation controller uses the following environment variables for Red Hat Virtualization credentials. These are fields in the user interface:

```
OVIRT_URL
OVIRT_USERNAME
OVIRT_PASSWORD
```

Provide the following information for Red Hat Virtualization credentials:

- **Host (Authentication URL):** The host URL or IP address to connect to. To sync with the inventory, the credential URL needs to include the **ovirt-engine/api** path.
- **Username:** The username to use to connect to oVirt4. This must include the domain profile to succeed, for example **username@ovirt.host.com**.
- **Password:** The password to use to connect to it.
- **Optional: CA File:** Provide an absolute path to the oVirt certificate file (it might end in **.pem**, **.cer** and **.crt** extensions, but preferably **.pem** for consistency)

#### 10.4.23.1. Access virtualization credentials in an Ansible Playbook

You can get the Red Hat Virtualization credential parameter from a job runtime environment:

```
vars:
  ovirt:
```

```
ovirt_url: '{{ lookup("env", "OVIRT_URL") }}'
ovirt_username: '{{ lookup("env", "OVIRT_USERNAME") }}'
ovirt_password: '{{ lookup("env", "OVIRT_PASSWORD") }}'
```

The **file** and **env** injectors for Red Hat Virtualization are as follows:

```
ManagedCredentialType(
    namespace='rhv',
    ....
    ....
    ....
    injectors={
        # The duplication here is intentional; the ovirt4 inventory plugin
        # writes a .ini file for authentication, while the ansible modules for
        # ovirt4 use a separate authentication process that support
        # environment variables; by injecting both, we support both
        'file': {
            'template': '\n'.join(
                [
                    '[ovirt]',
                    'ovirt_url={{host}}',
                    'ovirt_username={{username}}',
                    'ovirt_password={{password}}',
                    '{% if ca_file %}ovirt_ca_file={{ca_file}}{% endif %}',
                ]
            )
        },
        'env': {'OVIRT_INI_PATH': '{{tower.filename}}', 'OVIRT_URL': '{{host}}', 'OVIRT_USERNAME':
            '{{username}}', 'OVIRT_PASSWORD': '{{password}}'},
    },
)
```

#### 10.4.24. Source Control credential type

*Source Control* credentials are used with projects to clone and update local source code repositories from a remote revision control system such as Git or Subversion.

Source Control credentials require the following inputs:

- **Username:** The username to use in conjunction with the source control system.
- **Password:** The password to use in conjunction with the source control system.
- **SCM Private Key:** Copy or drag-and-drop the actual SSH Private Key to be used to authenticate the user to the source control system through SSH.
- **Private Key Passphrase:** If the SSH Private Key used is protected by a passphrase, you can configure a Key Passphrase for the private key.

**NOTE**

You cannot configure Source Control credentials as **Prompt on launch**.

If you are using a GitHub account for a Source Control credential and you have *Two Factor Authentication (2FA)* enabled on your account, you must use your Personal Access Token in the password field rather than your account password.

**10.4.25. Thycotic DevOps Secrets Vault credential type**

This is considered part of the secret management capability.

For more information, see [Thycotic DevOps Secrets Vault](#).

**10.4.26. Thycotic secret server credential type**

This is considered part of the secret management capability.

For more information, see [Thycotic Secret Server](#).

**10.4.27. Ansible Vault credential type**

Select this credential type to enable synchronization of inventory with Ansible Vault.

Vault credentials require the **Vault Password** and an optional **Vault Identifier** if applying multi-Vault credentialing.

For more information on the Multi-Vault support, refer to the [Multi-Vault Credentials](#) section of the *Automation controller Administration Guide*.

You can configure automation controller to ask the user for the password at launch time by selecting **Prompt on launch**.

When you select **Prompt on Launch**, a dialog opens when the job is launched, prompting the user to enter the password.

**WARNING**

Credentials that are used in scheduled jobs must not be configured as **Prompt on launch**.

For more information about Ansible Vault, see [Protecting sensitive data with Ansible vault](#).

**10.4.28. VMware vCenter credential type**

Select this credential type to enable synchronization of inventory with VMware vCenter.

Automation controller uses the following environment variables for VMware vCenter credentials:

**VMWARE\_HOST**

```
VMWARE_USER
VMWARE_PASSWORD
VMWARE_VALIDATE_CERTS
```

These are fields prompted in the user interface.

VMware credentials require the following inputs:

- **vCenter Host:** The vCenter hostname or IP address to connect to.
- **Username:** The username to use to connect to vCenter.
- **Password:** The password to use to connect to vCenter.



#### NOTE

If the VMware guest tools are not running on the instance, VMware inventory synchronization does not return an IP address for that instance.

### 10.4.28.1. Access VMware vCenter credentials in an ansible playbook

You can get VMware vCenter credential parameters from a job runtime environment:

```
vars:
  vmware:
    host: '{{ lookup("env", "VMWARE_HOST") }}'
    username: '{{ lookup("env", "VMWARE_USER") }}'
    password: '{{ lookup("env", "VMWARE_PASSWORD") }}'
```

## 10.5. USE AUTOMATION CONTROLLER CREDENTIALS IN A PLAYBOOK

The following playbook is an example of how to use automation controller credentials in your playbook.

```
- hosts: all

vars:
  machine:
    username: '{{ ansible_user }}'
    password: '{{ ansible_password }}'
  controller:
    host: '{{ lookup("env", "CONTROLLER_HOST") }}'
    username: '{{ lookup("env", "CONTROLLER_USERNAME") }}'
    password: '{{ lookup("env", "CONTROLLER_PASSWORD") }}'
  network:
    username: '{{ lookup("env", "ANSIBLE_NET_USERNAME") }}'
    password: '{{ lookup("env", "ANSIBLE_NET_PASSWORD") }}'
  aws:
    access_key: '{{ lookup("env", "AWS_ACCESS_KEY_ID") }}'
    secret_key: '{{ lookup("env", "AWS_SECRET_ACCESS_KEY") }}'
    security_token: '{{ lookup("env", "AWS_SECURITY_TOKEN") }}'
  vmware:
    host: '{{ lookup("env", "VMWARE_HOST") }}'
    username: '{{ lookup("env", "VMWARE_USER") }}'
```

```

password: '{{ lookup("env", "VMWARE_PASSWORD") }}'
gce:
  email: '{{ lookup("env", "GCE_EMAIL") }}'
  project: '{{ lookup("env", "GCE_PROJECT") }}'
azure:
  client_id: '{{ lookup("env", "AZURE_CLIENT_ID") }}'
  secret: '{{ lookup("env", "AZURE_SECRET") }}'
  tenant: '{{ lookup("env", "AZURE_TENANT") }}'
  subscription_id: '{{ lookup("env", "AZURE_SUBSCRIPTION_ID") }}'

tasks:
- debug:
  var: machine

- debug:
  var: controller

- debug:
  var: network

- debug:
  var: aws

- debug:
  var: vmware

- debug:
  var: gce

- shell: 'cat {{ gce.pem_file_path }}'
  delegate_to: localhost

- debug:
  var: azure

```

### Use 'delegate\_to' and any lookup variable

```

- command: somecommand
  environment:
    USERNAME: '{{ lookup("env", "USERNAME") }}'
    PASSWORD: '{{ lookup("env", "PASSWORD") }}'
  delegate_to: somehost

```

## CHAPTER 11. CUSTOM CREDENTIAL TYPES

As a system administrator, you can define a custom credential type in a standard format by using a YAML or JSON-like definition. You can define a custom credential type that works in ways similar to existing credential types. For example, a custom credential type can inject an API token for a third-party web service into an environment variable, for your playbook or custom inventory script to consume.

Custom credentials support the following ways of injecting their authentication information:

- Environment variables
- Ansible extra variables
- File-based templating, which means generating **.ini** or **.conf** files that contain credential values

You can attach one SSH and multiple cloud credentials to a job template. Each cloud credential must be of a different type. Only one of each type of credential is permitted. Vault credentials and machine credentials are separate entities.



### NOTE

- When creating a new credential type, you must avoid collisions in the **extra\_vars**, **env**, and file namespaces.
- Environment variable or extra variable names must not start with **ANSIBLE\_** because they are reserved.
- You must have System administrator (superuser) permissions to be able to create and edit a credential type (**CredentialType**) and to be able to view the **CredentialType.injection** field.

### 11.1. CONTENT SOURCING FROM COLLECTIONS

A "managed" credential type of **kind=galaxy** represents a content source for fetching collections defined in **requirements.yml** when project updates are run. Examples of content sources are `galaxy.ansible.com`, `console.redhat.com`, or on-premise automation hub. This new credential type represents a URL and (optional) authentication details necessary to construct the environment variables when a project update runs **ansible-galaxy collection install** as described in the Ansible documentation, [Configuring the ansible-galaxy client](#). It has fields that map directly to the configuration options exposed to the Ansible Galaxy CLI, for example, `per-server`.

An endpoint in the API reflects an ordered list of these credentials at the Organization level:

```
/api/v2/organizations/N/galaxy_credentials/
```

When installations of automation controller migrate existing Galaxy-oriented setting values, post-upgrade proper credentials are created and attached to every Organization. After upgrading to the latest version, every organization that existed before upgrade now has a list of one or more "Galaxy" credentials associated with it.

Additionally, post-upgrade, these settings are not visible (or editable) from the **/api/v2/settings/jobs/** endpoint.

Automation controller continues to fetch roles directly from public Galaxy even if **galaxy.ansible.com** is not the first credential in the list for the organization. The global Galaxy settings are no longer configured at the jobs level, but at the organization level in the user interface.

The organization's **Add** and **Edit** windows have an optional **Credential** lookup field for credentials of **kind=galaxy**.

It is important to specify the order of these credentials as order sets precedence for the sync and lookup of the content. For more information, see [Creating an organization](#).

For more information about how to set up a project by using collections, see [Using Collections with automation hub](#).

## 11.2. BACKWARDS-COMPATIBLE API CONSIDERATIONS

Support for version 2 of the API (**api/v2/**) means a one-to-many relationship for job templates to credentials (including multicloud support).

You can filter credentials the v2 API:

```
curl "https://controller.example.org/api/v2/credentials/?credential_type__namespace=aws"
```

In the V2 Credential Type model, the relationships are defined as follows:

Machine	SSH
Vault	Vault
Network	Sets environment variables, for example <b>ANSIBLE_NET_AUTHORIZE</b>
SCM	Source Control
Cloud	EC2, AWS
Cloud	Lots of others
Insights	Insights
Galaxy	galaxy.ansible.com, console.redhat.com

Machine	SSH
Galaxy	on-premise automation hub

### 11.3. CONTENT VERIFICATION


Automation controller uses GNU Privacy Guard (GPG) to verify content.

For more information, see [The GNU Privacy Handbook](#).

### 11.4. GETTING STARTED WITH CREDENTIAL TYPES

From the navigation panel, select **Administration** → **Credential Types**. If no custom credential types have been created, the **Credential Types** prompts you to add one.

If credential types have been created, this page displays a list of existing and available Credential Types.

To view more information about a credential type, click the name of a credential or the Edit  icon.

Each credential type displays its own unique configurations in the **Input Configuration** field and the **Injector Configuration** field, if applicable. Both YAML and JSON formats are supported in the configuration fields.

### 11.5. CREATING A NEW CREDENTIAL TYPE

To create a new credential type:

#### Procedure

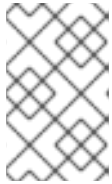
1. In the **Credential Types** view, click **Add**.

[Credential Types](#)  
Create new credential type ↻

Name *	Description
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
Input configuration <span style="font-size: 0.8em;">⊙</span> <span style="margin-left: 5px;">YAML JSON</span> <span style="float: right;">✕</span>	
<div style="border: 1px solid #ccc; padding: 5px; min-height: 40px;">           1 ---         </div>	
Injector configuration <span style="font-size: 0.8em;">⊙</span> <span style="margin-left: 5px;">YAML JSON</span> <span style="float: right;">✕</span>	
<div style="border: 1px solid #ccc; padding: 5px; min-height: 40px;">           1 ---         </div>	
<div style="display: flex; justify-content: space-between; align-items: center;"> <span style="background-color: #0070c0; color: white; padding: 5px 10px; border-radius: 3px;">Save</span> <span style="color: #0070c0; padding: 5px 10px;">Cancel</span> </div>	

2. Enter the appropriate details in the **Name** and **Description** field.



**NOTE**

When creating a new credential type, do not use reserved variable names that start with **ANSIBLE\_** for the **INPUT** and **INJECTOR** names and IDs, as they are invalid for custom credential types.

3. In the **Input Configuration** field, specify an input schema that defines a set of ordered fields for that type. The format can be in YAML or JSON:

**YAML**

```
fields:
  - type: string
    id: username
    label: Username
  - type: string
    id: password
    label: Password
    secret: true
required:
  - username
  - password
```

View more YAML examples at the [YAML page](#).

**JSON**

```
{
  "fields": [
    {
      "type": "string",
      "id": "username",
      "label": "Username"
    },
    {
      "secret": true,
      "type": "string",
      "id": "password",
      "label": "Password"
    }
  ],
  "required": ["username", "password"]
}
```

View more JSON examples at [The JSON website](#).

The following configuration in JSON format shows each field and how they are used:

```
{
  "fields": [{
    "id": "api_token", # required - a unique name used to reference the field value

    "label": "API Token", # required - a unique label for the field

    "help_text": "User-facing short text describing the field.",
```

```

"type": ("string" | "boolean") # defaults to 'string'

"choices": ["A", "B", "C"] # (only applicable to `type=string`)

"format": "ssh_private_key" # optional, can be used to enforce data format validity
                             for SSH private key data (only applicable to `type=string`)

"secret": true, # if true, the field value will be encrypted

"multiline": false # if true, the field should be rendered as multi-line for input entry
                   # (only applicable to `type=string`)
},{
  # field 2...
},{
  # field 3...
}],

"required": ["api_token"] # optional; one or more fields can be marked as required
},

```

When **type=string**, fields can optionally specify multiple choice options:

```

{
  "fields": [{
    "id": "api_token", # required - a unique name used to reference the field value
    "label": "API Token", # required - a unique label for the field
    "type": "string",
    "choices": ["A", "B", "C"]
  }]
},

```

4. In the **Injector Configuration** field, enter environment variables or extra variables that specify the values a credential type can inject. The format can be in YAML or JSON (see examples in the previous step).

The following configuration in JSON format shows each field and how they are used:

```

{
  "file": {
    "template": "[mycloud]\ntoken={{ api_token }}"
  },
  "env": {
    "THIRD_PARTY_CLOUD_API_TOKEN": "{{ api_token }}"
  },
  "extra_vars": {
    "some_extra_var": "{{ username }}:{{ password }}"
  }
}

```

Credential Types can also generate temporary files to support **.ini** files or certificate or key data:

```

{
  "file": {
    "template": "[mycloud]\ntoken={{ api_token }}"
  },

```

```

"env": {
  "MY_CLOUD_INI_FILE": "{{ tower.filename }}"
}
}

```

In this example, automation controller writes a temporary file that has:

```
[mycloud]\ntoken=SOME_TOKEN_VALUE
```

The absolute file path to the generated file is stored in an environment variable named **MY\_CLOUD\_INI\_FILE**.

The following is an example of referencing many files in a custom credential template:

### Inputs

```

{
  "fields": [{
    "id": "cert",
    "label": "Certificate",
    "type": "string"
  }, {
    "id": "key",
    "label": "Key",
    "type": "string"
  }
]
}

```

### Injectors

```

{
  "file": {
    "template.cert_file": "[mycert]\n{{ cert }}",
    "template.key_file": "[mykey]\n{{ key }}"
  },
  "env": {
    "MY_CERT_INI_FILE": "{{ tower.filename.cert_file }}",
    "MY_KEY_INI_FILE": "{{ tower.filename.key_file }}"
  }
}

```

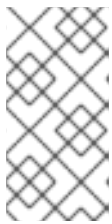
5. Click **Save**.

Your newly created credential type is displayed on the list of credential types:

## Credential Types

Name	Actions
Another new credential type	
New credential type	
new_cred_type	

- Click the Edit icon to modify the credential type options.

**NOTE**

In the **Edit** screen, you can modify the details or delete the credential. If the **Delete** option is disabled, this means that the credential type is being used by a credential, and you must delete the credential type from all the credentials that use it before you can delete it.

**Verification**

- Verify that the newly created credential type can be selected from the **Credential Type** selection window when creating a new credential:

**Create New Credential**

Name \*  Description  Organization

Credential Type \*

- Microsoft Azure Resource Manager
- Network
- New credential type
- new\_cred\_type
- OpenShift or Kubernetes API Bearer Token
- OpenStack
- Red Hat Ansible Automation Platform

**Additional resources**

For information about how to create a new credential, see [Creating a credential](#).

## CHAPTER 12. SECRET MANAGEMENT SYSTEM

Users and system administrators upload machine and cloud credentials so that automation can access machines and external services on their behalf. By default, sensitive credential values such as SSH passwords, SSH private keys, and API tokens for cloud services are stored in the database after being encrypted.

With external credentials backed by credential plugins, you can map credential fields (such as a password or an SSH Private key) to values stored in a **secret management system** instead of providing them to automation controller directly.

Automation controller provides a secret management system that include integrations for:

- AWS Secrets Manager Lookup
- Centrify Vault Credential Provider Lookup
- *CyberArk Central Credential Provider* Lookup (CCP)
- CyberArk Conjur Secrets Manager Lookup
- HashiCorp Vault *Key-Value* Store (KV)
- HashiCorp Vault SSH Secrets Engine
- Microsoft Azure *Key Management System* (KMS)
- Thycotic DevOps Secrets Vault
- Thycotic Secret Server

These external secret values are fetched before running a playbook that needs them.

### Additional resources

For more information about specifying secret management system credentials in the user interface, see [Credentials](#).

## 12.1. CONFIGURING AND LINKING SECRET LOOKUPS

When pulling a secret from a third-party system, you are linking credential fields to external systems. To link a credential field to a value stored in an external system, select the external credential corresponding to that system and provide **metadata** to look up the required value. The metadata input fields are part of the external credential type definition of the source credential.

Automation controller provides a credential plugin interface for developers, integrators, system administrators, and power-users with the ability to add new external credential types to extend it to support other secret management systems.


Use the following procedure to use automation controller to configure and use each of the supported third-party secret management systems.

### Procedure

1. Create an external credential for authenticating with the secret management system. At minimum, give a name for the external credential and select one of the following for the **Credential Type** field:

- [AWS Secrets Manager Lookup](#)
- [Centrify Vault Credential Provider Lookup](#)
- [CyberArk Central Credential Provider \(CCP\) Lookup](#)
- [CyberArk Conjur Secrets Manager Lookup](#)
- [HashiCorp Vault Secret Lookup](#)
- [HashiCorp Vault Signed SSH](#)
- [Microsoft Azure Key Vault](#)
- [Thycotic DevOps Secrets Vault](#)
- [Thycotic Secret Server](#)

In this example, the *Demo Credential* is the target credential.

2. For any of the fields that follow the **Type Details** area that you want to link to the external credential, click the key  icon in the input field to link one or more input fields to the external credential along with metadata for locating the secret in the external system.

**Type Details**

<b>Username</b>	<b>Password</b>	<input type="checkbox"/> Prompt on launch
<input type="text" value="admin"/>	<input type="password"/>	

SSH Private Key

3. Select the input source to use to retrieve your secret information.

**External Secret Management System** ✕

**1 Credential**

2 Metadata

Name Q

Name ↑

- Aim lookup creds
- Azure KMS lookup creds
- Centrify lookup creds
- Conjur lookup creds
- Hashicorp KV lookup creds

<< < 1 > >> of 2 pages

Next
Cancel

- Select the credential you want to link to, and click **Next**. This takes you to the **Metadata** tab of the input source. This example shows the Metadata prompt for HashiVault Secret Lookup. Metadata is specific to the input source you select.  
For more information, see the [Metadata for credential input sources](#) table.

- Click **Test** to verify connection to the secret management system. If the lookup is unsuccessful, an error message similar to the following displays:



- Click **OK**. You return to the **Details** screen of your target credential.
- Repeat these steps, starting with Step 3 to complete the remaining input fields for the target credential. By linking the information in this manner, automation controller retrieves sensitive information, such as username, password, keys, certificates, and tokens from the third-party management systems and populates the remaining fields of the target credential form with that data.
- If necessary, supply any information manually for those fields that do not use linking as a way of retrieving sensitive information. For more information about each of the fields, see the appropriate [Credential Types](#).
- Click **Save**.

### Additional resources

For more information, see the development documents for [Credential plugins](#).

#### 12.1.1. Metadata for credential input sources

The information required for the **Metadata** tab of the input source.

### AWS Secrets Manager Lookup

Metadata	Description
AWS Secrets Manager Region (required)	The region where the secrets manager is located.
AWS Secret Name (required)	Specify the AWS secret name that was generated by the AWS access key.

### Centrify Vault Credential Provider Lookup

Metadata	Description
Account name (required)	Name of the system account or domain associated with Centrify Vault.
System Name	Specify the name used by the Centrify portal.

### CyberArk Central Credential Provider Lookup

Metadata	Description
Object Query (Required)	Lookup query for the object.
Object Query Format	Select <b>Exact</b> for a specific secret name, or <b>Regexp</b> for a secret that has a dynamically generated name.
Object Property	Specifies the name of the property to return. For example, <b>UserName</b> or <b>Address</b> other than the default of <b>Content</b> .
Reason	If required for the object's policy, supply a reason for checking out the secret, as CyberArk logs those.

### CyberArk Conjur Secrets Lookup

Metadata	Description
Secret Identifier	The identifier for the secret.
Secret Version	Specify a version of the secret, if necessary, otherwise, leave it empty to use the latest version.

### HashiVault Secret Lookup

Metadata	Description
Name of Secret Backend	Specify the name of the KV backend to use. Leave it blank to use the first path segment of the <b>Path to Secret</b> field instead.



Metadata	Description
Path to Secret (required)	Specify the path to where the secret information is stored; for example, <b>/path/username</b> .
Key Name (required)	Specify the name of the key to look up the secret information.
Secret Version (V2 Only)	Specify a version if necessary, otherwise, leave it empty to use the latest version.

### HashiCorp Signed SSH

Metadata	Description
Unsigned Public Key (required)	Specify the public key of the certificate you want to have signed. It needs to be present in the authorized keys file of the target hosts.
Path to Secret (required)	Specify the path to where the secret information is stored; for example, <b>/path/username</b> .
Role Name (required)	A role is a collection of SSH settings and parameters that are stored in Hashi vault. Typically, you can specify some with different privileges or timeouts, for example. So you could have a role that is permitted to get a certificate signed for root, and other less privileged ones, for example.
Valid Principals	Specify a user (or users) other than the default, that you are requesting vault to authorize the cert for the stored key. Hashi vault has a default user for whom it signs, for example, ec2-user.

### Microsoft Azure KMS

Metadata	Description
Secret Name (required)	The name of the secret as it is referenced in Microsoft Azure's Key vault app.
Secret Version	Specify a version of the secret, if necessary, otherwise, leave it empty to use the latest version.

### Thycotic DevOps Secrets Vault

Metadata	Description
Secret Path (required)	Specify the path to where the secret information is stored, for example, <b>/path/username</b> .

### Thycotic Secret Server

Metadata	Description
Secret ID (required)	The identifier for the secret.
Secret Field	Specify the field to be used from the secret.

### 12.1.2. AWS Secrets Manager Lookup

This plugin enables Amazon Web Services to be used as a credential input source to pull secrets from the Amazon Web Services Secrets Manager. The AWS Secrets Manager provides similar service to Microsoft Azure Key Vault, and the AWS collection provides a lookup plugin for it.

When AWS Secrets Manager lookup is selected for Credential Type, provide the following metadata to configure your lookup:

- **AWS Access Key** (required): provide the access key used for communicating with AWS key management system
- **AWS Secret Key** (required): provide the secret as obtained by the AWS IAM console

The following is an example of a configured AWS Secret Manager credential.

Credentials > AWS secrets manager lookup creds ↻

**Edit Details**

<b>Name *</b>	<b>Description</b>	<b>Organization</b>
<input type="text" value="AWS secrets manager lookup creds"/>	<input type="text"/>	<input type="text" value="Q"/>
<b>Credential Type *</b>		
<input type="text" value="AWS Secrets Manager lookup"/>		
<b>Type Details</b>		
<b>AWS Access Key *</b>	<b>AWS Secret Key *</b>	
<input type="text" value="AKIA5DPYWLK20BUWNW"/>	<input type="text" value="ENCRYPTED"/>	

### 12.1.3. Centrify Vault Credential Provider Lookup

You need the Centrify Vault web service running to store secrets for this integration to work. When you select **Centrify Vault Credential Provider Lookup** for **Credential Type**, give the following metadata to configure your lookup:

- **Centrify Tenant URL** (required): give the URL used for communicating with Centrify's secret management system
- **Centrify API User** (required): give the username
- **Centrify API Password** (required): give the password
- **OAuth2 Application ID**: specify the identifier given associated with the OAuth2 client
- **OAuth2 Scope**: specify the scope of the OAuth2 client

### 12.1.4. CyberArk Central Credential Provider (CCP) Lookup

The CyberArk Central Credential Provider web service must be running to store secrets for this integration to work. When you select **CyberArk Central Credential Provider Lookup** for **Credential Type**, give the following metadata to configure your lookup:

- **CyberArk CCP URL** (required): give the URL used for communicating with CyberArk CCP's secret management system. It must include the URL scheme such as http or https.
- Optional: **Web Service ID**: specify the identifier for the web service. Leaving this blank defaults to AIMWebService.
- **Application ID** (required): specify the identifier given by CyberArk CCP services.
- **Client Key**: paste the client key if provided by CyberArk.
- **Client Certificate**: include the **BEGIN CERTIFICATE** and **END CERTIFICATE** lines when pasting the certificate, if provided by CyberArk.
- **Verify SSL Certificates**: this option is only available when the URL uses HTTPS. Check this option to verify that the server's SSL/TLS certificate is valid and trusted. For environments that use internal or private CA's, leave this option unchecked to disable verification.

### 12.1.5. CyberArk Conjur Secrets Manager Lookup

With a Conjur Cloud tenant available to target, configure the CyberArk Conjur Secrets Lookup external management system credential plugin.

When you select **CyberArk Conjur Secrets Manager Lookup** for **Credential Type**, give the following metadata to configure your lookup:

- **Conjur URL** (required): provide the URL used for communicating with CyberArk Conjur's secret management system. This must include the URL scheme, such as http or https.
- **API Key** (required): provide the key given by your Conjur admin
- **Account** (required): the organization's account name
- **Username** (required): the specific authenticated user for this service
- **Public Key Certificate**: include the **BEGIN CERTIFICATE** and **END CERTIFICATE** lines when pasting the public key, if provided by CyberArk

The following is an example of a configured CyberArk Conjur credential.

The screenshot shows a configuration form for a Credential Type. The fields are as follows:

- Name:** Conjur lookup creds
- Description:** (empty)
- Organization:** (empty)
- Credential Type:** CyberArk Conjur Secret Lookup
- Type Details:**
  - Conjur URL:** https://conjur.example.com
  - API Key:** ENCRYPTED
  - Account:** admin
  - Username:** admin
- Public Key Certificate:** Drag a file here or browse to upload (with Browse... and Clear buttons)

Buttons: Save, Cancel

### 12.1.6. HashiCorp Vault Secret Lookup

When you select **HashiCorp Vault Secret Lookup** for **Credential Type**, give the following metadata to configure your lookup:

- **Server URL** (required): give the URL used for communicating with HashiCorp Vault's secret management system.
- **Token:** specify the access token used to authenticate HashiCorp's server.
- **CA Certificate:** specify the CA certificate used to verify HashiCorp's server.
- **Approle Role\_ID:** specify the ID if using Approle for authentication.
- **Approle Secret\_ID:** specify the corresponding secret ID for Approle authentication.
- **Client Certificate:** specify a PEM-encoded client certificate when using the TLS authentication method, including any required intermediate certificates expected by Hashicorp Vault.
- **Client Certificate Key:** specify a PEM-encoded certificate private key when using the TLS authentication method.
- **TLS Authentication Role:** specify the role or certificate name in Hashicorp Vault that corresponds to your client certificate when using the TLS authentication method. If it is not provided, Hashicorp Vault attempts to match the certificate automatically.
- **Namespace name:** specify the Namespace name (Hashicorp Vault enterprise only).
- **Kubernetes role:** specify the role name when using Kubernetes authentication.
- **Username:** enter the username of the user to be used to authenticate this service.
- **Password:** enter the password associated with the user to be used to authenticate this service.

- **Path to Auth** specify a path if other than the default path of `/approle`.
- **API Version** (required): select v1 for static lookups and v2 for versioned lookups.

LDAP authentication requires LDAP to be configured in HashiCorp's Vault UI and a policy added to the user. Cubbyhole is the name of the default secret mount. If you have proper permissions, you can create other mounts and write key values to those.

To test the lookup, create another credential that uses Hashicorp Vault lookup.

### Additional resources

For more detail about the LDAP authentication method and its fields, see the [Vault documentation for LDAP auth method](#).

For more information about Approle authentication method and its fields, see the [Vault documentation for AppRole auth method](#).

For more information about the userpass authentication method and its fields, see the [Vault documentation for userpass auth method](#).

For more information about the Kubernetes auth method and its fields, see the [Vault documentation for Kubernetes auth method](#).

For more information about the TLS certificate auth method and its fields, see the [Vault documentation for TLS certificates auth method](#).

### 12.1.7. HashiCorp Vault Signed SSH

When you select **HashiCorp Vault Signed SSH** for **Credential Type**, give the following metadata to configure your lookup:

- **Server URL** (required): give the URL used for communicating with HashiCorp Signed SSH's secret management system.
- **Token**: specify the access token used to authenticate HashiCorp's server.
- **CA Certificate**: specify the CA certificate used to verify HashiCorp's server.
- **Approle Role\_ID**: specify the ID for Approle authentication.
- **Approle Secret\_ID**: specify the corresponding secret ID for Approle authentication.
- **Client Certificate**: specify a PEM-encoded client certificate when using the TLS authentication method, including any required intermediate certificates expected by Hashicorp Vault.
- **Client Certificate Key**: specify a PEM-encoded certificate private key when using the TLS authentication method.
- **TLS Authentication Role**: specify the role or certificate name in Hashicorp Vault that corresponds to your client certificate when using the TLS authentication method. If it is not provided, Hashicorp Vault attempts to match the certificate automatically.
- **Namespace name**: specify the Namespace name (Hashicorp Vault enterprise only).
- **Kubernetes role**: specify the role name when using Kubernetes authentication.

- **Username:** enter the username of the user to be used to authenticate this service.
- **Password:** enter the password associated with the user to be used to authenticate this service.
- **Path to Auth** specify a path if other than the default path of `/approve`.

### Additional resources

For more information about Approle authentication method and its fields, see the [Vault documentation for Approle Auth Method](#).

For more information about the Kubernetes authentication method and its fields, see the [Vault documentation for Kubernetes auth method](#).

For more information about the TLS certificate auth method and its fields, see the [Vault documentation for TLS certificates auth method](#).

## 12.1.8. Microsoft Azure Key Vault

When you select **Microsoft Azure Key Vault** for **Credential Type**, give the following metadata to configure your lookup:

- **Vault URL (DNS Name)**(required): give the URL used for communicating with Microsoft Azure's key management system
- **Client ID** (required): give the identifier as obtained by the Microsoft Azure Active Directory
- **Client Secret** (required): give the secret as obtained by the Microsoft Azure Active Directory
- **Tenant ID** (required): give the unique identifier that is associated with an Microsoft Azure Active Directory instance within an Azure subscription
- **Cloud Environment** select the applicable cloud environment to apply

## 12.1.9. Thycotic DevOps Secrets Vault

When you select **Thycotic DevOps Secrets Vault** for **Credential Type**, give the following metadata to configure your lookup:

- **Tenant** (required): give the URL used for communicating with Thycotic's secret management system
- **Top-level Domain (TLD)**: give the top-level domain designation, for example .com, .edu, or .org, associated with the secret vault you want to integrate
- **Client ID** (required): give the identifier as obtained by the Thycotic secret management system
- **Client Secret** (required): give the secret as obtained by the Thycotic secret management system

## 12.1.10. Thycotic Secret Server

When you select **Thycotic Secrets Server** for **Credential Type**, give the following metadata to configure your lookup:

- **Secret Server URL** (required): give the URL used for communicating with the Thycotic Secrets Server management system
- **Username** (required): specify the authenticated user for this service
- **Password** (required): give the password associated with the user

## CHAPTER 13. APPLICATIONS

Create and configure token-based authentication for external applications such as ServiceNow and Jenkins. With token-based authentication, external applications can easily integrate with automation controller.

With OAuth 2 you can use tokens to share data with an application without disclosing login information. You can configure these tokens as read-only.

You can create an application that is representative of the external application you are integrating with, then use it to create tokens for the application to use on behalf of its users.

Associating these tokens with an application resource enables you to manage all tokens issued for a particular application. By separating the issue of tokens under **Applications**, you can revoke all tokens based on the Application without having to revoke all tokens in the system.

### 13.1. GETTING STARTED WITH APPLICATIONS

From the navigation panel, select **Administration** → **Applications**. The **Applications** page displays a searchable list of all available Applications currently managed by automation controller and can be sorted by **Name**.

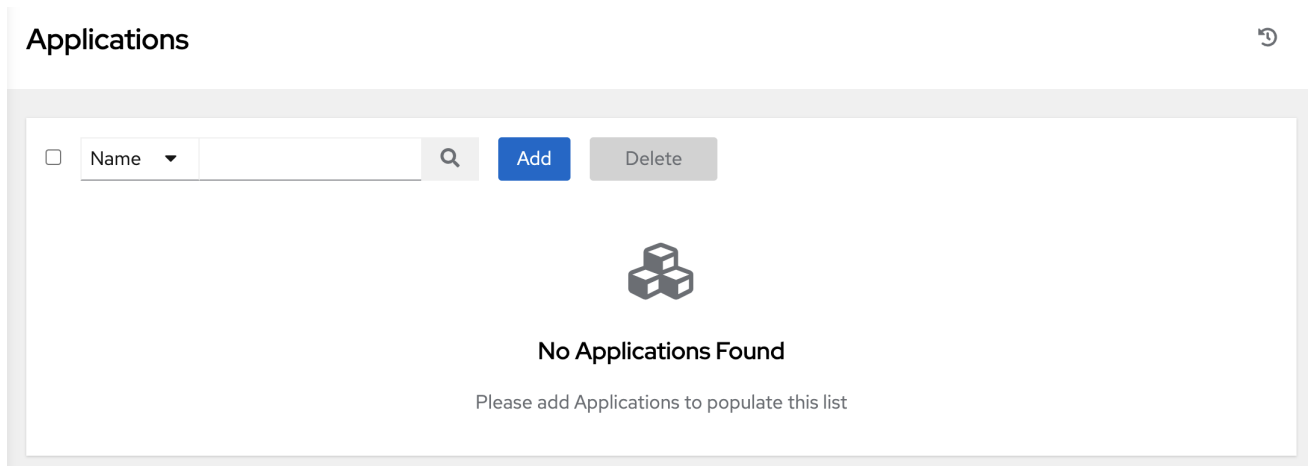
The screenshot displays the 'Applications' page. At the top left, there is a search bar with a dropdown menu set to 'Name' and a search icon. To the right of the search bar are 'Add' and 'Delete' buttons. Further right, there is a pagination indicator '1 - 3 of 3' with left and right arrow icons. Below this is a table with the following columns: 'Name' (with an upward arrow), 'Organization' (with a downward arrow), 'Last Modified', and 'Actions'. The table contains three rows of application data:

<input type="checkbox"/>	Name ↑	Organization ↓	Last Modified	Actions
<input type="checkbox"/>	My creds app	Default	8/4/2021, 5:04:38 PM	
<input type="checkbox"/>	New app	Honey Dog, Inc.	8/4/2021, 5:05:23 PM	
<input type="checkbox"/>	Sample Application	Default	8/4/2021, 4:27:20 PM	

At the bottom of the table, there is another pagination indicator '1 - 3 of 3 items' with left and right arrow icons, and a page indicator '1 of 1 page' with left and right arrow icons.

If no applications exist, you are requested to add applications.





## 13.2. CREATING A NEW APPLICATION

When integrating an external web application with automation controller the web application might need to create OAuth2 Tokens on behalf of users of the web application. Creating an application with the Authorization Code grant type is the preferred way to do this for the following reasons:

- External applications can obtain a token for users, using their credentials.
- Compartmentalized tokens issued for a particular application, enables those tokens to be easily managed. For example, revoking all tokens associated with that application.

### Procedure

1. From the navigation panel, select **Administration** → **Applications**.
2. Click **Add**. The **Create New Application** page opens.

 The screenshot shows the 'Create New Application' form. At the top left, there is a breadcrumb 'Applications' and the title 'Create New Application'. The form contains six input fields: 'Name' (required), 'Description', 'Organization' (required), 'Authorization grant type' (required, with a dropdown arrow), 'Redirect URIs', and 'Client type' (required, with a dropdown arrow). At the bottom left, there are 'Save' and 'Cancel' buttons.

3. Enter the following details:
  - **Name** (required): give a name for the application you want to create
  - Optional: **Description**: give a short description for your application
  - **Organization** (required): give an organization with which this application is associated
  - **Authorization Grant Type** (required): select one of the grant types to use for the user to get tokens for this application. For more information, see [Application Functions](#) in the Applications section of the *Automation controller Administration Guide*.
  - **Redirect URIS**: give a list of allowed URIs, separated by spaces. You need this if you specified the grant type to be **Authorization code**.

- **Client Type** (required): select the level of security of the client device.
4. Click **Save**, or click **Cancel** to abandon your changes.  
The client ID displays in a window.

### 13.2.1. Adding tokens

Select **Tokens** to display a list of the users that have tokens to access the application.


Configure authentication tokens for your users. You can select the application to which the token is associated and the level of access that the token has.



#### NOTE

You can only create OAuth 2 Tokens for your user through the API or UI, which means you can only access your own user profile to configure or view your tokens.

#### Procedure

1. From the navigation panel, select **Access → Users**.
2. Select the user for which you want to configure the OAuth 2 tokens.
3. Select the **Tokens** tab on the user's profile.  
When no tokens are present, the **Tokens** screen prompts you to add them.
4. Click **Add** to open the **Create Token** window.
5. Enter the following details:
  - **Application**: enter the name of the application with which you want to associate your token. Alternatively, you can search for it by clicking the  icon. This opens a separate window that enables you to choose from the available options. Use the Search bar to filter by name if the list is extensive. Leave this field blank if you want to create a Personal Access Token (PAT) that is not linked to any application.
  - Optional: **Description**: provide a short description for your token.
  - **Scope** (required): specify the level of access you want this token to have.
6. Click **Save**, or click **Cancel** to abandon your changes.  
After you save the token, the newly created token for the user is displayed with the token information and when it expires.

### Token information ✕

**i** This is the only time the token value and associated refresh token value will be shown.

<b>Token</b>	<span style="border: 1px solid #ccc; padding: 2px 5px;">CkrG6WImDnOiIPGAfszpYmRBrgpY5m</span> <span style="float: right;">📄</span>
<b>Refresh Token</b>	<span style="border: 1px solid #ccc; padding: 2px 5px;">IMyxhcMhUTHK67anXmHSnP3sPsw9VP</span> <span style="float: right;">📄</span>
<b>Expires</b>	12/5/3020, 4:23:52 PM

7. To view the application to which the token is associated and the token expiration date, go to the token list view.

[Users](#) > [austin78](#) > [Tokens](#)

### Details 🔗

◀ Back to Tokens    Details

<b>Scope</b>	Write	<b>Expires</b>	11/14/3020, 11:09:44 PM	<b>Created</b>	7/15/2021, 12:09:44 AM by <a href="#">austin78</a>
<b>Last Modified</b>	7/15/2021, 12:09:44 AM by <a href="#">austin78</a>				

[Delete](#)

## Verification

To verify that the application now shows the user with the appropriate token, open the **Tokens** tab of the Applications window:

[Applications](#) > [Sample Application](#)

### Tokens 🔗

◀ Back to applications    Details    Tokens

<input type="checkbox"/>	Name <span style="font-size: small;">▼</span>	<input type="text"/>	<input type="button" value="🔍"/>	<input type="button" value="Delete"/>	1 - 1 of 1 <span style="font-size: small;">◀ ▶</span>
	Name <span style="font-size: x-small;">↑</span>	Scope <span style="font-size: x-small;">↓</span>	Expires <span style="font-size: x-small;">↓</span>		
<input type="checkbox"/>	<a href="#">austin78</a>	Read	12/5/3020, 3:48:38 PM		

1 - 1 of 1 items    << < 1 of 1 page > >>

## Additional resources

If you are a system administrator and have to create or remove tokens for other users, see the revoke and create commands in the [Token and session management](#) section of the *Automation controller Administration Guide*.

## CHAPTER 14. EXECUTION ENVIRONMENTS

Unlike legacy virtual environments, execution environments are container images that make it possible to incorporate system-level dependencies and collection-based content. Each execution environment enables you to have a customized image to run jobs and has only what is necessary when running the job.

### 14.1. BUILDING AN EXECUTION ENVIRONMENT

If your Ansible content depends on custom virtual environments instead of a default environment, you must take additional steps. You must install packages on each node, interact well with other software installed on the host system, and keep them in synchronization.

To simplify this process, you can build container images that serve as Ansible [Control nodes](#). These container images are referred to as automation execution environments, which you can create with `ansible-builder`. `Ansible-runner` can then make use of those images.

#### 14.1.1. Install `ansible-builder`

To build images, you must have Podman or Docker installed, along with the **`ansible-builder`** Python package.

The **`--container-runtime`** option must correspond to the Podman or Docker executable you intend to use.

For more information, see [Quickstart for Ansible Builder](#), or [Creating and consuming execution environments](#).

#### 14.1.2. Content needed for an execution environment

`Ansible-builder` is used to create an execution environment.

An execution environment must contain:

- Ansible
- Ansible Runner
- Ansible Collections
- Python and system dependencies of:
  - modules or plugins in collections
  - content in `ansible-base`
  - custom user needs

Building a new execution environment involves a definition that specifies which content you want to include in your execution environment, such as collections, Python requirements, and system-level packages. The definition must be a `.yml` file

The content from the output generated from migrating to execution environments has some of the required data that can be piped to a file or pasted into this definition file.

### Additional resources

For more information, see [Migrate legacy venvs to execution environments](#). If you did not migrate from a virtual environment, you can create a definition file with the required data described in the [Execution Environment Setup Reference](#).

Collection developers can declare requirements for their content by providing the appropriate metadata.

For more information, see [Dependencies](#).

### 14.1.3. Example YAML file to build an image

The **ansible-builder build** command takes an execution environment definition as an input. It outputs the build context necessary for building an execution environment image, and then builds that image. The image can be re-built with the build context elsewhere, and produces the same result. By default, the builder searches for a file named **execution-environment.yml** in the current directory.

The following example **execution-environment.yml** file can be used as a starting point:

```
---
version: 3
dependencies:
  galaxy: requirements.yml
```

The content of **requirements.yml**:

```
---
collections:
  - name: awx.awx
```

To build an execution environment using the preceding files and run the following command:

```
ansible-builder build
...
STEP 7: COMMIT my-awx-ee
--> 09c930f5f6a
09c930f5f6ac329b7ddb321b144a029dbbfcc83bdfc77103968b7f6cdfc7bea2
Complete! The build context can be found at: context
```

In addition to producing a ready-to-use container image, the build context is preserved. This can be rebuilt at a different time or location with the tools of your choice, such as **docker build** or **podman build**.

### Additional resources

For additional information about the **ansible-builder build** command, see Ansible's [CLI Usage](#) documentation.

### 14.1.4. Execution environment mount options

Rebuilding an execution environment is one way to add certificates, but inheriting certificates from the host provides a more convenient solution. For VM-based installations, automation controller automatically mounts the system truststore in the execution environment when jobs run.

You can customize execution environment mount options and mount paths in the **Paths to expose to isolated jobs** field of the **Job Settings** page, where Podman-style volume mount syntax is supported.

### Additional resources

For more information, see the [Podman documentation](#).

#### 14.1.4.1. Troubleshooting execution environment mount options

In some cases where the `/etc/ssh/*` files were added to the execution environment image due to customization of an execution environment, an SSH error can occur. For example, exposing the `/etc/ssh/ssh_config.d:/etc/ssh/ssh_config.d:O` path enables the container to be mounted, but the ownership permissions are not mapped correctly.

Use the following procedure if you meet this error, or have upgraded from an older version of automation controller:

### Procedure

1. Change the container ownership on the mounted volume to **root**.
2. From the navigation panel, select **Job Settings**.
3. Expose the path in the **Paths to expose to isolated jobs** field, using the current example:

#### Paths to expose to isolated jobs

```
1 [
2   "/ssh_config:/etc/ssh/ssh_config.d/:O"
3 ]
```




### NOTE

The `:O` option is only supported for directories. Be as detailed as possible, especially when specifying system paths. Mounting `/etc` or `/usr` directly has an impact that makes it difficult to troubleshoot.

This informs Podman to run a command similar to the following example, where the configuration is mounted and the **ssh** command works as expected:

```
podman run -v /ssh_config:/etc/ssh/ssh_config.d/:O ...
```

To expose isolated paths in OpenShift or Kubernetes containers as HostPath, use the following configuration:

Paths to expose to isolated jobs 

```

1 [
2   "/mnt2:/mnt2",
3   "/mnt3",
4   "/mnt4:/mnt4:0"
5 ]

```

Expose host paths for Container Groups 

On

[Revert](#)

Set **Expose host paths for Container Groups** to **On** to enable it.

When the playbook runs, the resulting Pod specification is similar to the following example. Note the details of the **volumeMounts** and **volumes** sections.

```

apiVersion: v1
kind: Pod
spec:
  containers:
  - image: registry.redhat.io/ansible-automation-platform-22/ee-minimal-rhel8
    args:
    - ansible-runner
    - worker
    - --private-data-dir=/runner
    volumeMounts:
    - mountPath: /mnt2
      name: volume-0
      readOnly: true
    - mountPath: /mnt3
      name: volume-1
      readOnly: true
    - mountPath: /mnt4
      name: volume-2
      readOnly: true
  volumes:
  - hostPath:
      path: /mnt2
      type: ""
      name: volume-0
  - hostPath:
      path: /mnt3
      type: ""
      name: volume-1
  - hostPath:
      path: /mnt4
      type: ""
      name: volume-2

```

#### 14.1.4.2. Mounting the directory in the execution node to the execution environment container

With Ansible Automation Platform 2.1.2, only **O** and **z** options were available. Since Ansible Automation Platform 2.2, further options such as **rw** are available. This is useful when using NFS storage.

## Procedure

1. From the navigation panel, select **Settings** → **Job Settings**.
2. Edit the **Paths to expose to isolated jobs** field:
  - Enter a list of paths that volumes are mounted from the execution node or the hybrid node to the container.
  - Enter one path per line.
  - The supported format is **HOST-DIR[:CONTAINER-DIR[:OPTIONS]]**. The allowed paths are **z**, **O**, **ro**, and **rw**.

### Example

```
[
  "/var/lib/awx/.ssh:/root/.ssh:O"
]
```

- For the **rw** option, configure the SELinux label correctly. For example, to mount the **/foo** directory, complete the following commands:

```
sudo su
mkdir /foo
chmod 777 /foo
semanage fcontext -a -t container_file_t "/foo(/.*)?"
restorecon -vFR /foo
```

The **awx** user must be permitted to read or write in this directory at least. Set the permissions as **777** at this time.

## Additional resources

For more information about mount volumes, see the [--volume option of the podman-run\(1\)](#) section of the Podman documentation.

## 14.2. ADDING AN EXECUTION ENVIRONMENT TO A JOB TEMPLATE

### Prerequisites

- An execution environment must have been created using `ansible-builder` as described in [Build an execution environment](#). When an execution environment has been created, you can use it to run jobs. Use the automation controller UI to specify the execution environment to use in your job templates.



- Depending on whether an execution environment is made available for global use or tied to an organization, you must have the appropriate level of administrator privileges to use an execution environment in a job. Execution environments tied to an organization require Organization administrators to be able to run jobs with those execution environments.
- Before running a job or job template that uses an execution environment that has a credential assigned to it, ensure that the credential contains a username, host, and password.

## Procedure

1. From the navigation panel, select **Administration** → **Execution Environments**.
2. Click **Add** to add an execution environment.
3. Enter the appropriate details into the following fields:
  - **Name** (required): Enter a name for the execution environment.
  - **Image** (required): Enter the image name. The image name requires its full location (repository), the registry, image name, and version tag in the example format of **quay.io/ansible/awx-ee:latestrepo/project/image-name:tag**.
  - Optional: **Pull**: Choose the type of pull when running jobs:
    - **Always pull container before running** Pulls the latest image file for the container.
    - **Only pull the image if not present before running** Only pulls the latest image if none is specified.
    - **Never pull container before running** Never pull the latest version of the container image.



### NOTE

If you do not set a typo for pull, the value defaults to **Only pull the image if not present before running**.

- Optional: **Description**:
- Optional: **Organization**: Assign the organization to specifically use this execution environment. To make the execution environment available for use across multiple organizations, leave this field blank.
- **Registry credential**: If the image has a protected container registry, provide the credential to access it.

Execution Environments

Create new execution environment ⓘ

<b>Name</b> *	<b>Image</b> *	<b>Pull</b>
Latest EE	quay.io/ansible/network-ee:latest	Always pull container before running.
<b>Description</b>	<b>Organization</b>	<b>Registry credential</b> ⓘ
	<input type="text"/> <small>Leave this field blank to make the execution environment globally available.</small>	<input type="text"/>
<input type="button" value="Save"/> <input type="button" value="Cancel"/>		

4. Click **Save**.

Your newly added execution environment is ready to be used in a job template.

5. To add an execution environment to a job template, specify it in the **Execution Environment** field of the job template, as shown in the following example:

The screenshot shows the 'Edit Details' page for a job template. The breadcrumb is 'Templates > EE Job'. The page title is 'Edit Details'. The form contains the following fields:

- Name \***: EE Job
- Description**: (empty)
- Job Type \***: Run
- Prompt on launch
- Inventory \***: Demo Inventory
- Prompt on launch
- Project \***: Demo Project
- Execution Environment \***: Latest EE (highlighted with a red box)
- Playbook \***: hello\_world.yml
- Credentials \***: (empty)
- Prompt on launch

When you have added an execution environment to a job template, those templates are listed in the **Templates** tab of the execution environment:

The screenshot shows the 'Latest EE' execution environment page. The breadcrumb is 'Execution Environments > Latest EE'. The page title is 'Latest EE'. The page has a navigation bar with 'Back to execution environments', 'Details', and 'Templates' (selected). Below the navigation bar is a search and filter section with 'Name' dropdown, a search icon, another 'Name' dropdown, and a list icon. The main content area shows a table with one row:

Name	Job Template
EE Job	Job Template

At the bottom right, there is a pagination control showing '1-1 of 1 items', '1' of 1 page, and navigation arrows.

## CHAPTER 15. EXECUTION ENVIRONMENT SETUP REFERENCE

This section contains reference information associated with the definition of an execution environment. You define the content of your execution environment in a YAML file. By default, this file is called **execution\_environment.yml**. This file tells Ansible Builder how to create the build instruction file (Containerfile for Podman, Dockerfile for Docker) and build context for your container image.



### NOTE

The definition schema for Ansible Builder 3.x is documented here. If you are running an older version of Ansible Builder, you need an older schema version. For more information, see older versions of [this](#) documentation. We recommend using version 3, which offers substantially more configurable options and functionality than previous versions.

### 15.1. EXECUTION ENVIRONMENT DEFINITION EXAMPLE

You must create a definition file to build an image for an execution environment. The file is in YAML format.

You must specify the version of Ansible Builder in the definition file. The default version is 1.

The following definition file is using Ansible Builder version 3:

```
version: 3
build_arg_defaults:
  ANSIBLE_GALAXY_CLI_COLLECTION_OPTS: '--pre'
dependencies:
  galaxy: requirements.yml
  python:
    - six
    - psutil
  system: bindep.txt
images:
  base_image:
    name: registry.redhat.io/ansible-automation-platform-24/ee-minimal-rhel8:latest
additional_build_files:
  - src: files/ansible.cfg
    dest: configs
additional_build_steps:
  prepend_galaxy:
    - ADD _build/configs/ansible.cfg /home/runner/.ansible.cfg
  prepend_final: |
    RUN whoami
    RUN cat /etc/os-release
  append_final:
    - RUN echo This is a post-install command!
    - RUN ls -la /etc
```

### 15.2. CONFIGURATION OPTIONS

Use the following configuration YAML keys in your definition file.

The Ansible Builder 3.x execution environment definition file accepts seven top-level sections:


- [additional\\_build\\_files](#)
- [additional\\_build\\_steps](#)
- [build\\_arg\\_defaults](#)
- [dependencies](#)
- [images](#)
  - [image verification](#)
- [options](#)
- [version](#)

### 15.2.1. additional\_build\_files

The build files specify what are to be added to the build context directory. These can then be referenced or copied by **additional\_build\_steps** during any build stage.

The format is a list of dictionary values, each with a **src** and **dest** key and value.

Each list item must be a dictionary containing the following required keys:

<b>src</b>	<p>Specifies the source files to copy into the build context directory.</p> <p>This can be an absolute path, for example, <b>/home/user/.ansible.cfg</b>, or a path that is relative to the file. Relative paths can be a glob expression matching one or more files, for example, <b>files/*.cfg</b>. Note that an absolute path must not include a regular expression. If <b>src</b> is a directory, the entire contents of that directory are copied to <b>dest</b>.</p>
<b>dest</b>	<p>Specifies a subdirectory path underneath the <b>_build</b> subdirectory of the build context directory that contains the source files, for example, <b>files/configs</b>.</p> <p>This cannot be an absolute path or contain <b>..</b> within the path. This directory is created for you if it does not exist.</p> <div style="display: flex; align-items: flex-start;"> <div style="flex: 1;">  </div> <div style="flex: 2;"> <p><b>NOTE</b></p> <p>When using an <b>ansible.cfg</b> file to pass a token and other settings for a private account to an automation hub server, listing the configuration file path here as a string enables it to be included as a build argument in the initial phase of the build.</p> </div> </div>

### 15.2.2. additional\_build\_steps

The build steps specify custom build commands for any build phase. These commands are inserted directly into the build instruction file for the container runtime, for example, Containerfile or Dockerfile. The commands must conform to any rules required by the containerization tool.

You can add build steps before or after any stage of the image creation process. For example, if you need **git** to be installed before you install your dependencies, you can add a build step at the end of the base build stage.

The following are the valid keys. Each supports either a multi-line string, or a list of strings.

<b>append_base</b>	Commands to insert after building of the base image.
<b>append_builder</b>	Commands to insert after building of the builder image.
<b>append_final</b>	Commands to insert after building of the final image.
<b>append_galaxy</b>	Commands to insert after building of the galaxy image.
<b>prepend_base</b>	Commands to insert before building of the base image.
<b>prepend_builder</b>	Commands to insert before building of the builder image.
<b>prepend_final</b>	Commands to insert before building of the final image.
<b>prepend_galaxy</b>	Commands to insert before building of the galaxy image.

### 15.2.3. build\_arg\_defaults

This specifies the default values for build arguments as a dictionary.

This is an alternative to using the **--build-arg** CLI flag.

Ansible Builder uses the following build arguments:

<b>ANSIBLE_GALAXY_CLI_COLLECTION_OPTS</b>	Enables the user to pass the <b>-pre</b> flag and other flags to enable the installation of pre-release collections.
<b>ANSIBLE_GALAXY_CLI_ROLE_OPTS</b>	This enables the user to pass any flags, such as <b>--no-deps</b> , to the role installation.
<b>PKGMRGR_PRESERVE_CACHE</b>	This controls how often the package manager cache is cleared during the image build process.  If this value is not set, which is the default, the cache is cleared frequently. If the value is <b>always</b> , the cache is never cleared. Any other value forces the cache to be cleared only after the system dependencies are installed in the final build stage.

Ansible Builder hard-codes values given inside of **build\_arg\_defaults** into the build instruction file, so they persist if you run your container build manually.

If you specify the same variable in the definition and at the command line with the CLI **build-arg** flag, the CLI value overrides the value in the definition.

## 15.2.4. Dependencies

Specifies dependencies to install into the final image, including **ansible-core**, **ansible-runner**, Python packages, system packages, and collections. Ansible Builder automatically installs dependencies for any Ansible collections you install.

In general, you can use standard syntax to constrain package versions. Use the same syntax you would pass to **dnf**, **pip**, **ansible-galaxy**, or any other package management utility. You can also define your packages or collections in separate files and reference those files in the **dependencies** section of your definition file.

