Red Hat
Training and
Certification

DO374 - Instructor Demo Guide

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Version 1.0

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1. Developing Playbooks with Ansible Automation Platform 2

1.1. Introducing Red Hat Ansible Automation Platform 2

Describing the architecture of Red Hat Ansible Automation Platform 2 (AAP2) and new features for Ansible development.

1.1.1. Orientation to Red Hat Ansible Automation Platform 2

New evolution of Ansible Platform providing customization with Ansible Execution Environments (EEs), Ansible Navigator, and a redesign of Ansible Tower which has now become Ansible Controller. Ansible Automation Platform now also provides Ansible Automation Hub which is a private Ansible Galaxy as well as a container registry service for Ansible EEs.

1.1.2. Red Hat Ansible Automation Platform 2 Components

1.1.2.1. Ansible Core

The Ansible Core package is provided by **ansible-core** and is version Ansible Core 2.11 in AAP2.0. This package provides the **ansible** command as well as the built-in modules allowing administrators to run playbooks with the **ansible-playbook** command. The **ansible-core** package only contains a minimal set of modules (***ansible.builtin***) collection and all other modules have been moved to Ansible collections.

The **ansible** *Package*

It is still possible to install the package called **ansible**. This will install Ansible 2.9 which is AAP1.2. This version of Ansible will support collections, but is not the full AAP2.0 version of Ansible.

1.1.2.2. Ansible Content Collections

Ansible content and modules have now been re-organized into what is referred to as Ansible Content Collections (***Content Collections***) in order to support the growth and rapid development of modules and packages. This separation allows modules, roles, plug-in to be separated from the **Ansible Core** for a simpler management style.

This separation provides the following

- Developers can easily upgrade and deploy new version of their modules without depending on Ansible
- Only needed modules can be present on the Ansible system or in the execution environment
- New modules and content doesn't need to wait for a new version of Ansible to be deployed

ansible.builtin

The **ansible.builtin** collection is a special collection that will always be part of Ansible Core. However, this has a limited number of modules. Things like the **Firealld** module have now been moved as part of the **POSIX** Ansible Collection.

Collection Mapping

Ansible mapping of content collections: https://github.com/ansible/ansible/blob/devel/lib/ansible/config/ansible_builtin_runtime.yml

Red Hat Official Collections are available from: https://console.redhat.com/ansible/ansible-dashboard

1.1.2.3. Ansible Content Navigator

AAP provides **ansible-navigator** which is the new *preffered* tool to run and interact with Ansible on the CLI. It extends and includes the functionality of the **ansible-playbook**, **ansible-inventory**, and **ansible-config** commands.

While Ansible Navigator still leverages **ansible.cfg**, it has its own configuration file that must point to both the **ansible.cfg** being used as well as using its own **ansible-navigator.yml** configuration file which has even more options to extend and control the behavior of Ansible Navigator.

Why **ansible-navigator***?*

The purpose of **ansible-navigator** is to separate the control node from the execution environment. This makes it easier for playbooks to be run in a production environment from Ansible Controller Nodes (formerly known as Ansible Tower).

1.1.2.4. Ansible Execution Environments

Ansible Execution Environments (EEs) as container images which contain the following items:

<u>Ansible EEs</u>

- Ansible Core
- Ansible Content Collections
  - Ansible Modules
  - Ansible Roles
- Python Libraries
- Other dependencies

The default AAP2 environment provides Ansible Core 2.11 and Red Hat Certified Content Collections to give a similar experience to AAP1.2 which is what provides Ansible 2.9.

AAP1.2 and Ansible 2.9

Ansible 2.9 is part of AAP1.2, but it supports things like Ansible Collections. You must have AAP2 to support things link Ansible Navigator, and other components of the AAP2 platform.

The **ansible-builder** package can be used to create and develop your own custom execution environments.

[Section1 5ee3b] | *Section1-5ee3b.png*

Figure 1. AAP2 Utilities

1.1.2.5. Automation Controller

Automation Controller provides a central web-based UI and REST API which can be used to automate Ansible jobs. Previous iterations of Ansible leveraged Ansible Tower which was the control node and execution environment. With the deployment of AAP2, Ansible Tower was re-named to Ansible Automation Controller and serves as the control node ***only***, as with Ansible Automation Controller, the execution environment can be separated from the controller node as it now runs in a container.

[Section1 85d04] | *Section1-85d04.png*

Figure 2. AAP2 Automation Controller Components, align=

By separating the control node functionality and execution environments, it is much easier to leverage the system when playbooks could require different python environments or other requirements to run.

