Red Hat Ansible Automation Platform 2.4

Ansible Automation Platform 1.2 to 2 Migration Guide
Red Hat Ansible Automation Platform 2.4 Ansible Automation Platform 1.2 to 2 Migration Guide

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Abstract

This document provides a methodology to migrate from Ansible Automation Platform 1.2 to Ansible Automation Platform 2
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In the spirit of open source, we invite anyone to provide feedback and comments on any reference architecture. Although we review our papers internally, sometimes issues or typographical errors are encountered. Feedback allows us to not only improve the quality of the papers we produce, but allows the reader to provide their thoughts on potential improvements and topic expansion to the papers. Feedback on the papers can be provided by emailing ansible-feedback@redhat.com. Please refer to the title within the email.
CHAPTER 1. OVERVIEW

The Ansible Automation Platform 1.2 to Ansible Automation Platform 2 migration guide provides an opinionated methodology on how to approach a side-by-side migration using the Ansible Automation Platform installer. Throughout this guide, you’ll be provided steps to follow that ensure the process of backing up, importing and upgrading to Ansible Automation Platform 2 is a success. This reference architecture is best suited for system and platform administrators looking to migrate to the latest version of Ansible Automation Platform 2.

This side-by-side migration reference architecture consists of having two environments, Environment A and Environment B, where all the data from your Environment A Ansible Automation Platform 1.2 environment gets migrated and upgraded to a new Environment B Ansible Automation Platform 2 replacement environment.

The high level approach of the platform migration process:

- Creates a full Ansible Automation Platform 1.2 data backup using the Ansible Automation Platform installer on Environment A
- Imports the full Ansible Automation Platform data backup to the new and empty replacement Ansible Automation Platform 1.2 environment control plane (Environment B)
- Upgrades Environment B using the Ansible Automation Platform 2 installer from its Ansible Automation Platform 1.2 version
- Deploy automation mesh execution and hop nodes in Environment B

Once the infrastructure is successfully migrated, the focus shifts to migrating your Python virtual environments in your Ansible Automation Platform 1.2 environment from Environment A to automation execution environments that will be used within your newly available Ansible Automation Platform 2 environment on Environment B. This one-time effort opens the door to take advantage of the latest Ansible Automation Platform 2 capabilities and the ability to execute consistent automation across multiple platforms with reduced operational overhead.

The high level execution environment adoption process consists of:

- Exporting custom virtual environments from Ansible Automation Platform 1.2 on Environment A
- Comparing each exported virtual environment against Ansible 2.9 base execution environment on Environment A
- Creating new execution environments using the Ansible 2.9 execution environment plus the additional dependencies not included that were exported by the virtual environment
- Attaching the new execution environment(s) to corresponding Job Templates on Environment B

NOTE

This document shows an opinionated reference environment showing a holistic migration approach which helps customers understand how they can retain their job run history and platform objects between the two clusters in a complex architecture. Based upon your existing architecture and requirements, the migration process may be further simplified. In many cases, the default Ansible Automation Platform installer values are sufficient. The migration process documented here applies to both simple and complex environments.
Customers migrating from Ansible Automation Platform 1.2 to version 2 may use the same manifest in both clusters/instances for upgrading as long as the managed node inventory is the same for both clusters/instances. The migration period may not exceed six months without an approved exception from the Ansible Business Unit by means of a formal BU Guidance request from the Red Hat Account Representative.

1.1. ARCHITECTURAL OVERVIEW

This section focuses on the architecture details of the two environments as they go through the side-by-side migration process.

The first environment, Environment A, consists of:

- 3 Ansible Tower 3.8.5 nodes running Red Hat Enterprise Linux 7 located in Raleigh, NC data center
- 1 Red Hat Enterprise Linux 7 database node
- 2 bastion hosts (jump hosts to access their corresponding isolated nodes)
- 2 isolated nodes located in Sacramento, CA data center
- 2 isolated nodes located in New Delhi, India data center

A pictorial representation of this environment is shown in:
The second environment, *Environment B*, is a new and empty Ansible Automation Platform 1.2 environment that will be used to import all the data from *Environment A* using the Ansible Automation Platform 1.2 installer from *Environment B* prior to upgrading to Ansible Automation Platform 2.

Initially, *Environment B* consists of:

- 3 Ansible Tower 3.8.5 nodes running Red Hat Enterprise Linux 8
- 1 Red Hat Enterprise Linux 8 database node

**WARNING**

Ansible Automation Platform 2 does not support Red Hat Enterprise Linux 7. It is critical that Red Hat Enterprise Linux 8 be used as the base OS for your Ansible Automation Platform 1.2 *Environment B* prior to upgrading to Ansible Automation Platform 2.
Throughout this reference architecture you will find references to Ansible Automation Platform 2.1. However, the Ansible Automation Platform migration process found within this document applies to version 2.1 or later.

A pictorial representation of the initial Environment B footprint is shown below:

**Figure 1.2. Initial Environment B Architecture Overview**

Once the data migration from Environment A to Environment B is successful, we expand the architecture of Environment B during the upgrade process by including:

- 2 execution nodes accessible directly by the Ansible controllers
- 3 hop nodes (**sacramento-hop**, **dublin-hop** **new-delhi-hop**)
- 2 execution nodes accessible only via hop node **sacramento-hop**
- 2 execution nodes accessible via hop node **dublin-hop** and **new-delhi-hop**

**NOTE**

The **dublin-hop** provides another route via the automation mesh that can be used to access the execution nodes that reside in New Delhi, India.

A world view of the expanded Ansible Automation Platform 2 Environment B is shown below:
A detailed representation of the expanded Ansible Automation Platform 2 Environment B architectural footprint is shown below:
NOTE

The process of disabling schedules from Job Templates is not covered within this reference architecture. It is important that once a successful migration is complete, to disable scheduling from any Job Templates from Environment A to ensure you do not have both Environment A and Environment B running the same jobs simultaneously.
CHAPTER 2. MIGRATION CONSIDERATIONS

With the introduction of Ansible Automation Platform 2, a re-imagined architecture has been created that expands the capabilities of automation. Ansible Automation Platform 2 now decouples the automation control plane and execution plane, which provides for a much more flexible architecture. This new capability alongside the introduction of automation mesh allows an organization to scale automation across the globe and allows automation to run as close to the endpoints as possible.