The following keys are valid:

<p><b>ansible_core</b></p>	<p>The version of the <b>ansible-core</b> Python package to be installed.</p> <p>This value is a dictionary with a single key, <b>package_pip</b>. The <b>package_pip</b> value is passed directly to pip for installation and can be in any format that pip supports. The following are some example values:</p> <pre> ansible_core:   package_pip: ansible-core ansible_core:   package_pip: ansible-core==2.14.3 ansible_core:   package_pip:     https://github.com/example_user/ansible/archive/refs/heads/ansible.tar.gz </pre>
<p><b>ansible_runner</b></p>	<p>The version of the Ansible Runner Python package to be installed.</p> <p>This value is a dictionary with a single key, <b>package_pip</b>. The <b>package_pip</b> value is passed directly to pip for installation and can be in any format that pip supports. The following are some example values:</p> <pre> ansible_runner:   package_pip: ansible-runner ansible_runner:   package_pip: ansible-runner==2.3.2 ansible_runner:   package_pip: https://github.com/example_user/ansible-runner/archive/refs/heads/ansible-runner.tar.gz </pre>
<p><b>galaxy</b></p>	<p>Collections to be installed from Ansible Galaxy.</p> <p>This can be a filename, a dictionary, or a multi-line string representation of an Ansible Galaxy <b>requirements.yml</b> file. For more information about the requirements file format, see the <a href="#">Galaxy User Guide</a>.</p>

<p><b>python</b></p>	<p>The Python installation requirements.</p> <p>This can be a filename, or a list of requirements. Ansible Builder combines all the Python requirements files from all collections into a single file using the <b>requirements-parser</b> library.</p> <p>This library supports complex syntax, including references to other files. If many collections require the same <i>package name</i>, Ansible Builder combines them into a single entry and combines the constraints.</p> <p>Ansible Builder excludes some packages in the combined file of Python dependencies even if a collection lists them as dependencies. These include test packages and packages that provide Ansible itself. The full list can be available under <b>EXCLUDE_REQUIREMENTS</b> in <b>src/ansible_builder/_target_scripts/introspect.py</b>.</p> <p>If you need to include one of these excluded package names, use the <b>--user-pip</b> option of the <b>introspect</b> command to list it in the user requirements file.</p> <p>Packages supplied this way are not processed against the list of excluded Python packages.</p>
<p><b>python_interpreter</b></p>	<p>A dictionary that defines the Python system package name to be installed by dnf (<b>package_system</b>) or a path to the Python interpreter to be used (<b>python_path</b>).</p>
<p><b>system</b></p>	<p>The system packages to be installed, in bindep format. This can be a filename or a list of requirements.</p> <p>For more information about bindep, see the <a href="#">OpenDev documentation</a>.</p> <p>For system packages, use the <b>bindep</b> format to specify cross-platform requirements, so they can be installed by whichever package management system the execution environment uses. Collections must specify necessary requirements for <b>[platform:rpm]</b>. Ansible Builder combines system package entries from multiple collections into a single file. Only requirements with no profiles (runtime requirements) are installed to the image. Entries from many collections which are duplicates of each other can be consolidated in the combined file.</p>

The following example uses filenames that contain the various dependencies:

```
dependencies:
  python: requirements.txt
  system: bindep.txt
  galaxy: requirements.yml
  ansible_core:
    package_pip: ansible-core==2.14.2
  ansible_runner:
    package_pip: ansible-runner==2.3.1
```

```
python_interpreter:
  package_system: "python310"
  python_path: "/usr/bin/python3.10"
```

This example uses inline values:

```
dependencies:
  python:
    - pywinrm
  system:
    - iputils [platform:rpm]
  galaxy:
    collections:
      - name: community.windows
      - name: ansible.utils
      version: 2.10.1
  ansible_core:
    package_pip: ansible-core==2.14.2
  ansible_runner:
    package_pip: ansible-runner==2.3.1
  python_interpreter:
    package_system: "python310"
    python_path: "/usr/bin/python3.10"
```



## NOTE

If any of these dependency files (**requirements.txt**, **bindep.txt**, and **requirements.yml**) are in the **build\_ignore** of the collection, the build fails.

Collection maintainers can verify that `ansible-builder` recognizes the requirements they expect by using the **introspect** command:

```
ansible-builder introspect --sanitize ~/.ansible/collections/
```

The **--sanitize** option reviews all of the collection requirements and removes duplicates. It also removes any Python requirements that are normally excluded (see **python** dependencies).

Use the **-v3** option to **introspect** to see logging messages about requirements that are being excluded.

### 15.2.5. images

Specifies the base image to be used. At a minimum you must specify a source, image, and tag for the base image. The base image provides the operating system and can also provide some packages. Use the standard **host/namespace/container:tag** syntax to specify images. You can use Podman or Docker shortcut syntax instead, but the full definition is more reliable and portable.

Valid keys for this section are:

<b>base_image</b>	<p>A dictionary defining the parent image for the execution environment.</p> <p>A <b>name</b> key must be supplied with the container image to use. Use the <b>signature_original_name</b> key if the image is mirrored within your repository, but signed with the original image's signature key.</p>
-------------------	---



## 15.2.6. Image verification

You can verify signed container images if you are using the **podman** container runtime.

Set the **container-policy** CLI option to control how this data is used in relation to a Podman **policy.json** file for container image signature validation.

- **ignore\_all** policy: Generate a **policy.json** file in the build **context directory <context>** where no signature validation is performed.
- **system** policy: Signature validation is performed using pre-existing **policy.json** files in standard system locations. **ansible-builder** assumes no responsibility for the content within these files, and the user has complete control over the content.
- **signature\_required** policy: **ansible-builder** uses the container image definitions to generate a **policy.json** file in the build **context directory <context>** that is used during the build to validate the images.

## 15.2.7. options

A dictionary of keywords or options that can affect the runtime functionality Ansible Builder.

Valid keys for this section are:

- **container\_init**: A dictionary with keys that allow for customization of the container **ENTRYPOINT** and **CMD** directives (and related behaviors). Customizing these behaviors is an advanced task, and can result failures that are difficult to debug. Because the provided defaults control several intertwined behaviors, overriding any value skips all remaining defaults in this dictionary.

Valid keys are:

- **cmd**: Literal value for the **CMD** Containerfile directive. The default value is **["bash"]**.
- **entrypoint**: Literal value for the **ENTRYPOINT** Containerfile directive. The default entrypoint behavior handles signal propagation to subprocesses, as well as attempting to ensure at runtime that the container user has a proper environment with a valid writeable home directory, represented in **/etc/passwd**, with the **HOME** environment variable set to match. The default entrypoint script can emit warnings to **stderr** in cases where it is unable to suitably adjust the user runtime environment. This behavior can be ignored or elevated to a fatal error; consult the source for the **entrypoint** target script for more details. The default value is **["/opt/builder/bin/entrypoint", "dumb-init"]**.
- **package\_pip**: Package to install with pip for entrypoint support. This package is installed in the final build image. The default value is **dumb-init==1.2.5**.
- **package\_manager\_path**: string with the path to the package manager (dnf or microdnf) to use. The default is **/usr/bin/dnf**. This value is used to install a Python interpreter, if specified in **dependencies**, and during the build phase by the **assemble** script.
- **skip\_ansible\_check**: This boolean value controls whether or not the check for an installation of Ansible and Ansible Runner is performed on the final image. Set this value to **True** to not perform this check.

The default is **False**.

- **relax\_passwd\_permissions**: This boolean value controls whether the **root** group (GID 0) is explicitly granted write permission to **/etc/passwd** in the final container image. The default entrypoint script can attempt to update **/etc/passwd** under some container runtimes with dynamically created users to ensure a fully-functional POSIX user environment and home directory. Disabling this capability can cause failures of software features that require users to be listed in **/etc/passwd** with a valid and writeable home directory, for example, **async** in **ansible-core**, and the **~username** shell expansion. The default is **True**.
- **workdir**: Default current working directory for new processes started under the final container image. Some container runtimes also use this value as **HOME** for dynamically-created users in the **root** (GID 0) group. When this value is specified, if the directory does not already exist, it is created, set to **root** group ownership, and **rwX** group permissions are recursively applied to it. The default value is **/runner**.
- **user**: This sets the username or UID to use as the default user for the final container image. The default value is **1000**.

#### Example options:

```
options:
  container_init:
    package_pip: dumb-init>=1.2.5
    entrypoint: ["dumb-init"]
    cmd: ["csh"]
  package_manager_path: /usr/bin/microdnf
  relax_password_permissions: false
  skip_ansible_check: true
  workdir: /myworkdir
  user: bob
```

#### 15.2.8. version

An integer value that sets the schema version of the execution environment definition file.

Defaults to **1**.

The value must be **3** if you are using Ansible Builder 3.x.

### 15.3. DEFAULT EXECUTION ENVIRONMENT FOR AWX

The example in **test/data/pytz** requires the **awx.awx** collection in the definition. The lookup plugin **awx.awx.tower\_schedule\_rrule** requires the PyPI **pytz** and another library to work. If the **test/data/pytz/execution-environment.yml** file is provided to the **ansible-builder build** command, it installs the collection inside the image, reads the **requirements.txt** file inside of the collection, and then installs **pytz** into the image.

The image produced can be used inside of an **ansible-runner** project by placing these variables inside the **env/settings** file, inside the private data directory.

```
---
container_image: image-name
process_isolation_executable: podman # or docker
process_isolation: true
```

The **awx.awx** collection is a subset of content included in the default AWX .

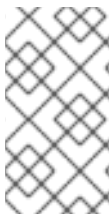
For further information, see the [awx-ee repository](#).

## CHAPTER 16. PROJECTS

A Project is a logical collection of Ansible playbooks, represented in automation controller. You can manage playbooks and playbook directories different ways:

- By placing them manually under the Project Base Path on your automation controller server.
- By placing your playbooks into a source code management (SCM) system supported by the automation controller. These include Git, Subversion, Mercurial and Red Hat Insights.

For more information on creating a Red Hat Insights project, see [Setting up insights remediations](#).



### NOTE

The Project Base Path is `/var/lib/awx/projects`. However, this can be modified by the system administrator. It is configured in `/etc/tower/conf.d/custom.py`.

Use caution when editing this file, as incorrect settings can disable your installation.

The Projects page displays the list of the projects that are currently available.

Automation controller provides you with a **Demo Project** that you can work with initially.

### Projects



Name	Status	Type	Revision	Actions
<input type="checkbox"/> <a href="#">Demo Project</a>	<span style="color: green;">✔ Successful</span>	Git	347e44f	
<input type="checkbox"/> <a href="#">Example</a>	<span style="color: green;">✔ Successful</span>	Git	d357156	

1 - 2 of 2 items    1 of 1 page


The default view is collapsed (**Compact**) with project name and its status, but you can use the next to each entry to expand for more information.

### Projects



Name	Status	Type	Revision	Actions
<input type="checkbox"/> <a href="#">Demo Project</a>	<span style="color: green;">✔ Successful</span>	Git	347e44f	
<b>Organization</b> <a href="#">Default</a>		<b>Last modified</b> 7/12/2021, 11:17:46 AM		<b>Last used</b> 7/15/2021, 1:13:15 AM
<input type="checkbox"/> <a href="#">Example</a>	<span style="color: green;">✔ Successful</span>	Git	d357156	

1 - 2 of 2 items    1 of 1 page

For each project listed, you can get the latest SCM revision , edit  the project, or copy  the project attributes, using the icons next to each project.

Projects can be updated while a related job is running.

In cases where you have a large project (around 10 GB), disk space on **/tmp** may be an issue.

**Status** indicates the state of the project and may be one of the following (note that you can also filter your view by specific status types):

- **Pending** - The source control update has been created, but not queued or started yet. Any job (not just source control updates) stays in pending until it is ready to be run by the system. Possible reasons for it not being ready are:
  - It has dependencies that are currently running so it has to wait until they are done.
  - There is not enough capacity to run in the locations it is configured to.
- **Waiting** - The source control update is in the queue waiting to be executed.
- **Running** - The source control update is currently in progress.
- **Successful** - The last source control update for this project succeeded.
- **Failed** - The last source control update for this project failed.
- **Error** - The last source control update job failed to run at all.
- **Canceled** - The last source control update for the project was canceled.
- **Never updated** - The project is configured for source control, but has never been updated.
- **OK** - The project is not configured for source control, and is correctly in place.
- **Missing** - Projects are absent from the project base path of **/var/lib/awx/projects**. This is applicable for manual or source control managed projects.



#### NOTE

Projects of credential type **Manual** cannot update or schedule source control-based actions without being reconfigured as an SCM type credential.

## 16.1. ADDING A NEW PROJECT

You can manage projects for automation controller in the **Resources** section of the UI.

### Procedure

1. From the navigation panel, select **Resources** → **Projects**.
2. On the **Projects** page, click **Add** to launch the **Create Project** window.

The screenshot shows the 'Create New Project' form. It has a header 'Projects' and 'Create New Project' with a refresh icon. The form contains the following fields:

- Name \***: A text input field.
- Description**: A text input field.
- Organization \***: A dropdown menu with a search icon.
- Execution Environment**: A dropdown menu with a search icon.
- Source Control Type \***: A dropdown menu with the text 'Choose a Source Control Type'.
- Content Signature Validation Credential**: A text input field with a search icon.

At the bottom left, there are two buttons: 'Save' (in blue) and 'Cancel'.

3. Enter the appropriate details into the following required fields:

- **Name** (required)
- Optional: **Description**
- **Organization** (required): A project must have at least one organization. Select one organization now to create the project. When the project is created you can add additional organizations.
- Optional: **Execution Environment**: Enter the name of the execution environment or search from a list of existing ones to run this project. For more information, see [Migrating to Execution Environments](#) in the *Red Hat Ansible Automation Platform Upgrade and Migration Guide*.
- **Source Control Type** (required): Select an SCM type associated with this project from the menu. Options in the following sections become available depending on the type chosen. For more information, see [Manage playbooks manually](#) or [Manage playbooks using source control](#).
- Optional: **Content Signature Validation Credential** Use this field to enable content verification. Specify the GPG key to use for validating content signature during project synchronization. If the content has been tampered with, the job will not run. For more information, see [Project signing and verification](#).

4. Click **Save**.

### Additional resources

The following describe the ways projects are sourced:

- [Manage playbooks manually](#)
- [Manage playbooks using source control](#)
  - [SCM Types - Git and Subversion](#)
  - [SCM Type - Red Hat Insights](#)
  - [SCM Type - Remote Archive](#)

## 16.1.1. Managing playbooks manually

### Procedure

- Create one or more directories to store playbooks under the Project Base Path, for example, `/var/lib/awx/projects/`.
- Create or copy playbook files into the playbook directory.
- Ensure that the playbook directory and files are owned by the same UNIX user and group that the service runs as.
- Ensure that the permissions are appropriate for the playbook directories and files.

## Troubleshooting

- If you have not added any Ansible Playbook directories to the base project path an error message is displayed. Choose one of the following options to troubleshoot this error:
  - Create the appropriate playbook directories and check out playbooks from your SCM (spell this\*).
  - Copy playbooks into the appropriate playbook directories.

## 16.1.2. Managing playbooks using source control

Choose one of the following options when managing playbooks using source control:

- [SCM Types - Configuring playbooks to use Git and Subversion](#)
- [SCM Type - Configuring playbooks to use Red Hat Insights](#)
- [SCM Type - Configuring playbooks to use a remote archive](#)

### 16.1.2.1. SCM Types - Configuring playbooks to use Git and Subversion

#### Procedure

1. In the Project **Details** tab, select the appropriate option (Git or Subversion) from the **SCM Type** menu.

Projects ↻

Create New Project

Name *	Description	Organization *
Example	Ansible example playbook	🔍 Honey Dog, Inc.
Default Execution Environment ⓘ	Source Control Credential Type *	Content Signature Validation Credential ⓘ
🔍	Git	🔍

**Type Details**

Source Control URL * ⓘ	Source Control Branch/Tag/Commit ⓘ	Source Control Refspec ⓘ
https://github.com/ansible/tower-example		
Source Control Credential		
🔍		

**Options**


Clean ⓘ  
  Delete ⓘ  
  Track submodules ⓘ  
  Update Revision on Launch ⓘ  
  Allow Branch Override ⓘ

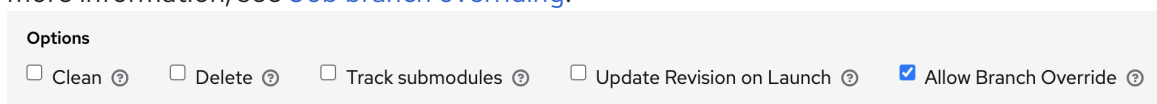
Save Cancel

2. Enter the appropriate details into the following fields:






- **SCM URL** - See an example in the tooltip .
- Optional: **SCM Branch/Tag/Commit**: Enter the SCM branch, tags, commit hashes, arbitrary refs, or revision number (if applicable) from the source control (Git or Subversion) to checkout. Some commit hashes and references might not be available unless you also provide a custom refspec in the next field. If left blank, the default is **HEAD** which is the last checked out Branch, Tag, or Commit for this project.
- **SCM Refspec** - This field is an option specific to git source control and only advanced users familiar and comfortable with git should specify which references to download from the remote repository. For more information, see [Job branch overriding](#).
- **Source Control Credential** - If authentication is required, select the appropriate source control credential

3. Optional: **SCM Update Options** - select the launch behavior, if applicable:

- **Clean** - Removes any local modifications before performing an update.
- **Delete** - Deletes the local repository in its entirety before performing an update. Depending on the size of the repository this can significantly increase the amount of time required to complete an update.
- **Track submodules** - Tracks the latest commit. There is more information in the tooltip .
- **Update Revision on Launch** - Updates the revision of the project to the current revision in the remote source control, and caching the roles directory from [Galaxy](#) or [Collections support](#). Automation controller ensures that the local revision matches and that the roles and collections are up-to-date with the last update. In addition, to avoid job overflows if jobs are spawned faster than the project can synchronize, selecting this enables you to configure a Cache Timeout to cache previous project synchronizations for a given number of seconds.
- **Allow Branch Override** - Enables a job template or an inventory source that uses this project to start with a specified SCM branch or revision other than that of the project. For more information, see [Job branch overriding](#).



Options

Clean   Delete   Track submodules   Update Revision on Launch   Allow Branch Override 

4. Click **Save** to save your project.

## TIP

Using a GitHub link is an easy way to use a playbook. To help get you started, use the [helloworld.yml](#) file available [here](#).

This link offers a very similar playbook to the one created manually in the instructions found in [Automation controller User Guide](#). Using it will not alter or harm your system in any way.

### 16.1.2.2. SCM Type - Configuring playbooks to use Red Hat Insights

#### Procedure

1. In the Project **Details** page, select **Red Hat Insights** from the **SCM Type** menu.



2. In the **Credential** field, select the appropriate credential for use with Insights, as Red Hat Insights requires a credential for authentication.
3. Optional: In the **SCM Update Options** field, select the launch behavior, if applicable.
  - **Clean** - Removes any local modifications before performing an update.
  - **Delete** - Deletes the local repository in its entirety before performing an update. Depending on the size of the repository this can significantly increase the amount of time required to complete an update.
  - **Update Revision on Launch** - Updates the revision of the project to the current revision in the remote source control, and caches the roles directory from [Ansible Galaxy support](#) or [Collections support](#). Automation controller ensures that the local revision matches, and that the roles and collections are up-to-date. If jobs are spawned faster than the project can synchronize, selecting this enables you to configure a Cache Timeout to cache previous project synchronizations for a certain number of seconds, to avoid job overflow.

Projects ↻

Create New Project

<b>Name *</b>	<b>Description</b>	<b>Organization *</b>
<input type="text" value="Red Hat Insights Project"/>	<input type="text"/>	<input type="text" value="Honey Dog, Inc."/>
<b>Execution Environment</b> ⓘ	<b>Source Control Type *</b>	<b>Content Signature Validation Credential</b> ⓘ
<input type="text"/>	<input type="text" value="Red Hat Insights"/>	<input type="text"/>

**Type Details**

**Insights Credential \***

**Options**

Clean ⓘ  
  Delete ⓘ  
  Update Revision on Launch ⓘ

4. Click **Save**.

### 16.1.2.3. SCM Type - Configuring playbooks to use a remote archive

Playbooks that use a remote archive enable projects to be based on a build process that produces a versioned artifact, or release, containing all the requirements for that project in a single archive.

#### Procedure

1. In the Project **Details** page, select **Remote Archive** from the **SCM Type** menu.
2. Enter the appropriate details into the following fields:
  - **SCM URL** - requires a URL to a remote archive, such as a *GitHub Release* or a build artifact stored in *Artifactory* and unpacks it into the project path for use.
  - **SCM Credential** - If authentication is required, select the appropriate SCM credential.
3. Optional: In the **SCM Update Options** field, select the launch behavior, if applicable:
  - **Clean** - Removes any local modifications before performing an update.

- **Delete** - Deletes the local repository in its entirety before performing an update. Depending on the size of the repository this can significantly increase the amount of time required to complete an update.
- **Update Revision on Launch** - Not recommended. This option updates the revision of the project to the current revision in the remote source control, and caches the roles directory from [Ansible Galaxy support](#) or [Collections support](#).
- **Allow Branch Override** - Not recommended. This option enables a job template that uses this project to launch with a specified SCM branch or revision other than that of the project's.

Projects

Create New Project ↻

The screenshot shows a 'Create New Project' form with the following fields and options:

- Name**: Remote Archived Project
- Description**: (empty)
- Organization**: Honey Dog, Inc.
- Execution Environment**: (empty)
- Source Control Type**: Remote Archive
- Content Signature Validation Credential**: (empty)
- Type Details** section:
  - Source Control URL**: https://github.com/ansible/product-docs
  - Source Control Credential**: (empty)
- Options**:
  - Clean
  - Delete
  - Update Revision on Launch
  - Allow Branch Override

Buttons: Save, Cancel


**NOTE**

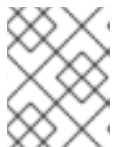
Since this SCM type is intended to support the concept of unchanging artifacts, it is advisable to disable Galaxy integration (for roles, at a minimum).

4. Click **Save**.

## 16.2. UPDATING PROJECTS FROM SOURCE CONTROL

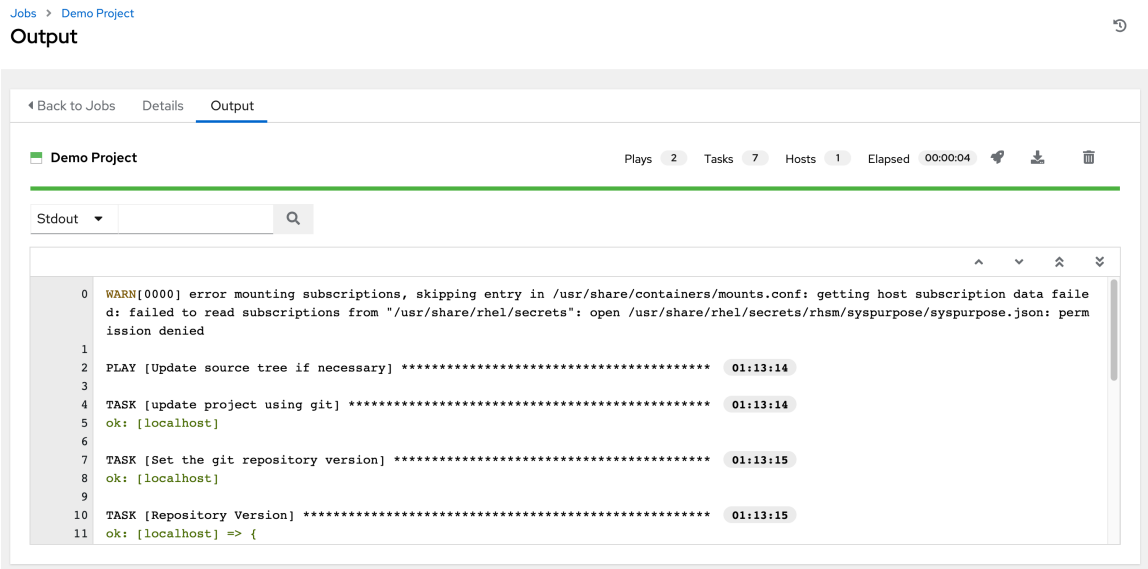
### Procedure

1. From the navigation panel, select **Resources** → **Projects**.
2. Click the sync  icon next to the project that you want to update.

**NOTE**

Immediately after adding a project setup to use source control, a sync starts that fetches the project details from the configured source control.

- Click the project's status under the **Status** column for further information about the update process. This brings you to the **Output** tab of the **Jobs** section.



## 16.3. WORK WITH PERMISSIONS

The set of permissions assigned to a project (role-based access controls) that provide the ability to read, change, and administer projects, inventories, job templates, and other elements are privileges.

To access the project permissions, select the **Access** tab of the **Projects** page. This screen displays a list of users that currently have permissions to this project.

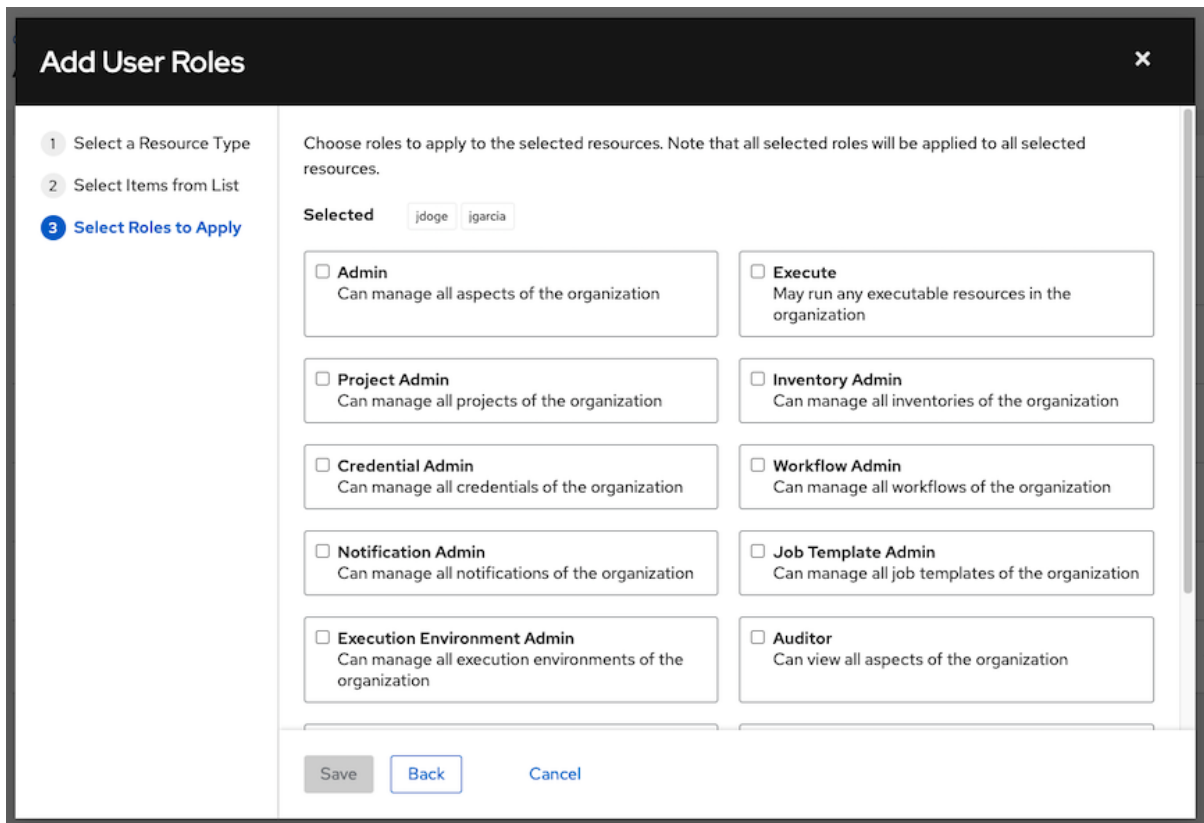
You can sort and search this list by **Username**, **First Name**, or **Last Name**.

### 16.3.1. Adding project permissions

Manage the permissions that users and teams have to access a project.

#### Procedure

1. From the navigation panel, select **Resources** → **Projects** page.
2. Select the project that you want to update and click the **Access** tab.
3. Click **Add**.
4. Select a user or team to add and click **Next**.
5. Select one or more users or teams from the list by clicking the checkbox next to the name to add them as members.
6. Click **Next**.
7. Select the roles you want the selected users or teams to have. Be sure to scroll down for a complete list of roles. Different resources have different options available.



- Click **Save** to apply the roles to the selected users or teams and to add them as members. The updated roles assigned for each user and team are displayed.

Username	First name	Last name	Roles
admin			User Roles System Administrator
austin78	Austin	Austin	User Roles Member x System Auditor
jgarcia	Jerry	Jerry	User Roles Credential Admin x Job Template Admin x Auditor x Member x
jdoge	Josie	Josie	User Roles Project Admin x Credential Admin x Job Template Admin x Auditor x

1 - 4 of 4 items 1 of 1 page

### 16.3.2. Removing permissions from a project

Remove roles for a particular user.

#### Procedure

- From the navigation panel, select **Resources** → **Projects**.
- Select the project that you want to update and click the **Access** tab.
- Click the **X** icon next to the user role in the **Roles** column.
- Click **Delete** in the confirmation window to confirm the disassociation.

## 16.4. ANSIBLE GALAXY SUPPORT

At the end of a project update, automation controller searches for the **requirements.yml** file in the **roles** directory, located at **<project-top-level-directory>/roles/requirements.yml**.

If this file is found, the following command automatically runs:

```
ansible-galaxy role install -r roles/requirements.yml -p <project-specific cache location>/requirements_roles -vvv
```

This file enables you to reference Ansible Galaxy roles or roles within other repositories which can be checked out in conjunction with your own project. The addition of Ansible Galaxy access eliminates the need to create git submodules to achieve this result. Given that SCM projects, along with roles or collections, are pulled into and executed from a private job environment, a **<private job directory>** specific to the project within **/tmp** is created by default. However, you can specify another **Job Execution Path** based on your environment in the **Jobs Settings** tab of the **Settings** window:

The screenshot shows the 'Jobs Settings' tab in the 'Settings' window, specifically the 'Edit Details' view. The 'Job execution path' field is highlighted with a red box and contains the value '/tmp'. Other settings visible include 'Maximum Scheduled Jobs' (10), 'Default Job Timeout' (0), 'Default Job Idle Timeout' (0), 'Default Inventory Update Timeout' (0), 'Default Project Update Timeout' (0), 'Per-Host Ansible Fact Cache Timeout' (0), 'Maximum number of forks per job' (200), 'When can extra variables contain Jinja templates?' (Template), 'Run Project Updates With Higher Verbosity' (Off), 'Ignore Ansible Galaxy SSL Certificate Verification' (Off), 'Enable Role Download' (On), 'Enable Collection(s) Download' (On), 'Follow symlinks' (Off), and 'Expose host paths for Container Groups' (Off).

The cache directory is a subdirectory inside the global projects folder. The content can be copied from the cache location to **<job private directory>/requirements\_roles**.

By default, automation controller has a system-wide setting that enables you to dynamically download roles from the **roles/requirements.yml** file for SCM projects. You can turn off this setting in the **Jobs settings** screen of the **Settings** menu by switching the **Enable Role Download** toggle button to **Off**.

Whenever a project synchronization runs, automation controller determines if the project source and any roles from Galaxy or Collections are out of date with the project. Project updates download the roles inside the update.

If jobs need to pick up a change made to an upstream role, updating the project ensures that this happens. A change to the role means that a new commit was pushed to the *provision-role* source control.

To make this change take effect in a job, you do not have to push a new commit to the *playbooks* repository. You must update the project, which downloads roles to a local cache.

For instance, say you have two git repositories in source control. The first one is *playbooks* and the project in automation controller points to this URL. The second one is *provision-role* and it is referenced by the **roles/requirements.yml** file inside of the *playbooks* git repository.

Jobs download the most recent roles before every job run. Roles and collections are locally cached for performance reasons. You must select **Update Revision on Launch** in the project **SCM Update Options** to ensure that the upstream role is re-downloaded before each job run:

## Options

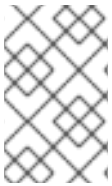
Clean ⓘ
  Delete ⓘ
  Track submodules ⓘ
  Update Revision on Launch ⓘ
  Allow Branch Override ⓘ

The update happens much earlier in the process than the sync, so this identifies errors and details faster and in a more logical location.

For more information and examples on the syntax of the **requirements.yml** file, see the [role requirements section](#) in the Ansible documentation.

If there are any directories that must be specifically exposed, you can specify those in the **Jobs** section of the **Settings** screen in **Paths to Expose to Isolated Jobs**. You can also update the following entry in the settings file:

```
AWX_ISOLATION_SHOW_PATHS = ['/list/of/', '/paths']
```

**NOTE**

If your playbooks need to use keys or settings defined in **AWX\_ISOLATION\_SHOW\_PATHS**, you must add **AWX\_ISOLATION\_SHOW\_PATHS** to **/var/lib/awx/.ssh**.

If you made changes in the settings file, be sure to restart services with the **automation-controller-service restart** command after your changes have been saved.

In the UI, you can configure these settings in the **Jobs settings** window.

Paths to expose to isolated jobs ⓘ

Revert

```

1- [
2  "/etc/pki/ca-trust:/etc/pki/ca-trust:0",
3  "/usr/share/pki:/usr/share/pki:0"
4 ]

```

## 16.5. COLLECTIONS SUPPORT

Automation controller supports project-specific [Ansible collections](#) in job runs. If you specify a collections requirements file in the SCM at **collections/requirements.yml**, automation controller installs collections in that file in the implicit project synchronization before a job run.

Automation controller has a system-wide setting that enables collections to be dynamically downloaded from the **collections/requirements.yml** file for SCM projects. You can turn off this setting in the **Jobs settings** tab of the **Settings** menu by switching the **Enable Collections Download** toggle button to **Off**.

Settings &gt; Jobs

## Edit Details



Job execution path <sup>?</sup>	Revert	Maximum Scheduled Jobs <sup>?</sup>	Revert	Default Job Timeout <sup>?</sup>	Revert
/tmp		10		0	
Default Job Idle Timeout <sup>?</sup>	Revert	Default Inventory Update Timeout <sup>?</sup>	Revert	Default Project Update Timeout <sup>?</sup>	Revert
0		0		0	
Per-Host Ansible Fact Cache Timeout <sup>?</sup>	Revert	Maximum number of forks per job <sup>?</sup>	Revert	When can extra variables contain Jinja templates? <sup>?</sup>	Revert
0		200		Template	
Run Project Updates With Higher Verbosity <sup>?</sup>	Revert	Ignore Ansible Galaxy SSL Certificate Verification <sup>?</sup>	Revert	Enable Role Download <sup>?</sup>	Revert
<input type="checkbox"/> Off		<input type="checkbox"/> Off		<input checked="" type="checkbox"/> On	
<b>Enable Collection(s) Download <sup>?</sup></b>	Revert	Follow symlinks <sup>?</sup>	Revert	Expose host paths for Container Groups <sup>?</sup>	Revert
<input type="checkbox"/> Off		<input type="checkbox"/> Off		<input type="checkbox"/> Off	

Roles and collections are locally cached for performance reasons, and you select **Update Revision on Launch** in the project SCM Update Options to ensure this:


<b>Options</b>					
<input type="checkbox"/> Clean <sup>?</sup>	<input type="checkbox"/> Delete <sup>?</sup>	<input type="checkbox"/> Track submodules <sup>?</sup>	<input checked="" type="checkbox"/> Update Revision on Launch <sup>?</sup>	<input type="checkbox"/> Allow Branch Override <sup>?</sup>	

### 16.5.1. Using collections with automation hub

Before automation controller can use automation hub as the default source for collections content, you must create an API token in the automation hub UI. You then specify this token in automation controller.

Use the following procedure to connect to private automation hub or automation hub, the only difference is which URL you specify.

#### Procedure

1. Go to <https://console.redhat.com/ansible/automation-hub/token>.
2. Click **Load token**.
3. Click the copy  icon to copy the API token to the clipboard.
4. Create a credential by choosing one of the following options:
  - a. To use automation hub, create an automation hub credential using the copied token and pointing to the URLs shown in the **Server URL** and **SSO URL** fields of the token page:
    - **Galaxy Server URL** = <https://console.redhat.com/api/automation-hub/>
    - **AUTH SEVER URL** = <https://sso.redhat.com/auth/realms/redhat-external/protocol/openid-connect/token>
  - b. To use private automation hub, create an automation hub credential using a token retrieved from the **Repo Management** dashboard of your private automation hub and pointing to the published repository URL as shown:

**Repo Management**

Local Remote

Distribution name	Repository name	Content c...	Last updated	Sync URL	Ansible CLI URL
community	community	34	17 days ago	https://10.10.94.209/api/galaxy/conte...	https://10.10.94.209/api/galaxy/conte...
published	published	6	5 days ago	https://10.10.94.209/api/galaxy/conte...	https://10.10.94.209/api/galaxy/conte...
red-hat-certified	rh-certified	195	an hour ago	https://10.10.94.209/api/galaxy/conte...	https://10.10.94.209/api/galaxy/conte...

You can create different repositories with different namespaces or collections in them. For each repository in automation hub you must create a different credential.

Copy the **Ansible CLI URL** from the UI in the format of **/https://\$<hub\_url>/api/galaxy/content/<repo you want to pull from>** into the **Galaxy Server URL** field of the *Create Credential* form:

Credentials

**Create New Credential**

Name \* Automation Hub Description Organization \* Default

Credential Type \* Ansible Galaxy/Automation Hub API Token

Type Details

Galaxy Server URL \*  Auth Server URL  API Token

Save Cancel

For UI specific instructions, see [Red Hat Certified, validated, and Ansible Galaxy content in automation hub](#).

- Go to the organization for which you want to synchronize content from and add the new credential to the organization. This enables you to associate each organization with the credential, or repository, that you want to use content from.

Organizations > Default

**Edit Details**

Name \* Default Description Max Hosts

Instance Groups  Default Execution Environment

Galaxy Credentials

Save Cancel

## Example

You have two repositories:



- **Prod: Namespace 1** and **Namespace 2**, each with collection **A** and **B** so: **namespace1.collectionA:v2.0.0** and **namespace2.collectionB:v2.0.0**
- **Stage: Namespace 1** with only collection **A** so: **namespace1.collectionA:v1.5.0** on , you have a repository URL for *Prod* and *Stage*. You can create a credential for each one.

Then you can assign different levels of access to different organizations. For example, you can create a **Developers** organization that has access to both repository, while an Operations organization just has access to the **Prod** repository only.

For UI specific instructions, see [Configuring user access for container repositories in private automation hub](#).

6. If automation hub has self-signed certificates, use the toggle to enable the setting **Ignore Ansible Galaxy SSL Certificate Verification**. For automation hub, which uses a signed certificate, use the toggle to disable it instead. This is a global setting:

Settings > Jobs ↻

### Edit Details


Job execution path <sup>*</sup> ⓘ	Revert	Maximum Scheduled Jobs <sup>*</sup> ⓘ	Revert	Default Job Timeout ⓘ	Revert
/tmp		10		0	
Default Job Idle Timeout ⓘ	Revert	Default Inventory Update Timeout ⓘ	Revert	Default Project Update Timeout ⓘ	Revert
0		0		0	
Per-Host Ansible Fact Cache Timeout ⓘ	Revert	Maximum number of forks per job ⓘ	Revert	When can extra variables contain Jinja templates? ⓘ	Revert
0		200		Template	
Run Project Updates With Higher Verbosity ⓘ	Revert	Ignore Ansible Galaxy SSL Certificate Verification ⓘ	Revert	Enable Role Download ⓘ	Revert
<input type="checkbox"/> Off		<input checked="" type="checkbox"/> On		<input checked="" type="checkbox"/> On	
Enable Collection(s) Download ⓘ	Revert	Follow symlinks ⓘ	Revert	Expose host paths for Container Groups ⓘ	Revert
<input checked="" type="checkbox"/> On		<input type="checkbox"/> Off		<input type="checkbox"/> Off	

7. Create a project, where the source repository specifies the necessary collections in a requirements file located in the **collections/requirements.yml** file. For information about the syntax to use, see [Using Ansible collections](#) in the Ansible documentation.

Projects ↻

### Create New Project

Name <sup>*</sup>	Description	Organization <sup>*</sup>
New Project		Default
Execution Environment ⓘ	Source Control Type <sup>*</sup>	Content Signature Validation Credential ⓘ
	Git	
<b>Type Details</b>		
Source Control URL <sup>*</sup> ⓘ	Source Control Branch/Tag/Commit ⓘ	Source Control Refspec ⓘ
https://github.com/ansible-collections		
Source Control Credential		
<b>Options</b>		
<input type="checkbox"/> Clean ⓘ <input type="checkbox"/> Delete ⓘ <input type="checkbox"/> Track submodules ⓘ <input type="checkbox"/> Update Revision on Launch ⓘ <input type="checkbox"/> Allow Branch Override ⓘ		
<input type="button" value="Save"/> <input type="button" value="Cancel"/>		

8. In the Projects list view, click the sync  icon to update this project. Automation controller fetches the Galaxy collections from the **collections/requirements.yml** file and reports it as changed. The collections are installed for any job template using this project.

**NOTE**

If updates are required from Galaxy or Collections, a sync is performed that downloads the required roles, consuming that much more space in your /tmp file. In cases where you have a large project (around 10 GB), disk space on **/tmp** may be an issue.

**Additional resources**

For more information about collections, see [Using Collections](#).

For more information about how Red Hat publishes one of these official collections, which can be used to automate your install directly, see the [AWX Ansible Collection](#) documentation.

## CHAPTER 17. PROJECT SIGNING AND VERIFICATION

Project signing and verification lets you sign files in your project directory, then verify whether or not that content has changed in any way, or files have been added or removed from the project unexpectedly. To do this, you require a private key for signing and a matching public key for verifying.

For project maintainers, the supported way to sign content is to use the **ansible-sign** utility, using the *command-line interface* (CLI) supplied with it.

The CLI aims to make it easy to use cryptographic technology such as *GNU Privacy Guard* (GPG) to validate that files within a project have not been tampered with in any way. Currently, GPG is the only supported means of signing and validation.

Automation controller is used to verify the signed content. After a matching public key has been associated with the signed project, automation controller verifies that the files included during signing have not changed, and that files have been added or removed unexpectedly. If the signature is not valid or a file has changed, the project fails to update, and jobs making use of the project will not launch. Verification status of the project ensures that only secure, untampered content can be run in jobs.

If the repository has already been configured for signing and verification, the usual workflow for altering the project becomes the following:

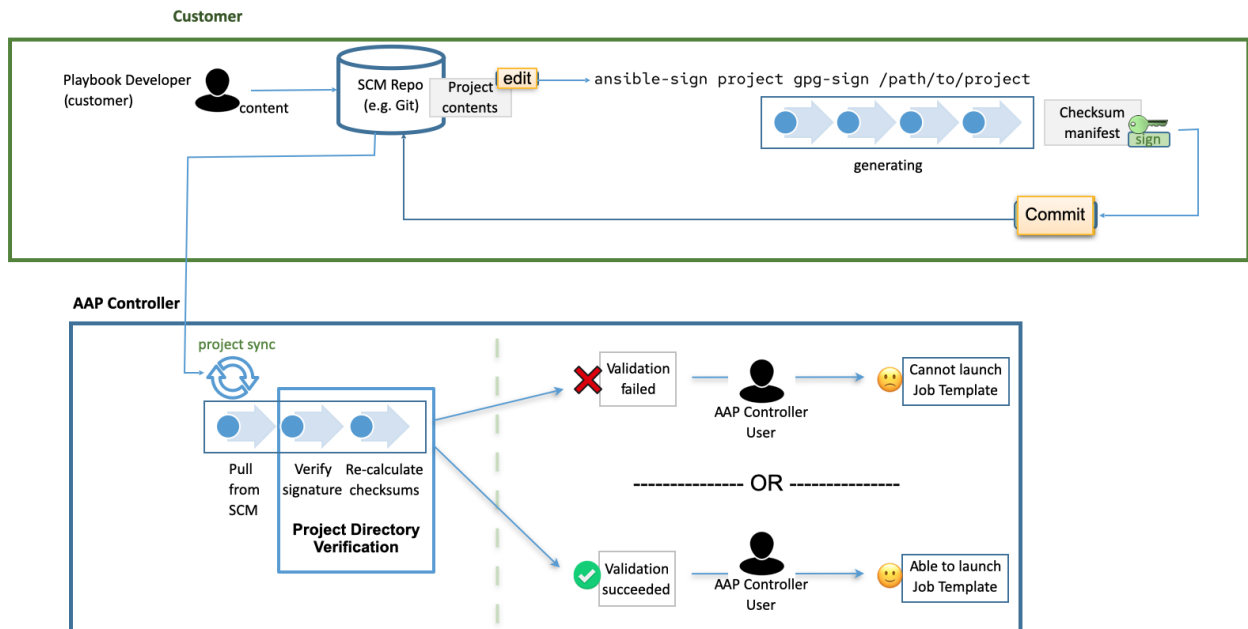
1. You have a project repository set up already and want to make a change to a file.
2. You make the change, and run the following command:

```
ansible-sign project gpg-sign /path/to/project
```

This command updates a checksum manifest and signs it.

3. You commit the change, the updated checksum manifest, and the signature to the repository.
4. When you synchronize the project, automation controller pulls in the new changes, checks that the public key associated with the project in automation controller matches the private key that the checksum manifest was signed with (this prevents tampering with the checksum manifest itself), then re-calculates the checksums of each file in the manifest to ensure that the checksum matches (and thus that no file has changed). It also ensures that all files are accounted for:

Files must be included in, or excluded from, the **MANIFEST.in** file. For more information on this file, see [Sign a project](#). If files have been added or removed unexpectedly, verification fails.



## 17.1. PREREQUISITES

- RHEL nodes must properly be subscribed to:
  - RHEL subscription with **baseos** and **appstream** repositories must be enabled.
  - Your Red Hat Ansible Automation Platform subscription and the proper channel must be enabled:

```
ansible-automation-platform-2.4-for-rhel-8-x86_64-rpms for RHEL 8
ansible-automation-platform-2.4-for-rhel-9-x86_64-rpms for RHEL 9
```

- A valid GPG public or private keypair is required for signing content. For more information, see [How to create GPG keypairs](#). For more information about GPG keys, see the [GnuPG documentation](#).

Verify that you have a valid GPG keypair in your default GnuPG keyring, with the following command:

```
gpg --list-secret-keys
```

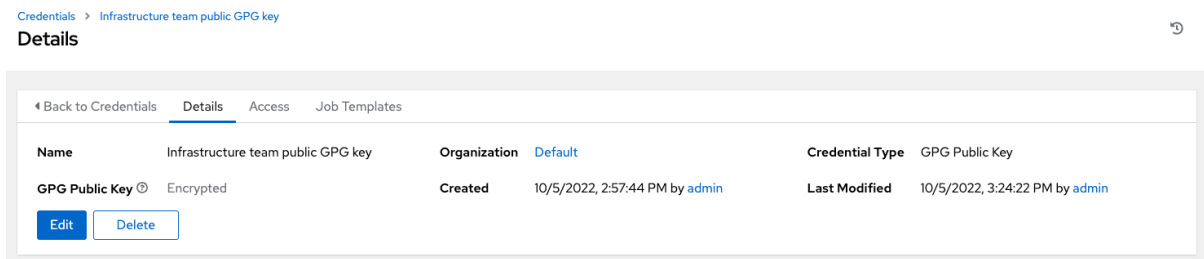
If this command produces no output, or one line of output that states, **trustdb was created**, then you do not have a secret key in your default keyring. In this case, refer to [How to create GPG keypairs](#) to learn how to create a new keypair before proceeding. If it produces any other output, you have a valid secret key and are ready to use **ansible-sign**.

## 17.2. ADDING A GPG KEY TO AUTOMATION CONTROLLER

To use the GPG key for content signing and validation in automation controller, add it by running the following command in the CLI:

```
$ gpg --list-keys
$ gpg --export --armor <key fingerprint> > my_public_key.asc
```

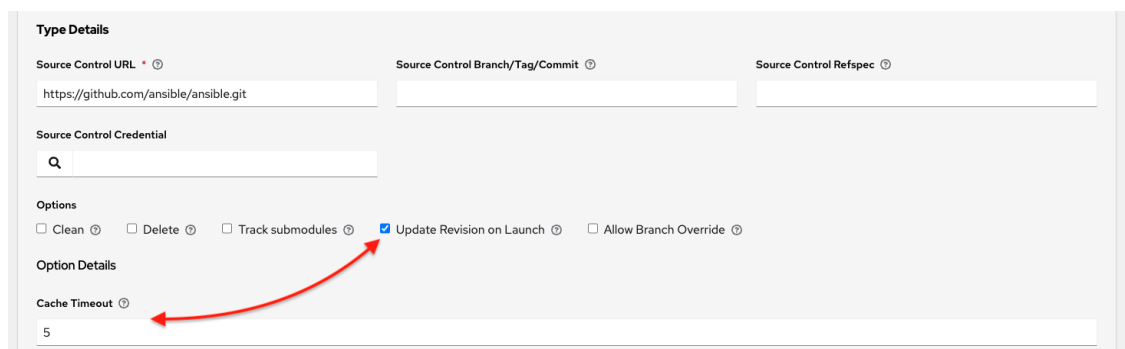
1. From the navigation panel, select **Credentials**.
2. Click **Add**.
3. Provide a meaningful name for the new credential, for example, "Infrastructure team public GPG key".
4. In the **Credential Type** field, select **GPG Public Key**.
5. Click **Browse** to locate and select the public key file, for example, **my\_public\_key.asc**.
6. Click **Save**.



This credential can now be selected in **projects <ug\_projects\_add>**, and content verification automatically takes place on future project synchronizations.

## NOTE

Use the project cache SCM timeout to control how often you want automation controller to re-validate the signed content. When a project is configured to update on launch (of any job template configured to use that project), you can enable the cache timeout setting, which sets it to update after **N** seconds have passed since the last update. If validation is running too frequently, you can slow down how often project updates occur by specifying the time in the **Cache Timeout** field of the **Option Details** pane of the project.



## 17.3. INSTALLING THE ANSIBLE-SIGN CLI UTILITY

Use the **ansible-sign** utility to provide options for the user to sign and verify whether the project is signed.

### Procedure

1. Run the following command to install **ansible-sign**:

```
$ dnf install ansible-sign
```

2. Verify that **ansible-sign** was successfully installed using the following command:

```
$ ansible-sign --version
```

Output similar to the following indicates that you have successfully installed **ansible-sign**:

```
ansible-sign 0.1
```

## 17.4. SIGN A PROJECT

Signing a project involves an Ansible project directory. For more information on project directory structures, see [Sample Ansible setup](#) in the Ansible documentation.

The following sample project has a very simple structure: an inventory file, and two small playbooks under a playbooks directory:

```
$ cd sample-project/
$ tree -a .
.
├── inventory
├── playbooks
│   ├── get_uptime.yml
│   └── hello.yml
└──
```

1 directory, 3 files



### NOTE

The commands used assume that your working directory is the root of your project. **ansible-sign project** commands take the project root directory as their last argument.

Use `.` to indicate the current working directory.

**ansible-sign** protects content from tampering by taking checksums (SHA256) of all of the secured files in the project, compiling those into a checksum manifest file, and then signing that manifest file.

To sign content, create a **MANIFEST.in** file in the project root directory that tells **ansible-sign** which files to protect.

Internally, **ansible-sign** uses the **distlib.manifest** module of Python's distlib library, therefore **MANIFEST.in** must follow the syntax that this library specifies. For an explanation of the 'MANIFEST.in' file directives, see the [Python Packaging User Guide](#).

In the sample project, two directives are included, resulting in the following **MANIFEST.in** file:

```
include inventory
recursive-include playbooks *.yml
```

With this file in place, generate your checksum manifest file and sign it. Both of these steps are achieved in a single **ansible-sign** command:

```
$ ansible-sign project gpg-sign .
```

Successful execution displays output similar to the following:

```
[OK ] GPG signing successful!
[NOTE ] Checksum manifest: ../ansible-sign/sha256sum.txt
[NOTE ] GPG summary: signature created
```

The project has now been signed.

Note that the **gpg-sign** subcommand resides under the **project** subcommand.

For signing project content, every command starts with **ansible-sign project**.

Every **ansible-sign project** command takes the project root directory `.` as its final argument.

**ansible-sign** makes use of your default keyring and looks for the first available secret key that it can find, to sign your project. You can specify a specific secret key to use with the **--fingerprint** option, or even a completely independent GPG home directory with the **--gnupg-home** option.



## NOTE

If you are using a desktop environment, GnuPG automatically prompts you for your secret key's passphrase.

If this functionality does not work, or you are working without a desktop environment, for example, through SSH, you can use the **-p --prompt-passphrase** flag after **gpg-sign**, which causes **ansible-sign** to prompt for the password instead.

Note that an **.ansible-sign** directory was created in the project directory. This directory contains the checksum manifest and a detached GPG signature for it.

```
$ tree -a .
.
├── .ansible-sign
│   ├── sha256sum.txt
│   └── sha256sum.txt.sig
├── inventory
├── MANIFEST.in
├── playbooks
│   ├── get_uptime.yml
│   └── hello.yml
```

## 17.5. VERIFY YOUR PROJECT

To verify that a signed Ansible project has not been altered, you can use **ansible-sign** to check whether the signature is valid and that the checksums of the files match what the checksum manifest says they should be. The **ansible-sign project gpg-verify** command can be used to automatically verify both of these conditions.

```
$ ansible-sign project gpg-verify .
[OK ] GPG signature verification succeeded.
[OK ] Checksum validation succeeded.
```

**NOTE**

By default, **ansible-sign** makes use of your default GPG keyring to look for a matching public key. You can specify a keyring file with the **--keyring** option, or a different GPG home with the **--gnupg-home** option.

If verification fails for any reason, information is displayed to help you debug the cause. More verbosity can be enabled by passing the global **--debug** flag, immediately after **ansible-sign** in your commands.

**NOTE**

When a GPG credential is used in a project, content verification automatically takes place on future project synchronizations.

## 17.6. AUTOMATE SIGNING

In environments with highly-trusted *Continuous Integration* (CI) environments such as OpenShift or Jenkins, it is possible to automate the signing process.

For example, you can store your GPG private key in a CI platform of choice as a secret, and import that into GnuPG in the CI environment. You can then run through the signing workflow within the normal CI environment.

When signing a project using GPG, the environment variable **ANSIBLE\_SIGN\_GPG\_PASSPHRASE** can be set to the passphrase of the signing key. This can be injected and masked or secured in a CI pipeline.

Depending on the scenario, **ansible-sign** returns with a different exit-code, during both signing and verification. This can also be useful in the context of CI and automation, as a CI environment can act differently based on the failure. For example, it can send alerts for some errors, but fail silently for others.

These are the current exit codes used in **ansible-sign**, which can be considered stable:

Exit code	Approximate meaning	Example scenarios
0	Success	<ul style="list-style-type: none"> <li>● Signing was successful</li> <li>● Verification was successful</li> </ul>
1	General failure	<ul style="list-style-type: none"> <li>● The checksum manifest file contained a syntax error during verification</li> <li>● The signature file did not exist during verification</li> <li>● <b>MANIFEST.in</b> did not exist during signing</li> </ul>



Exit code	Approximate meaning	Example scenarios
2	Checksum verification failure	<ul style="list-style-type: none"><li>● The checksum hashes calculated during verification differed from what was in the signed checksum manifest, for example, a project file was changed but the signing process was not re-completed.</li></ul>
3	Signature verification failure	<ul style="list-style-type: none"><li>● The signer's public key was not in the user's GPG keyring</li><li>● The wrong GnuPG home directory or keyring file was specified</li><li>● The signed checksum manifest file was modified in some way</li></ul>
4	Signing process failure	<ul style="list-style-type: none"><li>● The signer's private key was not found in the GPG keyring</li><li>● The wrong GnuPG home directory or keyring file was specified</li></ul>

## CHAPTER 18. INVENTORIES

Red Hat Ansible Automation Platform works against a list of managed nodes or hosts in your infrastructure that are logically organized, using an inventory file. You can use the Red Hat Ansible Automation Platform installer inventory file to specify your installation scenario and describe host deployments to Ansible. By using an inventory file, Ansible can manage a large number of hosts with a single command. Inventories also help you use Ansible more efficiently by reducing the number of command line options you have to specify. Inventories are divided into groups and these groups contain the hosts.

Groups may be sourced manually, by entering host names into automation controller, or from one of its supported cloud providers.



### NOTE

If you have a custom dynamic inventory script, or a cloud provider that is not yet supported natively in automation controller, you can also import that into automation controller.

For more information, see [Inventory file importing](#) in the *Automation controller Administration Guide*.

From the navigation panel, select **Resources** → **Inventories**. The **Inventories** window displays a list of the inventories that are currently available. You can sort the inventory list by **Name**, **Type**, or **Organization**.

**Inventories** ↻

Name	Sync Status	Type	Organization	Actions
<input type="checkbox"/> Demo Inventory	Disabled	Inventory	Default	
<input type="checkbox"/> East	Success	Inventory	Default	
<input type="checkbox"/> East-West		Constructed Inventory	Default	
<input type="checkbox"/> Smart inventory sample		Smart Inventory	Default	
<input type="checkbox"/> West	Success	Inventory	Default	



1 - 5 of 5 items    << < 1 of 1 page > >>

The **Inventory details** page includes:

- **Name:** The inventory name.
- **Status**

The statuses are:

- **Success:** When the inventory source sync completed successfully

- **Disabled:** No inventory source added to the inventory
- **Error:** When the inventory source sync completed with error
  - **Type:** Identifies whether it is a standard inventory, a Smart inventory, or a constructed inventory.
  - **Organization:** The organization to which the inventory belongs.
  - **Actions:** The following actions are available for the selected inventory:
- **Edit**  : Edit the properties for the selected inventory
- **Copy**  : Makes a copy of an existing inventory as a template for creating a new one

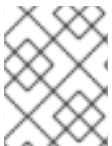
Click the Inventory name to display the **Details** page for the selected inventory, which shows the inventory's groups and hosts.

