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Course/Section: CPE31S23	**Date Submitted:**
Instructor: Dr. Taylar	**Semester and SY:**

Activity 4: Running Elevated Ad hoc Commands

1. **Objectives:**

1.1 Use commands that makes changes to remote machines

1.2 Use playbook in automating ansible commands

2. **Discussion:**

Provide screenshots for each task.

Elevated Ad hoc commands

So far, we have not performed ansible commands that makes changes to the remote servers. We manage to gather facts and connect to the remote machines, but we still did not make changes on those machines. In this activity, we will learn to use commands that would install, update, and upgrade packages in the remote machines. We will also create a playbook that will be used for automations.

Playbooks record and execute **Ansible**'s configuration, deployment, and orchestration functions. They can describe a policy you want your remote systems to enforce, or a set of steps in a general IT process. If Ansible modules are the tools in your workshop, playbooks are your instruction manuals, and your inventory of hosts are your raw material. At a basic level, playbooks can be used to manage configurations of and deployments to remote machines. At a more advanced level, they can sequence multi-tier rollouts involving rolling updates, and can delegate actions to other hosts, interacting with monitoring servers and load balancers along the way. You can check this documentation if you want to learn more about playbooks. Working with playbooks — Ansible Documentation

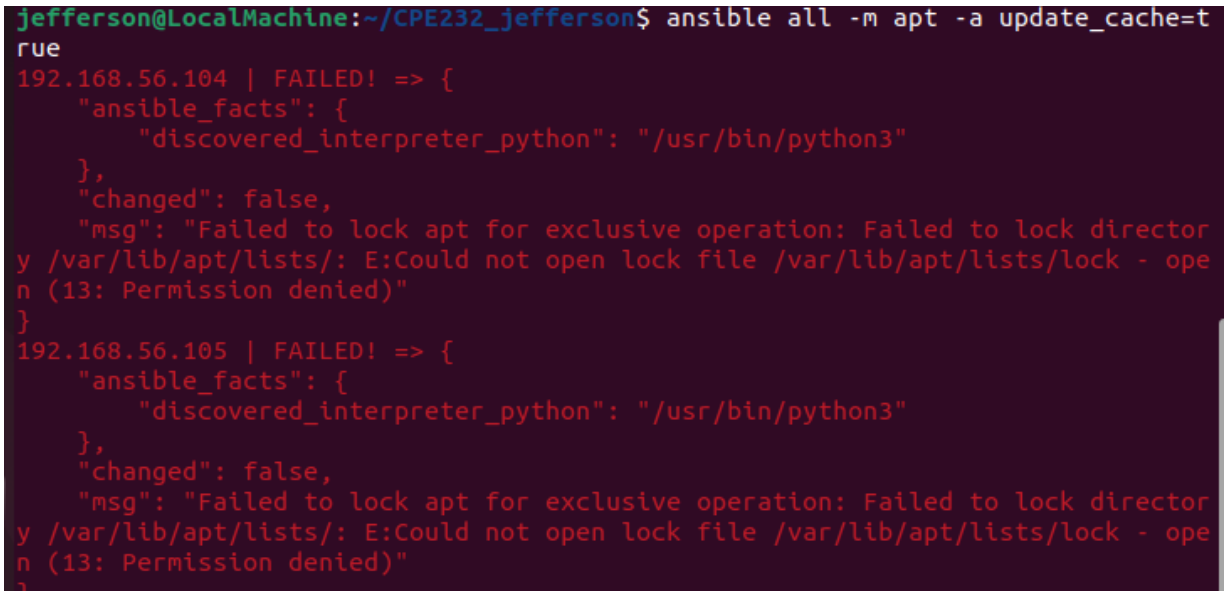
Task 1: Run elevated ad hoc commands

1. Locally, we use the command *sudo apt update* when we want to download package information from all configured resources. The sources often defined in /etc/apt/sources.list file and other files located in /etc/apt/sources.list.d/ directory. So, when you run update command, it downloads the package information from the Internet. It is useful to get info on an updated version of packages or their dependencies. We can only run

an apt update command in a remote machine. Issue the following command:

ansible all -m apt -a update_cache=true

What is the result of the command? Is it successful?



The command failed.

Try editing the command and add something that would elevate the privilege. Issue the command *ansible all -m apt -a update_cache=true --become --ask-become-pass.* Enter the sudo password when prompted. You will notice now that the output of this command is a success. The *update_cache=true* is the same thing as running *sudo apt update*. The --become command elevate the privileges and the *--ask-become-pass* asks for the password. For now, even if we only have changed the packaged index, we were able to change something on the remote server.

You may notice after the second command was executed, the status is CHANGED compared to the first command, which is FAILED.

```
jefferson@LocalMachine:~/CPE232_jefferson$ ansible all -m apt -a update_cache=t
rue --become --ask-become-pass
BECOME password:
192.168.56.105 | CHANGED => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1663163396,
    "cache_updated": true,
    "changed": true
}
192.168.56.104 | CHANGED => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1663163395,
    "cache_updated": true,
    "changed": true
```

The command is successful after adding a new command.

2. Let's try to install VIM, which is an almost compatible version of the UNIX editor Vi. To do this, we will just changed the module part in 1.1 instruction. Here is the command: *ansible all -m apt -a name=vim-nox --become --ask-become-pass.* The command would take some time after typing the password because the local machine instructed the remote servers to actually install the package.