Prior to the step-by-step migration approach provided for this reference architecture, it is important to carefully assess and plan to determine your overall migration readiness to proceed without exceptions.

2.1. TECHNICAL CONSIDERATIONS

One of the key changes between Ansible Automation Platform 1.2 and Ansible Automation Platform 2 is the removal of isolated nodes in favor of hop nodes and execution nodes with automation mesh. Automation mesh is an overlay network that provides a simple, flexible and reliable way to scale automation of large inventories across diverse network topologies, platforms and regions. Automation mesh provides flexible design options to build resilient and fault-tolerant architectures while providing enhanced security to standardize and normalize automation across your entire IT estate.

In this reference environment, we capture the steps of migrating Ansible Automation Platform 1.2 that uses isolated nodes and third party tooling, such as SSH proxies and jump hosts, to upgrade to Ansible Automation Platform 2 using automation mesh hop and execution nodes.

The use of automation mesh and execution nodes will require additional ports be opened within your firewall.

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Port</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSH</td>
<td>22/TCP</td>
<td>Ansible Automation Platform installation</td>
</tr>
<tr>
<td>HTTPS</td>
<td>443/TCP</td>
<td>Web UI, API, Execution Environment (EE) pulls</td>
</tr>
<tr>
<td>Receptor</td>
<td>27199/TCP</td>
<td>automation mesh</td>
</tr>
</tbody>
</table>

NOTE

The receptor TCP port can be customized during the Ansible Automation Platform upgrade process.

Another important consideration is database supportability. With the introduction of automation controller, the requirement of Postgres 12 database is introduced. If your existing Postgres 10 database was installed/managed by Ansible Automation Platform 1.2, the upgrade process to Ansible Automation Platform 2 handles the upgrade of the Postgres database to the new version 12.

NOTE

For this reference architecture, the Postgres database is managed by Ansible Automation Platform.
If you manage your own Postgres 10 database, you will want to:

- Install a new Postgres 10 database that will be part of the side-by-side migration
- Import your data from Environment A to the newly created Postgres 10 database that is to be used by Environment B
- Upgrade from Postgres 10 to Postgres 12 on the database that is to be used by Environment B
- With the upgraded Postgres 12, upgrade your Ansible Automation Platform 1.2 to Ansible Automation Platform 2 on Environment B

**NOTE**
Managing your own Postgres database is out of scope for this reference architecture.

**NOTE**
For more information regarding database supportability, visit the Database Scope of Coverage article.

 Aside from the key considerations regarding isolated nodes and database supportability, there is a list of functionality that has been removed in Ansible Automation Platform 2. The list includes:

- The ability to delete the default instance group through the User Interface
- Support for deploying on CentOS (any version) and RHEL 7
- Support for Mercurial projects
- Support for custom inventory scripts stored in controller
- Resource profiling code (AWX_RESOURCE_PROFILING_*)
- Support for custom Python virtual environments in favor of execution environments
- Top-level /api/v2/job_events/ API endpoint
- Job isolation is achieved using Execution environments and is no longer a feature of Ansible Tower.

**NOTE**
The replacement of custom Python virtual environments with user-built execution environments is described and done via an Ansible Playbook provided by this reference architecture in a later chapter.

### 2.2. ANSIBLE CONTENT MIGRATION CONSIDERATIONS

As you evaluate the process of migrating your environment to Ansible Automation Platform 1.2 to Ansible Automation Platform 2, there may be additional considerations to address when it comes to Ansible content (Collections, modules, roles, plugins, etc).

These considerations are not limited to this list, but include the following:
- Ansible Playbooks must run on Ansible Engine 2.9.10 or higher in order to be used in a compatibility execution environment (required)

- Ansible content in playbooks should utilize Ansible Collections (not required, but recommended)

- Ansible content in playbooks should utilize Fully Qualified Collection Name (FQCN) (not required, but recommended)

- Ansible Playbooks must be modified to address any references to localhost as using execution environments this refers to the pod itself and not the underlying host as previously done.

**NOTE**

User-built execution environments may be required if additional dependencies are needed to successfully execute your Ansible content.

### 2.3. OPERATING MODEL CONSIDERATIONS

With the adoption of a new Ansible Automation Platform architecture, it is vital to have a plan on how you will integrate your newly designed Ansible Automation Platform environment.

Key questions to have answers to include the following:

- What training and enablement is required in my organization to run Ansible Automation Platform 2?

- How will execution environments and Ansible Content Collections be managed?

- What execution environment container versioning best fits my organization?
  - Do I want different models for development and production?

- If user-built execution environments are needed, how will I manage and distribute those environments?

- Do we plan on building CI around execution environments?

- What is the security response plan to patch CVEs and remain compliant?

- How often will I upgrade my Ansible Automation Platform clusters?

While these are just a few examples, they are critical questions that need answers to ensure a successful strategy for your organization.
CHAPTER 3. PREREQUISITES

The side-by-side migration and upgrade to Ansible Automation Platform 2 requires *Environment A* and *Environment B*. *Environment A* should be your main cluster as shown in Figure 1.1, “Environment A Architecture Overview” consisting of:

- 3 Ansible Tower 3.8.5 nodes running Red Hat Enterprise Linux 7 located in Raleigh NC data center
- 1 Red Hat Enterprise Linux 7 database node.
- 2 bastion hosts (jump hosts to access their corresponding isolated nodes)
- 2 isolated nodes located in Sacramento, CA data center
- 2 isolated nodes located in New Delhi, India data center

Initially, *Environment B* is a simplified Ansible Automation Platform 1.2 architecture as shown in Figure 1.2, “Initial Environment B Architecture Overview”. During the upgrade process to Ansible Automation Platform 2, a pool of Red Hat Enterprise Linux 8.4 servers expands the cluster to include:

- 2 execution nodes accessible directly by the control plane nodes
- 3 hop nodes (sacramento-hop, dublin-hop and new-delhi-hop)
- 2 execution nodes accessible only via hop node sacramento-hop
- 2 execution nodes accessible via hop nodes dublin-hop and new-delhi-hop

The final cluster post upgrade architecture can be seen within the Figure 1.4, “Expanded Environment B Architecture Overview”

**NOTE**

These nodes are not required to be physical servers.

