Red Hat Satellite 6.15

Managing configurations using Ansible integration

Configure Ansible integration in Satellite and use Ansible roles and playbooks to configure your hosts

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Red Hat Satellite 6.15 Managing configurations using Ansible integration

Configure Ansible integration in Satellite and use Ansible roles and playbooks to configure your hosts

Red Hat Satellite Documentation Team
satellite-doc-list@redhat.com

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Abstract

This guide describes how to integrate Red Hat Satellite with Ansible and how to perform remote execution and automate repetitive tasks using Ansible roles and playbooks in Satellite.

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MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. Because of the enormity of this endeavor, these changes are being updated gradually and where possible. For more details, see our CTO Chris Wright's message .

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CHAPTER 1. GETTING STARTED WITH ANSIBLE IN SATELLITE

Use this guide to configure Satellite to use Ansible for remote execution.

1.1. SUPPORTED ANSIBLE VERSIONS

Satellite uses Ansible as provided by the base operating system of Satellite Server or any Capsules for remote execution. Therefore, the supported version of Ansible depends on your base OS configuration.

1.2. CONFIGURING YOUR SATELLITE TO RUN ANSIBLE ROLES

In Satellite, you can import Ansible roles to help with automation of routine tasks. Ansible is enabled by default on Satellite Server.

Ansible paths

Satellite imports and runs Ansible roles from the following paths:

- **/etc/ansible/roles**
- **/usr/share/ansible/roles**
- **/etc/ansible/collections**
- **/usr/share/ansible/collections**

Roles and collections from installed packages are placed under **/usr/share/ansible**. If you want to add custom roles or collections, place them under **/etc/ansible**.

Note that Red Hat provides support only for Ansible roles and collections obtained from Red Hat.

The paths are configured by Satellite. For more information, see Section 1.8, “Customizing Ansible configuration”.

Procedure

1. Add the roles to a directory in an Ansible path on Satellite Server and all Capsule Servers from where you want to use the roles. If you want to use custom or third party Ansible roles, ensure to configure an external version control system to synchronize roles between Satellite Server and Capsule Servers.
2. On all Capsule Servers that you want to use to run Ansible roles on hosts, enable the Ansible plugin:

```
# satellite-installer --scenario capsule \
--enable-foreman-proxy-plugin-ansible
```

3. Distribute SSH keys to enable Capsules to connect to hosts using SSH. For more information, see Distributing SSH Keys for Remote Execution in *Managing hosts*. Satellite runs Ansible roles the same way it runs remote execution jobs.
4. Import the Ansible roles into Satellite.
5. Proceed to Chapter 2, *Using Ansible roles to automate repetitive tasks on clients* .

1.3. ENABLING ANSIBLE INTEGRATION WITH SATELLITE

Perform the following procedure to enable the Ansible plugin on your Satellite Server.

Procedure

- Enable the Ansible plugin on your Satellite Server:

```
# satellite-installer \
--enable-foreman-plugin-ansible \
--enable-foreman-proxy-plugin-ansible
```

1.4. IMPORTING ANSIBLE ROLES AND VARIABLES

You can import Ansible roles and variables from the Ansible paths on Satellite Server or Capsule that has Ansible enabled.

Note that some roles take longer to import than others.

Prerequisites

- Ensure that the roles and variables that you import are located in the Ansible paths on all Capsules from where you want to use the roles.

Procedure

1. In the Satellite web UI, navigate to **Configure** > **Ansible** > **Roles**.
2. Click **Import** to select the Capsule from which you want to import.
3. Select the roles that you want to import.
4. Click **Submit**.

1.5. OVERRIDING ANSIBLE VARIABLES IN SATELLITE

If you run Ansible roles in Satellite, you can use Satellite to override Ansible variables for those roles.

The following procedure refers to hosts and host groups. For more information, see *Managing hosts*.

Precedence in overriding variables

If you use an Ansible role to run a task as a user that is not the **Effective User**, there is a strict order of precedence for overriding Ansible variables. To ensure the variable that you override follows the correct order of precedence, see Variable precedence: Where should I put a variable?

Prerequisites

- You must have Ansible variables in Satellite. For more information, see Section 1.4, “Importing Ansible roles and variables”
- To use overridden Ansible variables, a user must have a role that allows them to see the attributes that are matched against hosts.

Procedure

Procedure

1. In the Satellite web UI, navigate to **Configure** > **Ansible** > **Variables**.
2. Select the Ansible variable that you want to override and manage with Satellite.
3. In the **Default Behavior** area, select the **Override** checkbox.
4. In the **Parameter Type** field, select the value type for validation such as **string** or **boolean**. The types **array** and **hash** have further options for handling upon a variable match. For more information, see the *Prioritize Attribute Order* area below.
5. In the **Default Value** field, enter the default value that you want to use if there is no match for the variable.
6. Optional: If you do not want to display the value of the variable as plain text in the Satellite web UI, select the **Hidden Value** checkbox to display the content of the variable as asterisks. This is useful for sensitive values such as passwords or secret tokens.
7. Optional: Expand the **Optional Input Validator** area and specify conditions that will be used to validate concrete values of the variable:
   - Select **Required** if you want to enforce users to fill in this variable.
   - In the **Validator Type** field, select how the value will be validated:
     - **list** – The value will be validated against an enumeration of allowed values.
     - **regex** – The value will be validated against a regular expression pattern.
8. Optional: In the **Prioritize Attribute Order** area, specify the order of priority to match an override with a host by host attributes. Order at the top takes higher precedence. The first match wins.
   You can combine multiple attributes into a single matcher key using a comma as the AND operation. For example, the matcher key of **hostgroup, environment** would expect matchers such as **hostgroup = "web servers"** AND **environment = production**.

   If you use the parameter type **array** or **hash**, you can further set:
   - **Merge Overrides** – Merges members of the arrays/hashes instead of replacing the whole array or hash. If the hashes contain the same key, the value is overwritten by the value of the host.
   - **Merge Default** – Adds the default value to the array or hash.
   - **Avoid Duplicates** – Ensures that the values in the array or hash are unique.
9. Optional: Expand the **Specify Matchers** area and specify criteria for selecting hosts on which the variable overrides.
10. To save the override settings, click **Submit**.

To use the Ansible variable, add the variable as a parameter to your host or host group, or add the variable as a global parameter.

Adding the variable to a host

1. In the Satellite web UI, navigate to **Hosts > All Hosts** and select the host that you want to use.

2. Click the **Ansible** tab, and in the **Variables** area, click the pencil icon to edit the value of the variable.
3. Click the tick icon to accept the value of the changed variable or the cross icon to cancel the change.

Adding the variable to a host group

1. In the Satellite web UI, navigate to **Configure** > **Host Groups**, and select the host group that you want to use.
2. Click the **Parameters** tab, and in the **Host Group Parameters** area, click **Add Parameter**.
3. In the **Name** field, add the Ansible variable name.
4. From the **Type** list, select the type of the variable for validation.
5. In the **Value** field, enter the value for the variable.

Adding the variable as a global parameter

1. In the Satellite web UI, navigate to **Configure** > **Global Parameters**, and click **Create Parameter**.
2. In the **Name** field, add the Ansible variable name.
3. From the **Type** list, select the type of the variable for validation.
4. In the **Value** field, enter the value for the variable.
5. Optional: If you do not want to display the Ansible variable in plain text, select the **Hidden Values** checkbox to display the content of the variable as asterisks in the Satellite web UI.

1.6. ADDING RED HAT ENTERPRISE LINUX SYSTEM ROLES

Red Hat Enterprise Linux System Roles is a configuration interface to remotely manage Red Hat Enterprise Linux servers. You can use Red Hat Enterprise Linux System Roles to add Ansible roles in Satellite. Using Ansible Roles in Satellite can make configuration faster and easier.

Support levels for some of the Red Hat Enterprise Linux System Roles might be in Technology Preview. For up-to-date information about support levels and general information about Red Hat Enterprise Linux System Roles, see Red Hat Enterprise Linux System Roles .

Before subscribing to the Extras channels, see the Red Hat Enterprise Linux Extras Product Lifecycle article.