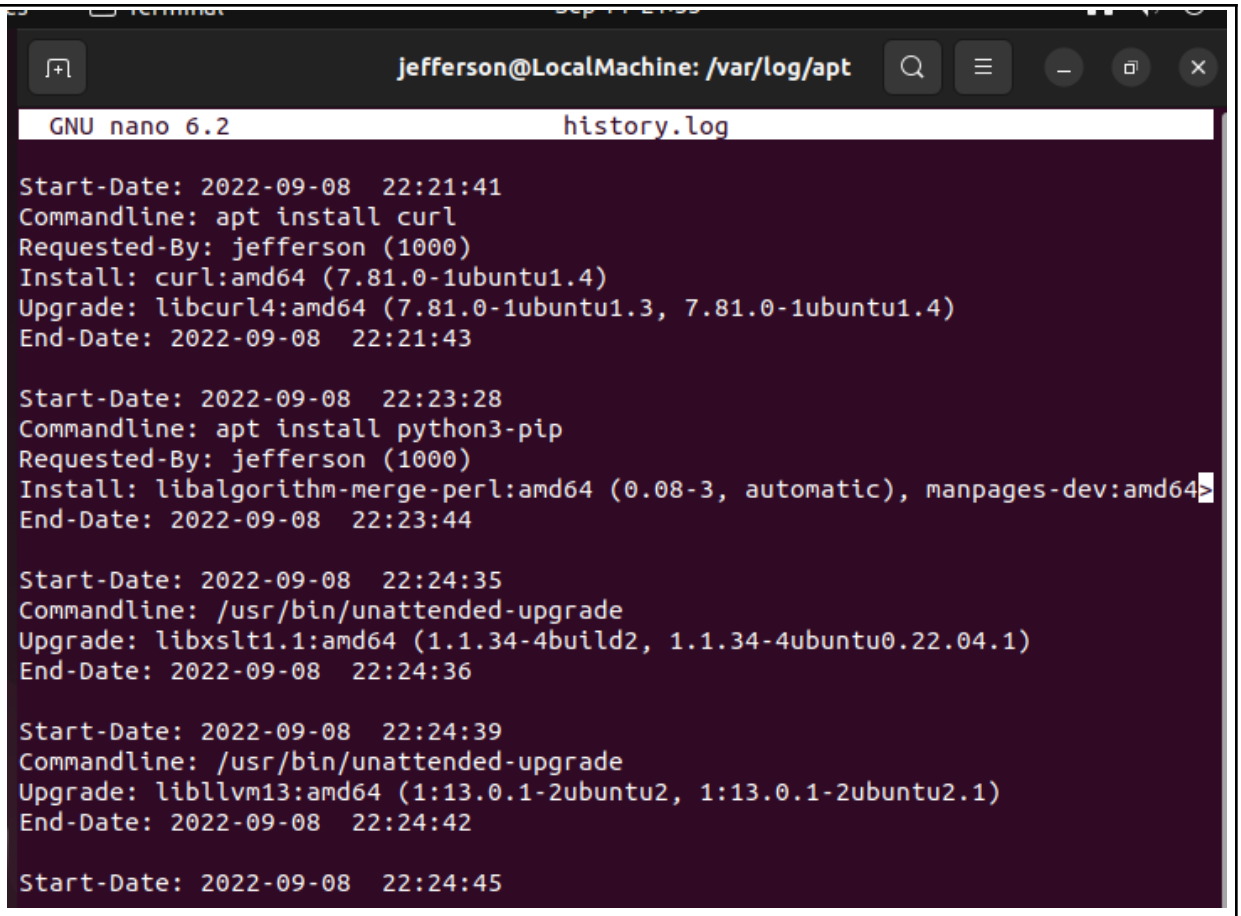
```
jefferson@LocalMachine:~/CPE232_jefferson$ ansible all -m apt -a name=vim-nox
-become --ask-become-pass
BECOME password:
192.168.56.105 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1663163396,
    "cache_updated": false,
    "changed": false
}
192.168.56.104 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1663163395,
    "cache_updated": false,
    "changed": false
}
```

2.1 Verify that you have installed the package in the remote servers. Issue the command *which vim* and the command *apt search vim-nox* respectively. Was the command successful?

```
jefferson@LocalMachine:~/CPE232_jefferson$ which vim
/usr/bin/vim
jefferson@LocalMachine:~/CPE232_jefferson$ apt search vim-nox
Sorting... Done
Full Text Search... Done
vim-nox/jammy 2:8.2.3995-1ubuntu2 amd64
  Vi IMproved - enhanced vi editor - with scripting languages support

vim-tiny/jammy,now 2:8.2.3995-1ubuntu2 amd64 [installed,automatic]
  Vi IMproved - enhanced vi editor - compact version
```

2.2 Check the logs in the servers using the following commands: *cd /var/log*. After this, issue the command *ls,* go to the folder *apt* and open history.log. Describe what you see in the history.log.

```
jefferson@LocalMachine:~/CPE232_jefferson$ cd /var/log
jefferson@LocalMachine:/var/log$ ls
alternatives.log    dmesg             kern.log
alternatives.log.1  dmesg.0           kern.log.1
apt                 dmesg.1.gz        lastlog
auth.log            dmesg.2.gz        openvpn
auth.log.1          dmesg.3.gz        private
boot.log            dmesg.4.gz        speech-dispatcher
boot.log.1          dpkg.log          syslog
boot.log.2          dpkg.log.1        syslog.1
boot.log.3          faillog           ubuntu-advantage.log
boot.log.4          fontconfig.log    ubuntu-advantage-timer.log
bootstrap.log       gdm3              ubuntu-advantage-timer.log.1
btmp                gpu-manager.log   ufw.log
btmp.1              hp                ufw.log.1
cups                installer         unattended-upgrades
dist-upgrade        journal           wtmp
jefferson@LocalMachine:/var/log$ cd apt
```



The history.log contains the log date of the upgrade of pips and other upgradable.