3.1. ENVIRONMENT SPECIFICATIONS

<table>
<thead>
<tr>
<th>Node Type</th>
<th>Control</th>
<th>Execution</th>
<th>Hop</th>
<th>Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>RAM</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Disk</td>
<td>40GB</td>
<td>40GB</td>
<td>40GB</td>
<td>150GB+</td>
</tr>
</tbody>
</table>

**Notes**

- Processes events and runs cluster jobs including
- Runs automation. Increase memory and CPU
- Serves to route traffic from one part of the
- Storage volume should be rated for a high baseline
Project updates and cleanup jobs. Increasing CPU and memory can help with job event processing.

- Dedicate a minimum of 20 GB to `/var/` for file and working directory storage. Storage volume should be rated for a minimum baseline of 1500 IOPS.

- Projects are stored on control and hybrid, and for the duration of jobs, also on execution nodes. If the cluster has many large projects, consider having twice the GB in `/var/lib/aws/proj` to avoid disk space errors.

  - Extra disk space is required for the `/var/lib/pgsql` directory. In the case you cannot expand the base OS partition, consider having 150GB+ for `/var/lib/pgsql` directory to avoid disk space errors.

  - 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 generally a more important factor than either RAM/CP U.

  - To increase capacity for running more forks.
NOTE

All automation controller data is stored in the PostgreSQL database. Database storage increases with the number of hosts managed, number of jobs run, number of facts stored in the fact cache, and number of tasks in any individual job. For example, a playbook run every hour (24 times a day) across 250 hosts, with 20 tasks will store over 800,000 events in the database every week.

If not enough space is reserved in the database, old job runs and facts will need to be cleaned on a regular basis. Refer to Management Jobs in the Automation Controller Administration Guide for more information.

3.2. NETWORK REQUIREMENTS

Ansible Automation Platform 2 requires direct network connectivity between the automation controller instances and mesh worker nodes allocated to run control plane jobs.

NOTE

In case of hop nodes that route traffic to the execution nodes behind a DMZ or an isolated network, your Ansible Automation Platform cluster can span across multiple networks. A network administrator should ensure that ssh connectivity is available to all nodes for installation purposes. For this reference environment hop-nodes act as ssh proxies to get to their respective execution nodes.

In order to access the Ansible Automation Platform dashboard, a browser that can access the network that the control plane nodes reside on is required. If you wish to access the Ansible Automation Platform dashboard externally, ensure to add a public IP address to your control plane nodes.

It is recommended that network administrators provide a dedicated IP address to all nodes and an appropriate DNS record. Network administrators can assign a static IP address to the nodes and configure the DHCP server to either reserve the IP with an infinite lease, or network administrators should ensure the assigned IP addresses are part of an excluded range. This ensures each node’s IP address remains constant in the absence of a DHCP server. NOTE: For the purposes of this reference architecture, setup of a DHCP server, setting up DNS records and setting up a load balancer is out of scope.

NOTE

For the purposes of this reference architecture, setup of a DHCP server, setting up DNS records and setting up a load balancer is out of scope.

A network administrator should reserve at least the following number of IP addresses, including:

1. One IP address for each control plane node.
2. One IP address for each execution node.
3. One IP address for each hop node.
4. One IP address for the database node.

This reference environment reserves 13 IP addresses per site.

The following table provides an example of Environment B of the reference environment.
<table>
<thead>
<tr>
<th>Usage</th>
<th>Host Name</th>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation Controller 1</td>
<td>envb_controller1.example.com</td>
<td>192.168.0.10</td>
</tr>
<tr>
<td>Automation Controller 2</td>
<td>envb_controller2.example.com</td>
<td>192.168.0.11</td>
</tr>
<tr>
<td>Automation Controller 3</td>
<td>envb_controller3.example.com</td>
<td>192.168.0.12</td>
</tr>
<tr>
<td>Control Plane Database</td>
<td>envb_database.example.com</td>
<td>192.168.0.13</td>
</tr>
<tr>
<td>Execution Node 1</td>
<td>envb_executionnode-1.example.com</td>
<td>192.168.0.14</td>
</tr>
<tr>
<td>Execution Node 2</td>
<td>envb_executionnode-2.example.com</td>
<td>192.168.0.15</td>
</tr>
<tr>
<td>Hop Node 1</td>
<td>envb_hopnode-sacramento.example.com</td>
<td>192.168.0.16</td>
</tr>
<tr>
<td>Hop Node 2</td>
<td>envb_hopnode-new-delhi.example.com</td>
<td>192.168.0.17</td>
</tr>
<tr>
<td>Hop Node 3</td>
<td>envb_hopnode-dublin.example.com</td>
<td>192.168.0.18</td>
</tr>
<tr>
<td>Execution Node 3</td>
<td>envb_executionnode-3.example.com</td>
<td>10.14.1.11</td>
</tr>
<tr>
<td>Execution Node 5</td>
<td>envb_executionnode-5.example.com</td>
<td>10.15.1.11</td>
</tr>
<tr>
<td>Execution Node 6</td>
<td>envb_executionnode-6.example.com</td>
<td>10.15.1.12</td>
</tr>
</tbody>
</table>

### 3.3. VALIDATION CHECKLIST FOR NODES

The following is a summary of all the requirements:

- □ 16 GB of RAM for controller nodes, database node, execution nodes and hop nodes
- □ 4 CPUs for controller nodes, database nodes, execution nodes and hop nodes
- □ 150 GB+ disk space for database node
- □ 40 GB+ disk space for non-database nodes
- □ DHCP reservations use infinite leases to deploy the cluster with static IP addresses.
DNS records for all nodes
Red Hat Enterprise Linux \{rhel_version\} or later 64-bit (x86) installed for all nodes
Chrony configured for all nodes

**NOTE**
Check Section 3.1, “Environment Specifications” for more detailed notes on node requirements.

### 3.4. AUTOMATION CONTROLLER CONFIGURATION DETAILS

This reference architecture focuses on the migration and upgrade of Ansible Automation Platform 1.2 to Ansible Automation Platform 2. The configuration is intended to provide a comprehensive Ansible Automation Platform solution that covers isde-by-side migration scenarios. The key solution components covered within this reference architecture consists of:

- Ansible Automation Platform 1.2
- Ansible Automation Platform 2
- Ansible Automation Platform Installer
- Ansible Playbooks for custom Python virtual environment migration

#### 3.4.1. OS Configuration

##### 3.4.1.1. Chrony Configuration

Each Ansible Automation Platform node in the cluster must have access to an NTP server. The **chronyd** is a daemon for synchronization of the system clock. It can synchronize the clock with NTP servers. This ensures that when cluster nodes use SSL certificates that require validation, they don’t fail if the date and time between the nodes are not in sync.

