Red Hat
Training and Certification

DO467

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Version 1.0

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1. Installing Red Hat Ansible Automation Platform

1.1. Explaining the Red Hat Ansible Automation Platform Architecture

1.1.1. Red Hat Ansible Automation Platform

New version of Ansible Automation.

AAP2.x provides

- Separation of the **Ansible Core** project development and Ansible Modules by introducing content collections
- Execution Environments (leverages containerized execution of playbooks)
  - Ansible Navigator
  - Ansible Builder
- Replaces Ansible Tower with Ansible Automation Controller
- Introduces Ansible Private Automation Hub (container registry and private collection source)

1.1.2. Red Hat Ansible Automation Platform Components

Ansible Core

Minimal implementation of Ansible providing functionality to run Ansible playbooks. Includes the **ansible.builtin** modules.

- **CLI** - Includes the **ansible-playbook**, **ansible-doc**, and the **ansible** ad-hoc commands and utilities
- **Language** - Uses YAML to construct playbooks
- **Framework** - provides platform to extend Ansible by leveraging Content Collections
- **Functions** - Allows use of various logic components such as conditionals, blocks, includes, loops, and other Ansible items.

Ansible Content Collections

Provides rapid growth and expansion for Ansible modules, functions, and filters. Allows only the **ansible.builtin** collection to be part of Ansible Core and separates development of all other collections and their corresponding modules, filters, and other components.

Supportability

Allows a means for vendors to provide certified and supported collections and modules and leverages Ansible Automation Hub as a means of acquiring these collections.

Ansible Content Navigator

New tool being leveraged to develop and test Ansible playbooks. The **ansible-navigator** command leverages Ansible Execution Environments (EEs) to execute playbooks. The EE allows separation of the control node from the environment executing the playbook. In other words, the EE through **ansible-navigator** provides a self-contained execution environment eliminating the need for any of the Ansible Core utilities (ansible-playbook, ansible-inventory, ansible-config) to be locally installed and further increases portability of the tested playbook because EEs can also be used from Ansible Automation Controller.

Automation Execution Environments

An Ansible Execution Environment Image (EEI) contains at a minimum the Ansible Core Package, Ansible Content Collections, any Python libraries, executables, and other dependencies needed to run a given playbook.
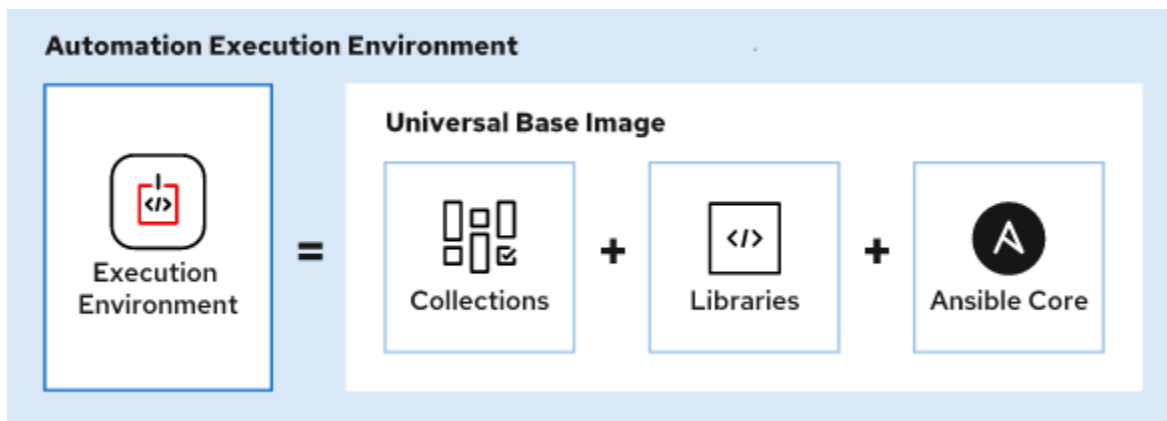
Figure 1. Ansible Execution Environment

Selecting an EEI

The **ansible-navigator** command allows selecting and EEI for executing and running a playbook. When developing playbooks for others to run, or more importantly Automation Controller, once tested, the EEI name will be provided so that future runs for the given playbook will be executed in the same environment ensuring the same outcome.

The EEI can be customized and extended with the Ansible Builder package.
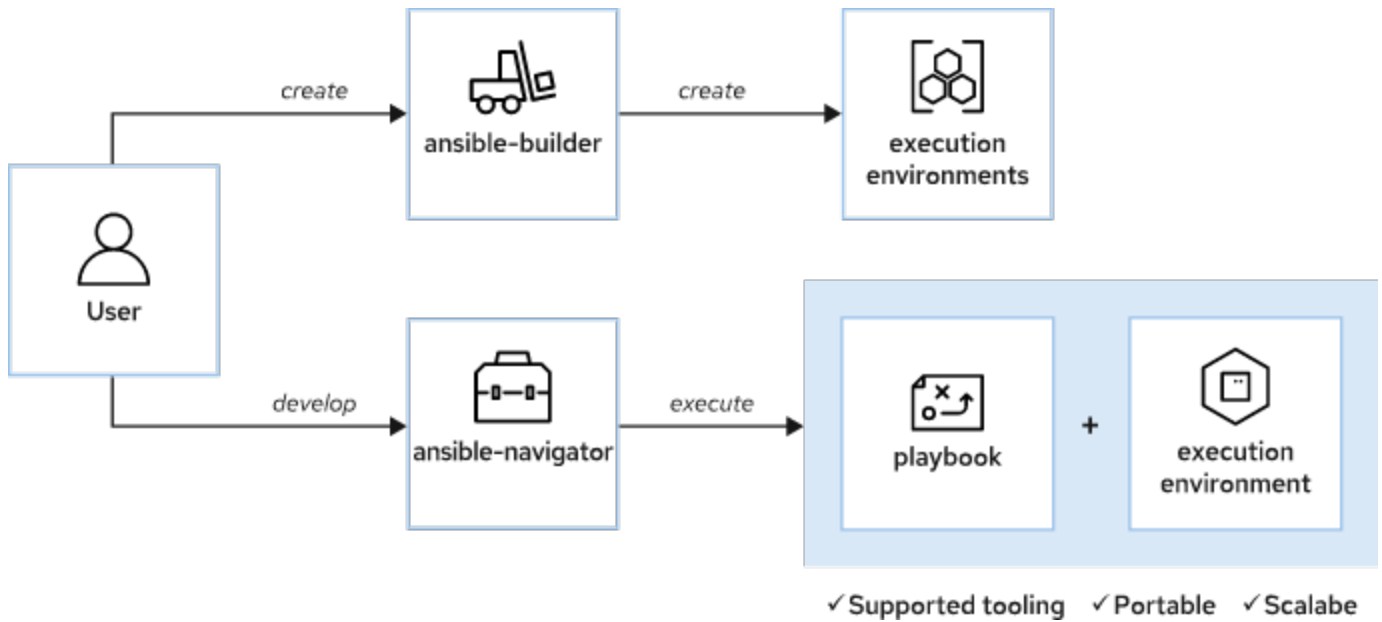
Figure 2. Creating an Ansible Execution Environment