3. This time, we will install a package called snapd. Snap is pre-installed in Ubuntu system. However, our goal is to create a command that checks for the latest installation package.

   3.1 Issue the command: *ansible all -m apt -a name=snapd --become --ask-become-pass*
   Can you describe the result of this command? Is it a success? Did it change anything in the remote servers?

```
jefferson@LocalMachine:~/CPE232_jefferson$ ansible all -m apt -a name=snapd --b
ecome --ask-become-pass
BECOME password:
192.168.56.105 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1663163396,
    "cache_updated": false,
    "changed": false
}
192.168.56.104 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1663163395,
    "cache_updated": false,
    "changed": false
}
```

The command is successful. It does not change anything in the remote servers.

3.2 Now, try to issue this command: *ansible all -m apt -a "name=snapd state=latest" --become --ask-become-pass*

Describe the output of this command. Notice how we added the command *state=latest* and placed them in double quotations.

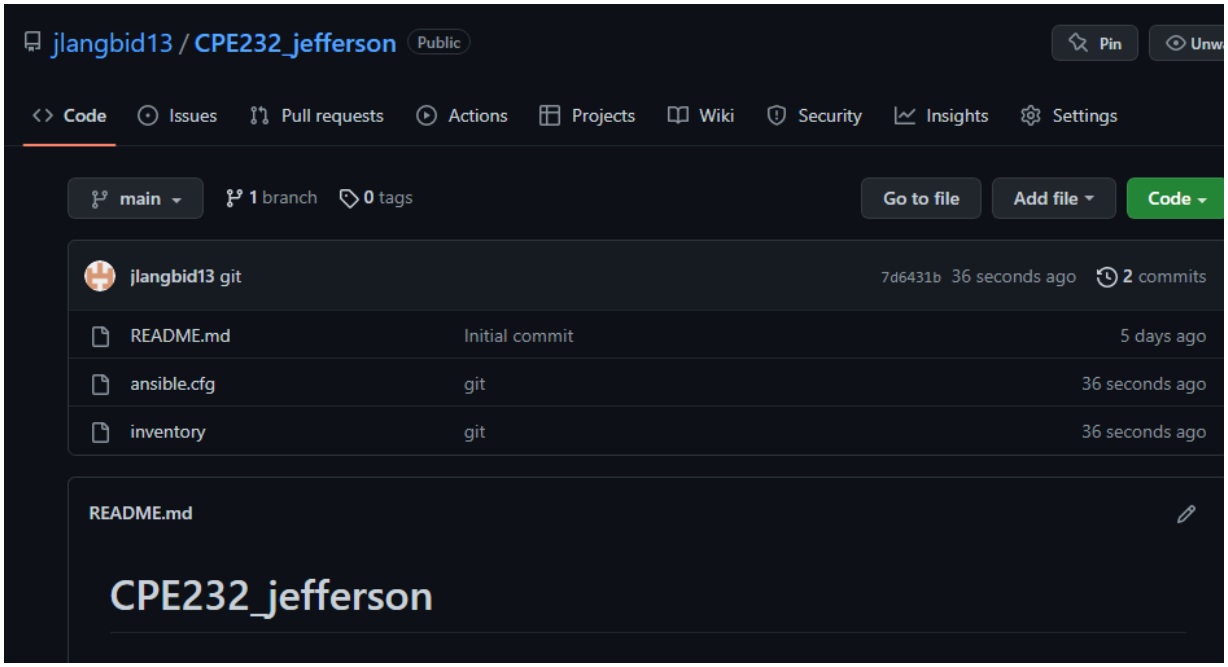
```
jefferson@LocalMachine:~/CPE232_jefferson$ ansible all -m apt -a "name=snapd st
ate=latest" --become --ask-become-pass
BECOME password:
192.168.56.104 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1663163395,
    "cache_updated": false,
    "changed": false
}
192.168.56.105 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1663163396,
    "cache_updated": false,
    "changed": false
}
```

The command is also successful but it does not change anything.

4. At this point, make sure to commit all changes to GitHub.

```
jefferson@LocalMachine:~/CPE232_jefferson$ git status
On branch main
Your branch is up to date with 'origin/main'.

Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        new file:   ansible.cfg
        new file:   inventory

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        install_apache.yml
```

```
jefferson@LocalMachine:~/CPE232_jefferson$ git commit -m "git"
[main 7d6431b] git
 2 files changed, 13 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 inventory
jefferson@LocalMachine:~/CPE232_jefferson$ git push origin main
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (4/4), 463 bytes | 463.00 KiB/s, done.
Total 4 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:jlangbid13/CPE232_jefferson.git
   8203ec6..7d6431b  main -> main
```