## 18.1. SMART INVENTORIES

Smart Inventories are collections of hosts defined by a stored search that can be viewed like a standard inventory and can be easily used with job runs. Organization administrators have admin permission for inventories in their organization and can create Smart Inventories.

A Smart Inventory is identified by **KIND=smart**.

You can define a Smart Inventory using the same method being used with Search. **InventorySource** is directly associated with an Inventory.



### NOTE

Smart inventories are deprecated and will be removed in a future release. Consider moving to constructed inventories for enhancements and replacement.

The **Inventory** model has the following new fields that are blank by default but are set accordingly for Smart Inventories:

- **kind** is set to **smart** for Smart Inventories.
- **host\_filter** is set AND **kind** is set to **smart** for Smart Inventories.

The **host** model has a related endpoint, **smart\_inventories** that identifies a set of all the Smart Inventories a host is associated with. The membership table is updated every time a job runs against a smart inventory.



## NOTE

To update the memberships more frequently, you can change the **AWX\_REBUILD\_SMART\_MEMBERSHIP** file-based setting to **True**. (The default is **False**). This updates memberships if the following events occur:

- A new host is added
- An existing host is modified (updated or deleted)
- A new Smart Inventory is added
- An existing Smart Inventory is modified (updated or deleted)

You can view inventories without being editable:

- Names of Host and Group created as a result of an inventory source synchronization.
- Group records cannot be edited or moved.

You cannot create hosts from a Smart Inventory host endpoint (**/inventories/N/hosts/**) as with a normal inventory. The administrator of a Smart Inventory has permission to edit fields such as the name, description, variables, and the ability to delete, but does not have the permission to modify the **host\_filter**, because that affects which hosts (that have a primary membership inside another inventory) are included in the smart inventory.

**host\_filter** only applies to hosts inside of inventories inside the Smart Inventory's organization.

To modify **host\_filter**, you must be the organization administrator of the inventory's organization. Organization administrators have implicit "admin" access to all inventories inside the organization, therefore, this does not convey any permissions they did not already possess.

Administrators of the Smart Inventory can grant other users (who are not also admins of your organization) permissions such as "use" and "ad hoc" to the smart inventory. These permit the actions indicated by the role, as with other standard inventories. However, this does not grant any special permissions to hosts (which live in a different inventory). It does not permit direct read permission to hosts, or permit them to see additional hosts under **/#/hosts/**, although they can still view the hosts under the smart inventory host list.

In some situations, you can modify the following:

- A new Host created manually on Inventory with Inventory sources.
- Groups that were created as a result of inventory source synchronizations.
- Variables on Host and Group are not changeable, even as the local System Administrator.

Hosts associated with the Smart Inventory are manifested at view time. If the results of a Smart Inventory contains more than one host with identical hostnames, only one of the matching hosts is included as part of the Smart Inventory, ordered by Host ID.

### 18.1.1. Smart Host Filters

You can use a search filter to populate hosts for an inventory. This feature uses the fact searching feature.

Automation controller stores facts generated by an Ansible playbook during a Job Template in the

database whenever **use\_fact\_cache=True** is set per-Job Template. New facts are merged with existing facts and are per-host. These stored facts can be used to filter hosts with the **/api/v2/hosts** endpoint, using the **GET** query parameter **host\_filter**.

For example:

```
/api/v2/hosts?host_filter=ansible_facts__ansible_processor_vcpus=8
```

The **host\_filter** parameter permits:

- grouping with ()
- use of the boolean and operator:
  - `__` to reference related fields in relational fields
  - `__` is used on `ansible_facts` to separate keys in a JSON key path
  - `[]` is used to denote a json array in the path specification
  - `""` can be used in the value when spaces are wanted in the value
- "classic" Django queries may be embedded in the **host\_filter**

#### Examples:

```
/api/v2/hosts/?host_filter=name=localhost
/api/v2/hosts/?host_filter=ansible_facts__ansible_date_time__weekday_number="3"
/api/v2/hosts/?host_filter=ansible_facts__ansible_processor[]="GenuineIntel"
/api/v2/hosts/?host_filter=ansible_facts__ansible_lo__ipv6[]__scope="host"
/api/v2/hosts/?host_filter=ansible_facts__ansible_processor_vcpus=8
/api/v2/hosts/?host_filter=ansible_facts__ansible_env__PYTHONUNBUFFERED="true"
/api/v2/hosts/?host_filter=(name=localhost or name=database) and (groups__name=east or
groups__name="west coast") and ansible_facts__an
```

You can search **host\_filter** by **host name**, **group name**, and **Ansible facts**.

Group search has the following format:

```
groups.name:groupA
```

Fact search has the following format:

```
ansible_facts.ansible_fips:false
```

You can also perform Smart Search searches, which consist of a host name and host description.

```
host_filter=name=my_host
```



## NOTE


If a search term in **host\_filter** is of string type, to make the value a number (for example, **2.66**) or a JSON keyword (for example, **null**, **true** or **false**) valid, add double quotations around the value to prevent the controller from parsing it as a non-string:

```
host_filter=ansible_facts__packages__dnsmasq[]__version="2.66"
```

### 18.1.2. Defining a host filter with ansible\_facts

Use the following procedure to use **ansible\_facts** to define the host filter when creating Smart Inventories.

#### Procedure

1. From the navigation panel, select **Resources** → **Inventories**.
2. Click **Add** and select **Add Smart Inventory** from the menu.
3. In the **Create new smart inventory** page, click the  icon in the **Smart host filter** field. This opens a window to filter hosts for this inventory.

**Perform a search to define a host filter** ✕

Name   1 - 5 of 15

Name <input type="button" value="↑"/>	Description <input type="button" value="↓"/>	Inventory
10.0.110.43		psi
bar.example.com	imported	Fake Hosts
bar.test.com	imported	Fake Hosts
five.example.com	imported	Fake Hosts
foo.example.com	imported	Fake Hosts

1 - 5 of 15 items   of 3 pages

4. In the search menu, change the search criteria from **Name** to **Advanced** and select **ansible\_facts** from the **Key** field.

Perform a search to define a host filter x

Advanced ▾ Set type ▾ ansible\_facts ✕ ▾ Lookup type ▾ First, select a key 🔍 ⓘ

Name ↑	Lookup type
localhost	Direct Keys
	ansible_facts_modified
	Related Keys
	ansible_facts
	Create "ansible_facts"

1 - 1 of 1 items ▾ << < 1 of 1 page > >>

Select Cancel

If you wanted to add the following ansible fact:

```
/api/v2/hosts/?host_filter=ansible_facts__ansible_processor[]="GenuineIntel"
```

In the search field, enter **ansible\_processor[]="GenuineIntel"** (no extra spaces or `__` before the value) and click **Enter**.

Perform a search to define a host filter x

ⓘ Searching by ansible\_facts requires special syntax. Refer to the [documentation](#) for more info.

Advanced ▾ ansible\_facts ✕ ▾ ansible\_processor[]="GenuineIntel" 🔍 ⓘ

Name ↓	Inventory
localhost	Demo Inventory

1 - 1 of 1 items ▾ << < 1 of 1 page > >>

Select Cancel

The search criteria for the specified ansible fact is displayed.

5. Click **Select** to add it to the **Smart host filter** field.
6. Click **Save**.
7. The **Details** tab of the new Smart Inventory opens and displays the specified ansible facts in the **Smart host filter** field.
8. From the **Details** view, you can edit the **Smart host filter** field by clicking **Edit** and delete existing filters, clear all existing filters, or add new ones.

## Perform a search to define a host filter

i Searching by `ansible_facts` requires special syntax. Refer to the [documentation](#) for more info.

---

Group ▾  Q

ansible\_facts ansible\_processor[]="..." ✕ Group (groups\_\_name\_\_i... hostgroups ✕ Clear all filters

## 18.2. CONSTRUCTED INVENTORIES

You can create a new inventory (called a constructed inventory) from a list of input inventories.

A constructed inventory contains copies of hosts and groups in its input inventories, permitting jobs to target groups of servers across multiple inventories. Groups and hostvars can be added to the inventory content, and hosts can be filtered to limit the size of the constructed inventory.

Constructed inventories use the [ansible.builtin.constructed inventory](#) model.

The key factors of a constructed inventory are:

- The normal Ansible hostvars namespace is available
- They provide groups

Constructed inventories take **source\_vars** and **limit** as inputs and transform its **input\_inventories** into a new inventory, complete with groups. Groups (existing or constructed) can then be referenced in the **limit** field to reduce the number of hosts produced.

You can construct groups based on these host properties:

- RHEL major or minor versions
- Windows hosts
- Cloud based instances tagged in a certain region
- other

The following is an example of a constructed inventory details view:



## Details



◀ Back to Inventories   **Details**   Access   Hosts   Groups   Jobs   Job Templates

<b>Name</b>	New constructed inventory	<b>Type</b>	Constructed Inventory	<b>Organization</b>	Default
<b>Total groups</b> ⓘ	0	<b>Total hosts</b> ⓘ	0	<b>Total inventory sources</b> ⓘ	0
<b>Update cache timeout</b> ⓘ	0	<b>Inventory sources with failures</b> ⓘ	0	<b>Verbosity</b> ⓘ	1

**Input Inventories**   East   Demo Inventory

**Source vars** ⓘ   YAML JSON

```

1 - ---
2   plugin: constructed
3   strict: true
4   use_vars_plugins: true

```

**Created**   3/9/2023, 12:16:18 PM by admin   **Modified**   3/9/2023, 12:16:18 PM by admin

Edit   Sync   Delete

The examples described in subsequent sections are organized by the structure of the input inventories.

### 18.2.1. Filtering on group name and variables

You can filter on a combination of groups and variables. For example, you can filter hosts that match a group variable value and also match a host variable value.

There are two approaches to executing this filter:

- Define two groups: one group to match the group variable and the other group to match the host variable value. Use the **limit** pattern to return the hosts that are in both groups. This is the recommended approach.
- Define one group. In the definition, include the condition that the group and host variables must match specific values. Use the **limit** pattern to return all the hosts in the new group.

#### Example:

The following inventory file defines four hosts and sets group and host variables. It defines a product group, a sustaining group, and it sets two hosts to a shutdown state.

The goal is to create a filter that returns only production hosts that are shutdown.

```

[account_1234]
host1
host2 state=shutdown

[account_4321]
host3
host4 state=shutdown

[account_1234:vars]
account_alias=product_dev

[account_4321:vars]
account_alias=sustaining

```

The goal here is to return only shutdown hosts that are present in the group with the **account\_alias** variable equal to **product\_dev**. There are two approaches to this, both shown in YAML format. The first one suggested is recommended.

### 1. Construct 2 groups, limit to intersection

#### source\_vars:

```
plugin: constructed
strict: true
groups:
  is_shutdown: state | default("running") == "shutdown"
  product_dev: account_alias == "product_dev"
```

#### limit: is\_shutdown:&product\_dev

This constructed inventory input creates a group for both categories and uses the **limit** (host pattern) to only return hosts that are in the intersection of those two groups, which is documented in [Patterns:targeting hosts and groups](#).

When a variable is or is not defined (depending on the host), you can give a default. For example, use | **default("running")** if you know what value it should have when it is not defined. This helps with debugging, as described in [Debugging tips](#).

### 2. Construct 1 group, limit to group

#### source\_vars:

```
plugin: constructed
strict: true
groups:
  shutdown_in_product_dev: state | default("running") == "shutdown" and account_alias ==
  "product_dev"
```

#### limit: shutdown\_in\_product\_dev

This input creates one group that only includes hosts that match both criteria. The limit is then just the group name by itself, returning **host2**. The same as the earlier approach.

## 18.2.2. Debugging tips

It is important to set the **strict** parameter to **true** so that you can debug problems with your templates. If the template fails to render, an error occurs in the associated inventory update for that constructed inventory.

When encountering errors, increase verbosity to get more details.

Giving a default, such as | **default("running")** is a generic use of Jinja2 templates in Ansible. Doing this avoids errors from the template when you set **strict: true**.

You can also set **strict: false**, and so enable the template to produce an error, which results in the host not getting included in that group. However, doing this makes it difficult to debug issues in the future if your templates continue to grow in complexity.

You might still have to debug the intended function of the templates if they are not producing the expected inventory content. For example, if a **groups** group has a complex filter (like **shutdown\_in\_product\_dev**) but does not contain any hosts in the resultant constructed inventory,

then use the **compose** parameter to help debug.

For example:

```
source_vars:

plugin: constructed
strict: true
groups:
  shutdown_in_product_dev: state | default("running") == "shutdown" and account_alias ==
"product_dev"
compose:
  resolved_state: state | default("running")
  is_in_product_dev: account_alias == "product_dev"

limit: ``
```

Running with a blank **limit** returns all hosts. You can use this to inspect specific variables on specific hosts, giving insight into where problems in the **groups** lie.

### 18.2.3. Nested groups

A nested group consists of two groups where one is a child of the other. In the following example, the child group has another host inside of it, and the parent group has a variable defined.

Because of the way Ansible core operates, the variable of the parent group is available in the namespace as a playbook is running, and can be used for filtering.

The following example inventory file, **nested.yml** is in YAML format:

```
all:
  children:
    groupA:
      vars:
        filter_var: filter_val
      children:
        groupB:
          hosts:
            host1: {}
    ungrouped:
      hosts:
        host2: {}
```

Because **host1** is in **groupB**, it is also in **groupA**.

#### Filter on nested group names

Use the following YAML format to filter on nested group names:

```
`source_vars`:

plugin: constructed

`limit`: `groupA`
```

### Filter on nested group property

Use the following YAML format to filter on a group variable, even if the host is indirectly a member of that group.

In the inventory content, note that **host2** is not expected to have the variable **filter\_var** defined, because it is not in any of the groups. Because **strict: true** is used, use a default value so that hosts without that variable are defined. Using this, **host2**, returns **false** from the expression, instead of producing an error. **host1** inherits the variable from its groups, and is returned.

```
source_vars:

plugin: constructed
strict: true
groups:
  filter_var_is_filter_val: filter_var | default("") == "filter_val"

limit: filter_var_is_filter_val
```

## 18.2.4. Ansible facts

To create an inventory with Ansible facts, you must run a playbook against the inventory that has the setting **gather\_facts: true**. The facts differ system-to-system. The following examples are not intended to address all known scenarios.

### 18.2.4.1. Filter on environment variables

The following example involves filtering on environmental variables using the YAML format:

```
source_vars:

plugin: constructed
strict: true
groups:
  hosts_using_xterm: ansible_env.TERM == "xterm"

limit: hosts_using_xterm
```

### 18.2.4.2. Filter hosts by processor type

The following example involves filtering hosts by processor type (Intel) using the YAML format:

```
source_vars:

plugin: constructed
strict: true
groups:
  intel_hosts: "GenuineIntel" in ansible_processor

limit: intel_hosts
```



## NOTE

Hosts in constructed inventories are not counted against your license allotment because they are referencing the original inventory host. Additionally, hosts that are disabled in the original inventories are not included in the constructed inventory.

An inventory update run using **ansible-inventory** creates the constructed inventory contents.

This is always configured to update-on-launch before a job, but you can still select a cache timeout value in case this takes too long.

When creating a constructed inventory, the API ensures that it always has one inventory source associated with it. All inventory updates have an associated inventory source, and the fields needed for constructed inventory (**source\_vars** and **limit**) are fields already present on the inventory source model.

## 18.3. INVENTORY PLUGINS

Inventory updates use dynamically-generated YAML files which are parsed by their respective inventory plugin. In automation controller v4.4, you can provide the inventory plugin configuration directly to automation controller using the inventory source **source\_vars** for the following inventory sources:

- [Amazon Web Services EC2](#)
- [Google Compute Engine](#)
- [Microsoft Azure Resource Manager](#)
- [VMware vCenter](#)
- [Red Hat Satellite 6](#)
- [Red Hat Insights](#)
- [OpenStack](#)
- [Red Hat Virtualization](#)
- [Red Hat Ansible Automation Platform](#)

Newly created configurations for inventory sources contain the default plugin configuration values. If you want your newly created inventory sources to match the output of a legacy source, you must apply a specific set of configuration values for that source. To ensure backward compatibility, automation controller uses "templates" for each of these sources to force the output of inventory plugins into the legacy format.

For more information on sources and their respective templates, see [Supported inventory plugin templates](#).

**source\_vars** that contain **plugin: foo.bar.baz** as a top-level key are replaced with the fully-qualified inventory plugin name at runtime based on the **InventorySource** source. For example, if `ec2` is selected for the **InventorySource** then, at run-time, plugin is set to **amazon.aws.aws\_ec2**.



## 18.4. ADD A NEW INVENTORY

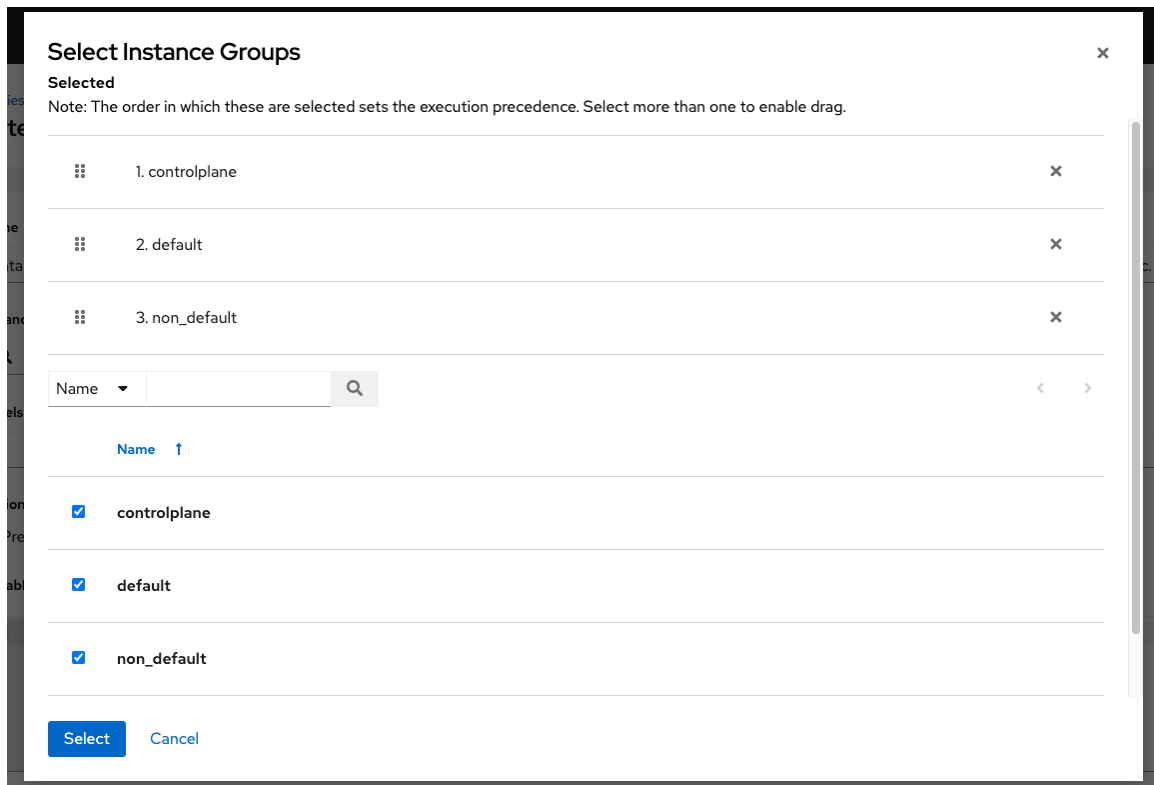
Adding a new inventory involves the following components:



- [Adding permissions to inventories](#)
- [Adding groups to inventories](#)
- [Adding a host](#)
- [Adding a source](#)
- [View completed jobs](#)

Use the following procedure to create a inventory:

### Procedure

1. From the navigation panel, select **Resources** → **Inventories**. The **Inventories** window displays a list of the inventories that are currently available.
2. Click **Add**, and select the type of inventory to create.
3. Enter the appropriate details into the following fields:
  - **Name:** Enter a name appropriate for this inventory.
  - Optional: **Description:** Enter an arbitrary description as appropriate.
  - **Organization:** Required. Choose among the available organizations.
  - Only applicable to Smart Inventories: **Smart Host Filter:** Click the  icon to open a separate window to filter hosts for this inventory. These options are based on the organization you chose.  
Filters are similar to tags in that tags are used to filter certain hosts that contain those names. Therefore, to populate the **Smart Host Filter** field, specify a tag that contains the hosts you want, not the hosts themselves. Enter the tag in the **Search** field and click **Enter**. Filters are case-sensitive. For more information, see [Smart host filters](#).
  - **Instance Groups:** Click the  icon to open a separate window. Select the instance group or groups for this inventory to run on. If the list is extensive, use the search to narrow the options. You can select multiple instance groups and sort them in the order that you want them run.



- Optional: **Labels:** Supply labels that describe this inventory, so they can be used to group and filter inventories and jobs.
- Only applicable to constructed inventories: **Input inventories:** Specify the source inventories to include in this constructed inventory. Click the  icon to select from available inventories. Empty groups from input inventories are copied into the constructed inventory.
- Optional:(Only applicable to constructed inventories): **Cached timeout (seconds):** Set the length of time you want the cache plugin data to timeout.
- Only applicable to constructed inventories: **Verbosity:** Control the level of output that Ansible produces as the playbook executes related to inventory sources associated with constructed inventories. Select the verbosity from Normal to various Verbose or Debug settings. This only appears in the "details" report view.
  - Verbose logging includes the output of all commands.
  - Debug logging is exceedingly verbose and includes information on SSH operations that can be useful in certain support instances. Most users do not need to see debug mode output.
- Only applicable to constructed inventories: **Limit:** Restricts the number of returned hosts for the inventory source associated with the constructed inventory. You can paste a group name into the limit field to only include hosts in that group. For more information, see the **Source vars** setting.
- Only applicable to standard inventories: **Options:** Check the **Prevent Instance Group Fallback** option to enable only the instance groups listed in the **Instance Groups** field to execute the job. If unchecked, all available instances in the execution pool will be used based on the hierarchy described in [Control where a job runs](#) in the *Automation controller Administration Guide*. Click the  icon for additional information.

**NOTE**

Set the **prevent\_instance\_group\_fallback** option for Smart Inventories through the API.

- **Variables** (**Source vars** for constructed inventories):
  - **Variables** Variable definitions and values to apply to all hosts in this inventory. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two.
  - **Source vars** for constructed inventories creates groups, specifically under the **groups** key of the data. It accepts Jinja2 template syntax, renders it for every host, makes a **true** or **false** evaluation, and includes the host in the group (from the key of the entry) if the result is **true**. This is particularly useful because you can paste that group name into the limit field to only include hosts in that group. See Example 1 in [Smart host filters](#).

4. Click **Save**.

After saving the new inventory, you can proceed with configuring permissions, groups, hosts, sources, and view completed jobs, if applicable to the type of inventory.

### 18.4.1. Adding permissions to inventories

Use the following procedure to add permissions to inventories:

#### Procedure

1. From the navigation panel, select **Resources** → **Inventories**.
2. Select a template, and in the **Access tab**, click **Add**.
3. Select a user or team to add and click **Next**.
4. Select the check box next to a name to add one or more users or teams from the list as members.
5. Click **Next**.



### Add Roles

- Select a Resource Type
 

Choose the type of resource that will be receiving new roles. For example, if you'd like to add new roles to a set of users please choose Users and click Next. You'll be able to select the specific resources in the next step.
- Select Items from List
- Select Roles to Apply

### Add User Roles

- Select a Resource Type
- Select Items from List
 

Choose the resources that will be receiving new roles. You'll be able to select the roles to apply in the next step. Note that the resources chosen here will receive all roles chosen in the next step.

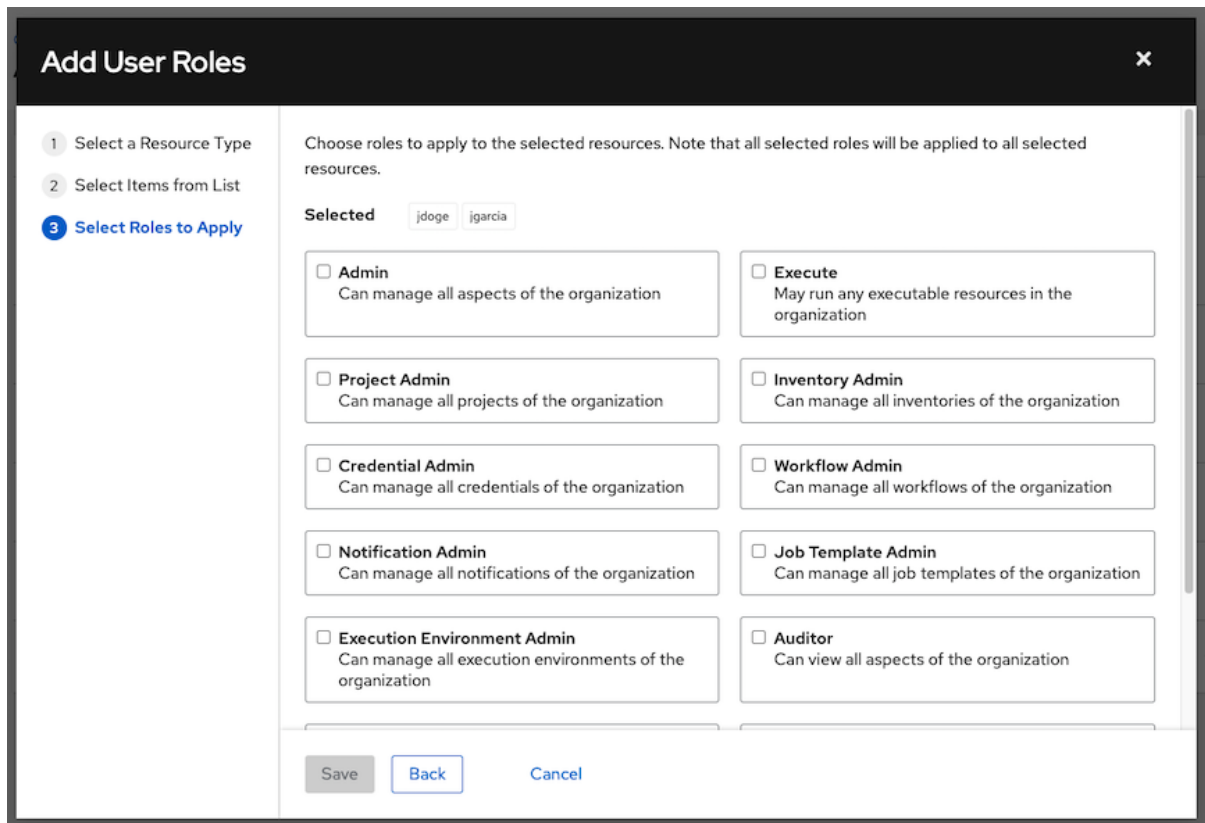
**Selected** jdoge X jgarcia X

Username

	Username ↑	First Name ↓	Last Name ↓
<input type="checkbox"/>	austin78	Austin	Texas
<input checked="" type="checkbox"/>	jdoge	Josie	Doge
<input checked="" type="checkbox"/>	jgarcia	Jerry	Garcia
- Select Roles to Apply

In this example, two users have been selected to be added.

- Select the roles you want the selected users or teams to have. Scroll down for a complete list of roles. Different resources have different options available.



7. Click **Save** to apply the roles to the selected users or teams and to add them as members.

The Add Users or Teams window closes to display the updated roles assigned for each user and team.

Username	First name	Last name	Roles
admin			User Roles: System Administrator
austin78	Austin	Austin	User Roles: Member <span>×</span> System Auditor
jgarcia	Jerry	Jerry	User Roles: Credential Admin <span>×</span> Job Template Admin <span>×</span> Auditor <span>×</span> Member <span>×</span>
jdoge	Josie	Josie	User Roles: Project Admin <span>×</span> Credential Admin <span>×</span> Job Template Admin <span>×</span> Auditor <span>×</span>

1 - 4 of 4 items    << < 1 of 1 page > >>

## Removing a permission

- To remove roles for a particular user, click the **×** icon next to its resource.

This launches a confirmation window, asking you to confirm the disassociation.

## 18.4.2. Adding groups to inventories

Inventories are divided into groups, which can contain hosts and other groups. Groups are only applicable to standard inventories and are not a configurable directly through a Smart Inventory. You can associate an existing group through hosts that are used with standard inventories.

The following actions are available for standard inventories:

- Create a new Group

- Create a new Host
- Run a command on the selected Inventory
- Edit Inventory properties
- View activity streams for Groups and Hosts
- Obtain help building your Inventory



## NOTE

Inventory sources are not associated with groups. Spawned groups are top-level and can still have child groups. All of these spawned groups can have hosts.

Use the following procedure to create a new group for an inventory:

### Procedure

1. Select the Inventory name you want to add groups to.
2. In the Inventory **Details** page, select **Groups**.
3. Click **Add** to open the **Create Group** window.
4. Enter the appropriate details:
  - **Name:** Required
  - Optional: **Description:** Enter a description as appropriate.
  - **Variables:** Enter definitions and values to be applied to all hosts in this group. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two.
5. Click **Save**.
6. When you have added a group to a template, the **Group details** page is displayed.

#### 18.4.2.1. Adding groups within groups

Use the following procedure to add groups within groups:

### Procedure

1. When you have added a group to a template, the **Group details** page is displayed.
2. Select the **Related Groups** tab.
3. Click **Add**.
4. Select whether to add a group that already exists in your configuration or create a new group.
5. If creating a new group, enter the appropriate details into the required and optional fields:
  - **Name** (required):

- Optional: **Description:** Enter a description as appropriate.
  - **Variables:** Enter definitions and values to be applied to all hosts in this group. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two.
6. Click **Save**.
  7. The **Create Group** window closes and the newly created group is displayed as an entry in the list of groups associated with the group that it was created for.

If you choose to add an existing group, available groups appear in a separate selection window.

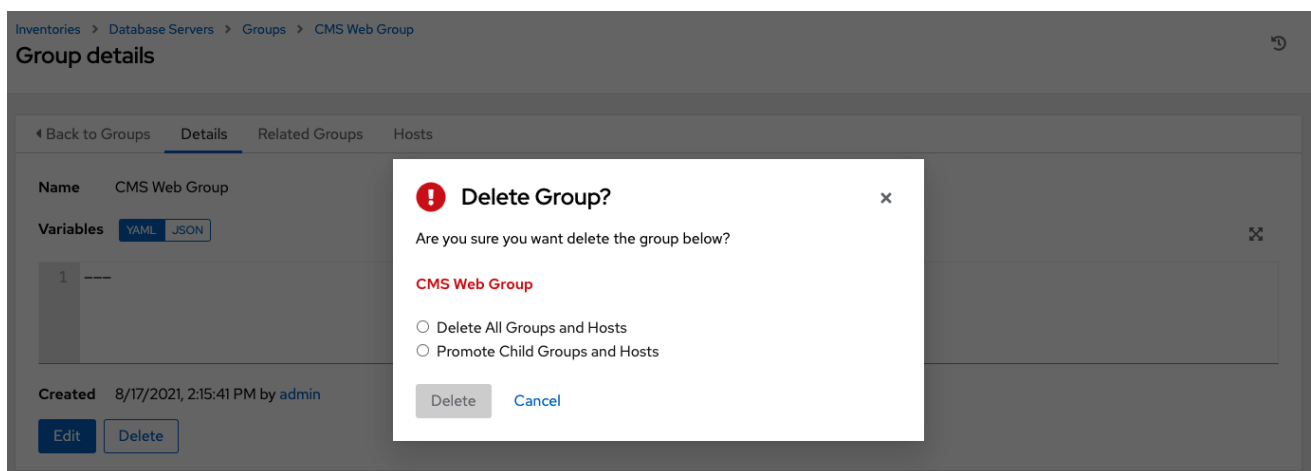
When a group is selected, it is displayed in the list of groups associated with the group.

- To configure additional groups and hosts under the subgroup, click the name of the subgroup from the list of groups and repeat the steps listed in this section.

### 18.4.2.2. View or edit inventory groups

The groups list view displays all your inventory groups, or you can filter it to only display the root groups. An inventory group is considered a root group if it is not a subset of another group.

You can delete a subgroup without concern for dependencies, because automation controller looks for dependencies such as child groups or hosts. If any exist, a confirmation window displays for you to choose whether to delete the root group and all of its subgroups and hosts; or to promote the subgroups so they become the top-level inventory groups, along with their hosts.



### 18.4.3. Adding hosts to an inventory

You can configure hosts for the inventory as well as for groups and groups within groups.

Use the following procedure to add hosts:

#### Procedure

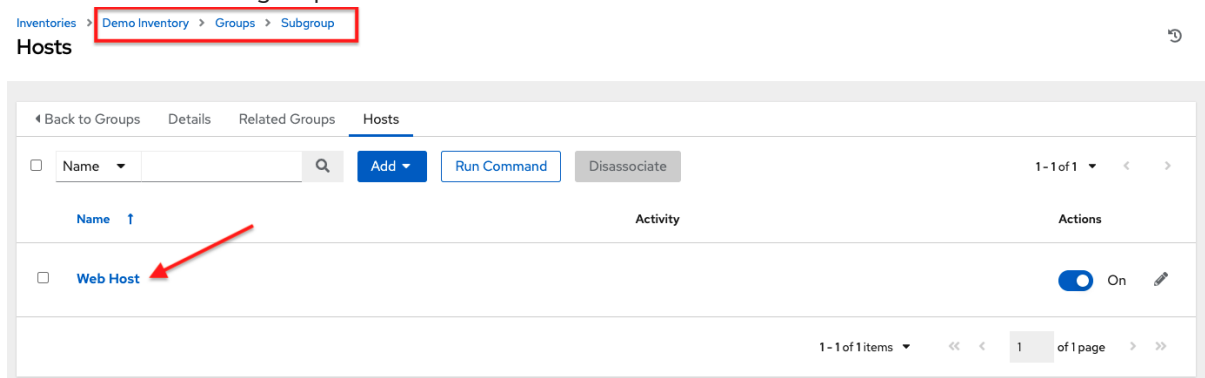
1. Select the Inventory name you want to add groups to.
2. In the Inventory **Details** page, select **Hosts**.
3. Click **Add**.

4. Select whether to add a host that already exists in your configuration or create a new host.
5. If creating a new host, set the toggle to **On** to include this host while running jobs.
6. Enter the appropriate details:
  - **Host Name** (required):
  - Optional: **Description**: Enter a description as appropriate.
  - **Variables**: Enter definitions and values to be applied to all hosts in this group, as in the following example:

```
{
  ansible_user : <username to ssh into>
  ansible_ssh_pass : <password for the username>
  ansible_become_pass: <password for becoming the root>
}
```

Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two.

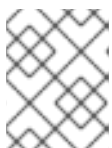
7. Click **Save**.
8. The **Create Host** window closes and the newly created host is displayed in the list of hosts associated with the group that it was created for.



If you choose to add an existing host, available hosts appear in a separate selection window.

When a host is selected, it is displayed in the list of hosts associated with the group.

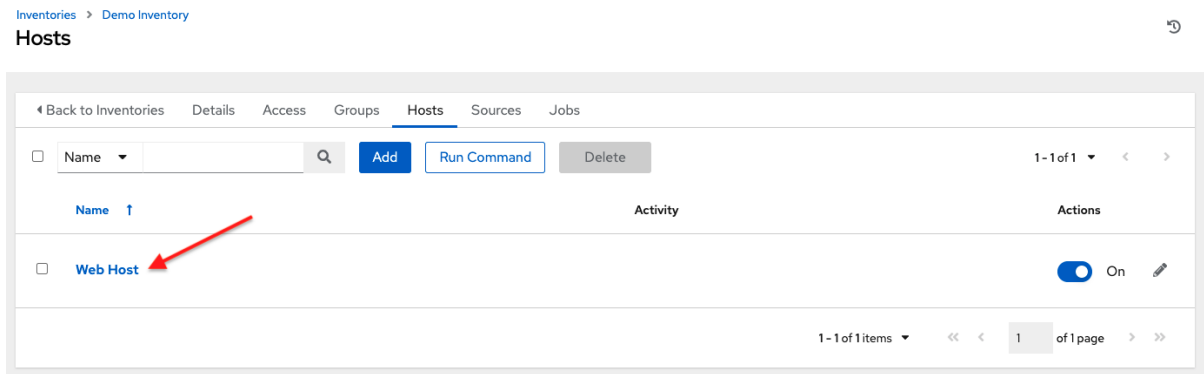
9. You can disassociate a host from this screen by selecting the host and clicking the **X** icon.



#### NOTE

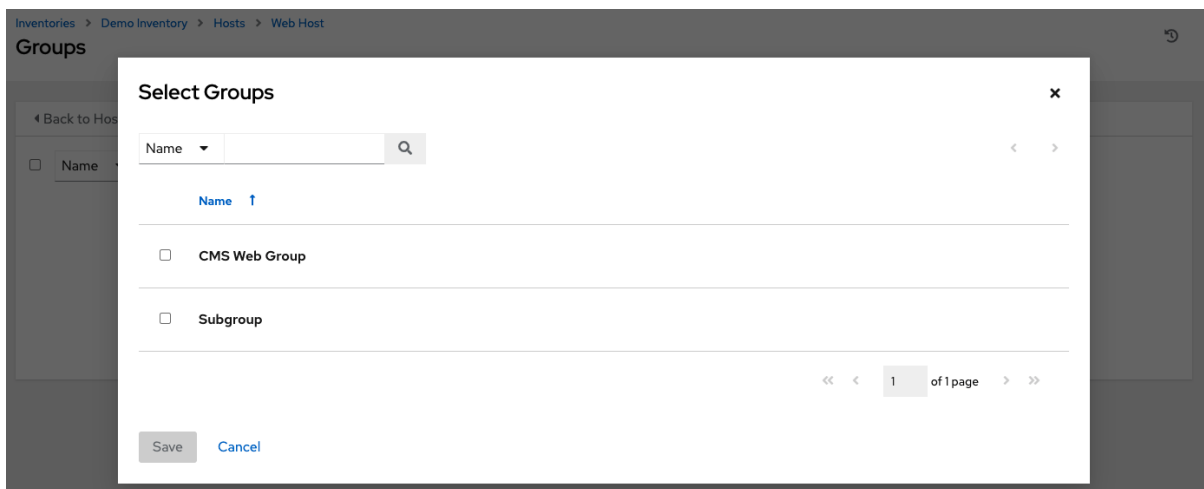
You can also run ad hoc commands from this screen. For more information, see [Running ad hoc commands].

10. To configure additional groups for the host, click the name of the host from the list of hosts.

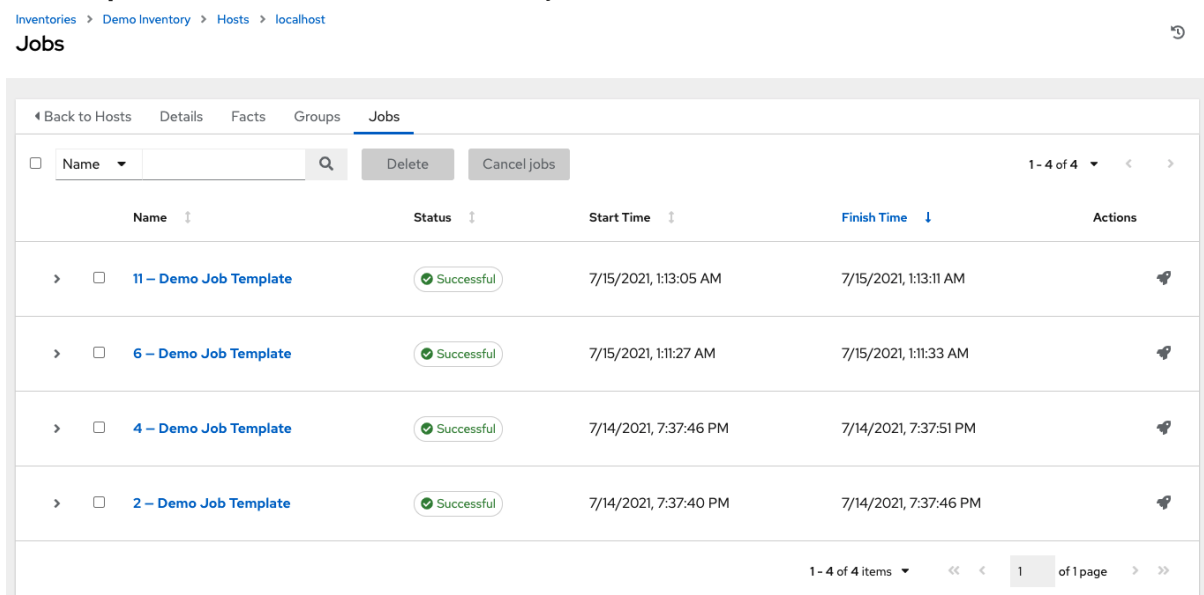


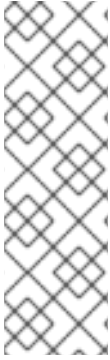
This opens the **Details** tab of the selected host.

11. Select **Groups** to configure groups for the host.
12. Click **Add** to associate the host with an existing group. Available groups appear in a separate selection window.



13. Select the groups to associate with the host and click **Save**.  
When a group is associated, it is displayed in the list of groups associated with the host.
14. If a host was used to run a job, you can view details about those jobs in the **Completed Jobs** tab of the host.
15. Click **Expanded** to view details about each job.





## NOTE

You can create hosts in bulk using the newly added endpoint in the API, `/api/v2/bulk/host_create`. This endpoint accepts JSON and you can specify the target inventory and a list of hosts to add to the inventory. These hosts must be unique within the inventory. Either all hosts are added, or an error is returned indicating why the operation was not able to complete. Use the **OPTIONS** request to return the relevant schema.

For more information, see [Bulk endpoints](#) in the *Automation Controller API Guide*.

### 18.4.4. Adding a source

Inventory sources are not associated with groups. Spawned groups are top-level and can still have child groups. All of these spawned groups can have hosts. Adding a source to an inventory only applies to standard inventories. Smart inventories inherit their source from the standard inventories they are associated with.

Use the following procedure to configure the source for the inventory:

#### Procedure

1. Select the Inventory name you want to add a source to.
2. In the Inventory **Details** page, select **Sources**.
3. Click **Add**. This opens the **Create Source** window.

Inventories > Demo Inventory > Sources ↻

**Create new source**

<b>Name *</b>	<b>Description</b>	<b>Execution Environment</b>
<input type="text"/>	<input type="text"/>	<input type="text" value="Q"/>
<b>Source *</b>		
<input type="text" value="Choose a source"/>		
<input type="button" value="Save"/> <input type="button" value="Cancel"/>		

4. Enter the appropriate details:
  - **Name** (required):
  - Optional: **Description**: Enter a description as appropriate.
  - Optional: **Execution Environment**: Click the **Q** icon or enter the name of the execution environment with which you want to run your inventory imports. For more information on building an execution environment, see [Execution environments](#).
  - **Source**: Choose a source for your inventory. For more information on sources, and supplying the appropriate information, see [Inventory sources](#).
5. When the information for your chosen [Inventory sources](#) is complete, you can optionally specify other common parameters, such as verbosity, host filters, and variables.
6. Use the **Verbosity** menu to select the level of output on any inventory source's update jobs.

7. Use the **Host Filter** field to specify only matching host names to be imported into automation controller.
8. In the **Enabled Variable** field, specify that automation controller retrieves the enabled state from the dictionary of host variables. You can specify the enabled variable using dot notation as 'foo.bar', in which case the lookup searches nested dictionaries, equivalent to: **from\_dict.get('foo', {}).get('bar', default)**.
9. If you specified a dictionary of host variables in the **Enabled Variable** field, you can provide a value to enable on import. For example, for **enabled\_var='status.power\_state'** and **'enabled\_value='powered\_on'** in the following host variables, the host is marked **enabled**:

```
{
  "status": {
    "power_state": "powered_on",
    "created": "2020-08-04T18:13:04+00:00",
    "healthy": true
  },
  "name": "foobar",
  "ip_address": "192.168.2.1"
}
```

If **power\_state** is any value other than **powered\_on**, then the host is disabled when imported into automation controller. If the key is not found, then the host is enabled.

10. All cloud inventory sources have the following update options:
  - **Overwrite:** If checked, any hosts and groups that were previously present on the external source but are now removed, are removed from the automation controller inventory. Hosts and groups that were not managed by the inventory source are promoted to the next manually created group, or, if there is no manually created group to promote them into, they are left in the "all" default group for the inventory. When not checked, local child hosts and groups not found on the external source remain untouched by the inventory update process.
  - **Overwrite Variables:** If checked, all variables for child groups and hosts are removed and replaced by those found on the external source. When not checked, a merge is performed, combining local variables with those found on the external source.
  - **Update on Launch:** Each time a job runs using this inventory, refresh the inventory from the selected source before executing job tasks. To avoid job overflows if jobs are spawned faster than the inventory can synchronize, selecting this enables you to configure a **Cache Timeout** to previous cache inventory synchronizations for a certain number of seconds.

The **Update on Launch** setting refers to a dependency system for projects and inventory, and does not specifically exclude two jobs from running at the same time.

If a cache timeout is specified, then the dependencies for the second job are created, and it uses the project and inventory update that the first job spawned.

Both jobs then wait for that project or inventory update to finish before proceeding. If they are different job templates, they can then both start and run at the same time, if the system has the capacity to do so. If you intend to use automation controller's provisioning callback



feature with a dynamic inventory source, **Update on Launch** must be set for the inventory group.

If you synchronize an inventory source that uses a project that has **Update On Launch** set, then the project might automatically update (according to cache timeout rules) before the inventory update starts.

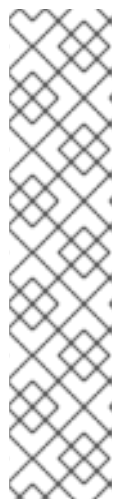
You can create a job template that uses an inventory that sources from the same project that the template uses. In such a case, the project updates and then the inventory updates (if updates are not already in progress, or if the cache timeout has not already expired).

11. Review your entries and selections. This enables you to configure additional details, such as schedules and notifications.
12. To configure schedules associated with this inventory source, click the **Schedules** tab:
  - If schedules are already set up, then review, edit, enable or disable your schedule preferences.
  - If schedules have not been set up, for more information about setting up schedules, see [Schedules](#).

### 18.4.5. Configuring notifications for the source

Use the following procedure to configure notifications for the source:

1. In the Inventory **Details** page, select **Notifications**.



#### NOTE

The **Notifications** tab is only present when you have saved the newly-created source.

[Inventories](#) > [Demo Inventory](#) > [Sources](#) > [New source](#)

## Notifications

◀ [Back to Sources](#)   [Details](#)   [Schedules](#)   **[Notifications](#)**

2. If notifications are already set up, use the toggles to enable or disable the notifications to use with your particular source. For more information, see [Enable and Disable Notifications](#).
3. If notifications have not been set up, see [Notifications](#) for more information.
4. Review your entries and selections.
5. Click **Save**.

When a source is defined, it is displayed in the list of sources associated with the inventory. From the **Sources** tab you can perform a sync on a single source, or sync all of them at once. You can also perform additional actions such as scheduling a sync process, and edit or delete the source.

Name	Status	Type	Actions
<a href="#">New source</a>		Sourced from a Project	<a href="#">Refresh</a> <a href="#">Edit</a>

### 18.4.5.1. Inventory sources

Choose a source which matches the inventory type against which a host can be entered:

- [Sourcing from a Project](#)
- [Amazon Web Services EC2](#)
- [Google Compute Engine](#)
- [Microsoft Azure Resource Manager](#)
- [VMware vCenter](#)
- [Red Hat Satellite 6](#)
- [Red Hat Insights](#)
- [OpenStack](#)
- [Red Hat Virtualization](#)
- [Red Hat Ansible Automation Platform](#)

#### 18.4.5.1.1. Sourcing from a Project

An inventory that is sourced from a project means that it uses the SCM type from the project it is tied to. For example, if the project's source is from GitHub, then the inventory uses the same source.

Use the following procedure to configure a project-sourced inventory:


#### Procedure

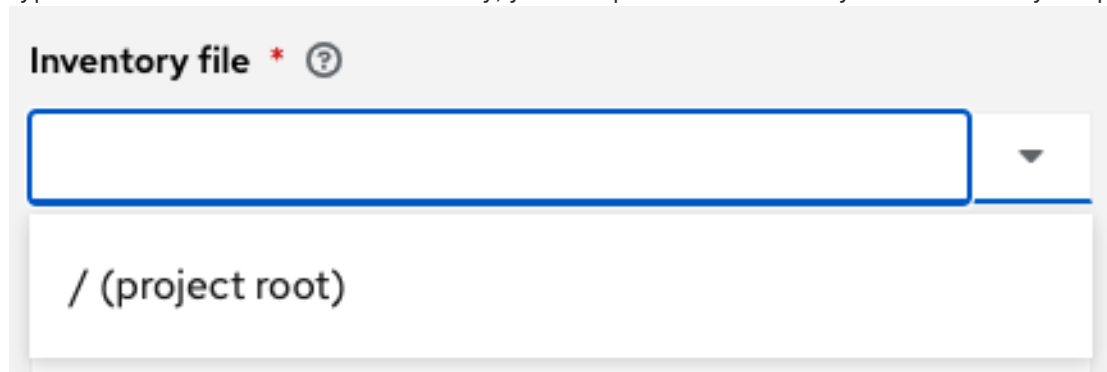
1. In the **Create new source** page, select **Source**.
2. From the menu, select **Sourced from a Project**
3. The Create Source window expands with additional fields. Enter the following details:
  - Optional: **Source Control Branch/Tag/Commit** Enter the SCM branch, tags, commit hashes, arbitrary refs, or revision number (if applicable) from the source control (Git or Subversion) to checkout.  
This field only displays if the sourced project has the **Allow Branch Override** option checked. For further information, see [SCM Types - Git and Subversion](#).

## Options

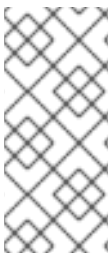
- Clean 
 Delete 
 Track submodules 
 Update Revision on Launch 
 Allow Branch Override 

Some commit hashes and refs might not be available unless you also provide a custom refspec in the next field. If left blank, the default is HEAD which is the last checked out Branch/Tag/Commit for this project.

- Optional: **Credential**: Specify the credential to use for this source.
- **Project** (required): Pre-populates with a default project, otherwise, specify the project this inventory is using as its source. Click the  icon to choose from a list of projects. If the list is extensive, use the search to narrow the options.
- **Inventory File** (required): Select an inventory file associated with the sourced project. If not already populated, you can type it into the text field within the menu to filter extraneous file types. In addition to a flat file inventory, you can point to a directory or an inventory script.



4. Optional: You can specify the verbosity, host filter, enabled variable/value, and update options as described in [Adding a source](#).
5. Optional: To pass to the custom inventory script, you can set environment variables in the **Environment Variables** field. You can also place inventory scripts in source control and then run it from a project. For more information, see [Inventory File Importing](#) in *Automation controller Administration Guide*.

**NOTE**

If you are executing a custom inventory script from SCM, ensure that you set the execution bit (**chmod +x**) for the script in your upstream source control.

If you do not, automation controller throws a **[Errno 13] Permission denied** error on execution.

**18.4.5.1.2. Amazon Web Services EC2**

Use the following procedure to configure an AWS EC2-sourced inventory,

**Procedure**

1. In the **Create new source** page, select **Source**.
2. From the menu, select **Amazon EC2**.
3. The **Create Source** window expands with additional fields. Enter the following details:

- Optional: **Credential**: Choose from an existing AWS credential (for more information, see [Credentials](#)).  
If automation controller is running on an EC2 instance with an assigned IAM Role, the credential can be omitted, and the security credentials from the instance metadata are used instead. For more information on using IAM Roles, see [IAM\\_Roles\\_for\\_Amazon\\_EC2\\_documentation\\_at\\_Amazon](#).
- 4. Optional: You can specify the verbosity, host filter, enabled variables or values, and update options as described in [Adding a source](#).
- 5. Use the **Source Variables** field to override variables used by the **aws\_ec2** inventory plugin. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two. For more information on these variables, see the [aws inventory plugin documentation](#).



#### NOTE

If you only use **include\_filters**, the AWS plugin always returns all the hosts. To use this correctly, the first condition on the **or** must be on **filters** and then build the rest of the **OR** conditions on a list of **include\_filters**.

#### 18.4.5.1.3. Google Compute Engine

Use the following procedure to configure a Google-sourced inventory.

##### Procedure

1. In the **Create new source** page, select **Source**.
2. From the menu, select **Google Compute Engine**.
3. The **Create Source** window expands with the required **Credential** field. Choose from an existing GCE Credential. For more information, see [Credentials](#).
4. Optional: You can specify the verbosity, host filter, enabled variables or values, and update options as described in [Adding a source](#).
5. Use the **Source Variables** field to override variables used by the **gcp\_compute** inventory plugin. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two. For more information on these variables, see the [gcp\\_compute inventory plugin documentation](#).

#### 18.4.5.1.4. Microsoft Azure resource manager

Use the following procedure to configure an Azure Resource Manager-sourced inventory:

##### Procedure

1. In the **Create new source** page, select **Source**.
2. From the menu, select **Microsoft Azure Resource Manager**.
3. The **Create Source** window expands with the required **Credential** field. Choose from an existing Azure Credential. For more information, see [Credentials](#).

4. Optional: You can specify the verbosity, host filter, enabled variables or values, and update options as described in [Adding a source](#).
5. Use the **Source Variables** field to override variables used by the **azure\_rm** inventory plugin. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two. For more information on these variables, see the [azure\\_rm inventory plugin documentation](#).

#### 18.4.5.1.5. VMware vCenter

Use the following procedure to configure a VMWare-sourced inventory.

##### Procedure

1. In the **Create new source** page, select **Source**.
2. From the menu, select **VMware vCenter**.
3. The **Create Source** window expands with the required **Credential** field. Choose from an existing VMware Credential. For more information, see [Credentials](#).
4. Optional: You can specify the verbosity, host filter, enabled variables or values, and update options as described in [Adding a source](#).
5. Use the **Source Variables** field to override variables used by the **vmware\_inventory** inventory plugin. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two. For more information on these variables, see the [vmware\\_inventory inventory plugin](#).



##### NOTE

VMWare properties have changed from lower case to camelCase. Automation controller provides aliases for the top-level keys, but lower case keys in nested properties have been discontinued. For a list of valid and supported properties, refer to [Using Virtual machine attributes in VMware dynamic inventory plugin](#).

#### 18.4.5.1.6. Red Hat Satellite 6

Use the following procedure to configure a Red Hat Satellite-sourced inventory.

##### Procedure

1. In the **Create new source** page, select **Source**.
2. From the menu, select **Red Hat Satellite**.
3. The **Create Source** window expands with the required **Credential** field. Choose from an existing Satellite Credential. For more information, see [Credentials](#).
4. Optional: You can specify the verbosity, host filter, enabled variables or values, and update options as described in [Adding a source](#).
5. Use the **Source Variables** field to specify parameters used by the **foreman** inventory source. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two. For more information on these variables, see the [Foreman inventory source](#) in the Ansible documentation.

If you encounter an issue with the automation controller inventory not having the "related groups" from Satellite, you might need to define these variables in the inventory source. For more information, see [Red Hat Satellite 6](#).

If you see the message, "**no foreman.id**" variable(s) when syncing the inventory, refer to the solution on the Red Hat Customer Portal at: <https://access.redhat.com/solutions/5826451>. Be sure to login with your customer credentials to access the full article.

#### 18.4.5.1.7. Red Hat Insights

Use the following procedure to configure a Red Hat Insights-sourced inventory.

##### Procedure

1. In the **Create new source** page, select **Source**.
2. From the menu, select **Red Hat Insights**
3. The **Create Source** window expands with the required **Credential** field. Choose from an existing GCE Credential. For more information, refer to [Credentials](#).
4. Optional: You can specify the verbosity, host filter, enabled variables or values, and update options as described in [Adding a source](#).
5. Use the **Source Variables** field to override variables used by the **gcp\_compute** inventory plugin. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two. For more information on these variables, see [insights inventory plugin](#).

#### 18.4.5.1.8. OpenStack

Use the following procedure to configure an OpenStack-sourced inventory.

##### Procedure

1. In the **Create new source** page, select **Source**.
2. From the menu, select **Openstack**.
3. The **Create Source** window expands with the required **Credential** field. Choose from an existing GCE Credential. For more information, refer to [Credentials](#).
4. Optional: You can specify the verbosity, host filter, enabled variables or values, and update options as described in [Adding a source](#).
5. Use the **Source Variables** field to override variables used by the **gcp\_compute** inventory plugin. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two. For more information on these variables, see [openstack inventory plugin](#).

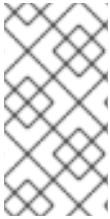
#### 18.4.5.1.9. Red hat virtualization

Use the following procedure to configure a Red Hat virtualization-sourced inventory.