Automation Controller

Replacement for Ansible Tower. Provides a multi-function environment with a RestfulAPI, WebUI, and both control plane and execution planes for enterprise environments. The Automation Controller provides the ability to integrate directly with CI/CD tools and provides a centralized place to manage all Ansible automation tasks.

Figure 3. Ansible Automation Controller Components

Automation Hub and Private Automation Hub

Ansible Automation Hub provides a central source to manage Ansible content collections and receive certified and supported collections and modules. The use of Private Automation Hub allows organizations to setup and manage an internal container registry for managing Ansible EEIs as well as storing and managing both certified and home-grown Ansible content collections.

1.2. Installing Automation Controller and Private Automation Hub

⚠️ *Installing Exercise Time*

It can take up to 15 minutes for the GE **lab start install-installation** so it is recommended to run this script at the start of the lecture.

1.2.1. Planning the Installation

Figure 4. Standalone Automation Controller

Figure 5. Automation Controller with Private Automation Hub

Automation Mesh Considerations

The Database server must be a separate machine is a requirement for using Ansible Automation Mesh.

Ease of Installation

When installing both Ansible Automation Controller and Private Automation Hub, it is recommended to install both of these items using the same setup command and inventory source. This will allow deployments of both services, but also provides additional benefits with automatic configurations such as creating the "link-style" resources between Controller and Hub like execution environments, and other items such as credentials.

Installation of Automation Controller and Private Automation Hub

In environments having both Automation Controller and Private Automation Hub, it is required that these be installed on separate nodes as they cannot be installed on the same node.

1.2.1.1. Standalone Automation Controller with a Database on the Same Node

1.2.1.2. Standalone Private Automation Hub with a Database on the Same Node

1.2.1.3. Automation Controller and Private Automation Hub with External Database Servers

Classroom and Lab Environment

The deployment for this course will be using both Controller and Hub connected to a shared **External** PostgreSQL database.

1.2.1.4. Advanced Deployment Scenarios

1.2.2. Installation Requirements

Table 1. Hardware Requirements

Machine name	RAM	CPU
Controller	16GB	4 CPUs
Hub	8GB	2 CPUs

Minimum vs. Practical Requirements

The memory and CPU requirements depend really on the size and implementation in the environment. Essentially a good rule of thumb is to have 1GB RAM (memory) for every ten (10) forks and keep at least 2GB for automation controller services. It is also important that with additional forks CPU capacity will also be increased.

Classroom Environment Doesn't Meet Specifications

The classroom environment being utilized doesn't meet the minimum specifications, so during the exercise, the **./setup.sh -e ignore_preflight_errors**=**true** is run. Specifically, the **-e ignore_preflight_errors**=**true** instructs the installer to ignore the checks for system requirements. This should not be done in a production environment.

Additionally, for the installation, we are running the setup as **root** since the root user exists on all systems being modified and SSH keys have been pre-distributed.

The classroom environment also uses an internal CA and custom certificates that have been created by the Red Hat Training team. These certificates must be obtained for your environment prior to installation if you want to leverage custom internal CAs.

1.2.2.1. Database Storage

1.2.3. Subscription and Support

1.2.4. Installing Red Hat Ansible Automation Platform

As mentioned above, it is recommended to install both Controller and Hub from the same inventory file using a single **setup.sh** command. In order to successfully install Controller and Hub, the inventory

file must be updated and modified providing credentials and FQDMs in the various section headers.

Extra Resources Added when Installed Together

If installed together, the setup script will create additional controller resources such as hub credentials and perform the configuration automatically as part of the installation/setup process. If done separately, it will be necessary to create the resources in controller manually so that controller can communicate with hub. The other benefit of using a combined installation from the bundled installer is that there are three (3) execution environment images (EEIs) included with the bundled installer and these are automatically loaded into hub.

1.2.4.1. Installing Automation Controller

1.2.4.2. Installing Private Automation Hub

1.2.5. Replacing the CA Certificate

1.2.5.1. Gathering Certificates and Private Keys

1.2.5.2. Preparing the Systems

1.2.5.3. Trusting Custom CA Certificates

Installing Exercise Time

It can take up to 15 minutes for the GE **lab start install-installation** so it is recommended to run this script at the start of the lecture.

1.2.6. DEMO: Installing Automation Controller and Private Automation Hub

Automation Controller and Private Automation Hub can both be installed from the **same** machine provided that they are both specified in the inventory file and that the installation user and installation machine has access to all systems specified in the **inventory** file and that the user has the ability to SSH/SUDO without passwords.

Automation Hub and Controller Placement

Ansible Controller and Ansible Private Automation Hub must be installed on separate systems and cannot be installed on the same system.

