Plan for installation of Ansible Automation Platform
Abstract

This guide provides requirements, options, and recommendations for installing Red Hat Ansible Automation Platform.
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Thank you for your interest in Red Hat Ansible Automation Platform. Ansible Automation Platform is a commercial offering that helps teams manage complex multi-tier deployments by adding control, knowledge, and delegation to Ansible-powered environments.

Use the information in this guide to plan your Red Hat Ansible Automation Platform installation.
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.
We appreciate your feedback on our technical content and encourage you to tell us what you think. If you’d like to add comments, provide insights, correct a typo, or even ask a question, you can do so directly in the documentation.

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2. Click the **Feedback** button at the top-right of the document.
3. Highlight the section of text where you want to provide feedback.
4. Click the **Add Feedback** dialog next to your highlighted text.
5. Enter your feedback in the text box on the right of the page and then click **Submit**.

We automatically create a tracking issue each time you submit feedback. Open the link that is displayed after you click **Submit** and start watching the issue or add more comments.
CHAPTER 1. PLANNING YOUR RED HAT ANSIBLE AUTOMATION PLATFORM INSTALLATION

Red Hat Ansible Automation Platform is supported on both Red Hat Enterprise Linux and Red Hat OpenShift. Use this guide to plan your Red Hat Ansible Automation Platform installation on Red Hat Enterprise Linux.

To install Red Hat Ansible Automation Platform on your Red Hat OpenShift Container Platform environment, see Deploying the Red Hat Ansible Automation Platform operator on OpenShift Container Platform.
CHAPTER 2. RED HAT ANSIBLE AUTOMATION PLATFORM ARCHITECTURE

As a modular platform, Ansible Automation Platform provides the flexibility to easily integrate components and customize your deployment to best meet your automation requirements. This section provides a comprehensive architectural example of an Ansible Automation Platform deployment.

2.1. EXAMPLE ANSIBLE AUTOMATION PLATFORM ARCHITECTURE

The Red Hat Ansible Automation Platform 2.4 reference architecture provides an example setup of a standard deployment of Ansible Automation Platform using automation mesh on Red Hat Enterprise Linux. The deployment shown takes advantage of the following key components to provide a simple, secure and flexible method of handling your automation workloads, a central location for content collections, and automated resolution of IT requests.

**Automation controller**
- Provides the control plane for automation through its UI, Restful API, RBAC workflows and CI/CD integrations.

**Automation mesh**
- Is an overlay network that provides the ability to ease the distribution of work across a large and dispersed collection of workers through nodes that establish peer-to-peer connections with each other using existing networks.

**Private automation hub**
- Provides automation developers the ability to collaborate and publish their own automation content and streamline delivery of Ansible code within their organization.

**Event-Driven Ansible (EDA)**
- Provides the event-handling capability needed to automate time-consuming tasks and respond to changing conditions in any IT domain.

The architecture for this example consists of the following:

- A two node automation controller cluster
- An optional hop node to connect automation controller to execution nodes
- A two node automation hub cluster
- A single node EDA controller cluster
- A single PostgreSQL database connected to the automation controller, automation hub, and EDA controller clusters
- Two execution nodes per automation controller cluster
Figure 2.1. Example Ansible Automation Platform 2.4 architecture
CHAPTER 3. RED HAT ANSIBLE AUTOMATION PLATFORM
PLATFORM COMPONENTS

Ansible Automation Platform is a modular platform composed of separate components that can be connected together to meet your deployment needs. Ansible Automation Platform deployments start with automation controller which is the enterprise framework for controlling, securing, and managing Ansible automation with a user interface (UI) and RESTful application programming interface (API). Then, you can add to your deployment any combination of the following automation platform components:

3.1. ANSIBLE AUTOMATION HUB

Ansible automation hub is a repository for certified content of Ansible Content Collections. It is the centralized repository for Red Hat and its partners to publish content, and for customers to discover certified, supported Ansible Content Collections. Red Hat Ansible Certified Content provides users with content that has been tested and is supported by Red Hat.

3.2. PRIVATE AUTOMATION HUB

Private automation hub provides both disconnected and on premise solution for synchronizing content. You can synchronize collections and execution environment images from Red Hat cloud automation hub, storing and serving your own custom automation collections and execution images. You can also use other sources such as Ansible Galaxy or other container registries to provide content to your private automation hub. Private automation hub can integrate into your enterprise directory and your CI/CD pipelines.

3.3. EVENT-DRIVEN ANSIBLE CONTROLLER

The Event-Driven Ansible controller is the interface for event-driven automation and introduces automated resolution of IT requests. This component helps you connect to sources of events and act on those events using rulebooks. This technology improves IT speed and agility, and enables consistency and resilience. With Event-Driven Ansible, you can:

- Automate decision making
- Use numerous event sources
- Implement event-driven automation within and across multiple IT use cases

Additional resources

- Getting Started with Event-Driven Ansible Guide

3.4. AUTOMATION MESH

Automation mesh is an overlay network intended to ease the distribution of work across a large and dispersed collection of workers through nodes that establish peer-to-peer connections with each other using existing networks.

Automation mesh provides:

- Dynamic cluster capacity that scales independently, allowing you to create, register, group, ungroup and deregister nodes with minimal downtime.
• Control and execution plane separation that enables you to scale playbook execution capacity independently from control plane capacity.

• Deployment choices that are resilient to latency, reconfigurable without outage, and that dynamically re-reroute to choose a different path when outages exist.

• Mesh routing changes.

• Connectivity that includes bi-directional, multi-hopped mesh communication possibilities which are Federal Information Processing Standards (FIPS) compliant.

