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Course/Section:CPE232 - CPE31S6	**Date Submitted: 9 / 14 / 2023**
Instructor: Dr. Jonathan Taylar	**Semester and SY: 1st Year S.Y. 2023 - 2024**

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 managed 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

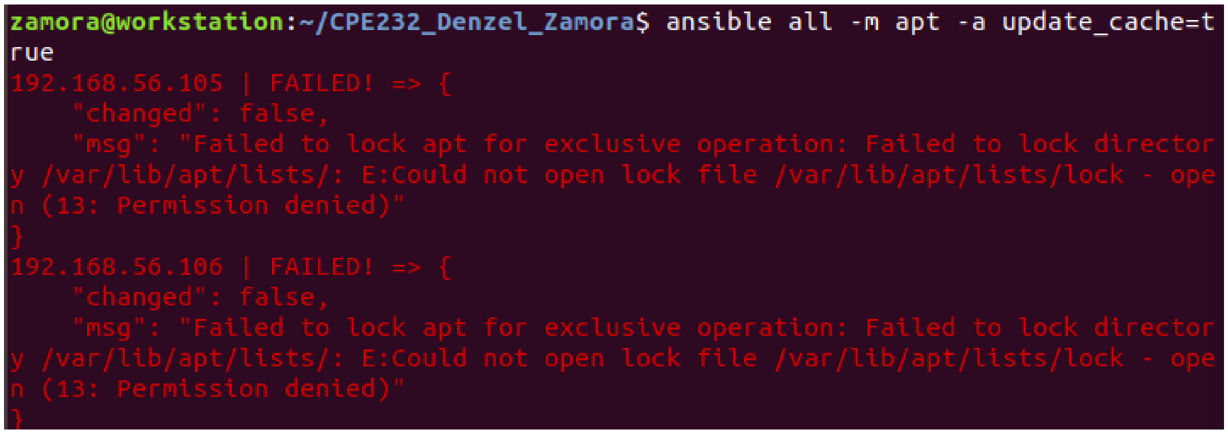
Task 1: Run elevated ad hoc commands

1. Locally, we use the command *sudo apt update* when we want to download package information from all configured resources. The sources are often defined in /etc/apt/sources.list file and other files located in /etc/apt/sources.list.d/ directory. So, when you run the 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:

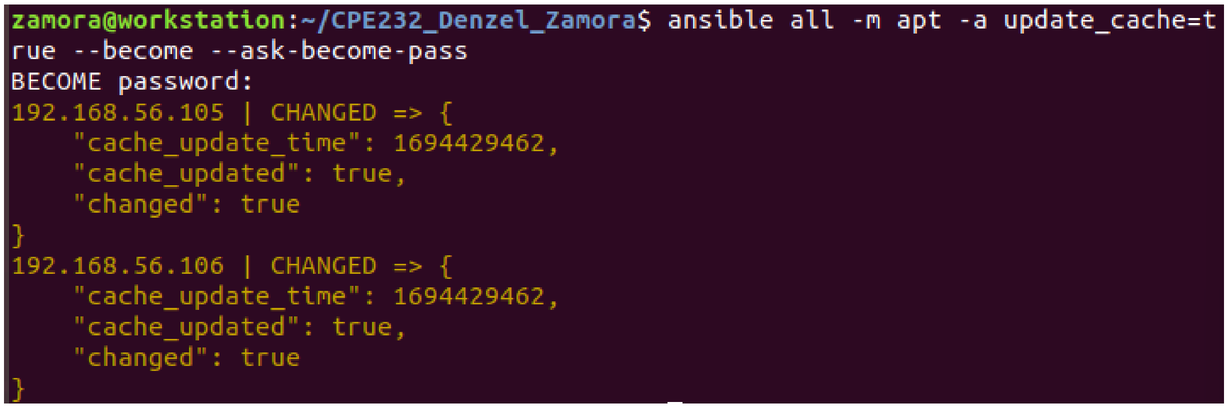
ansible all -m apt -a update_cache=true

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



```
zamora@workstation:~/CPE232_Denzel_Zamora$ ansible all -m apt -a update_cache=t
rue
192.168.56.105 | FAILED! => {
    "changed": false,
    "msg": "Failed to lock apt for exclusive operation: Failed to lock director
y /var/lib/apt/lists/: E:Could not open lock file /var/lib/apt/lists/lock - ope
n (13: Permission denied)"
}
192.168.56.106 | FAILED! => {
    "changed": false,
    "msg": "Failed to lock apt for exclusive operation: Failed to lock director
y /var/lib/apt/lists/: E:Could not open lock file /var/lib/apt/lists/lock - ope
n (13: Permission denied)"
}
```