Example 1. **DEMO: Installing Automation Hub and Controller**

1. Obtain the bundled installer and untar the file

```
[student@workstation ~]$ tar xvf ansible-automation-platform-setup-bundle-2.2.0-
6.1.tar.gz

[student@workstation ~]$ mv ansible-automation-platform-setup-bundle-2.2.0-6.1
AAP2

[student@workstation ~]$ cd AAP2/
```

2. Update the inventory file with the system FQDNs or IP Addresses

Listing 1. Update the Inventory File

```
[student@workstation AAP2]$ vim inventory
```

```
[automationcontroller]  ①
controller.lab.example.com


[execution_nodes]

[automationhub]  ②
hub.lab.example.com

[automationcatalog]

[database]  ③
db.lab.example.com


[all:vars]
admin_password='redhat'  ④

pg_host='db.lab.example.com'  ⑤
pg_port=5432  ⑥

pg_database='awx'
pg_username='awx'
pg_password='redhat'  ⑦


registry_url='hub.lab.example.com'  ⑧
```

```
registry_username='admin'  ⑨
registry_password='redhat'  ⑩


# Automation Hub Configuration  ⑪
#

automationhub_admin_password='redhat'

automationhub_pg_host='db.lab.example.com'
automationhub_pg_port=5432

automationhub_pg_database='automationhub'
automationhub_pg_username='automationhub'
automationhub_pg_password='redhat'
automationhub_pg_sslmode='prefer'

# SSL Settings  ⑫

custom_ca_cert=/home/student/certs/classroom-ca.pem
web_server_ssl_cert=/home/student/certs/controller.lab.example.com.crt
web_server_ssl_key=/home/student/certs/controller.lab.example.com.key
automationhub_ssl_cert=/home/student/certs/hub.lab.example.com.crt
automationhub_ssl_key=/home/student/certs/hub.lab.example.com.key
postgres_use_ssl=True
postgres_ssl_cert=/home/student/certs/db.lab.example.com.crt
postgres_ssl_key=/home/student/certs/db.lab.example.com.key
```

① Specify the Controller Node

② Specify the Private Automation Hub Node

③ Specify the Database Node

④ Specify the **admin** password for Controller

⑤ Specify the Database FQDN

⑥ Specify the Database Port

⑦ Specify the Database Password

⑧ URL and Registry for Container Images/Execution Environments

⑨ Username for Registry

⑩ Password for Registry

⑪ Ansible Automation Hub Configuration Settings

⑫ SSL Settings

Database

If you are running the database locally and not as a separate installation, you can leave the database section blank and the **pg_host** and **pg_port** blank. This will cause the installer to setup the database locally with the deployed AAP application.

Registry

Setting the registry for **hub.example.com** will allow the installer to link and configure Ansible Automation Hub to Ansible Controller. It will also ensure that the execution environments container in the bundled installer will be loaded properly into Ansible Automation Hub.

SSL

The classroom and lab environment has been configured to run with SSL enabled. In order for the certificates to work properly, the SSL certificates have been supplied in the **/home/student/certs** directory. These certificates must be specified in the **inventory** file. In the default inventory file, the certificates and SSL settings are generally commented out, so it is possible to just place the certificate information at the bottom of the inventory file to prevent searching for each line.

Listing 2. Default SSL Certificate

```
# SSL-related variables

# If set, this will install a custom CA certificate to the system
trust store.
# custom_ca_cert=/home/student/certs/classroom-ca.pem

# Certificate and key to install in nginx for the web UI and API
# web_server_ssl_cert=/path/to/tower.cert
# web_server_ssl_key=/path/to/tower.key
```

3. View final inventory file

```
[student@workstation AAP2]$ grep -Ev "^#|^$" inventory
[automationcontroller]
controller.lab.example.com
[automationcontroller:vars]
peers=execution_nodes
[execution_nodes]
[automationhub]
hub.lab.example.com
[automationcatalog]
[database]
db.lab.example.com
[sso]
[all:vars]
admin_password='redhat'
pg_host='db.lab.example.com'
pg_port=5432
pg_database='awx'
pg_username='awx'
pg_password='redhat'
pg_sslmode='prefer'  # set to 'verify-full' for client-side enforced SSL
registry_url='hub.lab.example.com'
registry_username='admin'
registry_password='redhat'
receptor_listener_port=27199
automationhub_admin_password='redhat'
automationhub_pg_host='db.lab.example.com'
automationhub_pg_port=5432
automationhub_pg_database='automationhub'
automationhub_pg_username='automationhub'
automationhub_pg_password='redhat'
automationhub_pg_sslmode='prefer'
automationcatalog_pg_host=''
automationcatalog_pg_port=5432
automationcatalog_pg_database='automationservicescatalog'
automationcatalog_pg_username='automationservicescatalog'
automationcatalog_pg_password=''
sso_keystore_password=''
sso_console_admin_password=''
custom_ca_cert=/home/student/certs/classroom-ca.pem
web_server_ssl_cert=/home/student/certs/controller.lab.example.com.crt
web_server_ssl_key=/home/student/certs/controller.lab.example.com.key
automationhub_ssl_cert=/home/student/certs/hub.lab.example.com.crt
automationhub_ssl_key=/home/student/certs/hub.lab.example.com.key
postgres_use_ssl=True
postgres_ssl_cert=/home/student/certs/db.lab.example.com.crt
postgres_ssl_key=/home/student/certs/db.lab.example.com.key
```