3.5. AUTOMATION EXECUTION ENVIRONMENTS

Automation execution environments are container images on which all automation in Red Hat Ansible Automation Platform is run. They provide a solution that includes the Ansible execution engine and hundreds of modules that help users automate all aspects of IT environments and processes. Automation execution environments automate commonly used operating systems, infrastructure platforms, network devices, and clouds.

3.6. ANSIBLE GALAXY

Ansible Galaxy is a hub for finding, reusing, and sharing Ansible content. Community-provided Galaxy content, in the form of prepackaged roles, can help start automation projects. Roles for provisioning infrastructure, deploying applications, and completing other tasks can be dropped into Ansible Playbooks and be applied immediately to customer environments.

3.7. AUTOMATION CONTENT NAVIGATOR

Automation content navigator is a textual user interface (TUI) that becomes the primary command line interface into the automation platform, covering use cases from content building, running automation locally in an execution environment, running automation in Ansible Automation Platform, and providing the foundation for future integrated development environments (IDEs).
CHAPTER 4. SYSTEM REQUIREMENTS

Use this information when planning your Red Hat Ansible Automation Platform installations and designing automation mesh topologies that fit your use case.

Prerequisites

- You must be able to obtain root access either through the `sudo` command, or through privilege escalation. For more on privilege escalation see [Understanding Privilege Escalation](#).
- You must be able to de-escalate privileges from root to users such as: AWX, PostgreSQL, EDA, or Pulp.

4.1. RED HAT ANSIBLE AUTOMATION PLATFORM SYSTEM REQUIREMENTS

Your system must meet the following minimum system requirements to install and run Red Hat Ansible Automation Platform.

Table 4.1. Base system

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Required</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subscription</td>
<td>Valid Red Hat Ansible Automation Platform</td>
<td></td>
</tr>
<tr>
<td>OS</td>
<td>Red Hat Enterprise Linux 8.6 or later 64-bit (x86, ppc64le, s390x, aarch64)</td>
<td>Red Hat Ansible Automation Platform is also supported on OpenShift, see <a href="#">Deploying the Red Hat Ansible Automation Platform operator on OpenShift Container Platform</a> for more information.</td>
</tr>
<tr>
<td>Ansible</td>
<td>version 2.14 (to install)</td>
<td>Ansible Automation Platform ships with execution environments that contain ansible-core 2.15.</td>
</tr>
<tr>
<td>Python</td>
<td>3.8 or later</td>
<td></td>
</tr>
<tr>
<td>Browser</td>
<td>A currently supported version of Mozilla FireFox or Google Chrome</td>
<td></td>
</tr>
<tr>
<td>Database</td>
<td>PostgreSQL version 13</td>
<td></td>
</tr>
</tbody>
</table>

The following are necessary for you to work with project updates and collections:

- Ensure that the following domain names are part of either the firewall or the proxy’s allowlist for successful connection and download of collections from automation hub or Galaxy server:
  - `galaxy.ansible.com`
- cloud.redhat.com
- console.redhat.com
- sso.redhat.com

- SSL inspection must be disabled either when using self signed certificates or for the Red Hat domains.

**NOTE**

The requirements for systems managed by Ansible Automation Platform are the same as for Ansible. See [Getting started with Ansible](https://docs.ansible.com/ansible/latest/user_guide/) in the Ansible *User Guide*.

**Additional notes for Red Hat Ansible Automation Platform requirements**

- Although Red Hat Ansible Automation Platform depends on Ansible Playbooks and requires the installation of the latest stable version of Ansible before installing automation controller, manual installations of Ansible are no longer required.

- For new installations, automation controller installs the latest release package of Ansible 2.14.

- If performing a bundled Ansible Automation Platform installation, the installation program attempts to install Ansible (and its dependencies) from the bundle for you.

- If you choose to install Ansible on your own, the Ansible Automation Platform installation program detects that Ansible has been installed and does not attempt to reinstall it.

**NOTE**

You must install Ansible using a package manager such as **dnf**, and the latest stable version of the package manager must be installed for Red Hat Ansible Automation Platform to work properly. Ansible version 2.14 is required for versions 2.4 and later.

### 4.2. AUTOMATION CONTROLLER SYSTEM REQUIREMENTS

Automation controller is a distributed system, where different software components can be co-located or deployed across multiple compute nodes. In the installer, node types of control, hybrid, execution, and hop are provided as abstractions to help you design the topology appropriate for your use case.

Use the following recommendations for node sizing:

**NOTE**

On control and hybrid nodes, allocate a minimum of 20 GB to `/var/lib/awx` for execution environment storage.

**Execution nodes**

Runs automation. Increases memory and CPU to increase capacity for running more forks.
### Control nodes

Processes events and runs cluster jobs including project updates and cleanup jobs. Increasing CPU and memory can help with job event processing.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAM</td>
<td>16 GB</td>
</tr>
<tr>
<td>CPUs</td>
<td>4</td>
</tr>
<tr>
<td>Local disk</td>
<td>40GB minimum with at least 20GB available under /var/lib/awx</td>
</tr>
<tr>
<td></td>
<td>Storage volume must be rated for a minimum baseline of 1500 IOPS</td>
</tr>
<tr>
<td></td>
<td>Projects are stored on control and hybrid nodes, and for the duration of jobs, are also stored on execution nodes. If the cluster has many large projects, consider doubling the GB in /var/lib/awx/projects, to avoid disk space errors</td>
</tr>
</tbody>
</table>

### Hybrid nodes

Runs both automation and cluster jobs. Comments on CPU and memory for execution and control nodes also apply to this node type.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAM</td>
<td>16 GB</td>
</tr>
<tr>
<td>CPUs</td>
<td>4</td>
</tr>
</tbody>
</table>
Local disk