##### Procedure

1. In the **Create new source** page, select **Source**.

2. From the menu, select **Red Hat Virtualization**.
3. The **Create Source** window expands with the required **Credential** field. Choose from an existing GCE Credential. For more information, see [Credentials](#).
4. Optional: You can specify the verbosity, host filter, enabled variables or values, and update options as described in [Adding a source](#).
5. Use the **Source Variables** field to override variables used by the **gcp\_compute** inventory plugin. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two. For more information on these variables, see [ovirt inventory plugin](#)



#### NOTE

Red Hat Virtualization (ovirt) inventory source requests are secure by default. To change this default setting, set the key **ovirt\_insecure** to **true** in **source\_variables**, which is only available from the API details of the inventory source at the `/api/v2/inventory_sources/N/` endpoint.

#### 18.4.5.1.10. Red Hat Ansible Automation Platform

Use the following procedure to configure an automation controller-sourced inventory.

##### Procedure

1. In the **Create new source** page, select **Source**.
2. From the menu, select **Red Hat Ansible Automation Platform**
3. The **Create Source** window expands with the required **Credential** field. Choose from an existing GCE Credential. For more information, refer to [Credentials](#).
4. Optional: You can specify the verbosity, host filter, enabled variables or values, and update options as described in [Adding a source](#).
5. Use the **Source Variables** field to override variables used by the **gcp\_compute** inventory plugin. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two. For more information on these variables, see [Controller inventory plugin](#). This requires your Red Hat Customer login.

#### 18.4.5.2. Export old inventory scripts

Despite the removal of the custom inventory scripts API, the scripts are still saved in the database. The commands described in this section enable you to recover the scripts from the database in a format that is suitable for you to subsequently check into source control.

Use the following commands:

```
$ awx-manage export_custom_scripts --filename=my_scripts.tar
```

```
Dump of old custom inventory scripts at my_scripts.tar
```

Making use of the output:

```
$ mkdir my_scripts
$ tar -xf my_scripts.tar -C my_scripts
```

The name of the scripts has the form: **<pk>\_<name>**. This is the naming scheme used for project folders.

```
$ ls my_scripts
10inventory_script_rawhook_19_30inventory_script_listenhospital_11inventory_script_upperorder
_1inventory_script_commercialinternet45_4inventory_script_whitestring
_12inventory_script_eastplant_22inventory_script_pinexchange
_5inventory_script_literaturepossession_13inventory_script_governmentculture
_23inventory_script_brainluck_6inventory_script_opportunitytelephone
_14inventory_script_bottomguess_25inventory_script_buyerleague_7inventory_script_letjury
_15inventory_script_wallisland_26inventory_script_lifesport_8random_inventory_script
_16inventory_script_wallisland_27inventory_script_exchangesomewhere_9random_inventory_script
_17inventory_script_bidstory_28inventory_script_boxchild_18p
_29__inventory_script_wearstress
```

Each file contains a script. Scripts can be **bash/python/ruby/more**, so the extension is not included. They are all directly executable. Executing the script dumps the inventory data.

```
$ ./my_scripts/11__inventory_script_upperorder
{"group": "\ud801\udcb0\uc20e\u7b0e\ud81c\udfeb\ub12b\ub4d0\u9ac6\ud81e\udf07\u6ff9\uc17b":
{"hosts":
["host_\ud821\udcad\u68b6\u7a51\u93b4\u69cf\uc3c2\ud81f\uddbe\ud820\udc92\u3143\u62c7",
"host_\u6057\u3985\u1f60\ufefb\u1b22\ubd2d\ua90c\ud81a\udc69\u1344\u9d15",
"host_\u78a0\ud820\udf3\u925e\u69da\ua549\ud80c\ude7e\ud81e\udc91\ud808\uddd1\u57d6\ud801\
ude57",
"host_\ud83a\udc2d\ud7f7\ua18a\u779a\ud800\udf8b\u7903\ud820\udead\u4154\ud808\ude15\u9711",

"host_\u18a1\u9d6f\u08ac\u74c2\u54e2\u740e\u5f02\ud81d\uddee\ufbd6\u4506"], "vars":
{"ansible_host": "127.0.0.1", "ansible_connection":
"local"}}
```

You can verify functionality with **ansible-inventory**. This gives the same data, but reformatted.

```
$ ansible-inventory -i ./my_scripts/_11__inventory_script_upperorder --list --export
```

In the preceding example, you can **cd** into **my\_scripts** and then issue a **git init** command, add the scripts you want, push it to source control, and then create an SCM inventory source in the user interface.

For more information on syncing or using custom inventory scripts, see [Inventory file importing](#) in the *Automation controller Administration Guide*.

## 18.5. VIEW COMPLETED JOBS

If an inventory was used to run a job, you can view details about those jobs in the **Completed Jobs** tab of the inventory and click **Expanded** to view details about each job.



Inventories > Demo Inventory

### Jobs

Name	Status	Start Time	Finish Time	Actions
11 - Demo Job Template	Successful	7/15/2021, 1:13:05 AM	7/15/2021, 1:13:11 AM	
6 - Demo Job Template	Successful	7/15/2021, 1:11:27 AM	7/15/2021, 1:11:33 AM	
4 - Demo Job Template	Successful	7/14/2021, 7:37:46 PM	7/14/2021, 7:37:51 PM	
2 - Demo Job Template	Successful	7/14/2021, 7:37:40 PM	7/14/2021, 7:37:46 PM	

1 - 4 of 4 items

## 18.6. RUNNING AD HOC COMMANDS

*Ad hoc* refers to using Ansible to perform a quick command, using `/usr/bin/ansible`, rather than the orchestration language, which is `/usr/bin/ansible-playbook`. An example of an ad hoc command might be rebooting 50 machines in your infrastructure. Anything you can do ad hoc can be accomplished by writing a Playbook. Playbooks can also glue lots of other operations together.

Use the following procedure to run an ad hoc command:

### Procedure

1. Select an inventory source from the list of hosts or groups. The inventory source can be a single group or host, a selection of multiple hosts, or a selection of multiple groups.

Inventories > Demo Inventory > Groups > Subgroup

### Hosts

Name	Activity	Actions
Web Host		On

1 - 1 of 1 items

2. Click **Run Command**. The Run command window opens.

✕

## Run command

**1 Details**

2 Execution Environment

3 Machine credential

**Module** ⓘ

Choose a module

**Arguments** ⓘ

**Verbosity** ⓘ

0 (Normal)

**Limit** ⓘ

all

**Forks** ⓘ

0

**Show changes** ⓘ

Off

**Enable privilege escalation** ⓘ

**Extra variables** ⓘ

YAML
JSON
✕

Next

Back

Cancel

3. Enter the following information:

- **Module:** Select one of the modules that the supports running commands against.

command	apt_repository	mount	win_service
shell	apt_rpm	ping	win_updates
yum	service	selinux	win_group
apt	group	setup	win_user
apt_key	user	win_ping	win_user

- **Arguments:** Provide arguments to be used with the module you selected.
- **Limit:** Enter the limit used to target hosts in the inventory. To target all hosts in the inventory enter **all** or **\***, or leave the field blank. This is automatically populated with whatever was selected in the previous view before clicking the launch button.
- **Machine Credential:** Select the credential to use when accessing the remote hosts to run the command. Choose the credential containing the username and SSH key or password that Ansible needs to log into the remote hosts.
- **Verbosity:** Select a verbosity level for the standard output.
- **Forks:** If needed, select the number of parallel or simultaneous processes to use while executing the command.
- **Show Changes:** Select to enable the display of Ansible changes in the standard output. The default is OFF.

- **Enable Privilege Escalation** If enabled, the playbook is run with administrator privileges. This is the equivalent of passing the **--become** option to the **ansible** command.
- **Extra Variables:** Provide extra command line variables to be applied when running this inventory. Enter variables using either JSON or YAML syntax. Use the radio button to toggle between the two.

**Run command**
✕

**1 Details**

2 Execution Environment

3 Machine credential

**Module** ⓘ

ping

---

**Arguments** ⓘ

---

**Verbosity** \* ⓘ

0 (Normal)

---

**Limit** ⓘ

Web Host

---

**Forks** ⓘ

0

---

**Show changes** ⓘ  **Enable privilege escalation** ⓘ

On

---

**Extra variables** ⓘ YAML JSON

---

1 ---

---

Next
Back
Cancel

4. Click **Next** to choose the execution environment you want the ad hoc command to be run against.

**Run command**
✕

1 Details

**2 Execution Environment**

3 Machine credential

**Execution Environments** ⓘ

Name ▾  🔍

---

Name ↑

---

**Controller Default EE**

---

**Control Plane Execution Environment**

---

⏪ < 1 > ⏩ of 1 page

---

Next
Back
Cancel

5. Click **Next** to choose the credential you want to use.

6. Click **Launch**. The results display in the **Output** tab of the module's job window.

Jobs > ping

**Output** 🔍

← Back to Jobs   Details   Output

**ping** Elapsed: 00:00:04   🔊   📄   🗑️

Stdout

```
0  WARN[0000] error mounting subscriptions, skipping entry in /usr/share/containers/mounts.conf: getting host subscription data failed: failed to read subscriptions from
   "/usr/share/rhel/secrets": open /usr/share/rhel/secrets/rhsm/syspurpose/syspurpose.json: permission denied
1  [WARNING]: Invalid characters were found in group names but not replaced, use
2  -vvvv to see details
3  [WARNING]: Could not match supplied host pattern, ignoring: Web
3  [WARNING]: Could not match supplied host pattern, ignoring: Web
5  [WARNING]: No hosts matched, nothing to do
```

## CHAPTER 19. SUPPORTED INVENTORY PLUGIN TEMPLATES

After upgrade to 4.x, existing configurations are migrated to the new format that produces a backwards compatible inventory output. Use the following templates to aid in migrating your inventories to the new style inventory plugin output.

- [Amazon Web Services EC2](#)
- [Google Compute Engine](#)
- [Microsoft Azure Resource Manager](#)
- [VMware vCenter](#)
- [Red Hat Satellite 6](#)
- [OpenStack](#)
- [Red Hat Virtualization](#)
- [Red Hat Ansible Automation Platform](#)

### 19.1. AMAZON WEB SERVICES EC2

```
compose:
  ansible_host: public_ip_address
  ec2_account_id: owner_id
  ec2_ami_launch_index: ami_launch_index | string
  ec2_architecture: architecture
  ec2_block_devices: dict(block_device_mappings | map(attribute='device_name') | list |
zip(block_device_mappings | map(attribute='ebs.volume_id') | list))
  ec2_client_token: client_token
  ec2_dns_name: public_dns_name
  ec2_ebs_optimized: ebs_optimized
  ec2_eventsSet: events | default("")
  ec2_group_name: placement.group_name
  ec2_hypervisor: hypervisor
  ec2_id: instance_id
  ec2_image_id: image_id
  ec2_instance_profile: iam_instance_profile | default("")
  ec2_instance_type: instance_type
  ec2_ip_address: public_ip_address
  ec2_kernel: kernel_id | default("")
  ec2_key_name: key_name
  ec2_launch_time: launch_time | regex_replace(" ", "T") | regex_replace("(\\+)(\\d\\d):(\\d)(\\d)$",
".\\g<2>\\g<3>Z")
  ec2_monitored: monitoring.state in ['enabled', 'pending']
  ec2_monitoring_state: monitoring.state
  ec2_persistent: persistent | default(false)
  ec2_placement: placement.availability_zone
  ec2_platform: platform | default("")
  ec2_private_dns_name: private_dns_name
  ec2_private_ip_address: private_ip_address
  ec2_public_dns_name: public_dns_name
  ec2_ramdisk: ramdisk_id | default("")
```

```

ec2_reason: state_transition_reason
ec2_region: placement.region
ec2_requester_id: requester_id | default("")
ec2_root_device_name: root_device_name
ec2_root_device_type: root_device_type
ec2_security_group_ids: security_groups | map(attribute='group_id') | list | join(',')
ec2_security_group_names: security_groups | map(attribute='group_name') | list | join(',')
ec2_sourceDestCheck: source_dest_check | default(false) | lower | string
ec2_spot_instance_request_id: spot_instance_request_id | default("")
ec2_state: state.name
ec2_state_code: state.code
ec2_state_reason: state_reason.message if state_reason is defined else ""
ec2_subnet_id: subnet_id | default("")
ec2_tag_Name: tags.Name
ec2_virtualization_type: virtualization_type
ec2_vpc_id: vpc_id | default("")
filters:
  instance-state-name:
    - running
groups:
  ec2: true
hostnames:
  - network-interface.addresses.association.public-ip
  - dns-name
  - private-dns-name
keyed_groups:
  - key: image_id | regex_replace("[^A-Za-z0-9_]", "_")
    parent_group: images
    prefix: "
    separator: "
  - key: placement.availability_zone
    parent_group: zones
    prefix: "
    separator: "
  - key: ec2_account_id | regex_replace("[^A-Za-z0-9_]", "_")
    parent_group: accounts
    prefix: "
    separator: "
  - key: ec2_state | regex_replace("[^A-Za-z0-9_]", "_")
    parent_group: instance_states
    prefix: instance_state
  - key: platform | default("undefined") | regex_replace("[^A-Za-z0-9_]", "_")
    parent_group: platforms
    prefix: platform
  - key: instance_type | regex_replace("[^A-Za-z0-9_]", "_")
    parent_group: types
    prefix: type
  - key: key_name | regex_replace("[^A-Za-z0-9_]", "_")
    parent_group: keys
    prefix: key
  - key: placement.region
    parent_group: regions
    prefix: "
    separator: "
  - key: security_groups | map(attribute="group_name") | map("regex_replace", "[^A-Za-z0-9_]", "_") |
list

```

```

parent_group: security_groups
prefix: security_group
- key: dict(tags.keys() | map("regex_replace", "[^A-Za-z0-9\\_]", "_") | list | zip(tags.values()
  | map("regex_replace", "[^A-Za-z0-9\\_]", "_") | list))
parent_group: tags
prefix: tag
- key: tags.keys() | map("regex_replace", "[^A-Za-z0-9\\_]", "_") | list
parent_group: tags
prefix: tag
- key: vpc_id | regex_replace("[^A-Za-z0-9\\_]", "_")
parent_group: vpcs
prefix: vpc_id
- key: placement.availability_zone
parent_group: '{{ placement.region }}'
prefix: "
separator: "
plugin: amazon.aws.aws_ec2
use_contrib_script_compatible_sanitization: true

```

## 19.2. GOOGLE COMPUTE ENGINE

```

auth_kind: serviceaccount
compose:
  ansible_ssh_host: networkInterfaces[0].accessConfigs[0].natIP |
default(networkInterfaces[0].networkIP)
gce_description: description if description else None
gce_id: id
gce_image: image
gce_machine_type: machineType
gce_metadata: metadata.get("items", []) | items2dict(key_name="key", value_name="value")
gce_name: name
gce_network: networkInterfaces[0].network.name
gce_private_ip: networkInterfaces[0].networkIP
gce_public_ip: networkInterfaces[0].accessConfigs[0].natIP | default(None)
gce_status: status
gce_subnetwork: networkInterfaces[0].subnetwork.name
gce_tags: tags.get("items", [])
gce_zone: zone
hostnames:
- name
- public_ip
- private_ip
keyed_groups:
- key: gce_subnetwork
  prefix: network
- key: gce_private_ip
  prefix: "
  separator: "
- key: gce_public_ip
  prefix: "
  separator: "
- key: machineType
  prefix: "
  separator: "
- key: zone

```

```

    prefix: "
    separator: "
  - key: gce_tags
    prefix: tag
  - key: status | lower
    prefix: status
  - key: image
    prefix: "
    separator: "
plugin: google.cloud.gcp_compute
retrieve_image_info: true
use_contrib_script_compatible_sanitization: true

```

### 19.3. MICROSOFT AZURE RESOURCE MANAGER

```

conditional_groups:
  azure: true
default_host_filters: []
fail_on_template_errors: false
hostvar_expressions:
  computer_name: name
  private_ip: private_ipv4_addresses[0] if private_ipv4_addresses else None
  provisioning_state: provisioning_state | title
  public_ip: public_ipv4_addresses[0] if public_ipv4_addresses else None
  public_ip_id: public_ip_id if public_ip_id is defined else None
  public_ip_name: public_ip_name if public_ip_name is defined else None
  tags: tags if tags else None
  type: resource_type
keyed_groups:
  - key: location
    prefix: "
    separator: "
  - key: tags.keys() | list if tags else []
    prefix: "
    separator: "
  - key: security_group
    prefix: "
    separator: "
  - key: resource_group
    prefix: "
    separator: "
  - key: os_disk.operating_system_type
    prefix: "
    separator: "
  - key: dict(tags.keys() | map("regex_replace", "^(.*)$", "\1_") | list | zip(tags.values() | list)) if tags else []
    prefix: "
    separator: "
plain_host_names: true
plugin: azure.azcollection.azure_rm
use_contrib_script_compatible_sanitization: true

```

### 19.4. VMWARE VCENTER



```
compose:
  ansible_host: guest.ipAddress
  ansible_ssh_host: guest.ipAddress
  ansible_uuid: 99999999 | random | to_uuid
  availablefield: availableField
  configissue: configIssue
  configstatus: configStatus
  customvalue: customValue
  effectiveverole: effectiveRole
  guestheartbeatstatus: guestHeartbeatStatus
  layoutex: layoutEx
  overallstatus: overallStatus
  parentvapp: parentVApp
  recenttask: recentTask
  resourcepool: resourcePool
  rootsnapshot: rootSnapshot
  triggeredalarmstate: triggeredAlarmState
filters:
- runtime.powerState == "poweredOn"
keyed_groups:
- key: config.guestId
  prefix: "
  separator: "
- key: "templates" if config.template else "guests"
  prefix: "
  separator: "
plugin: community.vmware.vmware_vm_inventory
properties:
- availableField
- configIssue
- configStatus
- customValue
- datastore
- effectiveRole
- guestHeartbeatStatus
- layout
- layoutEx
- name
- network
- overallStatus
- parentVApp
- permission
- recentTask
- resourcePool
- rootSnapshot
- snapshot
- triggeredAlarmState
- value
- capability
- config
- guest
- runtime
- storage
- summary
strict: false
with_nested_properties: true
```

## 19.5. RED HAT SATELLITE 6

```

group_prefix: foreman_
keyed_groups:
- key: foreman['environment_name'] | lower | regex_replace(' ', '') | regex_replace('[^A-Za-z0-9_]', '_') |
  regex_replace('none', '')
  prefix: foreman_environment_
  separator: ""
- key: foreman['location_name'] | lower | regex_replace(' ', '') | regex_replace('[^A-Za-z0-9_]', '_')
  prefix: foreman_location_
  separator: ""
- key: foreman['organization_name'] | lower | regex_replace(' ', '') | regex_replace('[^A-Za-z0-9_]', '_')
  prefix: foreman_organization_
  separator: ""
- key: foreman['content_facet_attributes']['lifecycle_environment_name'] | lower | regex_replace(' ', '') |
  regex_replace('[^A-Za-z0-9_]', '_')
  prefix: foreman_lifecycle_environment_
  separator: ""
- key: foreman['content_facet_attributes']['content_view_name'] | lower | regex_replace(' ', '') |
  regex_replace('[^A-Za-z0-9_]', '_')
  prefix: foreman_content_view_
  separator: ""
legacy_hostvars: true
plugin: theforeman.foreman.foreman
validate_certs: false
want_facts: true
want_hostcollections: false
want_params: true

```

## 19.6. OPENSTACK

```

expand_hostvars: true
fail_on_errors: true
inventory_hostname: uuid
plugin: openstack.cloud.openstack

```

## 19.7. RED HAT VIRTUALIZATION

```

compose:
  ansible_host: (devices.values() | list)[0][0] if devices else None
keyed_groups:
- key: cluster
  prefix: cluster
  separator: _
- key: status
  prefix: status
  separator: _
- key: tags
  prefix: tag
  separator: _
ovirt_hostname_preference:
- name

```


```
- fqdn  
ovirt_insecure: false  
plugin: ovirt.ovirt.ovirt
```

## 19.8. RED HAT ANSIBLE AUTOMATION PLATFORM

```
include_metadata: true  
inventory_id: <inventory_id or url_quoted_named_url>  
plugin: awx.awx.tower  
validate_certs: <true or false>
```

## CHAPTER 20. JOB TEMPLATES

A job template is a definition and set of parameters for running an Ansible job. Job templates are useful to run the same job many times. They also encourage the reuse of Ansible playbook content and collaboration between teams.

The **Templates** list view shows job templates that are currently available. The default view is collapsed (Compact), showing the template name, template type, and the timestamp of the last job that ran using that template. You can click the arrow  icon next to each entry to expand and view more information. This list is sorted alphabetically by name, but you can sort by other criteria, or search by various fields and attributes of a template.

















**Templates** ↻

>




Add
Delete

1 - 5 of 5
<
>


Name ↑	Type ↑	Last Ran ↑	Actions
> <input type="checkbox"/> <a href="#">Demo Job Template</a>	Job Template	6/13/2021, 1:19:23 PM	  
> <input type="checkbox"/> <a href="#">Example</a>	Job Template	6/13/2021, 1:19:53 PM	  
> <input type="checkbox"/> <a href="#">Job template with dependencies</a>	Job Template	6/13/2021, 1:27:55 PM	  
> <input type="checkbox"/> <a href="#">Job with Slicing</a>	Job Template	6/13/2021, 1:19:53 PM	  
> <input type="checkbox"/> <a href="#">WF Template with examples</a>	Workflow Job Template	6/13/2021, 1:19:53 PM	   

1 - 5 of 5 items
<<
<
1
of 1 page
>
>>

From this screen you can launch , edit , and copy  a workflow job template.



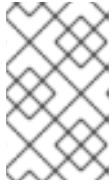
### NOTE

Job templates can be used to build a workflow template. Templates that show the **Workflow Visualizer**  icon next to them are workflow templates. Clicking the icon allows you to build a workflow graphically. Many parameters in a job template enable you to select **Prompt on Launch** that you can change at the workflow level, and do not affect the values assigned at the job template level. For instructions, see the [Workflow Visualizer](#) section.

## 20.1. CREATING A JOB TEMPLATE

### Procedure

1. On the **Templates** list view, click **Add** → **Add job template**.
2. Enter the appropriate details in the following fields:




## NOTE

If a field has the **Prompt on launch** checkbox selected, launching the job prompts you for the value for that field when launching. Most prompted values override any values set in the job template. Exceptions are noted in the following table.

Field	Options	Prompt on Launch
Name	Enter a name for the job.	N/A
Description	Enter an arbitrary description as appropriate (optional).	N/A
Job Type	<p>Choose a job type:</p> <ul style="list-style-type: none"> <li>● Run: Start the playbook when launched, running Ansible tasks on the selected hosts.</li> <li>● Check: Perform a "dry run" of the playbook and report changes that would be made without actually making them. Tasks that do not support check mode are missed and do not report potential changes.</li> </ul> <p>For more information about job types see the <a href="#">Playbooks</a> section of the Ansible documentation.</p>	Yes
Inventory	<p>Choose the inventory to be used with this job template from the inventories available to the logged in user.</p> <p>A System Administrator must grant you or your team permissions to be able to use certain inventories in a job template.</p>	<p>Yes.</p> <p>Inventory prompts show up as its own step in a later prompt window.</p>
Project	Select the project to use with this job template from the projects available to the user that is logged in.	N/A

Field	Options	Prompt on Launch
SCM branch	<p>This field is only present if you chose a project that allows branch override. Specify the overriding branch to use in your job run. If left blank, the specified SCM branch (or commit hash or tag) from the project is used.</p> <p>For more information, see <a href="#">Job branch overriding</a>.</p>	Yes
Execution Environment	<p>Select the container image to be used to run this job. You must select a project before you can select an execution environment.</p>	Yes.  Execution environment prompts show up as its own step in a later prompt window.
Playbook	<p>Choose the playbook to be launched with this job template from the available playbooks. This field automatically populates with the names of the playbooks found in the project base path for the selected project. Alternatively, you can enter the name of the playbook if it is not listed, such as the name of a file (such as foo.yml) you want to use to run with that playbook. If you enter a filename that is not valid, the template displays an error, or causes the job to fail.</p>	N/A


Field	Options	Prompt on Launch
<p>Credentials</p>	<p>Select the  icon to open a separate window.</p> <p>Choose the credential from the available options to use with this job template.</p> <p>Use the drop-down menu list to filter by credential type if the list is extensive. Some credential types are not listed because they do not apply to certain job templates.</p>	<ul style="list-style-type: none"> <li>● If selected, when launching a job template that has a default credential and supplying another credential replaces the default credential if it is the same type. The following is an example this message:</li> </ul> <p><b>Job Template default credentials must be replaced with one of the same type. Please select a credential for the following types in order to proceed: Machine.</b></p> <ul style="list-style-type: none"> <li>● Alternatively, you can add more credentials as you see fit.</li> <li>● Credential prompts show up as its own step in a later prompt window.</li> </ul>

Field	Options	Prompt on Launch
Labels	<ul style="list-style-type: none"> <li>● Optionally supply labels that describe this job template, such as <b>dev</b> or <b>test</b>.</li> <li>● Use labels to group and filter job templates and completed jobs in the display.</li> <li>● Labels are created when they are added to the job template. Labels are associated with a single Organization by using the Project that is provided in the job template. Members of the Organization can create labels on a job template if they have edit permissions (such as the admin role).</li> <li>● Once you save the job template, the labels appear in the <b>Job Templates</b> overview in the Expanded view.</li> <li>● Select <b>X</b> beside a label to remove it. When a label is removed, it is no longer associated with that particular Job or Job Template, but it remains associated with any other jobs that reference it.</li> <li>● Jobs inherit labels from the Job Template at the time of launch. If you delete a label from a Job Template, it is also deleted from the Job.</li> </ul>	<ul style="list-style-type: none"> <li>● If selected, even if a default value is supplied, you are prompted when launching to supply additional labels, if needed.</li> <li>● You cannot delete existing labels, selecting <b>X</b> only removes the newly added labels, not existing default labels.</li> </ul>



Field	Options	Prompt on Launch
Variables	<ul style="list-style-type: none"> <li>● Pass extra command line variables to the playbook. This is the "-e" or "-extra-vars" command line parameter for ansible-playbook that is documented in the Ansible documentation at <a href="#">Defining variables at runtime</a>.</li> <li>● Provide key or value pairs by using either YAML or JSON. These variables have a maximum value of precedence and overrides other variables specified elsewhere. The following is an example value: <b>git_branch: production release_version: 1.5</b></li> </ul>	<p>Yes.</p> <p>If you want to be able to specify <b>extra_vars</b> on a schedule, you must select <b>Prompt on launch</b> for Variables on the job template, or enable a survey on the job template. Those answered survey questions become <b>extra_vars</b>.</p>
Forks	<p>The number of parallel or simultaneous processes to use while executing the playbook. A value of zero uses the Ansible default setting, which is five parallel processes unless overridden in <b>/etc/ansible/ansible.cfg</b>.</p>	<p>Yes</p>
Limit	<p>A host pattern to further constrain the list of hosts managed or affected by the playbook. You can separate many patterns by colons (:). As with core Ansible:</p> <ul style="list-style-type: none"> <li>● a:b means "in group a or b"</li> <li>● a:b&amp;c means "in a or b but must be in c"</li> <li>● a:!b means "in a, and definitely not in b"</li> </ul> <p>For more information, see <a href="#">Patterns: targeting hosts and groups</a> in the Ansible documentation.</p>	<p>Yes</p> <p>If not selected, the job template executes against all nodes in the inventory or only the nodes predefined on the <b>Limit</b> field. When running as part of a workflow, the workflow job template limit is used instead.</p>

Field	Options	Prompt on Launch
Verbosity	<p>Control the level of output Ansible produces as the playbook executes. Choose the verbosity from Normal to various Verbose or Debug settings. This only appears in the <b>details</b> report view. Verbose logging includes the output of all commands. Debug logging is exceedingly verbose and includes information about SSH operations that can be useful in certain support instances.</p> <p>Verbosity <b>5</b> causes automation controller to block heavily when jobs are running, which could delay reporting that the job has finished (even though it has) and can cause the browser tab to lock up.</p>	Yes
Job Slicing	<p>Specify the number of slices you want this job template to run. Each slice runs the same tasks against a part of the inventory. For more information about job slices, see <a href="#">Job Slicing</a>.</p>	Yes

Field	Options	Prompt on Launch
Timeout	<p>This enables you to specify the length of time (in seconds) that the job can run before it is canceled. Consider the following for setting the timeout value:</p> <ul style="list-style-type: none"> <li>• There is a global timeout defined in the settings which defaults to 0, indicating no timeout.</li> <li>• A negative timeout (&lt;0) on a job template is a true "no timeout" on the job.</li> <li>• A timeout of 0 on a job template defaults the job to the global timeout (which is no timeout by default).</li> <li>• A positive timeout sets the timeout for that job template.</li> </ul>	Yes
Show Changes	Enables you to see the changes made by Ansible tasks.	Yes
Instance Groups	<p>Choose <a href="#">Instance and Container Groups</a> to associate with this job template. If the list is extensive, use the  icon to narrow the options. Job template instance groups contribute to the job scheduling criteria, see <a href="#">Job Runtime Behavior</a> and <a href="#">Control where a job runs</a> for rules. A System Administrator must grant you or your team permissions to be able to use an instance group in a job template. Use of a container group requires admin rights.</p>	<ul style="list-style-type: none"> <li>• Yes.</li> </ul> <p>If selected, you are providing the jobs preferred instance groups in order of preference. If the first group is out of capacity, later groups in the list are considered until one with capacity is available, at which point that is selected to run the job.</p> <ul style="list-style-type: none"> <li>• If you prompt for an instance group, what you enter replaces the normal instance group hierarchy and overrides all of the organizations' and inventories' instance groups.</li> <li>• The Instance Groups prompt shows up as its own step in a later prompt window.</li> </ul>

Field	Options	Prompt on Launch
Job Tags	Type and select the <b>Create</b> menu to specify which parts of the playbook should be executed. For more information and examples see <a href="#">Tags</a> in the Ansible documentation.	Yes
Skip Tags	Type and select the <b>Create</b> menu to specify certain tasks or parts of the playbook to skip. For more information and examples see <a href="#">Tags</a> in the Ansible documentation.	Yes

3. Specify the following **Options** for launching this template, if necessary:

- **Privilege Escalation:** If checked, you enable this playbook to run as an administrator. This is the equivalent of passing the **--become** option to the **ansible-playbook** command.
- **Provisioning Callbacks:** If checked, you enable a host to call back to automation controller through the REST API and start a job from this job template. For more information, see [Provisioning Callbacks](#).
- **Enable Webhook:** If checked, you turn on the ability to interface with a predefined SCM system web service that is used to launch a job template. GitHub and GitLab are the supported SCM systems.

- If you enable webhooks, other fields display, prompting for additional information:

- **Webhook Service:** Select which service to listen for webhooks from.
- **Webhook URL:** Automatically populated with the URL for the webhook service to POST requests to.
- **Webhook Key:** Generated shared secret to be used by the webhook service to sign payloads sent to automation controller. You must configure this in the settings on the webhook service in order for automation controller to accept webhooks from this service.
- **Webhook Credential:** Optionally, provide a GitHub or GitLab personal access token (PAT) as a credential to use to send status updates back to the webhook service. Before you can select it, the credential must exist. See [Credential Types](#) to create one.
- For additional information about setting up webhooks, see [Working with Webhooks](#).
- **Concurrent Jobs:** If checked, you are allowing jobs in the queue to run simultaneously if not dependent on one another. Check this box if you want to run job slices simultaneously. For more information, see [Automation controller capacity determination and job impact](#).

- **Enable Fact Storage** If checked, automation controller stores gathered facts for all hosts in an inventory related to the job running.
  - **Prevent Instance Group Fallback** Check this option to allow only the instance groups listed in the **Instance Groups** field to run the job. If clear, all available instances in the execution pool are used based on the hierarchy described in [Control where a job runs](#).
4. Click **Save**, when you have completed configuring the details of the job template.

Saving the template does not exit the job template page but advances to the **Job Template Details** tab. After saving the template, you can click **Launch** to launch the job, or click **Edit** to add or change the attributes of the template, such as permissions, notifications, view completed jobs, and add a survey (if the job type is not a scan). You must first save the template before launching, otherwise, **Launch** remains disabled.

Templates > JT with lots of prompts 🔍

### Details

◀ Back to Templates   **Details**   Access   Notifications   Schedules   Jobs   Survey

<b>Name</b>	JT with lots of prompts	<b>Job Type</b> ⓘ	run	<b>Organization</b>	Default
<b>Inventory</b> ⓘ	Demo Inventory (Prompt on launch)	<b>Project</b> ⓘ	Demo Project	<b>Execution Environment</b> ⓘ	Control Plane Execution Environment
<b>Playbook</b> ⓘ	hello_world.yml	<b>Forks</b> ⓘ	0	<b>Verbosity</b> ⓘ	0 (Normal)
<b>Timeout</b> ⓘ	0	<b>Show Changes</b> ⓘ	Off	<b>Job Slicing</b> ⓘ	1
<b>Created</b>	10/10/2022, 3:12:59 PM by admin	<b>Last Modified</b>	10/12/2022, 2:05:10 PM by admin		
<b>Enabled Options</b> ⓘ	Concurrent Jobs				
<b>Labels</b> ⓘ	existing label				
<b>Variables</b> ⓘ	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <span style="background-color: #007bff; color: white; padding: 2px 5px;">YAML</span> <span style="background-color: #6c757d; color: white; padding: 2px 5px; margin-left: 5px;">JSON</span> <span style="float: right; font-size: 0.8em;">✕</span> </div> <pre style="margin: 0;"> 1 --- 2 ansible_ssh_user: ec2 3 ansible_connection: local </pre>				
	<div style="display: flex; gap: 10px; margin-top: 10px;"> <span style="background-color: #007bff; color: white; padding: 5px 10px; border-radius: 3px;">Edit</span> <span style="background-color: #6c757d; color: white; padding: 5px 10px; border-radius: 3px; opacity: 0.5;">Launch</span> <span style="background-color: #6c757d; color: white; padding: 5px 10px; border-radius: 3px; opacity: 0.5;">Delete</span> </div>				

## Verification

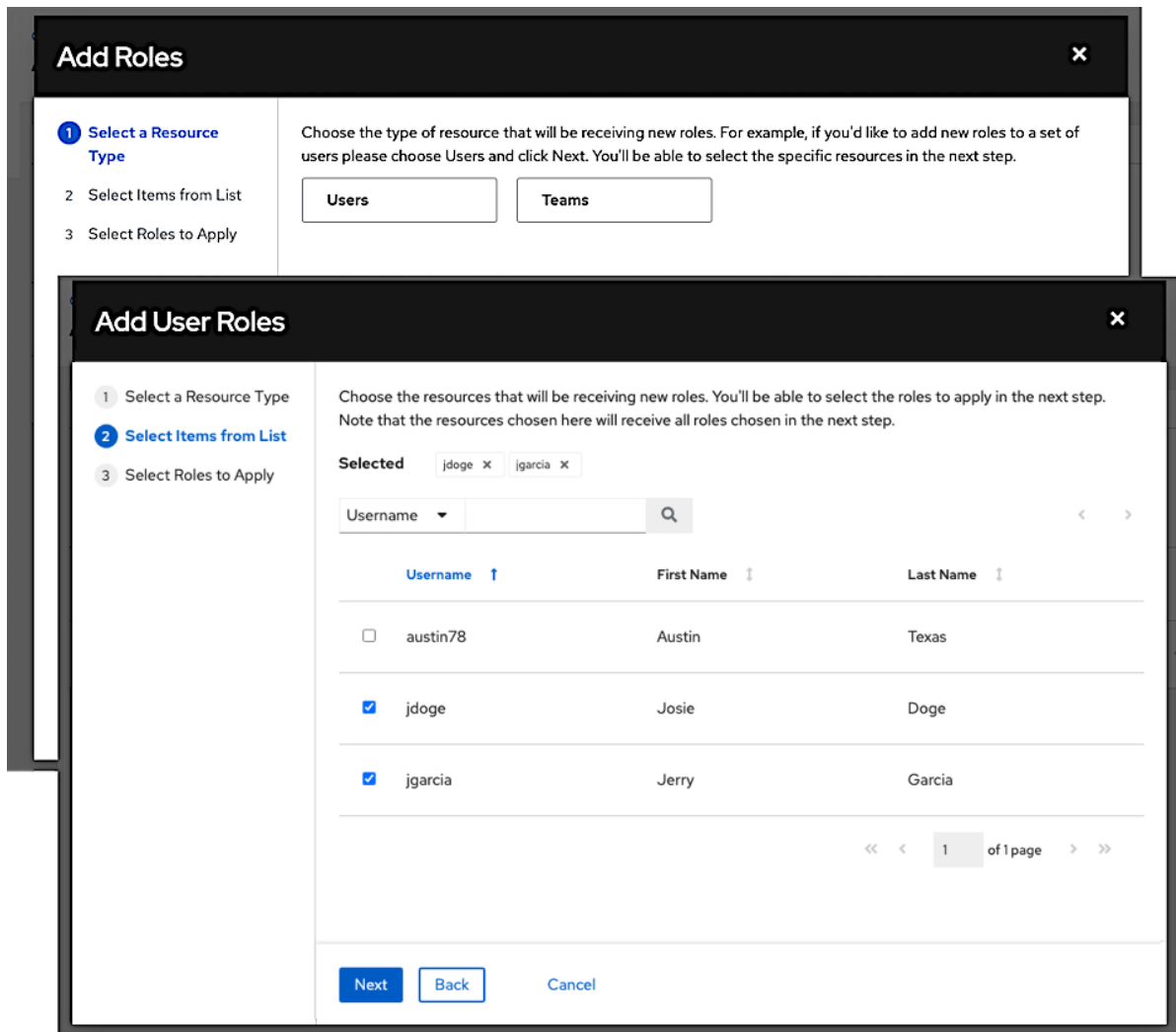
1. From the navigation panel, select **Resources** → **Templates**.
2. Verify that the newly created template appears on the **Templates** list view.

## 20.2. ADDING PERMISSIONS TO TEMPLATES

Use the following steps to add permissions for the team.

### Procedure

1. From the navigation panel, select **Resources** → **Templates**.
2. Select a template, and in the **Access** tab, click **Add**.
3. Select **Users** or **Teams** and click **Next**.
4. Select one or more users or teams from the list by clicking the check boxes next to the names to add them as members and click **Next**.  
The following example shows two users have been selected to be added:



- Choose the roles that you want users or teams to have. Ensure that you scroll down for a complete list of roles. Each resource has different options available.
- Click **Save** to apply the roles to the selected users or teams and to add them as members.

The window to add users and teams closes to display the the updated roles assigned for each user and team:

Username	First name	Last name	Roles
admin			User Roles: System Administrator
austin78	Austin	Austin	User Roles: Member, System Auditor
jgarcia	Jerry	Jerry	User Roles: Credential Admin, Job Template Admin, Auditor, Member
jdoge	Josie	Josie	User Roles: Project Admin, Credential Admin, Job Template Admin, Auditor

To remove roles for a particular user, click the **X** icon next to its resource.

This launches a confirmation dialog, asking you to confirm the disassociation.

## 20.3. DELETING A JOB TEMPLATE

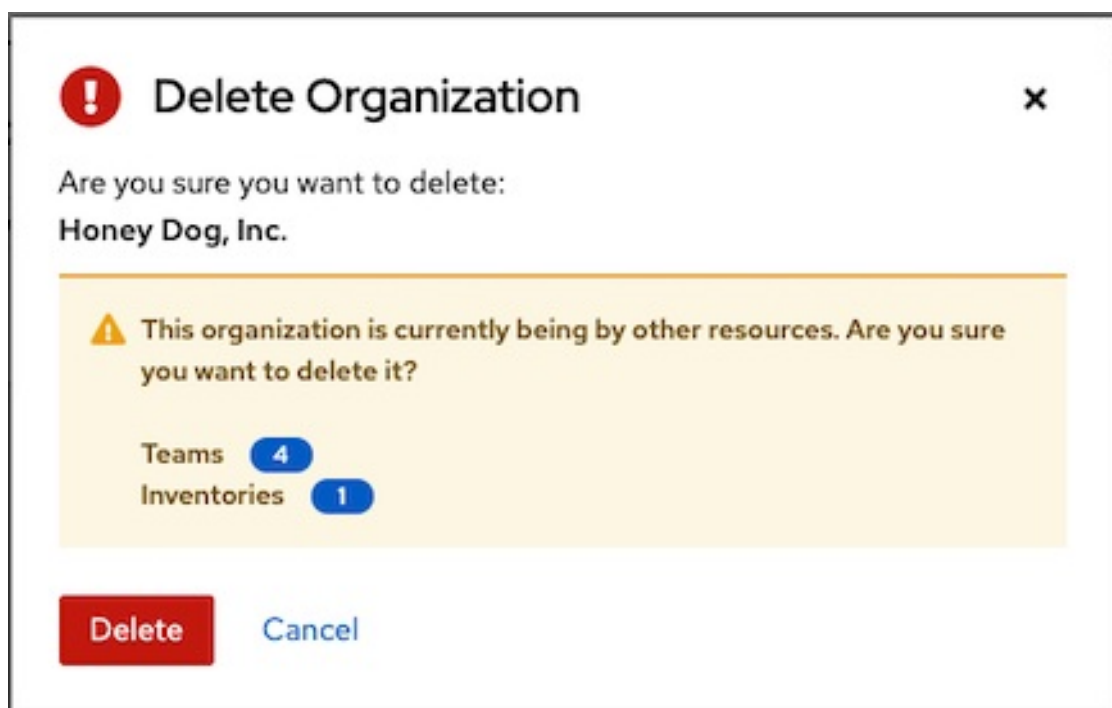
Before deleting a job template, ensure that it is not used in a workflow job template.

### Procedure

1. Delete a job template by using one of these methods:
  - Select the checkbox next to one or more job templates and click **Delete**.
  - Click the desired job template and click **Delete**, on the **Details** page.

### NOTE

If deleting items that are used by other work items, a message opens listing the items that are affected by the deletion and prompts you to confirm the deletion. Some screens contain items that are invalid or previously deleted, and will fail to run. The following is an example of that message:



## 20.4. WORK WITH NOTIFICATIONS

From the navigation panel, select **Administration** → **Notifications**. This enables you to review any notification integrations you have set up and their statuses, if they have run.

**Notification Templates** ↻

Name    1 - 4 of 4 < >

Name ↑	Status	Type ↑	Actions
<input type="checkbox"/> Email notification	<span style="color: green;">✔ Successful</span>	Email	<input type="checkbox"/> <input type="button" value="🔔"/> <input type="button" value="✎"/> <input type="button" value="🗑️"/>
<input type="checkbox"/> Grafana notification	<span style="color: green;">✔ Successful</span>	Grafana	<input type="checkbox"/> <input type="button" value="🔔"/> <input type="button" value="✎"/> <input type="button" value="🗑️"/>
<input type="checkbox"/> IRC Notification		IRC	<input type="checkbox"/> <input type="button" value="🔔"/> <input type="button" value="✎"/> <input type="button" value="🗑️"/>
<input type="checkbox"/> Slack notification	<span style="color: green;">✔ Successful</span>	Slack	<input type="checkbox"/> <input type="button" value="🔔"/> <input type="button" value="✎"/> <input type="button" value="🗑️"/>

1 - 4 of 4 items << < 1 of 1 page > >>

Use the toggles to enable or disable the notifications to use with your particular template. For more information, see [Enable and Disable Notifications](#).

If no notifications have been set up, click **Add** to create a new notification. For more information on configuring various notification types and extended messaging, see [Notification Types](#).

## 20.5. VIEW COMPLETED JOBS

The **Jobs** tab provides the list of job templates that have run. Click the expand icon next to each job to view the following details:

- Status
- ID and name
- Type of job
- Time started and completed
- Who started the job and which template, inventory, project, and credential were used.

You can filter the list of completed jobs using any of these criteria.



Templates > Demo Job Template

## Jobs

◀ Back to Templates Details Access Notifications Schedules **Jobs** Survey

1 - 5 of 7

Name	Status	Start Time	Finish Time	Actions
23 – Demo Job Template	Pending			
21 – Demo Job Template	Successful	5/25/2021, 10:46:25 AM		
19 – Demo Job Template	Successful	5/25/2021, 10:46:22 AM		
17 – Demo Job Template	Canceled	5/25/2021, 10:09:13 AM		
15 – Demo Job Template	Successful	5/25/2021, 10:06:48 AM		

1 - 5 of 7 items 1 of 2 pages

Sliced jobs that display on this list are labeled accordingly, with the number of sliced jobs that have run:

Project Demo Project Execution Environment Control Plane Execution Environment

8 – Demo Job Template Error Playbook Run 6/13/2022, 1:19:11 PM 6/13/2022, 1:19:11 PM

Launched By admin Job Template Demo Job Template Inventory Demo Inventory

Project Demo Project Execution Environment Default execution environment

Credentials SSH: Demo Credential

Job Slice 0/1

## 20.6. SCHEDULING JOB TEMPLATES

Access the schedules for a particular job template from the **Schedules** tab.

Templates > Demo Job Template

## Schedules

◀ Back to Templates Details Access Notifications **Schedules** Jobs Survey

1 - 1 of 1

Name	Type	Next Run	Actions
Daily routine schedule	Playbook Run	Next Run 7/3/2022, 6:00:00 PM	On

1 - 1 of 1 items 1 of 1 page

### Procedure

- To schedule a job template, select the **Schedules** tab, and choose the appropriate method:
  - If schedules are already set up, review, edit, enable or disable your schedule preferences.

- If schedules have not been set up, see [Schedules](#) for more information.

If you select **Prompt on Launch** for the **Credentials field**, and you create or edit scheduling information for your job template, a **Prompt** option displays on the Schedules form.

You cannot remove the default machine credential in the **Prompt** dialog without replacing it with another machine credential before you can save it.



#### NOTE

To set **extra\_vars** on schedules, you must select **Prompt on Launch** for **Variables** on the job template, or configure and enable a survey on the job template.

The answered survey questions then become **extra\_vars**.

## 20.7. SURVEYS IN JOB TEMPLATES

Job types of **Run** or **Check** provide a way to set up surveys in the **Job Template** creation or editing screens. Surveys set extra variables for the playbook similar to **Prompt for Extra Variables** does, but in a user-friendly question and answer way. Surveys also permit for validation of user input. Select the **Survey** tab to create a survey.

### Example

Surveys can be used for a number of situations. For example, operations want to give developers a "push to stage" button that they can run without advance knowledge of Ansible. When launched, this task could prompt for answers to questions such as "What tag should we release?".

Many types of questions can be asked, including multiple-choice questions.

### 20.7.1. Creating a survey

#### Procedure

1. From the **Survey** tab, click **Add**.
2. A survey can consist of any number of questions. For each question, enter the following information:
  - **Question:** The question to ask the user.
  - Optional: **Description:** A description of what is being asked of the user.
  - **Answer variable name:** The Ansible variable name to store the user's response in. This is the variable to be used by the playbook. Variable names cannot contain spaces.
  - **Answer type:** Choose from the following question types:
    - **Text:** A single line of text. You can set the minimum and maximum length (in characters) for this answer.
    - **Textarea:** A multi-line text field. You can set the minimum and maximum length (in characters) for this answer.


- **Password:** Responses are treated as sensitive information, much like an actual password is treated. You can set the minimum and maximum length (in characters) for this answer.
- **Multiple Choice (single select):** A list of options, of which only one can be selected at a time. Enter the options, one per line, in the **Multiple Choice Options** field.
- **Multiple Choice (multiple select):** A list of options, any number of which can be selected at a time. Enter the options, one per line, in the **Multiple Choice Options** field.
- **Integer:** An integer number. You can set the minimum and maximum length (in characters) for this answer.
- **Float:** A decimal number. You can set the minimum and maximum length (in characters) for this answer.
- **Required:** Whether or not an answer to this question is required from the user.
- **Minimum length and Maximum length** Specify if a certain length in the answer is required.
- **Default answer:** The default answer to the question. This value is pre-filled in the interface and is used if the answer is not provided by the user.

Templates > Demo Job Template > Survey ↻

**Add Question**

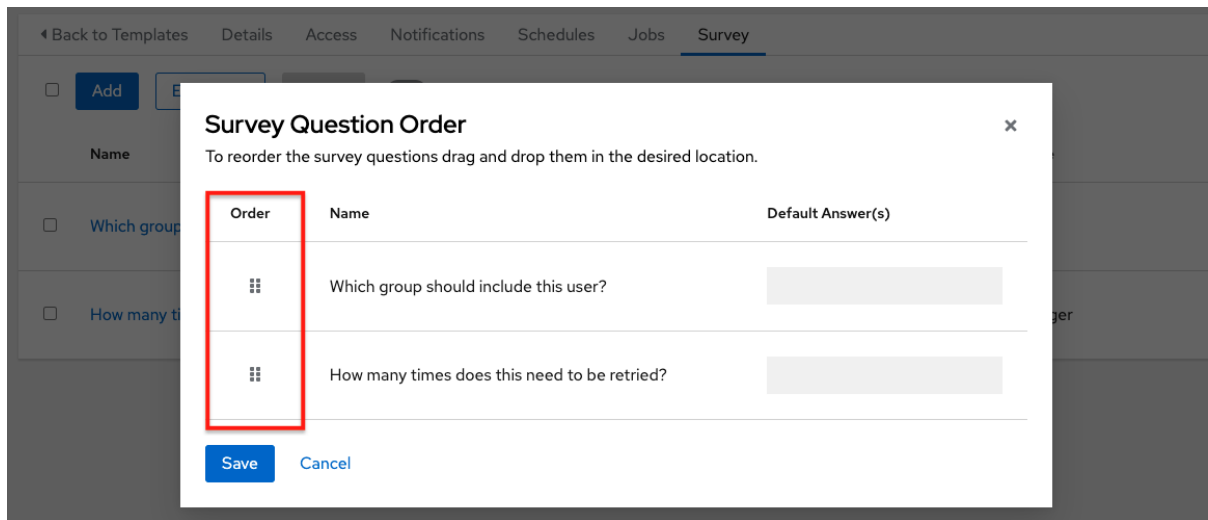
<b>Question *</b>	<b>Description</b>	<b>Answer variable name *</b> ⓘ
<input type="text" value="Which group should include this user?"/>	<input type="text" value="Enter groups, one per line."/>	<input type="text" value="group_name"/>
<b>Answer type *</b> ⓘ	<input checked="" type="checkbox"/> <b>Required</b>	
<input type="text" value="Text"/>		
<b>Minimum length</b>	<b>Maximum length</b>	<b>Default answer</b>
<input type="text" value="0"/>	<input type="text" value="1024"/>	<input type="text"/>
<input type="button" value="Save"/> <input type="button" value="Cancel"/>		

3. Once you have entered the question information, click **Save** to add the question.

The survey question displays in the **Survey** list. For any question, you can click  to edit it.

Check the box next to each question and click **Delete** to delete the question, or use the toggle option in the menu bar to enable or disable the survey prompts.

If you have more than one survey question, click **Edit Order** to rearrange the order of the questions by clicking and dragging on the grid icon.



- To add more questions, click **Add**.

### 20.7.2. Optional survey questions

The **Required** setting on a survey question determines whether the answer is optional or not for the user interacting with it.

Optional survey variables can also be passed to the playbook in **extra\_vars**.

- If a non-text variable (input type) is marked as optional, and is not filled in, no survey **extra\_var** is passed to the playbook.
- If a text input or text area input is marked as optional, is not filled in, and has a minimum **length > 0**, no survey **extra\_var** is passed to the playbook.
- If a text input or text area input is marked as optional, is not filled in, and has a minimum **length === 0**, that survey **extra\_var** is passed to the playbook, with the value set to an empty string ("").

## 20.8. LAUNCHING A JOB TEMPLATE

A benefit of automation controller is the push-button deployment of Ansible playbooks. You can configure a template to store all the parameters that you would normally pass to the Ansible playbook on the command line. In addition to the playbooks, the template passes the inventory, credentials, extra variables, and all options and settings that you can specify on the command line.

Easier deployments drive consistency, by running your playbooks the same way each time, and allowing you to delegate responsibilities.

### Procedure

- Launch a job template by using one of these methods:
  - From the navigation panel, select **Templates** → **Launch** next to the job template.

Templates 🔍

>  Name    
1 - 5 of 5 < >

Name <span style="font-size: small;">↑</span>	Type <span style="font-size: small;">↓</span>	Last Ran <span style="font-size: small;">↓</span>	Actions
> <input type="checkbox"/> <a href="#">Demo Job Template</a>	Job Template	6/13/2021, 1:19:23 PM	🔍 ✎ 🗑️
> <input type="checkbox"/> <a href="#">Example</a>	Job Template	6/13/2021, 1:19:53 PM	🔍 ✎ 🗑️
> <input type="checkbox"/> <a href="#">Job template with dependencies</a>	Job Template	6/13/2021, 1:27:55 PM	🔍 ✎ 🗑️
> <input type="checkbox"/> <a href="#">Job with Slicing</a>	Job Template	6/13/2021, 1:19:53 PM	🔍 ✎ 🗑️
> <input type="checkbox"/> <a href="#">WF Template with examples</a>	Workflow Job Template	6/13/2021, 1:19:53 PM	🔍 ✎ 🗑️

1 - 5 of 5 items << < 1 of 1 page > >>

- In the job template **Details** view of the job template you want to launch, click **Launch**.

A job can require additional information to run. The following data can be requested at launch:

- Credentials that were setup
- The option **Prompt on Launch** is selected for any parameter
- Passwords or passphrases that have been set to **Ask**
- A survey, if one has been configured for the job templates
- Extra variables, if requested by the job template



## NOTE

If a job has user-provided values, then those are respected upon relaunch. If the user did not specify a value, then the job uses the default value from the job template. Jobs are not relaunched as-is. They are relaunched with the user prompts re-applied to the job template.

If you provide values on one tab, return to a previous tab, continuing to the next tab results in having to re-provide values on the rest of the tabs. Ensure that you fill in the tabs in the order that the prompts appear.

When launching, automation controller automatically redirects the web browser to the **Job Status** page for this job under the **Jobs** tab.

You can re-launch the most recent job from the list view to re-run on all hosts or just failed hosts in the specified inventory. For more information, see the [Jobs](#) section.

When slice jobs are running, job lists display the workflow and job slices, as well as a link to view their details individually.




## NOTE

You can launch jobs in bulk using the newly added endpoint in the API, `/api/v2/bulk/job_launch`. This endpoint accepts JSON and you can specify a list of unified job templates (such as job templates and project updates) to launch. The user must have the appropriate permission to launch all the jobs. If all jobs are not launched an error is returned indicating why the operation was not able to complete. Use the **OPTIONS** request to return relevant schema. For more information, see the [Bulk endpoint](#) of the Reference section of the Automation Controller API Guide.

## 20.9. COPYING A JOB TEMPLATE

If you copy a job template, it does not copy any associated schedule, notifications, or permissions. Schedules and notifications must be recreated by the user or administrator creating the copy of the job template. The user copying the Job Template is granted administrator permission, but no permissions are assigned (copied) to the job template.

### Procedure

1. From the navigation panel, select **Resources** → **Templates**.
2. Click the  icon associated with the template that you want to copy.
  - The new template with the name of the template from which you copied and a timestamp displays in the list of templates.
3. Click to open the new template and click **Edit**.
4. Replace the contents of the **Name** field with a new name, and provide or modify the entries in the other fields to complete this page.
5. Click **Save**.

## 20.10. SCAN JOB TEMPLATES

Scan jobs are no longer supported starting with automation controller 3.2. This system tracking feature was used as a way to capture and store facts as historical data. Facts are now stored in the controller through fact caching. For more information, see [Fact Caching](#).

Job template scan jobs in your system before automation controller 3.2, are converted to type run, like normal job templates. They retain their associated resources, such as inventories and credentials. By default, job template scan jobs that do not have a related project are assigned a special playbook. You can also specify a project with your own scan playbook. A project is created for each organization that points to [awx-facts-playbooks](#) and the job template was set to the playbook: [https://github.com/ansible/tower-fact-modules/blob/master/scan\\_facts.yml](https://github.com/ansible/tower-fact-modules/blob/master/scan_facts.yml).

### 20.10.1. Fact scan playbooks

The scan job playbook, `scan_facts.yml`, contains invocations of three **fact scan modules** - packages, services, and files, along with Ansible's standard fact gathering. The `scan_facts.yml` playbook file is similar to this:

```
- hosts: all
  vars:
    scan_use_checksum: false
```

```

scan_use_recursive: false
tasks:
- scan_packages:
- scan_services:
- scan_files:
  paths: '{{ scan_file_paths }}'
  get_checksum: '{{ scan_use_checksum }}'
  recursive: '{{ scan_use_recursive }}'
  when: scan_file_paths is defined

```

The **scan\_files** fact module is the only module that accepts parameters, passed through **extra\_vars** on the scan job template:

**scan\_file\_paths**: /tmp/scan\_use\_checksum: true **scan\_use\_recursive**: true

- The **scan\_file\_paths** parameter can have multiple settings (such as **/tmp/** or **/var/log**).
- The **scan\_use\_checksum** and **scan\_use\_recursive** parameters can also be set to false or omitted. An omission is the same as a false setting.