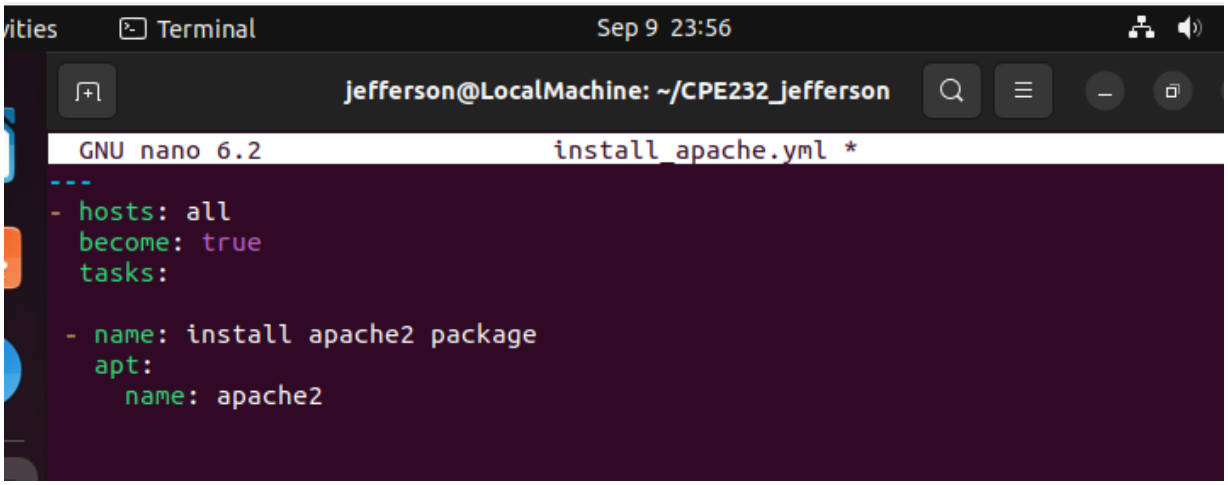
Task 2: Writing our First Playbook

1. With ad hoc commands, we can simplify the administration of remote servers. For example, we can install updates, packages, and applications, etc. However, the real strength of ansible comes from its playbooks. When we write a playbook, we can define the state that we want our servers to be in and the place or commands that ansible will carry out to bring to that state. You can use an editor to create a playbook. Before we proceed, make sure that you are in the directory of the repository that we use in the previous activities (*CPE232_yourname*). Issue the command *nano install_apache.yml*. This will create a playbook file called *install_apache.yml*. The .yml is the basic standard extension for playbook files.

   When the editor appears, type the following:

```
  GNU nano 4.8                  install_apache.yml
---
- hosts: all
  become: true
  tasks:

  - name: install apache2 package
    apt:
      name: apache2
```

   Make sure to save the file. Take note also of the alignments of the texts.