*Using **grep** to remove comments and blank lines*

Listing 3. Source Description

```
grep -Ev "^#|^$" <FILENAME>
```

4. Run the installation **setup.sh** script as the root user with **ignore_preflight_errors**=**true** as the systems in this course don't meet the minimum hardware requirements.

```
[student@workstation AAP2]$ sudo -i
[sudo] password for student:

[root@workstation ~]# cd ~student/AAP2/

[root@workstation AAP2]# ./setup.sh -e ignore_preflight_errors=true
```
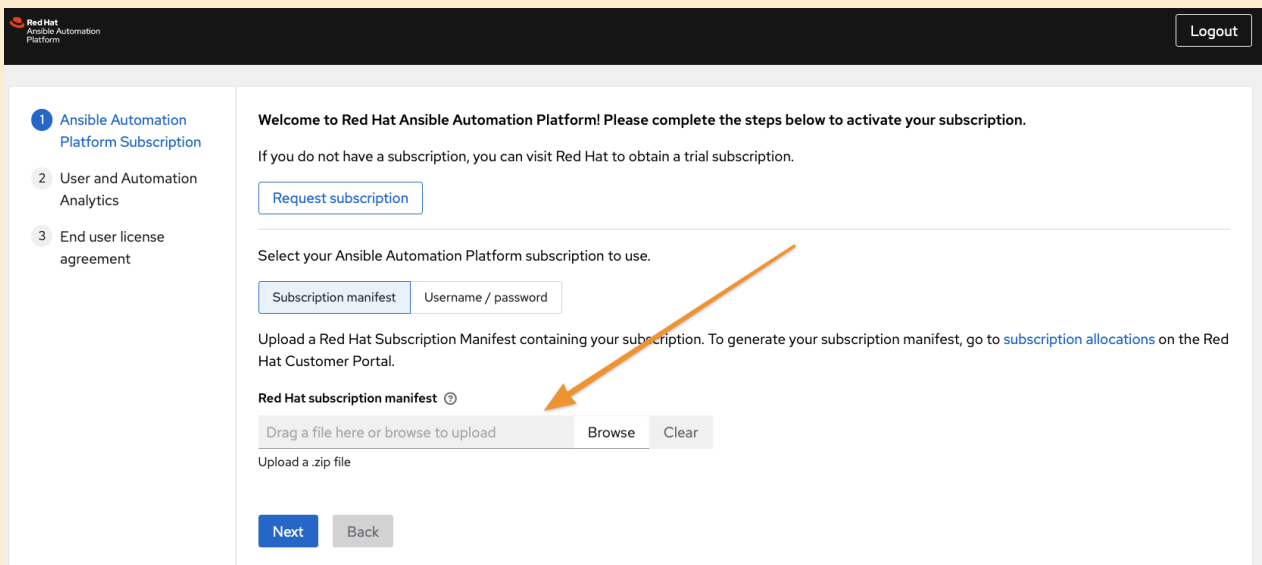
Bundled Software Installer

It is important to at least save the bundled software installer archive **TGZ** file or to save the entire bundled installation directory. In addition, you will also want to save the **Inventory** file that was created so that adding additional components later, performing system backups/restores, and other administrative and maintenance tasks can be performed easily.

5. Install the licenses for Controller by providing the **manifest.zip** file to controller in the WebUI.

Figure 6. Ansible Controller License

6. Verify **Automation Hub** is installed

1.3. Initial Configuration of Automation Controller and Private Automation Hub

1.3.1. Configuration Overview

Main benefit of AAP2 is the Controller uses execution environments just like developers have tested with **ansible-navigator** so playbooks can run directly on controller without modification. Initial installation will import the base container images for execution environments, but synchronization and some initial configuration is often necessary for custom environments.

1.3.2. Making Automation Execution Environments Available from Private Automation Hub

Private Automation hub provides a container registry where needed execution environment images (EEIs) can be synchronized and stored. The EEIs can also be uploaded manually to private automation hub as well as collections which we will find out about later.

1.3.2.1. Synchronizing Automation Execution Environments

In most instances, you will want to sync the supported EEIs from **https://registry.redhat.io** and get the latest supported versions for the AAP2 platform.

> *Synchronizing all EEIs*
>
> It is possible to synchronize all remote registries getting all versions from a remote catalog by selecting **Index execution environments** from the vertical dots icon.

1.3.2.2. Manually Adding Container Images

There are multiple ways to copy and inspect container images. The **skopeo** command is probably the best, however it can also be done with **Podman**. The benefit of **Skopeo** is that once you are logged into both the remote container registry and private automation hub, it is possible to use **skopeo copy** directly without needing to first download the container image and set the tags.

1.3.2.3. Managing Container Repositories, Images, and Tags

Management of container images within private automation hub can be done through the WebUI or using the **skopeo** command on the CLI. Images can be easily tagged and displayed here.

1.3.3. Synchronizing Ansible Content Collections

Another key piece of AAP2 is the need for content collections. Many modules that were built-in for Ansible have been moved to content collections (firewalld, podman, and networking components and filters). In order to leverage these modules, collections must be installed and available.

Collection Locations

- **Red Hat Certified (Supported) Content Collections** - https://console.redhat.com/ansible/automation-hub

- **Ansible Community (Unsupported) Content Collections provided by Ansible Galaxy** - https://galaxy.ansible.com

- **Homegrown/Manual Collections**: Manually uploaded to private automation hub

1.3.3.1. Synchronizing Red Hat Certified Ansible Content Collections

Login and Credentials required for RH Certified Collections

Red Hat Certified Ansible Collections require a multi-step process.

1. Login to Ansible Automation Platform

   a. Select Collections

   b. Click "Sync"

2. Create an Authentication Token with the **Connect to Hub**

3. Login to Private Automation Hub

   a. Collections ⇒ Repository Management and remote tab

   b. Select **rh-certified** and **Edit** to provide your token.

   c. Click **Save** and then from Repository Management page, select Sync and it will sync all collections marked as Sync.

1.3.3.2. Synchronizing Ansible Content Collections from Ansible Galaxy

Galaxy Doesn't Require Authentication

Since Ansible Galaxy doesn't require authentication, if is possible to configure a **Community** colelction or set of collections by providing a single **requirements.yml** file. This file provides a list of all content collections to synchronize.