Scan job templates should enable **become** and use **credentials** for which **become** is a possibility. You can enable **become** by checking **Privilege Escalation** from the options menu:



### 20.10.2. Supported OSES for scan\_facts.yml

If you use the **scan\_facts.yml** playbook with use fact cache, ensure that you are using one of the following supported operating systems:

- Red Hat Enterprise Linux 5, 6, 7, 8, and 9
- Ubuntu 23.04 (Support for Ubuntu is deprecated and will be removed in a future release)
- OEL 6 and 7
- SLES 11 and 12
- Debian 6, 7, 8, 9, 10, 11, and 12
- Fedora 22, 23, and 24
- Amazon Linux 2023.1.20230912
- Windows Server 2008 and later

Some of these operating systems require initial configuration to run python or have access to the python packages, such as **python-apt**, which the scan modules depend on.

### 20.10.3. Pre-scan setup

The following are examples of playbooks that configure certain distributions so that scan jobs can be run against them:

```

Bootstrap Ubuntu (16.04)
---
- name: Get Ubuntu 16, and on ready
  hosts: all
  sudo: yes
  gather_facts: no
  tasks:
    - name: install python-simplejson
      raw: sudo apt-get -y update
      raw: sudo apt-get -y install python-simplejson
      raw: sudo apt-get install python-apt

```

```

Bootstrap Fedora (23, 24)
---
- name: Get Fedora ready
  hosts: all
  sudo: yes
  gather_facts: no
  tasks:
    - name: install python-simplejson
      raw: sudo dnf -y update
      raw: sudo dnf -y install python-simplejson
      raw: sudo dnf -y install rpm-python

```

#### 20.10.4. Custom fact scans

A playbook for a custom fact scan is similar to the example in the [Fact scan playbooks](#) section. For example, a playbook that only uses a custom **scan\_foo** Ansible fact module looks similar to this:

```

scan_foo.py:
def main():
    module = AnsibleModule(
        argument_spec = dict())

    foo = [
        {
            "hello": "world"
        },
        {
            "foo": "bar"
        }
    ]
    results = dict(ansible_facts=dict(foo=foo))
    module.exit_json(**results)

main()

```

To use a custom fact module, ensure that it lives in the **/library/** subdirectory of the Ansible project used in the scan job template. This fact scan module returns a hard-coded set of facts:

```

[
  {

```



```

"hello": "world"
},
{
"foo": "bar"
}
]

```

For more information, see the [Developing modules](#) section of the Ansible documentation.

### 20.10.5. Fact caching

Automation controller can store and retrieve facts on a per-host basis through an Ansible Fact Cache plugin. This behavior is configurable on a per-job template basis. Fact caching is turned off by default but can be enabled to serve fact requests for all hosts in an inventory related to the job running. This enables you to use job templates with `--limit` while still having access to the entire inventory of host facts. A global timeout setting that the plugin enforces per-host, can be specified (in seconds) through the **Jobs** settings menu:

The screenshot shows the 'Edit Details' page for a job template. The 'Per-Host Ansible Fact Cache Timeout' field is highlighted with a red box and set to 0. Other settings include Job execution path (/tmp), Maximum Scheduled Jobs (10), Default Job Timeout (0), Default Job Idle Timeout (0), Default Inventory Update Timeout (0), Default Project Update Timeout (0), Maximum number of forks per job (200), When can extra variables contain Jinja templates? (Template), Run Project Updates With Higher Verbosity (Off), Ignore Ansible Galaxy SSL Certificate Verification (Off), Enable Role Download (On), Enable Collection(s) Download (On), Follow symlinks (Off), and Expose host paths for Container Groups (Off). The Ansible Modules Allowed for Ad Hoc Jobs list includes command, shell, yum, apt, apt\_key, apt\_repository, apt\_rpm, service, and group.

After launching a job that uses fact cache (`use_fact_cache=True`), each host's **ansible\_facts** are all stored by the controller in the job's inventory.

The Ansible Fact Cache plugin that ships with automation controller is enabled on jobs with fact cache enabled (`use_fact_cache=True`).

When a job that has fact cache enabled (`use_fact_cache=True`) has run, automation controller restores all records for the hosts in the inventory. Any records with update times newer than the currently stored facts per-host are updated in the database.

New and changed facts are logged through automation controller's logging facility. Specifically, to the **system\_tracking namespace** or logger. The logging payload includes the following fields:

- **host\_name**
- **inventory\_id**

- **ansible\_facts**

**ansible facts** is a dictionary of all Ansible facts for **host\_name** in the automation controller inventory, **inventory\_id**.

**NOTE**

If a hostname includes a forward slash (/), fact cache does not work for that host. If you have an inventory with 100 hosts and one host has a / in the name, the remaining 99 hosts still collect facts.

**20.10.6. Benefits of fact caching**

Fact caching saves you time over running fact gathering. If you have a playbook in a job that runs against a thousand hosts and forks, you can spend 10 minutes gathering facts across all of those hosts. However, if you run a job on a regular basis, the first run of it caches these facts and the next run pulls them from the database. This reduces the runtime of jobs against large inventories, including Smart Inventories.

**NOTE**

Do not modify the `ansible.cfg` file to apply fact caching. Custom fact caching could conflict with the controller's fact caching feature. You must use the fact caching module that comes with automation controller.

You can choose to use cached facts in your job by enabling it in the **Options** field of the job templates window.

**Options**

Privilege Escalation ⓘ  Provisioning Callbacks ⓘ  Enable Webhook ⓘ  Concurrent Jobs ⓘ  Enable Fact Storage ⓘ

To clear facts, run the Ansible **clear\_facts meta task**. The following is an example playbook that uses the Ansible **clear\_facts meta task**.

```
- hosts: all
gather_facts: false
tasks:
  - name: Clear gathered facts from all currently targeted hosts
    meta: clear_facts
```

You can find the API endpoint for fact caching at:

`http://<controller server name>/api/v2/hosts/x/ansible_facts`

**20.11. USE CLOUD CREDENTIALS WITH A CLOUD INVENTORY**

Cloud Credentials can be used when syncing a cloud inventory. They can also be associated with a job template and included in the runtime environment for use by a playbook. The following Cloud Credentials are supported:

- [Openstack](#)
- [Amazon Web Services](#)

- [Google](#)
- [Azure](#)
- [VMware](#)

### 20.11.1. OpenStack

The following sample playbook invokes the **nova\_compute** Ansible OpenStack cloud module and requires credentials:

- **auth\_url**
- **username**
- **password**
- **project name**

These fields are made available to the playbook through the environmental variable **OS\_CLIENT\_CONFIG\_FILE**, which points to a YAML file written by the controller based on the contents of the cloud credential. The following sample playbooks load the YAML file into the Ansible variable space:

- OS\_CLIENT\_CONFIG\_FILE example:

```
clouds:
  devstack:
    auth:
      auth_url: http://devstack.yoursite.com:5000/v2.0/
      username: admin
      password: your_password_here
      project_name: demo
```

- Playbook example:

```
- hosts: all
gather_facts: false
vars:
  config_file: "{{ lookup('env', 'OS_CLIENT_CONFIG_FILE') }}"
  nova_tenant_name: demo
  nova_image_name: "cirros-0.3.2-x86_64-uec"
  nova_instance_name: autobot
  nova_instance_state: 'present'
  nova_flavor_name: m1.nano

nova_group:
  group_name: antarctica
  instance_name: deceptacon
  instance_count: 3
tasks:
  - debug: msg="{{ config_file }}"
  - stat: path="{{ config_file }}"
    register: st
  - include_vars: "{{ config_file }}"
```

```

when: st.stat.exists and st.stat.isreg

- name: "Print out clouds variable"
  debug: msg="{{ clouds|default('No clouds found') }}"

- name: "Setting nova instance state to: {{ nova_instance_state }}"
  local_action:
    module: nova_compute
    login_username: "{{ clouds.devstack.auth.username }}"
    login_password: "{{ clouds.devstack.auth.password }}"

```

### 20.11.2. Amazon Web Services

Amazon Web Services (AWS) cloud credentials are exposed as the following environment variables during playbook execution (in the job template, choose the cloud credential needed for your setup):

- **AWS\_ACCESS\_KEY\_ID**
- **AWS\_SECRET\_ACCESS\_KEY**

Each AWS module implicitly uses these credentials when run through the controller without having to set the **aws\_access\_key\_id** or **aws\_secret\_access\_key** module options.

### 20.11.3. Google

Google cloud credentials are exposed as the following environment variables during playbook execution (in the job template, choose the cloud credential needed for your setup):

- **GCE\_EMAIL**
- **GCE\_PROJECT**
- **GCE\_CREDENTIALS\_FILE\_PATH**

Each Google module implicitly uses these credentials when run through the controller without having to set the **service\_account\_email**, **project\_id**, or **pem\_file** module options.

### 20.11.4. Azure

Azure cloud credentials are exposed as the following environment variables during playbook execution (in the job template, choose the cloud credential needed for your setup):

- **AZURE\_SUBSCRIPTION\_ID**
- **AZURE\_CERT\_PATH**

Each Azure module implicitly uses these credentials when run via the controller without having to set the **subscription\_id** or **management\_cert\_path** module options.

### 20.11.5. VMware

VMware cloud credentials are exposed as the following environment variables during playbook execution (in the job template, choose the cloud credential needed for your setup):

- **VMWARE\_USER**
- **VMWARE\_PASSWORD**
- **VMWARE\_HOST**

The following sample playbook demonstrates the usage of these credentials:

```
- vsphere_guest:
  vcenter_hostname: "{{ lookup('env', 'VMWARE_HOST') }}"
  username: "{{ lookup('env', 'VMWARE_USER') }}"
  password: "{{ lookup('env', 'VMWARE_PASSWORD') }}"
  guest: newvm001
  from_template: yes
  template_src: linuxTemplate
  cluster: MainCluster
  resource_pool: "/Resources"
  vm_extra_config:
    folder: MyFolder
```

## 20.12. PROVISIONING CALLBACKS

Provisioning Callbacks are a feature of automation controller that enable a host to initiate a playbook run against itself, rather than waiting for a user to launch a job to manage the host from the automation controller console.

Provisioning Callbacks are only used to run playbooks on the calling host and are meant for cloud bursting. Cloud bursting is a cloud computing configuration that enables a private cloud to access public cloud resources by "bursting" into a public cloud when computing demand spikes.

### Example

New instances with a need for client to server communication for configuration, such as transmitting an authorization key, not to run a job against another host. This provides for automatically configuring the following:

- A system after it has been provisioned by another system (such as AWS auto-scaling, or an OS provisioning system like kickstart or preseed).
- Launching a job programmatically without invoking the automation controller API directly.

The job template launched only runs against the host requesting the provisioning.

This is often accessed with a firstboot type script or from **cron**.

### 20.12.1. Enabling Provisioning Callbacks

#### Procedure

- To enable callbacks, check the **Provisioning Callbacks** checkbox in the job template. This displays **Provisioning Callback URL** for the job template.



## NOTE

If you intend to use automation controller's provisioning callback feature with a dynamic inventory, set **Update on Launch** for the inventory group used in the job template.

Options

Privilege Escalation  Provisioning Callbacks  Enable Webhook  Concurrent Jobs  Enable Fact Storage

---

**Provisioning Callback details**

Provisioning Callback URL Host Config Key

Callbacks also require a Host Config Key, to ensure that foreign hosts with the URL cannot request configuration. Provide a custom value for Host Config Key. The host key can be reused across multiple hosts to apply this job template against multiple hosts. If you want to control what hosts are able to request configuration, the key may be changed at any time.

To callback manually using REST:

## Procedure

- Look at the callback URL in the UI, in the form:  
`https://<CONTROLLER_SERVER_NAME>/api/v2/job_templates/7/callback/`
  - The "7" in the sample URL is the job template ID in automation controller.
- Ensure that the request from the host is a POST. The following is an example using **curl** (all on a single line):

```
curl -k -f -i -H 'Content-Type:application/json' -XPOST -d '{"host_config_key": "redhat"}' \
https://<CONTROLLER_SERVER_NAME>/api/v2/job_templates/7/callback/
```

- Ensure that the requesting host is defined in your inventory for the callback to succeed.

## Troubleshooting

If automation controller fails to locate the host either by name or IP address in one of your defined inventories, the request is denied. When running a job template in this way, ensure that the host initiating the playbook run against itself is in the inventory. If the host is missing from the inventory, the job template fails with a **No Hosts Matched** type error message.

If your host is not in the inventory and **Update on Launch** is set for the inventory group automation controller attempts to update cloud based inventory sources before running the callback.

## Verification

Successful requests result in an entry on the **Jobs** tab, where you can view the results and history. You can access the callback using REST, but the suggested method of using the callback is to use one of the example scripts that ships with automation controller:

- `/usr/share/awx/request_tower_configuration.sh` (Linux/UNIX)
- `/usr/share/awx/request_tower_configuration.ps1` (Windows)

Their usage is described in the source code of the file by passing the **-h** flag, as the following shows:

```
./request_tower_configuration.sh -h
Usage: ./request_tower_configuration.sh <options>
```

Request server configuration from Ansible Tower.

#### OPTIONS:

```
-h Show this message
-s Controller server (e.g. https://ac.example.com) (required)
-k Allow insecure SSL connections and transfers
-c Host config key (required)
-t Job template ID (required)
-e Extra variables
```

This script can retry commands and is therefore a more robust way to use callbacks than a simple **curl** request. The script retries once per minute for up to ten minutes.



#### NOTE

This is an example script. Edit this script if you need more dynamic behavior when detecting failure scenarios, as any non-200 error code may not be a transient error requiring retry.

You can use callbacks with dynamic inventory in automation controller. For example, when pulling cloud inventory from one of the supported cloud providers. In these cases, along with setting **Update On Launch**, ensure that you configure an inventory cache timeout for the inventory source, to avoid hammering of your cloud's API endpoints. Since the **request\_tower\_configuration.sh** script polls once per minute for up to ten minutes, a suggested cache invalidation time for inventory (configured on the inventory source itself) would be one or two minutes.

Running the **request\_tower\_configuration.sh** script from a cron job is not recommended, however, a suggested cron interval is every 30 minutes. Repeated configuration can be handled by scheduling automation controller so that the primary use of callbacks by most users is to enable a base image that is bootstrapped into the latest configuration when coming online. Running at first boot is best practice. First boot scripts are init scripts that typically self-delete, so you set up an init script that calls a copy of the **request\_tower\_configuration.sh** script and make that into an auto scaling image.

### 20.12.2. Passing extra variables to Provisioning Callbacks

You can pass **extra\_vars** in Provisioning Callbacks the same way you can in a regular job template. To pass **extra\_vars**, the data sent must be part of the body of the POST as application or JSON, as the content type.

#### Procedure

- Pass extra variables by using one of these methods:
  - Use the following JSON format as an example when adding your own **extra\_vars** to be passed:

```
'{"extra_vars": {"variable1": "value1", "variable2": "value2", ...}}'
```

- Pass extra variables to the job template call using **curl**:

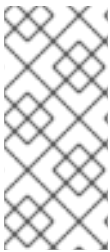
```
root@localhost:~$ curl -f -H 'Content-Type: application/json' -XPOST \
-d '{"host_config_key": "redhat", "extra_vars": {"foo": "bar"}}' \
https://<CONTROLLER_SERVER_NAME>/api/v2/job_templates/7/callback
```

For more information, see [Launching Jobs with Curl](#) in the *Automation controller Administration Guide*.

## 20.13. EXTRA VARIABLES

When you pass survey variables, they are passed as extra variables (**extra\_vars**) within automation controller. However, passing extra variables to a job template (as you would do with a survey) can override other variables being passed from the inventory and project.

By default, **extra\_vars** are marked as **!unsafe** unless you specify them on the Job Template's Extra Variables section. These are trusted, because they can only be added by users with enough privileges to add or edit a Job Template. For example, nested variables do not expand when entered as a prompt, as the Jinja brackets are treated as a string. For more information about unsafe variables, see [Unsafe or raw strings](#).



### NOTE

**extra\_vars** passed to the job launch API are only honored if one of the following is true:

- They correspond to variables in an enabled survey.
- **ask\_variables\_on\_launch** is set to **True**.

### Example

You have a defined variable for an inventory for **debug = true**. It is possible that this variable, **debug = true**, can be overridden in a job template survey.

To ensure the variables that you pass are not overridden, ensure they are included by redefining them in the survey. Extra variables can be defined at the inventory, group, and host levels.

If you are specifying the **ALLOW\_JINJA\_IN\_EXTRA\_VARS** parameter, see the [Controller Tips and Tricks](#) section of the *Automation controller Administration Guide* to configure it in the **Jobs Settings** screen of the controller UI.

The job template extra variables dictionary is merged with the survey variables.

The following are some simplified examples of **extra\_vars** in YAML and JSON formats:

- The configuration in YAML format:

```
launch_to_orbit: true
satellites:
- sputnik
- explorer
- satcom
```

- The configuration in JSON format:

```
{
  "launch_to_orbit": true,
```



```
"satellites": ["sputnik", "explorer", "satcom"]
}
```

The following table notes the behavior (hierarchy) of variable precedence in automation controller as it compares to variable precedence in Ansible.

**Table 20.1. Automation controller Variable Precedence Hierarchy (last listed wins)**

Ansible	automation controller
role defaults	role defaults
dynamic inventory variables	dynamic inventory variables
inventory variables	automation controller inventory variables
inventory <b>group_vars</b>	automation controller group variables
inventory <b>host_vars</b>	automation controller host variables
playbook <b>group_vars</b>	playbook <b>group_vars</b>
playbook <b>host_vars</b>	playbook <b>host_vars</b>
host facts	host facts
registered variables	registered variables
set facts	set facts
play variables	play variables
play <b>vars_prompt</b>	(not supported)
play <b>vars_files</b>	play <b>vars_files</b>
role and include variables	role and include variables
block variables	block variables
task variables	task variables
extra variables	Job Template extra variables
	Job Template Survey (defaults)
	Job Launch extra variables

### 20.13.1. Relaunch a job template

Instead of manually relaunching a job, a relaunch is denoted by setting **launch\_type** to **relaunch**. The relaunch behavior deviates from the launch behavior in that it does not inherit **extra\_vars**.

Job relaunching does not go through the inherit logic. It uses the same **extra\_vars** that were calculated for the job being relaunched.

#### Example

You launch a job template with no **extra\_vars** which results in the creation of a job called **j1**. Then you edit the job template and add **extra\_vars** (such as adding `"hello": "world"`).

Relaunching **j1** results in the creation of **j2**, but because there is no inherit logic and **j1** has no **extra\_vars**, **j2** does not have any **extra\_vars**.

If you launch the job template with the **extra\_vars** that you added after the creation of **j1**, the relaunch job created (**j3**) includes the **extra\_vars**. Relaunching **j3** results in the creation of **j4**, which also includes **extra\_vars**.

## CHAPTER 21. JOB SLICING

A sliced job refers to the concept of a distributed job. Distributed jobs are used for running a job across a large number of hosts, enabling you to run multiple ansible-playbooks, each on a subset of an inventory, that can be scheduled in parallel across a cluster.

By default, Ansible runs jobs from a single control instance. For jobs that do not require cross-host orchestration, job slicing takes advantage of automation controller's ability to distribute work to multiple nodes in a cluster.

Job slicing works by adding a Job Template field **job\_slice\_count**, which specifies the number of jobs into which to slice the Ansible run. When this number is greater than **1**, automation controller generates a workflow from a job template instead of a job. The inventory is distributed evenly amongst the slice jobs. The workflow job is then started, and proceeds as though it were a normal workflow.

When launching a job, the API returns either a job resource (if `job_slice_count = 1`) or a workflow job resource. The corresponding User Interface (UI) redirects to the appropriate screen to display the status of the run.

### 21.1. JOB SLICE CONSIDERATIONS

When setting up job slices, consider the following:

- A sliced job creates a workflow job, which then creates jobs.
- A job slice consists of a job template, an inventory, and a slice count.
- When executed, a sliced job splits each inventory into a number of "slice size" chunks. It then queues jobs of ansible-playbook runs on each chunk of the appropriate inventory. The inventory fed into ansible-playbook is a shortened version of the original inventory that only contains the hosts in that particular slice. The completed sliced job that displays on the **Jobs** list are labeled accordingly, with the number of sliced jobs that have run:

Project	Demo Project	Execution Environment	Control Plane Execution Environment
▼ □	8 - Demo Job Template	Error	Playbook Run
			6/13/2022, 1:19:11 PM
			6/13/2022, 1:19:11 PM
Launched By	admin	Job Template	Demo Job Template
Project	Demo Project	Inventory	Demo Inventory
Credentials	SSH: Demo Credential	Execution Environment	Default execution environment
Job Slice	0/1		

- These sliced jobs follow normal scheduling behavior (number of forks, queuing due to capacity, assignment to instance groups based on inventory mapping).



## NOTE

Job slicing is intended to scale job executions horizontally. Enabling job slicing on a job template divides an inventory to be acted upon in the number of slices configured at launch time and then starts a job for each slice.

Normally, the number of slices is equal to or less than the number of automation controller nodes. Setting an extremely high number of job slices, such as thousands, while permitted, can cause performance degradation as the job scheduler is not designed to simultaneously schedule thousands of workflow nodes, which are what the sliced jobs become.

- Sliced job templates with prompts or extra variables behave the same as standard job templates, applying all variables and limits to the entire set of slice jobs in the resulting workflow job. However, when passing a limit to a sliced job, if the limit causes slices to have no hosts assigned, those slices will fail, causing the overall job to fail.
  - A job slice job status of a distributed job is calculated in the same manner as workflow jobs. It fails if there are any unhandled failures in its sub-jobs.
- Any job that intends to orchestrate across hosts (rather than just applying changes to individual hosts) must not be configured as a slice job.
  - Any job that does, can fail, and automation controller does not attempt to discover or account for playbooks that fail when run as slice jobs.

## 21.2. JOB SLICE EXECUTION BEHAVIOR

When jobs are sliced, they can run on any node. Insufficient capacity in the system can cause some to run at a different time. When slice jobs are running, job details display the workflow and job slices currently running, as well as a link to view their details individually.

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By default, job templates are not normally configured to execute simultaneously (**allow\_simultaneous** must be checked in the API or **Enable Concurrent Jobs** in the UI). Slicing overrides this behavior and implies **allow\_simultaneous** even if that setting is clear. See [Job templates](#) for information on how to specify this, as well as the number of job slices on your job template configuration.

The [Job templates](#) section provides additional detail on performing the following operations in the UI:

- Launch workflow jobs with a job template that has a slice number greater than one.
- Cancel the whole workflow or individual jobs after launching a slice job template.
- Relaunch the whole workflow or individual jobs after slice jobs finish running.
- View the details about the workflow and slice jobs after launching a job template.
- Search slice jobs specifically after you create them, as per the subsequent section, "Search job slices").

## 21.3. SEARCHING JOB SLICES

To make it easier to find slice jobs, use the search functionality to apply a search filter to:

- Job lists to show only slice jobs
- Job lists to show only parent workflow jobs of job slices
- Job template lists to only show job templates that produce slice jobs

### Procedure

- Search for slice jobs by using one of the following methods:
  - To show only slice jobs in job lists, as with most cases, you can filter either on the type (jobs here) or **unified\_jobs**:

```
/api/v2/jobs/?job_slice_count__gt=1
```

- To show only parent workflow jobs of job slices:

```
/api/v2/workflow_jobs/?job_template__isnull=false
```

- To show only job templates that produce slice jobs:

```
/api/v2/job_templates/?job_slice_count__gt=1
```

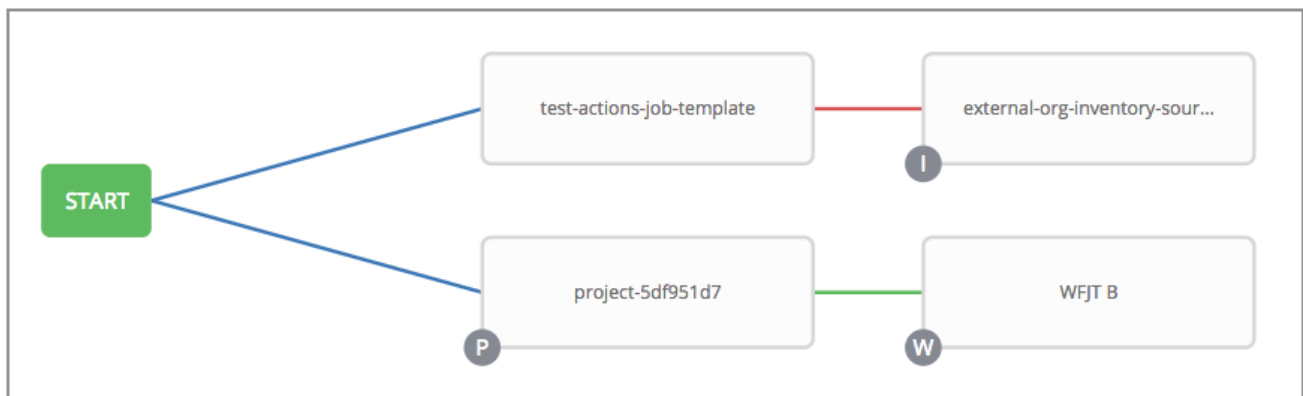
## CHAPTER 22. WORKFLOWS IN AUTOMATION CONTROLLER

Workflows enable you to configure a sequence of disparate job templates (or workflow templates) that may or may not share inventory, playbooks, or permissions.

Workflows have **admin** and **execute** permissions, similar to job templates. A workflow accomplishes the task of tracking the full set of jobs that were part of the release process as a single unit.

Job or workflow templates are linked together using a graph-like structure called nodes. These nodes can be jobs, project syncs, or inventory syncs. A template can be part of different workflows or used multiple times in the same workflow. A copy of the graph structure is saved to a workflow job when you launch the workflow.

The following example shows a workflow that contains all three, as well as a workflow job template:



As the workflow runs, jobs are spawned from the node's linked template. Nodes linking to a job template which has prompt-driven fields (`job_type`, `job_tags`, `skip_tags`, `limit`) can contain those fields, and is not prompted on launch. Job templates that prompt for a credential or inventory, without defaults, are not available for inclusion in a workflow.

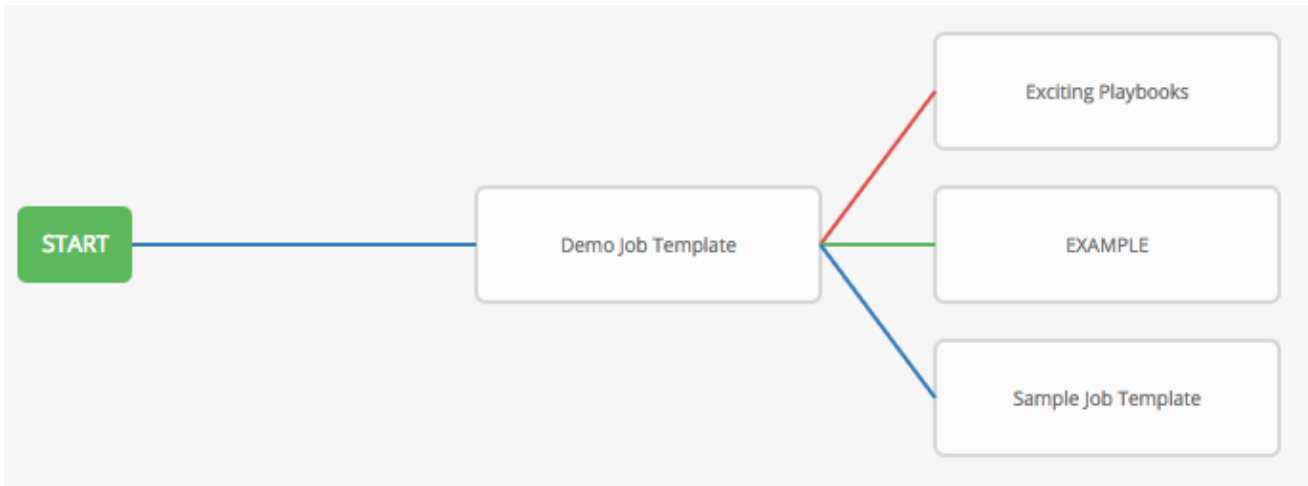
### 22.1. WORKFLOW SCENARIOS AND CONSIDERATIONS

When building workflows, consider the following:

- A root node is set to **ALWAYS** by default and cannot be edited.



- A node can have multiple parents, and children can be linked to any of the states of success, failure, or always. If always, then the state is neither success nor failure. States apply at the node level, not at the workflow job template level. A workflow job is marked as successful unless it is canceled or encounters an error.



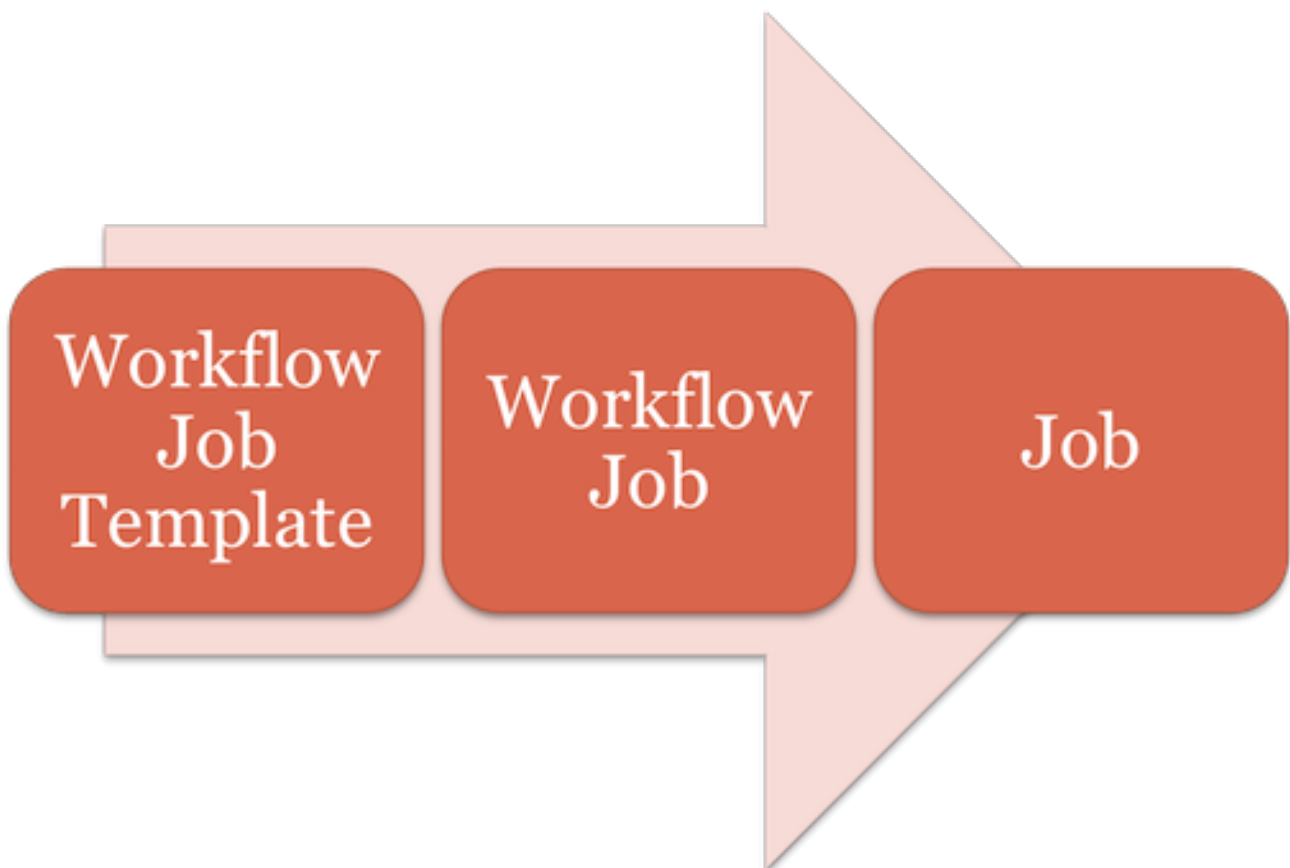
- If you remove a job or workflow template within the workflow, the nodes previously connected to those deleted, automatically get connected upstream and retain the edge type as in the following example:



- You can have a convergent workflow, where multiple jobs converge into one. In this scenario, any of the jobs or all of them must complete before the next one runs, as shown in the following example:



- In this example, automation controller runs the first two job templates in parallel. When they both finish and succeed as specified, the third downstream (convergence node), triggers.
- Prompts for inventory and surveys apply to workflow nodes in workflow job templates.
- If you launch from the API, running a **get** command displays a list of warnings and highlights missing components. The following image illustrates a basic workflow for a workflow job template:



- It is possible to launch several workflows simultaneously, and set a schedule for when to launch them. You can set notifications on workflows, such as when a job completes, similar to that of job templates.





## NOTE

Job slicing is intended to scale job executions horizontally.

If you enable job slicing on a job template, it divides the inventory to be acted on in the number of slices configured at launch time. Then starts a job for each slice.

For more information see the [Job slicing](#) section.

- You can build a recursive workflow, but if automation controller detects an error, it stops at the time the nested workflow attempts to run.
- Artifacts gathered in jobs in the sub-workflow are passed to downstream nodes.
- An inventory can be set at the workflow level, or prompt for inventory on launch.
- When launched, all job templates in the workflow that have **ask\_inventory\_on\_launch=true** use the workflow level inventory.
- Job templates that do not prompt for inventory ignore the workflow inventory and run against their own inventory.
- If a workflow prompts for inventory, schedules and other workflow nodes can provide the inventory.
- In a workflow convergence scenario, **set\_stats** data is merged in an undefined way, therefore you must set unique keys.

## 22.2. WORKFLOW EXTRA VARIABLES

Workflows use surveys to specify variables to be used in the playbooks in the workflow, called **extra\_vars**. Survey variables are combined with **extra\_vars** defined on the workflow job template, and saved to the workflow job **extra\_vars**. **extra\_vars** in the workflow job are combined with job template variables when spawning jobs within the workflow.

Workflows use the same behavior (hierarchy) of variable precedence as job templates with the exception of three additional variables. See the [Automation controller Variable Precedence Hierarchy](#) in the Extra variables section of Job templates. The three additional variables include:

- Workflow job template extra variables
- Workflow job template survey (defaults)
- Workflow job launch extra variables

Workflows included in a workflow follow the same variable precedence, they only inherit variables if they are specifically prompted for, or defined as part of a survey.

In addition to the workflow **extra\_vars**, jobs and workflows run as part of a workflow can inherit variables in the artifacts dictionary of a parent job in the workflow (also combining with ancestors further upstream in its branch). These can be defined by the **set\_stats** [Ansible module](#).

If you use the **set\_stats** module in your playbook, you can produce results that can be consumed downstream by another job.

### Example

Notifying users as to the success or failure of an integration run. In this example, there are two playbooks that can be combined in a workflow to exercise artifact passing:

- `invoke_set_stats.yml`: first playbook in the workflow:

```
---
- hosts: localhost
  tasks:
    - name: "Artifact integration test results to the web"
      local_action: 'shell curl -F "file=@integration_results.txt" https://file.io'
      register: result

    - name: "Artifact URL of test results to Workflows"
      set_stats:
        data:
          integration_results_url: "{{ (result.stdout|from_json).link }}"
```

- `use_set_stats.yml`: second playbook in the workflow:

```
---
- hosts: localhost
  tasks:
    - name: "Get test results from the web"
      uri:
        url: "{{ integration_results_url }}"
        return_content: true
        register: results

    - name: "Output test results"
      debug:
        msg: "{{ results.content }}"
```

The **set\_stats** module processes this workflow as follows:

1. The contents of an integration result is uploaded to the web.
2. Through the **invoke\_set\_stats** playbook, **set\_stats** is then invoked to artifact the URL of the uploaded **integration\_results.txt** into the Ansible variable "integration\_results\_url".
3. The second playbook in the workflow consumes the Ansible extra variable "integration\_results\_url". It calls out to the web using the uri module to get the contents of the file uploaded by the previous job template job. Then, it prints out the contents of the obtained file.



#### NOTE

For artifacts to work, keep the default setting, **per\_host = False** in the **set\_stats** module.

## 22.3. WORKFLOW STATES

The workflow job can have the following states (no Failed state):

- Waiting

- Running
- Success (finished)
- Cancel
- Error
- Failed

In the workflow scheme, canceling a job cancels the branch, while canceling the workflow job cancels the entire workflow.

## 22.4. ROLE-BASED ACCESS CONTROLS

To edit and delete a workflow job template, you must have the administrator role. To create a workflow job template, you must be an organization administrator or a system administrator. However, you can run a workflow job template that contains job templates that you do not have permissions for. System administrators can create a blank workflow and then grant an **admin\_role** to a low-level user, after which they can delegate more access and build the graph. You must have **execute** access to a job template to add it to a workflow job template.

You can also perform other tasks, such as making a duplicate copy or re-launching a workflow, depending on which permissions are granted to a user. You must have permissions to all the resources used in a workflow, such as job templates, before relaunching or making a copy.




For more information, see [Role-based access controls](#).


For more information on performing the tasks described in this section, see the [Administration Guide](#).

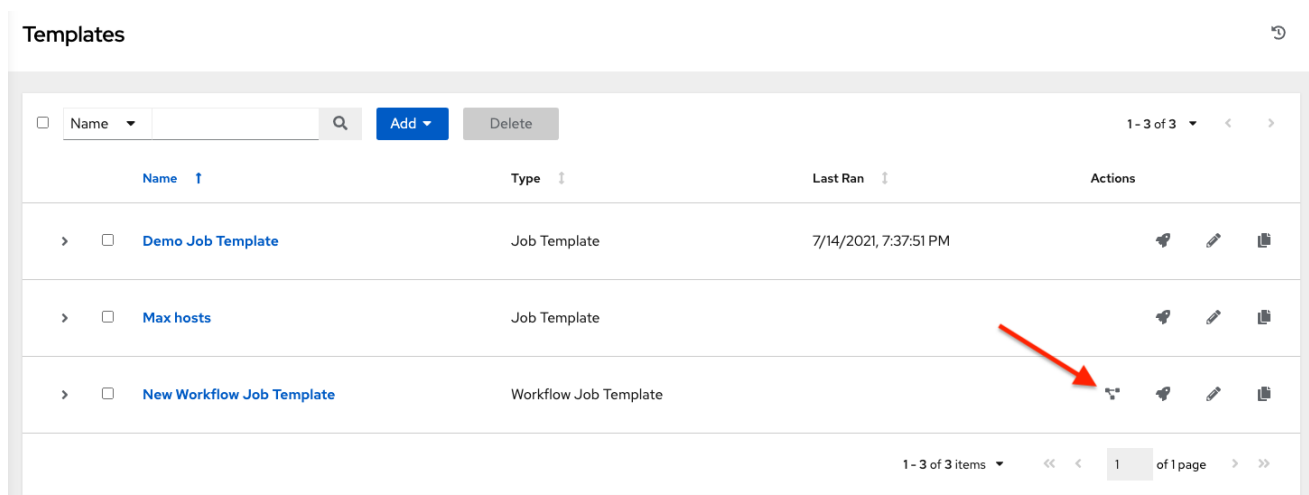
## CHAPTER 23. WORKFLOW JOB TEMPLATES

A workflow job template links together a sequence of disparate resources that tracks the full set of jobs that were part of the release process as a single unit. These resources include the following:

- Job templates
- Workflow job templates
- Project syncs
- Inventory source syncs

The **Templates** list view shows the workflow and job templates that are currently available. The default view is collapsed (Compact), showing the template name, template type, and the statuses of the jobs that have run by using that template. You can click the arrow next to each entry to expand and view more information. This list is sorted alphabetically by name, but you can sort by other criteria, or search by various fields and attributes of a template. From this screen you can launch , edit , and copy  a workflow job template.

Only workflow templates have the workflow visualizer  icon as a shortcut for accessing the workflow editor.



Name	Type	Last Ran	Actions
> <input type="checkbox"/> Demo Job Template	Job Template	7/14/2021, 7:37:51 PM	
> <input type="checkbox"/> Max hosts	Job Template		
> <input type="checkbox"/> New Workflow Job Template	Workflow Job Template		



### NOTE

Workflow templates can be used as building blocks for another workflow template. You can enable **Prompt on Launch** by setting up several settings in a workflow template, which you can edit at the workflow job template level. These do not affect the values assigned at the individual workflow template level. For further instructions, see the [Workflow Visualizer](#) section.

### 23.1. CREATING A WORKFLOW TEMPLATE

To create a new workflow job template, complete the following steps:



## IMPORTANT

If you set a limit to a workflow template, it is not passed down to the job template unless you check **Prompt on launch** for the limit. This can lead to playbook failures if the limit is mandatory for the playbook that you are running.

### Procedure

1. On the **Templates** list view, click **Add → Add workflow template**.

Templates ↻

Create New Workflow Template

<b>Name</b> *	<b>Description</b>	<b>Organization</b>
<input type="text"/>	<input type="text"/>	<input type="text" value="Q"/>
<b>Inventory</b> ⓘ <input type="checkbox"/> Prompt on launch	<b>Limit</b> ⓘ <input type="checkbox"/> Prompt on launch	<b>Source control branch</b> ⓘ <input type="checkbox"/> Prompt on launch
<input type="text" value="Q"/>	<input type="text"/>	<input type="text"/>
<b>Labels</b> ⓘ		
<input type="text"/>		
<b>Variables</b> ⓘ <span>YAML</span> <span>JSON</span>		<input type="checkbox"/> Prompt on launch <span>⌘</span>
<div style="background-color: #f0f0f0; padding: 2px;">1 ---</div>		
<b>Options</b>		
<input type="checkbox"/> Enable Webhook ⓘ <input type="checkbox"/> Enable Concurrent Jobs ⓘ		
<div style="display: flex; justify-content: space-between; align-items: center;"> <span style="background-color: #0070c0; color: white; padding: 5px 10px; border-radius: 3px;">Save</span> <span style="color: #0070c0; padding: 5px 10px;">Cancel</span> </div>		

2. Enter the appropriate details in the following fields:



## NOTE

If a field has the **Prompt on launch** checkbox selected, either launching the workflow template, or using the workflow template within another workflow template, you are prompted for the value for that field. Most prompted values override any values set in the job template. Exceptions are noted in the following table.

Field	Options	Prompt on Launch
Name	Enter a name for the job.	N/A
Description	Enter an arbitrary description as appropriate (optional).	N/A
Organization	Choose the organization to use with this template from the organizations available to the logged in user.	N/A

Field	Options	Prompt on Launch
Inventory	Optionally, select the inventory to use with this template from the inventories available to the logged in user.	Yes
Limit	<p>A host pattern to further constrain the list of hosts managed or affected by the playbook. You can separate many patterns by colons (:). As with core Ansible:</p> <ul style="list-style-type: none"> <li>• a:b means "in group a or b"</li> <li>• a:b&amp;c means "in a or b but must be in c"</li> <li>• a:!b means "in a, and definitely not in b"</li> </ul> <p>For more information see, <a href="#">Patterns: targeting hosts and groups</a> in the Ansible documentation.</p>	<p>Yes</p> <p>If selected, even if a default value is supplied, you are prompted upon launch to select a limit.</p>
Source control branch	Select a branch for the workflow. This branch is applied to all workflow job template nodes that prompt for a branch.	Yes

Field	Options	Prompt on Launch
Labels	<ul style="list-style-type: none"> <li>● Optionally, supply labels that describe this workflow job template, such as <b>dev</b> or <b>test</b>. Use labels to group and filter workflow job templates and completed jobs in the display.</li> <li>● Labels are created when they are added to the workflow template. Labels are associated to a single Organization using the Project that is provided in the workflow template. Members of the Organization can create labels on a workflow template if they have edit permissions (such as the admin role).</li> <li>● Once you save the job template, the labels appear in the workflow job templates <b>Details</b> view.</li> <li>● Labels are only applied to the workflow templates not the job template nodes that are used in the workflow.</li> <li>● Select <b>X</b> beside a label to remove it. When a label is removed, it is no longer associated with that particular Job or Job Template, but it remains associated with any other jobs that reference it.</li> </ul>	<p>Yes</p> <p>If selected, even if a default value is supplied, you are prompted when launching to supply additional labels, if needed. - You cannot delete existing labels, selecting <b>X</b> only removes the newly added labels, not existing default labels.</p>

Field	Options	Prompt on Launch
Variables	<ul style="list-style-type: none"> <li>Pass extra command line variables to the playbook.</li> </ul> <p>This is the "-e" or "-extra-vars" command line parameter for ansible-playbook that is documented in the Ansible documentation at <a href="#">Controlling how Ansible behaves: precedence rules</a>. - Provide key or value pairs by using either YAML or JSON. These variables have a maximum value of precedence and overrides other variables specified elsewhere. The following is an example value:  <b>git_branch: production</b>  <b>release_version: 1.5</b></p>	<p>Yes</p> <p>If you want to be able to specify extra_vars on a schedule, you must select <b>Prompt on launch</b> for Variables on the workflow job template, or enable a survey on the job template. Those answered survey questions become <b>extra_vars</b>. For more information about extra variables, see <a href="#">Extra Variables</a>.</p>
Job tags	Type and select the <b>Create</b> drop-down to specify which parts of the playbook should run. For more information and examples see <a href="#">Tags</a> in the Ansible documentation.	Yes
Skip Tags	Type and select the <b>Create</b> drop-down to specify certain tasks or parts of the playbook to skip. For more information and examples see <a href="#">Tags</a> in the Ansible documentation.	Yes

3. Specify the following **Options** for launching this template, if necessary:

- Check **Enable Webhooks** to turn on the ability to interface with a predefined SCM system web service that is used to launch a workflow job template. GitHub and GitLab are the supported SCM systems.
  - If you enable webhooks, other fields display, prompting for additional information:
    - Webhook Service:** Select which service to listen for webhooks from.
    - Webhook Credential:** Optionally, provide a GitHub or GitLab personal access token (PAT) as a credential to use to send status updates back to the webhook service. For more information, see [Credential Types](#) to create one.
  - When you click **Save**, additional fields populate and the workflow visualizer automatically opens.



- **Webhook URL:** Automatically populated with the URL for the webhook service to POST requests to.
- **Webhook Key:** Generated shared secret to be used by the webhook service to sign payloads sent to automation controller. You must configure this in the settings on the webhook service so that webhooks from this service are accepted in automation controller. For additional information about setting up webhooks, see [Working with Webhooks](#).  
Check **Enable Concurrent Jobs** to allow simultaneous runs of this workflow. For more information, see [Automation controller capacity determination and job impact](#).

4. When you have completed configuring the workflow template, click **Save**.

Saving the template exits the workflow template page and the workflow visualizer opens to allow you to build a workflow. For more information, see the [Workflow visualizer](#) section. Otherwise, select one of these methods:

- Close the workflow visualizer to return to the **Details** tab of the newly saved template. There you can complete the following tasks:
  - Review, edit, add permissions, notifications, schedules, and surveys
  - View completed jobs
  - Build a workflow template
- Click **Launch** to start the workflow.



## NOTE

Save the template before launching, or **Launch** remains disabled. The **Notifications** tab is only present after you save the template.

Templates > New Workflow Job Template ↻

### Details

← Back to Templates   **Details**   Access   Notifications   Schedules   Visualizer   Jobs   Survey

**Name** New Workflow Job Template      **Job Type** Workflow Job Template      **Created** 7/15/2021, 12:21:43 AM by admin

**Modified** 7/15/2021, 12:21:43 AM by admin

**Variables** YAML JSON ✕

1 ---

Edit
Launch
Delete

## 23.2. WORK WITH PERMISSIONS

Click the **Access** tab to review, grant, edit, and remove associated permissions for users as well as team members.

Templates &gt; New Workflow Job Template

## Access




◀ Back to Templates				Details	Access	Notifications	Schedules	Visualizer	Jobs	Survey
Username	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1 - 2 of 2										
Username	First name	Last name	Roles							
admin			User Roles System Administrator							
austin78	Austin	Austin	User Roles System Auditor							
1 - 2 of 2 items										
1 of 1 page										

Click **Add** to create new permissions for this workflow template by following the prompts to assign them accordingly.

## 23.3. WORK WITH NOTIFICATIONS

For information on working with notifications in workflow job templates, see [Work with notifications](#).

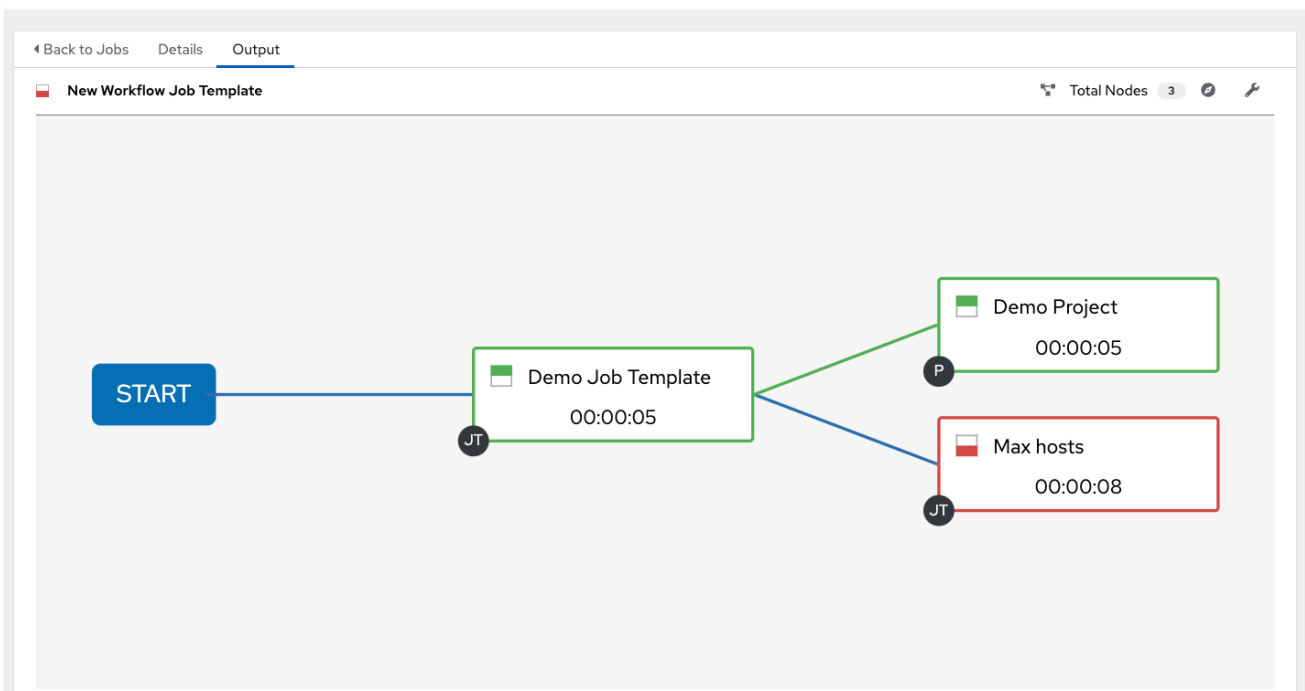
## 23.4. VIEW COMPLETED WORKFLOW JOBS

The **Jobs** tab provides the list of job templates that have run. Click the expand  icon next to each job to view the details of each job.

From this view, you can click the job ID, name of the workflow job and see its graphical representation. The following example shows the job details of a workflow job:

Jobs &gt; New Workflow Job Template

## Output



The nodes are marked with labels to help you identify them. For more information, see the legend in the [Workflow visualizer](#) section.

## 23.5. SCHEDULING A WORKFLOW JOB TEMPLATE

Select the **Schedules** tab to access the schedules for a particular workflow job template..

For more information on scheduling a workflow job template run, see the [Scheduling job templates](#) section.

If a workflow job template used in a nested workflow has a survey, or the **Prompt on Launch** is selected for the inventory option, the **PROMPT** option displays next to the **SAVE** and **CANCEL** options on the schedule form. Click **PROMPT** to show an optional **INVENTORY** step where you can provide or remove an inventory or skip this step without any changes.

## 23.6. SURVEYS IN WORKFLOW JOB TEMPLATES

Workflows containing job types of **Run** or **Check** provide a way to set up surveys in the workflow job template creation or editing screens.

For more information on job surveys, including how to create a survey and optional survey questions in workflow job templates, see the [Surveys in job templates](#) section.

## 23.7. WORKFLOW VISUALIZER

The Workflow Visualizer provides a graphical way of linking together job templates, workflow templates, project syncs, and inventory syncs to build a workflow template. Before you build a workflow template, see the [Workflows](#) section for considerations associated with various scenarios on parent, child, and sibling nodes.


### 23.7.1. Building a workflow

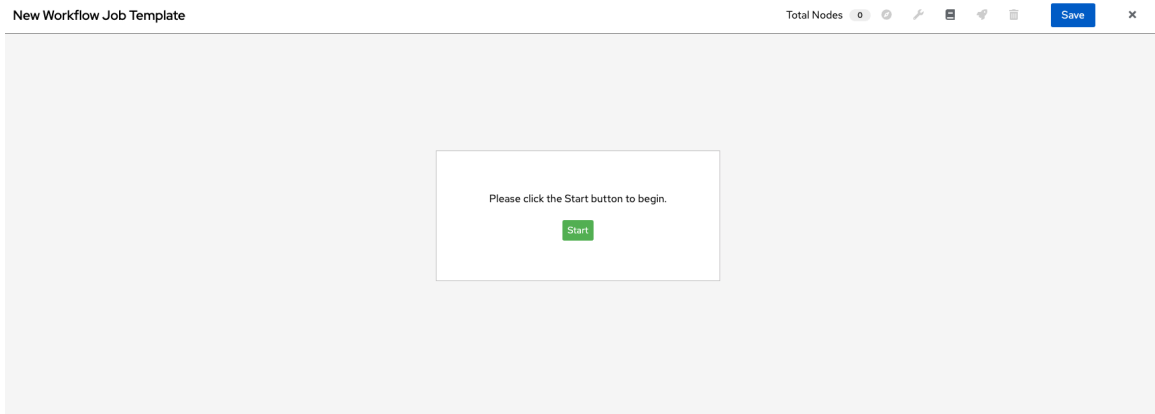
You can set up any combination of two or more of the following node types to build a workflow:

- Template (Job Template or Workflow Job Template)
- Project Sync
- Inventory Sync
- Approval

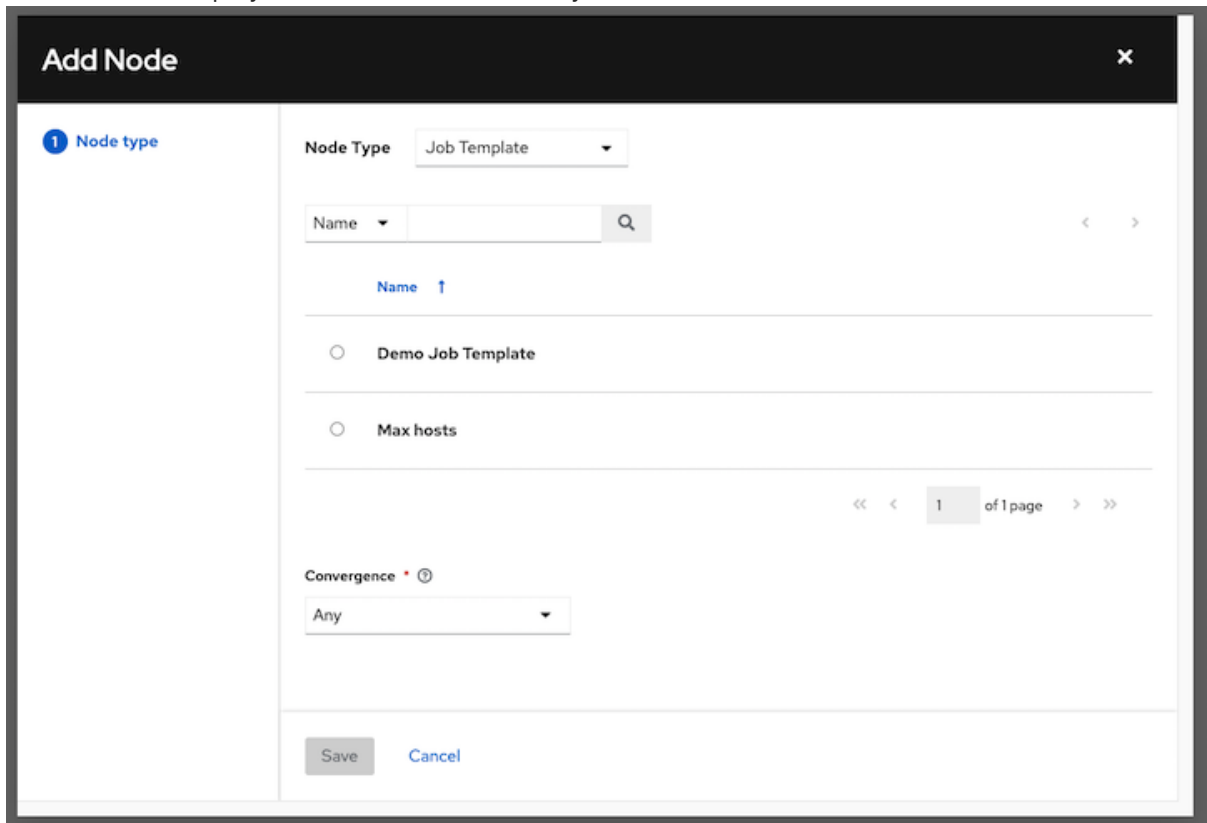
Each node is represented by a rectangle while the relationships and their associated edge types are represented by a line (or link) that connects them.