Procedure

1. Ensure that the following repository is enabled:
   - On Red Hat Enterprise Linux 8, ensure that the **Appstream** repository is enabled:

     ```
     # subscription-manager repos --enable=rhel-8-for-x86_64-appstream-rpms
     ```

     You must enable an Appstream repository that is designated for your architecture. For more information, see RHEL 8 repositories.

- On Red Hat Enterprise Linux 7, ensure that the **Extras** repository is enabled:

```
# subscription-manager repos --enable=rhel-7-server-extras-rpms
```

2. Install the **rhel-system-roles** package:

```
# satellite-maintain packages install rhel-system-roles
```

The **rhel-system-roles** package downloads to **/usr/share/ansible/roles/**. You can view and make any modifications that you want to the files before you import.

3. In the Satellite web UI, navigate to **Configure** > **Ansible** > **Roles**.
4. Click the Capsule that contains the roles that you want to import.
5. From the list of Ansible roles, select the checkbox of the roles you want to import, and then click **Update**.

You can now assign Ansible roles to hosts or host groups. For more information, see Section 2.1, “Assigning Ansible roles to an existing host”.

You can also add the modules contained in these roles to your Ansible playbooks by adding them to Ansible Job Templates. You must include the **hosts:all** line in the job template. For more information, see Red Hat Enterprise Linux (RHEL) System Roles .

1.7. SYNCHRONIZING ANSIBLE COLLECTIONS

On Satellite, you can synchronize your Ansible Collections from Private Automation Hub, **console.redhat.com**, and other Satellite instances. Ansible Collections will appear on Satellite as a new repository type in the Satellite web UI menu under **Content** after the sync.

Procedure

1. In the Satellite web UI, navigate to **Content** > **Products**.
2. Select the required product name.
3. In the **Products** window, select the name of a product that you want to create a repository for.
4. Click the **Repositories** tab, and then click **New Repository**.
5. In the **Name** field, enter a name for the repository.
   The **Label** field is populated automatically based on the name.
6. From the **Type** list, select **ansible collection**.
7. In the **Upstream URL** field, enter the URL for the upstream collections repository.
   The URL can be any Ansible Galaxy endpoint. For example,
   https://console.redhat.com/api/automation-hub/.
8. Optional: In the **Requirements.yml** field, you can specify the list of collections you want to sync from the endpoint, as well as their versions.
   If you do not specify the list of collections, everything from the endpoint will be synced.

```
---
```

```
collections:
- name: my_namespace.my_collection
  version: 1.2.3
```

For more information, see Install multiple collections with a requirements file in *Galaxy User Guide*.

9. Authenticate.
   a. To sync Satellite from **Private Automation Hub**, enter your token in the **Auth Token** field. For more information, see Connect Private Automation Hub in *Connect to Hub*.
   b. To sync Satellite from **console.redhat.com**, enter your token in the **Auth Token** field and enter your SSO URL in the the **Auth URL** field. For more information, see *Getting started with automation hub*.
   c. To sync Satellite from Satellite, leave both authentication fields blank.
10. Click **Save**.
11. Navigate to the Ansible Collections repository.
12. From the **Select Action** menu, select **Sync Now**.

1.8. CUSTOMIZING ANSIBLE CONFIGURATION

Satellite manages essential Ansible configuration that is required for Ansible integration with Satellite. However, you can customize other Ansible configuration options as usual.

Satellite stores the essential Ansible configuration as environment variables in **/etc/foreman-proxy/ansible.env**. This file is managed by **satellite-installer**.

Ansible reads configuration from a configuration file and the environment provided by Capsule. If you need to customize Ansible configuration, you can do so in the system-wide **/etc/ansible/ansible.cfg** file or in the **/usr/share/foreman-proxy/.ansible.cfg** file in the home directory of the **foreman-proxy** user. Note that if you use **/usr/share/foreman-proxy/.ansible.cfg**, Ansible spawned by Satellite ignores configuration in **/etc/ansible/ansible.cfg**.

Note that environment variables take precedence over values in **ansible.cfg**, which ensures that the essential configuration required by Satellite is retained.

The following table lists the essential Ansible configuration options managed by Satellite.

Table 1.1. Essential Ansible configuration

Environment Variable	Config Key	Description
ANSIBLE_CALLBACKS_ENABLED	callbacks_enabled	Enables callback to Satellite; equivalent to **callback_whitelist** for cross-version compatibility
ANSIBLE_CALLBACK_WHITELIST	callback_whitelist	Enables callback to Satellite; equivalent to **callbacks_enabled** for cross-version compatibility

Environment Variable	Config Key	Description
ANSIBLE_COLLECTIONS_PATHS	collections_paths	List of paths to Ansible collections
ANSIBLE_HOST_KEY_CHECKING	host_key_checking	Disables checking of host keys during SSH connection
ANSIBLE_LOCAL_TEMP	local_tmp	Temporary directory on Capsule
ANSIBLE_ROLES_PATH	roles_path	List of paths to Ansible roles
ANSIBLE_SSH_ARGS	ssh_args	Arguments passed to SSH connection

Additional resources

- Ansible Configuration Settings

1.9. USING ANSIBLE VAULT WITH SATELLITE

You can encrypt sensitive Ansible data files using the Ansible Vault tool and configure Ansible to access the encrypted files using a password stored in a file.

Procedure

1. If you customized **/etc/ansible/ansible.cfg**, copy your configuration from **/etc/ansible/ansible.cfg** to **/usr/share/foreman-proxy/.ansible.cfg**.
2. Encrypt the sensitive file using the **ansible-vault** command:

```
# ansible-vault encrypt /etc/ansible/roles/Role_Name/vars/main.yml
```

   Note that **ansible-vault** changes the file permissions to **600**.

3. Change the group and permissions of the encrypted file to ensure that the **foreman-proxy** user can read it:

```
# chgrp foreman-proxy /etc/ansible/roles/Role_Name/vars/main.yml
# chmod 0640 /etc/ansible/roles/Role_Name/vars/main.yml
```

4. Create the **/usr/share/foreman-proxy/.ansible_vault_password** file and enter the Vault password into it.
5. Change the user and permissions of the **.ansible_vault_password** file to ensure that only the **foreman-proxy** user can read it:

```
# chown foreman-proxy:foreman-proxy /usr/share/foreman-proxy/.ansible_vault_password
# chmod 0400 /usr/share/foreman-proxy/.ansible_vault_password
```

6. Add the path of the Vault password file to the **[defaults]** section in **/usr/share/foreman-proxy/.ansible.cfg**:

```
[defaults]
vault_password_file = /usr/share/foreman-proxy/.ansible_vault_password
```

The path to the Vault password file must be absolute.

CHAPTER 2. USING ANSIBLE ROLES TO AUTOMATE REPETITIVE TASKS ON CLIENTS

2.1. ASSIGNING ANSIBLE ROLES TO AN EXISTING HOST

You can use Ansible roles for remote management of Satellite clients.

Prerequisites

- Ensure that you have configured and imported Ansible roles.

Procedure

1. In the Satellite web UI, navigate to **Hosts > All Hosts**.
2. Select the host and click **Edit**.
3. On the **Ansible Roles** tab, select the role that you want to add from the **Available Ansible Roles** list.
4. Click the **+** icon to add the role to the host. You can add more than one role.
5. Click **Submit**.

After you assign Ansible roles to hosts, you can use Ansible for remote execution. For more information, see Section 4.13, “Distributing SSH keys for remote execution” .

Overriding parameter variables

On the **Parameters** tab, click **Add Parameter** to add any parameter variables that you want to pass to job templates at run time. This includes all Ansible playbook parameters and host parameters that you want to associate with the host. To use a parameter variable with an Ansible job template, you must add a **Host Parameter**.

2.2. REMOVING ANSIBLE ROLES FROM A HOST

Use the following procedure to remove Ansible roles from a host.

Procedure

1. In the Satellite web UI, navigate to **Hosts > All Hosts**.
2. Select the host and click **Edit**.
3. Select the **Ansible Roles** tab.
4. In the **Assigned Ansible Roles** area, click the **-** icon to remove the role from the host. Repeat to remove more roles.
5. Click **Submit**.