Automation Controller

AAP2 Automation Controllers has the ability to use multiple execution environments on playbook and project levels as the execution plan is 100% separate from the control plane.

1.1.2.6. Ansible Automation Hub

Ansible Automation Hub allows easy management and distribution of Ansible automation content. Red Hat maintains supported and certified content collections and Ansible Galaxy maintains the community-based content. The addition of Automation Hub also provides the ability to host a private automation hub which is basically a self-hosted version of Ansible Galaxy or Red Hat's **console.redhat.com** version of Automation Hub.

The private automation hub provides a container registry for distribution of custom execution environments as well as a repository for Ansible Collections and namespaces.

1.1.2.7. Hosted Services

Red Hat provides three (3) hosted Ansible Automation services

- Ansible Automation Hub
- Ansible Automation Services Catalog
- Ansible Insights for Red Hat AAP

1.1.3. Red Hat Ansible Automation Platform 2 Architecture

1.1.3.1. Developing Playbooks with Ansible Automation Platform 2

Ansible Execution Engines (EEs) can be built and customized to contain everything needed to execute playbooks developed by your organization. These playbooks can be leveraged seamlessly between content navigator and automation controller providing access is available to the EEs being used (which is where automation hub comes into play). :pygments-style: tango :source-highlighter: pygments :toc: :toclevels: 7 :sectnums: :sectnumlevels: 6 :numbered: :chapter-label: :icons: font :icons: font :imagesdir: ./images/

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Ansible Content Navigator can be used to run playbooks in place of the Ansible command. At this point, the **ansible-navigator.yml** file doesn't exist, so additional command line options will need to exist. Later chapters introduce how to fully configure navigator for execution environments.

Example 1. **Navigator Demo**

1. Switch to Demo Directory

```
[student@workstation ~]$ cd /home/student/github/do374/Demos/CH1/navigator
```

2. Install Navigator

```
[student@workstation navigator]$ sudo yum install ansible-navigator

... OUTPUT OMITTED ...

Installed:
  ansible-navigator-1.0.0-2.el8ap.noarch

Complete!
```

3. Login to **hub.lab.example.com** to allow downloading of the EE **ee-supported-rhel8:2.0** for navigator

```
[student@workstation navigator]$ podman login -u admin -p redhat hub.lab.example.com
Login Succeeded!
```

4. Set an execution environment variable and verify

```
[student@workstation navigator]$ export EE=ee-supported-rhel8:2.0 ; echo $EE
ee-supported-rhel8:2.0
```

5. Run the playbook with the **ansible-navigator run** command

```
[student@workstation navigator]$ ansible-navigator run playbook.yml -m stdout --eei $EE ①

... OUTPUT OMITTED ...

servere.lab.example.com    : ok=3    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
serverf.lab.example.com    : ok=3    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

① The **$EE** environment variable provides the EE for the **ansible-navigator** command

SSH Key Errors from Execution Environment

If you receive this as a message … it is possible you are running ansible using SSH and the SSH keys haven't been added. it is necessary to use an **eval $(ssh-agent)** followed by adding the key to your keyring.

Listing 1. Error

```
fatal: [servera.lab.example.com]: UNREACHABLE! => {"changed": false, "msg": "Failed to connect to the host
via ssh: Warning: Permanently added 'servera.lab.example.com,172.25.250.10' (ECDSA) to the list of known
hosts.\r\ndevops@servera.lab.example.com: Permission denied (publickey,gssapi-keyex,gssapi-with-
mic,password,keyboard-interactive).", "unreachable": true}
```

Listing 2. Adding SSH Keys for Ansible Execution Environment

```
[student@workstation navigator]$ eval $(ssh-agent) ①
Agent pid 234883

[student@workstation navigator]$ ssh-add ~/.ssh/lab_rsa ②
Identity added: /home/student/.ssh/lab_rsa (/home/student/.ssh/lab_rsa)
```

① Starting **ssh-agent**

② Adding key to keyring for SSH-Agent

ansible-playbook *Equivalence*

The **ansible-navigator run playbook.yml -m stdout** will provide the same STDOUT as the **ansible-playbook** command. There are some other features about **ansible-navigator** but those will be covered in a later chapter and section.

6. Run the **ansible-navigator run** command interactively (***Leave out the -m stdout***)
   a. Get output of first playbook/play (Hit **0** and Enter to navigate)
   b. Get detailed output of **Task 13** (Hit **:** and then hit **13** and enter to navigate)

```
[student@workstation navigator]$ ansible-navigator run playbook.yml --eei $EE
```

[S2Demo 4dd38] | *S2Demo-4dd38.png*

Figure 3. Navigator Interactive Window

[S2Demo 12ea6] | *S2Demo-12ea6.png*

Figure 4. Attempting to get Task 13 Information

[S2Demo e90f4] | *S2Demo-e90f4.png*

Figure 5. Task 13 Information

7. Exit Ansible Navigator by hitting the **ESC** key multiple times to exit each layer.