#### Procedure

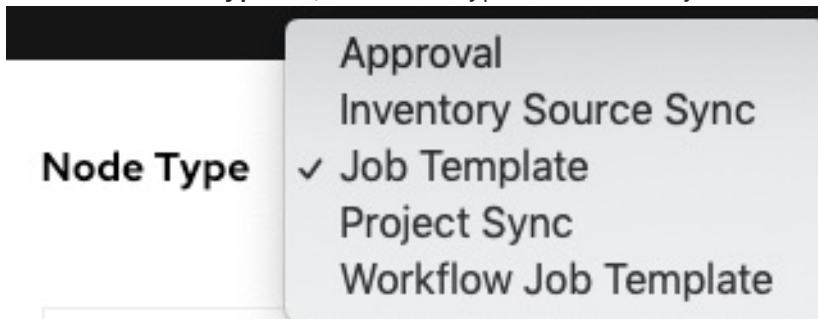
1. To launch the workflow visualizer, use one of these methods:
  - a. From the navigation panel, select **Resources** → **Templates**.
    - i. Select a workflow template, in the **Details** tab click **Edit**.
    - ii. Select the **Visualizer** tab.
  - b. From the **Templates** list view, click the  icon.



2. Click **Start** to display a list of nodes to add to your workflow.



3. From the **Node Type** list, select the type of node that you want to add:

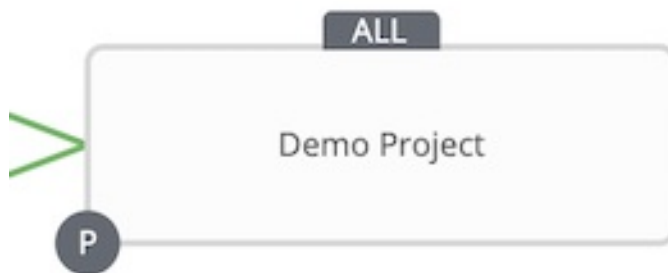


- If you select an **Approval** node, see [Approval nodes](#) for more information. Selecting a node provides the available valid options associated with it.

**NOTE**

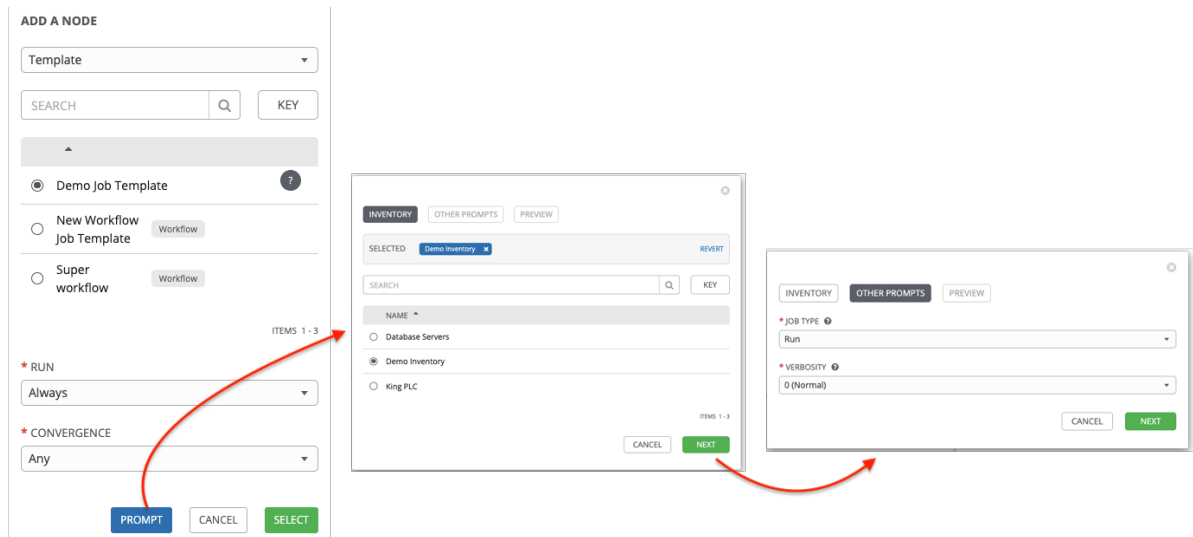
If you select a job template that does not have a default inventory when populating a workflow graph, the inventory of the parent workflow is used. Though a credential is not required in a job template, you cannot choose a job template for your workflow if it has a credential that requires a password, unless the credential is replaced by a prompted credential.

4. When you select a node type, the workflow begins to build, and you must specify the type of action to be taken for the selected node. This action is also referred to as edge type.
5. If the node is a root node, the edge type defaults to **Always** and is non-editable. For subsequent nodes, you can select one of the following scenarios (edge type) to apply to each:
  - **Always:** Continue to execute regardless of success or failure.
  - **On Success:** After successful completion, execute the next template.
  - **On Failure:** After failure, execute a different template.
6. Select the behavior of the node if it is a convergent node from the **Convergence** field:
  - **Any** is the default behavior, allowing any of the nodes to complete as specified, before triggering the next converging node. As long as the status of one parent meets one of those run conditions, an **any** child node will run. An **any** node requires all nodes to complete, but only one node must complete with the expected outcome.
  - Choose **All** to ensure that all nodes complete as specified, before converging and triggering the next node. The purpose of **all\*** nodes is to make sure that every parent meets its expected outcome in order to run the child node. The workflow checks to make sure every parent behaves as expected in order to run the child node. Otherwise, it will not run the child node.  
If selected, the node is labeled as **ALL** in the graphical view:

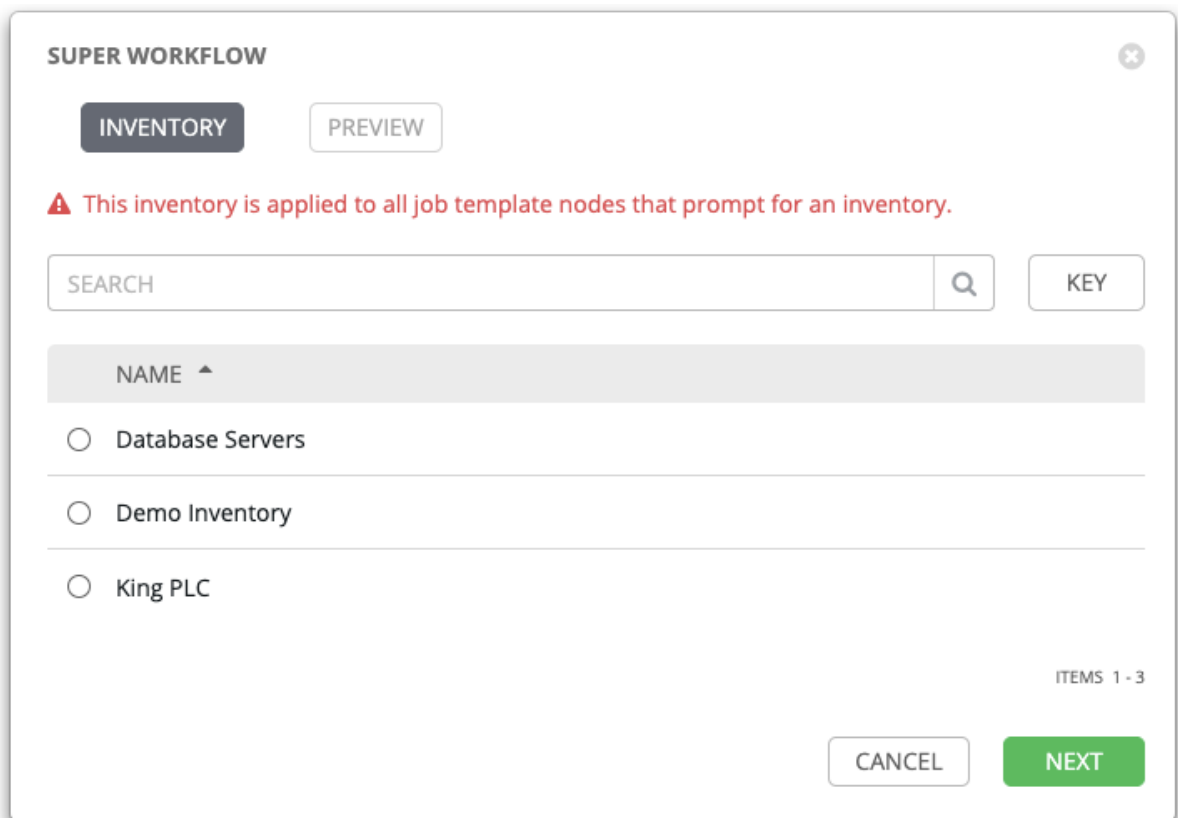
**NOTE**

If a node is a root node, or a node that does not have any nodes converging into it, setting the Convergence rule does not apply, as its behavior is dictated by the action that triggers it.

7. If a job template used in the workflow has **Prompt on Launch** selected for any of its parameters, a **PROMPT** option appears, enabling you to change those values at the node level. Use the wizard to change the values in each of the tabs and click **Confirm** in the **Preview** tab.



If a workflow template used in the workflow has **Prompt on Launch** selected for the inventory option, use the wizard to supply the inventory at the prompt. If the parent workflow has its own inventory, it overrides any inventory that is supplied here.





## NOTE

For workflow job templates with required fields that prompt details, but do not have a default, you must provide those values when creating a node before the **Select** option is enabled.

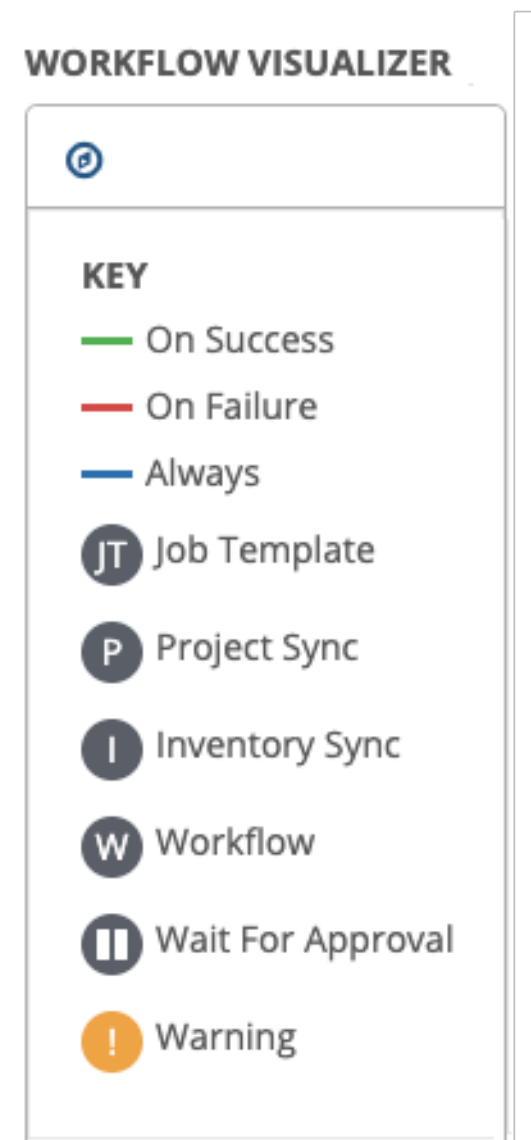
The following two cases disable the **SELECT** option until a value is provided by the **PROMPT** option:

- a. When you select the **Prompt on Launch** checkbox in a workflow job template, but do not provide a default.
- b. When you create a survey question that is required but do not provide a default answer.

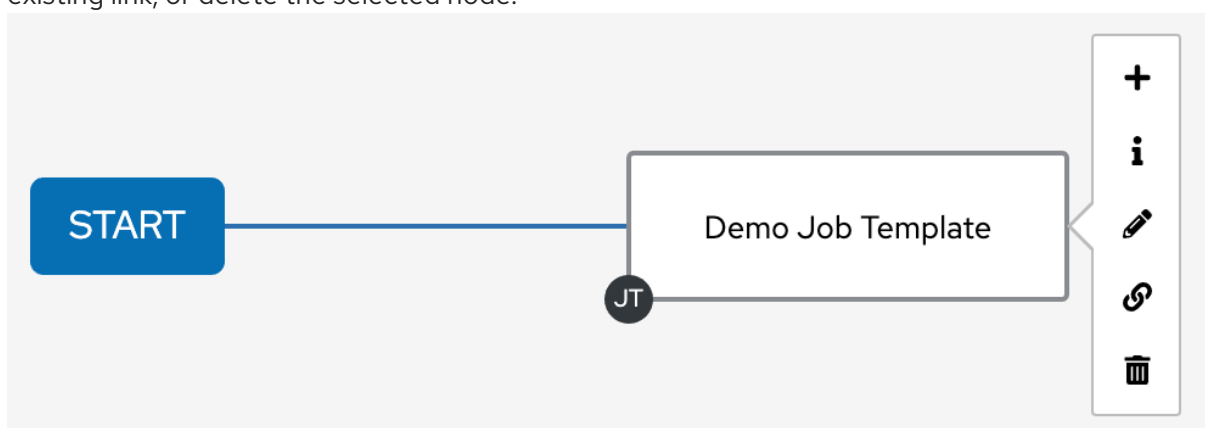
However, this is not the case with credentials. Credentials that require a password on launch are not permitted when creating a workflow node, because everything required to launch the node must be provided when the node is created. If you are prompted for credentials in a workflow job template, it is not possible to select a credential that requires a password in automation controller.

You must also click **SELECT** when the prompt wizard closes, to apply the changes at that node. Otherwise, any changes you make revert back to the values set in the job template.

When the node is created, it is labeled with its job type. A template that is associated with each workflow node runs based on the selected run scenario as it proceeds. Click the compass (🧭) icon to display the legend for each run scenario and their job types.



8. Hover over a node to add another node, view info about the node, edit the node details, edit an existing link, or delete the selected node:



9. When you have added or edited a node, click **SELECT** to save any modifications and render it on the graphical view. For possible ways to build your workflow, see [Building nodes scenarios](#).
10. When you have built your workflow job template, click **Save** to save your entire workflow template and return to the new workflow job template details page.





## IMPORTANT

Clicking **Close** does not save your work, but instead, it closes the entire Workflow Visualizer so that you have to start again.

### 23.7.2. Approval nodes

Choosing an **Approval** node requires your intervention in order to advance the workflow. This functions as a means to pause the workflow in between playbooks so that you can give approval to continue on to the next playbook in the workflow. This gives the user a specified amount of time to intervene, but also enables you to continue as quickly as possible without having to wait on another trigger.

The default for the timeout is none, but you can specify the length of time before the request expires and is automatically denied. After you select and supply the information for the approval node, it displays on the graphical view with a pause icon beside it.



The approver is anyone who meets the following criteria:

- A user that can execute the workflow job template containing the approval nodes.
- A user who has organization administrator or above privileges (for the organization associated with that workflow job template).
- A user who has the **Approve** permission explicitly assigned to them within that specific workflow job template.

The screenshot displays the user interface for an administrator. At the top, the user is identified as 'admin'. A notification bell icon shows 3 pending notifications. The notifications panel is titled 'NOTIFICATIONS' and contains three items:

- New Workflow Job Template**: An approval node for 'Approval node' created on 9/25/2019 at 12:33:44 PM, expiring at 1:03:44 PM. It includes 'APPROVE' and 'DENY' buttons.
- Remove VMWare Host**: An approval node for 'Remove VMWare Host?' created on 9/25/2019 at 12:45:10 PM, expiring at 12:57:10 PM. It includes 'APPROVE' and 'DENY' buttons.
- Cleanup Deleted Data**: An approval node for 'Cleanup?' created on 9/25/2019 at 12:45:46 PM, expiring at 10:45:46 PM. It includes 'APPROVE' and 'DENY' buttons.

At the bottom right of the notifications panel, it indicates 'ITEMS 1 - 3'.

If pending approval nodes are not approved within the specified time limit (if an expiration was assigned) or they are denied, then they are marked as "timed out" or "failed", and move on to the next "on fail node" or "always node". If approved, the "on success" path is taken. If you try to **POST** in the API to a node that has already been approved, denied or timed out, an error message notifies you that this action is redundant, and no further steps are taken.

The following table shows the various levels of permissions allowed on approval workflows:

SCOPE	ROLE	CREATE WORKFLOW APPROVAL	GRANT APPROVAL	VIEW WORKFLOW APPROVAL	APPROVE/DENY	VIEW WORKFLOW APPROVAL IN ACTIVITY STREAM
Organization	Organization Admin	Yes	Yes	Yes	Yes	Yes
Organization Workflow Job Template	Workflow Admin	Yes	Yes (*)	Yes	Yes	Yes
	Workflow Executor	No	No	Yes	No	Yes
	Workflow Approver	No	No	Yes	Yes	Yes
	Read on Workflow	No	No	Yes (**)	No	Yes (***)
System	System Admin	Yes	Yes	Yes	Yes	Yes
	System Auditor	No	No	Yes	No	Yes
Random user in Organization		No	No	No	No	No
Random user outside Organization		No	No	No	No	No

\* Exception: A User with WF Admin permission at the organization level would not be able to grant approval.

\*\* Exception: A User with Read on WF permission at the organization level would not be able to view WF approvals.

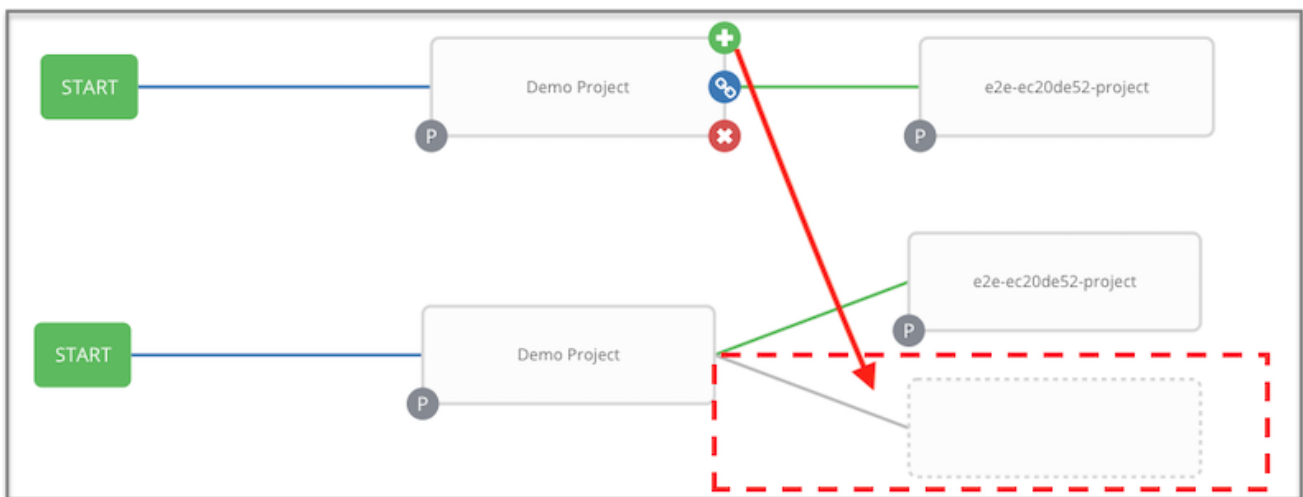
\*\*\* Exception: A User with Read on WF permission at the organization level would not be able to view approval jobs in the Activity Stream.

### 23.7.3. Building nodes scenarios

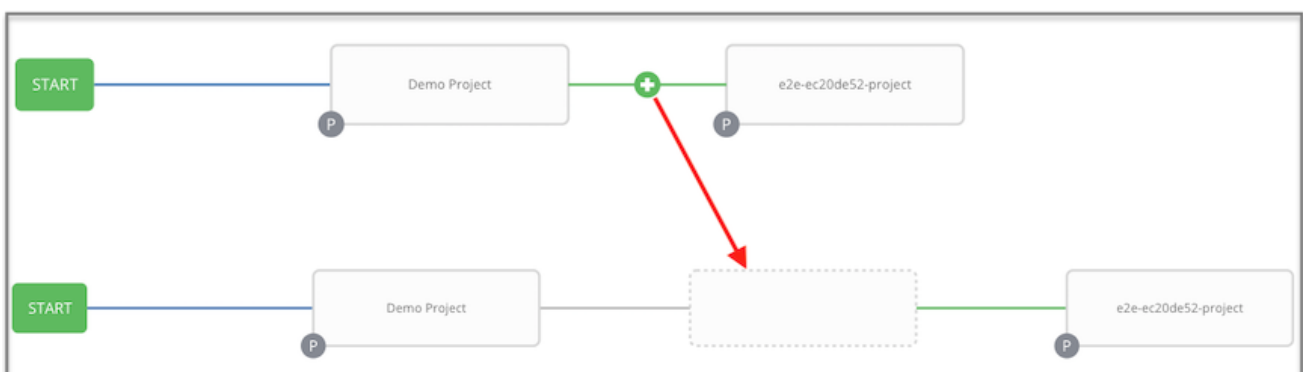
Learn how to manage nodes in the following scenarios.

#### Procedure

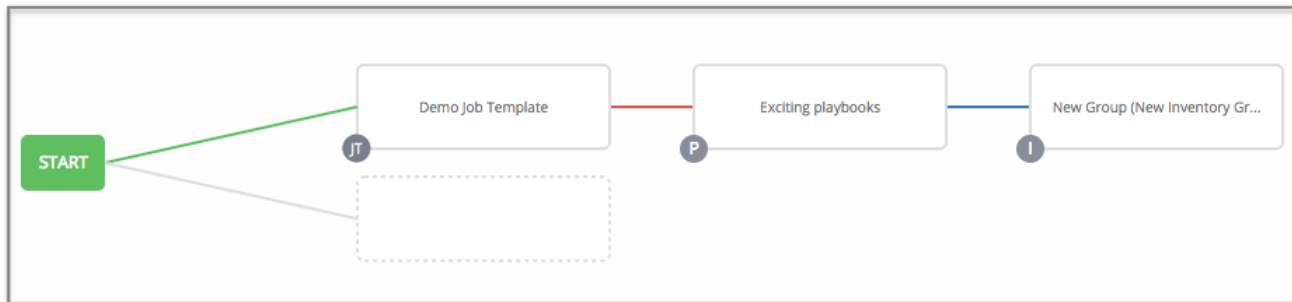
- Click the (+) icon on the parent node to add a sibling node:



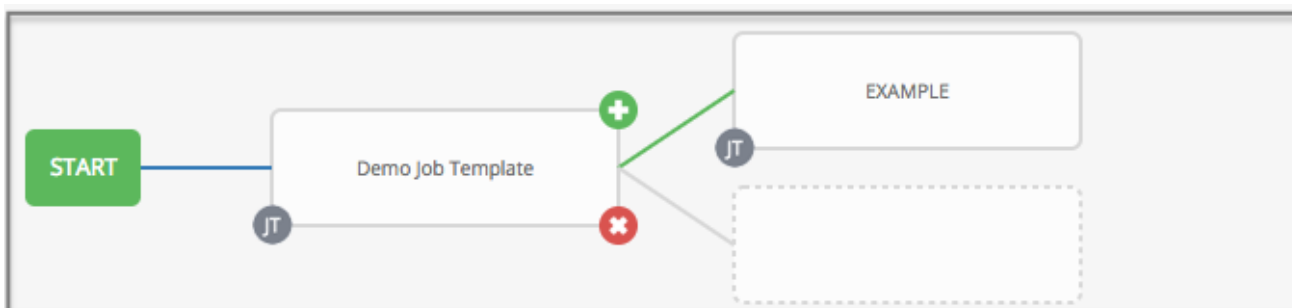
- Hover over the line that connects two nodes and click the plus (+) icon, to insert another node in between nodes. Clicking the plus (+) icon automatically inserts the node between the two nodes:



- Click **START** again, to add a root node to depict a split scenario:



- At any node where you want to create a split scenario, hover over the node from which the split scenario begins and click the plus ( **+** ) icon. This adds multiple nodes from the same parent node, creating sibling nodes:




## NOTE

When adding a new node, the **PROMPT** option also applies to workflow templates. Workflow templates prompt for inventory and surveys.

- You can undo the last inserted node by using one of these methods:
  - Click on another node without making a selection.
  - Click **Cancel**.

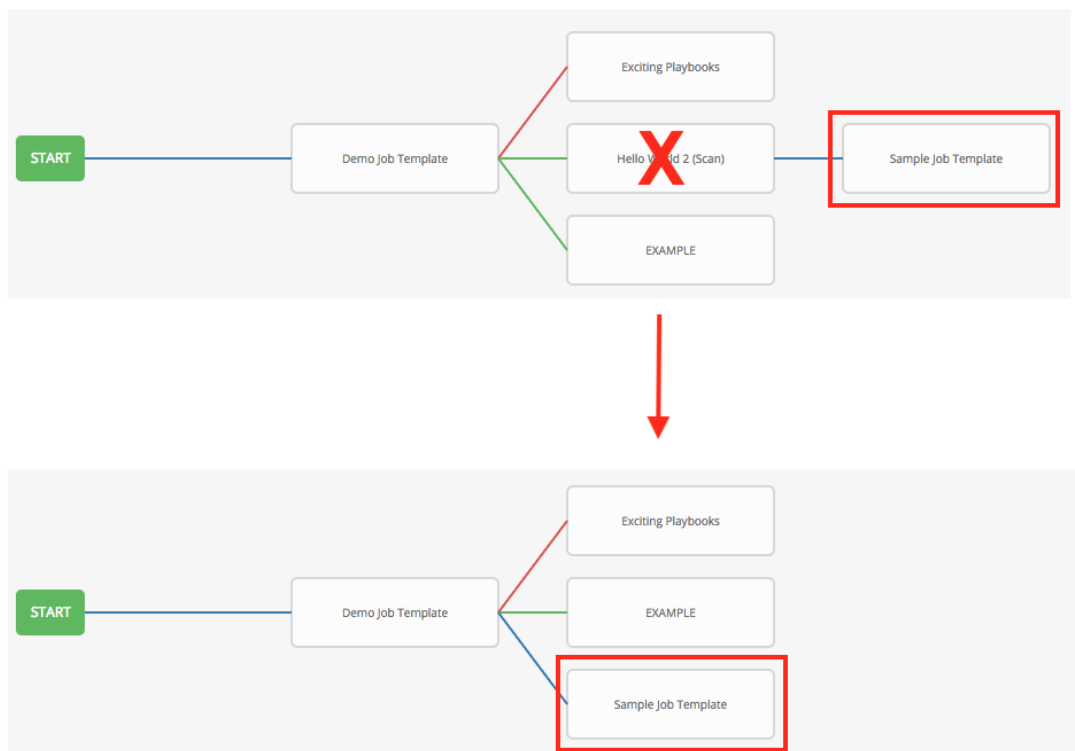
The following example workflow contains all three types of jobs initiated by a job template. If it fails to run, you must protect the sync job. Regardless of whether it fails or succeeds, proceed to the inventory sync job:




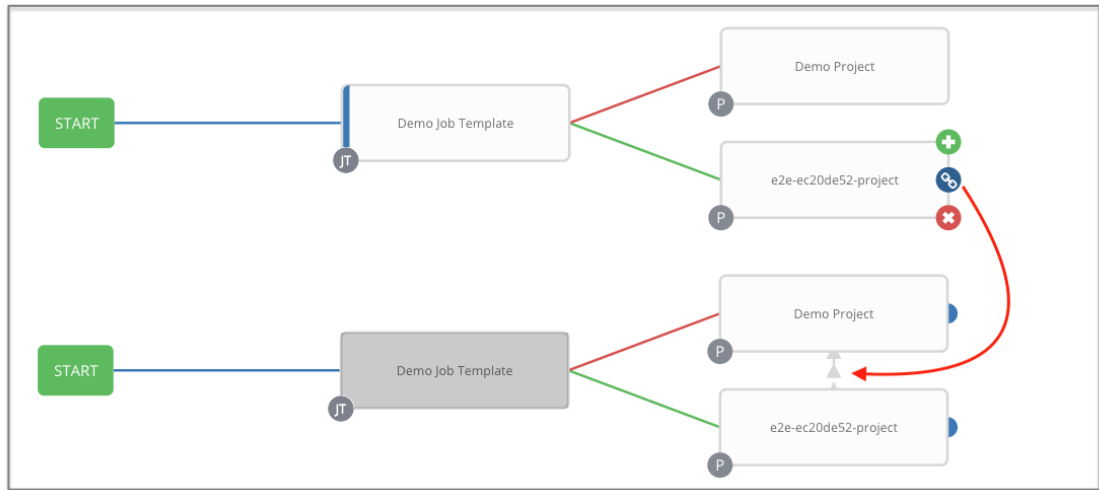
Refer to the key by clicking the compass (  ) icon to identify the meaning of the symbols and colors associated with the graphical depiction.

**NOTE**

If you remove a node that has a follow-on node attached to it in a workflow with a set of sibling nodes that has varying edge types, the attached node automatically joins the set of sibling nodes and retains its edge type:

**23.7.4. Editing a node****Procedure**

- Edit a node by using one of these methods:
  - If you want to edit a node, click on the node you want to edit. The pane displays the current selections. Make your changes and click **Select** to apply them to the graphical view.
  - To edit the edge type for an existing link, (**success**, **failure**, **always**), click the link. The pane displays the current selection. Make your changes and click **Save** to apply them to the graphical view.
  - Click the link (  ) icon that appears on each node, to add a new link from one node to another. Doing this highlights the nodes that are possible to link to. These options are indicated by the dotted lines. Invalid options are indicated by disabled boxes (nodes) that would otherwise produce an invalid link. The following example shows the **Demo Project** as a possible option for the **e2e-ec20de52-project** to link to, indicated by the arrows:



- To remove a link, click the link and click **UNLINK**. This option only appears in the pane if the target or child node has more than one parent. All nodes must be linked to at least one other node at all times so you must create a new link before removing an old one.
- Edit the view of the workflow diagram by using one of these methods:
  - Click the settings icon to zoom, pan, or reposition the view.
  - Drag the workflow diagram to reposition it on the screen or use the scroll on your mouse to zoom.

## 23.8. LAUNCHING A WORKFLOW JOB TEMPLATE

### Procedure

- Launch a workflow job template by using one of these methods:
  - From the navigation panel, select **Templates** → **Launch** next to the job template:

Templates 🔄

Name	Type	Last Ran	Actions
> <input type="checkbox"/> Demo Job Template	Job Template	7/15/2021, 1:13:11 AM	🔊 🖋️ 🗑️
> <input type="checkbox"/> Max hosts	Job Template	7/15/2021, 1:11:47 AM	🔊 🖋️ 🗑️
> <input type="checkbox"/> New Workflow Job Template	Workflow Job Template	7/15/2021, 1:13:15 AM	🔊 🖋️ 🗑️

1 - 3 of 3 items << >> 1 of 1 page

- Click **Launch** in the **Details** tab of the workflow job template that you want to launch.

Variables added for a workflow job template are automatically added in automation controller when launching, along with any extra variables set in the workflow job template and survey.

Events related to approvals on workflows are displayed in the activity stream (🔄) with detailed information about the approval requests, if any.

## 23.9. COPYING A WORKFLOW JOB TEMPLATE

With automation controller you can copy a workflow job template. When you copy a workflow job template, it does not copy any associated schedule, notifications, or permissions. Schedules and notifications must be recreated by the user or system administrator creating the copy of the workflow template. The user copying the workflow template is granted the administrator permission, but no permissions are assigned (copied) to the workflow template.

### Procedure

1. Open the workflow job template that you want to copy by using one of these methods:
  - From the navigation panel, select **Resources** → **Templates**.
  - In the workflow job template **Details** view, scroll down to access it from a list of templates.
    - Click the copy (📄) icon.  
A new template opens with the name of the template from which you copied and a timestamp:



2. Select the copied template and replace the contents of the **Name** field with a new name, and provide or modify the entries in the other fields to complete this template.
3. Click **Save**.



### NOTE

If a resource has a related resource that you do not have the right level of permission to, you cannot copy the resource. For example, in the case where a project uses a credential that a current user only has Read access. However, for a workflow job template, if any of its nodes use an unauthorized job template, inventory, or credential, the workflow template can still be copied. But in the copied workflow job template, the corresponding fields in the workflow template node are absent.

## 23.10. WORKFLOW JOB TEMPLATE EXTRA VARIABLES

For more information see the [Extra variables](#) section.

## CHAPTER 24. MANAGING INSTANCE GROUPS

An Instance Group enables you to group instances in a clustered environment. Policies dictate how instance groups behave and how jobs are executed. The following view displays the capacity levels based on policy algorithms:

Instance Groups 🔍

Name     1 - 4 of 4

Name ↑	Type	Running Jobs	Total Jobs	Instances	Capacity	Actions
<input type="checkbox"/> Can't contain myself	Container group	0	0	0		
<input type="checkbox"/> controlplane	Instance group	1	15	1	Used capacity <span style="float: right;">2%</span>	
<input type="checkbox"/> default	Instance group	0	0	2	Unavailable	
<input type="checkbox"/> test-instance-group	Instance group	0	0	2	Unavailable	

1 - 4 of 4 items
<< < 1 of 1 page > >>

### Additional resources

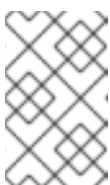
- For more information about the policy or rules associated with instance groups, see the [Instance Groups](#) section of the *Automation controller Administration Guide*.
- For more information on connecting your instance group to a container, see [Container Groups](#).

## 24.1. CREATING AN INSTANCE GROUP

Use the following procedure to create a new instance group.

### Procedure

1. From the navigation panel, select **Administration** → **Instance Groups**.
2. Click **Add** → **Add instance group**.
3. Enter the appropriate details into the following fields:
  - **Name:** Names must be unique and must not be named "controller".
  - **Policy instance minimum** Enter the minimum number of instances to automatically assign to this group when new instances come online.
  - **Policy instance percentage** Use the slider to select a minimum percentage of instances to automatically assign to this group when new instances come online.



### NOTE

Policy instance fields are not required to create a new instance group. If you do not specify values, then the **Policy instance minimum** and **Policy instance percentage** default to 0.




- **Max concurrent jobs:** Specify the maximum number of forks that can be run for any given job.
- **Max forks:** Specify the maximum number of concurrent jobs that can be run for any given job.



## NOTE

The default value of 0 for **Max concurrent jobs** and **Max forks** denotes no limit. For more information, see [Instance group capacity limits](#) in the *Automation controller Administration Guide*.

4. Click **Save**.

When you have successfully created the instance group the **Details** tab of the newly created instance group remains, enabling you to review and edit your instance group information. This is the same screen that opens when you click the Edit  icon from the **Instance Groups** list view. You can also edit **Instances** and review **Jobs** associated with this instance group:

The screenshot shows two parts of the user interface. The top part is the configuration page for 'Instance Group 1', which has tabs for 'DETAILS', 'INSTANCES', and 'JOBS'. The 'DETAILS' tab is active, showing fields for 'NAME' (Instance Group 1), 'POLICY INSTANCE MINIMUM' (2), and 'POLICY INSTANCE PERCENTAGE' (25%). There are 'CANCEL' and 'SAVE' buttons at the bottom right. The bottom part is the 'INSTANCE GROUPS' list view, which has a search bar and a 'KEY' button. It displays a table with two instance groups:

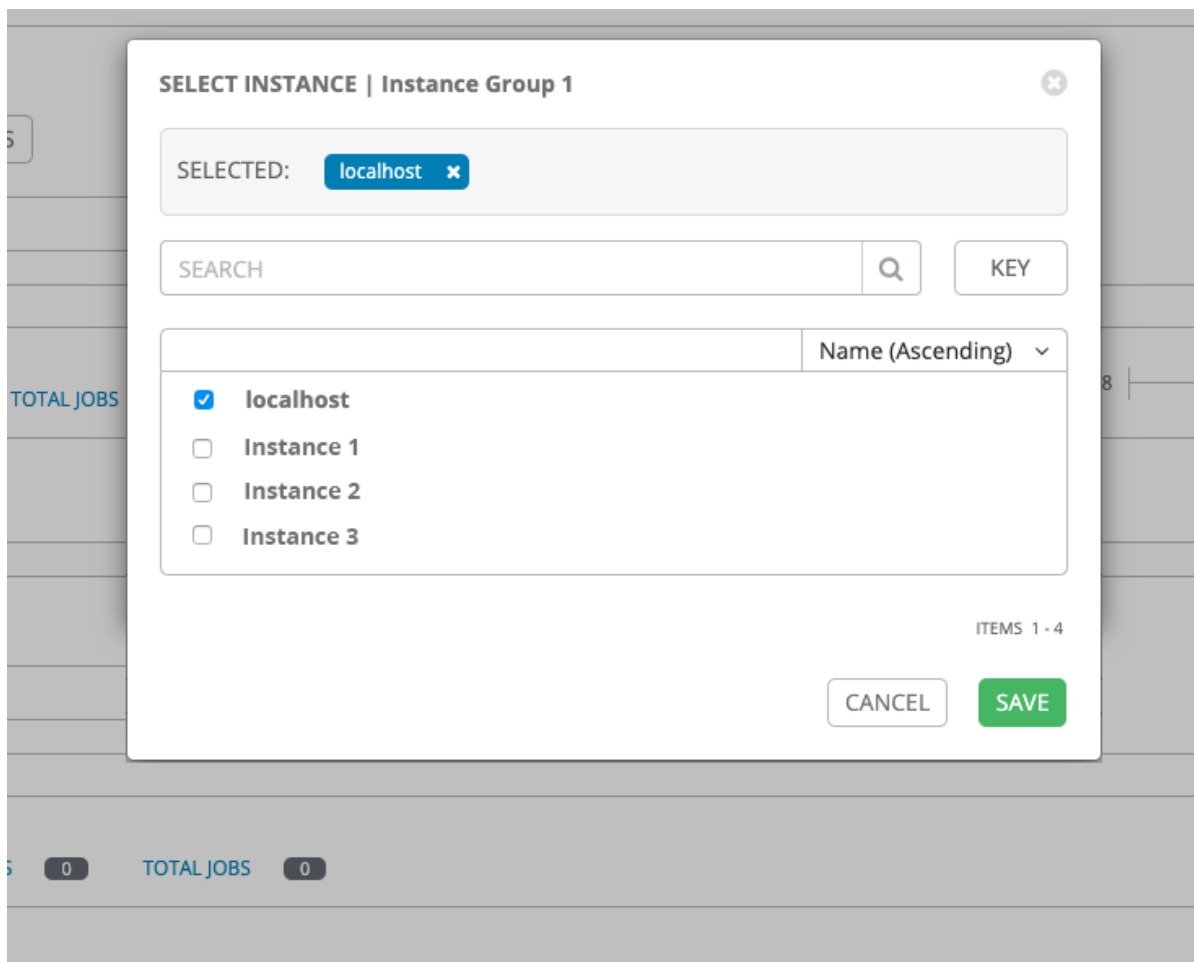
Instance Group	RUNNING JOBS	TOTAL JOBS	INSTANCES	USED CAPACITY
Instance Group 1	0	0	1	0%
tower	0	43	1	0%

The table also includes a 'Name (Ascending)' dropdown and a trash icon for each row. At the bottom right, it says 'ITEMS 1 - 2'.

### 24.1.1. Associating instances to an instance group

#### Procedure

1. Select the **Instances** tab of the **Instance Groups** window.
2. Click **Associate**.
3. Click the checkbox next to one or more available instances from the list to select the instances you want to associate with the instance group:




- In the following example, the instances added to the instance group displays along with information about their capacity:



## 24.1.2. Viewing jobs associated with an instance group

### Procedure

- Select the **Jobs** tab of the **Instance Group** window.
- Click the arrow  icon next to a job to expand the view and show details about each job. Each job displays the following details:
  - The job status


- The ID and name
- The type of job
- The time it started and completed
- Who started the job and applicable resources associated with it, such as the template, inventory, project, and execution environment

### **Additional resources**

The instances are run in accordance with instance group policies. For more information, see [Instance Group Policies](#) in the *Automation controller Administration Guide*.

## CHAPTER 25. JOBS IN AUTOMATION CONTROLLER


A job is an instance of automation controller launching an Ansible playbook against an inventory of hosts.

The **Jobs** list view displays a list of jobs and their statuses, shown as completed successfully, failed, or as an active (running) job. The default view is collapsed (Compact) with the job name, status, job type, start, and finish times. You can click the arrow  icon to expand and see more information. You can sort this list by various criteria, and perform a search to filter the jobs of interest.


**Jobs** 🔍

Name

1 - 11 of 11 < >

<	Name ↑	Status ↑	Type	Start Time ↑	Finish Time ↓	Actions
▼	<a href="#">14 – Cleanup Job Details</a>	<span style="color: green;">✔ Successful</span>	Management Job	5/8/2022, 9:43:42 AM	5/8/2022, 9:43:44 AM	
<div style="display: flex; justify-content: space-between; font-size: 0.9em;"> <span>Launched By <a href="#">Cleanup Job Schedule</a></span> <span>Schedule <a href="#">Cleanup Job Schedule</a></span> <span>Execution Environment <a href="#">Default execution environment</a></span> </div>						
▼	<a href="#">13 – Cleanup Activity Stream</a>	<span style="color: green;">✔ Successful</span>	Management Job	5/3/2022, 9:43:51 AM	5/3/2022, 9:43:53 AM	
<div style="display: flex; justify-content: space-between; font-size: 0.9em;"> <span>Launched By <a href="#">Cleanup Activity Schedule</a></span> <span>Schedule <a href="#">Cleanup Activity Schedule</a></span> <span>Execution Environment <a href="#">Default execution environment</a></span> </div>						
▼	<a href="#">9 – Example project</a>	<span style="color: green;">✔ Successful</span>	Source Control Update	5/2/2022, 4:17:51 PM	5/2/2022, 4:17:56 PM	
<div style="display: flex; justify-content: space-between; font-size: 0.9em;"> <span>Launched By <a href="#">admin</a></span> <span>Project <a href="#">Example project</a></span> <span>Execution Environment <a href="#">Control Plane Execution Environment</a></span> </div>						

From this screen you can complete the following tasks:

- View details and standard output of a particular job
- Re-launch  jobs
- Remove selected jobs

The relaunch operation only applies to relaunches of playbook runs and does not apply to project or inventory updates, system jobs, and workflow jobs. When a job relaunches, the **Jobs Output** view is displayed. Selecting any type of job also takes you to the **Job Output** view for that job, where you can filter jobs by various criteria:

Jobs &gt; 16 - Example project

## Output



Example project Successful Plays 2 Tasks 6 Hosts 1 Elapsed 00:00:04

Stdout

Event

Advanced

```

17 TASK [debug] ***** 10:38:57
18 skipping: [localhost]
19 TASK [meta] ***** 10:38:57
20 skipping: [localhost]
21
22 TASK [fetch galaxy roles from requirements.(yaml/yaml)] ***** 10:38:57
23
24 TASK [fetch galaxy collections from collections/requirements.(yaml/yaml)] ***** 10:38:57
25 [WARNING]: Unable to find
26 '/var/lib/awx/projects/_9_example_project/collections' in expected paths (use
27 -vvvvv to see paths)
28
29 PLAY RECAP ***** 10:38:57
30 localhost : ok=3 changed=0 unreachable=0 failed=0 skipped=3 rescued=0 ignored=0

```

- The **Stdout** option is the default display that shows the job processes and output.
- The **Event** option enables you to filter by the events of interest, such as errors, host failures, host retries, and items skipped. You can include as many events in the filter as necessary.
- The **Advanced** option is a refined search that gives you a combination of including or excluding criteria, searching by key, or by lookup type. For more information on using the search, refer to the [Search](#) section.

## 25.1. INVENTORY SYNC JOBS

When an inventory synchronization is executed, the results display in the **Output** tab. If used, the Ansible CLI displays the same information. This can be useful for debugging. The **ANSIBLE\_DISPLAY\_ARGS\_TO\_STDOUT** parameter is set to **False** for all playbook runs. This parameter matches Ansible's default behavior and does not display task arguments in task headers in the **Job Detail** interface to avoid leaking certain sensitive module parameters to **stdout**. To restore the previous behavior, set **ANSIBLE\_DISPLAY\_ARGS\_TO\_STDOUT** to **True** through the **AWX\_TASK\_ENV** configuration setting.

For more information, see [ANSIBLE\\_DISPLAY\\_ARGS\\_TO\\_STDOUT](#).

Use the icons to relaunch , download  the job output, or delete  the job.

Jobs &gt; 212 - my inv - inv source

## Output



my inv - inv source Successful Elapsed 00:00:14

Stdout

```

1  "class": algorithms.Blowfish,
2  ansible-inventory [core 2.12.5.post0]
3  config file = /runner/project/ansible.cfg
4  configured module search path = ['/home/runner/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
5  ansible python module location = /usr/local/lib/python3.8/site-packages/ansible
6  ansible collection location = /runner/requirements_collections:/home/runner/.ansible/collections:/usr/share/ansible/collections:/usr/share/automation-contro
7  ller/collections
8  executable location = /usr/local/bin/ansible-inventory
9  python version = 3.8.12 (default, Sep 21 2021, 00:10:52) [GCC 8.5.0 20210514 (Red Hat 8.5.0-3)]
10 jinja version = 2.10.3
11 libyaml = True
12 Using /runner/project/ansible.cfg as config file
13 host_list declined parsing /runner/project/inventories/create_10_hosts.ini as it did not pass its verify_file() method
14 script declined parsing /runner/project/inventories/create_10_hosts.ini as it did not pass its verify_file() method
15 auto declined parsing /runner/project/inventories/create_10_hosts.ini as it did not pass its verify_file() method
16 yaml declined parsing /runner/project/inventories/create_10_hosts.ini as it did not pass its verify_file() method
17 Parsed /runner/project/inventories/create_10_hosts.ini inventory source with ini plugin
18 14.082 INFO Processing JSON output...
19 14.084 INFO Loaded 0 groups, 10 hosts

```



## NOTE

You can perform an inventory update while a related job is running. In cases where you have a large project (around 10 GB), disk space on **/tmp** can be an issue.

## 25.1.1. Inventory sync details

Access the **Details** tab to view details about the job execution:

Jobs &gt; 212 - my inv - inv source

## Details



Back to Jobs **Details** Output

Job ID	212	Status	<span>Successful</span>	Started	5/11/2022, 1:18:35 PM
Finished	5/11/2022, 1:18:49 PM	Job Type	Inventory Sync	Launched By	admin
Inventory	my inv	Inventory Source	inv source	Source	Sourced from a Project
Inventory Source Project	<span>Successful</span> my project	Verbosity	1 (Verbose)	Execution Environment	AWX EE (latest)
Execution Node	receptor-1	Instance Group	default	Created	5/11/2022, 1:18:34 PM by admin
Last Modified	5/11/2022, 1:18:35 PM				

Relaunch Delete

You can view the following details for an executed job:

- **Status:** It can be any of the following:
  - **Pending:** The inventory sync has been created, but not queued or started yet. Any job, not just inventory source syncs, stays in pending until it is ready to be run by the system. Reasons for inventory source syncs not being ready include:
    - Dependencies that are currently running (all dependencies must be completed before the next step can execute).
    - Insufficient capacity to run in the locations it is configured for.
  - **Waiting:** The inventory sync is in the queue waiting to be executed.

- **Running:** The inventory sync is currently in progress.
- **Successful:** The inventory sync job succeeded.
- **Failed:** The inventory sync job failed.
- **Inventory:** The name of the associated inventory group.
- **Source:** The type of cloud inventory.
- **Inventory Source Project** The project used as the source of this inventory sync job.
- **Execution Environment:** The execution environment used.
- **Execution node:** The node used to execute the job.
- **Instance Group:** The name of the instance group used with this job (automation controller is the default instance group).

Selecting these items enables you to view the corresponding job templates, projects, and other objects.

## 25.2. SCM INVENTORY JOBS

When an inventory sourced from an SCM, for example git, is executed, the results are displayed in the **Output** tab. If used, the Ansible CLI displays the same information. This can be useful for debugging.

Use the icons in the navigation menu to relaunch (  ), download (  ) the job output, or delete (  ) the job.

Jobs > 16 - Example project 🔍

### Details 🔍

◀ Back to Jobs   Details   Output

<b>Job ID</b>	16	<b>Status</b>	🟢 Successful	<b>Started</b>	5/9/2022, 10:38:53 AM
<b>Finished</b>	5/9/2022, 10:38:58 AM	<b>Job Type</b>	Source Control Update	<b>Launched By</b>	admin
<b>Project</b>	<a href="#">Example project</a>	<b>Project Status</b>	🟢 Successful	<b>Revision</b>	98b8dc2d4d6671ddceab73a5d3958e94fcdba419
<b>Execution Environment</b>	<a href="#">Control Plane Execution Environment</a>	<b>Execution Node</b>	ec2-3-88-85-45.compute-1.amazonaws.com	<b>Instance Group</b>	controlplane
<b>Job Tags</b>	<input type="text" value="update_git"/> <input type="text" value="install_roles"/> <input type="text" value="install_collections"/>				
<b>Created</b>	5/9/2022, 10:38:53 AM by admin	<b>Last Modified</b>	5/9/2022, 10:38:53 AM		

### 25.2.1. SCM inventory details

To view details about the job execution and its associated project, select the **Access** tab.

Jobs > 16 - Example project

## Details

◀ Back to Jobs   Details   Output

<b>Job ID</b>	16	<b>Status</b>	<span>Successful</span>	<b>Started</b>	5/9/2022, 10:38:53 AM
<b>Finished</b>	5/9/2022, 10:38:58 AM	<b>Job Type</b>	Source Control Update	<b>Launched By</b>	admin
<b>Project</b>	Example project	<b>Project Status</b>	<span>Successful</span>	<b>Revision</b>	98b8dc2d4d6671ddceab73a5d3958e94fcdba419
<b>Execution Environment</b>	Control Plane Execution Environment	<b>Execution Node</b>	ec2-3-88-85-45.compute-1.amazonaws.com	<b>Instance Group</b>	controlplane
<b>Job Tags</b>	update_git   install_roles   install_collections				
<b>Created</b>	5/9/2022, 10:38:53 AM by admin	<b>Last Modified</b>	5/9/2022, 10:38:53 AM		

Relaunch   Delete

You can view the following details for an executed job:

- **Status:** It can be any of the following:
  - **Pending:** The SCM job has been created, but not queued or started yet. Any job, not just SCM jobs, stay in pending until it is ready to be run by the system. Reasons for SCM jobs not being ready include dependencies that are currently running (all dependencies must be completed before the next step can execute), or there is not enough capacity to run in the locations it is configured to.
  - **Waiting:** The SCM job is in the queue waiting to be executed.
  - **Running:** The SCM job is currently in progress.
  - **Successful:** The last SCM job succeeded.
  - **Failed:** The last SCM job failed.
- **Job Type:** SCM jobs display Source Control Update.
- **Project:** The name of the project.
- **Project Status:** Indicates whether the associated project was successfully updated.
- **Revision:** Indicates the revision number of the sourced project that was used in this job.
- **Execution Environment:** Specifies the execution environment used to run this job.
- **Execution Node:** Indicates the node on which the job ran.
- **Instance Group:** Indicates the instance group on which the job ran, if specified.
- **Job Tags:** Tags show the various job operations executed.

Selecting these items enables you to view the corresponding job templates, projects, and other objects.

## 25.3. PLAYBOOK RUN JOBS

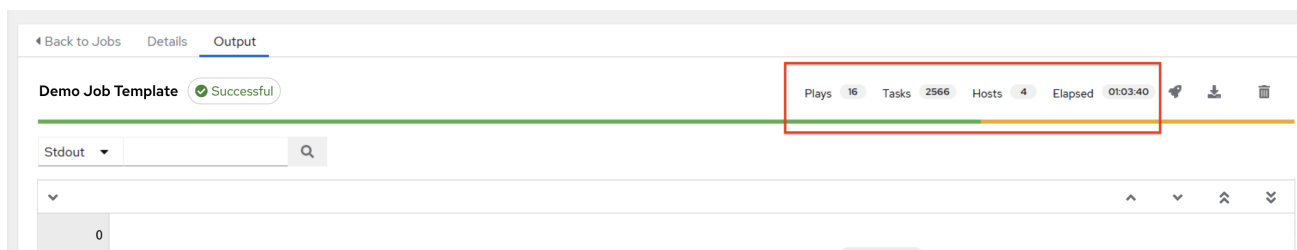
When a playbook is executed, the results display in the **Output** tab. If used, the Ansible CLI displays the same information. This can be useful for debugging.





The events summary displays the following events that are run as part of this playbook:

- The number of times this playbook has run is shown in the **Plays** field
- The number of tasks associated with this playbook is shown in the **Tasks** field
- The number of hosts associated with this playbook is shown in the **Hosts** field
- The amount of time it took to complete the playbook run is shown in the **Elapsed** field



Use the icons next to the events to relaunch (  ), download (  ) the job output, or delete (  ) the job.

Hover over a section of the host status bar in the **Output** view and the number of hosts associated with that status displays.

The output for a playbook job is also available after launching a job from the **Jobs** tab of its **Jobs Templates** page. View its host details by clicking on the line item tasks in the output.

### 25.3.1. Search

Use **Search** to look up specific events, hostnames, and their statuses. To filter only certain hosts with a particular status, specify one of the following valid statuses:

#### ok

Indicates that a task completed successfully but no change was executed on the host.

#### changed

The playbook task executed. Since Ansible tasks should be written to be idempotent, tasks may exit successfully without executing anything on the host. In these cases, the task returns **ok**, but not **changed**.

**failed**

The task failed. Further playbook execution stopped for this host.

**unreachable**

The host is unreachable from the network or has another fatal error associated with it.

**skipped**

The playbook task skipped because no change was necessary for the host to reach the target state.

**rescued**

This shows the tasks that failed and then executes a rescue section.

**ignored**

This shows the tasks that failed and have **ignore\_errors: yes** configured.

These statuses also display in each **Stdout** pane, in a group of "stats" called the host summary fields:

The screenshot shows the 'Output' tab for a 'Demo Job Template' which is 'Successful'. The output is filtered to 'Stdout'. The following lines are visible:

```

0
1 PLAY [Hello World Sample] ***** 12:48:50
2
3 TASK [Gathering Facts] ***** 12:48:50
4 ok: [localhost]
5
6 TASK [Hello Message] ***** 12:48:52
7 ok: [localhost] => {
8   "msg": "Hello World!"
9 }
10
11 PLAY RECAP ***** 12:48:52
12 localhost : ok=2  changed=0  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0

```

The following example shows a search with only unreachable hosts:



The screenshot shows the 'Output' tab for a 'Job with errors' which is 'Failed'. The search filter is set to 'Host Unreachable'. The output is filtered to 'Event'. The following line is visible:

```

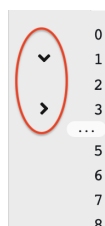
4 fatal: [Host example]: UNREACHABLE! => {"changed": false, "msg": "Failed to connect to the host via ssh: ssh: Could not resolve host name host example: Name or service not known", "unreachable": true}

```

For more information on using the search, see the [Search](#) section.

The standard output view displays the events that occur on a particular job. By default, all rows are expanded so that the details are displayed. Use the collapse-all (  ) icon to switch to a view that only contains the headers for plays and tasks. Click the plus (  ) icon to view all the lines of the standard output.

You can display all the details of a specific play or task by clicking the arrow icons next to them. Click an arrow from sideways to downward to expand the lines associated with that play or task. Click the arrow back to the sideways position to collapse and hide the lines.



```

0
1 PLAY [Hello World Sample] ***** 15:31:04
2
3 TASK [Gathering Facts] ***** 15:31:04
4
5
6 PLAY RECAP ***** 15:31:04
7 Host example : ok=0 changed=0 unreachable=1 failed=0 skipped=0 rescued=0 ignored=0
8

```

When viewing details in the expand or collapse mode, note the following:

- Each displayed line that is not collapsed has a corresponding line number and start time.
- An expand or collapse icon is at the start of any play or task after the play or task has completed.
- If querying for a particular play or task, it appears collapsed at the end of its completed process.
- In some cases, an error message appears, stating that the output may be too large to display. This occurs when there are more than 4000 events. Use the search and filter for specific events to bypass the error.

Click on a line of an event from the **Stdout** pane and a **Host Events** window displays in a separate window. This window shows the host that was affected by that particular event.



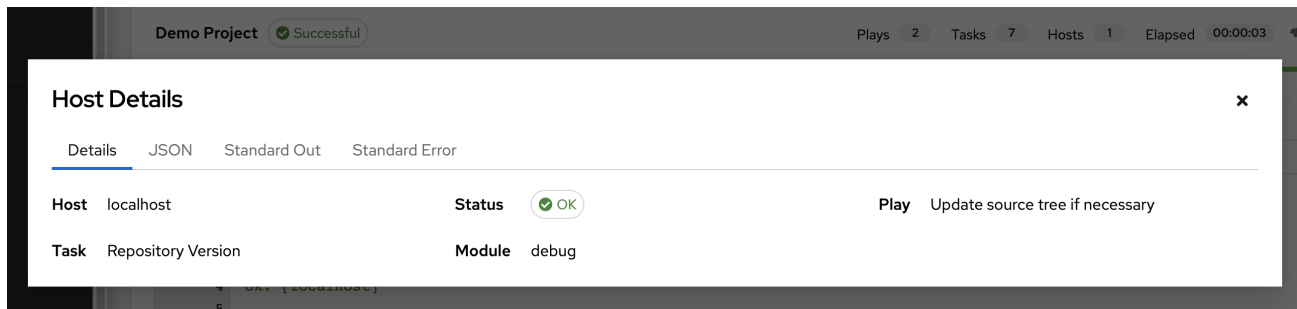
## NOTE

Upgrading to the latest versions of Ansible Automation Platform involves progressively migrating all historical playbook output and events. This migration process is gradual, and happens automatically in the background after installation is complete. Installations with very large amounts of historical job output (tens or hundreds of GB of output) can have missing job output until migration is complete. The most recent data shows up at the top of the output, followed by older events.