1.3.3.3. Manually Adding Ansible Content Collections

In order to manually upload connections, you must first create a **Namespace** in private automation hub.

Collection Security and Signing

The concept of **collection signing** which is signing collection content similar to signing RPMs is currently in Tech Preview for AAP 2.2. This feature is expected to provide an additional level of security with respect to the download content and where it originated from and that it is in its intact and intended format.

1.3.4. Testing Basic Automation Controller Functionality

DEMO Project Benefits

The **Demo** project is essentially there to provide some "smoke" tests allowing a quick way to see if Controller is performing as expected.

1.3.4.1. The Demo Project

Verification of EE and Project Synchronization

The new thing that Controller needs is the ability to use EEIs. The **Demo** project in addition to testing project synchronization components is now able to verify that the EEI can be downloaded and leveraged with Controller.

1.3.4.2. Default Execution Environment Registry Credential

Registry Credential

This is a valid credential and is created based on information at install found in the **inventory** file. This credential cannot be changed from the WebUI and must be modified in the inventory file and have the **setup.sh** script executed again.

1.3.4.3. The Demo Credential

Machine Credential Doesn't Work

This is the only non-working component in the project. The **Machine** credential will need to be updated with a valid username and password or SSH key so that connections can be made to the remote hosts.

1.3.4.4. The Demo Inventory

Modify Inventory to Add Systems

Initially the **Demo** inventory only contains localhost. It should be modified to include one or more hosts from the environment. Ideally, all hosts would be added so that it is possible to verify Controller connectivity to your entire environment.

1.3.4.5. The Demo Job Template

1.3.5. DEMO: Initial Configuration of Automation Controller and Private Automation Hub

Example 2. **DEMO: Initial Configuration of Automation Controller and Private Automation Hub**

Working with Execution Environments

Manually uploading and adding container images (EEs) to Ansible Private Automation Hub.

1. Login to Registries to both Push/Pull and Copy container images

```
[student@workstation Add_EEs]$ skopeo login hub.lab.example.com
```

2. Inspect available containers and tags

```
[student@workstation Add_EEs]$ skopeo inspect docker://hub.lab.example.com/ee-29-rhel8
```

Grabbing Tags and Release Information from the CLI

Listing 4. **skopeo inspect** *to get release and* **skopeo tags** *to get tags*

```
[student@workstation Add_EEs]$ skopeo inspect
docker://hub.lab.example.com/ee-29-rhel8 --format "{{
.Labels.version }}-{{ .Labels.release }}"
1.0.0-119

[student@workstation Add_EEs]$ skopeo list-tags
docker://hub.lab.example.com/ee-29-rhel8
```

It is also possible to use **podman** to search and list tags, but that is generally considered less reliable. It should also be noted that only **skopeo** has the ability to inspect and act with images remotely. As such, this course will leverage **skopeo** over Podman for many of the exercises.

Listing 5. **podman** *Tag Listing*

```
[student@workstation Add_EEs]$ podman search --list-tags
docker://hub.lab.example.com/ee-29-rhel8
```

The **skopeo** *Command*

Skopeo is another command that can be used with containers and was introduced as part of the **container-tools** suite with RHEL8. The **container-tools** suite installs the RHEL 8 toolchain to work with containers which includes: **podman**, **buildah**, and **skopeo**.

2. Managing User Access

2.1. Creating and Managing Automation Controller Users

2.1.1. Role-based Access Controls

Users assigned roles which grants one or more permissions (RBAC). Roles can be applied to both teams and users and all users in a team will inherit the team's roles.

2.1.2. Automation Controller Organizations

Top-level component in Controller. Organization can have large numbers of users and teams and this is one way to segregate resources such as teams/users/projects into a logical structure to control access.

2.1.3. Types of Users

- **System Adminstrator**: The built in **superuser** role providing unrestricted access to the entire controller installation. This has **read/write** permissions on all objects in controller regardless of organizations and structure present.
- **System Auditor**: Special **read-only** role with access to everything on the automation controller
- **Normal User**: Standard user with minimal access and no special roles assigned.

2.1.4. Creating Users

Basically done interactively from the WebUI.

Access ⇒ **Users** ⇒ **Add** and then fill in the form.

2.1.5. Editing Users

Access ⇒ **Users** ⇒ **Edit** and then modify values the form.

2.1.6. Organization Roles

Roles within an organization can provide users/teams with additional privileges. Users and teams can be assigned multiple roles to accomplish various tasks and functions.

- **Admin Role**: Provides ability to manage all aspects at the organization level and below. It should be noted that a **System Administrator** automatically inherits an **Admin** role at the organization level.
- **Auditor Role**: Provides read-only access to all aspects at the organization level and below. It should be noted that a **System Auditor** automatically inherits an **Auditor** role at the organization level.
- **Member Role**: Users with this role have **read** access to the organization. There are no special permissions or authorizations given with a member role, so permissions must be assigned to users

or teams in order for users to have permissions on organization objects.

2.1.7. Managing User Organization Roles

Organizations can be created and managed from **Access** ⇒ **Organizations** ⇒ **Access** ⇒ **Add** :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

2.2. Managing Automation Controller Access with Teams

2.2.1. Teams in Automation Controller

Teams are groups of users and provide the ability to assign permissions to team members by assigning one or more roles to a team.

> *Users vs. Teams*
>
> It is important to understand that while a user can belong to one or more organization having a variety of different permissions, a **Team** can belong to exectly one organization.

2.2.2. Creating Teams

Access ⇒ **Teams** ⇒ **Add** to create teams.

2.2.3. Team Roles

- **Member Role**: Inherits roles with resources granted to a team
- **Admin Role**: Full control of a team. This role specifically applies to the team, in order to manage other resources as an admin, the **Admin** role must be assigned to the team for a given resources.
- **Read Role**: Provides ability for team members to view resources and team roles.

2.2.4. Adding Users to a Team and Assigning Team Roles

Access ⇒ **Teams** = **Access** ⇒ **Add** ⇒ **Users** ⇒ **Next** and then complete the form.