2.3. CHANGING THE ORDER OF ANSIBLE ROLES

Use the following procedure to change the order of Ansible roles applied to a host.

Procedure

1. In the Satellite web UI, navigate to **Hosts > All Hosts**.
2. Select a host.
3. Select the **Ansible Roles** tab.
4. In the **Assigned Ansible Roles** area, you can change the order of the roles by dragging and dropping the roles into the preferred position.
5. Click **Submit** to save the order of the Ansible roles.

2.4. RUNNING ANSIBLE ROLES ON A HOST

You can run Ansible roles on a host through the Satellite web UI.

Prerequisites

- You must configure your deployment to run Ansible roles. For more information, see Section 1.2, "Configuring your Satellite to run Ansible roles".
- You must have assigned the Ansible roles to the host.

Procedure

1. In the Satellite web UI, navigate to **Hosts** > **All Hosts**.
2. Select the checkbox of the host that contains the Ansible role you want to run.
3. From the **Select Action** list, select **Run all Ansible roles**.

You can view the status of your Ansible job on the **Run Ansible roles** page. To rerun a job, click **Rerun**.

2.5. ASSIGNING ANSIBLE ROLES TO A HOST GROUP

You can use Ansible roles for remote management of Satellite clients.

Prerequisites

- You must configure your deployment to run Ansible roles. For more information, see Section 1.2, "Configuring your Satellite to run Ansible roles".

Procedure

1. In the Satellite web UI, navigate to **Configure** > **Host Groups**.
2. Click the host group name to which you want to assign an Ansible role.
3. On the **Ansible Roles** tab, select the role that you want to add from the **Available Ansible Roles** list.
4. Click the **+** icon to add the role to the host group. You can add more than one role.
5. Click **Submit**.

2.6. RUNNING ANSIBLE ROLES ON A HOST GROUP

You can run Ansible roles on a host group through the Satellite web UI.

Prerequisites

- You must configure your deployment to run Ansible roles. For more information, see Section 1.2, "Configuring your Satellite to run Ansible roles".
- You must have assigned the Ansible roles to the host group.
- You must have at least one host in your host group.

Procedure

1. In the Satellite web UI, navigate to **Configure** > **Host Groups**.
2. From the list in the **Actions** column for the host group, select **Run all Ansible roles**.

You can view the status of your Ansible job on the **Run Ansible roles** page. Click **Rerun** to rerun a job.

2.7. RUNNING ANSIBLE ROLES IN CHECK MODE

You can run Ansible roles in check mode through the Satellite web UI.

Prerequisites

- You must configure your deployment to run Ansible roles. For more information, see Section 1.2, "Configuring your Satellite to run Ansible roles".
- You must have assigned the Ansible roles to the host group.
- You must have at least one host in your host group.

Procedure

1. In the Satellite web UI, navigate to **Hosts** > **All Hosts**.
2. Click **Edit** for the host you want to enable check mode for.
3. In the **Parameters** tab, ensure that the host has a parameter named **ansible_roles_check_mode** with type **boolean** set to **true**.
4. Click **Submit**.

CHAPTER 3. RUNNING AN ANSIBLE PLAYBOOK FROM SATELLITE

You can run an Ansible playbook on a host or host group by executing a remote job in Satellite.

Prerequisites

- Ansible plugin in Satellite is enabled.
- Remote job execution is configured. For more information, see Chapter 4, *Configuring and setting up remote jobs*.
- You have an Ansible playbook ready to use.

Procedure

1. In the Satellite web UI, navigate to **Monitor** > **Jobs**.
2. Click **Run Job**.
3. In **Job category**, select **Ansible Playbook**.
4. In **Job template**, select **Ansible - Run playbook**.
5. Click **Next**.
6. Select the hosts on which you want to run the playbook.
7. In the **playbook** field, paste the content of your Ansible playbook.
8. Follow the wizard to complete setting the remote job. For more information, see Section 4.21, "Executing a remote job".
9. Click **Submit** to run the Ansible playbook on your hosts.

Additional resources

- Alternatively, you can import Ansible playbooks from Capsule Servers. For more information, see the following resources:
  - Section 4.7, "Importing an Ansible playbook by name"
  - Section 4.8, "Importing all available Ansible playbooks"

CHAPTER 4. CONFIGURING AND SETTING UP REMOTE JOBS

Red Hat Satellite supports remote execution of commands on hosts. Using remote execution, you can perform various tasks on multiple hosts simultaneously.

4.1. REMOTE EXECUTION IN RED HAT SATELLITE

With remote execution, you can run jobs on hosts remotely from Capsules using shell scripts or Ansible tasks and playbooks.

Use remote execution for the following benefits in Satellite:

- Run jobs on multiple hosts at once.
- Use variables in your commands for more granular control over the jobs you run.
- Use host facts and parameters to populate the variable values.
- Specify custom values for templates when you run the command.

Communication for remote execution occurs through Capsule Server, which means that Satellite Server does not require direct access to the target host, and can scale to manage many hosts. For more information, see Section 4.4, “Transport modes for remote execution”.

To use remote execution, you must define a job template. A job template is a command that you want to apply to remote hosts. You can execute a job template multiple times.

Satellite uses ERB syntax job templates. For more information, see Template Writing Reference in *Managing hosts*.

By default, Satellite includes several job templates for shell scripts and Ansible. For more information, see Setting up Job Templates in *Managing hosts*.

Additional resources

- See Executing a Remote Job in *Managing hosts*.

4.2. REMOTE EXECUTION WORKFLOW

For custom Ansible roles that you create, or roles that you download, you must install the package containing the roles on your Capsule Server. Before you can use Ansible roles, you must import the roles into Satellite from the Capsule where they are installed.

When you run a remote job on hosts, for every host, Satellite performs the following actions to find a remote execution Capsule to use.

Satellite searches only for Capsules that have the Ansible feature enabled.

1. Satellite finds the host’s interfaces that have the **Remote execution** checkbox selected.
2. Satellite finds the subnets of these interfaces.
3. Satellite finds remote execution Capsules assigned to these subnets.

4. From this set of Capsules, Satellite selects the Capsule that has the least number of running jobs. By doing this, Satellite ensures that the jobs load is balanced between remote execution Capsules.

If you have enabled **Prefer registered through Capsule for remote execution**, Satellite runs the REX job using the Capsule the host is registered to.

By default, **Prefer registered through Capsule for remote execution** is set to **No**. To enable it, in the Satellite web UI, navigate to **Administer** > **Settings**, and on the **Content** tab, set **Prefer registered through Capsule for remote execution** to **Yes**. This ensures that Satellite performs REX jobs on hosts by the Capsule to which they are registered to.

If Satellite does not find a remote execution Capsule at this stage, and if the **Fallback to Any Capsule** setting is enabled, Satellite adds another set of Capsules to select the remote execution Capsule from. Satellite selects the most lightly loaded Capsule from the following types of Capsules that are assigned to the host:

- DHCP, DNS and TFTP Capsules assigned to the host's subnets
- DNS Capsule assigned to the host's domain
- Realm Capsule assigned to the host's realm
- Puppet server Capsule
- Puppet CA Capsule
- OpenSCAP Capsule

If Satellite does not find a remote execution Capsule at this stage, and if the **Enable Global Capsule** setting is enabled, Satellite selects the most lightly loaded remote execution Capsule from the set of all Capsules in the host's organization and location to execute a remote job.

4.3. PERMISSIONS FOR REMOTE EXECUTION

You can control which roles can run which jobs within your infrastructure, including which hosts they can target. The remote execution feature provides two built-in roles:

- **Remote Execution Manager**: Can access all remote execution features and functionality.
- **Remote Execution User**: Can only run jobs.

You can clone the **Remote Execution User** role and customize its filter for increased granularity. If you adjust the filter with the **view_job_templates** permission on a customized role, you can only see and trigger jobs based on matching job templates. You can use the **view_hosts** and **view_smart_proxies** permissions to limit which hosts or Capsules are visible to the role.