### 25.3.2. Host Details

The **Host Details** window displays the following information about the host affected by the selected event and its associated play and task:

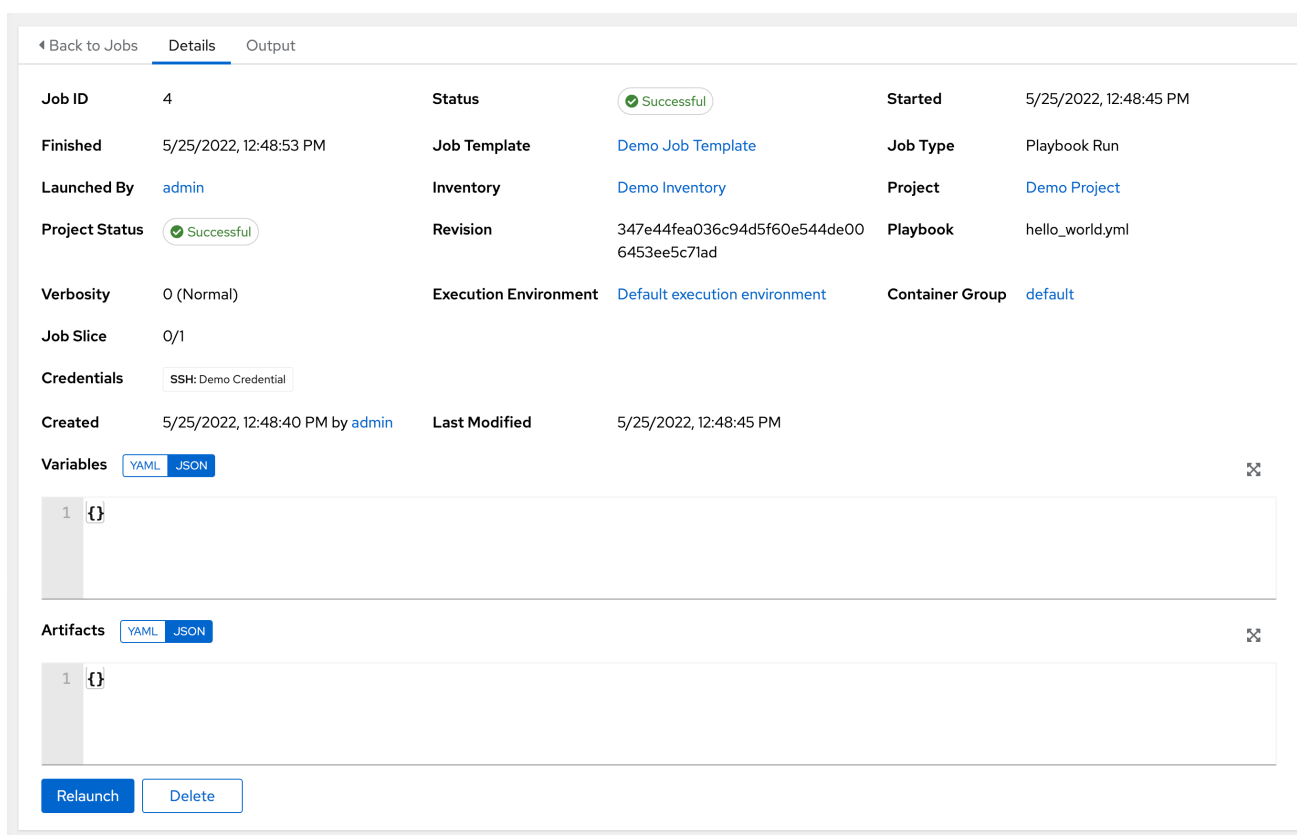
- The **Host**.
- The **Status**.
- The type of run in the **Play** field.
- The type of **Task**.
- If applicable, the Ansible Module task, and any arguments for that module.



To view the results in JSON format, click the **JSON** tab. To view the output of the task, click **Standard Out**. To view errors from the output, click **Standard Error**.

### 25.3.3. Playbook run details

Access the **Details** tab to view details about the job execution:



You can view the following details for an executed job:

- **Status:** It can be any of the following:
  - **Pending:** The playbook run has been created, but not queued or started yet. Any job, not just playbook runs, stay in pending until it is ready to be run by the system. Reasons for playbook runs not being ready include dependencies that are currently running (all dependencies must be completed before the next step can execute), or there is not enough capacity to run in the locations it is configured to.
  - **Waiting:** The playbook run is in the queue waiting to be executed.
  - **Running:** The playbook run is currently in progress.
  - **Successful:** The last playbook run succeeded.

- **Failed:** The last playbook run failed.
- **Job Template:** The name of the job template from which this job launched.
- **Inventory:** The inventory selected to run this job against.
- **Project:** The name of the project associated with the launched job.
- **Project Status:** The status of the project associated with the launched job.
- **Playbook:** The playbook used to launch this job.
- **Execution Environment:** The name of the execution environment used in this job.
- **Container Group:** The name of the container group used in this job.
- **Credentials:** The credentials used in this job.
- **Extra Variables:** Any extra variables passed when creating the job template are displayed here.

Select one of these items to view the corresponding job templates, projects, and other objects.

## 25.4. AUTOMATION CONTROLLER CAPACITY DETERMINATION AND JOB IMPACT

The Automation controller capacity system determines how many jobs can run on an instance given the amount of resources available to the instance and the size of the jobs that are running (referred to as Impact). The algorithm used to determine this is based on the following two things:

- How much memory is available to the system (**mem\_capacity**)
- How much processing capacity is available to the system (**cpu\_capacity**)

Capacity also impacts instance groups. Since groups are made up of instances, instances can also be assigned to multiple groups. This means that impact to one instance can affect the overall capacity of other groups.

Instance groups, not instances themselves, can be assigned to be used by jobs at various levels. For more information, see [Clustering](#) in the *Automation controller Administration Guide*.

When the Task Manager prepares its graph to determine which group a job runs on, it commits the capacity of an instance group to a job that is not ready to start yet.

In smaller configurations, if only one instance is available for a job to run, the Task Manager enables that job to run on the instance even if it pushes the instance over capacity. This guarantees that jobs do not get stuck as a result of an under-provisioned system.

### Additional resources

- For information on container groups, see [Container capacity limits](#) in the *Automation controller Administration Guide*.
- For information on sliced jobs and their impact to capacity, see [Job slice execution behavior](#).

### 25.4.1. Resource determination for capacity algorithm

Capacity algorithms determine how many forks a system is capable of running simultaneously. These algorithms control how many systems Ansible can communicate with simultaneously. Increasing the number of forks an automation controller system is running enables jobs to run faster by performing more work in parallel. However, this increases the load on the system, which can cause work to slow down.

The default, **mem\_capacity**, enables you to over-commit processing resources while protecting the system from running out of memory. If most of your work is not processor-bound, then selecting this mode maximizes the number of forks.

#### 25.4.1.1. Memory relative capacity

**mem\_capacity** is calculated relative to the amount of memory needed per fork. Taking into account the overhead for internal components, this is approximately 100MB per fork. When considering the amount of memory available to Ansible jobs, the capacity algorithm reserves 2GB of memory to account for the presence of other services. The algorithm formula for this is:

$$(mem - 2048) / mem\_per\_fork$$

The following is an example:

$$(4096 - 2048) / 100 == \sim 20$$

A system with 4GB of memory is capable of running 20 forks. The value **mem\_per\_fork** is controlled by setting the value of **SYSTEM\_TASK\_FORKS\_MEM**, which defaults to 100.

#### 25.4.1.2. CPU relative capacity

Ansible workloads are often processor-bound. In such cases, you can reduce the simultaneous workload to enable more tasks to run faster and reduce the average time-to-completion of those jobs.

Just as the **mem\_capacity** algorithm adjusts the amount of memory required per fork, the **cpu\_capacity** algorithm adjusts the amount of processing resources required per fork. The baseline value for this is four forks per core. The algorithm formula for this is:

$$cpus * fork\_per\_cpu$$

For example, a 4-core system looks like the following:

$$4 * 4 == 16$$

You can control the value of **fork\_per\_cpu** by setting the value of **SYSTEM\_TASK\_FORKS\_CPU** which defaults to 4.

### 25.4.2. Capacity job impacts

When selecting the capacity, it is important to understand how each job type affects capacity.

The default forks value for Ansible is five. However, if you set up automation controller to run against fewer systems than that, then the actual concurrency value is lower.

When a job is run in automation controller, the number of forks selected is incremented by 1, to compensate for the Ansible parent process.

## Example

If you run a playbook against five systems with forks value of 5, then the actual forks value from the Job Impact perspective is 6.

### 25.4.2.1. Impact of job types in automation controller

Jobs and ad hoc jobs follow the preceding model, forks +1. If you set a fork value on your job template, your job capacity value is the minimum of the forks value supplied and the number of hosts that you have, plus one. The +1 is to account for the parent Ansible process.

Instance capacity determines which jobs get assigned to any specific instance. Jobs and ad hoc commands use more capacity if they have a higher forks value.

Job types including the following, have a fixed impact:

- Inventory updates: 1
- Project updates: 1
- System jobs: 5



#### NOTE

If you do not set a forks value on your job template, your job uses Ansible's default forks value of five. However, it uses fewer if your job has fewer than five hosts. In general, setting a forks value higher than what the system is capable of can cause issues by running out of memory or over-committing CPU. The job template fork values that you use must fit on the system. If you have playbooks using 1000 forks but none of your systems individually has that much capacity, then your systems are undersized and at risk of performance or resource issues.

### 25.4.2.2. Selecting the correct capacity

Selecting a capacity out of the CPU-bound or the memory-bound capacity limits is selecting between the minimum or maximum number of forks. In the [previous examples](#), the CPU capacity permits a maximum of 16 forks while the memory capacity permits 20. For some systems, the disparity between these can be large and you might want to have a balance between these two.

The instance field **capacity\_adjustment** enables you to select how much you want to consider. It is represented as a value between 0.0 and 1.0. If set to a value of 1.0, then the largest value is used. The previous example involves memory capacity, so a value of 20 forks can be selected. If set to a value of 0.0 then the smallest value is used. A value of 0.5 is a 50/50 balance between the two algorithms, which is 18:

$$16 + (20 - 16) * 0.5 = 18$$

#### Procedure

View or edit the capacity:

1. From the **Instances Groups** list view, select the desired instance.
2. Select the **Instances** tab and adjust the **Capacity Adjustment** slider.

**NOTE**

The slider adjusts whether the instance capacity algorithm yields less forks (towards the left) or yields more forks (towards the right).

## 25.5. JOB BRANCH OVERRIDING

Projects specify the branch, tag, or reference to use from source control in the **scm\_branch** field. These are represented by the values specified in the **Type Details** fields:

The screenshot shows the 'Create New Project' form. The 'Type Details' section is highlighted with a red box, containing three input fields: 'Source Control URL', 'Source Control Branch/Tag/Commit', and 'Source Control Refspec'. The 'Source Control Type' dropdown is set to 'Git'. The 'Options' section at the bottom includes checkboxes for 'Clean', 'Delete', 'Track submodules', 'Update Revision on Launch', and 'Allow Branch Override'.

When creating or editing a job you have the option to **Allow Branch Override**. When this option is checked, project administrators can delegate branch selection to the job templates that use that project, requiring only project **use\_role**.

### 25.5.1. Source tree copy behavior

Every job run has its own private data directory. This directory contains a copy of the project source tree for the given **scm\_branch** that the job is running. Jobs are free to make changes to the project folder and make use of those changes while it is still running. This folder is temporary and is removed at the end of the job run.

If you check the **Clean** option, modified files are removed in automation controller's local copy of the repository. This is done through use of the force parameter in its corresponding Ansible modules pertaining to git or Subversion.

#### Additional resources

For more information, see the [Parameters](#) section of the Ansible documentation.

### 25.5.2. Project revision behavior

During a project update, the revision of the default branch (specified in the **SCM Branch** field of the project) is stored when updated. If providing a non-default **SCM Branch** (not a commit hash or tag) in a job, the newest revision is pulled from the source control remote immediately before the job starts. This revision is shown in the **Source Control Revision** field of the job and its project update.



As a result, offline job runs are impossible for non-default branches. To ensure that a job is running a static version from source control, use tags or commit hashes. Project updates do not save all branches, only the project default branch.

The **SCM Branch** field is not validated, so the project must update to assure it is valid. If this field is provided or prompted for, the **Playbook** field of job templates is not validated, and you have to launch the job template in order to verify presence of the expected playbook.

### 25.5.3. Git Refspec

The **SCM Refspec** field specifies which extra references the update should download from the remote. Examples include the following:

- **refs:/refs/remotes/origin/**: This fetches all references, including remotes of the remote
- **refs/pull:/refs/remotes/origin/pull/** (GitHub-specific): This fetches all refs for all pull requests
- **refs/pull/62/head:refs/remotes/origin/pull/62/head**: This fetches the ref for one GitHub pull request

For large projects, consider performance impact when using the first or second previous examples.

The **SCM Refspec** parameter affects the availability of the project branch, and can enable access to references not otherwise available. The previous examples enable you to supply a pull request from the **SCM Branch**, which is not possible without the **SCM Refspec** field.

The Ansible git module fetches **refs/heads/** by default. This means that a project's branches, tags and commit hashes, can be used as the **SCM Branch** if **SCM Refspec** is blank. The value specified in the **SCM Refspec** field affects which **SCM Branch** fields can be used as overrides. Project updates (of any type) perform an extra **git fetch** command to pull that refspec from the remote.

#### Example

You can set up a project that enables branch override with the first or second refspec example. Use this in a job template that prompts for the **SCM Branch**. A client can then launch the job template when a new pull request is created, providing the branch **pull/N/head** and the job template can run against the provided GitHub pull request reference.

#### Additional resources

For more information, see the [Ansible git module](#).

## CHAPTER 26. WORKING WITH WEBHOOKS

A Webhook enables you to execute specified commands between applications over the web. Automation controller currently provides webhook integration with GitHub and GitLab.

Set up a webhook using the following services:

- [Setting up a GitHub webhook](#)
- [Setting up a GitLab webhook](#)
- [Viewing a payload output](#)

The webhook post-status-back functionality for GitHub and GitLab is designed to work only under certain CI events. Receiving another kind of event results in messages such as the following in the service log:

**awx.main.models.mixins Webhook event did not have a status API endpoint associated, skipping.**

### 26.1. SETTING UP A GITHUB WEBHOOK

Automation controller has the ability to run jobs based on a triggered webhook event coming in. Job status information (pending, error, success) can be sent back only for pull request events. If you do not need automation controller to post job statuses back to the webhook service, go directly to step 3.

#### Procedure

1. Generate a *Personal Access Token* (PAT) for use with automation controller:
  - a. In the profile settings of your GitHub account, select **Settings**.
  - b. From the navigation panel, select <> **Developer Settings**.
  - c. On the **Developer Settings** page, select **Personal access tokens**
  - d. From the **Personal access tokens** screen, click **Generate a personal access token**.
  - e. When prompted, enter your GitHub account password to continue.
  - f. In the **Note** field, enter a brief description about what this PAT is used for.
  - g. In the **Select scopes** fields, check the boxes next to **repo:status**, **repo\_deployment**, and **public\_repo**. The automation webhook only needs repository scope access, with the exception of invites. For more information, see [Scopes for OAuth apps documentation](#).
  - h. Click **Generate token**.



#### IMPORTANT

When the token is generated, ensure that you copy the PAT, as you need it in step 2. You cannot access this token again in GitHub.

2. Use the PAT to optionally create a GitHub credential:

- a. Go to your instance, and [Create a new credential for the GitHub PAT](#) using the generated token.
- b. Make note of the name of this credential, as you use it in the job template that posts back to GitHub.

The screenshot shows the 'Create New Credential' form. The 'Name' field contains 'GitHub PAT'. The 'Credential Type' dropdown is set to 'GitHub Personal Access Token'. In the 'Type Details' section, the 'Token' field is highlighted with a red arrow. The form includes 'Save' and 'Cancel' buttons at the bottom.

- c. Go to the job template with which you want to enable webhooks, and select the webhook service and credential you created in the preceding step.

The screenshot shows a job template configuration page with a modal window titled 'SELECT WEBHOOK CREDENTIAL'. The modal displays a search bar and a list with 'GitHub PAT' selected. A red arrow points from the 'GitHub PAT' entry in the modal to the 'WEBHOOK CREDENTIAL' dropdown in the background form.

- d. Click **Save**. Your job template is set up to post back to GitHub.
3. Go to a GitHub repository where you want to configure webhooks and select **Settings**.
  4. From the navigation panel, select **Webhooks** → **Add webhook**.
  5. To complete the **Add webhook** page, you must check the **Enable Webhook** option in a job template or workflow job template. For more information, see step 3 in both [Creating a job template](#) and [Creating a workflow template](#).
  6. Complete the following fields:
    - **Payload URL:** Copy the contents of the **Webhook URL** from the job template and paste it here. The results are sent to this address from GitHub.
    - **Content type:** Set it to `application/json`.
    - **Secret:** Copy the contents of the **Webhook Key** from the job template and paste it here.
    - **Which events would you like to trigger this webhook?** Select the types of events you want to trigger a webhook. Any such event will trigger the job or workflow. To have the job status (pending, error, success) sent back to GitHub, you must select **Pull requests** in the

Let me select individual events section.

**Which events would you like to trigger this webhook?**

Just the push event.

Send me **everything**.

Let me select individual events.

**Check runs**  
Check run is created, requested, rerequested, or completed.

**Check suites**  
Check suite is requested, rerequested, or completed.

---

**Packages**  
GitHub Packages published or updated in a repository.

**Projects**  
Project created, updated, or deleted.

**Project columns**  
Project column created, updated, moved or deleted.

**Pull requests**  
Pull request opened, closed, reopened, edited, assigned, unassigned, review requested, review request removed, labeled, unlabeled, synchronized, ready for review, converted to draft, locked, or unlocked.

**Pull request review comments**  
Pull request diff comment created, edited, or deleted.

**Page builds**  
Pages site built.

**Project cards**  
Project card created, updated, or deleted.

**Visibility changes**  
Repository changes from private to public.

**Pull request reviews**  
Pull request review submitted, edited, or dismissed.

**Pushes**  
Git push to a repository.

- **Active:** Leave this checked.

- Click **Add webhook**.
- When your webhook is configured, it is displayed in the list of webhooks active for your repository, along with the ability to edit or delete it. Click on a webhook, to go to the **Manage webhook** screen.
- Scroll to view the delivery attempts made to your webhook and whether they succeeded or failed.

### Additional resources

For more information, see the [Webhooks documentation](#).

## 26.2. SETTING UP A GITLAB WEBHOOK

Automation controller has the ability to run jobs based on a triggered webhook event coming in. Job status information (pending, error, success) can be sent back only for pull request events. If automation controller is not required to post job statuses back to the webhook service, go directly to step 3.

## Procedure

1. Generate a *Personal Access Token* (PAT) for use with automation controller:
  - a. From the navigation panel in GitLab, select your avatar and **Edit profile**.
  - b. From the navigation panel, select **Access tokens**.
  - c. Complete the following fields:
    - **Token name:** Enter a brief description about what this PAT is used for.
    - **Expiration date:** Skip this field unless you want to set an expiration date for your webhook.
    - **Select scopes:** Select those that are applicable to your integration. For automation controller, **api** is the only selection necessary.
  - d. Click **Create personal access token**.

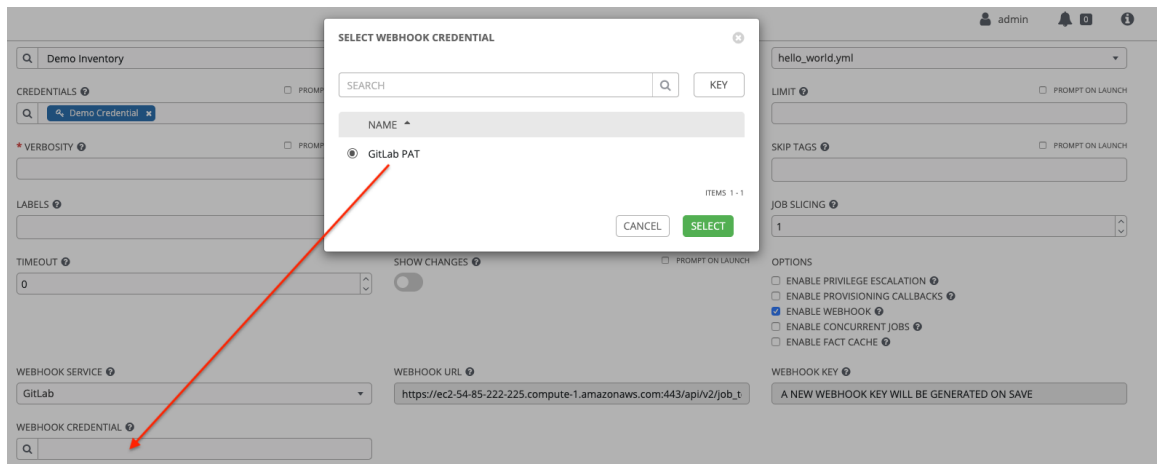


### IMPORTANT

When the token is generated, ensure that you copy the PAT, as you need it in step 2. You cannot access this token again in GitLab.

2. Use the PAT to optionally create a GitLab credential:
  - a. Go to your instance, and [create a new credential for the GitLab PAT](#) using the generated token.
  - b. Make note of the name of this credential, as you use it in the job template that posts back to GitLab.

- c. Go to the job template with which you want to enable webhooks, and select the webhook service and credential you created in the preceding step.



- d. Click **Save**. Your job template is set up to post back to GitLab.
3. Go to a GitLab repository where you want to configure webhooks.
4. From the navigation panel, select **Settings** → **Integrations**.
5. To complete the **Add webhook** page, you must check the **Enable Webhook** option in a job template or workflow job template. For more information, see step 3 in both [Creating a job template](#) and [Creating a workflow template](#).
6. Complete the following fields:
  - **URL:** Copy the contents of the **Webhook URL** from the job template and paste it here. The results are sent to this address from GitLab.
  - **Secret Token:** Copy the contents of the **Webhook Key** from the job template and paste it here.
  - **Trigger:** Select the types of events you want to trigger a webhook. Any such event will trigger the job or workflow. To have job status (pending, error, success) sent back to GitLab, you must select **Merge request events** in the **Trigger** section.
  - **SSL verification:** Leave **Enable SSL verification** selected.
7. Click **Add webhook**.
8. When your webhook is configured, it is displayed in the list **Project Webhooks** for your repository, along with the ability to test events, edit or delete the webhook. Testing a webhook event displays the results on each page whether it succeeded or failed.

### Additional resources

For more information, see [Webhooks](#).

## 26.3. VIEWING THE PAYLOAD OUTPUT

You can view the entire payload exposed as an extra variable.

### Procedure

1. From the navigation panel, select **Views** → **Jobs**.

2. Select the job template with the webhook enabled.
3. Select the **Details** tab.
4. In the **Extra Variables** field, view the payload output from the **awx\_webhook\_payload** variable, as shown in the following example:

Jobs > 1026 - Dump Webhook Variables GitHub

**Details**

◀ Back to Jobs | **Details** | Output

<b>Job ID</b>	1026	<b>Status</b>	Successful	<b>Started</b>	3/21/2022, 3:38:44 PM
<b>Finished</b>	3/21/2022, 3:38:50 PM	<b>Job Template</b>	Dump Webhook Variables GitHub	<b>Job Type</b>	Playbook Run
<b>Inventory</b>	Demo Inventory	<b>Project</b>	Johns Test Project	<b>Project Status</b>	Successful
<b>Revision</b>	b24022723f681690325fd352f949b70ea26d89b5	<b>Playbook</b>	dump_webhook_variables.yml	<b>Verbosity</b>	0 (Normal)
<b>Execution Environment</b>	AWX EE (latest)	<b>Execution Node</b>	receptor-1	<b>Instance Group</b>	default
<b>Job Slice</b>	0/1	<b>Created</b>	3/21/2022, 3:38:43 PM	<b>Last Modified</b>	3/21/2022, 3:38:43 PM

**Variables** [YAML](#) [JSON](#)

```
1- {
2  "awx_webhook_event_type": null,
3  "awx_webhook_event_guid": "0ed69aac-6035-415c-8fd1-2271537cd5b7",
4  "awx_webhook_event_ref": null,
5  "awx_webhook_status_api": null,
6  "awx_webhook_payload": {
7    "object_kind": "push",
8    "event_name": "push",
9    "before": "957980f891e76fee5e1747ab58993a6a1f80f22",
10   "after": "da15688b64f094c3e6cfe40349f7d38b5d27d7",
11   "ref": "refs/heads/master",
12   "checkout_sha": "da15688b64f094c3e6cfe40349f7d38b5d27d7",
13   "user_id": 4,
14   "user_name": "John Smith",
15   "user_username": "jsmith",
16   "user_email": "john@example.com",
17   "user_avatar": "https://s.gravatar.com/avatar/d4c74594d8411393286957566486b667s=8://s.gravatar.com/avatar/d4c74594d8411393286957566486b667s=80",
18   "project_id": 15,
19   "project": {
20     "id": 15,
21     "name": "Diaspora",
22     "description": "",
23     "web_url": "http://example.com/mike/diaspora",
24     "avatar_url": null,
25     "git_ssh_url": "git@example.com:mike/diaspora.git",
26     "git_http_url": "http://example.com/mike/diaspora.git",
27     "namespace": "Mike",
28     "visibility_level": 0,
29     "path_with_namespace": "mike/diaspora",
30     "default_branch": "master",
31     "homepage": "http://example.com/mike/diaspora",
32     "url": "git@example.com:mike/diaspora.git",
33     "ssh_url": "git@example.com:mike/diaspora.git",
34     "http_url": "http://example.com/mike/diaspora.git"
35   },
36   "repository": {
37     "name": "Diaspora",
38     "url": "git@example.com:mike/diaspora.git",
39     "description": "",
40     "homepage": "http://example.com/mike/diaspora",

```

[Relaunch](#) [Delete](#)

**Variables**Variables [YAML](#) [JSON](#)

```
1- {
2  "awx_webhook_event_type": null,
3  "awx_webhook_event_guid": "0ed69aac-6035-415c-8fd1-2271537cd5b7",
4  "awx_webhook_event_ref": null,
5  "awx_webhook_status_api": null,
6  "awx_webhook_payload": {
7    "object_kind": "push",
8    "event_name": "push",
9    "before": "957980f891e76fee5e1747ab58993a6a1f80f22",
10   "after": "da15688b64f094c3e6cfe40349f7d38b5d27d7",
11   "ref": "refs/heads/master",
12   "checkout_sha": "da15688b64f094c3e6cfe40349f7d38b5d27d7",
13   "user_id": 4,
14   "user_name": "John Smith",
15   "user_username": "jsmith",
16   "user_email": "john@example.com",
17   "user_avatar": "https://s.gravatar.com/avatar/d4c74594d8411393286957566486b667s=8://s.gravatar.com/avatar/d4c74594d8411393286957566486b667s=80",
18   "project_id": 15,
19   "project": {
20     "id": 15,
21     "name": "Diaspora",
22     "description": "",
23     "web_url": "http://example.com/mike/diaspora",
24     "avatar_url": null,
25     "git_ssh_url": "git@example.com:mike/diaspora.git",
26     "git_http_url": "http://example.com/mike/diaspora.git",
27     "namespace": "Mike",
28     "visibility_level": 0,
29     "path_with_namespace": "mike/diaspora",
30     "default_branch": "master",
31     "homepage": "http://example.com/mike/diaspora",
32     "url": "git@example.com:mike/diaspora.git",
33     "ssh_url": "git@example.com:mike/diaspora.git",
34     "http_url": "http://example.com/mike/diaspora.git"
35   },
36   "repository": {
37     "name": "Diaspora",
38     "url": "git@example.com:mike/diaspora.git",
39     "description": "",
40     "homepage": "http://example.com/mike/diaspora",

```

[Done](#)

## CHAPTER 27. NOTIFICATIONS

A [Notification type](#) such as Email, Slack or a Webhook, is an instance of a Notification Template, and has a name, description and configuration defined in the Notification template.

The following include examples of details needed to add a notification template:

- A username, password, server, and recipients are needed for an Email notification template
- The token and a list of channels are needed for a Slack notification template
- The URL and Headers are needed for a Webhook notification template

When a job fails, a notification is sent using the configuration that you define in the notification template.

The following shows the typical flow for the notification system:

- You create a notification template to the **REST API** at the **`/api/v2/notification_templates` endpoint**, either through the API or through the UI.
- You assign the notification template to any of the various objects that support it (all variants of job templates as well as organizations and projects) and at the appropriate trigger level for which you want the notification (started, success, or error). For example, you might want to assign a particular notification template to trigger when Job Template 1 fails. In this case, you associate the notification template with the job template at **`/api/v2/job_templates/n/notification_templates_error`** API endpoint.
- You can set notifications on job start and job end. Users and teams are also able to define their own notifications that can be attached to arbitrary jobs.

### 27.1. NOTIFICATION HIERARCHY

Notification templates inherit templates defined on parent objects, such as the following:

- Job templates use notification templates defined for them. Additionally, they can inherit notification templates from the project used by the job template, and from the organization that it is listed under.
- Project updates use notification templates defined on the project and inherit notification templates from the organization associated with it.
- Inventory updates use notification templates defined on the organization that it is listed under.
- Ad hoc commands use notification templates defined on the organization that the inventory is associated with.

### 27.2. NOTIFICATION WORKFLOW

When a job succeeds or fails, the error or success handler pulls a list of relevant notification templates using the procedure defined in the [Notifications](#) section.

It then creates a notification object for each one, containing relevant details about the job and sends it to the destination. These include email addresses, slack channels, and SMS numbers.



These notification objects are available as related resources on job types (jobs, inventory updates, project updates), and also at **/api/v2/notifications**. You can also see what notifications have been sent from a notification template by examining its related resources.

If a notification fails, it does not impact the job associated with it or cause it to fail. The status of the notification can be viewed at its detail endpoint **/api/v2/notifications/<n>**.

## 27.3. CREATING A NOTIFICATION TEMPLATE

Use the following procedure to create a notification template.

### Procedure

1. From the navigation panel, select **Administration** → **Notifications**.
2. Click **Add**.
3. Complete the following fields:
  - **Name:** Enter the name of the notification.
  - **Description:** Enter a description for the notification. This field is optional.
  - **Organization:** Specify the organization that the notification belongs to.
  - **Type:** Choose a type of notification from the drop-down menu. For more information, see the [Notification types](#) section.
4. Click **Save**.

## 27.4. NOTIFICATION TYPES

The following notification types are supported with automation controller:

- [Email](#)
- [Grafana](#)
- [IRC](#)
- [Mattermost](#)
- [PagerDuty](#)
- [Rocket.Chat](#)
- [Slack](#)
- [Twilio](#)
- [Webhook](#)
  - [Webhook payloads](#)

Each notification type has its own configuration and behavioral semantics. You might need to test them in different ways. Additionally, you can customize each type of notification down to a specific detail or a set of criteria to trigger a notification.

## Additional resources

For more information on configuring custom notifications, see [Create custom notifications](#). The following sections give further details on each type of notification.

### 27.4.1. Email

The email notification type supports a wide variety of SMTP servers and has support for SSL/TLS connections.

Provide the following details to set up an email notification:

- **Host**
- **Recipient list**
- **Sender e-mail**
- **Port**
- **Timeout** (in seconds): Enables you to specify up to 120 seconds, the length of time that automation controller attempts to connect to the email server before failure.

The screenshot shows a configuration form for an email notification. The form is organized into several sections:

- General Information:**
  - Name:** Email notification
  - Description:** (empty)
  - Organization:** Default
  - Type:** E-mail (selected from a dropdown menu)
- Type Details:**
  - Username:** (empty)
  - Password:** (empty, with a visibility toggle icon)
  - Host:** hostname
  - Recipient list:** recipient@theiremail.com
  - Sender e-mail:** me@myemail.com
  - Port:** 80
  - Timeout:** 30
  - E-mail options:**
    - Use SSL
    - Use TLS
- Customization:**
  - Customize messages...
- Actions:** Save (blue button), Cancel

### 27.4.2. Grafana

To integrate Grafana, you must first create an API key in the [Grafana system](#). This is the token that is given to automation controller.

Provide the following details to set up a Grafana notification:

- **Grafana URL:** The URL of the Grafana API service, such as: `http://yourcompany.grafana.com`.
- **Grafana API key:** You must first create an API key in the Grafana system.

- Optional: **ID of the dashboard** When you create an API key for the Grafana account, you can set up a dashboard with its own unique ID.
- Optional: **ID of the panel** If you added panels and graphs to your Grafana interface, you can specify its ID here.
- Optional: **Tags for the annotation** Enter keywords that help identify the types of events of the notification that you are configuring.
- **Disable SSL verification:** SSL verification is on by default, but you can choose to turn off verification of the authenticity of the target's certificate. Select this option to disable verification for environments that use internal or private CA's.

The screenshot shows the configuration form for a Grafana notification. It includes the following fields and options:

- Name:** Grafana notification
- Description:** (empty)
- Organization:** Default
- Type:** Grafana
- Type Details:**
  - Grafana URL:** http://grafana.com
  - Grafana API key:** (masked with dots)
  - ID of the dashboard (optional):** (empty)
  - ID of the panel (optional):** (empty)
  - Tags for the annotation (optional):** ansible
  - Disable SSL verification:**
- Customize messages:**
- Buttons:** Save, Cancel

### 27.4.3. IRC

The IRC notification takes the form of an IRC bot that connects, delivers its messages to channels or individual users, and then disconnects. The notification bot also supports SSL authentication. The bot does not currently support Nickserv identification. If a channel or user does not exist or is not online then the notification fails. The failure scenario is reserved specifically for connectivity.

Provide the following details to set up an IRC notification:

- Optional: **IRC server password** IRC servers can require a password to connect. If the server does not require one, leave it blank. **IRC server port** The IRC server port. **IRC server address** The host name or address of the IRC server. **IRC nick:** The bot's nickname once it connects to the server. **Destination channels or users:** A list of users or channels to which the notification is sent.
- Optional: **Disable SSL verification:** Check if you want the bot to use SSL when connecting.

The screenshot shows the configuration form for an IRC Notification. The form is organized into several sections:

- Header Section:** Contains three input fields: "Name" (with value "IRC Notification"), "Description" (empty), and "Organization" (with value "Default").
- Type Section:** A dropdown menu for "Type" is set to "IRC".
- Type Details Section:**
  - IRC server password:** A text input field with a masked password ".....".
  - IRC server port:** A text input field with the value "6667".
  - IRC server address:** A text input field with the value "irc.testirc.net".
  - IRC nick:** A text input field with the value "helpbot".
  - Destination channels or users:** A text area containing "#engineers" and "#release-engineers".
  - Disable SSL verification:** An unchecked checkbox.
- Footer Section:** A toggle switch for "Customize messages..." is turned off. Below it are "Save" and "Cancel" buttons.

### 27.4.4. Mattermost

The Mattermost notification type provides a simple interface to Mattermost's messaging and collaboration workspace.

Provide the following details to set up a Mattermost notification:

- **Target URL:** The full URL that is posted to.
- **Optional: Username:** Enter a username for the notification.
- **Optional: Channel:** Enter a channel for the notification.
- **Icon URL:** Specifies the icon to display for this notification.
- **Disable SSL verification:** Turns off verification of the authenticity of the target's certificate. Select this option to disable verification for environments that use internal or private CA's.

The screenshot shows the configuration form for a Mattermost notification. The form is organized into several sections:

- Header Section:** Contains three input fields: "Name" (with value "Mattermost notification"), "Description" (empty), and "Organization" (with value "Default").
- Type Section:** A dropdown menu for "Type" is set to "Mattermost".
- Type Details Section:**
  - Target URL:** A text input field with the value "http://1.2.3.4:8065/hooks/jSkurmybl5i34pnf9sdptjs".
  - Username:** A text input field with the value "beth".
  - Channel:** A text input field with the value "my-channel".
  - Icon URL:** A text input field with the value "https://www.myicon/favicon.ico".
  - Disable SSL verification:** A checked checkbox.
- Footer Section:** A toggle switch for "Customize messages..." is turned off. Below it are "Save" and "Cancel" buttons.

### 27.4.5. PagerDuty

To integrate PagerDuty, you must first create an API key in the [PagerDuty system](#). This is the token that is given to automation controller. Then create a **Service** which provides an **Integration Key** that is also given to automation controller.

Provide the following details to set up a PagerDuty notification:

- **API Token:** You must first create an API key in the PagerDuty system. This is the token that is given to automation controller.
- **PagerDuty subdomain:** When you sign up for the PagerDuty account, you receive a unique subdomain to communicate with. For example, if you signed up as "testuser", the web dashboard is at **testuser.pagerduty.com** and you give the API **testuser** as the subdomain, not the full domain.
- **API service/integration Key:** Enter the API service/integration key created in PagerDuty.
- **Client identifier:** This is sent along with the alert content to the PagerDuty service to help identify the service that is using the API key and service. This is helpful if multiple integrations are using the same API key and service.

The screenshot shows a configuration form for a PagerDuty notification. The form is divided into several sections:

- Name:** A text input field containing "PagerDuty notification".
- Description:** An empty text input field.
- Organization:** A dropdown menu with "Default" selected.
- Type:** A dropdown menu with "Pagerduty" selected.
- Type Details:** A section containing three input fields:
  - API Token:** A text input field with a masked value ".....".
  - Pagerduty subdomain:** A text input field containing "pagerduty.subdomain.com".
  - API service/integration key:** A text input field containing "efk3ou7wpo3L3JIORO".
- Client identifier:** A text input field containing "322393".
- Customize messages...:** A toggle switch that is currently turned off.
- Buttons:** "Save" and "Cancel" buttons at the bottom left.

### 27.4.6. Rocket.Chat

The Rocket.Chat notification type provides an interface to Rocket.Chat's collaboration and communication platform.

Provide the following details to set up a Rocket.Chat notification:

- **Target URL:** The full URL that is **POSTed** to.
- Optional: **Username:** Enter a username.
- Optional: **Icon URL:** Specifies the icon to display for this notification
- **Disable SSL Verification:** Turns off verification of the authenticity of the target's certificate. Select this option to disable verification for environments that use internal or private CA's.

The screenshot shows a configuration form for a Rocket.Chat notification. The form includes the following fields and options:

- Name:** Rocket Chat notification
- Description:** (Empty)
- Organization:** Default
- Type:** Rocket.Chat
- Type Details:**
  - Target URL:** http://1.2.3.4:8065/hooks/rocket-target
  - Username:** jerry
  - Icon URL:** https://www.myicon/favicon.ico
  - Disable SSL verification
  - Customize messages...
- Buttons:** Save, Cancel

### 27.4.7. Slack

Slack is a collaborative team communication and messaging tool.

Provide the following details to set up a Slack notification:

- A Slack application. For more information, see the [Quickstart](#) page of the Slack documentation on how to create one.
- A token. For more information, see [Legacy bots](#) and specific details on bot tokens on the [Current token types](#) documentation page.

When you have a bot or app set up, you must complete the following steps:

1. Navigate to **Apps**.
2. Click the newly-created app and then go to **Add features and functionality**, which enables you to configure incoming webhooks, bots, and permissions, as well as **Install your app to your workspace**.

The screenshot shows a configuration form for a Slack notification. The form includes the following fields and options:

- Name:** Slack notification
- Description:** (Empty)
- Organization:** Default
- Type:** Slack
- Type Details:**
  - Destination channels:** #engineering, #helpdesk
  - Token:** [Redacted]
  - Notification color:** (Empty)
  - Customize messages...
- Buttons:** Save, Cancel

### 27.4.8. Twilio

Twilio is a voice and SMS automation service. When you are signed in, you must create a phone number from which the messages are sent. You can then define a **Messaging Service** under **Programmable SMS** and associate the number you previously created with it.

You might need to verify this number or some other information before you are permitted to use it to send to any numbers. The **Messaging Service** does not require a status callback URL and it does not need the ability to process inbound messages.

Under your individual (or sub) account settings, you have API credentials. Twilio uses two credentials to determine which account an API request is coming from. The **Account SID**, which acts as a username, and the **Auth Token** which acts as a password.

Provide the following details to set up a Twilio notification:

- **Account token:** Enter the account token.
- **Source phone number:** Enter the number associated with the messaging service in the form of "+15556667777".
- **Destination SMS number(s):** Enter the list of numbers you want to receive the SMS. It must be a 10 digit phone number.
- **Account SID:** Enter the account SID.

The screenshot shows a form for configuring a Twilio notification. The form is divided into several sections:

- Name:** A text input field containing "Twilio notification".
- Description:** An empty text input field.
- Organization:** A dropdown menu showing "Default".
- Type:** A dropdown menu showing "Twilio".
- Type Details:** A section containing three input fields:
  - Account token:** A text input field with a masked value ".....".
  - Source phone number:** A text input field containing "18009865593".
  - Destination SMS number(s):** A text input field containing "18009865593".
- Account SID:** A text input field containing "Afksri904pkfep040o".
- Customize messages:** A toggle switch that is currently turned off.
- Buttons:** "Save" and "Cancel" buttons at the bottom left.

### 27.4.9. Webhook

The webhook notification type provides a simple interface for sending **POSTs** to a predefined web service. Automation controller **POSTs** to this address using application and JSON content type with the data payload containing the relevant details in JSON format. Some web service APIs expect HTTP requests to be in a certain format with certain fields.

Configure the webhook notification with the following:

- Configure the HTTP method, using **POST** or **PUT**.
- The body of the outgoing request.
- Configure authentication, using basic auth.

Provide the following details to set up a webhook notification:

- Optional: **Username:** Enter a username.
- Optional: **Basic auth password**
- **Target URL:** Enter the full URL to which the webhook notification is **PUT** or **POSTed**.
- **Disable SSL Verification:** SSL verification is on by default, but you can choose to turn off verification of the authenticity of the target's certificate. Select this option to disable verification for environments that use internal or private CA's.
- **HTTP Headers:** Enter Headers in JSON format where the keys and values are strings. For example:

```
{ "Authentication": "988881adc9fc3655077dc2d4d757d480b5ea0e11", "MessageType": "Test" }
```

- **HTTP Method:** Select the method for your webhook:
- **POST:** Creates a new resource. It also acts as a catch-all for operations that do not fit into the other categories. It is likely that you need to **POST** unless you know your webhook service expects a **PUT**.
- **PUT:** Updates a specific resource (by an identifier) or a collection of resources. You can also use **PUT** to create a specific resource if the resource identifier is known beforehand.

The screenshot shows the configuration page for a Webhook notification. The form is divided into several sections:

- Name:** Webhook notification
- Description:** (empty)
- Organization:** Default
- Type:** Webhook
- Type Details:**
  - Username:** janedoe
  - Basic auth password:** (masked with dots)
  - Target URL:** http://www.honeydog.com/web/db/notification
  - Disable SSL verification
  - HTTP Headers:** [{"Authentication": "988881adc9fc3655077dc2d4d757d480b5ea0e11", "MessageType": "Test"}]
  - HTTP Method:** A dropdown menu is open, showing "POST" and "PUT" as options, along with a "Choose an HTTP method" option.
  - Customize messages...
- Buttons:** Save, Cancel

### 27.4.9.1. Webhook payloads

The following data is sent by automation controller at the webhook endpoint:

```
job id
name
```



```

url
created_by
started
finished
status
traceback
inventory
project
playbook
credential
limit
extra_vars
hosts
http method

```

The following is an example of a **started** notification through a webhook message as returned by automation controller:

```

{"id": 38, "name": "Demo Job Template", "url": "https://host/#/jobs/playbook/38", "created_by":
"bianca", "started":
"2020-07-28T19:57:07.888193+00:00", "finished": null, "status": "running", "traceback": "", "inventory":
"Demo Inventory",
"project": "Demo Project", "playbook": "hello_world.yml", "credential": "Demo Credential", "limit": "",
"extra_vars": "{}",
"hosts": {}}POST / HTTP/1.1

```

The following data is returned by automation controller at the webhook endpoint for a **success/fail** status:

```

job id
name
url
created_by
started
finished
status
traceback
inventory
project
playbook
credential
limit
extra_vars
hosts

```

The following is an example of a **success/fail** notification as returned by automation controller through a webhook message:

```

{"id": 46, "name": "AWX-Collection-tests-awx_job_wait-long_running-XVFBGRSAvUUIrYKn", "url":
"https://host/#/jobs/playbook/46",
"created_by": "bianca", "started": "2020-07-28T20:43:36.966686+00:00", "finished": "2020-07-
28T20:43:44.936072+00:00", "status": "failed",
"traceback": "", "inventory": "Demo Inventory", "project": "AWX-Collection-tests-awx_job_wait-
long_running-JJSIglnwtsRJyQmw", "playbook":

```

```
"fail.yml", "credential": null, "limit": "", "extra_vars": "{\"sleep_interval\": 300}", "hosts": {"localhost":
{"failed": true, "changed": 0,
"dark": 0, "failures": 1, "ok": 1, "processed": 1, "skipped": 0, "rescued": 0, "ignored": 0}}}
```

## 27.5. CREATING CUSTOM NOTIFICATIONS

You can [customize the text content](#) of each [Notification type](#) on the notification form.

### Procedure

1. On the **Notification Templates** list view click **Add**.
2. Choose a notification type from the **Type** list.
3. Enable **Customize messages** using the toggle.

Customize messages...

Use custom messages to change the content of notifications sent when a job starts, succeeds, or fails. Use curly braces to access information about the job: `{{ job_friendly_name }}`, `{{ url }}`, `{{ job.status }}`. You may apply a number of possible variables in the message. For more information, refer to the [Ansible Tower Documentation](#).

**Start message**

1 `{{ job_friendly_name }} #{{ job.id }} '{{ job.name }}' {{ job.status }}: {{ url }}`

**Start message body**

1 `{{ job_friendly_name }} #{{ job.id }} had status {{ job.status }}, view details at {{ url }}`  
 2  
 3 `{{ job_metadata }}`

**Success message**

1 `{{ job_friendly_name }} #{{ job.id }} '{{ job.name }}' {{ job.status }}: {{ url }}`

**Success message body**

1 `{{ job_friendly_name }} #{{ job.id }} had status {{ job.status }}, view details at {{ url }}`  
 2  
 3 `{{ job_metadata }}`

**Error message**

1 `{{ job_friendly_name }} #{{ job.id }} '{{ job.name }}' {{ job.status }}: {{ url }}`

**Error message body**

1 `{{ job_friendly_name }} #{{ job.id }} had status {{ job.status }}, view details at {{ url }}`  
 2  
 3 `{{ job_metadata }}`

**Workflow approved message**

1 The approval node "`{{ approval_node_name }}`" was approved. `{{ workflow_url }}`

**Workflow approved message body**

1 The approval node "`{{ approval_node_name }}`" was approved. `{{ workflow_url }}`  
 2  
 3 `{{ job_metadata }}`

**Workflow denied message**

1 The approval node "`{{ approval_node_name }}`" was denied. `{{ workflow_url }}`

**Workflow denied message body**

```

1 The approval node "{{ approval_node_name }}" was denied. {{ workflow_url }}
2
3 {{ job_metadata }}

```

---

**Workflow pending message**

```

1 The approval node "{{ approval_node_name }}" needs review. This node can be viewed at: {{ workflow_url }}

```

---

**Workflow pending message body**

```

1 The approval node "{{ approval_node_name }}" needs review. This approval node can be viewed at: {{ workflow_url }}
2
3 {{ job_metadata }}

```

---

**Workflow timed out message**

```

1 The approval node "{{ approval_node_name }}" has timed out. {{ workflow_url }}

```

---

**Workflow timed out message body**

```

1 The approval node "{{ approval_node_name }}" has timed out. {{ workflow_url }}
2
3 {{ job_metadata }}

```

4. You can provide a custom message for various job events, such as the following:

- **Start message**
- **Success message body**
- **Error message**
- **Workflow approved message**
- **Workflow denied message**
- **Workflow running message**
- **Workflow pending message**
- **Workflow timed out message**

The message forms vary depending on the type of notification that you are configuring. For example, messages for Email and PagerDuty notifications appear to be a typical email, with a body and a subject, in which case, automation controller displays the fields as **Message** and **Message Body**. Other notification types only expect a **Message** for each type of event.

The **Message** fields are pre-populated with a template containing a top-level variable, **job** coupled with an attribute, such as **id** or **name**. Templates are enclosed in curly brackets and can draw from a fixed set of fields provided by automation controller, as shown in the pre-populated message fields:

**Start message**

```

1 {{ job_friendly_name }} #{{ job.id }} '{{ job.name }}' {{ job.status }}: {{ url }}

```

Variable      Attribute

This pre-populated field suggests commonly displayed messages to a recipient who is notified of an event. You can customize these messages with different criteria by adding your own attributes for the job as needed. Custom notification messages are rendered using Jinja; the same templating engine used by Ansible playbooks.

Messages and message bodies have different types of content, as the following points outline:

- Messages are always just strings, one-liners only. New lines are not supported.
- Message bodies are either a dictionary or a block of text:
  - The message body for Webhooks and PagerDuty uses dictionary definitions. The default message body for these is `{{ job_metadata }}`, you can either leave that as it is or provide your own dictionary.
  - The message body for email uses a block of text or a multi-line string. The default message body is:

```

{{ job_friendly_name }} #{{ job.id }} had status {{ job.status }}, view details at {{ url }} {{
job_metadata }}

```

You can edit this text leaving `{{ job_metadata }}` in, or drop `{{ job_metadata }}`. Since the body is a block of text, it can be any string you want. `{{ job_metadata }}` is rendered as a dictionary containing fields that describe the job being executed. In all cases, `{{ job_metadata }}` includes the following fields:

- **id**
- **name**
- **url**
- **created\_by**
- **started**
- **finished**
- **status**
- **traceback**



#### NOTE

You cannot query individual fields within `{{ job_metadata }}`. When you use `{{ job_metadata }}` in a notification template, all data is returned.

The resulting dictionary looks like the following:

```

{"id": 18,
 "name": "Project - Space Procedures",
 "url": "https://host/#/jobs/project/18",
 "created_by": "admin",
 "started": "2019-10-26T00:20:45.139356+00:00",
 "finished": "2019-10-26T00:20:55.769713+00:00",

```

```

    "status": "successful",
    "traceback": ""
  }

```

If `{{ job_metadata }}` is rendered in a job, it includes the following additional fields:

- **inventory**
- **project**
- **playbook**
- **credential**
- **limit**
- **extra\_vars**
- **hosts**

The resulting dictionary looks like the following:

```

{"id": 12,
 "name": "JobTemplate - Launch Rockets",
 "url": "https://host/#/jobs/playbook/12",
 "created_by": "admin",
 "started": "2019-10-26T00:02:07.943774+00:00",
 "finished": null,
 "status": "running",
 "traceback": "",
 "inventory": "Inventory - Fleet",
 "project": "Project - Space Procedures",
 "playbook": "launch.yml",
 "credential": "Credential - Mission Control",
 "limit": "",
 "extra_vars": "{}",
 "hosts": {}
}

```

If `{{ job_metadata }}` is rendered in a workflow job, it includes the following additional field:

- **body** (This enumerates the nodes in the workflow job and includes a description of the job associated with each node)

The resulting dictionary looks like the following:

```

{"id": 14,
 "name": "Workflow Job Template - Launch Mars Mission",
 "url": "https://host/#/workflows/14",
 "created_by": "admin",
 "started": "2019-10-26T00:11:04.554468+00:00",
 "finished": "2019-10-26T00:11:24.249899+00:00",
 "status": "successful",
 "traceback": "",
 "body": "Workflow job summary:

```

```

    node #1 spawns job #15, \"Assemble Fleet JT\", which finished with status

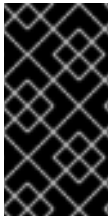
```

```

successful.
  node #2 spawns job #16, \"Mission Start approval node\", which finished with
status successful.\n
  node #3 spawns job #17, \"Deploy Fleet\", which finished with status
successful."
}

```

If you create a notification template that uses invalid syntax or references unusable fields, an error message displays indicating the nature of the error. If you delete a notification's custom message, the default message is shown in its place.



### IMPORTANT

If you save the notifications template without editing the custom message (or edit and revert back to the default values), the **Details** screen assumes the defaults and does not display the custom message tables. If you edit and save any of the values, the entire table displays in the **Details** screen.

#### Additional resources

- For more information, see [Using variables with Jinja2](#).
- Automation controller requires valid syntax to retrieve the correct data to display the messages. For a list of supported attributes and the proper syntax construction, see the [Supported Attributes for Custom Notifications](#) section.

## 27.6. ENABLE AND DISABLE NOTIFICATIONS

You can set up notifications to notify you when a specific job starts, as well as on the success or failure at the end of the job run. Note the following behaviors:

- If a workflow job template has notification on start enabled, and a job template within that workflow also has notification on start enabled, you receive notifications for both.
- You can enable notifications to run on many job templates within a workflow job template.
- You can enable notifications to run on a sliced job template start and each slice generates a notification.
- When you enable a notification to run on job start, and that notification gets deleted, the job template continues to run, but results in an error message.

You can enable notifications on job start, job success, and job failure, or a combination of these, from the **Notifications** tab of the following resources:

- Job Templates
- Workflow Templates
- Projects (shown in the following example)
- Inventory Sources
- Organizations

Name	Type	Options
Email notification	Email	<input checked="" type="checkbox"/> Start <input type="checkbox"/> Success <input type="checkbox"/> Failure
Grafana notification	Grafana	<input checked="" type="checkbox"/> Start <input type="checkbox"/> Success <input type="checkbox"/> Failure
IRC Notification	IRC	<input type="checkbox"/> Start <input type="checkbox"/> Success <input checked="" type="checkbox"/> Failure
Slack notification	Slack	<input type="checkbox"/> Start <input checked="" type="checkbox"/> Success <input type="checkbox"/> Failure

For workflow templates that have approval nodes, in addition to **Start**, **Success**, and **Failure**, you can enable or disable certain approval-related events:

[Templates](#) > [New Workflow Job Template](#)

### Notifications



Name	Type	Options
Email notifications for job starts	Email	<input type="checkbox"/> Approval <input checked="" type="checkbox"/> Start <input type="checkbox"/> Success <input type="checkbox"/> Failure
Slack notifications	Slack	<input checked="" type="checkbox"/> Approval <input type="checkbox"/> Start <input type="checkbox"/> Success <input type="checkbox"/> Failure
SMS notification to self	Pagerduty	<input type="checkbox"/> Approval <input type="checkbox"/> Start <input type="checkbox"/> Success <input checked="" type="checkbox"/> Failure
Web notification	Webhook	<input type="checkbox"/> Approval <input type="checkbox"/> Start <input checked="" type="checkbox"/> Success <input type="checkbox"/> Failure

### Additional resources

For more information on working with these types of nodes, see [Approval nodes](#).

## 27.7. CONFIGURE THE HOST HOSTNAME FOR NOTIFICATIONS

In [System settings](#), you can replace the default value in the **Base URL of the service** field with your preferred hostname to change the notification hostname.

## Edit Details



<b>Enable Activity Stream</b> <input checked="" type="checkbox"/> On	<b>Revert</b>	<b>Enable Activity Stream for Inventory Sync</b> <input type="checkbox"/> Off	<b>Revert</b>	<b>Global default execution environment</b> <input type="text" value=""/>	<b>Revert</b>
<b>Base URL of the service *</b> <input type="text" value="https://towerhost"/>	<b>Revert</b>	<b>All Users Visible to Organization Admins</b> <input checked="" type="checkbox"/> On	<b>Revert</b>	<b>Organization Admins Can Manage Users and Teams</b> <input checked="" type="checkbox"/> On	<b>Revert</b>
<b>Gather data for Automation Analytics</b> <input checked="" type="checkbox"/> On	<b>Revert</b>	<b>Red Hat customer username</b> <input type="text" value=""/>	<b>Revert</b>	<b>Red Hat customer password</b> <input type="password" value=""/>	<b>Revert</b>
<b>Red Hat or Satellite username</b> <input type="text" value="thavo@redhat.com"/>	<b>Revert</b>	<b>Red Hat or Satellite password</b> <input type="password" value="ENCRYPTED"/>	<b>Revert</b>	<b>Automation Analytics Gather Interval *</b> <input type="text" value="14400"/>	<b>Revert</b>
<b>Last gathered entries from the data collection service of Automation Analytics</b>					<b>Revert</b>
<input type="text" value="1"/>					

Refreshing your license also changes the notification hostname. New installations of automation controller do not have to set the hostname for notifications.

### 27.7.1. Resetting TOWER\_URL\_BASE

Automation controller determines how the base URL (**TOWER\_URL\_BASE**) is defined by looking at an incoming request and setting the server address based on that incoming request.