- 40GB minimum with at least 20GB available under /var/lib/awx
- Storage volume must be rated for a minimum baseline of 1500 IOPS
- Projects are stored on control and hybrid nodes, and for the duration of jobs, are also stored on execution nodes. If the cluster has many large projects, consider doubling the GB in /var/lib/awx/projects, to avoid disk space errors

Hop nodes

Serves to route traffic from one part of the Automation Mesh to another (for example, could be a bastion host into another network). RAM could affect throughput, CPU activity is low. Network bandwidth and latency are generally a more important factor than either RAM or CPU.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAM</td>
<td>16 GB</td>
</tr>
<tr>
<td>CPUs</td>
<td>4</td>
</tr>
<tr>
<td>Local disk</td>
<td>40GB</td>
</tr>
</tbody>
</table>

- Actual RAM requirements vary based on how many hosts automation controller will manage simultaneously (which is controlled by the forks parameter in the job template or the system ansible.cfg file). To avoid possible resource conflicts, Ansible recommends 1 GB of memory per 10 forks + 2 GB reservation for automation controller, see Automation controller Capacity Determination and Job Impact for further details. If forks is set to 400, 42 GB of memory is recommended.

- A larger number of hosts can of course be addressed, though if the fork number is less than the total host count, more passes across the hosts are required. These RAM limitations are avoided when using rolling updates or when using the provisioning callback system built into automation controller, where each system requesting configuration enters a queue and is processed as quickly as possible; or in cases where automation controller is producing or deploying images such as AMIs. All of these are great approaches to managing larger environments. For further questions, please contact Ansible support through the Red Hat Customer portal at https://access.redhat.com/.

Additional resources

- Import a subscription.

4.3. AUTOMATION HUB SYSTEM REQUIREMENTS
Automation hub enables you to discover and use new certified automation content from Red Hat Ansible and Certified Partners. On Ansible automation hub, you can discover and manage Ansible Collections, which are supported automation content developed by Red Hat and its partners for use cases such as cloud automation, network automation, and security automation.

Automation hub has the following system requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Required</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAM</td>
<td>8 GB minimum</td>
<td>• 8 GB RAM (minimum and recommended for Vagrant trial installations)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 8 GB RAM (minimum for external standalone PostgreSQL databases)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For capacity based on forks in your configuration, see additional resources</td>
</tr>
<tr>
<td>CPUs</td>
<td>2 minimum</td>
<td>For capacity based on forks in your configuration, see additional resources</td>
</tr>
<tr>
<td>Local disk</td>
<td>60 GB disk</td>
<td>A minimum of 40GB should be dedicated to /var for collection storage.</td>
</tr>
</tbody>
</table>

**NOTE**

Private automation hub

If you install private automation hub from an internal address, and have a certificate which only encompasses the external address, this can result in an installation which cannot be used as container registry without certificate issues.

To avoid this, use the `automationhub_main_url` inventory variable with a value like `https://pah.example.com` linking to the private automation hub node in the installation inventory file.

This adds the external address to `/etc/pulp/settings.py`.

This implies that you only want to use the external address.

For information on inventory file variables, see Inventory File Variables in the Red Hat Ansible Automation Platform Installation Guide.

### 4.4. POSTGRESQL REQUIREMENTS

• PostgreSQL user passwords are hashed with SCRAM-SHA-256 secure hashing algorithm before storing in the database.

• To determine if your automation controller instance has access to the database, you can do so with the command, `awx-manage check_db`.

Table 4.2. Database

<table>
<thead>
<tr>
<th>Service</th>
<th>Required</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each automation controller</td>
<td>40 GB dedicated hard disk space</td>
<td>• dedicate a minimum of 20 GB to <code>/var/</code> for file and working directory storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Storage volume must be rated for a minimum baseline of 1500 IOPS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Projects are stored on control and hybrid nodes, and for the duration of jobs, are also stored on execution nodes. If the cluster has many large projects, consider having twice the GB in <code>/var/lib/awx/projects</code>, to avoid disk space errors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 150 GB+ recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Storage volume must be rated for a high baseline IOPS (1500 or more).</td>
</tr>
<tr>
<td>Each automation hub</td>
<td>60 GB dedicated hard disk space</td>
<td>Storage volume must be rated for a minimum baseline of 1500 IOPS.</td>
</tr>
</tbody>
</table>
### PostgreSQL Configurations

Optionally, you can configure the PostgreSQL database as separate nodes that are not managed by the Red Hat Ansible Automation Platform installer. When the Ansible Automation Platform installer manages the database server, it configures the server with defaults that are generally recommended for most workloads. However, you can adjust these PostgreSQL settings for standalone database server node where `ansible_memtotal_mb` is the total memory size of the database server:

```plaintext
- max_connections == 1024
- shared_buffers == ansible_memtotal_mb*0.3
- work_mem == ansible_memtotal_mb*0.03
- maintenance_work_mem == ansible_memtotal_mb*0.04
```

#### Additional resources

For more detail on tuning your PostgreSQL server, see the [PostgreSQL documentation](#).

#### 4.4.1. Enabling the hstore extension for the automation hub PostgreSQL database
From Ansible Automation Platform 2.4, the database migration script uses hstore fields to store information, therefore the hstore extension to the automation hub PostgreSQL database must be enabled.

This process is automatic when using the Ansible Automation Platform installer and a managed PostgreSQL server.

However, when the PostgreSQL database is external, you must carry out this step manually before automation hub installation.

If the hstore extension is not enabled before automation hub installation, a failure is raised during database migration.