```
[student@workstation navigator]$
```

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1.5. Demo - Using Git

Ansible playbooks can be leveraged for Infrastructure-as-Code (IaC). In order to do this, playbooks and other assets should exist in version control. One way to accomplish this is by using Github or Gitlab. The course has been setup to use Gitlab, but this demo, we will see how to use Github and personal access tokens.

Example 2. **Git Demo**

1. Update the BASHRC file to use the **git-prompt.sh** Assets

Listing 3. **.bashrc** *File*

```
[student@workstation ~]$ vim .bashrc
# .bashrc

# Source global definitions
if [ -f /etc/bashrc ]; then
    . /etc/bashrc
fi

## Lines added for Git Management
source /usr/share/git-core/contrib/completion/git-prompt.sh
export GIT_PS1_SHOWDIRTYSTATE=true
export GIT_PS1_SHOWUNTRACKEDFILES=true
export PS1='[\u@\h \W$(declare -F __git_ps1 &>/dev/null && __git_ps1 " (%s)")]\$ '


# User specific environment
PATH="$HOME/.local/bin:$HOME/bin:$PATH"
export PATH

# Uncomment the following line if you don't like systemctl's auto-paging feature:
# export SYSTEMD_PAGER=

# User specific aliases and functions
```

2. Apply changes for BASHRC

```
[student@workstation ~]$ source .bashrc
```

3. Configure system for PAT (Personal Access Tokens)

```
[student@workstation ~]$ git config --global credential.helper cache
```

4. Verify credential helper and other configurations

```
[student@workstation ~]$ git config --global -l
user.name=Git Lab
user.email=git@lab.example.com
push.default=simple
```

5. Create Github Directory and Switch to it

```
[student@workstation ~]$ mkdir Github ; cd Github
```

6. Clone **DO374** Repository

```
[student@workstation Github]$ git clone https://github.com/tmichett/do374.git
Cloning into 'do374'...
remote: Enumerating objects: 56, done.
remote: Counting objects: 100% (56/56), done.
remote: Compressing objects: 100% (38/38), done.
remote: Total 56 (delta 11), reused 51 (delta 9), pack-reused 0
Unpacking objects: 100% (56/56), 556.15 KiB | 2.93 MiB/s, done
```

7. Change to **do374** Directory

```
[student@workstation Github]$ cd do374/
[student@workstation do374 (main)]$ ①
```

① Notice it shows main branch

8. Create a dummy file and observe prompt change

```
[student@workstation do374 (main)]$ echo "I'm a dummy file" > test.txt
[student@workstation do374 (main %)]$ ①
```

① Prompt changed to **%** indicating new "untracked" files

9. Add and Commit File

Listing 4. Adding File for Tracking

```
[student@workstation do374 (main %)]$ git add .
[student@workstation do374 (main +)]$ ①
```

① Prompt changed to **+** indicating new files being tracked, but not committed

Listing 5. Commiting File Locally

```
[student@workstation do374 (main +)]$ git commit -m "Testing"
[main 9697a39] Testing
 1 file changed, 1 insertion(+)
 create mode 100644 test.txt
[student@workstation do374 (main)]$ ①
```

① Normal Prompt

10. Get status of repository

```
[student@workstation do374 (main)]$ git status
On branch main
Your branch is ahead of 'origin/main' by 1 commit.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
```

11. Push to remote repository

```
[student@workstation do374 (main)]$ git push
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 4 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 285 bytes | 285.00 KiB/s, done.
Total 3 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To https://github.com/tmichett/do374.git
   2b7cf28..9697a39  main -> main
```

First time pushing saves credentials

Listing 6. SSH/CLI Version - Warning doesn't appear if using X11/Wayland and Gnome in Graphical Environment

```
[student@workstation CH1]$ git push

(gnome-ssh-askpass:236143): Gtk-WARNING **: 11:50:21.480: cannot open display:
error: unable to read askpass response from '/usr/libexec/openssh/gnome-ssh-askpass'
Username for 'https://github.com': tmichett

(gnome-ssh-askpass:236144): Gtk-WARNING **: 11:50:23.638: cannot open display:
error: unable to read askpass response from '/usr/libexec/openssh/gnome-ssh-askpass'
Password for 'https://tmichett@github.com':
```

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