

Ansible Workshop - Exercises

# Advanced

Building and running Ansible with Container  
Images and more advanced topics.



# Ansible Navigator

## Objective

In this exercise, we are going to explore the latest Ansible command line utility `ansible-navigator` to learn how to work with inventory files and the listing of modules when needing assistance. The goal is to familiarize yourself with how `ansible-navigator` works and how it can be used to enrich your Ansible experience.

This exercise will cover

- Working with inventory files
- Locating and understanding an `ini` formatted inventory file
- Listing modules and getting help when trying to use them

## Guide

With the introduction of Ansible Automation Platform 2, several new key components are being introduced as a part of the overall developer experience. Execution environments have been introduced to provide predictable environments to be used during automation runtime. All collection dependencies are contained within the execution environment to ensure that automation created in development environments runs the same as in production environments.

What do you find within an execution environment?

- Base Image ([RHEL UBI, Fedora, ...](#))
- Ansible (-Core) and `ansible-runner`
- Python 3
- Any content Collections
- Collection python or binary dependencies.

Why use execution environments?

They provide a standardized way to define, build and distribute the environments that the automation runs in. In a nutshell, Automation execution environments are container images that allow for easier administration of Ansible by the platform administrator.

Considering the shift towards containerized execution of automation, automation development workflow and tooling that existed before Ansible Automation Platform 2 have had to be re-imagined. In short, `ansible-navigator` replaces `ansible-playbook` and other `ansible-*` command line utilities.

With this change, Ansible playbooks are executed using the `ansible-navigator` command on the control node.

The prerequisites and best practices for using `ansible-navigator` have been done for you within this lab.

These include:

- Installing the `ansible-navigator` package

- Creating a default settings `/home/student1/.ansible-navigator.yml` for all your projects (optional)
- All execution environment (EE) logs are stored within `/home/student1/.ansible-navigator/logs/ansible-navigator.log`
- Playbook artifacts are saved under `/tmp/artifact.json`

Follow the next link for more information on the [Ansible navigator settings](#).

### Tip

The parameters for `ansible-navigator` maybe modified for your specific environment. The current settings use a default `ansible-navigator.yml` for all projects, but a specific `ansible-navigator.yml` can be created for each project and is the recommended practice.

A useful `ansible-navigator`-configuration for the workshop environment is the following, create a new file in your project directory `/home/student1/ansible_files/ansible-navigator.yml` and paste in this configuration:

```
---
ansible-navigator:
  ansible:
    # Specify an inventory file path or comma separated host list
    inventories:
      - /home/student1/lab_inventory/hosts
    # Sets configuration for the creation of artifacts for completed playbooks.
    # Can be enabled or disabled and specify filename and location
    playbook-artifact:
      enable: true
      save-as: ~/ansible_files/artifacts/{playbook_name}-artifact-{ts_utc}.json
    # Set user interface mode, either 'stdout' or 'interactive'
    # Mode 'stdout' ensures same output method as with ansible-playbook command
    mode: interactive

    # Enable or disable the use of an execution environment and specify different options
    execution-environment:
      image: registry.redhat.io/ansible-automation-platform-20-early-access/ee-supported-rhel8:2.0.0
      enabled: true
      container-engine: podman
      pull-policy: missing
      volume-mounts:
        - src: "/etc/ansible/"
          dest: "/etc/ansible/"
```

Adjust the path to your inventory file, as well as the used container image if a newer image is used in the default `ansible-navigator`-configuration.

## Step 1 - Work with your Inventory

An inventory file is a text file that specifies the nodes that will be managed by the control machine. The nodes to be managed may include a list of hostnames or IP addresses of those nodes. The inventory file allows for nodes to be organized into groups by declaring a host group name within square brackets ([]).

To use the `ansible-navigator` command for host management, you need to provide an inventory file which defines a list of hosts to be managed from the control node. In this lab, the inventory is provided by your instructor. The

inventory file is an `ini` formatted file listing your hosts, sorted in groups, additionally providing some variables. It looks like:

```
[web]
node1 ansible_host=<X.X.X.X>
node2 ansible_host=<Y.Y.Y.Y>
node3 ansible_host=<Z.Z.Z.Z>

[control]
ansible-1 ansible_host=44.55.66.77
```

Ansible is already configured to use the inventory specific to your environment. We will show you in the next step how that is done. For now, we will execute some simple commands to work with the inventory.