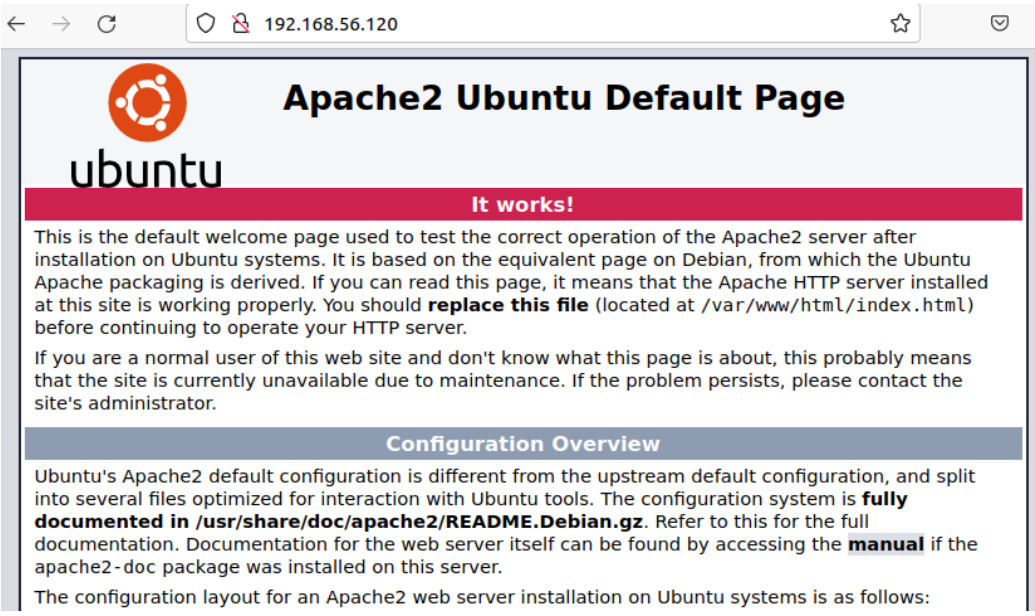


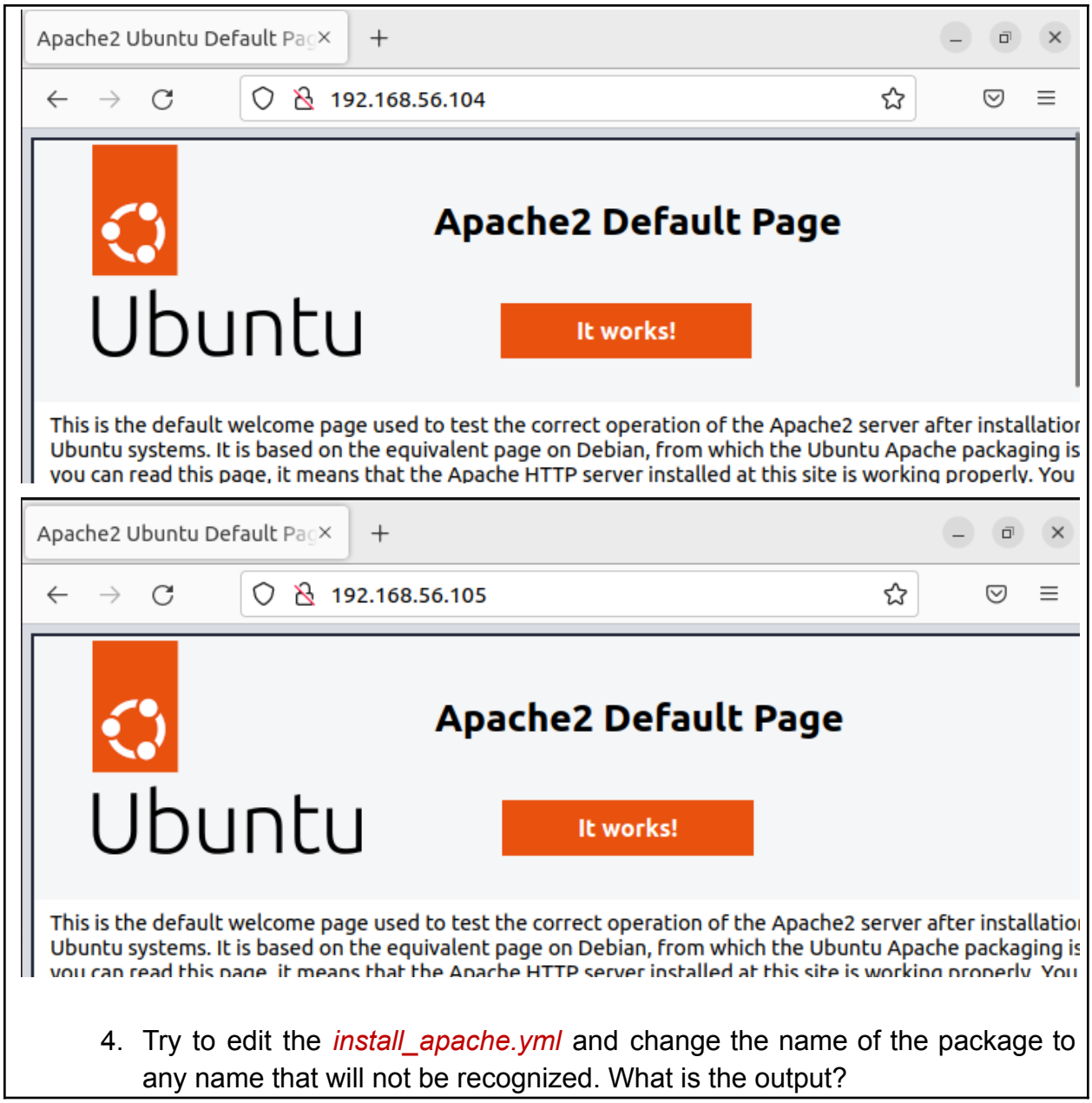
2. Run the yml file using the command: *ansible-playbook --ask-become-pass install_apache.yml.* Describe the result of this command.

```
jefferson@LocalMachine:~/CPE232_jefferson$ ansible-playbook --ask-become-pass i
nstall_apache.yml
BECOME password:

PLAY [all] *********************************************************************
*

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.104]
ok: [192.168.56.105]

TASK [install apache2 package] *************************************************
*
ok: [192.168.56.104]
changed: [192.168.56.105]

PLAY RECAP *********************************************************************
*
192.168.56.104             : ok=2    changed=0    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
192.168.56.105             : ok=2    changed=1    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
```

The command is successful and it plays the playbook.

3. To verify that apache2 was installed automatically in the remote servers, go to the web browsers on each server and type its IP address. You should see something like this.





4. Try to edit the *install_apache.yml* and change the name of the package to any name that will not be recognized. What is the output?

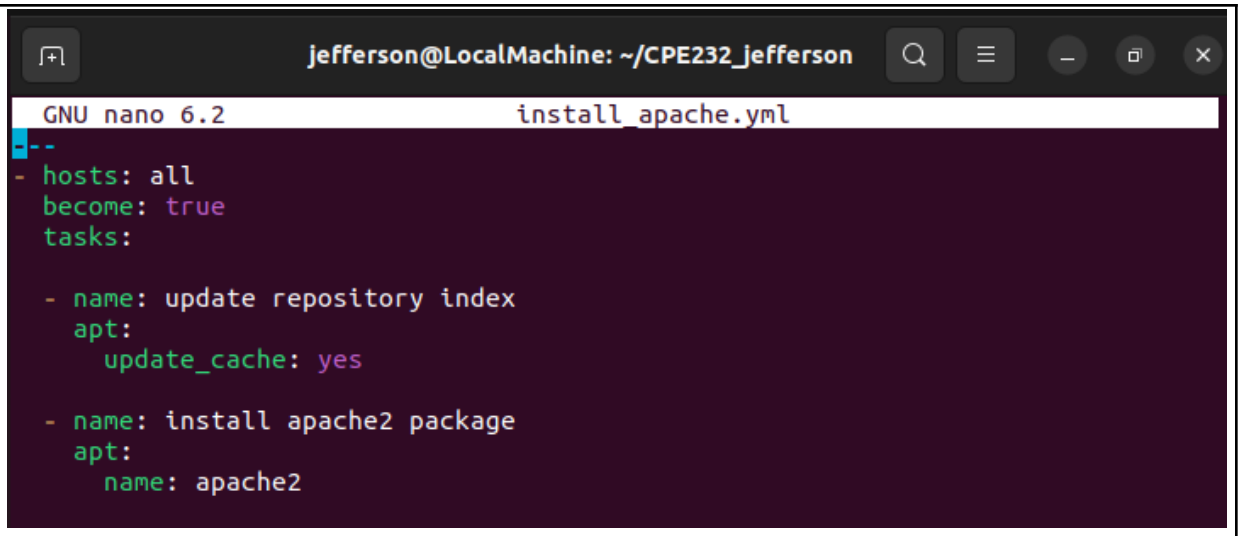
```
jefferson@LocalMachine:~/CPE232_jefferson$ nano install_apache.yml
jefferson@LocalMachine:~/CPE232_jefferson$ nano install_apache.yml
jefferson@LocalMachine:~/CPE232_jefferson$ ansible-playbook --ask-become-pass i
nstall_apache.yml
BECOME password:

PLAY [all] *********************************************************************
*

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.104]
ok: [192.168.56.105]

TASK [install apache2 package] *************************************************
*
fatal: [192.168.56.104]: FAILED! => {"changed": false, "msg": "No package matc
ing 'apachea' is available"}
fatal: [192.168.56.105]: FAILED! => {"changed": false, "msg": "No package matc
ing 'apachea' is available"}

PLAY RECAP *********************************************************************
*
192.168.56.104             : ok=1    changed=0    unreachable=0    failed=1
skipped=0    rescued=0    ignored=0
192.168.56.105             : ok=1    changed=0    unreachable=0    failed=1
skipped=0    rescued=0    ignored=0
```