Procedure

1. Check if the extension is available on the PostgreSQL server (automation hub database).

   ```
   $ psql -d <automation hub database> -c "SELECT * FROM pg_available_extensions WHERE name='hstore'"
   ```

   Where the default value for `<automation hub database>` is `automationhub`.

   This gives an output similar to the following:

<table>
<thead>
<tr>
<th>name</th>
<th>default_version</th>
<th>installed_version</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>hstore</td>
<td>1.7</td>
<td></td>
<td>data type for storing sets of (key, value) pairs</td>
</tr>
</tbody>
</table>
   (1 row)

2. This indicates that the hstore 1.7 extension is available, but not enabled.
   If the hstore extension is not available on the PostgreSQL server, the result is similar to the following:

   ```
   name | default_version | installed_version | comment
   +-----+-----------------+-------------------+---------
   (0 rows)
   ```

3. On a RHEL based server, the hstore extension is included in the postgresql-contrib RPM package, which is not installed automatically when installing the PostgreSQL server RPM package.
   To install the RPM package, use the following command:

   ```
   dnf install postgresql-contrib
   ```

4. Create the hstore PostgreSQL extension on the automation hub database with the following command:

   ```
   $ psql -d <automation hub database> -c "CREATE EXTENSION hstore"
   ```

   The output of which is:

   ```
   CREATE EXTENSION
   ```
5. In the following output, the **installed_version** field contains the **hstore** extension used, indicating that **hstore** is enabled.

```
name | default_version | installed_version | comment
-----------------------------------------------
hstore | 1.7 | 1.7 | data type for storing sets of (key, value) pairs
(1 row)
```
CHAPTER 5. NETWORK PORTS AND PROTOCOLS

Red Hat Ansible Automation Platform (AAP) uses a number of ports to communicate with its services. These ports must be open and available for incoming connection to the Red Hat Ansible Automation Platform server in order for it to work. Ensure that these ports are available and are not being blocked by the server firewall.

The following architectural diagram is an example of a fully deployed Ansible Automation Platform with all possible components.

The following tables provide the default Red Hat Ansible Automation Platform destination ports required for each application.

NOTE

The default destination ports and installer inventory listed below are configurable. If you choose to configure them to suit your environment, you may experience a change in behavior.
### Table 5.1. PostgreSQL

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
<th>Service</th>
<th>Direction</th>
<th>Installer Inventory Variable</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>TCP</td>
<td>SSH</td>
<td>Inbound and Outbound</td>
<td>ansible_port</td>
<td>Remote access during installation</td>
</tr>
<tr>
<td>5432</td>
<td>TCP</td>
<td>Postgres</td>
<td>Inbound and Outbound</td>
<td>pg_port</td>
<td>Default port ALLOW connections from controller(s) to database port</td>
</tr>
</tbody>
</table>

### Table 5.2. Automation controller

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
<th>Service</th>
<th>Direction</th>
<th>Installer Inventory Variable</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>TCP</td>
<td>SSH</td>
<td>Inbound and Outbound</td>
<td>ansible_port</td>
<td>Installation</td>
</tr>
<tr>
<td>80</td>
<td>TCP</td>
<td>HTTP</td>
<td>Inbound</td>
<td>nginx_http_port</td>
<td>UI/API</td>
</tr>
<tr>
<td>443</td>
<td>TCP</td>
<td>HTTPS</td>
<td>Inbound</td>
<td>nginx_https_port</td>
<td>UI/API</td>
</tr>
<tr>
<td>5432</td>
<td>TCP</td>
<td>PostgreSQL</td>
<td>Inbound and Outbound</td>
<td>pg_port</td>
<td>Open only if the internal database is used along with another component. Otherwise, this port should not be open Hybrid mode in a cluster</td>
</tr>
</tbody>
</table>
### Table 5.3. Hop Nodes

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
<th>Service</th>
<th>Direction</th>
<th>Installer Inventory Variable</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>27199</td>
<td>TCP</td>
<td>Receptor</td>
<td>Inbound and Outbound</td>
<td>receptor_listener_port</td>
<td>ALLOW receptor listener port across all controllers for mandatory &amp; automatic control plane clustering</td>
</tr>
</tbody>
</table>

### Table 5.4. Execution Nodes

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
<th>Service</th>
<th>Direction</th>
<th>Installer Inventory Variable</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>TCP</td>
<td>SSH</td>
<td>Inbound and Outbound</td>
<td>ansible_port</td>
<td>Installation</td>
</tr>
<tr>
<td>27199</td>
<td>TCP</td>
<td>Receptor</td>
<td>Inbound and Outbound</td>
<td>receptor_listener_port</td>
<td>Mesh</td>
</tr>
</tbody>
</table>

ALLOW connection from controller(s) to Receptor port
### CHAPTER 5. NETWORK PORTS AND PROTOCOLS

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
<th>Service</th>
<th>Direction</th>
<th>Installer Inventory Variable</th>
<th>Required for</th>
</tr>
</thead>
</table>
| 27199  | TCP      | Receptor| Inbound and Outbound | receptor_list ener_port         | Mesh - Nodes directly peered to controllers. No hop nodes involved. 27199 is bi-directional for the execution nodes.  
ALLOW connections from controller(s) to Receptor port (non-hop connected nodes)  
ALLOW connections from hop node(s) to Receptor port (if relayed through hop nodes) |