On all the nodes on **Environment B** including those to be used for the Ansible Automation Platform cluster expansion,

1. If not installed, install **chrony** as follows

```
# dnf install chrony --assumeyes
```

2. Edit the `/etc/chrony.conf` file with a text editor such as **vi**.

```
# vi /etc/chrony.conf
```

3. Locate the following public server pool section, and modify it to include the appropriate servers. Only one server is required, but three is recommended. The **iburst** option is added to speed up the time that it takes to properly sync with the servers.

```
# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (http://www.pool.ntp.org/join.html).
server <ntp-server-address> iburst
```
4. Save all the changes within the `/etc/chrony.conf` file.

5. Start and enable that the `chronyd` daemon is started when the host is booted.
   
   ```
   # systemctl --now enable chronyd.service
   ```

6. Verify the chronyd daemon status.
   
   ```
   # systemctl status chronyd.service
   ```

### 3.4.1.2. Red Hat Subscription Manager

The `subscription-manager` command registers a system to the Red Hat Network (RHN) and manages the subscription entitlements for a system. The `--help` option specifies on the command line to query the command for the available options. If the `--help` option is issued along with a command directive, then options available for the specific command directive are listed.

To use Red Hat Subscription Management for providing packages to a system, the system must first register with the service. In order to register a system, use the `subscription-manager` command and pass the `register` command directive. If the `--username` and `--password` options are specified, then the command does not prompt for the RHN Network authentication credentials.

An example of registering a system using `subscription-manager` is shown below.

#### NOTE

The following should be done on all the nodes within Environment B including those to be used for the Ansible Automation Platform cluster expansion.

```
# subscription-manager register --username [User] --password '[Password]'
The system has been registered with id: abcd1234-ab12-ab12-ab12-481ba8187f60
```

After a system is registered, it must be attached to an entitlement pool. For the purposes of this reference environment, the Red Hat Ansible Automation Platform is the pool chosen. Identify and subscribe to the Red Hat Ansible Automation Platform entitlement pool, the following command directives are required.

```
# subscription-manager list --available | grep -A8 "Red Hat Ansible Automation Platform"
---
Subscription Name:  Red Hat Ansible Automation Platform, Premium (5000 Managed Nodes)
Provides:            Red Hat Ansible Engine
                    Red Hat Single Sign-On
                    Red Hat Ansible Automation Platform
SKU:                 MCT3695
Contract:            <contract>
Pool ID:             <pool_id>
Provides Management: No
Available:           9990
Suggested:           1
Service Type:        L1-L3
Roles:               
```
# subscription-manager attach --pool <pool_id>
Successfully attached a subscription for: Red Hat Ansible Automation Platform, Premium (5000 Managed Nodes)

# subscription-manager repos --enable=ansible-automation-platform-2.1-for-rhel-8-x86_64-rpms

**NOTE**
As part of the Ansible Automation Platform subscription, 10 Red Hat Enterprise Linux (RHEL) subscriptions are available to utilize RHEL for your automation controllers, private automation hubs and other Ansible Automation Platform components.

### 3.4.1.3. User Accounts

Prior to the installation of Ansible Automation Platform 2, it is recommended to create a non-root user with `sudo` privileges for the deployment process. This user is used for:

- SSH connectivity
- passwordless authentication during installation
- Privilege escalation (sudo) permissions

For the purposes of this reference environment, the user `ansible` was chosen, however, any user name would suffice.

On all the nodes on *Environment B* including those to be used for the Ansible Automation Platform cluster expansion, create a user named `ansible` and generate an `ssh` key.

1. Create a non-root user
   ```bash
   # useradd ansible
   ```

2. Set a password for your `ansible` user.
   ```bash
   # passwd ansible
   ```

3. Generate an `ssh` key as the `ansible` user.
   ```bash
   $ ssh-keygen -t rsa
   ```

4. Disable password requirements when using `sudo` as the `ansible` user
   ```bash
   # echo "ansible ALL=(ALL) NOPASSWD:ALL" | sudo tee -a /etc/sudoers.d/ansible
   ```

### 3.4.1.4. Copying SSH keys to all nodes

With the `ansible` user created, as the `ansible` user, copy the `ssh` key to all the nodes on *Environment B* including those to be used for the Ansible Automation Platform cluster expansion. This ensures that when the Ansible Automation Platform installation runs, it can `ssh` to all the nodes without a password.

This can be done using the `ssh-copy-id` command as follows:
NOTE

If running within a cloud provider, you may need to instead create an 
~/.ssh/authorized_keys file containing the public key for the ansible user on all your 
nodes and set the permissions to the authorized_keys file to only the owner (ansible) 
having read and write access (permissions 600).

3.4.1.5. Configuring Firewall Settings

Firewall access and restrictions play a critical role in securing Ansible Automation Platform 2 
environment. The use of Red Hat Enterprise Linux {rhel_version} defaults to using firewalld, a dynamic 
firewall daemon. firewalld works by assigning network zones to assign a level of trust to a network and 
its associated connections and interfaces.

It is recommended that firewall settings be configured to permit access to the appropriate services and 
ports for a success Ansible Automation Platform 2 installation.

On all the nodes within Environment B including those to be used for the Ansible Automation Platform 
cluster expansion, ensure that firewalld is installed, started and enabled.