The output will fail because it cannot read because it has a different package name.

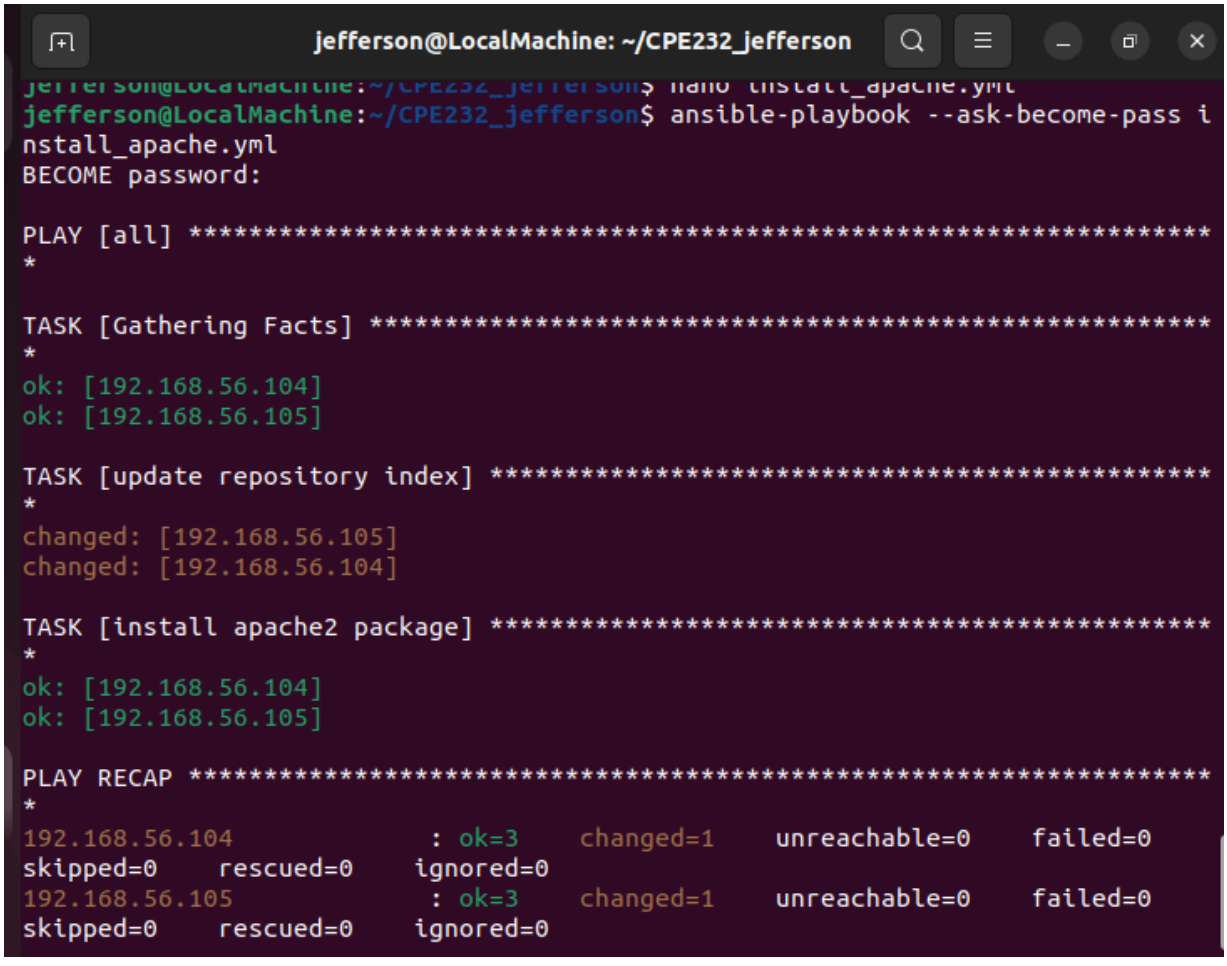
5. This time, we are going to put additional tasks into our playbook. Edit the *install_apache.yml*. As you can see, we are now adding an additional command, which is the *update_cache.* This command updates existing package-indexes on a supporting distro but not upgrading installed-packages (utilities) that were being installed.

```
---
- hosts: all
  become: true
  tasks:

  - name: update repository index
    apt:
      update_cache: yes

  - name: install apache2 package
    apt:
      name: apache2
```

Save the changes to this file and exit.