To reference all the inventory hosts, you supply a pattern to the `ansible-navigator` command. `ansible-navigator inventory` has a `--list` option which can be useful for displaying all the hosts that are part of an inventory file including what groups they are associated with.

## Navigator

```
[student@ansible-1 ~]$ ansible-navigator inventory --list -m stdout
{
    "_meta": {
        "hostvars": {
            "ansible-1": {
                "ansible_host": "3.236.186.92",
            },
            "node1": {
                "ansible_host": "3.239.234.187"
            },
            "node2": {
                "ansible_host": "75.101.228.151"
            },
            "node3": {
                "ansible_host": "100.27.38.142"
            }
        }
    },
    "all": {
        "children": [
            "control",
            "ungrouped",
            "web"
        ]
    },
    "control": {
        "hosts": [
            "ansible-1"
        ]
    },
    "web": {
        "hosts": [
            "node1",
            "node2",
            "node3"
        ]
    }
}
```

## Note

`-m` is short for `--mode` which allows for the mode to be switched to standard output instead of using the text-based user interface (TUI).

If the `--list` is too verbose, the option of `--graph` can be used to provide a more condensed version of `--list`.

## Navigator

```
[student@ansible-1 ~]$ ansible-navigator inventory --graph -m stdout
@all:
|--@control:
|   |--ansible-1
|--@ungrouped:
|--@web:
|   |--node1
|   |--node2
|   |--node3
```

## Ansible

```
[student@ansible-1 ~]$ ansible-inventory --graph
@all:
|--@control:
|   |--ansible-1
|--@ungrouped:
|--@web:
|   |--node1
|   |--node2
|   |--node3
```

We can clearly see that nodes: `node1`, `node2`, `node3` are part of the `web` group, while `ansible-1` is part of the `control` group.

An inventory file can contain a lot more information, it can organize your hosts in groups or define variables. In our example, the current inventory has the groups `web` and `control`. Run Ansible with these host patterns and observe the output:

Using the `ansible-navigator inventory` command, we can also run commands that provide information only for one host or group. For example, give the following commands a try to see their output.

```
[student@ansible-1 ~]$ ansible-navigator inventory --graph web -m stdout
[student@ansible-1 ~]$ ansible-navigator inventory --graph control -m stdout
[student@ansible-1 ~]$ ansible-navigator inventory --host node1 -m stdout
```

## Tip

The inventory can contain more data. E.g. if you have hosts that run on non-standard SSH ports you can put the port number after the hostname with a colon. Or you could define names specific to Ansible and have them point to the "real" IP or hostname.

## Step 2 - Listing Modules and Getting Help

Ansible Automation Platform comes with multiple supported Execution Environments (EEs). These EEs come with bundled supported collections that contain supported content, including modules. To browse your available modules first enter interactive mode:

```
ansible-navigator
```

The screenshot shows a terminal window titled "student1@ansible-1:~". The window displays a welcome message from "winston" with a list of commands and their descriptions. The commands are numbered 0 through 18. The descriptions are as follows:

Command	Description
0 ## Welcome	Explore available collections
1 -----	Explore the current ansible configuration
2	Review documentation for a module or plugin
3 Some things you can try from here:	Show the main help page
4 - `:collections`	Explore execution environment images
5 - `:config`	Explore an inventory
6 - `:doc <plugin>`	Review the application log
7 - `:help`	Open current page in the editor
8 - `:images`	Explore a previous run using a playbook artifact
9 - `:inventory -i <inventory>`	Run a playbook in interactive mode
10 - `:log`	Quit the application
11 - `:open`	
12 - `:replay`	
13 - `:run <playbook> -i <inventory>`	
14 - `:quit`	
15	
16 happy automating,	
17	
18 -winston	

At the bottom of the terminal, there are navigation keys: `^f/PgUp` page up, `^b/PgDn` page down, `↑↓ scroll`, `esc back`, and `:help help`.