The **execute_template_invocation** permission is a special permission that is checked immediately before execution of a job begins. This permission defines which job template you can run on a particular host. This allows for even more granularity when specifying permissions.

You can run remote execution jobs against Red Hat Satellite and Capsule registered as hosts to Red Hat Satellite with the **execute_jobs_on_infrastructure_hosts** permission. Standard **Manager** and **Site Manager** roles have this permission by default. If you use either the **Manager** or **Site Manager** role, or if you use a custom role with the **execute_jobs_on_infrastructure_hosts** permission, you can execute remote jobs against registered Red Hat Satellite and Capsule hosts.

For more information on working with roles and permissions, see Creating and Managing Roles in *Administering Red Hat Satellite*.

The following example shows filters for the **execute_template_invocation** permission:

```
name = Reboot and host.name = staging.example.com
name = Reboot and host.name ~ *.staging.example.com
name = "Restart service" and host_group.name = webservers
```

Use the first line in this example to apply the **Reboot** template to one selected host. Use the second line to define a pool of hosts with names ending with **.staging.example.com**. Use the third line to bind the template with a host group.

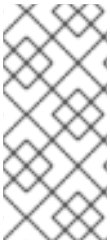
NOTE

Permissions assigned to users with these roles can change over time. If you have already scheduled some jobs to run in the future, and the permissions change, this can result in execution failure because permissions are checked immediately before job execution.

4.4. TRANSPORT MODES FOR REMOTE EXECUTION

You can configure your Satellite to use two different modes of transport for remote job execution.

On Capsules in **ssh** mode, remote execution uses the SSH service to transport job details. This is the default transport mode. The SSH service must be enabled and active on the target hosts. The remote execution Capsule must have access to the SSH port on the target hosts. Unless you have a different setting, the standard SSH port is 22.



NOTE

If your Capsule already uses the **pull-mqtt** mode and you want to switch back to the **ssh** mode, run this **satellite-installer** command:

```
# satellite-installer --foreman-proxy-plugin-remote-execution-script-mode=ssh
```

On Capsules in **pull-mqtt** mode, remote execution uses Message Queueing Telemetry Transport (MQTT) to publish jobs it receives from Satellite Server. The host subscribes to the MQTT broker on Capsule for job notifications using the **yggdrasil** pull client. After the host receives a notification, it pulls job details from Capsule over HTTPS, runs the job, and reports results back to Capsule.

To use the **pull-mqtt** mode, you must enable it on Capsule Server and configure the pull client on the target hosts.

Additional resources

- To enable pull mode on Capsule Server, see Configuring Remote Execution for Pull Client in *Installing Capsule Server*.
- To enable pull mode on an existing host, continue with Section 4.5, “Configuring a host to use the pull client”.
- To enable pull mode on a new host, continue with either of the following procedures in *Managing hosts*:

- Creating a Host
- Registering Hosts

4.5. CONFIGURING A HOST TO USE THE PULL CLIENT

For Capsules configured to use **pull-mqtt** mode, hosts can subscribe to remote jobs using the remote execution pull client. Hosts do not require an SSH connection from their Capsule Server.

Prerequisites

- You have registered the host to Satellite.
- The host's Capsule is configured to use **pull-mqtt** mode. For more information, see Configuring Remote Execution for Pull Client in *Installing Capsule Server*.
- The Red Hat Satellite Client 6 repository is enabled and synchronized on Satellite Server, and enabled on the host.
- The host is able to communicate with its Capsule over MQTT using port **1883**.
- The host is able to communicate with its Capsule over HTTPS.

Procedure

- Install the **katello-pull-transport-migrate** package on your host:
  - On Red Hat Enterprise Linux 9 and Red Hat Enterprise Linux 8 hosts:

    ```
    # dnf install katello-pull-transport-migrate
    ```

  - On Red Hat Enterprise Linux 7 hosts:

    ```
    # yum install katello-pull-transport-migrate
    ```

  The package installs **foreman_ygg_worker** and **yggdrasil** as dependencies and enables the pull mode on the host. The host's **subscription-manager** configuration and consumer certificates are used to configure the **yggdrasil** client on the host, and the pull mode client worker is started.

Verification

- Check the status of the **yggdrasild** service:

  ```
  # systemctl status yggdrasild
  ```

4.6. CREATING A JOB TEMPLATE

Use this procedure to create a job template. To use the CLI instead of the Satellite web UI, see the CLI procedure.

Procedure

1. In the Satellite web UI, navigate to **Hosts** > **Templates** > **Job templates**.

2. Click **New Job Template**.
3. Click the **Template** tab, and in the **Name** field, enter a unique name for your job template.
4. Select **Default** to make the template available for all organizations and locations.
5. Create the template directly in the template editor or upload it from a text file by clicking **Import**.
6. Optional: In the **Audit Comment** field, add information about the change.
7. Click the **Job** tab, and in the **Job category** field, enter your own category or select from the default categories listed in Default Job Template Categories in *Managing hosts*.
8. Optional: In the **Description Format** field, enter a description template. For example, **Install package %{package_name}**. You can also use **%{template_name}** and **%{job_category}** in your template.
9. From the **Provider Type** list, select **SSH** for shell scripts and **Ansible** for Ansible tasks or playbooks.
10. Optional: In the **Timeout to kill** field, enter a timeout value to terminate the job if it does not complete.
11. Optional: Click **Add Input** to define an input parameter. Parameters are requested when executing the job and do not have to be defined in the template. For examples, see the **Help** tab.
12. Optional: Click **Foreign input set** to include other templates in this job.
13. Optional: In the **Effective user** area, configure a user if the command cannot use the default **remote_execution_effective_user** setting.
14. Optional: If this template is a snippet to be included in other templates, click the **Type** tab and select **Snippet**.
15. Optional: If you use the Ansible provider, click the **Ansible** tab. Select **Enable Ansible Callback** to allow hosts to send facts, which are used to create configuration reports, back to Satellite after a job finishes.
16. Click the **Location** tab and add the locations where you want to use the template.
17. Click the **Organizations** tab and add the organizations where you want to use the template.
18. Click **Submit** to save your changes.

You can extend and customize job templates by including other templates in the template syntax. For more information, see Template Writing Reference and Job Template Examples and Extensions in *Managing hosts*.

CLI procedure

- To create a job template using a template-definition file, enter the following command:

```
# hammer job-template create \
--file "Path_to_My_Template_File" \
--job-category "My_Category_Name" \
```

```
--name "My_Template_Name" \
--provider-type SSH
```

4.7. IMPORTING AN ANSIBLE PLAYBOOK BY NAME

You can import Ansible playbooks by name to Satellite from collections installed on Capsule. Satellite creates a job template from the imported playbook and places the template in the **Ansible Playbook - Imported** job category.

If you have a custom collection, place it in **/etc/ansible/collections/ansible_collections/*My_Namespace*/*My_Collection***.

Prerequisites

- Ansible plugin is enabled.
- Your Satellite account has a role that grants the **import_ansible_playbooks** permission.

Procedure

1. Fetch the available Ansible playbooks by using the following API request:

```
# curl -X GET -H 'Content-Type: application/json'
https://satellite.example.com/ansible/api/v2/ansible_playbooks/fetch?
proxy_id=My_capsule_ID
```

2. Select the Ansible playbook you want to import and note its name.
3. Import the Ansible playbook by its name:

```
# curl -X PUT -H 'Content-Type: application/json' -d '{ "playbook_names":
["My_Playbook_Name"] }'
https://satellite.example.com/ansible/api/v2/ansible_playbooks/sync?
proxy_id=My_capsule_ID
```

You get a notification in the Satellite web UI after the import completes.

Next steps

- You can run the playbook by executing a remote job from the created job template. For more information, see Section 4.21, “Executing a remote job”.

4.8. IMPORTING ALL AVAILABLE ANSIBLE PLAYBOOKS

You can import all the available Ansible playbooks to Satellite from collections installed on Capsule. Satellite creates job templates from the imported playbooks and places the templates in the **Ansible Playbook - Imported** job category.

If you have a custom collection, place it in **/etc/ansible/collections/ansible_collections/*My_Namespace*/*My_Collection***.