2.2.5. Organization Roles

- **Execute**
- **Project Admin**
- **Credential Admin**
- **Workflow Admin**
- **Notification Admin**

- **Job Template Admin**

- **Execution Environment Admin**

- **Auditor**

- **Red**

- **Approve**

2.2.6. Managing Organization Roles

Access ⇒ **Organizations** ⇒ **Access** ⇒ **Add** :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

2.3. Creating and Managing Users and Groups for Private Automation Hub

2.3.1. User Access

Private automation hub allows administrators to setup and manage granular access to content for end-users. This access is based on managing permissions to system objects.

> 💡 See permission table in book!!

> ❗ *Superusers*
> Superusers are assigned all permissions regardless of groups or other permissions assigned.

2.3.1.1. Creating Groups

User Access ⇒ **Groups** ⇒ **Create**

Edit, select permissions and then save.

2.3.1.2. Creating Users

User Access ⇒ **Users** ⇒ **Create** then fill in the form and hit "Save"

2.3.1.3. Creating Groups to Manage Content

3. Managing Inventories and Machine Credentials

3.1. Creating a Static Inventory

3.1.1. Red Hat Ansible Inventory

When leveraging Ansible at the CLI, the inventory is generally specified by one or more inventory files/scripts and defined within the **ansible.cfg** file. These are known as managed hosts. When using Ansible Automation Controller, inventory can be specified within the WebUI or inventories can be provided as part of projects for static files (for example Git repository) or generated dynamically from an external source.

3.1.2. Creating an Inventory Using the Automation Controller Web UI

Licensing Concerns

It is extremely important to remember that Ansible Automation Controller is a licensed and supported project. Each unique entry in an inventory file consumes a single license. So naming conventions for hosts (especially when using Dynamic Inventory) must be considered when developing and constructing inventories.

Listing 6. Inventory

```
servera
servera.lab.example.com
172.25.250.10
```

The above inventory all refer to the same system but referenced in different ways: Hostname, FQDN, and IP address. Since each of these is a unique entry, this inventory file would consume three (3) entitlements instead of just a single entitlement. Therefore, it is important to note how inventories are created and license entitlements are managed.

3.1.2.1. Creating a New Inventory

Resources ⇒ Inventories ⇒ Add ⇒ Add Inventory

3.1.2.2. Creating a Host Group in an Inventory

3.1.2.3. Creating Hosts in an Inventory

3.1.3. Inventory Roles

- **Admin**

- **Update**

- **Ad Hoc**

- **Use**

- **Read**

3.1.3.1. Assigning Roles

Resources ⇒ Inventories ⇒ Access ⇒ Add

Assign users/teams to an inventory and assign one ore more roles, then click "Save"

3.1.4. Inventory Variables

It is possible from the inventory screen to provide **inventory** variables which would apply to all systems within the inventory. It is possible to provide group-based or host-based variables to inventory as well by selecting the hosts or host groups.

> *Automation Mesh and Instance Groups*
> The **Instance Groups** is primarily used for Automation Mesh.

3.2. Creating Machine Credentials for Access to Inventory Hosts

3.2.1. Storing Secrets in Credentials

Ansible automation controller objects can store secrets such as passwords, SSH keys and other credentials. It is also possible to store vault credentials which can then decrypt files from projects.

> *Encryption and Decryption*
> Once secrets or sensitive information has been entered into the WebUI and encrypted, it can no longer be retrieved in decrypted form through the WebUI.

3.2.2. Credential Types

- **Ansible Galaxy/Automation Hub API Token**

- **Container Registry**

- **Github Personal Access Token**

- **Machine**

- **Network**

- **Source Control**

- **Vault**

> *Note on Source Control and PAT*
>
> In order to use standard source control Github/Gitlab without SSH keys, it is possible to still use the Username/Password. However, you must create a Personal Access Token (PAT) to be used and this will be done with the **Source Control** credential type and not the **Github Personal Access Token**.

3.2.3. Creating Machine Credentials

Resources ⇒ **Credentials** ⇒ **Add** and complete the form.

3.2.4. Editing Machine Credentials

3.2.5. Credential Roles

- **Admin**

- **Use**

- **Read**

3.2.6. Managing Credential Access

Resources ⇒ **Credentials** ⇒ **Access** and then add users/teams with one or more roles.

3.2.7. Common Credential Scenarios

Credentials Protected by Controller (Not known to Users)

- SSH and Machine Keys

- Sudo keys

Credential Prompts for Sensitive Password, Not Stored in Automation Controller

- Prompts user for passwords at job launch because don't want credentials stored on the controller (Based on compliance or other regulations) :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

4. Managing Projects and Launching Ansible Jobs

4.1. Creating a Project for Ansible Playbooks

4.1.1. Automation Controller Projects

Generally backed by a source control repository (Git) and contains at least one playbook. It is possible for Ansible Controller to automatically download resources and project materials specified by the **requirements.yml** when the job template using the project template is launched.