### Tip

In `ansible-navigator` exit by pressing the button `ESC`.

First browse a collection by typing `:collections`

```
:collections
```

NAME	VERSION	SHADOWED	TYPE	PATH
0 amazon.aws	1.5.0	False	contained	/usr/share/ansible/collections/ansible_collections/amazon/aws/
1 ansible.controller	4.0.0	False	contained	/usr/share/ansible/collections/ansible_collections/ansible/controller/
2 ansible.netcommon	2.2.0	False	contained	/usr/share/ansible/collections/ansible_collections/ansible/netcommon/
3 ansible.network	1.0.1	False	contained	/usr/share/ansible/collections/ansible_collections/ansible/network/
4 ansible.posix	1.2.0	False	contained	/usr/share/ansible/collections/ansible_collections/ansible posix/
5 ansible.security	1.0.0	False	contained	/usr/share/ansible/collections/ansible_collections/ansible/security/
6 ansible.utils	2.3.0	False	contained	/usr/share/ansible/collections/ansible_collections/ansible/utils/
7 ansible.windows	1.5.0	False	contained	/usr/share/ansible/collections/ansible_collections/ansible/windows/
8 arista.eos	2.2.0	False	contained	/usr/share/ansible/collections/ansible_collections/arista/eos/
9 cisco.asa	2.0.2	False	contained	/usr/share/ansible/collections/ansible_collections/cisco/asa/
10 cisco.ios	2.3.0	False	contained	/usr/share/ansible/collections/ansible_collections/cisco/ios/
11 cisco-iosxr	2.3.0	False	contained	/usr/share/ansible/collections/ansible_collections/cisco/iosxr/
12 cisco.nxos	2.4.0	False	contained	/usr/share/ansible/collections/ansible_collections/cisco/nxos/
13 cloud.common	2.0.3	False	contained	/usr/share/ansible/collections/ansible_collections/cloud/common/
14 frr.frr	1.0.3	False	contained	/usr/share/ansible/collections/ansible_collections/frr/frr/
15 ibm.qradar	1.0.3	False	contained	/usr/share/ansible/collections/ansible_collections/ibm/qradar/
16 junipernetworks.junos	2.2.0	False	contained	/usr/share/ansible/collections/ansible_collections/junipernetworks/junos/
17 kubernetes.core	2.1.1	False	contained	/usr/share/ansible/collections/ansible_collections/kubernetes/core/
18 openvswitch.openvswitch	2.0.0	False	contained	/usr/share/ansible/collections/ansible_collections/openvswitch/openvswitch/
19 redhat.insights	1.0.5	False	contained	/usr/share/ansible/collections/ansible_collections/redhat/insights/
20 redhat.openshift	2.0.1	False	contained	/usr/share/ansible/collections/ansible_collections/redhat/openshift/
21 redhat.rhel_system_roles	1.0.1	False	contained	/usr/share/ansible/collections/ansible_collections/redhat/rhel_system_roles/
22 redhat.rhv	1.4.4	False	contained	/usr/share/ansible/collections/ansible_collections/redhat/rhv/
23 redhat.satellite	2.0.1	False	contained	/usr/share/ansible/collections/ansible_collections/redhat/satellite/
24 servicenow.itsm	1.1.0	False	contained	/usr/share/ansible/collections/ansible_collections/servicenow/itsm/
25 splunk.es	1.0.2	False	contained	/usr/share/ansible/collections/ansible_collections/splunk/es/
26 trendmicro.deepsec	1.1.0	False	contained	/usr/share/ansible/collections/ansible_collections/trendmicro深深sec/
27 vmware.vmware_rest	2.0.0	False	contained	/usr/share/ansible/collections/ansible_collections/vmware/vmware_rest/
28 vyos.vyos	2.3.1	False	contained	/usr/share/ansible/collections/ansible_collections/vyos/vyos/

^f/PgUp page up    ^b/PgDn page down    ↵ scroll    esc back    [0-9] goto    :help help

To browse the content for a specific collections, type the corresponding number. For example in the example screenshot above the number 0 corresponds to `amazon.aws` collection. To zoom into collection type the number 0 .