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.*



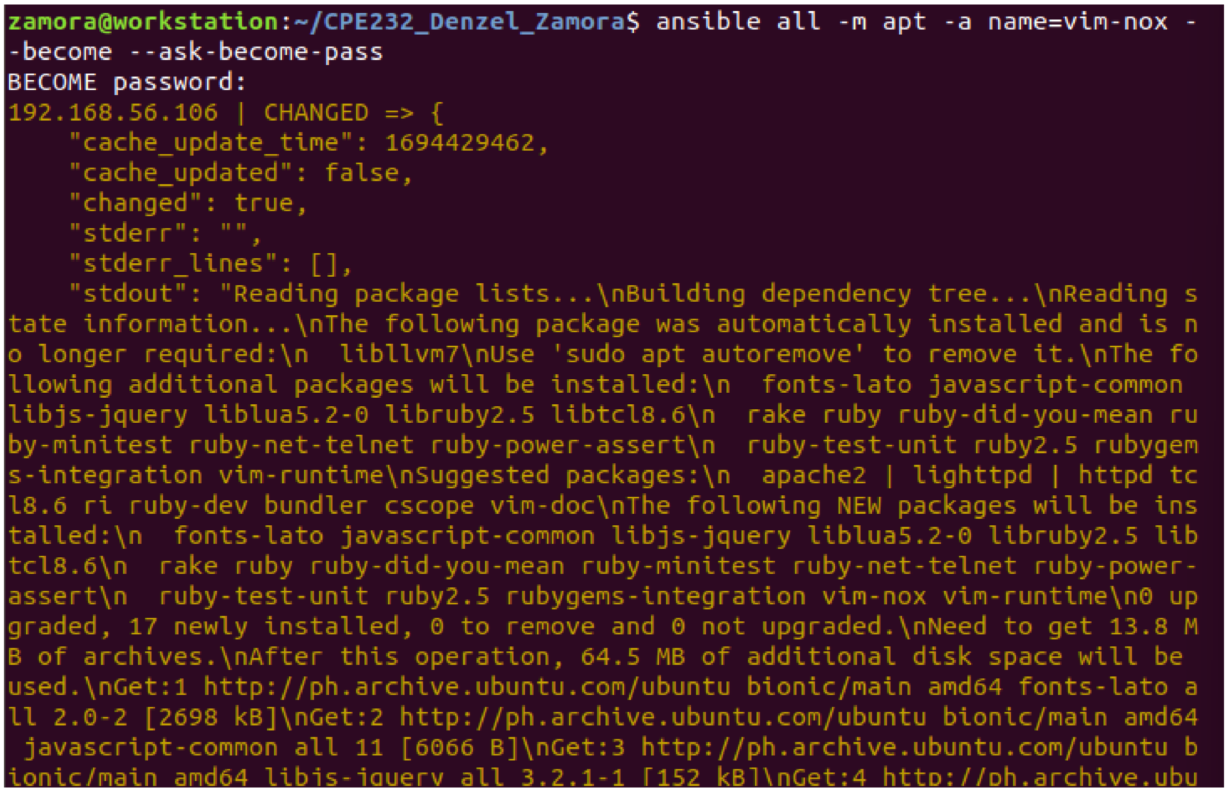
```
zamora@workstation:~/CPE232_Denzel_Zamora$ ansible all -m apt -a update_cache=t
rue --become --ask-become-pass
BECOME password:
192.168.56.105 | CHANGED => {
    "cache_update_time": 1694429462,
    "cache_updated": true,
    "changed": true
}
192.168.56.106 | CHANGED => {
    "cache_update_time": 1694429462,
    "cache_updated": true,
    "changed": true
}
```

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 elevates the privileges and the *--ask-become-pass* asks for the password. For now, even if we only 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.