1. Install the firewalld package

   # dnf install firewalld --assumeyes

2. Start the firewalld service

   # systemctl start firewalld

3. Enable the firewalld service

   # systemctl enable firewalld

3.5. ANSIBLE AUTOMATION PLATFORM CONFIGURATION DETAILS

3.5.1. Configuring firewall settings for execution and hop nodes

For a successful Ansible Automation Platform upgrade to 2, one of the prerequisites is to enable the 
automation mesh port on the mesh nodes(execution and hop nodes). The default port used for the 
mesh networks on all the nodes is set to 27199/tcp, however it can also be configured to use a different 
port by specifying receptor_listener_port as each node’s variable within your inventory file. More details 
on modifying the inventory file can be found within Section 4.3, “Upgrade Environment B to Ansible 
Automation Platform 2”

NOTE

For this reference environment all the Ansible Automation Platform 2 controller nodes 
are designated as node type control. If control nodes are designated as hybrid nodes 
(default node type), they require mesh port(default: 27199/tcp) to be enabled.

Within your hop and execution node, as the ansible user, set the firewalld port to be used for installation.
1. Ensure that `firewalld` is running.
   
   ```
   $ sudo systemctl status firewalld
   ```

2. Add the `firewalld` port on your controller database node (e.g. port 27199)
   
   ```
   $ sudo firewall-cmd --permanent --zone=public --add-port=27199/tcp
   ```

3. Reload `firewalld`
   
   ```
   $ sudo firewall-cmd --reload
   ```

4. Confirm that the port is open
   
   ```
   $ sudo firewall-cmd --list-ports
   ```
CHAPTER 4. INFRASTRUCTURE MIGRATION

To achieve a successful migration from Ansible Automation Platform 1.2 to Ansible Automation Platform 2, this reference environment takes advantage of the capabilities of the Ansible Automation Platform installer.

Using the Ansible Automation Platform installer, you’ll be able to backup, import and upgrade to the latest Ansible Automation Platform 2 with a few simple commands.

The following sections provide a step-by-step of that process.

4.1. BACKUP ANSIBLE AUTOMATION PLATFORM 1.2 ON ENVIRONMENT A

As our Ansible Automation Platform 1.2 environment from Environment A contains all of our data, the following creates a backup using the Ansible Automation Platform installer on Environment A.

**WARNING**

Prior to taking a backup, ensure there are no current running jobs or future jobs scheduled to run. Any data collected after the backup is taken will be **LOST**.

Within Environment A,

1. Login as the **ansible** user

   ```
   $ ssh ansible@enva_controller1.example.com
   ```

   **NOTE**

   This reference environment uses `enva_controller1` as the host that contains the Ansible Automation Platform installer directory and binaries.

2. Change to the **ansible-tower-setup-3.8.5-X** directory

   ```
   $ cd /path/to/ansible-tower-setup-3.8.5-X
   ```

3. Run the Ansible Automation Platform installer to create a backup

   a. **backup_dest** provides the location where to store the backup of your Ansible Automation Platform database

   b. **use_compression** shrinks the size of the Ansible Automation Platform database backup

   c. **@credentials.yml** passes the password variables and their values encrypted via **ansible-vault**
d. `--ask-vault-pass` asks for the password used to access the encrypted `credentials.yml` file

e. `-b` sets the create a backup option to True

```bash
$ ./setup.sh -e 'backup_dest=<mount_point>' -e 'use_compression=True' -e @credentials.yml -b
```

**NOTE**

This reference environment takes advantage of encrypted credentials and does not include passwords in plain text. Details in Appendix C, *Creating an encrypted credentials.yml file* can be found on how to use `ansible-vault` to encrypt your credentials.

**NOTE**

The backup process may take some time to complete.

### 4.2. IMPORT ANSIBLE AUTOMATION PLATFORM 1.2 DATABASE TO ENVIRONMENT B

With the backup from *Environment A* created and available, the following imports the backed up Ansible Automation Platform database using the Ansible Automation Platform installer on *Environment B*.

Within *Environment B*,

1. Login as the `ansible` user

   ```bash
   $ ssh ansible@envb_controller1.example.com
   ```

   **NOTE**

   This reference environment uses `envb_controller1` as the host that contains the Ansible Automation Platform installer directory and binaries.

2. Change to the `ansible-tower-setup-3.8.5-X` directory

   ```bash
   $ cd /path/to/ansible-tower-setup-3.8.5-X
   ```

3. Run the Ansible Automation Platform installer to import the Ansible Automation Platform database

   a. `restore_backup_file` provides the location of the backed up Ansible Automation Platform database

   b. `use_compression` is set to True due to compression being used during the backup process

   c. `-r` sets the restore database option to True

   ```bash
   $ ./setup.sh -e 'restore_backup_file=<mount_point>/tower-backup-latest.tar.gz' -e 'use_compression=True' -e @credentials.yml -r -- --ask-vault-pass
   ```
NOTE

This reference environment takes advantage of encrypted credentials and does not include passwords in plain text. Details in Appendix C, Creating an encrypted credentials.yml file can be found on how to use ansible-vault to encrypt your credentials.

NOTE

The import process may take some time to complete.

4.3. UPGRADE ENVIRONMENT B TO ANSIBLE AUTOMATION PLATFORM 2

With the successful import of the Ansible Automation Platform database, the final step in the migration process is to upgrade the Environment B Ansible Automation Platform 1.2 environment to Ansible Automation Platform 2 and expand the architecture of Environment B as shown in Figure 1.4, "Expanded Environment B Architecture Overview".

Within Environment B,

1. Login as the ansible user

   $ ssh ansible@envb_controller1.example.com

   NOTE

   This reference environment uses envb_controller1 as the host that contains the Ansible Automation Platform installer directory and binaries.

2. Download Ansible Automation Platform 2.1.1 Setup tar ansible-automation-platform-setup-2.1.1-1.tar.gz

   NOTE

   For disconnected installs, download the Ansible Automation Platform 2.1.1 Setup Bundle

3. Untar the ansible-automation-platform-setup-2.1.1-1.tar.gz

   $ tar zxf ansible-automation-platform-setup-2.1.1-1.tar.gz

4. Change directory into ansible-automation-platform-setup-2.1.1-1

   $ cd ansible-automation-platform-setup-2.1.1-1/

5. Copy the Ansible Automation Platform 1.2 inventory file to the ansible-automation-platform-setup-2.1.1-1 directory

   $ cp /path/to/ansible-tower-setup-3.8.5-X/inventory .
6. Generate an Ansible Automation Platform 2 installation inventory proposal using the Ansible Automation Platform 1.2 inventory file copied over using the Ansible Automation Platform installer

```
$ ./setup.sh
```

**NOTE**

*ansible-core* is installed during this process if not already installed.