0				
AMAZON.AWS	TYPE	ADDED	DEPRECATED	DESCRIPTION
0 aws_account_attribute	lookup	None	False	Look up AWS account attributes.
1 aws_az_info	module	1.0.0	False	Gather information about availability zones in AWS.
2 aws_caller_info	module	1.0.0	False	Get information about the user and account being used to make AWS calls.
3 aws_ec2	inventory	None	False	EC2 inventory source
4 aws_rds	inventory	None	False	rds instance source
5 aws_resource_actions	callback	None	False	Summarizes all "resource:actions" completed
6 aws_s3	module	1.0.0	False	Manage objects in S3.
7 aws_secret	lookup	None	False	Look up secrets stored in AWS Secrets Manager.
8 aws_service_ip_ranges	lookup	None	False	Look up the IP ranges for services provided in AWS such as EC2 and S3.
9 aws_ssm	lookup	None	False	Get the value for a SSM parameter or all parameters under a path.
10 cloudformation	module	1.0.0	False	Create or delete an AWS CloudFormation stack
11 cloudformation_info	module	1.0.0	False	Obtain information about an AWS CloudFormation stack
12 ec2	module	1.0.0	False	Create, terminate, start or stop an instance in ec2
13 ec2_ami	module	1.0.0	False	Create or destroy an image (AMI) in ec2
14 ec2_ami_info	module	1.0.0	False	Gather information about ec2 AMIs
15 ec2_elb_lb	module	1.0.0	False	Creates, updates or destroys an Amazon ELB.
16 ec2_eni	module	1.0.0	False	Create and optionally attach an Elastic Network Interface (ENI) to an instance
17 ec2_eni_info	module	1.0.0	False	Gather information about ec2 ENI interfaces in AWS
18 ec2_group	module	1.0.0	False	Maintain an ec2 VPC security group.
19 ec2_group_info	module	1.0.0	False	Gather information about ec2 security groups in AWS.
20 ec2_key	module	1.0.0	False	Create or delete an ec2 key pair
21 ec2_metadata_facts	module	1.0.0	False	Gathers facts (instance metadata) about remote hosts within EC2
22 ec2_snapshot	module	1.0.0	False	Creates a snapshot from an existing volume
23 ec2_snapshot_info	module	1.0.0	False	Gather information about ec2 volume snapshots in AWS
24 ec2_tag	module	1.0.0	False	Create and remove tags on ec2 resources
25 ec2_tag_info	module	1.0.0	False	List tags on ec2 resources
26 ec2_vol	module	1.0.0	False	Create and attach a volume, return volume id and device map
27 ec2_vol_info	module	1.0.0	False	Gather information about ec2 volumes in AWS
28 ec2_vpc_dhcp_option	module	1.0.0	False	Manages DHCP Options, and can ensure the DHCP options for the given VPC match what's required
29 ec2_vpc_dhcp_option_info	module	1.0.0	False	Gather information about dhcp options sets in AWS
30 ec2_vpc_net	module	1.0.0	False	Configure AWS virtual private clouds

^f/PgUp page up    ^b/PgDn page down    ↵ scroll    esc back    [0-9] goto    :help help

Get help for a specific module including usage by zooming in further. For example the module `ec2_tag` corresponds to 24 .

:24

Scrolling down using the arrow keys or page-up and page-down can show us documentation and examples.

The screenshot shows a terminal window with the title "student1@ansible-1:~". The command run is "man AMAZON.AWS.EC2\_TAG". The output displays the module's short description, version information, and examples. The examples section shows how to use the module to manage tags on EC2 resources, including creating tags, ensuring volumes are tagged, and removing specific tags like 'Env'.

```
AMAZON.AWS.EC2_TAG: create and remove tags on ec2 resources
short_description: create and remove tags on ec2 resources
version_added: 1.0.0
version_added_collection: amazon.aws
examples: !-
- name: Ensure tags are present on a resource
  amazon.aws.ec2_tag:
    region: eu-west-1
    resource: vol-XXXXXX
    state: present
    tags:
      Name: ubervol
      env: prod

- name: Ensure all volumes are tagged
  amazon.aws.ec2_tag:
    region: eu-west-1
    resource: '{{ item.id }}'
    state: present
    tags:
      Name: dbserver
      Env: production
  loop: '{{ ec2_vol.volumes }}'

- name: Remove the Env tag
  amazon.aws.ec2_tag:
    region: eu-west-1
    resource: i-xxxxxxxxxxxxxxxxx
    tags:
      Env:
    state: absent
```