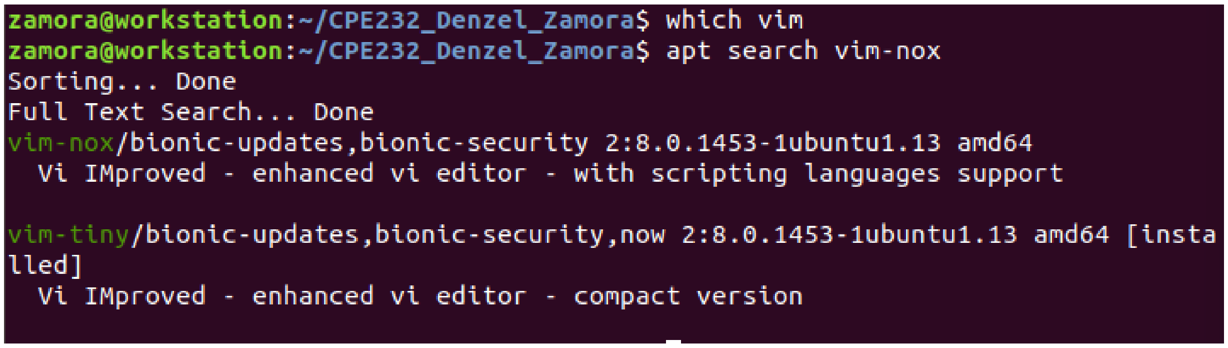
2. Let's try to install VIM, which is an almost compatible version of the UNIX editor Vi. To do this, we will just change the module part in 1.1 instruction.

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.



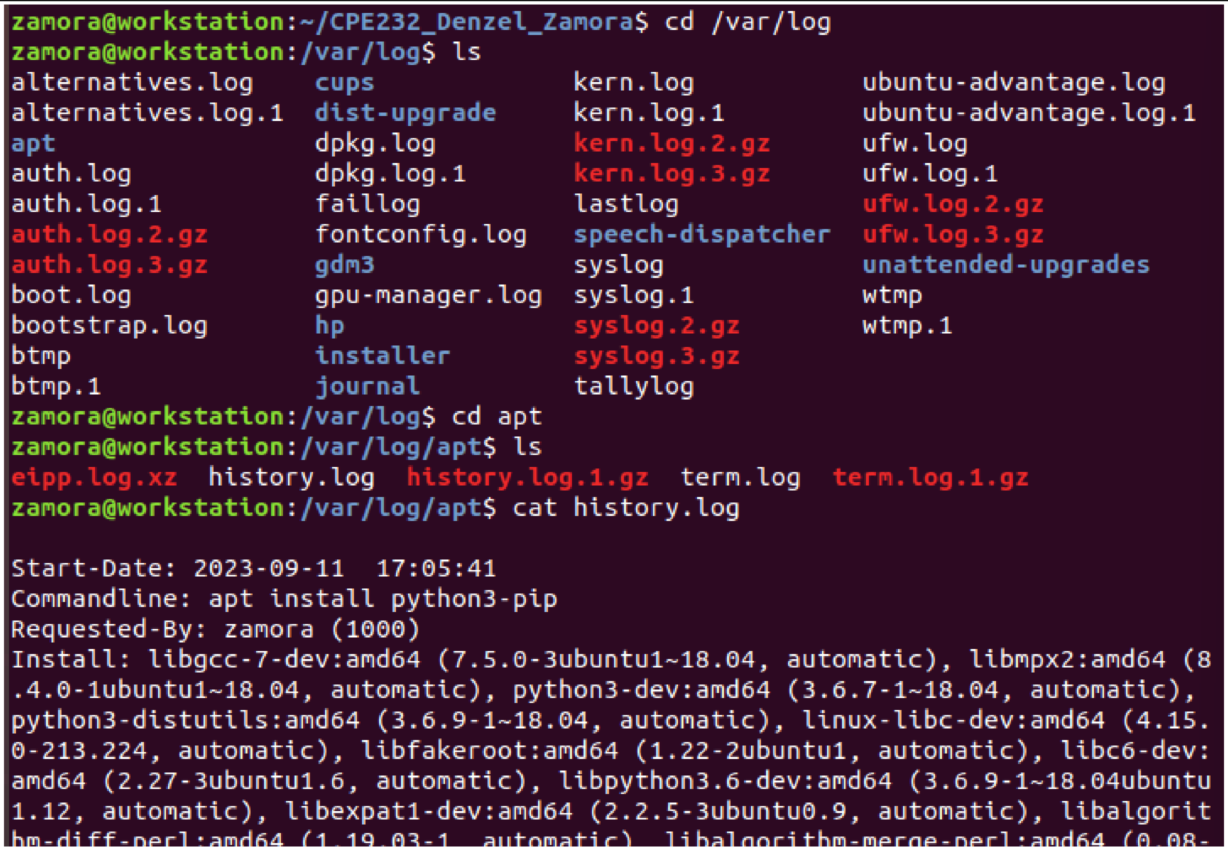
```
zamora@workstation:~/CPE232_Denzel_Zamora$ ansible all -m apt -a name=vim-nox -
-become --ask-become-pass
BECOME password:
192.168.56.106 | CHANGED => {
    "cache_update_time": 1694429462,
    "cache_updated": false,
    "changed": true,
    "stderr": "",
    "stderr_lines": [],
    "stdout": "Reading package lists...\nBuilding dependency tree...\nReading s
tate information...\nThe following package was automatically installed and is n
o longer required:\n  libllvm7\nUse 'sudo apt autoremove' to remove it.\nThe fo
llowing additional packages will be installed:\n  fonts-lato javascript-common
libjs-jquery liblua5.2-0 libruby2.5 libtcl8.6\n  rake ruby ruby-did-you-mean ru
by-minitest ruby-net-telnet ruby-power-assert\n  ruby-test-unit ruby2.5 rubygem
s-integration vim-runtime\nSuggested packages:\n  apache2 | lighttpd | httpd tc
l8.6 ri ruby-dev bundler cscope vim-doc\nThe following NEW packages will be ins
talled:\n  fonts-lato javascript-common libjs-jquery liblua5.2-0 libruby2.5 lib
tcl8.6\n  rake ruby ruby-did-you-mean ruby-minitest ruby-net-telnet ruby-power-
assert\n  ruby-test-unit ruby2.5 rubygems-integration vim-nox vim-runtime\n0 up
graded, 17 newly installed, 0 to remove and 0 not upgraded.\nNeed to get 13.8 M
B of archives.\nAfter this operation, 64.5 MB of additional disk space will be
used.\nGet:1 http://ph.archive.ubuntu.com/ubuntu bionic/main amd64 fonts-lato a
ll 2.0-2 [2698 kB]\nGet:2 http://ph.archive.ubuntu.com/ubuntu bionic/main amd64
 javascript-common all 11 [6066 B]\nGet:3 http://ph.archive.ubuntu.com/ubuntu b
ionic/main amd64 libjs-jquery all 3.2.1-1 [152 kB]\nGet:4 http://ph.archive.ubu
```