Prerequisites

- Ansible plugin is enabled.
- Your Satellite account has a role that grants the **import_ansible_playbooks** permission.

Procedure

- Import the Ansible playbooks by using the following API request:

```
# curl -X PUT -H 'Content-Type: application/json'
https://satellite.example.com/ansible/api/v2/ansible_playbooks/sync?
proxy_id=My_capsule_ID
```

  You get a notification in the Satellite web UI after the import completes.

Next steps

- You can run the playbooks by executing a remote job from the created job templates. For more information, see Section 4.21, “Executing a remote job”.

4.9. CONFIGURING THE FALLBACK TO ANY CAPSULE REMOTE EXECUTION SETTING IN SATELLITE

You can enable the **Fallback to Any Capsule** setting to configure Satellite to search for remote execution Capsules from the list of Capsules that are assigned to hosts. This can be useful if you need to run remote jobs on hosts that have no subnets configured or if the hosts' subnets are assigned to Capsules that do not have the remote execution feature enabled.

If the **Fallback to Any Capsule** setting is enabled, Satellite adds another set of Capsules to select the remote execution Capsule from. Satellite also selects the most lightly loaded Capsule from the set of all Capsules assigned to the host, such as the following:

- DHCP, DNS and TFTP Capsules assigned to the host’s subnets
- DNS Capsule assigned to the host’s domain
- Realm Capsule assigned to the host’s realm
- Puppet server Capsule
- Puppet CA Capsule
- OpenSCAP Capsule

Procedure

1. In the Satellite web UI, navigate to **Administer** > **Settings**.
2. Click **Remote Execution**.
3. Configure the **Fallback to Any Capsule** setting.

CLI procedure

- Enter the **hammer settings set** command on Satellite to configure the **Fallback to Any Capsule** setting. To set the value to **true**, enter the following command:

```
# hammer settings set \
--name=remote_execution_fallback_proxy \
--value=true
```

4.10. CONFIGURING THE GLOBAL CAPSULE REMOTE EXECUTION SETTING IN SATELLITE

By default, Satellite searches for remote execution Capsules in hosts' organizations and locations regardless of whether Capsules are assigned to hosts' subnets or not. You can disable the **Enable Global Capsule** setting if you want to limit the search to the Capsules that are assigned to hosts' subnets.

If the **Enable Global Capsule** setting is enabled, Satellite adds another set of Capsules to select the remote execution Capsule from. Satellite also selects the most lightly loaded remote execution Capsule from the set of all Capsules in the host's organization and location to execute a remote job.

Procedure

1. In the Satellite web UI, navigate to **Administer** > **Settings**.
2. Click **Remote Execution**.
3. Configure the **Enable Global Capsule** setting.

CLI procedure

- Enter the **hammer settings set** command on Satellite to configure the **Enable Global Capsule** setting. To set the value to **true**, enter the following command:

```
# hammer settings set \
--name=remote_execution_global_proxy \
--value=true
```

4.11. CONFIGURING SATELLITE TO USE AN ALTERNATIVE DIRECTORY TO EXECUTE REMOTE JOBS ON HOSTS

Ansible puts its own files it requires on the server side into the **/tmp** directory. You have the option to set a different directory if required.

Procedure

1. On your Satellite Server or Capsule Server, create a new directory:

```
# mkdir /My_Remote_Working_Directory
```

2. Copy the SELinux context from the default **/tmp** directory:

```
# chcon --reference=/tmp /My_Remote_Working_Directory
```

3. Configure your Satellite Server or Capsule Server to use the new directory:

```
# satellite-installer \
--foreman-proxy-plugin-ansible-working-dir /My_Remote_Working_Directory
```

4.12. ALTERING THE PRIVILEGE ELEVATION METHOD

By default, push-based remote execution uses **sudo** to switch from the SSH user to the effective user that executes the script on your host. In some situations, you might require to use another method, such as **su** or **dzdo**. You can globally configure an alternative method in your Satellite settings.

Prerequisites

- Your user account has a role assigned that grants the **view_settings** and **edit_settings** permissions.
- If you want to use **dzdo** for Ansible jobs, ensure the **community.general** Ansible collection, which contains the required **dzdo** become plugin, is installed. For more information, see Installing collections in *Ansible documentation*.

Procedure

1. Navigate to **Administer** > **Settings**.
2. Select the **Remote Execution** tab.
3. Click the value of the **Effective User Method** setting.
4. Select the new value.
5. Click **Submit**.

4.13. DISTRIBUTING SSH KEYS FOR REMOTE EXECUTION

For Capsules in **ssh** mode, remote execution connections are authenticated using SSH. The public SSH key from Capsule must be distributed to its attached hosts that you want to manage.

Ensure that the SSH service is enabled and running on the hosts. Configure any network or host-based firewalls to enable access to port 22.

Use one of the following methods to distribute the public SSH key from Capsule to target hosts:

1. Section 4.14, “Distributing SSH keys for remote execution manually” .
2. Section 4.16, “Using the Satellite API to obtain SSH keys for remote execution” .
3. Section 4.17, “Configuring a Kickstart template to distribute SSH keys during provisioning” .
4. For new Satellite hosts, you can deploy SSH keys to Satellite hosts during registration using the global registration template. For more information, see Registering a Host to Red Hat Satellite Using the Global Registration Template in *Managing hosts*.

Satellite distributes SSH keys for the remote execution feature to the hosts provisioned from Satellite by default.

If the hosts are running on Amazon Web Services, enable password authentication. For more information, see New User Accounts.

4.14. DISTRIBUTING SSH KEYS FOR REMOTE EXECUTION MANUALLY

To distribute SSH keys manually, complete the following steps:

Procedure

- Copy the SSH pub key from your Capsule to your target host:

```
# ssh-copy-id -i ~foreman-proxy/.ssh/id_rsa_foreman_proxy.pub root@client.example.com
```

  Repeat this step for each target host you want to manage.

Verification

- To confirm that the key was successfully copied to the target host, enter the following command on Capsule:

```
# ssh -i ~foreman-proxy/.ssh/id_rsa_foreman_proxy root@client.example.com
```

4.15. ADDING A PASSPHRASE TO SSH KEY USED FOR REMOTE EXECUTION

By default, Capsule uses a non-passphrase protected SSH key to execute remote jobs on hosts. You can protect the SSH key with a passphrase by following this procedure.

Procedure

- On your Satellite Server or Capsule Server, use **ssh-keygen** to add a passphrase to your SSH key:

```
# ssh-keygen -p -f ~foreman-proxy/.ssh/id_rsa_foreman_proxy
```

Next steps

- Users now must use a passphrase when running remote execution jobs on hosts.

4.16. USING THE SATELLITE API TO OBTAIN SSH KEYS FOR REMOTE EXECUTION

To use the Satellite API to download the public key from Capsule, complete this procedure on each target host.

Procedure

1. On the target host, create the **~/.ssh** directory to store the SSH key:

```
# mkdir ~/.ssh
```

2. Download the SSH key from Capsule:

```
# curl https://capsule.example.com:9090/ssh/pubkey >> ~/.ssh/authorized_keys
```

3. Configure permissions for the ~/**.ssh** directory:

```
# chmod 700 ~/.ssh
```

4. Configure permissions for the **authorized_keys** file:

```
# chmod 600 ~/.ssh/authorized_keys
```

4.17. CONFIGURING A KICKSTART TEMPLATE TO DISTRIBUTE SSH KEYS DURING PROVISIONING

You can add a **remote_execution_ssh_keys** snippet to your custom Kickstart template to deploy SSH keys to hosts during provisioning. Kickstart templates that Satellite ships include this snippet by default. Satellite copies the SSH key for remote execution to the systems during provisioning.

Procedure

- To include the public key in newly-provisioned hosts, add the following snippet to the Kickstart template that you use:

```
<%= snippet 'remote_execution_ssh_keys' %>
```

4.18. CONFIGURING A KEYTAB FOR KERBEROS TICKET GRANTING TICKETS

Use this procedure to configure Satellite to use a keytab to obtain Kerberos ticket granting tickets. If you do not set up a keytab, you must manually retrieve tickets.