> *Automatically Installing Collections and Roles*
>
> The automated installation of roles/collections depends on the **roles** or **collections** directory containing a **requirements.yml** file. It further requires that these sub-directories be at the top level of the source control project. Meaning they cannot be nested down within other sub-directories in the project.
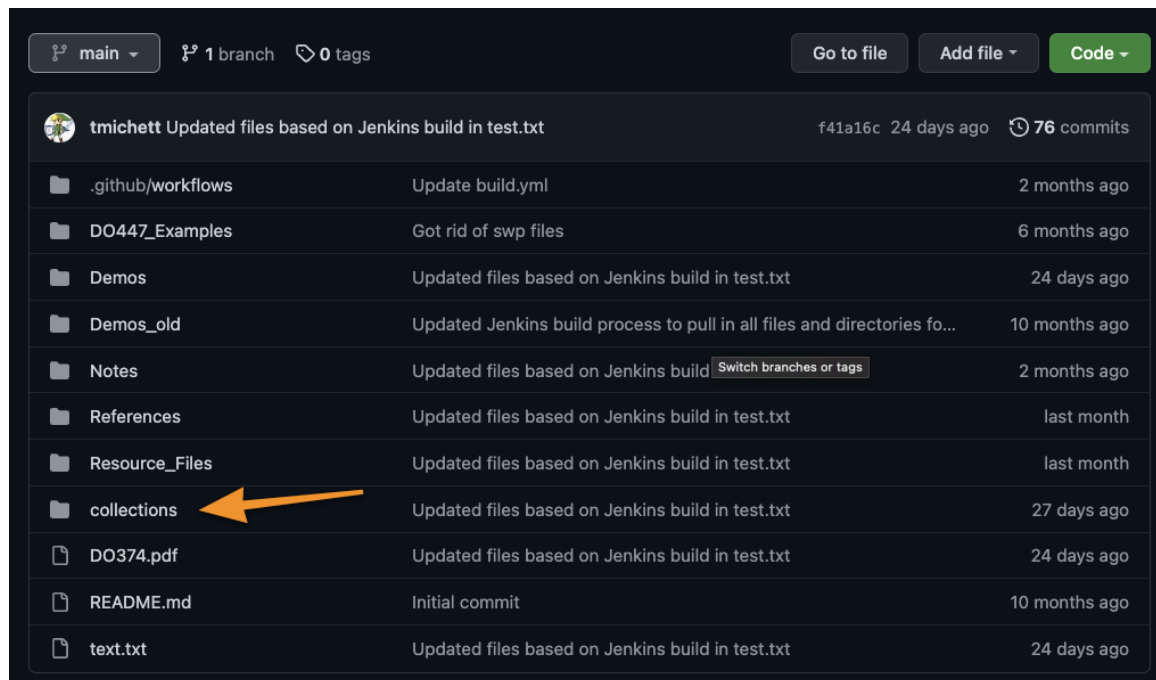

Figure 7. Source Control Project with Collections directory

4.1.2. Creating a Project

Resources ⇒ **Projects** ⇒ **Add** ⇒ **Create New Project**

Complete all the entries and select source control location.

> *Credentials must exist*
>
> The source control credentials must be created in advance of creating a project.

4.1.3. Project Roles

- **Admin**
- **Use**
- **Update**
- **Read**

4.1.4. Managing Project Access

Resources ⇒ Projects ⇒ (name of project) ⇒ Access ⇒ Add

Add the users/teams to the project and select one or more roles.

4.1.5. Creating SCM Credentials

Resources ⇒ Credentials ⇒ Add and complete the form on the new credentials page.

4.1.6. SCM Credential Roles

- **Admin**
- **Use**
- **Read**

4.1.7. Managing Access to SCM Credentials

Resources ⇒ Credentials ⇒ (credential name) ⇒ Access ⇒ Add

Add the users/teams to the credential and select one or more roles.

4.1.8. Updating Projects

SCM projects require copies of playbooks and other version control objects to be replicated locally and stored in Controller. Based on this functionality, it must be determined how project assets get updated.

Clean

Removes any local modifications before pulling latest SCM revision.

Delete

Deletes local copy of repository and clones down a the repository from the remote system.

Allow Branch Override

Allows using items from other branches in the source control.

4.1.8.1. Update Revision on Launch

Ensures that each time project is used source control is updated before any other actions take place.

4.1.8.2. Manual Updates

Project source versions can be updated manually or custom workflow nodes can be created when Advanced Job Workflows are made.

4.1.9. Support for Ansible Content Collections and Roles

Ansible Content Collections can be installed automatically at runtime by Controller providing that …

- There is a **collections/requirements.yml** file present in the project
- Ansible controller has access to the collection source :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

4.1.10. DEMO: Ansible Automation Controller and Automatic Installation of Collections and Roles

Automation Controller can install roles and collections automatically from a **requirements.yml** file.

Automatic Installation of Collections/Roles

The **collections** and **roles** directory must exist at the top-layer of the project. The contents of this directory will contain a **requirements.yml** file with the collections or roles that need to be installed for the project to work. These directories cannot be nested anywhere else within the project.

Example 3. **DEMO: Installing Automation Hub and Controller**

=== Creating Job Templates and Launching Jobs

Section Info Here

==== Job Templates

==== Creating Job Templates

==== Modifying Job Execution

==== Prompting for Job Parameters

==== Job Template Roles

==== Managing Job Template Access

==== Launching Jobs

==== Evaluating the Results of a Job :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

== Advanced Job Configuration

=== Improving Performance with Fact Caching

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==== Fact Caching

===== Enabling Fact Caching in Automation Controller :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Creating Job Template Surveys to Set Variables for Jobs

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==== Managing Variables

==== Defining Extra Variables

==== Job Template Surveys

===== Managing Answers to Survey Questions

===== Creating a Job Template Survey :pygments-style: tango :source-highlighter: pygments :toc:

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=== Scheduling Jobs and Configuring Notifications

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==== Scheduling Job Execution

===== Temporarily Disabling a Schedule

===== Scheduled Management Jobs

==== Reporting Job Execution Results

===== Notification Templates

===== Creating Notification Templates

===== Enabling Job Result Notification :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

== Constructing Job Workflows

=== Creating Workflow Job Templates and Launching Workflow Jobs

Section Info Here

==== Workflow Job Templates

==== Creating Workflow Job Templates

===== Using the Workflow Visualizer

===== Adding Multiple Nodes with the Same Relationship

===== Creating Convergent Nodes

===== Workflow Job Template Surveys

==== Launching Workflow Jobs

===== Evaluating Workflow Job Execution :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Requiring Approvals in Workflow Jobs

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==== Approval Nodes

==== Adding Approval Nodes to Workflows

==== Approving and Denying Workflow Approval Requests

==== Approval Time-outs

==== Approval Notifications :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