**WARNING**

Expect the Ansible Automation Platform installer to fail early in the process when creating the proposal *inventory.new.ini*.

Expected error task look as follows:

```
TASK [ansible.automation_platform_installer.check_config_static : Detect pre-2.x inventory and offer a migration] ***
fatal: [172.16.58.48 -> localhost]: FAILED! => {"changed": false, "msg": "The installer has detected that you are using an inventory format from a version prior to 4.0. We have created an example inventory based on your old style inventory. Please check the file `/home/ansible/aap_install-2.1.1/ansible-automation-platform-setup-bundle-2.1.1-2/inventory.new.ini` and make necessary adjustments so that the file can be used by the installer."}
```

**Proposed inventory.new.ini**

```
[all:vars]
pg_host='10.0.188.133'
pg_port='5432'
pg_database='awx'
pg_username='awx'
pg_sslmode='prefer'
anible_become='true'
anible_user='ansible'
tower_package_name='automation-controller'
tower_package_version='4.1.1'
automationhub_package_name='automation-hub'
automationhub_package_version='4.4.1'
animation_platform_version='2.1.1'
animation_platform_channel='ansible-automation-platform-2.1-for-rhel-8-x86_64-rpms'
minimum_ansible_version='2.11'

# In AAP 2.X [tower] has been renamed to [automationcontroller]
# Nodes in [automationcontroller] will be hybrid by default, capable of executing user jobs.
# To specify that any of these nodes should be control-only instead, give them a host var of 'node_type=control'
```
NOTE

The variables **admin_password**, **pg_password** and **registry_password** are not part of the `inventory.new.ini` file as it is not recommended to store passwords in plain text. An encrypted `credentials.yml` file is used instead.

7. With the proposed `inventory.new.ini` created, modify the file to include the expanded architecture of **Environment B** that includes hop nodes and execution nodes

**Expanded Environment B inventory.new.ini**

```
[all:vars]
pg_host='envb_database.example.com'
pg_port='5432'
pg_database='awx'
pg_username='awx'
pg_sslmode='prefer'
anible_become='true'
anible_user='ansible'
tower_package_name='automation-controller'
tower_package_version='4.1.1'
amstitutionhub_package_name='automation-hub'
amstitutionhub_package_version='4.4.1'
amstitution_platform_version='2.1.1'
amstitution_platform_channel='ansible-automation-platform-2.1-for-rhel-8-x86_64-rpms'
minimum_ansible_version='2.11'
registry_url='registry.redhat.io'
registry_username='myusername'

# In AAP 2.X [tower] has been renamed to [automationcontroller]
# Nodes in [automationcontroller] will be hybrid by default, capable of executing user jobs.
# To specify that any of these nodes should be control-only instead, give them a host var of `node_type=control`

[automationcontroller]
envb_controller1.example.com
envb_controller2.example.com
envb_controller3.example.com

[database]
envb_database.example.com

[automationcontroller:vars]
node_type=control
peers=envb_datacenter_execution_nodes,envb_datacenter_hop_nodes
```
Execution Environment images are downloaded and included in your installation. Proper credentials required to download the images.

2. User credential for access to registry_url.

3. Control nodes run project and inventory updates and system jobs, but not execution jobs. Execution capabilities are disabled on these nodes.

4. Setting peer relationships between the execution nodes.

5. Setting node type and peer relationships between the hop nodes and execution nodes.

6. Group of execution nodes with direct connection access to the automation controller nodes.

7. Group of hop nodes that route traffic to their corresponding execution nodes.

8. Group of execution nodes accessible via envb_hopnode-sacramento.example.com

9. Group of execution nodes accessible via envb_hopnode-new-delhi.example.com

8. Run the `setup.sh` to upgrade to Ansible Automation Platform 2 with the following options

```
$ ./setup.sh -i inventory.new.ini -e @credentials.yml -- --ask-vault-pass
```
9. Verify the Ansible Automation Platform dashboard UI is accessible across all automation controller nodes.

**NOTE**

If you experience 502 error or a Secure Connection Failed when accessing the the Ansible Automation Platform dashboard via any of your automation controllers, this is likely due to one or both of the following issues:

- Certificate mismatch
- Incorrect SELinux context for nginx

The Appendix D, Post upgrade playbook provides a workaround to fix these issues. A fix is currently being implemented and should be fixed in an upcoming dot release.

The cert mismatch issue is fixed in version 2.1.2 and later of Ansible Automation Platform. The incorrect SELinux context for nginx still requires the workaround Ansible Playbook. Check the Appendix D, Post upgrade playbook for more details.

This reference environment uses credentials.yml for the following variables: * admin_password * registry_password * pg_password

For more information regarding the different values that can be set within your inventory file, visit: Setting up the inventory file

### 4.4. CONFIGURING INSTANCE AND INSTANCE GROUPS

With the upgrade process complete, you’ll need to associate your instances to their corresponding instance groups, e.g. sacramento and new-delhi.

1. Select Administration→Instance Groups
2. Click on the sacramento instance group
3. Select the Instances tab
4. Click the blue Associate button
5. Within the Select Instances window, select
   a. envb_executionnode-3.example.com
   b. envb_executionnode-4.example.com
6. Click Save

Repeat the process for the new-delhi instance group and associate the instances below with the new-delhi instance group:

- envb_executionnode-5.example.com
- envb_executionnode-6.example.com
Once complete, disassociate those instances within the *default* group.