Automation controller takes settings values from the database first. If no settings values are found, it uses the values from the settings files. If you post a license by navigating to the automation controller host's IP address, the posted license is written to the settings entry in the database.

Use the following procedure to reset **TOWER\_URL\_BASE** if the wrong address has been picked up:

#### Procedure

1. From the navigation panel, select **Settings** → **Miscellaneous System settings**.
2. Click **Edit**.
3. Enter the address in the **Base URL of the service** field for the DNS entry you wish to appear in notifications.
4. Re-add your license in **Settings** → **Subscription settings**.

## 27.8. NOTIFICATIONS API

Use the **started**, **success**, or **error** endpoints:

```
/api/v2/organizations/N/notification_templates_started/
/api/v2/organizations/N/notification_templates_success/
/api/v2/organizations/N/notification_templates_error/
```

Additionally, the **../..../N/notification\_templates\_started** endpoints have **GET** and **POST** actions for:

- Organizations
- Projects
- Inventory Sources



- Job Templates
- System Job Templates
- Workflow Job Templates

## CHAPTER 28. SUPPORTED ATTRIBUTES FOR CUSTOM NOTIFICATIONS

Learn about the list of supported job attributes and the proper syntax for constructing the message text for notifications.

The following are the supported job attributes:

- **allow\_simultaneous** - (boolean) Indicates if multiple jobs can run simultaneously from the job template associated with this job.
- **controller\_node** - (string) The instance that manages the isolated execution environment.
- **created** - (datetime) The timestamp when this job was created.
- **custom\_virtualenv** - (string) The custom virtual environment used to execute the job.
- **description** - (string) An optional description of the job.
- **diff\_mode** - (boolean) If enabled, textual changes made to any templated files on the host are shown in the standard output.
- **elapsed** - (decimal) The elapsed time in seconds that the job has run.
- **execution\_node** - (string) The node that the job executes on.
- **failed** - (boolean) True if the job failed.
- **finished** - (datetime) The date and time the job finished execution.
- **force\_handlers** - (boolean) When handlers are forced, they run when notified even if a task fails on that host. Note that some conditions, such as unreachable hosts can still prevent handlers from running.
- **forks** - (int) The number of forks requested for this job.
- **id** - (int) The database ID for this job.
- **job\_explanation** - (string) The status field to indicate the state of the job if it was not able to run and capture **stdout**.
- **job\_slice\_count** - (integer) If run as part of a sliced job, this is the total number of slices (if 1, job is not part of a sliced job).
- **job\_slice\_number** - (integer) If run as part of a sliced job, this is the ID of the inventory slice operated on (if not part of a sliced job, attribute is not used).
- **job\_tags** - (string) Only tasks with specified tags execute.
- **job\_type** - (choice) This can be **run**, **check**, or **scan**.
- **launch\_type** - (choice) This can be **manual**, **relaunch**, **callback**, **scheduled**, **dependency**, **workflow**, **sync**, or **scm**.
- **limit** - (string) The playbook execution limited to this set of hosts, if specified.
- **modified** - (datetime) The timestamp when this job was last modified.

- **name** - (string) The name of this job.
- **playbook** - (string) The playbook executed.
- **scm\_revision** - (string) The scm revision from the project used for this job, if available.
- **skip\_tags** - (string) The playbook execution skips over this set of tags, if specified.
- **start\_at\_task** - (string) The playbook execution begins at the task matching this name, if specified.
- **started**- (datetime) The date and time the job was queued for starting.
- **status** - (choice) This can be **new**, **pending**, **waiting**, **running**, **successful**, **failed**, **error**, or **canceled**.
- **timeout** - (int) The amount of time, in seconds, to run before the task is canceled.
- **type** - (choice) The data type for this job.
- **url** - (string) The URL for this job.
- **use\_fact\_cache** - (boolean) If enabled for the job, automation controller acts as an Ansible Fact Cache Plugin at the end of a playbook run to the database and caches facts for use by Ansible.
- **verbosity** - (choice) 0 through 5 (corresponding to Normal through WinRM Debug).
  - **host\_status\_counts** (The count of hosts uniquely assigned to each status)
    - **skipped** (integer)
    - **ok** (integer)
    - **changed** (integer)
    - **failures** (integer)
    - **dark** (integer)
    - **processed** (integer)
    - **rescued** (integer)
    - **ignored** (integer)
    - **failed** (boolean)
  - **summary\_fields**:
    - **inventory**
      - **id** - (integer) The database ID for the inventory.
      - **name** - (string) The name of the inventory.
      - **description** - (string) An optional description of the inventory.

- **has\_active\_failures**- (boolean) (deprecated) flag indicating whether any hosts in this inventory have failed.
  - **total\_hosts** - (deprecated) (int) The total number of hosts in this inventory.
  - **hosts\_with\_active\_failures** - (deprecated) (int) The number of hosts in this inventory with active failures.
  - **total\_groups** - (deprecated) (int) The total number of groups in this inventory.
  - **groups\_with\_active\_failures** - (deprecated) (int) The number of hosts in this inventory with active failures.
  - **has\_inventory\_sources** - (deprecated) (boolean) The flag indicating whether this inventory has external inventory sources.
  - **total\_inventory\_sources** - (int) The total number of external inventory sources configured within this inventory.
  - **inventory\_sources\_with\_failures** - (int) The number of external inventory sources in this inventory with failures.
  - **organization\_id** - (id) The organization containing this inventory.
  - **kind** - (choice) (empty string) (indicating hosts have direct link with inventory) or **smart**
- **project**
    - **id** - (int) The database ID for the project.
    - **name** - (string) The name of the project.
    - **description** (string) An optional description of the project.
    - **status** - (choices) One of **new, pending, waiting, running, successful, failed, error, canceled, never updated, ok**, or **missing**.
    - **scm\_type** (choice) One of (empty string), **git, hg, svn, insights**.
  - **job\_template**
    - **id** - (int) The database ID for the job template.
    - **description** - (string) The optional description of the project.
    - **status** - (choices) One of **new, pending, waiting, running, successful, failed, error, canceled, never updated, ok**, or **missing**.
  - **job\_template**
    - **id**- (int) The database ID for the job template.
    - **name**- (string) The name of the job template.
    - **description**- (string) An optional description for the job template.
  - **unified\_job\_template**

- **id** - (int) The database ID for the unified job template.
  - **name** - (string) The name of the unified job template.
  - **description** - (string) An optional description for the unified job template.
  - **unified\_job\_type** - (choice) The unified job type, such as **job**, **workflow\_job**, or **project\_update**.
- **instance\_group**
    - **id** - (int) The database ID for the instance group.
    - **name** - (string) The name of the instance group.
  - **created\_by**
    - **id** - (int) The database ID of the user that launched the operation.
    - **username** - (string) The username that launched the operation.
    - **first\_name** - (string) The first name.
    - **last\_name** - (string) The last name.
  - **labels**
    - **count** - (int) The number of labels.
    - **results** - The list of dictionaries representing labels. For example, `{"id": 5, "name": "database jobs"}`.

You can reference information about a job in a custom notification message using grouped curly brackets `{{ }}`. Specific job attributes are accessed using dotted notation, for example, `{{ job.summary_fields.inventory.name }}`. You can add any characters used in front or around the braces, or plain text, for clarification, such as `"#"` for job ID and single-quotes to denote some descriptor. Custom messages can include a number of variables throughout the message:

```

{{ job_friendly_name }} {{ job.id }} ran on {{ job.execution_node }} in {{ job.elapsed }} seconds.

```


The following are additional variables that can be added to the template:

- **approval\_node\_name** - (string) The approval node name.
- **approval\_status** - (choice) One of **approved**, **denied**, and **timed\_out**.
- **url** - (string) The URL of the job for which the notification is emitted (this applies to **start**, **success**, **fail**, and **approval notifications**).
- **workflow\_url** - (string) The URL to the relevant approval node. This allows the notification recipient to go to the relevant workflow job page to examine the situation. For example, **This node can be viewed at: {{workflow\_url}}**. In cases of approval-related notifications, both **url** and **workflow\_url** are the same.
- **job\_friendly\_name** - (string) The friendly name of the job.
- **job\_metadata** - (string) The job metadata as a JSON string, for example:
  -










```
{'url': 'https://towerhost/$/jobs/playbook/13',  
  'traceback': "",  
  'status': 'running',  
  'started': '2019-08-07T21:46:38.362630+00:00',  
  'project': 'Stub project',  
  'playbook': 'ping.yml',  
  'name': 'Stub Job Template',  
  'limit': "",  
  'inventory': 'Stub Inventory',  
  'id': 42,  
  'hosts': {},  
  'friendly_name': 'Job',  
  'finished': False,  
  'credential': 'Stub credential',  
  'created_by': 'admin'}
```

## CHAPTER 29. SCHEDULES

From the navigation panel, click **Views** → **Schedules** to access your configured schedules. The schedules list can be sorted by any of the attributes from each column using the directional arrows. You can also search by name, date, or the name of the month in which a schedule runs.

Each schedule has a corresponding **Actions** column that has options to enable or disable that schedule using the **On** or **Off** toggle next to the schedule name. Click the Edit  icon to edit a schedule.

Schedules ↻

Name	Type	Next Run	Actions
<input type="checkbox"/> <a href="#">Cleanup Activity Schedule</a>	Management Job	Next Run 8/10/2021, 11:15:02 AM	<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Cleanup Expired OAuth 2 Tokens</a>	Management Job		<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Cleanup Expired Sessions</a>	Management Job		<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Cleanup Job Schedule</a>	Management Job	Next Run 8/8/2021, 11:15:02 AM	<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Run Once</a>	Source Control Update	Next Run 8/9/2021, 8:00:00 AM	<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Schedule 1</a>	Source Control Update	Next Run 8/8/2021, 3:00:00 AM	<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Schedule 2</a>	Source Control Update	Next Run 8/8/2021, 8:00:00 AM	<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Schedule 3</a>	Source Control Update	Next Run 8/7/2021, 10:00:00 AM	<input checked="" type="checkbox"/> On 
<input type="checkbox"/> <a href="#">Schedule 4</a>	Source Control Update	Next Run 9/5/2021, 10:00:00 AM	<input checked="" type="checkbox"/> On 

1 - 9 of 9 items    << < 1 of 1 page > >>

If you are setting up a template, a project, or an inventory source, click the **Schedules** tab to configure schedules for these resources. When you create a schedule, they are listed by the following:

### Name

Click the schedule name to open its details.

### Type

This identifies whether the schedule is associated with a source control update or a system-managed job schedule.

### Next run

The next scheduled run of this task.

## 29.1. ADDING A NEW SCHEDULE

You can only create schedules from a template, project, or inventory source, and not directly on the main **Schedules** screen.

To create a new schedule:

## Procedure

1. Click the **Schedules** tab of the resource that you are configuring. This can be a template, project, or inventory source.
2. Click **Add**. This opens the **Create New Schedule** window.

Templates > Demo Job Template > Schedules

Create New Schedule

3. Enter the appropriate details into the following fields:

- **Name:** Enter the name.
- Optional: **Description:** Enter a description.
- **Start date/time:** Enter the date and time to start the schedule.
- **Local time zone:** The start time that you enter must be in this time zone.
- **Repeat frequency:** Appropriate scheduling options display depending on the frequency you select.

The **Schedule Details** display when you establish a schedule, enabling you to review the schedule settings and a list of the scheduled occurrences in the selected **Local Time Zone**.



### IMPORTANT

Jobs are scheduled in UTC. Repeating jobs that run at a specific time of day can move relative to a local time zone when Daylight Savings Time shifts occur. The system resolves the local time zone based time to UTC when the schedule is saved. To ensure your schedules are correctly created, set your schedules in UTC time.

4. Click **Save**.

Use the **On** or **Off** toggle to stop an active schedule or activate a stopped schedule.



## CHAPTER 30. SETTING UP RED HAT INSIGHTS FOR RED HAT ANSIBLE AUTOMATION PLATFORM REMEDIATIONS

Automation controller supports integration with Red Hat Insights.

When a host is registered with Red Hat Insights, it is scanned continually for vulnerabilities and known configuration conflicts. Each problem identified can have an associated fix in the form of an Ansible playbook.


Red Hat Insights users create a maintenance plan to group the fixes and can create a playbook to mitigate the problems. Automation controller tracks the maintenance plan playbooks through a Red Hat Insights project.

Authentication to Red Hat Insights through Basic Authorization is backed by a special credential, which must first be established in automation controller. To run a Red Hat Insights maintenance plan, you need a Red Hat Insights project and inventory.

### 30.1. CREATING RED HAT INSIGHTS CREDENTIALS

Use the following procedure to create a new credential for use with Red Hat Insights:

#### Procedure

1. From the navigation panel, select **Resources** → **Credentials**.
2. Click **Add**.
3. Enter the appropriate details in the following fields:
  - **Name:** Enter the name of the credential.
  - Optional: **Description:** Enter a description for the credential.
  - Optional: **Organization:** Enter the name of the organization with which the credential is associated, or click the search  icon and select it from the **Select organization** window.
  - **Credential Type:** Enter **Insights** or select it from the list.

**Credentials**

## Create New Credential

**Name \***

**Credential Type \***

HashiCorp Vault Signed SSH

**Insights**

Machine


- **Username:** Enter a valid Red Hat Insights credential.
- **Password:** Enter a valid Red Hat Insights credential. The Red Hat Insights credentials are the user's [Red Hat Customer Portal](#) account username and password.



4. Click **Save**.

## 30.2. CREATING A RED HAT INSIGHTS PROJECT

Use the following steps to create a new project for use with Red Hat Insights:

### Procedure

1. From the navigation panel, select **Resources** → **Projects**.
2. Click **Add**.
3. Enter the appropriate details in the following fields. Note that the following fields require specific Red Hat Insights related entries:
  - **Name:** Enter the name for your Red Hat Insights project.
  - Optional: **Description:** Enter a description for the project.
  - **Organization:** Enter the name of the organization with which the credential is associated, or click the search (  ) icon and select it from the **Select organization** window.

- Optional: **Execution Environment:** The execution environment that is used for jobs that use this project.
  - **Source Control Type:** Select **Red Hat Insights**
  - Optional: **Content Signature Validation Credential** Enable content signing to verify that the content has remained secure when a project is synced.
  - **Insights Credential:** This is pre-populated with the Red Hat Insights credential you previously created. If not, enter the credential, or click the search  icon and select it from the **Select Insights Credential** window.
4. Select the update options for this project from the **Options** field and provide any additional values, if applicable. For more information about each option click the tooltip  icon next to each one.

Projects ↻

### Create New Project

<b>Name *</b>	<b>Description</b>	<b>Organization *</b>
<input type="text" value="Insights Project"/>	<input type="text"/>	<input type="text" value="Default"/>
<b>Execution Environment</b> ⓘ	<b>Source Control Type *</b>	
<input type="text" value=""/>	<input type="text" value="Red Hat Insights"/>	


**Type Details**

**Insights Credential \***

**Options**

Clean ⓘ  
  Delete ⓘ  
  Track submodules ⓘ  
  Update Revision on Launch ⓘ

5. Click **Save**.

All SCM and project synchronizations occur automatically the first time you save a new project. If you want them to be updated to what is current in Red Hat Insights, manually update the SCM-based project by clicking the update  icon under the project's available actions.

This process syncs your Red Hat Insights project with your Red Hat Insights account solution. Note that the status dot beside the name of the project updates once the sync has run.

### 30.3. CREATE AN INSIGHTS INVENTORY


The Insights playbook contains a **hosts:** line where the value is the host name supplied to red Hat insights, which can be different from the host name supplied to automation controller

To create a new inventory to use with Red Hat Insights, see [Creating Insights credentials](#).

### 30.4. REMEDIATING A RED HAT INSIGHTS INVENTORY

Remediation of a Red Hat Insights inventory enables automation controller to run Red Hat Insights playbooks with a single click. You can do this by creating a job template to run the Red Hat Insights remediation.

#### Procedure

1. From the navigation menu, select **Resources** → **Templates**.
2. On the **Templates** list view, click **Add** → **Add job template**.
3. Enter the appropriate details in the following fields. Note that the following fields require specific Red Hat Insights related entries:
  - **Name:** Enter the name of your Maintenance Plan.
  - Optional: **Description:** Enter a description for the job template.
  - **Job Type:** If not already populated, select **Run** from the job type list.
  - **Inventory:** Select the Red Hat Insights inventory that you previously created.
  - **Project:** Select the Red Hat Insights project that you previously created.
  - Optional: **Execution Environment:** The container image to be used for execution.
  - **Playbook:** Select a playbook associated with the Maintenance Plan that you want to run from the playbook list.
  - Optional: **Credentials:** Enter the credential to use for this project or click the search (  ) icon and select it from the pop-up window. The credential does not have to be a Red Hat Insights credential.
  - **Verbosity:** Keep the default setting, or select the desired verbosity from the list.

Templates 🔍

### Create New Job Template

**Name \***

**Description**

**Job Type \*** 🔍  Prompt on launch

Run ▼

**Inventory \*** 🔍  Prompt on launch

Insights inventory

**Project \*** 🔍

Insights Project

**Execution Environment** 🔍

**Playbook \*** 🔍

file.yml ▼

**Credentials** 🔍  Prompt on launch

SSH: Demo Credential ✕

**Labels** 🔍

**Variables** 🔍 YAML JSON  Prompt on launch ⌵

1 ----

2

**Forks** 🔍

0

**Limit** 🔍  Prompt on launch

**Verbosity** 🔍  Prompt on launch

0 (Normal) ▼

**Job Slicing** 🔍

1

**Timeout** 🔍

0

**Show Changes** 🔍  Prompt on launch

Off

**Instance Groups** 🔍

**Job Tags** 🔍  Prompt on launch

**Skip Tags** 🔍  Prompt on launch

**Options**

Privilege Escalation 🔍  Provisioning Callbacks 🔍  Enable Webhook 🔍  Concurrent Jobs 🔍  Enable Fact Storage 🔍

Save

Cancel

4. Click **Save**.

5. Click the launch  icon to launch the job template.

When complete, the job results in the **Job Details** page.

## CHAPTER 31. BEST PRACTICES FOR AUTOMATION CONTROLLER

The following describes best practice for the use of automation controller:

### 31.1. USE SOURCE CONTROL

Automation controller supports playbooks stored directly on the server. Therefore, you must store your playbooks, roles, and any associated details in source control. This way you have an audit trail describing when and why you changed the rules that are automating your infrastructure. Additionally, it permits sharing of playbooks with other parts of your infrastructure or team.

### 31.2. ANSIBLE FILE AND DIRECTORY STRUCTURE

If you are creating a common set of roles to use across projects, these should be accessed through source control submodules, or a common location such as `/opt`. Projects should not expect to import roles or content from other projects.

For more information, see the link [General tips](#) from the Ansible documentation.



#### NOTE

- Avoid using the playbooks **vars\_prompt** feature, as automation controller does not interactively permit **vars\_prompt** questions. If you cannot avoid using **vars\_prompt**, see the [Surveys](#) functionality.
- Avoid using the playbooks **pause** feature without a timeout, as automation controller does not permit canceling a pause interactively. If you cannot avoid using **pause**, you must set a timeout.

Jobs use the playbook directory as the current working directory, although jobs must be coded to use the **playbook\_dir** variable rather than relying on this.

### 31.3. USE DYNAMIC INVENTORY SOURCES

If you have an external source of truth for your infrastructure, whether it is a cloud provider or a local CMDB, it is best to define an inventory sync process and use the support for dynamic inventory (including cloud inventory sources). This ensures your inventory is always up to date.



#### NOTE

Edits and additions to Inventory host variables persist beyond an inventory synchronization as long as **--overwrite\_vars** is **not** set.

### 31.4. VARIABLE MANAGEMENT FOR INVENTORY

Keep variable data with the hosts and groups definitions (see the inventory editor), rather than using **group\_vars/** and **host\_vars/**. If you use dynamic inventory sources, automation controller can synchronize such variables with the database as long as the **Overwrite Variables** option is not set.

### 31.5. AUTOSCALING

Use the "callback" feature to permit newly booting instances to request configuration for auto-scaling scenarios or provisioning integration.

## 31.6. LARGER HOST COUNTS

Set "forks" on a job template to larger values to increase parallelism of execution runs. For more information on tuning Ansible, see [the Ansible blog](#).

## 31.7. CONTINUOUS INTEGRATION / CONTINUOUS DEPLOYMENT

For a Continuous Integration system, such as Jenkins, to spawn a job, it must make a **curl** request to a job template. The credentials to the job template must not require prompting for any particular passwords. For configuration and use instructions, see [Installation](#) in the Ansible documentation.

## CHAPTER 32. SECURITY

The following sections describe how automation controller handles and enables you to control file system security.

All playbooks are executed through the **awx** file system user. For running jobs, automation controller offers job isolation through the use of Linux containers. This protection ensures that jobs can only access playbooks, roles, and data from the Project directory for that job template.

For credential security, you can choose to upload locked SSH keys and set the unlock password to "ask". You can also choose to have the system prompt for SSH credentials or sudo passwords rather than having the system store them in the database.

### 32.1. PLAYBOOK ACCESS AND INFORMATION SHARING

Automation controller's use of automation execution environments and Linux containers prevents playbooks from reading files outside of their project directory.

By default, the only data exposed to the ansible-playbook process inside the container is the current project being used.

You can customize this in the Job Settings and expose additional directories from the host into the container.

#### 32.1.1. Isolation functionality and variables

Automation controller uses container technology to isolate jobs from each other. By default, only the current project is exposed to the container running a job template.

If you need to expose additional directories, you must customize your playbook runs. To configure job isolation, you can set variables.

By default, automation controller uses the system's **tmp** directory (**/tmp** by default) as its staging area. This can be changed in the **Job Execution Path** field of the **Jobs settings** page, or in the REST API at **/api/v2/settings/jobs**:

```
AWX_ISOLATION_BASE_PATH = "/opt/tmp"
```

If there are any additional directories that should specifically be exposed from the host to the container that playbooks run in, you can specify those in the **Paths to Expose to Isolated Jobs** field of the **Jobs settings** page, or in the REST API at **/api/v2/settings/jobs**:

```
AWX_ISOLATION_SHOW_PATHS = ['/list/of/', '/paths']
```



#### NOTE

If your playbooks need to use keys or settings defined in **AWX\_ISOLATION\_SHOW\_PATHS**, then add this file to **/var/lib/awx/.ssh**.

The fields described here can be found on the **Jobs settings** page:



<b>Job execution path</b> * ⓘ	Revert	<b>Maximum Scheduled Jobs</b> * ⓘ	Revert	<b>Default Job Timeout</b> ⓘ	Revert
/tmp		10		0	
<b>Default Job Idle Timeout</b> ⓘ	Revert	<b>Default Inventory Update Timeout</b> ⓘ	Revert	<b>Default Project Update Timeout</b> ⓘ	Revert
0		0		0	
<b>Per-Host Ansible Fact Cache Timeout</b> ⓘ	Revert	<b>Maximum number of forks per job</b> ⓘ	Revert	<b>When can extra variables contain Jinja templates?</b> ⓘ	Revert
0		200		Template	
<b>Run Project Updates With Higher Verbosity</b> ⓘ	Revert	<b>Ignore Ansible Galaxy SSL Certificate Verification</b> ⓘ	Revert	<b>Enable Role Download</b> ⓘ	Revert
<input type="checkbox"/> Off		<input type="checkbox"/> Off		<input checked="" type="checkbox"/> On	
<b>Enable Collection(s) Download</b> ⓘ	Revert	<b>Follow symlinks</b> ⓘ	Revert	<b>Expose host paths for Container Groups</b> ⓘ	Revert
<input checked="" type="checkbox"/> On		<input type="checkbox"/> Off		<input type="checkbox"/> Off	
<b>Ansible Modules Allowed for Ad Hoc Jobs</b> ⓘ					Revert
<pre> 1 - [ 2   "command", 3   "shell", 4   "yum", 5   "apt", 6   "apt_key", 7   "apt_repository", 8   "apt_rpm", 9   "service", 10  "group", 11  "user", 12  "mount", 13  "ping", 14  "selinux", 15  "setup", 16  "win_ping", 17  "win_service", 18  "win_updates", 19  "win_group", 20  "win_user" 21 ] </pre>					
<b>Ansible Callback Plugins</b> ⓘ					Revert
1 []					
<b>Paths to expose to isolated jobs</b> ⓘ					Revert
<pre> 1 - [ 2   "/etc/pki/ca-trust:/etc/pki/ca-trust:0", 3   "/usr/share/pki:/usr/share/pki:0" 4 ] </pre>					
<b>Extra Environment Variables</b> ⓘ					Revert
1 {}					

## 32.2. ROLE-BASED ACCESS CONTROLS

*Role-Based Access Controls* (RBAC) are built into automation controller and enable administrators to delegate access to server inventories, organizations, and more. Administrators can also centralize the management of various credentials, enabling users to use a required secret without exposing that secret to the user. You can use RBAC to enable automation controller to increase security and streamline management.

RBAC is the practice of granting roles to users or teams. RBACs can be thought of in terms of Roles which define precisely who or what can see, change, or delete an "object" for which a specific capability is being set.

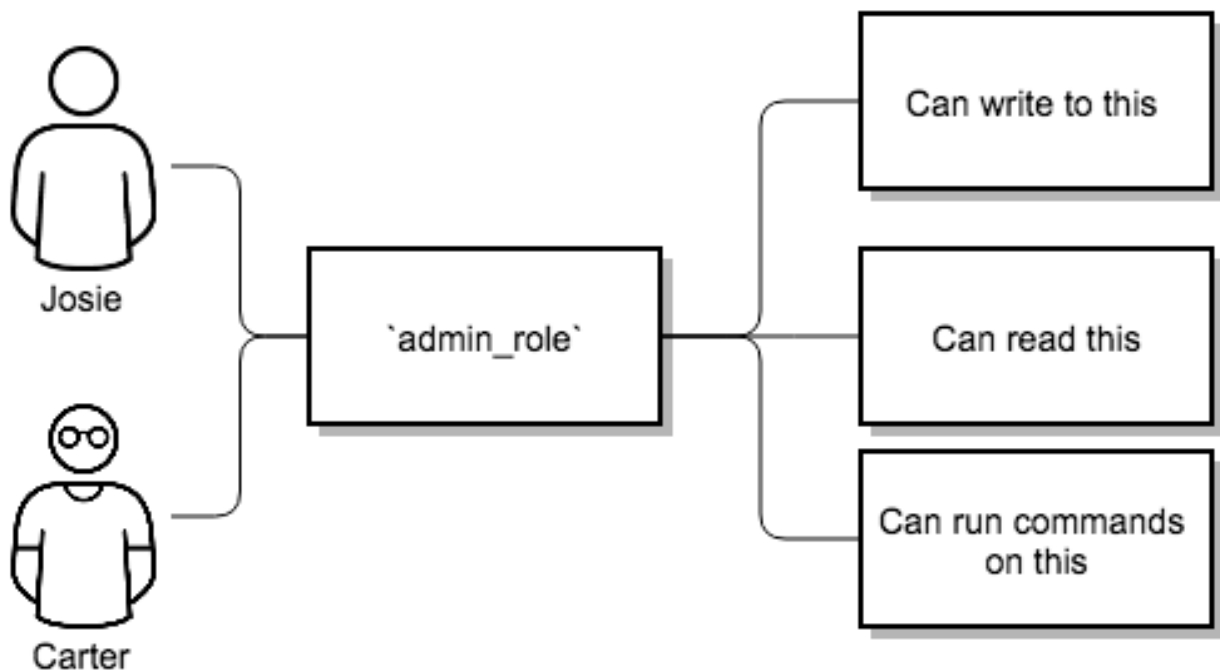
The main concepts of automation controller's RBAC design roles, resources, and users are as follows:

- Users can be members of a role, which gives them certain access to any resources associated with that role, or any resources associated with "descendant" roles.
- A role is a collection of capabilities.

- Users are granted access to these capabilities and the automation controller's resources through the roles to which they are assigned or through roles inherited through the role hierarchy.
- Roles associate a group of capabilities with a group of users. All capabilities are derived from membership within a role. Users receive capabilities only through the roles to which they are assigned or through roles they inherit through the role hierarchy. All members of a role have all capabilities granted to that role. Within an organization, roles are relatively stable, while users and capabilities are both numerous and may change rapidly.
- Users can have many roles.

### 32.2.1. Role hierarchy and access inheritance

Imagine that you have an organization named "SomeCompany" and want to give two people, "Josie" and "Carter", access to manage all the settings associated with that organization. To do this, you must make both people members of the organization's **admin\_role**.

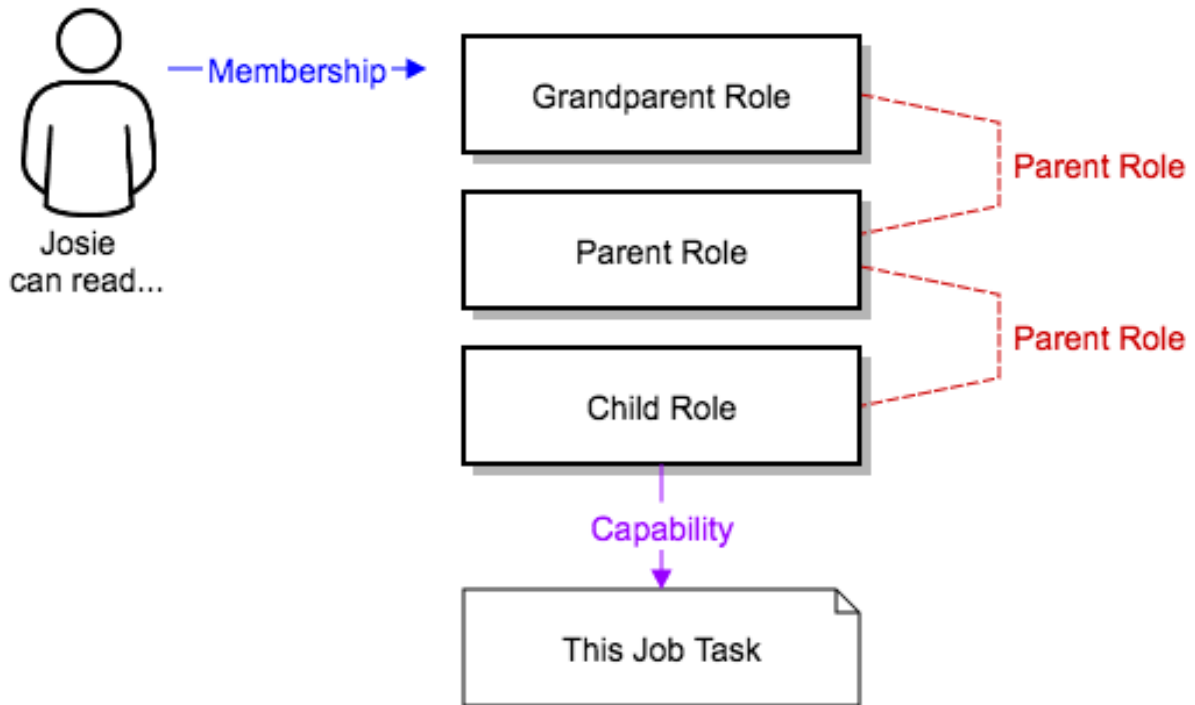


There are frequently many Roles in a system, some of which you want to include all of the capabilities of other roles. For example, you might want a System Administrator to have access to everything that an Organization Administrator has access to, who has everything that a Project Administrator has access to.

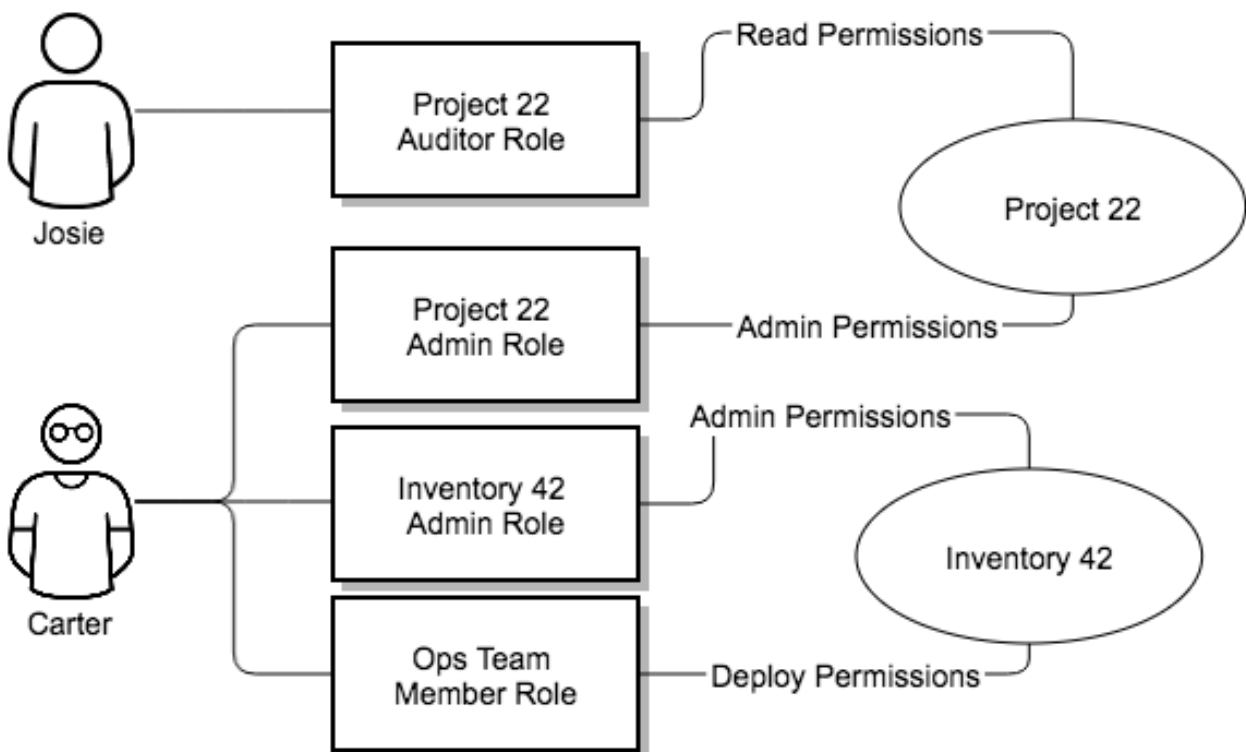
This concept is referred to as the "Role Hierarchy":

- Parent roles get all capabilities bestowed on any child roles.
- Members of roles automatically get all capabilities for the role they are a member of, as well as any child roles.

The Role Hierarchy is represented by permitting Roles to have "Parent Roles". Any capability that a Role has is implicitly granted to any parent roles (or parents of those parents).



Roles can have more than one parent, and capabilities are implicitly granted to all parents.



RBACs also enable you to explicitly permit Users and Teams of Users to run playbooks against certain sets of hosts. Users and teams are restricted to just the sets of playbooks and hosts to which they are granted capabilities. With automation controller, you can create or import as many Users and Teams as you require, create Users and Teams manually, or import them from LDAP or Active Directory.

### 32.2.1.1. Use of RBAC

The following describes how to apply automation controller's RBAC system in your environment.

#### 32.2.1.1.1. Edit Users

When editing a user, an automation controller system administrator can specify the user as being either a *System Administrator* (also referred to as the Superuser) or a *System Auditor*:

- System administrators implicitly inherit all capabilities (read/write/execute) for all objects within the environment.
- System Auditors implicitly inherit the read-only capability for all objects within the environment.

#### 32.2.1.1.2. Edit Organizations

When editing an organization, system administrators can specify the following roles:

- One or more users as organization administrators
- One or more users as organization auditors
- One or more users (or teams) as organization members

Users and teams that are members of an organization can view their organization administrator.

Users who are organization administrators implicitly inherit all capabilities for all objects within that organization.

Users who are organization auditors implicitly inherit the read-only capability for all objects within that organization.

#### 32.2.1.1.3. Edit Projects in an Organization

When editing a project in an organization for which they are the administrator, system administrators and organization administrators can specify:

- One or more users or teams that are project administrators
- One or more users or teams that are project members
- One or more users or teams that can update the project from SCM, from among the users and teams that are members of that organization.

Users who are members of a project can view their project administrators.

Project administrators implicitly inherit the capability to update the project from SCM.

Administrators can also specify one or more users or teams (from those that are members of that project) that can use that project in a job template.

#### 32.2.1.1.4. Create Inventories and Credentials within an Organization

All access that is granted to use, read, or write credentials is handled through roles, which use automation controller's RBAC system to grant ownership, auditor, or usage roles.

System administrators and organization administrators can create inventories and credentials within organizations under their administrative capabilities.

Whether editing an inventory or a credential, System administrators and organization administrators can specify one or more users or teams (from those that are members of that organization) to be granted the usage capability for that inventory or credential.

System administrators and organization administrators can specify one or more users or teams (from those that are members of that organization) that have the capabilities to update (dynamic or manually) an inventory. Administrators can also execute ad hoc commands for an inventory.

#### 32.2.1.1.5. Edit Job Templates

System administrators, organization administrators, and project administrators, within a project under their administrative capabilities, can create and modify new job templates for that project.

When editing a job template, administrators (automation controller, organization, and project) can select inventory and credentials in the organization for which they have usage capabilities, or they can leave those fields blank so that they are selected at runtime.

Additionally, they can specify one or more users or teams (from those that are members of that project) that have execution capabilities for that job template. The execution capability is valid regardless of any explicit capabilities the user or team have been granted against the inventory or credential specified in the job template.

#### 32.2.1.1.6. User View

A user can:

- See any organization or project for which they are a member
- Create their own credential objects which only belong to them
- See and execute any job template for which they have been granted execution capabilities

If a job template for which a user has been granted execution capabilities does not specify an inventory or credential, the user is prompted at run-time to select among the inventory and credentials in the organization they own or have been granted usage capabilities.

Users that are job template administrators can make changes to job templates. However, to change to the inventory, project, playbook, credentials, or instance groups used in the job template, the user must also have the "Use" role for the project and inventory currently being used or being set.

### 32.2.1.2. Roles

All access that is granted to use, read, or write credentials is handled through roles, and roles are defined for a resource.

#### 32.2.1.2.1. Built-in roles

The following table lists the RBAC system roles with a brief description of how that role is defined with regard to privileges in automation controller:

System Role	What it can do
System Administrator - System wide singleton	Manages all aspects of the system

System Role	What it can do
System Auditor - System wide singleton	Views all aspects of the system
Ad Hoc Role - Inventory	Runs ad hoc commands on an Inventory
Admin Role - Organizations, Teams, Inventory, Projects, Job Templates	Manages all aspects of a defined Organization, Team, Inventory, Project, or Job Template
Auditor Role - All	Views all aspects of a defined Organization, Project, Inventory, or Job Template
Execute Role - Job Templates	Runs assigned Job Template
Member Role - Organization, Team	User is a member of a defined Organization or Team.
Read Role - Organizations, Teams, Inventory, Projects, Job Templates	Views all aspects of a defined Organization, Team, Inventory, Project, or Job Template
Update Role - Project	Updates the Project from the configured source control management system
Update Role - Inventory	Updates the Inventory using the cloud source update system
Owner Role - Credential	Owens and manages all aspects of this Credential
Use Role - Credential, Inventory, Project, IGs, CGs	Uses the Credential, Inventory, Project, IGs, or CGs in a Job Template

A Singleton Role is a special role that grants system-wide permissions. Automation controller currently provides two built-in Singleton Roles but the ability to create or customize a Singleton Role is not supported at this time.

### 32.2.1.3. Common Team Roles - "Personas"

Automation controller support personnel typically works to ensure that automation controller is available, and manage it in a way as to balance supportability and ease-of-use for users. Automation controller support personnel often assign *Organization Owner* or *Administrator* roles to users to enable them to create a new Organization or add members from their team that the respective access requires. This minimizes the number of supporting individuals and focuses more on maintaining uptime of the service and assisting users who are using automation controller.

The following table lists some common roles managed by the automation controller Organization:

System Role (for Organizations)	Common User Roles	Description
Owner	Team Lead - Technical Lead	This user can control access for other users in their organization. They can add, remove and grant users specific access to projects, inventories, and job templates. This type of user can also create, remove or modify any aspect of an organization's projects, templates, inventories, teams, and credentials.
Auditor	Security Engineer - Project Manager	This account can view all aspects of the organization in read-only mode. This might be a good role for a user who checks in and maintains compliance. This might also be a good role for a service account who manages or ships job data from automation controller to some other data collector.
Member - Team	All other users	By default, these users as an organization member do not receive any access to any aspect of the organization. To grant them access the respective organization owner must add them to their respective team and grant them Administrator, Execute, Use, Update, and Ad-hoc permissions to each component of the organization's projects, inventories, and job templates.
Member - Team "Owner"	Power users - Lead Developer	Organization Owners can provide "admin" through the team interface, over any component of their organization including projects, inventories, and job templates. These users are able to modify and use the respective component given access.
Member - Team "Execute"	Developers - Engineers	This is the most common role and enables the organization member to execute job templates and read permission to the specific components. This permission applies to templates.
Member - Team "Use"	Developers - Engineers	This permission applies to an organization's credentials, inventories, and projects. This permission enables a user to use the respective component within their job template.
Member - Team "Update"	Developers - Engineers	This permission applies to projects. Enables the user to run an SCM update on a project.

### 32.3. FUNCTION OF ROLES: EDITING AND CREATING

Organization "resource roles" functionality are specific to a certain resource type - such as workflows. Being a member of such a role usually provides two types of permissions. If a user is given a "workflow admin role" for the organization "Default", then they have the following permissions:

- This user can create new workflows in the organization "Default"
- This user can edit all workflows in the "Default" organization

One exception is job templates, where having the role is independent of creation permission. For more information, see [Job Templates](#).

### 32.3.1. Independence of resource roles and organization membership roles

Resource-specific organization roles are independent of the organization roles of administrator and member. Having the "workflow administrator role" for the "Default" organization does not enable a user to view all users in the organization, but having a "member" role in the "Default" organization does. The two types of roles are delegated independently of each other.

#### 32.3.1.1. Necessary permissions to edit job templates

Users can edit fields not impacting job runs (non-sensitive fields) with a Job Template administrator role alone. However, to edit fields that impact job runs in a job template, a user must have the following:

- An **admin** role for the job template and container groups
- A **use** role for related projects
- A **use** role for related inventories
- A **use** role for related instance groups

An "organization job template admin" role was introduced, but having this role is not sufficient by itself to edit a job template within the organization if the user does not have a *use* role for the project, inventory, or instance group, or an administrator role to the container group that a job template uses.

To delegate *full* job template control (within an organization) to a user or team, you must grant the team or user all three organization-level roles:

- job template administrator
- project administrator
- inventory administrator

This ensures that the user (or all users who are members of the team with these roles) has full access to modify job templates in the organization. If a job template uses an inventory or project from another organization, the user with these organization roles can still not have permission to modify that job template. For clarity of permission management, do not mix projects or inventories from different organizations.

#### 32.3.1.2. RBAC permissions

Each role must have a content object, for instance, the organization administrator role has a content object of the organization. To delegate a role, you must have administrator permission for the content object, with some exceptions that would result in you being able to reset a user's password.

**Parent** is the organization.

**Allow** is what this new permission will explicitly allow.

**Scope** is the parent resource that this new role is created on. For example:

**Organization.project\_create\_role.**



It is assumed that the creator of the resource is given the administrator role for that resource. Instances where resource creation does not also imply resource administration are explicitly called out.

The rules associated with each administrator type are as follows:

### Project Admin

- Allow: Create, read, update, delete any project
- Scope: Organization
- User Interface: *Project Add Screen - Organizations*

### Inventory Admin

- Parent: Org admin
- Allow: Create, read, update, delete any inventory
- Scope: Organization
- User Interface: *Inventory Add Screen - Organizations*



### NOTE

As with the **Use** role, if you assign Project Administrator and Inventory Administrator roles to a user, it enables them to create Job Templates (not workflows) for your organization.

### Credential Admin

- Parent: Org admin
- Allow: Create, read, update, delete shared credentials
- Scope: Organization
- User Interface: *Credential Add Screen - Organizations*

### Notification Admin

- Parent: Org admin
- Allow: Assignment of notifications
- Scope: Organization

### Workflow Admin

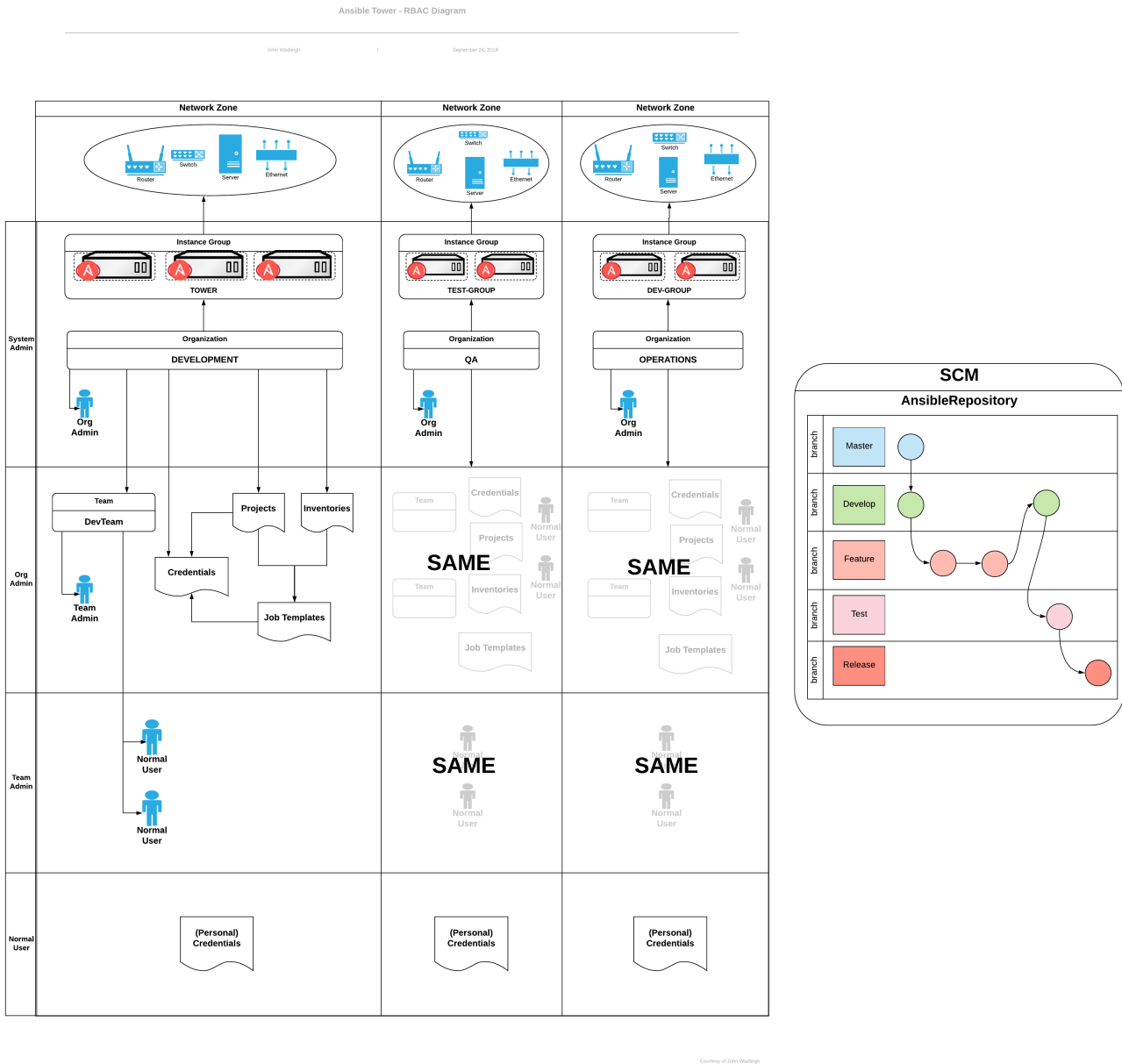
- Parent: Org admin
- Allow: Create a workflow
- Scope: Organization

### Org Execute

- Parent: Org admin

- Allow: Executing job templates and workflow job templates
- Scope: Organization

The following is a sample scenario showing an organization with its roles and which resources each have access to:



## CHAPTER 33. GLOSSARY

### Ad Hoc

*Ad hoc* refers to using Ansible to perform a quick command, using `/usr/bin/ansible`, rather than the orchestration language, which is `/usr/bin/ansible-playbook`. An example of an ad hoc command might be rebooting 50 machines in your infrastructure. Anything you can do ad hoc can be accomplished by writing a Playbook. Playbooks can also glue lots of other operations together.

### Callback Plugin

Refers to user-written code that can intercept results from Ansible and act on them. Some examples in the GitHub project perform custom logging, send email, or play sound effects.

### Control Groups

Also known as *cgroups*, a control group is a feature in the Linux kernel that enables resources to be grouped and allocated to run processes. In addition to assigning resources to processes, cgroups can also report use of resources by all processes running inside of the cgroup.

### Check Mode

Refers to running Ansible with the `--check` option, which does not make any changes on the remote systems, but only outputs the changes that might occur if the command ran without this flag. This is analogous to so-called "dry run" modes in other systems. However, this does not take into account unexpected command failures or cascade effects (which is true of similar modes in other systems). Use Check mode to get an idea of what might happen, but it is not a substitute for a good staging environment.

### Container Groups

Container Groups are a type of Instance Group that specify a configuration for provisioning a pod in a Kubernetes or OpenShift cluster where a job is run. These pods are provisioned on-demand and exist only for the duration of the playbook run.

### Credentials

Authentication details that can be used by automation controller to launch jobs against machines, to synchronize with inventory sources, and to import project content from a version control system. For more information, see [Credentials](#).

### Credential Plugin

Python code that contains definitions for an external credential type, its metadata fields, and the code needed for interacting with a secret management system.

### Distributed Job

A job that consists of a job template, an inventory, and slice size. When executed, a distributed job slices each inventory into a number of "slice size" chunks, which are then used to run smaller job slices.

### External Credential Type

A managed credential type used for authenticating with a secret management system.

### Facts

Facts are things that are discovered about remote nodes. While they can be used in playbooks and templates just like variables, facts are things that are inferred, rather than set. Facts are automatically discovered when running plays by executing the internal setup module on the remote nodes. You never have to call the setup module explicitly: it just runs. It can be disabled to save time if it is not required. For the convenience of users who are switching from other configuration management systems, the fact module also pulls in facts from the **ohai** and **facter** tools if they are installed, which are fact libraries from Chef and Puppet, respectively.

### Forks

Ansible and automation controller communicate with remote nodes in parallel. The level of parallelism can be set in several ways during the creation or editing of a Job Template, by passing **--forks**, or by editing the default in a configuration file. The default is a very conservative five forks, though if you have a lot of RAM, you can set this to a higher value, such as 50, for increased parallelism.

## Group

A set of hosts in Ansible that can be addressed as a set, of which many can exist within a single Inventory.

## Group Vars

The **group\_vars/** files are files that are stored in a directory with an inventory file, with an optional filename named after each group. This is a convenient place to put variables that are provided to a given group, especially complex data structures, so that these variables do not have to be embedded in the inventory file or playbook.

## Handlers

Handlers are like regular tasks in an Ansible playbook (see **Tasks**), but are only run if the Task contains a "notify" directive and also indicates that it changed something. For example, if a configuration file is changed then the task referencing the configuration file templating operation might notify a service restart handler. This means services can be bounced only if they need to be restarted. Handlers can be used for things other than service restarts, but service restarts are the most common use.

## Host

A system managed by automation controller, which may include a physical, virtual, or cloud-based server, or other device (typically an operating system instance). Hosts are contained in an Inventory. Sometimes referred to as a "node".

## Host Specifier

Each Play in Ansible maps a series of tasks (which define the role, purpose, or orders of a system) to a set of systems. This "hosts:" directive in each play is often called the hosts specifier. It can select one system, many systems, one or more groups, or hosts that are in one group and explicitly not in another.

## Instance Group

A group that contains instances for use in a clustered environment. An instance group provides the ability to group instances based on policy.

## Inventory

A collection of hosts against which Jobs can be launched.

## Inventory Script

A program that looks up hosts, group membership for hosts, and variable information from an external resource, whether that be a SQL database, a CMDB solution, or LDAP. This concept was adapted from Puppet (where it is called an "External Nodes Classifier") and works in a similar way.

## Inventory Source

Information about a cloud or other script to be merged into the current inventory group, resulting in the automatic population of Groups, Hosts, and variables about those groups and hosts.

## Job

One of many background tasks launched by automation controller, this is usually the instantiation of a Job Template, such as the launch of an Ansible playbook. Other types of jobs include inventory imports, project synchronizations from source control, or administrative cleanup actions.

## Job Detail

The history of running a particular job, including its output and success/failure status.

## Job Slice

See **Distributed Job**.

### Job Template

The combination of an Ansible playbook and the set of parameters required to launch it. For more information, see [Job templates](#).

### JSON

JSON is a text-based format for representing structured data based on JavaScript object syntax. Ansible and automation controller use JSON for return data from remote modules. This enables modules to be written in any language, not just Python.

### Mesh

Describes a network comprising of nodes. Communication between nodes is established at the transport layer by protocols such as TCP, UDP or Unix sockets.

See also, **Node**.

### Metadata

Information for locating a secret in the external system once authenticated. The user provides this information when linking an external credential to a target credential field.

### Node

A node corresponds to entries in the instance database model, or the `/api/v2/instances/` endpoint, and is a machine participating in the cluster or mesh. The unified jobs API reports **controller\_node** and **execution\_node** fields. The execution node is where the job runs, and the controller node interfaces between the job and server functions.

Node Type	Description
Control	Nodes that run persistent services, and delegate jobs to hybrid and execution nodes.
Hybrid	Nodes that run persistent services and execute jobs.
Hop	Used for relaying across the mesh only.
Execution	Nodes that run jobs delivered from control nodes (jobs submitted from the user's Ansible automation)

### Notification Template

An instance of a notification type (Email, Slack, Webhook, etc.) with a name, description, and a defined configuration.

### Notification

A Notification, such as Email, Slack or a Webhook, has a name, description and configuration defined in a Notification template. For example, when a job fails, a notification is sent using the configuration defined by the notification template.

### Notify

The act of a task registering a change event and informing a handler task that another action needs to be run at the end of the play. If a handler is notified by multiple tasks, it is still only run once. Handlers are run in the order they are listed, not in the order that they are notified.

## Organization

A logical collection of Users, Teams, Projects, and Inventories. Organization is the highest level in the object hierarchy.

## Organization Administrator

An user with the rights to modify the Organization's membership and settings, including making new users and projects within that organization. An organization administrator can also grant permissions to other users within the organization.

## Permissions

The set of privileges assigned to Users and Teams that provide the ability to read, modify, and administer Projects, Inventories, and other objects.

## Plays

A play is minimally a mapping between a set of hosts selected by a host specifier (usually chosen by groups, but sometimes by hostname globs) and the tasks which run on those hosts to define the role that those systems perform. A playbook is a list of plays. There can be one or many plays in a playbook.

## Playbook

An Ansible playbook. For more information, see [Ansible playbooks](#).

## Policy

Policies dictate how instance groups behave and how jobs are executed.

## Project

A logical collection of Ansible playbooks, represented in automation controller.

## Roles

Roles are units of organization in Ansible and automation controller. Assigning a role to a group of hosts (or a set of groups, or host patterns, etc.) implies that they implement a specific behavior. A role can include applying variable values, tasks, and handlers, or a combination of these things. Because of the file structure associated with a role, roles become redistributable units that enable you to share behavior among playbooks, or with other users.

## Secret Management System

A server or service for securely storing and controlling access to tokens, passwords, certificates, encryption keys, and other sensitive data.

## Schedule

The calendar of dates and times for which a job should run automatically.

## Sliced Job

See **Distributed Job**.

## === Source Credential

An external credential that is linked to the field of a target credential.

## Sudo

Ansible does not require root logins and, since it is daemonless, does not require root level daemons (which can be a security concern in sensitive environments). Ansible can log in and perform many operations wrapped in a **sudo** command, and can work with both password-less and password-based sudo. Some operations that do not normally work with **sudo** (such as **scp** file transfer) can be achieved with Ansible's *copy*, *template*, and *fetch* modules while running in **sudo** mode.

## Superuser

An administrator of the server who has permission to edit any object in the system, whether or not it is associated with any organization. Superusers can create organizations and other superusers.

**Survey**

Questions asked by a job template at job launch time, configurable on the job template.

**Target Credential**

A non-external credential with an input field that is linked to an external credential.

**Team**

A sub-division of an Organization with associated Users, Projects, Credentials, and Permissions. Teams provide a means to implement role-based access control schemes and delegate responsibilities across Organizations.

**User**

An operator with associated permissions and credentials.

**Webhook**

Webhooks enable communication and information sharing between applications. They are used to respond to commits pushed to SCMs and launch job templates or workflow templates.

**Workflow Job Template**

A set consisting of any combination of job templates, project syncs, and inventory syncs, linked together in order to execute them as a single unit.

**YAML**

A human-readable language that is often used for writing configuration files. Ansible and automation controller use YAML to define playbook configuration languages and also variable files. YAML has a minimum of syntax, is very clean, and is easy for people to skim. It is a good data format for configuration files and humans, but is also machine readable. YAML is popular in the dynamic language community and the format has libraries available for serialization in many languages. Examples include Python, Perl, or Ruby.