Procedure

1. Find the ID of the **foreman-proxy** user:

```
# id -u foreman-proxy
```

2. Modify the **umask** value so that new files have the permissions **600**:

```
# umask 077
```

3. Create the directory for the keytab:

```
# mkdir -p "/var/kerberos/krb5/user/My_User_ID"
```

4. Create a keytab or copy an existing keytab to the directory:

```
# cp My_Client.keytab /var/kerberos/krb5/user/My_User_ID/client.keytab
```

5. Change the directory owner to the **foreman-proxy** user:

```
# chown -R foreman-proxy:foreman-proxy "/var/kerberos/krb5/user/My_User_ID"
```

6. Ensure that the keytab file is read-only:

```
# chmod -wx "/var/kerberos/krb5/user/My_User_ID/client.keytab"
```

7. Restore the SELinux context:

```
# restorecon -RvF /var/kerberos/krb5
```

4.19. CONFIGURING KERBEROS AUTHENTICATION FOR REMOTE EXECUTION

You can use Kerberos authentication to establish an SSH connection for remote execution on Satellite hosts.

Prerequisites

- Enroll Satellite Server on the Kerberos server
- Enroll the Satellite target host on the Kerberos server
- Configure and initialize a Kerberos user account for remote execution
- Ensure that the foreman-proxy user on Satellite has a valid Kerberos ticket granting ticket

Procedure

1. To install and enable Kerberos authentication for remote execution, enter the following command:

```
# satellite-installer --scenario satellite \
--foreman-proxy-plugin-remote-execution-script-ssh-kerberos-auth true
```

2. To edit the default user for remote execution, in the Satellite web UI, navigate to **Administer** > **Settings** and click the **Remote Execution** tab. In the **SSH User** row, edit the second column and add the user name for the Kerberos account.

3. Navigate to **remote_execution_effective_user** and edit the second column to add the user name for the Kerberos account.

Verification

- To confirm that Kerberos authentication is ready to use, run a remote job on the host. For more information, see Executing a Remote Job in *Managing configurations using Ansible integration*.

4.20. SETTING UP JOB TEMPLATES

Satellite provides default job templates that you can use for executing jobs. To view the list of job templates, navigate to **Hosts** > **Templates** > **Job templates**. If you want to use a template without making changes, proceed to Executing a Remote Job in *Managing hosts*.

You can use default templates as a base for developing your own. Default job templates are locked for editing. Clone the template and edit the clone.

Procedure

1. To clone a template, in the **Actions** column, select **Clone**.
2. Enter a unique name for the clone and click **Submit** to save the changes.

Job templates use the Embedded Ruby (ERB) syntax. For more information about writing templates, see the Template Writing Reference in *Managing hosts*.

Ansible considerations

To create an Ansible job template, use the following procedure and instead of ERB syntax, use YAML syntax. Begin the template with **---**. You can embed an Ansible playbook YAML file into the job template body. You can also add ERB syntax to customize your YAML Ansible template. You can also import Ansible playbooks in Satellite. For more information, see Synchronizing Repository Templates in *Managing hosts*.

Parameter variables

At run time, job templates can accept parameter variables that you define for a host. Note that only the parameters visible on the **Parameters** tab at the host's edit page can be used as input parameters for job templates.

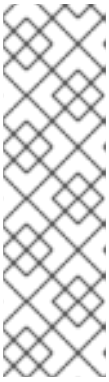
4.21. EXECUTING A REMOTE JOB

You can execute a job that is based on a job template against one or more hosts.

To use the CLI instead of the Satellite web UI, see the CLI procedure.

Procedure

1. In the Satellite web UI, navigate to **Monitor** > **Jobs** and click **Run job**.
2. Select the **Job category** and the **Job template** you want to use, then click **Next**.
3. Select hosts on which you want to run the job. If you do not select any hosts, the job will run on all hosts you can see in the current context.



NOTE

If you want to select a host group and all of its subgroups, it is not sufficient to select the host group as the job would only run on hosts directly in that group and not on hosts in subgroups. Instead, you must either select the host group and all of its subgroups or use this search query:

```
hostgroup_fullname ~ "My_Host_Group*"
```

Replace *My_Host_Group* with the name of the top-level host group.

4. If required, provide inputs for the job template. Different templates have different inputs and some templates do not have any inputs. After entering all the required inputs, click **Next**.
5. Optional: To configure advanced settings for the job, fill in the **Advanced fields**. To learn more about advanced settings, see Section 4.22, "Advanced settings in the job wizard".
6. Click **Next**.

7. Schedule time for the job.
   - To execute the job immediately, keep the pre-selected **Immediate execution**.
   - To execute the job in future time, select **Future execution**.
   - To execute the job on regular basis, select **Recurring execution**.
8. Optional: If you selected future or recurring execution, select the **Query type**, otherwise click **Next**.
   - **Static query** means that job executes on the exact list of hosts that you provided.
   - **Dynamic query** means that the list of hosts is evaluated just before the job is executed. If you entered the list of hosts based on some filter, the results can be different from when you first used that filter.

   Click **Next** after you have selected the query type.
9. Optional: If you selected future or recurring execution, provide additional details:
   - For **Future execution**, enter the **Starts at** date and time. You also have the option to select the **Starts before** date and time. If the job cannot start before that time, it will be canceled.
   - For **Recurring execution**, select the start date and time, frequency, and the condition for ending the recurring job. You can choose the recurrence to never end, end at a certain time, or end after a given number of repetitions. You can also add **Purpose** - a special label for tracking the job. There can only be one active job with a given purpose at a time.

   Click **Next** after you have entered the required information.
10. Review job details. You have the option to return to any part of the job wizard and edit the information.
11. Click **Submit** to schedule the job for execution.

CLI procedure

1. Enter the following command on Satellite:

```
# hammer settings set \
--name=remote_execution_global_proxy \
--value=false
```

2. Find the ID of the job template you want to use:

```
# hammer job-template list
```

3. Show the template details to see parameters required by your template:

```
# hammer job-template info --id My_Template_ID
```

4. Execute a remote job with custom parameters:

```
# hammer job-invocation create \
--inputs My_Key_1="My_Value_1",My_Key_2="My_Value_2",... \
```

```
--job-template "My_Template_Name" \
--search-query "My_Search_Query"
```

Replace ***My_Search_Query*** with the filter expression that defines hosts, for example **"name ~ *My_Pattern*"**. For more information about executing remote commands with hammer, enter **hammer job-template --help** and **hammer job-invocation --help**.

4.22. ADVANCED SETTINGS IN THE JOB WIZARD

Some job templates require you to enter advanced settings. Some of the advanced settings are only visible to certain job templates. Below is the list of general advanced settings.

SSH user

A user to be used for connecting to the host through SSH.

Effective user

A user to be used for executing the job. By default it is the SSH user. If it differs from the SSH user, su or sudo, depending on your settings, is used to switch the accounts.

Description

A description template for the job.

Timeout to kill

Time in seconds from the start of the job after which the job should be killed if it is not finished already.

Time to pickup

Time in seconds after which the job is canceled if it is not picked up by a client. This setting only applies to hosts using **pull-mqtt** transport.

Password

Is used if SSH authentication method is a password instead of the SSH key.

Private key passphrase

Is used if SSH keys are protected by a passphrase.

Effective user password

Is used if effective user is different from the ssh user.

Concurrency level

Defines the maximum number of jobs executed at once. This can prevent overload of system resources in a case of executing the job on a large number of hosts.

Execution ordering

Determines the order in which the job is executed on hosts. It can be alphabetical or randomized.

4.23. USING EXTENDED CRON LINES

When scheduling a cron job with remote execution, you can use an extended cron line to specify the cadence of the job. The standard cron line contains five fields that specify minute, hour, day of the month, month, and day of the week. For example, **0 5 * * *** stands for every day at 5 AM.