**Table 5.5. Control Nodes**

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
<th>Service</th>
<th>Direction</th>
<th>Installer Inventory Variable</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>TCP</td>
<td>SSH</td>
<td>Inbound and Outbound</td>
<td>ansible_port</td>
<td>Installation</td>
</tr>
<tr>
<td>Port</td>
<td>Protocol</td>
<td>Service</td>
<td>Direction</td>
<td>Installer Inventory Variable</td>
<td>Required for</td>
</tr>
<tr>
<td>--------</td>
<td>----------</td>
<td>---------</td>
<td>--------------------</td>
<td>-------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>27199</td>
<td>TCP</td>
<td>Receptor</td>
<td>Inbound and Outbound</td>
<td>receptor_listener_port</td>
<td>Mesh - Nodes directly peered to controllers. Direct nodes involved. 27199 is bi-directional for execution nodes ENABLE connections from controller(s) to Receptor port for non-hop connected nodes ENABLE connections from hop node(s) to Receptor port if relayed through hop nodes</td>
</tr>
<tr>
<td>443</td>
<td>TCP</td>
<td>Podman</td>
<td>Inbound</td>
<td>nginx_https_port</td>
<td>UI/API</td>
</tr>
</tbody>
</table>

Table 5.6. Hybrid Nodes

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
<th>Service</th>
<th>Direction</th>
<th>Installer Inventory Variable</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>TCP</td>
<td>SSH</td>
<td>Inbound and Outbound</td>
<td>ansible_port</td>
<td>Installation</td>
</tr>
</tbody>
</table>
Table 5.7. Automation hub

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
<th>Service</th>
<th>Direction</th>
<th>Installer Inventory Variable</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>TCP</td>
<td>SSH</td>
<td>Inbound and Outbound</td>
<td>ansible_port</td>
<td>Installation</td>
</tr>
<tr>
<td>80</td>
<td>TCP</td>
<td>HTTP</td>
<td>Inbound</td>
<td>Fixed value</td>
<td>User interface</td>
</tr>
<tr>
<td>443</td>
<td>TCP</td>
<td>HTTPS</td>
<td>Inbound</td>
<td>Fixed value</td>
<td>User interface</td>
</tr>
</tbody>
</table>
### Table 5.8. Red Hat Insights for Red Hat Ansible Automation Platform

<table>
<thead>
<tr>
<th>URL</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://api.access.redhat.com:443">http://api.access.redhat.com:443</a></td>
<td>General account services, subscriptions</td>
</tr>
<tr>
<td><a href="https://cert-api.access.redhat.com:443">https://cert-api.access.redhat.com:443</a></td>
<td>Insights data upload</td>
</tr>
<tr>
<td><a href="https://cert.cloud.redhat.com:443">https://cert.cloud.redhat.com:443</a></td>
<td>Inventory upload and Cloud Connector connection</td>
</tr>
<tr>
<td><a href="https://cloud.redhat.com">https://cloud.redhat.com</a></td>
<td>Access to Insights dashboard</td>
</tr>
</tbody>
</table>

### Table 5.9. Automation Hub

<table>
<thead>
<tr>
<th>URL</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="https://console.redhat.com:443">https://console.redhat.com:443</a></td>
<td>General account services, subscriptions</td>
</tr>
<tr>
<td><a href="https://catalog.redhat.com">https://catalog.redhat.com</a></td>
<td>Indexing execution environments</td>
</tr>
<tr>
<td><a href="https://sso.redhat.com:443">https://sso.redhat.com:443</a></td>
<td>TCP</td>
</tr>
<tr>
<td><a href="https://automation-hub-prd.s3.amazonaws.com">https://automation-hub-prd.s3.amazonaws.com</a></td>
<td>Firewall access</td>
</tr>
<tr>
<td><a href="https://automation-hub-prd.s3.us-east-2.amazonaws.com">https://automation-hub-prd.s3.us-east-2.amazonaws.com</a></td>
<td></td>
</tr>
<tr>
<td><a href="https://galaxy.ansible.com">https://galaxy.ansible.com</a></td>
<td>Ansible Community curated Ansible content</td>
</tr>
<tr>
<td><a href="https://ansible-galaxy.s3.amazonaws.com">https://ansible-galaxy.s3.amazonaws.com</a></td>
<td></td>
</tr>
<tr>
<td><a href="https://registry.redhat.io:443">https://registry.redhat.io:443</a></td>
<td>Access to container images provided by Red Hat and partners</td>
</tr>
<tr>
<td><a href="https://cert.cloud.redhat.com:443">https://cert.cloud.redhat.com:443</a></td>
<td>Red Hat and partner curated Ansible Collections</td>
</tr>
</tbody>
</table>

The port 5432 is for PostgreSQL. It is marked as **Inbound and Outbound** automationhub__pg_port.

Open only if the internal database is used along with another component. Otherwise, this port should not be open.
Table 5.10. Execution Environments (EE)

<table>
<thead>
<tr>
<th>URL</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="https://registry.redhat.io:443">https://registry.redhat.io:443</a></td>
<td>Access to container images provided by Red Hat and partners</td>
</tr>
<tr>
<td>cdn.quay.io:443</td>
<td>Access to container images provided by Red Hat and partners</td>
</tr>
<tr>
<td>cdn01.quay.io:443</td>
<td>Access to container images provided by Red Hat and partners</td>
</tr>
<tr>
<td>cdn02.quay.io:443</td>
<td>Access to container images provided by Red Hat and partners</td>
</tr>
<tr>
<td>cdn03.quay.io:443</td>
<td>Access to container images provided by Red Hat and partners</td>
</tr>
</tbody>
</table>

**IMPORTANT**

Image manifests and filesystem blobs are served directly from `registry.redhat.io`. However, from 1 May 2023, filesystem blobs are served from `quay.io` instead. To avoid problems pulling container images, you must enable outbound connections to the listed `quay.io` hostnames.

This change should be made to any firewall configuration that specifically enables outbound connections to `registry.redhat.io`.