== Managing Advanced Inventories

=== Importing External Static Inventories

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==== Importing Existing Static Inventories

==== Storing an Inventory in a Project :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Configuring Dynamic Inventory Plug-ins

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==== Dynamic Inventories

==== OpenStack Dynamic Inventories

==== Red Hat Satellite 6 Dynamic Inventories :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Filtering Hosts with Smart Inventories

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==== Defining Smart Inventories

==== Using Ansible Facts in Smart Inventory Filters

===== Creating a Smart Inventory Based on Ansible Facts

==== Other Smart Inventory Filters :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

== Automating Configuration of Ansible Automation Platform

=== Configuring Red Hat Ansible Automation Platform with Collections

Section Info Here

==== Automating Red Hat Ansible Automation Platform Configuration

==== Getting the Supported Ansible Content Collection

==== Exploring the Supported Ansible Content Collection

===== Reading Documentation with Ansible Content Navigator

===== Reading Documentation on Automation Hub

==== Examples of Automation with ansible.controller

===== Creating Automation Controller Users

===== Creating Automation Controller Teams

===== Adding Users to Organizations and Teams

==== Community-supported Ansible Content Collections :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Automating Configuration Updates with Git Webhooks

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==== Introducing Red Hat Ansible Automation Platform Webhooks

===== What Are the Benefits of Webhooks

==== Configuring Webhooks

===== Configuring a Webhook for a Job Template

===== Creating the Webhook for the Repository in GitLab

==== Use Cases for Using Webhooks

===== Triggering Different Job Templates Using Branches

===== Configuration as Code for Automation Controller :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Launching Jobs with the Automation Controller API

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==== The Automation Controller REST API

===== Using the REST API

===== JSON Pagination

===== Accessing the REST API From a Graphical Web Browser

==== Launching a Job Template Using the API

==== Launching a Job Using the API from an Ansible Playbook

===== Vault Credentials

==== Token-based Authentication :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

== Maintaining Red Hat Ansible Automation Platform

=== Performing Basic Troubleshooting of Automation Controller

Section Info Here

==== Automation Controller Components

===== Starting, Stopping, and Restarting Automation Controller

===== Supervisord Components

==== Automation Controller Configuration and Log Files

===== Configuration Files

===== Log Files

===== Other Automation Controller Files

==== Common Troubleshooting Scenarios

===== Problems Running Playbooks

===== Problems Connecting to Your Host

===== Playbooks Do Not Appear in the List of Job Templates

===== Playbook Stays in Pending State

===== Error: Provided Hosts List Is Empty

==== Performing Command-Line Management

===== Changing the Automation Controller Admin Password :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Backing Up and Restoring Red Hat Ansible Automation Platform

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==== Backing Up Red Hat Ansible Automation Platform

===== Backup Procedure

==== Restoring Ansible Automation Platform From Backup

===== Restoration Procedure :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

== Getting Insights into Automation Performance

=== Gathering Data for Cloud-based Analysis

Section Info Here

==== Introducing Red Hat Hybrid Cloud Console Services

==== Collecting Data for Cloud Services

==== Registering Managed Hosts with Insights for Ansible Automation Platform

==== Accessing the Red Hat Hybrid Cloud Console :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Getting Insights into Automation Performance

Section Info Here

==== Insights for Ansible Automation Platform

==== Generating Remediation Playbooks with Advisor

===== Automating Remediation of an Issue for Multiple Systems

===== Automating Remediation of Multiple Issues for One System

==== Comparing Systems with Drift

===== Finding Differences Between Systems

===== Comparing the State of One System at Different Times

===== Comparing Systems to a Standard Baseline

==== Sending Alerts Based on Ansible Facts with Policies :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Evaluating Performance with Automation Analytics

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==== Automation Analytics

==== Reporting Playbook Execution Status

==== Examining Job History

==== Monitoring Notifications :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Producing Reports from Automation Analytics

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==== Producing Reports from Automation Analytics

===== Choosing an Appropriate Report

===== Using Automation Calculator to Compute Savings

===== Exporting a Report

==== Predicting the Cost Savings of Automation

===== Creating a Savings Plan

===== Reviewing the Cost Savings Calculations :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

== Building a Large Scale Red Hat Ansible Automation Platform Deployment

=== Designing a Clustered Ansible Automation Platform Implementation

==== Running Red Hat Ansible Automation Platform at Scale

==== Automation Mesh

===== Benefits of Automation Mesh

===== Types of Nodes on Automation Mesh

===== What Are Instance Groups?

==== Planning Network Communication and Firewalls

===== Requirements for Control Nodes and Hybrid Nodes

===== Requirements for Hop Nodes

===== Requirements for Execution Nodes

==== Planning for Automation Mesh

===== Providing Resilient Services :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Deploying Distributed Execution with Automation Mesh

==== Configuring Automation Mesh

===== Creating Instance Groups

===== Adding Nodes to the Automation Mesh

===== Removing Nodes from the Automation Mesh

==== Visualizing Automation Mesh Topology

==== Automation Mesh Design Patterns

==== Validation Checks :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

=== Managing Distributed Execution with Automation Mesh

==== Managing Instance Groups in Automation Controller

===== Creating Instance Groups

===== Assigning Execution Nodes to an Instance Group

===== Running a Health Check on the Nodes

===== Disassociating a Node from an Instance Group

==== Assigning Default Instance Groups to Inventories and Job Templates

===== Configuring an Inventory to Use Instance Groups

===== Configure a Job Template to Use Instance Groups

===== Running a Job Template with Instance Groups

==== Testing the Resilience of Automation Mesh

===== Testing Control Plane Resilience

===== Testing Execution Plane Resilience

==== Monitoring Automation Mesh from the Web UI

==== Monitoring Automation Mesh from the Command Line

===== Listing Nodes and Instance Groups

===== Monitoring Automation Mesh Using the **receptorctl** Command

== References and Additional Information

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