6. Run the playbook and describe the output. Did the new command change anything on the remote servers?

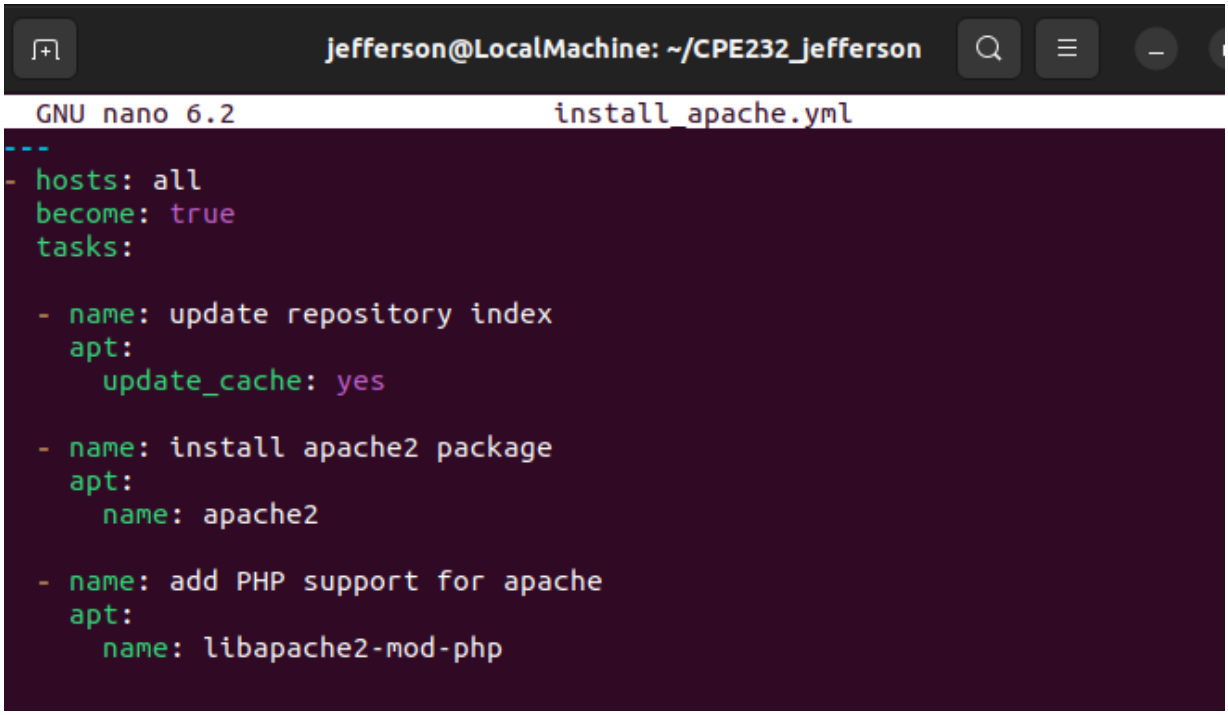


The command is successful and it updates the remote servers.

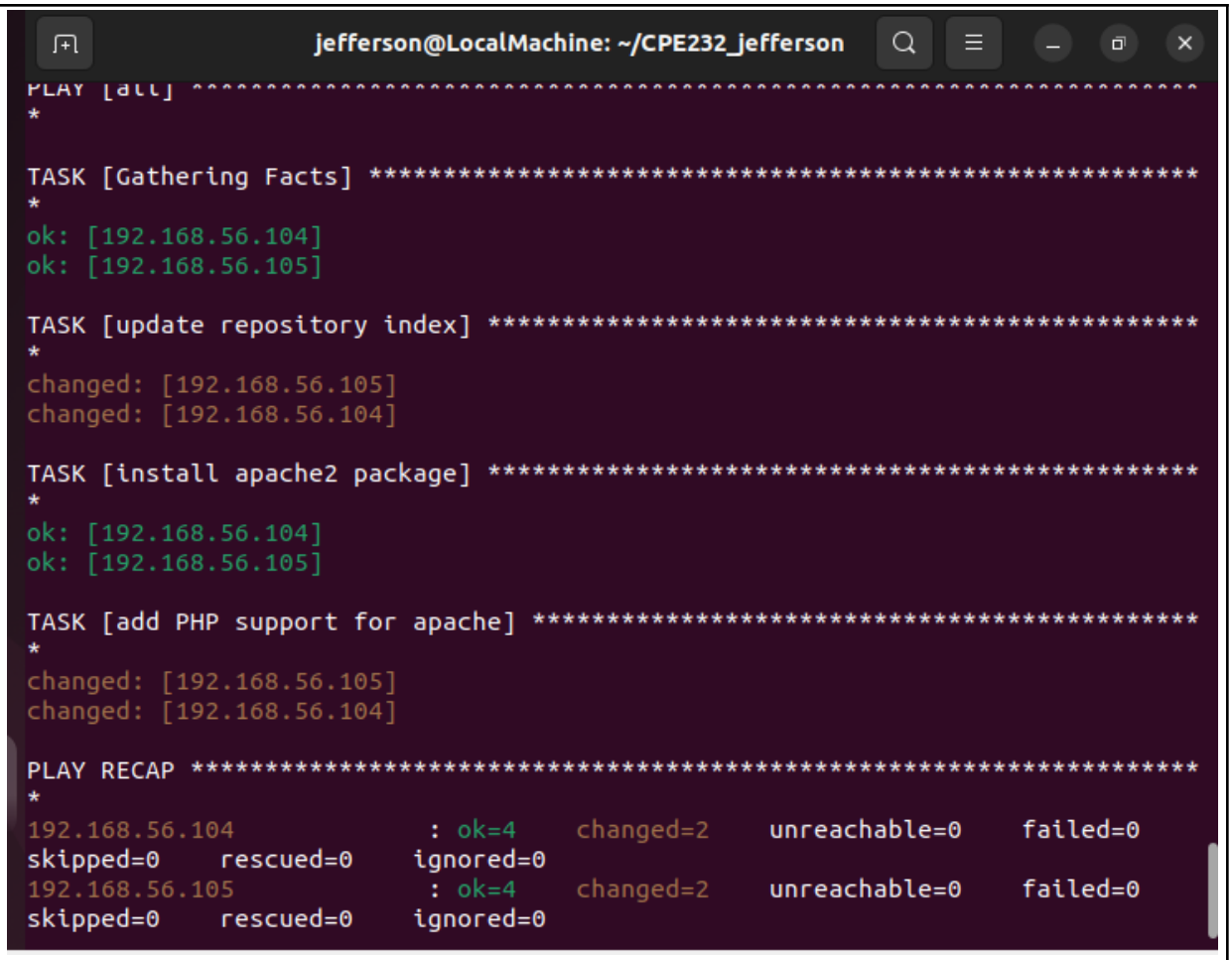
7. Edit again the *install_apache.yml*. This time, we are going to add a PHP support for the apache package we installed earlier.

```
---
- hosts: all
  become: true
  tasks:

  - name: update repository index
    apt:
      update_cache: yes

  - name: install apache2 package
    apt:
      name: apache2

  - name: add PHP support for apache
    apt:
      name: libapache2-mod-php
```