1. Select **Administration**→**Instance Groups**
2. Click on the *default* instance group
3. Select the **Instances** tab
4. Select the checkbox to the following instances
   a. `envb_executionnode-3.example.com`
   b. `envb_executionnode-4.example.com`
   c. `envb_executionnode-5.example.com`
   d. `envb_executionnode-6.example.com`
5. Click the blue button labeled **Disassociate**
6. Confirm the dissociation via the red **Disassociate** button

The *default* instance group should only contain the following instances:

- `envb_executionnode-1.example.com`
- `envb_executionnode-2.example.com`

With the infrastructure migration complete, the focus shifts to migrating Python virtual environments to user-built execution environments.
CHAPTER 5. MIGRATE VIRTUAL ENVIRONMENTS TO EXECUTION ENVIRONMENTS

Ansible Automation Platform 2 comes with a re-imagined architecture that fully decouples the automation control plane and execution plane. The new capabilities enable easier to scale automation across the globe and allow you to run your automation as close to the source as possible without being bound to running automation in a single data center. It’s more dynamic, scalable, resilient and flexible compared to Ansible Automation Platform 1.2.

With the introduction of automation execution environments, these container images allow for all the automation needed to be packaged and run including the key components such as Ansible Core, Ansible Content Collections, Python dependencies, Red Hat Enterprise Linux UBI 8, and any additional package dependencies.

This chapter focuses on migrating your custom Python virtual environments in your Ansible Automation Platform 1.2 cluster to user-built automation execution environments.

This one-time effort opens the door to take advantage of the latest Ansible Automation Platform 2 capabilities and the ability to execute consistent automation across multiple platforms with lower long-term maintenance.

5.1. AUTOMATING THE MIGRATION OF VIRTUAL ENVIRONMENTS TO EXECUTION ENVIRONMENTS

For simplicity, we are including supplemental Ansible Playbooks that automate the process by simply running an Ansible command.

For completeness, the manual process consists of:

1. An Ansible Automation Platform 1.2 environment with custom Python virtual environments
2. Using of the `awx-manage` command line utility to get a custom list of Python virtual environments
3. Running the `awx-manage export_custom_venv` command on each Python virtual environment to get the list of Python packages installed
4. Checking the association of a Python virtual environment using the `awx-manage custom_venv_associations` command
5. Filtering the above information to create execution environments using the `ansible-builder` tool
The automated process consists of:

1. Pulling a list of packages from each custom Python virtual environments present on the Ansible Automation Platform 1.2 environment

2. Comparing the package lists from the previous step with the package list of the Ansible-2.9[1] to find the packages that are not present in the base Ansible-2.9 execution environment

3. Create a new custom execution environment that uses the Ansible-2.9 execution environment as the base and including the missing dependencies from the list in the previous step

To run a scenario of what that may look like, let’s take the following example.

In our existing Ansible Automation Platform 1.2, there are two custom Python virtual environments labeled custom-venv1 and custom-venv2.

Using the role `virtualenv_migrate` packaged in the `redhat_cop.ee_utilities` collection we will run it against our Ansible Automation Platform 1.2 environment via ssh access to the Ansible Tower node to extract the packages and their versions that are not currently part of the base execution environment we are comparing against (Ansible 2.9 execution environment).

**NOTE**

The `redhat_cop.ee_utilities` collection is a community project and officially not supported by Red Hat.

A sample playbook and inventory file respectively of the environment are found below:

**playbook.yml**

```yaml
---
- name: Review custom virtualenvs and pull requirements
  hosts: enva_tower
  become: true
  tasks:
    - name: Include venv role
      include_role:
        name: redhat_cop.ee_utilities.virtualenv_migrate
```

**Inventory**

```
[tower]
ansibletower.example.com
ansible_ssh_private_key_file=/path/to/example.pem

[all:vars]
# The default URL location to the execution environment (Default Ansible 2.9)
# If you want to use the newest Ansible base, change to: ee-minimal-rhel8:latest
venv_migrate_default_ee_url="registry.redhat.io/ansible-automation-platform-21/ee-29-rhel8:latest"
```
# User credential for access to venv_migrate_default_ee_url
registry_username='myusername'

NOTE

- Add ansible_user=<ANSIBLE_USER> based on the user needed to ssh into the Ansible Tower node.

- This reference environment takes advantage of encrypted credentials and does not include passwords in plain text. Details in Appendix C, Creating an encrypted credentials.yml file can be found on how to use ansible-vault to encrypt your registry credentials. An encrypted credentials.yml file is used to supply registry_password

WARNING

This role requires sudo privileges in order to run the podman commands.

The sample output of the Ansible playbook shows a list of the additional packages that are required for each custom Python virtual environment. In this case you'll notice that custom-venv1 Python virtual environment requires the following packages in additional to what is already part of the Ansible 2.9 execution environment:

- certifi
- charset-normalizer
- enum34
- future
- solidfire-sdk-python

While custom-venv2 Python virtual environment only required zabbix-api in addition to what is already part of the standard Ansible-2.9 execution environment.

NOTE

The Ansible 2.9 execution environment is used for comparison against the custom Python virtual environments because of the fact that most Ansible Automation Platform 1.2 environments are using Ansible 2.9. This ensures an easier migration transition due to backward compatibility.

```
TASK [redhat_cop.tower_utilities.virtualenv_migrate : diff | Show the packages that are extra from default EEs in custom venvs.] ******************************************
ok: [3.228.23.40 -> localhost] => {
  "msg": [
    {
      "/opt/my-envs/custom-venv1/": [
```
Once the packages are captured for each custom Python virtual environment, the Ansible playbook uses the ee_builder role that is part of the redhat_cop.ee_utilities collection that automates the creation of execution environments on the local user environment.