At the bottom of the terminal window, there are navigation keys: `^f/PgUp page up`, `^b/PgDn page down`, `↑ scroll`, `esc back`, `- previous`, `+ next`, `[0-9] goto`, and `:help help`.

You can also skip directly to a particular module by simply typing `:doc namespace.collection.module-name`. For example typing `:doc amazon.aws.ec2_tag` would skip directly to the final page shown above.

### Tip

Different execution environments can have access to different collections, and different versions of those collections. By using the built-in documentation you know that it will be accurate for that particular version of the collection.

## Step 3 - Examining Execution Environments

Run the `ansible-navigator` command with the `images` argument to look at execution environments configured on the control node:

```
ansible-navigator images
```

NAME	TAG	EXECUTION ENVIRONMENT	CREATED	SIZE
0 ee-29-rhel8	2.0.0	True	12 days ago	791 MB
1 ee-minimal-rhel8	2.0.0	True	12 days ago	288 MB
2 ee-supported-rhel8 (primary)	2.0.0	True	12 days ago	920 MB
3 security_workshop_ee	latest	True	7 days ago	862 MB

^f/PgUp page up      ^b/PgDn page down      ↑ scroll      esc back      [0-9] goto      :help help

### Note

The output you see might differ from the above output

This command gives you information about all currently installed Execution Environments or EEs for short. Investigate an EE by pressing the corresponding number. For example pressing **2** with the above example will open the `ee-supported-rhel8` execution environment:

PROBLEMS	OUTPUT	TERMINAL	DEBUG CONSOLE	DESCRIPTION
			EE-SUPPORTED-RHEL8:2.0.0 (PRIMARY)	
0	Image information			Information collected from image inspection
1	General information			OS and python version information
2	Ansible version and collections			Information about ansible and ansible collections
3	Python packages			Information about python and python packages
4	Operating system packages			Information about operating system packages
5	Everything			All image information

Selecting **2** for `Ansible version and collections` will show us all Ansible Collections installed on that particular EE, and the version of `ansible-core`:

```

EE-SUPPORTED-RHEL8:2.0.0 (PRIMARY) (INFORMATION ABOUT ANSIBLE AND ANSIBLE COLLECTIONS)
0 ---
1 ansible:
2   collections:
3     details:
4       amazon.aws: 1.5.0
5       ansible.controller: 4.0.0
6       ansible.netcommon: 2.2.0
7       ansible.network: 1.0.1
8       ansible.posix: 1.2.0
9       ansible.security: 1.0.0
10      ansible.utils: 2.3.0
11      ansible.windows: 1.5.0
12      arista.eos: 2.2.0
13      cisco.asa: 2.0.2
14      cisco.ios: 2.3.0
15      cisco-iosxr: 2.3.0
16      cisco.nxos: 2.4.0
17      cloud.common: 2.0.3
18      frr.frr: 1.0.3
19      ibm.qradar: 1.0.3
20      junipernetworks.junos: 2.2.0
21      kubernetes.core: 2.1.1
22      openvswitch.openvswitch: 2.0.0
23      redhat.insights: 1.0.5
24      redhat.openshift: 2.0.1
25      redhat.rhel_system_roles: 1.0.1
26      redhat.rhv: 1.4.4
27      redhat.satellite: 2.0.1
28      servicenow.itsm: 1.1.0
29      splunk.es: 1.0.2
30      trendmicro.deepsec: 1.1.0
31      vmware.vmware_rest: 2.0.0
32      vyos.vyos: 2.3.1
33      version:
34        details: core 2.11.2