Use the hostnames instead of IP addresses when configuring firewall rules.

After making this change, you can continue to pull images from `registry.redhat.io`. You do not require a `quay.io` login, or need to interact with the `quay.io` registry directly in any way to continue pulling Red Hat container images.

For more information, see the article [here](#).
CHAPTER 6. ATTACHING YOUR RED HAT ANSIBLE AUTOMATION PLATFORM SUBSCRIPTION

You **must** have valid subscriptions attached on all nodes before installing Red Hat Ansible Automation Platform. Attaching your Ansible Automation Platform subscription allows you to access subscription-only resources necessary to proceed with the installation.

**NOTE**

Attaching a subscription is unnecessary if you have enabled *Simple Content Access Mode* on your Red Hat account. Once enabled, you will need to register your systems to either Red Hat Subscription Management (RHSM) or Satellite before installing the Ansible Automation Platform. See *Simple Content Access Mode* for more information.

**Procedure**

1. Obtain the **pool_id** for your Red Hat Ansible Automation Platform subscription:
   
   ```bash
   # subscription-manager list --available --all | grep "Ansible Automation Platform" -B 3 -A 6
   
   **NOTE**
   
   Do not use MCT4022 as a **pool_id** for your subscription because it can cause Ansible Automation Platform subscription attachment to fail.
   
   **Example**
   
   An example output of the `subscription-manager list` command. Obtain the **pool_id** as seen in the **Pool ID:** section:
   ```
   Subscription Name: Red Hat Ansible Automation, Premium (5000 Managed Nodes)
   Provides: Red Hat Ansible Engine
   Red Hat Ansible Automation Platform
   SKU: MCT3695
   Contract: ```
   Pool ID: <pool_id>
   Provides Management: No
   Available: 4999
   Suggested: 1
   ```
   
   2. Attach the subscription:
   ```bash
   # subscription-manager attach --pool=<pool_id>
   
   You have now attached your Red Hat Ansible Automation Platform subscriptions to all nodes.
   
   **Verification**
   ```
   • Verify the subscription was successfully attached:
   ```bash
   # subscription-manager list --consumed
   ```
Troubleshooting

- If you are unable to locate certain packages that came bundled with the Ansible Automation Platform installer, or if you are seeing a **Repositories disabled by configuration** message, try enabling the repository using the command:

  Red Hat Ansible Automation Platform 2.4 for RHEL 8

  ```bash
  subscription-manager repos --enable ansible-automation-platform-2.4-for-rhel-8-x86_64-rpms
  ```

  Red Hat Ansible Automation Platform 2.4 for RHEL 9

  ```bash
  subscription-manager repos --enable ansible-automation-platform-2.4-for-rhel-9-x86_64-rpms
  ```
CHAPTER 7. CHOOSING AND OBTAINING A RED HAT ANSIBLE AUTOMATION PLATFORM INSTALLER

Choose the Red Hat Ansible Automation Platform installer you need based on your Red Hat Enterprise Linux environment internet connectivity. Review the scenarios below and determine which Red Hat Ansible Automation Platform installer meets your needs.

7.1. INSTALLING WITH INTERNET ACCESS

Choose the Red Hat Ansible Automation Platform (AAP) installer if your Red Hat Enterprise Linux environment is connected to the internet. Installing with internet access retrieves the latest required repositories, packages, and dependencies. Choose one of the following ways to set up your AAP installer.

**Tarball install**

1. Navigate to the Red Hat Ansible Automation Platform download page.
2. Click Download Now for the Ansible Automation Platform <latest-version> Setup.
3. Extract the files:
   ```
   $ tar xvzf ansible-automation-platform-setup-<latest-version>.tar.gz
   ```

**RPM install**

1. Install Ansible Automation Platform Installer Package v.2.4 for RHEL 8 for x86_64
   ```
   $ sudo dnf install --enablerepo=ansible-automation-platform-2.4-for-rhel-8-x86_64-rpms ansible-automation-platform-installer
   ```
2. Install Ansible Automation Platform Installer Package v.2.4 for RHEL 9 for x86-64
   ```
   $ sudo dnf install --enablerepo=ansible-automation-platform-2.4-for-rhel-9-x86_64-rpms ansible-automation-platform-installer
   ```

   **NOTE**
   `dnf install` enables the repo as the repo is disabled by default.

When you use the RPM installer, the files are placed under the `/opt/ansible-automation-platform/installer` directory.

7.2. INSTALLING WITHOUT INTERNET ACCESS

Use the Red Hat Ansible Automation Platform Bundle installer if you are unable to access the internet, or would prefer not to install separate components and dependencies from online repositories. Access to Red Hat Enterprise Linux repositories is still needed. All other dependencies are included in the tar archive.

**Procedure**
Procedure

1. Navigate to the Red Hat Ansible Automation Platform download page.

2. Click Download Now for the Ansible Automation Platform <latest-version> Setup Bundle

3. Extract the files:

   $ tar xvzf ansible-automation-platform-setup-bundle-<latest-version>.tar.gz
CHAPTER 8. ABOUT THE INSTALLER INVENTORY FILE

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.

The inventory file can be in one of many formats, depending on the inventory plugins that you have. The most common formats are **INI** and **YAML**. Inventory files listed in this document are shown in INI format.

The location of the inventory file depends on the installer you used. The following table shows possible locations:

<table>
<thead>
<tr>
<th>Installer</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bundle tar</td>
<td>/ansible-automation-platform-setup-bundle-&lt;latest-version&gt;</td>
</tr>
<tr>
<td>Non-bundle tar</td>
<td>/ansible-automation-platform-setup-&lt;latest-version&gt;</td>
</tr>
<tr>
<td>RPM</td>
<td>/opt/ansible-automation-platform/installer</td>
</tr>
</tbody>
</table>

You can verify the hosts in your inventory using the command:

```
ansible all -i <path-to-inventory-file. --list-hosts
```

**Example inventory file**

```
[automationcontroller]
host1.example.com
host2.example.com
Host4.example.com

[automationhub]
host3.example.com

[database]
Host5.example.com

[all:vars]
admin_password='<password>'

pg_host=""
pg_port=""

pg_database='awx'
pg_username='awx'
pg_password='<password>'
```
The first part of the inventory file specifies the hosts or groups that Ansible can work with.

8.1. GUIDELINES FOR HOSTS AND GROUPS

Databases

- When using an external database, ensure the [database] sections of your inventory file are properly set up.
- To improve performance, do not colocate the database and the automation controller on the same server.

Automation hub

- If there is an [automationhub] group, you must include the variables automationhub_pg_host and automationhub_pg_port.
- Add Ansible automation hub information in the [automationhub] group.
- Do not install Ansible automation hub and automation controller on the same node.
- Provide a reachable IP address or fully qualified domain name (FDQN) for the [automationhub] and [automationcontroller] hosts to ensure that users can synchronize and install content from Ansible automation hub and automation controller from a different node. Do not use localhost.

Private automation hub

- Do not install private automation hub and automation controller on the same node.
- You can use the same Postgresql (database) instance, but they must use a different (database) name.
- If you install private automation hub from an internal address, and have a certificate which only encompasses the external address, it can result in an installation you cannot use as a container registry without certificate issues.

**IMPORTANT**

You must separate the installation of automation controller and Ansible automation hub because the [database] group does not distinguish between the two if both are installed at the same time.

If you use one value in [database] and both automation controller and Ansible automation hub define it, they would use the same database.

Automation controller

- Automation controller does not configure replication or failover for the database that it uses.
automation controller works with any replication that you have.

Clustered installations

- When upgrading an existing cluster, you can also reconfigure your cluster to omit existing instances or instance groups. Omitting the instance or the instance group from the inventory file is not enough to remove them from the cluster. In addition to omitting instances or instance groups from the inventory file, you must also deprovision instances or instance groups before starting the upgrade. See Deprovisioning nodes or groups. Otherwise, omitted instances or instance groups continue to communicate with the cluster, which can cause issues with automation controller services during the upgrade.

- If you are creating a clustered installation setup, you must replace [localhost] with the hostname or IP address of all instances. Installers for automation controller and automation hub do not accept [localhost]. All nodes and instances must be able to reach any others using this hostname or address. In other words, you cannot use the localhost ansible_connection=local on one of the nodes. Use the same format for the host names of all the nodes. Therefore, this does not work:

  ```
  [automationhub]
  localhost ansible_connection=local
  hostA
  hostB.example.com
  172.27.0.4
  ```

  Instead, use these formats:

  ```
  [automationhub]
  hostA
  hostB
  hostC
  ```

  or

  ```
  [automationhub]
  hostA.example.com
  hostB.example.com
  hostC.example.com
  ```

8.2. DEPROVISIONING NODES OR GROUPS

You can deprovision nodes and instance groups using the Ansible Automation Platform installer. Running the installer will remove all configuration files and logs attached to the nodes in the group.

NOTE

You can deprovision any hosts in your inventory except for the first host specified in the [automationcontroller] group.

To deprovision nodes, append node_state=deprovision to the node or group within the inventory file.

For example:
To remove a single node from a deployment:

```
[automationcontroller]
host1.example.com
host2.example.com
host4.example.com  node_state=deprovision
```

or

To remove an entire instance group from a deployment:

```
[instance_group_restrictedzone]
host4.example.com
host5.example.com
```

```
[instance_group_restrictedzone:vars]
node_state=deprovision
```

### 8.3. INVENTORY VARIABLES

The second part of the example inventory file, following `[all:vars]`, is a list of variables used by the installer. Using `all` means the variables apply to all hosts.

To apply variables to a particular host, use `[hostname:vars]`. For example, `[automationhub:vars]`.

### 8.4. RULES FOR DECLARING VARIABLES IN INVENTORY FILES

The values of string variables are declared in quotes. For example:

```
pg_database='awx'
pg_username='awx'
pg_password='<password>'
```

When declared in a `:vars` section, INI values are interpreted as strings. For example, `var=FALSE` creates a string equal to `FALSE`. Unlike host lines, `:vars` sections accept only a single entry per line, so everything after the `=` must be the value for the entry. Host lines accept multiple `key=value` parameters per line. Therefore they need a way to indicate that a space is part of a value rather than a separator. Values that contain whitespace can be quoted (single or double). See the Python shlex parsing rules for details.

If a variable value set in an INI inventory must be a certain type (for example, a string or a boolean value), always specify the type with a filter in your task. Do not rely on types set in INI inventories when consuming variables.

**NOTE**

Consider using YAML format for inventory sources to avoid confusion on the actual type of a variable. The YAML inventory plugin processes variable values consistently and correctly.

If a parameter value in the Ansible inventory file contains special characters, such as #, { or }, you must double-escape the value (that is enclose the value in both single and double quotation marks).
For example, to use `mypasswordwith#hashsigns` as a value for the variable `pg_password`, declare it as `pg_password=""mypasswordwith#hashsigns""` in the Ansible host inventory file.

### 8.5. SECURING SECRETS IN THE INVENTORY FILE

You can encrypt sensitive or secret variables with Ansible Vault. However, encrypting the variable names as well as the variable values makes it hard to find the source of the values. To circumvent this, you can encrypt the variables individually using `ansible-vault encrypt_string`, or encrypt a file containing the variables.

#### Procedure

1. Create a file labeled `credentials.yml` to store the encrypted credentials.

   ```bash
   $ cat credentials.yml
   admin_password: my_long_admin_pw
   pg_password: my_long_pg_pw
   registry_password: my_long_registry_pw
   ```

2. Encrypt the `credentials.yml` file using `ansible-vault`.

   ```bash
   $ ansible-vault encrypt credentials.yml
   New Vault password: 
   Confirm New Vault password: 
   Encryption successful
   ```

   **IMPORTANT**

   Store your encrypted vault password in a safe place.

3. Verify that the `credentials.yml` file is encrypted.

   ```bash
   $ cat credentials.yml
   $ANSIBLE_VAULT;1.1;AES25636383639653562386534163333339613833363064653364656138313534353135306464616539376539306306532346663306462323630651666610a373062303133376339633831303334313534383962611363230376163663262393265306234839613639653635643565386536316334643438353464323766386235336136663261363433323131633436393939646132656164333634303935646264633034383966363232303365383763
   ```

4. Run `setup.sh` for installation of Ansible Automation Platform 2.4 and pass both `credentials.yml` and the `--ask-vault-pass` option.

   ```bash
   $ ANSIBLE_BECOME_METHOD='sudo' ANSIBLE_BECOME=True ANSIBLE_HOST_KEY_CHECKING=False ./setup.sh -e @credentials.yml -- --ask-vault-pass
   ```

### 8.6. ADDITIONAL INVENTORY FILE VARIABLES

You can further configure your Red Hat Ansible Automation Platform installation by including additional Red Hat Ansible Automation Platform 2.4 Red Hat Ansible Automation Platform Planning Guide
You can further configure your Red Hat Ansible Automation Platform installation by including additional variables in the inventory file. These configurations add optional features for managing your Red Hat Ansible Automation Platform. Add these variables by editing the inventory file using a text editor.

A table of predefined values for inventory file variables can be found in Inventory File Variables in the Red Hat Ansible Automation Platform Installation Guide.
CHAPTER 9. SUPPORTED INSTALLATION SCENARIOS

Red Hat supports the following installations scenarios for Red Hat Ansible Automation Platform:

Additional resources

To edit inventory file parameters to specify a supported installation scenario, see Inventory file examples based on installation scenarios in the Red Hat Ansible Automation Platform Installation Guide.

9.1. STANDALONE AUTOMATION CONTROLLER WITH A DATABASE ON THE SAME NODE, OR A NON-INSTALLER MANAGED DATABASE

This scenario includes installation of automation controller, including the web frontend, REST API backend, and database on a single machine. It installs PostgreSQL, and configures the automation controller to use that as its database. This is considered the standard automation controller installation scenario.

9.2. STANDALONE AUTOMATION CONTROLLER WITH AN EXTERNAL MANAGED DATABASE

This scenario includes installation of the automation controller server on a single machine and configures communication with a remote PostgreSQL instance as its database. This remote PostgreSQL can be a server you manage, or can be provided by a cloud service such as Amazon RDS.

9.3. SINGLE EVENT-DRIVEN ANSIBLE CONTROLLER NODE WITH INTERNAL DATABASE

This scenario includes installation of Event-Driven Ansible controller on a single machine with an internal database. It installs an installer managed PostgreSQL that is similar to the automation controller installation scenario.

IMPORTANT

Automation controller must be installed before you populate the inventory file with the appropriate Event-Driven Ansible variables.

Additional resources

- Single Event-Driven Ansible controller node with internal database
- Appendix A. 5. Event-Driven Ansible controller variables

9.4. STANDALONE AUTOMATION HUB WITH A DATABASE ON THE SAME NODE, OR A NON-INSTALLER MANAGED DATABASE

This scenario includes installation of automation hub, including the web frontend, REST API backend, and database on a single machine. It installs PostgreSQL, and configures the automation hub to use that as its database.
9.5. STANDALONE AUTOMATION HUB WITH AN EXTERNAL MANAGED DATABASE

This scenario includes installation of the automation hub server on a single machine, and installs a remote PostgreSQL database, managed by the Red Hat Ansible Automation Platform installer.

9.6. PLATFORM INSTALLATION WITH A DATABASE ON THE AUTOMATION CONTROLLER NODE, OR NON-INSTALLER MANAGED DATABASE

This scenario includes installation of automation controller and automation hub with a database on the automation controller node, or a non-installer managed database.

9.7. PLATFORM INSTALLATION WITH AN EXTERNAL MANAGED DATABASE

This scenario includes installation of automation controller and automation hub and configures communication with a remote PostgreSQL instance as its database. This remote PostgreSQL can be a server you manage, or can be provided by a cloud service such as Amazon RDS.

9.8. MULTI-MACHINE CLUSTER INSTALLATION WITH AN EXTERNAL MANAGED DATABASE

This scenario includes installation of multiple automation controller nodes and an automation hub instance and configures communication with a remote PostgreSQL instance as its database. This remote PostgreSQL can be a server you manage, or can be provided by a cloud service such as Amazon RDS. In this scenario, all automation controller are active and can execute jobs, and any node can receive HTTP requests.

NOTE

- Running in a cluster setup requires any database that automation controller uses to be external—PostgreSQL must be installed on a machine that is not one of the primary or secondary tower nodes. When in a redundant setup, the remote PostgreSQL version requirements is PostgreSQL 13.
  - See Clustering for more information on configuring a clustered setup.
- Provide a reachable IP address for the [automationhub] host to ensure users can sync content from Private Automation Hub from a different node.