Before running the supplied Ansible playbook, install ansible-builder on your localhost machine, the playbook run creates execution environments on your local machine based upon the package delta between the custom Python virtual environment and the base execution environment supplied.

```
$ podman images

REPOSITORY                           TAG                IMAGE ID
localhost/custom-venv2               latest             c017418d1919
localhost/custom-venv1               latest             7cbe3b49974d
localhost/custom-venv                latest             9d5d809f38b0
```

5.1.1. Pushing to private automation hub

With the local execution environments in place, you can push them to your private automation hub via:

```
NOTE
In this reference architecture, we keep the name of the automation execution environments as the name of the custom Python virtual environments for simplicity. If a change in name is required, use the podman tag command before pushing the execution environments to your private automation hub or a container registry of choice.

$ podman login [automation-hub-url]
# Enter the username and password to access Private Automation Hub.
$ podman tag [image-id] [automation-hub-url]/[container image name]
$ podman push [automation-hub-url]/[container image name]
```

TIP

For more information, visit: Managing containers in private automation hub

Once there, synchronize the execution environments to your automation controller by creating the registry credentials for your private automation hub inside the controller user interface.
To create your registry credentials within automation controller:

1. Select **Resources→Credentials**

2. Within **Credentials**, select the blue *Add* button

3. In the **Create New Credentials** window,
   a. provide a **Name** e.g. *My private automation hub credentials*
   b. under **Credential Type** select the drop down and select *Container Registry*
   c. under **Type Details**
      i. provide Authentication URL, e.g. *pah.example.com*
      ii. provide your private automation hub username within **Username** field
      iii. provide your private automation hub password or token within **Password or Token** field
      iv. select **Verify SSL** if your private automation hub environment supports SSL

4. Click **Save**

To make the execution environments available within automation controller, create a new execution environment that will pull the images from your private automation hub.

Within automation controller,

1. Select **Administration→Execution Environments**

2. Within **Execution Environments**, select the blue *Add* button

3. In the **Create new execution environment** window,
   a. provide a **Name**, e.g. *my execution environment*
   b. provide the image location of the execution environment, e.g. *repo/project/image-name:tag*
   c. select the **Registry credential** magnifying glass
      i. click the radio button for your private automation hub credentials, e.g. *my private automation hub credentials*

With the execution environments now available within automation controller, they can be used against any existing Job Templates or newly created Job Templates.

**TIP**

When creating new user-built execution environments not constrained to require backward compatibility, it is recommended to use the **ee-minimal** execution environment as your base execution environment to build your new images against.

---

[1] This reference architecture uses the **ansible-2.9** execution environment to best mimic the execution plane environment of Ansible Automation Platform 1.2.
APPENDIX A. ABOUT THE AUTHORS

Anshul Behl
Anshul is a Technical Marketing Manager at Red Hat, where he bring his software development and QE experience to increase Ansible Automation Platform’s adoption experience for customers by producing technical content on all aspects of the product.

Roger Lopez
Roger Lopez is a Principal Technical Marketing Manager bringing 10+ years of computer industry experience delivering high-value solutions used by our sales, marketing and engineering teams to develop best practice documentation & methods for internal and external customers. He is a Red Hat Certified Engineer (RHCE) with experience building solutions around Ansible, OpenShift and OpenStack.
APPENDIX B. CONTRIBUTORS

We would like to thank the following individuals for their time and patience as we collaborated on this process. This document would not have been possible without their many contributions.

<table>
<thead>
<tr>
<th>Contributor</th>
<th>Title</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Julen Landa Alustiza</td>
<td>Senior Software Quality Engineer</td>
<td>Technical Review</td>
</tr>
<tr>
<td>Craig Brandt</td>
<td>Principal Technical Marketing Manager</td>
<td>Content Review</td>
</tr>
</tbody>
</table>
APPENDIX C. CREATING AN ENCRYPTED CREDENTIALS.YML FILE

This section describes how to create an encrypted credentials.yml file that is passed to the Ansible Automation Platform installer.

WARNING
The passwords used must match between Environment A and Environment B.

Within your initial Environment B Ansible Automation Platform environment,

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

```
$ cat credentials.yml

admin_password: my_long_admin_password
pg_password: my_long_pg_password
registry_password: my_long_registry_password
```

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

```
$ ansible-vault encrypt credentials.yml

New Vault password: 
Confirm New Vault password: 
Encryption successful
```

WARNING
The admin_password and pg_password credentials need to match the value used in your Ansible Automation Platform 1.2 Environment A.

WARNING
Ensure to store your encrypted vault password in a safe location.

3. Verify the credentials.yml file is encrypted
NOTE

The creation of encrypted credentials is optional but recommended as storing passwords within your inventory file should not be in plain text.

If you are already using encrypted credentials, use your credentials.yml file instead of creating a new one.
APPENDIX D. POST UPGRADE PLAYBOOK

This section provides an Ansible Playbook that you should run if you are not able to access the automation controller UI on all automation controller nodes after the migration. This addresses the SELinux context and the certificate mismatch issues that were described in the Chapter 4, Infrastructure Migration section.

Copy the below Ansible Playbook content and place it in a file called `post_upgrade_playbook.yml` inside the untarred installer directory.

```
NOTE
This directory consists of the installer inventory file and this playbook uses the installer inventory to make some changes to your automation controller nodes.

post_upgrade_playbook.yml
```

```
---
- name: Play to apply workaround to known issues in upgrade
  hosts: automationcontroller
  become: true
  tasks:
    - block:
      - name: Remove certs from all the controllers
        file:
          name: "{{ item }}"
          state: absent
        loop:
          - /etc/tower/tower.cert
          - /etc/tower/tower.key
      - name: Role to create new certs and copy to all controllers
        include_role:
          name: ansible.automation_platform_installer.nginx
        when:
          - automation_platform_version is version('2.1.1', '<=')
      - name: Add to targeted policy and apply selinux policy to controller dirs
        ansible.builtin.command: "{{ item }}"
        loop:
          - semodule -s targeted -i /usr/share/selinux/targeted/automation-controller.pp
          - /sbin/restorecon -R /var/lib/awx/venv /var/lib/awx/job_status /var/run/tower
      - name: Restart the controller service
        service:
          name: automation-controller
          state: restarted
```

Run the command to execute the playbook on the controller nodes.

```
$ ansible-playbook -i inventory.new.ini post_upgrade_playbook.yml
```
## APPENDIX E. REVISION HISTORY

<table>
<thead>
<tr>
<th>Revision 1.1-0</th>
<th>2022-04-29</th>
<th>Roger Lopez</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Added NOTE within Overview regarding using same subscription manifest when migrating between versions of Ansible Automation Platform</td>
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<tr>
<td>Revision 1.0-0</td>
<td>2022-03-31</td>
<td>Anshul Behl and Roger Lopez</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Initial Release</td>
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