```

## Step 4 - Examining the ansible-navigator configuration

Either use Visual Studio Code to open or use the `cat` command to view the contents of the `ansible-navigator.yml` file. The file is located in the home directory:

```

$ cat ~/.ansible-navigator.yml
---
ansible-navigator:
  ansible:
    inventories:
      - /home/student1/lab_inventory/hosts

  execution-environment:
    image: registry.redhat.io/ansible-automation-platform-20-early-access/ee-supported-
rhe18:2.0.0
    enabled: true
    container-engine: podman
    pull-policy: missing
    volume-mounts:
      - src: "/etc/ansible/"
        dest: "/etc/ansible/"

```

Note the following parameters within the `ansible-navigator.yml` file:

- `inventories`: shows the location of the ansible inventory being used

- execution-environment : where the default execution environment is set

For a full listing of every configurable knob checkout the [documentation](#).

## Step 3 - Running the Playbook

Create a simple playbook:

```
---
- name: Apache server installation
  hosts: node1
  become: true
  tasks:
    - name: Ensure Apache package is installed
      ansible.builtin.package:
        name: httpd
        state: present
```

To run your playbook, use the `ansible-navigator run <playbook>` command as follows:

```
[student@ansible-1 ansible_files]$ ansible-navigator run apache.yml
```



### Tip

The existing `ansible-navigator.yml` file provides the location of your inventory file. If this was not set within your `ansible-navigator.yml` file, the command to run the playbook would be: `ansible-navigator run apache.yml -i /home/student1/lab_inventory/hosts`

When running the playbook, you'll be displayed a text user interface (TUI) that displays the play name among other information about the playbook that is currently run.

PLAY NAME	OK	CHANGED	UNREACHABLE	FAILED	SKIPPED	IGNORED
IN PROGRESS	TASK COUNT	PROGRESS				
0 Apache server installed	2	1	0	0	0	0
0	2	COMPLETE				

If you notice, prior to the play name `Apache server installed`, you'll see a `0`. By pressing the `0` key on your keyboard, you will be provided a new window view displaying the different tasks that ran for the playbook completion. In this example, those tasks included the "Gathering Facts" and "latest Apache version installed". The "Gathering Facts" is a built-in task that runs automatically at the beginning of each play. It collects information about the managed nodes. Exercises later on will cover this in more detail. The "latest Apache version installed" was the task created within the `apache.yml` file that installed `httpd`.

The display should look something like this:

RESULT	HOST	NUMBER	CHANGED	TASK	TASK ACTION	DURATION
0 OK	node1	0	False	Gathering Facts	gather_facts	1s
1 OK	node1	1	False	latest Apache version installed	package	4s

Taking a closer look, you'll notice that each task is associated with a number. Task 1, "latest Apache version installed", does not show a change state, you already installed Apache yesterday, otherwise it would show a change.

By pressing `0` or `1` on your keyboard, you can see further details of the task being run. If a more traditional output view is desired, type `:st` within the text user interface.

Once you've completed, reviewing your Ansible playbook, you can exit out of the TUI via the `Esc` key on your keyboard.

### Tip

The `Esc` key only takes you back to the previous screen. Once at the main overview screen an additional `Esc` key will take you back to the terminal window.

Once the playbook has completed, connect to `node1` via `SSH` to make sure Apache has been installed. You may also skip this, as you did this yesterday.

```
[student@ansible-1 ansible_files]$ ssh node1
Last login: Wed May 15 14:03:45 2019 from 44.55.66.77
Managed by Ansible
```

Use the command `rpm -qi httpd` to verify httpd is installed:

```
[ec2-user@node1 ~]$ rpm -qi httpd
Name        : httpd
Version     : 2.4.37
[...]
```

Log out of `node1` with the command `exit` so that you are back on the control host and verify the installed package with an Ansible playbook labeled `package.yml`

```
---
- name: Check packages
  hosts: node1
  become: true
  vars:
    package: "httpd"
  tasks:
    - name: Gather the package facts
      ansible.builtin.package_facts:
        manager: auto

    - name: Output message if package is installed
      ansible.builtin.debug:
        msg: "{{ package }} in Version {{ ansible_facts.packages[package][0].version }} is
installed!"
```

```
[student@ansible-1 ~]$ ansible-navigator run package.yml -m stdout
```

```

PLAY [Check packages] ****
TASK [Gathering Facts] ****
ok: [ansible]
TASK [Gather the package facts] ****
ok: [ansible]
TASK [Check whether a httpd is installed] ****
ok: [ansible] => {
    "msg": "httpd 2.4.37 is installed!"
}
PLAY RECAP ****
ansible : ok=3    changed=0    unreachable=0    failed=0    skipped=0
rescued=0   ignored=0