The extended cron line provides the following features:

You can use # to specify a concrete week day in a month

For example:

- **0 0 * * mon#1** specifies first Monday of the month
- **0 0 * * fri#3,fri#4** specifies 3rd and 4th Fridays of the month
- **0 7 * * fri#-1** specifies the last Friday of the month at 07:00
- **0 7 * * fri#L** also specifies the last Friday of the month at 07:00
- **0 23 * * mon#2,tue** specifies the 2nd Monday of the month and every Tuesday, at 23:00

You can use % to specify every n-th day of the month

For example:

- **9 0 * * sun%2** specifies every other Sunday at 00:09
- **0 0 * * sun%2+1** specifies every odd Sunday
- **9 0 * * sun%2,tue%3** specifies every other Sunday and every third Tuesday

You can use & to specify that the day of the month has to match the day of the week

For example:

- **0 0 30 * 1&** specifies 30th day of the month, but only if it is Monday

4.24. SCHEDULING A RECURRING ANSIBLE JOB FOR A HOST

You can schedule a recurring job to run Ansible roles on hosts.

Prerequisites

- Ensure you have the **view_foreman_tasks**, **view_job_invocations**, and **view_recurring_logics** permissions.

Procedure

1. In the Satellite web UI, navigate to **Hosts > All Hosts** and select the target host on which you want to execute a remote job.
2. On the **Ansible** tab, select **Jobs**.
3. Click **Schedule recurring job**.
4. Define the repetition frequency, start time, and date of the first run in the **Create New Recurring Ansible Run** window.
5. Click **Submit**.
6. Optional: View the scheduled Ansible job in host overview or by navigating to **Ansible** > **Jobs**.

4.25. SCHEDULING A RECURRING ANSIBLE JOB FOR A HOST GROUP

You can schedule a recurring job to run Ansible roles on host groups.

Procedure

1. In the Satellite web UI, navigate to **Configure** > **Host groups**.
2. In the **Actions** column, select **Configure Ansible Job** for the host group you want to schedule an Ansible roles run for.
3. Click **Schedule recurring job**.
4. Define the repetition frequency, start time, and date of the first run in the **Create New Recurring Ansible Run** window.
5. Click **Submit**.

4.26. MONITORING JOBS

You can monitor the progress of a job while it is running. This can help in any troubleshooting that may be required.

Ansible jobs run on batches of 100 hosts, so you cannot cancel a job running on a specific host. A job completes only after the Ansible playbook runs on all hosts in the batch.

Procedure

1. In the Satellite web UI, navigate to **Monitor > Jobs**. This page is automatically displayed if you triggered the job with the **Execute now** setting. To monitor scheduled jobs, navigate to **Monitor** > **Jobs** and select the job run you wish to inspect.
2. On the Job page, click the **Hosts** tab. This displays the list of hosts on which the job is running.
3. In the **Host** column, click the name of the host that you want to inspect. This displays the **Detail of Commands** page where you can monitor the job execution in real time.
4. Click **Back to Job** at any time to return to the **Job Details** page.

CLI procedure

1. Find the ID of a job:

```
# hammer job-invocation list
```

2. Monitor the job output:

```
# hammer job-invocation output \
--host My_Host_Name \
--id My_Job_ID
```

3. Optional: To cancel a job, enter the following command:

```
# hammer job-invocation cancel \
--id My_Job_ID
```

4.27. USING ANSIBLE PROVIDER FOR PACKAGE AND ERRATA ACTIONS

By default, Satellite is configured to use the Script provider templates for remote execution jobs. If you prefer using Ansible job templates for your remote jobs, you can configure Satellite to use them by default for remote execution features associated with them.

NOTE

Remember that Ansible job templates only work when remote execution is configured for **ssh** mode.

Procedure

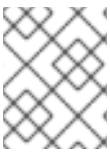
1. In the Satellite web UI, navigate to **Administer** > **Remote Execution Features**.
2. Find each feature whose name contains **by_search**.
3. Change the job template for these features from **Katello Script Default** to **Katello Ansible Default**.
4. Click **Submit**.

Satellite now uses Ansible provider templates for remote execution jobs by which you can perform package and errata actions. This applies to job invocations from the Satellite web UI as well as by using **hammer job-invocation create** with the same remote execution features that you have changed.

4.28. SETTING THE JOB RATE LIMIT ON CAPSULE

You can limit the maximum number of active jobs on a Capsule at a time to prevent performance spikes. The job is active from the time Capsule first tries to notify the host about the job until the job is finished on the host.

The job rate limit only applies to mqtt based jobs.



NOTE

The optimal maximum number of active jobs depends on the computing resources of your Capsule Server. By default, the maximum number of active jobs is unlimited.

Procedure

- Set the maximum number of active jobs using **satellite-installer**:

```
# satellite-installer \
--foreman-proxy-plugin-remote-execution-script-mqtt-rate-limit MAX_JOBS_NUMBER
```

For example:

```
# satellite-installer \
--foreman-proxy-plugin-remote-execution-script-mqtt-rate-limit 200
```

CHAPTER 5. INTEGRATING RED HAT SATELLITE AND ANSIBLE AUTOMATION CONTROLLER

You can integrate Red Hat Satellite and Ansible Automation Controller to use Satellite Server as a dynamic inventory source for Ansible Automation Controller. Ansible Automation Controller is a component of the Red Hat Ansible Automation Platform.

You can also use the provisioning callback function to run playbooks on hosts managed by Satellite, from either the host or Ansible Automation Controller. When provisioning new hosts from Satellite Server, you can use the provisioning callback function to trigger playbook runs from Ansible Automation Controller. The playbook configures the host after the provisioning process.

5.1. ADDING SATELLITE SERVER TO ANSIBLE AUTOMATION CONTROLLER AS A DYNAMIC INVENTORY ITEM

To add Satellite Server to Ansible Automation Controller as a dynamic inventory item, you must create a credential for a Satellite Server user on Ansible Automation Controller, add an Ansible Automation Controller user to the credential, and then configure an inventory source.

Prerequisites

- If your Satellite deployment is large, for example, managing tens of thousands of hosts, using a non-admin user can negatively impact performance because of time penalties that accrue during authorization checks. For large deployments, consider using an admin user.
- For non-admin users, you must assign the **Ansible Tower Inventory Reader** role to your Satellite Server user. For more information about managing users, roles, and permission filters, see Creating and Managing Roles in *Administering Red Hat Satellite*.
- You must host your Satellite Server and Ansible Automation Controller on the same network or subnet.

Procedure

1. In the Ansible Automation Controller web UI, create a credential for your Satellite. For more information about creating credentials, see Add a New Credential and Red Hat Satellite Credentials in the *Automation Controller User Guide*.

   Table 5.1. Satellite credentials

Credential Type:	Red Hat Satellite 6
Satellite URL:	https://*satellite.example.com*
Username:	The username of the Satellite user with the integration role.
Password:	The password of the Satellite user.

2. Add an Ansible Automation Controller user to the new credential. For more information about adding a user to a credential, see Getting Started with Credentials in the *Automation Controller User Guide*.

3. Add a new inventory. For more information, see Add a new inventory in the *Automation Controller User Guide*.

4. In the new inventory, add Satellite Server as the inventory source, specifying the following inventory source options. For more information, see Add Source in the *Automation Controller User Guide*.

Table 5.2. Inventory source options

Source	Red Hat Satellite 6
Credential	The credential you create for Satellite Server.
Overwrite	Select
Overwrite Variables	Select
Update on Launch	Select
Cache Timeout	*90*

5. Ensure that you synchronize the source that you add.

5.2. CONFIGURING PROVISIONING CALLBACK FOR A HOST

When you create hosts in Satellite, you can use Ansible Automation Controller to run playbooks to configure your newly created hosts. This is called *provisioning callback* in Ansible Automation Controller.

The provisioning callback function triggers a playbook run from Ansible Automation Controller as part of the provisioning process. The playbook configures the host after the provisioning process.

For more information about provisioning callbacks, see Provisioning Callbacks in the *Automation Controller User Guide*.

In Satellite Server, the **Kickstart Default** and **Kickstart Default Finish** templates include three snippets:

1. **ansible_provisioning_callback**
2. **ansible_tower_callback_script**
3. **ansible_tower_callback_service**

You can add parameters to hosts or host groups to provide the credentials that these snippets can use to run Ansible playbooks on your newly created hosts.