Save the changes to this file and exit.



8. Run the playbook and describe the output. Did the new command change anything on the remote servers?

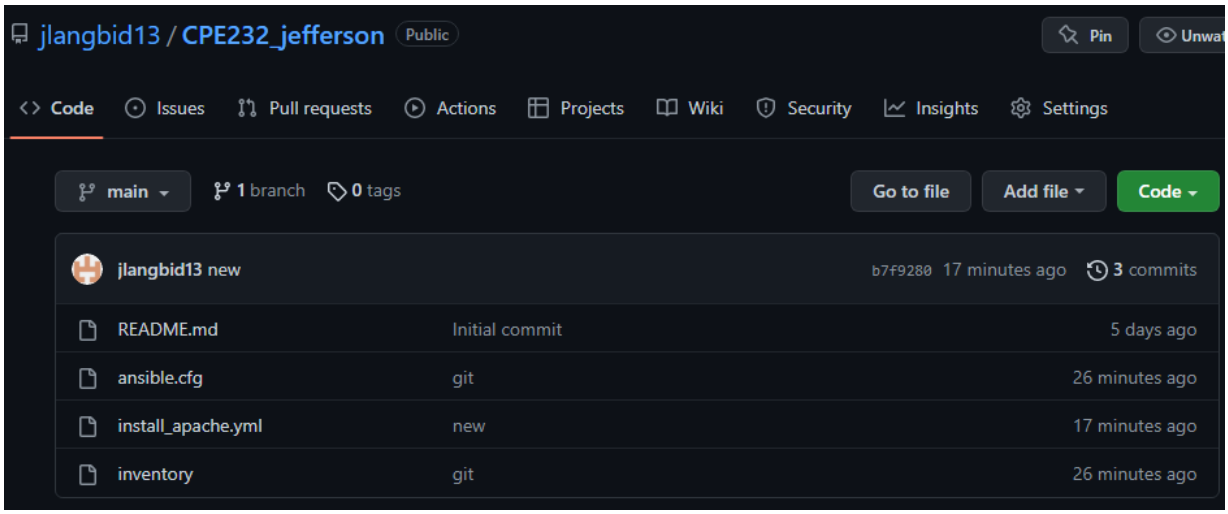


The command is successful and it adds PHP support for apache.

9. Finally, make sure that we are in sync with GitHub. Provide the link to your GitHub repository.

jlangbid13/CPE232_jefferson (github.com)

```
jefferson@LocalMachine:~/CPE232_jefferson$ git status
On branch main
Your branch is up to date with 'origin/main'.

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        install_apache.yml

nothing added to commit but untracked files present (use "git add" to track)
jefferson@LocalMachine:~/CPE232_jefferson$ git add install_apache.yml
jefferson@LocalMachine:~/CPE232_jefferson$ git commit -m "new"
[main b7f9280] new
 1 file changed, 16 insertions(+)
 create mode 100644 install_apache.yml
jefferson@LocalMachine:~/CPE232_jefferson$ git push origin main
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 488 bytes | 488.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:jlangbid13/CPE232_jefferson.git
   7d6431b..b7f9280  main -> main
```



Reflections:

Answer the following:

1. What is the importance of using a playbook?
   Playbooks are frequently used to automate IT infrastructure, including networks, security systems, and developer personas.
2. Summarize what we have done on this activity.

   First, I need to connect the other virtual machine using ssh keys and then connect them with a public key and then install python3 pip. After, I installed ansible to be able to make changes in remote servers. I was also able to make a playbook to

change the remote servers and install apache2, repository index, and PHP. I used a playbook in automating ansible commands. And lastly, I synced my playbook, commit it and upload it to my github account.