```

## Step 5 - Extend your Playbook: Create an web.html

Check that the tasks were executed correctly and Apache is accepting connections: Make an HTTP request using Ansible's `uri` module in a playbook named `check_httpd.yml` from the control node to `node1`.

```

---
- name: Check URL
  hosts: control
  vars:
    node: "node1"
  tasks:
    - name: Check that you can connect (GET) to a page and it returns a status 200
      ansible.builtin.uri:
        url: "http://{{ node }}"

```

### Warning

Expect a lot of red lines and a 403 status!

```
[student@ansible-1 ~]$ ansible-navigator run check_httpd.yml -m stdout
```

There are a lot of red lines and an error: As long as there is not at least an `web.html` file to be served by Apache, it will throw an ugly "HTTP Error 403: Forbidden" status and Ansible will report an error.

So why not use Ansible to deploy a simple `web.html` file? On the ansible control host, as the `student` user, create the directory `files` to hold file resources in `~/ansible_files/`:

```
[student@ansible-1 ansible_files]$ mkdir files
```

Then create the file `~/ansible_files/files/web.html` on the control node:

```

<body>
<h1>Apache is running fine</h1>
</body>

```

In a previous example, you used Ansible's `copy` module to write text supplied on the command line into a file. Now you'll use the module in your playbook to copy a file.

On the control node as your student user edit the file `~/ansible_files/apache.yml` and add a new task utilizing the `copy` module. It should now look like this:

```
---
- name: Apache server installation
  hosts: node1
  become: true
  tasks:
    - name: Install Apache package
      ansible.builtin.package:
        name: httpd
        state: present

    - name: Ensure Apache is enabled and running
      ansible.builtin.service:
        name: httpd.service
        enabled: true
        state: started

    - name: Copy file for webserver index
      ansible.builtin.copy:
        src: web.html
        dest: /var/www/html/index.html
        mode: "0644"
```

What does this new copy task do? The new task uses the `copy` module and defines the source and destination options for the copy operation as parameters.

Run your extended Playbook:

```
[student@ansible-1 ansible_files]$ ansible-navigator run apache.yml -m stdout
```

- Have a good look at the output, notice the changes of "CHANGED" and the tasks associated with that change.
- Run the Ansible playbook `check_httpd.yml` using the "uri" module from above again to test Apache. The command should now return a friendly green "status: 200" line, amongst other information.

## Step 6 - Practice: Apply to Multiple Host

While the above, shows the simplicity of applying changes to a particular host. What about if you want to set changes to many hosts? This is where you'll notice the real power of Ansible as it applies the same set of tasks reliably to many hosts.

- So what about changing the `apache.yml` Playbook to run on `node1` **and** `node2` **and** `node3` ?

As you might remember, the inventory lists all nodes as members of the group `web`:

```
[web]
node1 ansible_host=node1.example.com
node2 ansible_host=node2.example.com
node3 ansible_host=node3.example.com
```

Change the playbook `hosts` parameter to point to `web` instead of `node1`:

```
---
```

```
- name: Apache server installation
hosts: web
become: true
tasks:
  - name: Install Apache package
    ansible.builtin.package:
      name: httpd
      state: present

  - name: Ensure Apache is enabled and running
    ansible.builtin.service:
      name: httpd.service
      enabled: true
      state: started

  - name: Copy file for webserver index
    ansible.builtin.copy:
      src: web.html
      dest: /var/www/html/index.html
      mode: "0644"
```

Now run the playbook:

```
[student@ansible-1 ansible_files]$ ansible-navigator run apache.yml -m stdout
```

Verify if Apache is now running on all web servers (node1, node2, node3). All output should be green.

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