Prerequisites

Before you can configure provisioning callbacks, you must add Satellite as a dynamic inventory in Ansible Automation Controller. For more information, see Integrating Satellite and Ansible Automation Controller.

In the Ansible Automation Controller web UI, you must complete the following tasks:

1. Create a machine credential for your new host. Ensure that you enter the same password in the credential that you plan to assign to the host that you create in Satellite. For more information, see Add a New Credential in the *Automation Controller User Guide*.
2. Create a project. For more information, see Projects in the *Ansible Automation Controller User Guide*.
3. Add a job template to your project. For more information, see Job Templates in the *Automation Controller User Guide*.
4. In your job template, you must enable provisioning callbacks, generate the host configuration key, and note the *template_ID* of your job template. For more information about job templates, see Job Templates in the *Automation Controller User Guide*.

Procedure

1. In the Satellite web UI, navigate to **Configure** > **Host Group**.
2. Create a host group or edit an existing host group.
3. In the Host Group window, click the **Parameters** tab.
4. Click **Add Parameter**.
5. Enter the following information for each new parameter:

Table 5.3. Host parameters

Name	Value	Description
ansible_tower_provisioning	true	Enables Provisioning Callback.
ansible_tower_fqdn	*controller.example.com*	The fully qualified domain name (FQDN) of your Ansible Automation Controller. Do not add **https** because this is appended by Satellite.
ansible_job_template_id	*template_ID*	The ID of your provisioning template that you can find in the URL of the template: **/templates/job_template/*5***.
ansible_host_config_key	*config_KEY*	The host configuration key that your job template generates in Ansible Automation Controller.

6. Click **Submit**.
7. Create a host using the host group.
8. On the new host, enter the following command to start the **ansible-callback** service:

```
# systemctl start ansible-callback
```

9. On the new host, enter the following command to output the status of the **ansible-callback** service:

```
# systemctl status ansible-callback
```

Provisioning callback is configured correctly if the command returns the following output:

```
SAT_host systemd[1]: Started Provisioning callback to Ansible Automation Controller...
```

Manual provisioning callback

- You can use the provisioning callback URL and the host configuration key from a host to call Ansible Automation Controller:

```
# curl -k -s --data curl --insecure --data host_config_key=my_config_key \
https://controller.example.com/api/v2/job_templates/8/callback/
```

Ensure that you use **https** when you enter the provisioning callback URL.

This triggers the playbook run specified in the template against the host.

CHAPTER 6. JOB TEMPLATE EXAMPLES AND EXTENSIONS

Use this section as a reference to help modify, customize, and extend your job templates to suit your requirements.

6.1. CUSTOMIZING JOB TEMPLATES

When creating a job template, you can include an existing template in the template editor field. This way you can combine templates, or create more specific templates from the general ones.

The following template combines default templates to install and start the **nginx** service on clients:

```
<%= render_template 'Package Action - SSH Default', :action => 'install', :package => 'nginx' %>
<%= render_template 'Service Action - SSH Default', :action => 'start', :service_name => 'nginx' %>
```

The above template specifies parameter values for the rendered template directly. It is also possible to use the **input()** method to allow users to define input for the rendered template on job execution. For example, you can use the following syntax:

```
<%= render_template 'Package Action - SSH Default', :action => 'install', :package =>
input("package") %>
```

With the above template, you have to import the parameter definition from the rendered template. To do so, navigate to the **Jobs** tab, click **Add Foreign Input Set**, and select the rendered template from the **Target template** list. You can import all parameters or specify a comma separated list.

6.2. DEFAULT JOB TEMPLATE CATEGORIES

Job template category	Description
Packages	Templates for performing package related actions. Install, update, and remove actions are included by default.
Puppet	Templates for executing Puppet runs on target hosts.
Power	Templates for performing power related actions. Restart and shutdown actions are included by default.
Commands	Templates for executing custom commands on remote hosts.
Services	Templates for performing service related actions. Start, stop, restart, and status actions are included by default.
Katello	Templates for performing content related actions. These templates are used mainly from different parts of the Satellite web UI (for example bulk actions UI for content hosts), but can be used separately to perform operations such as errata installation.

6.3. EXAMPLE RESTORECON TEMPLATE

This example shows how to create a template called **Run Command - restorecon** that restores the default **SELinux** context for all files in the selected directory on target hosts.

Procedure

1. In the Satellite web UI, navigate to **Hosts** > **Templates** > **Job templates**.
2. Click **New Job Template**.
3. Enter **Run Command - restorecon** in the **Name** field. Select **Default** to make the template available to all organizations. Add the following text to the template editor:

```
restorecon -RvF <%= input("directory") %>
```

   The **<%= input("directory") %>** string is replaced by a user-defined directory during job invocation.

4. On the **Job** tab, set **Job category** to **Commands**.
5. Click **Add Input** to allow job customization. Enter **directory** to the **Name** field. The input name must match the value specified in the template editor.
6. Click **Required** so that the command cannot be executed without the user specified parameter.
7. Select **User input** from the **Input type** list. Enter a description to be shown during job invocation, for example **Target directory for restorecon**.
8. Click **Submit**. For more information, see Executing a restorecon Template on Multiple Hosts in *Managing hosts*.

6.4. RENDERING A RESTORECON TEMPLATE

This example shows how to create a template derived from the **Run command - restorecon** template created in Example restorecon Template. This template does not require user input on job execution, it will restore the SELinux context in all files under the /**home**/ directory on target hosts.

Create a new template as described in Setting up Job Templates, and specify the following string in the template editor:

```
<%= render_template("Run Command - restorecon", :directory => "/home") %>
```

6.5. EXECUTING A RESTORECON TEMPLATE ON MULTIPLE HOSTS

This example shows how to run a job based on the template created in Example restorecon Template on multiple hosts. The job restores the SELinux context in all files under the /**home**/ directory.

Procedure

1. In the Satellite web UI, navigate to **Monitor** > **Jobs** and click **Run job**.
2. Select **Commands** as **Job category** and **Run Command – restorecon** as **Job template** and click **Next**.

3. Select the hosts on which you want to run the job. If you do not select any hosts, the job will run on all hosts you can see in the current context.
4. In the **directory** field, provide a directory, for example /**home**, and click **Next**.
5. Optional: To configure advanced settings for the job, fill in the **Advanced fields**. To learn more about advanced settings, see Section 4.22, "Advanced settings in the job wizard". When you are done entering the advanced settings or if it is not required, click **Next**.
6. Schedule time for the job.
   - To execute the job immediately, keep the pre-selected **Immediate execution**.
   - To execute the job in future time, select **Future execution**.
   - To execute the job on regular basis, select **Recurring execution**.
7. Optional: If you selected future or recurring execution, select the **Query type**, otherwise click **Next**.
   - **Static query** means that the job executes on the exact list of hosts that you provided.
   - **Dynamic query** means that the list of hosts is evaluated just before the job is executed. If you entered the list of hosts based on some filter, the results can be different from when you first used that filter.
     Click **Next** after you have selected the query type.
8. Optional: If you selected future or recurring execution, provide additional details:
   - For **Future execution**, enter the **Starts at** date and time. You also have the option to select the **Starts before** date and time. If the job cannot start before that time, it will be canceled.
   - For **Recurring execution**, select the start date and time, frequency, and condition for ending the recurring job. You can choose the recurrence to never end, end at a certain time, or end after a given number of repetitions. You can also add **Purpose** - a special label for tracking the job. There can only be one active job with a given purpose at a time.
     Click **Next** after you have entered the required information.
9. Review job details. You have the option to return to any part of the job wizard and edit the information.
10. Click **Submit** to schedule the job for execution.

6.6. INCLUDING POWER ACTIONS IN TEMPLATES

This example shows how to set up a job template for performing power actions, such as reboot. This procedure prevents Satellite from interpreting the disconnect exception upon reboot as an error, and consequently, remote execution of the job works correctly.

Create a new template as described in Setting up Job Templates, and specify the following string in the template editor:

```
<%= render_template("Power Action - SSH Default", :action => "restart") %>
```