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?



```
zamora@workstation:~/CPE232_Denzel_Zamora$ which vim
zamora@workstation:~/CPE232_Denzel_Zamora$ apt search vim-nox
Sorting... Done
Full Text Search... Done
vim-nox/bionic-updates,bionic-security 2:8.0.1453-1ubuntu1.13 amd64
  Vi IMproved - enhanced vi editor - with scripting languages support

vim-tiny/bionic-updates,bionic-security,now 2:8.0.1453-1ubuntu1.13 amd64 [insta
lled]
  Vi IMproved - enhanced vi editor - compact version
```

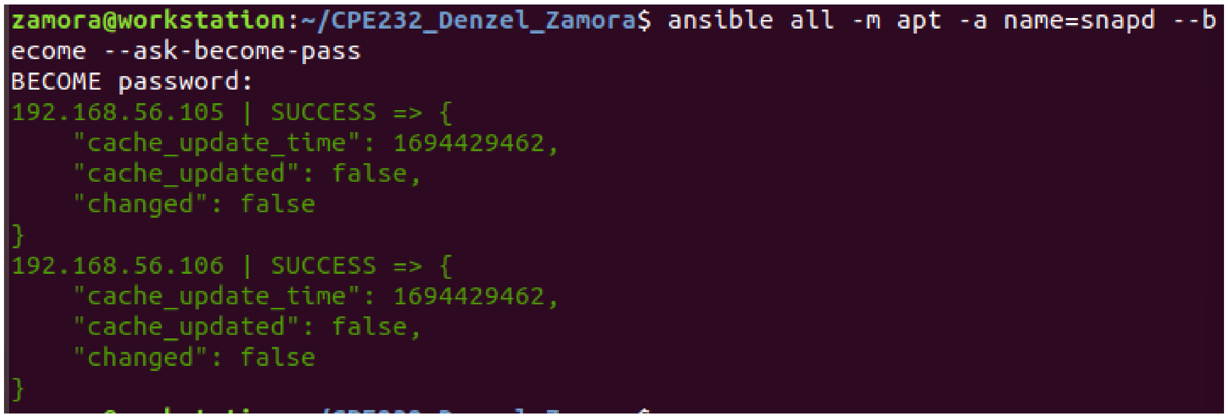
2.2 Check the logs in the servers using the following commands: *cd /var/log*. After this, issue the command *ls,* go to the folder *apt* and open history.log. Describe what you see in the history.log.



```
zamora@workstation:~/CPE232_Denzel_Zamora$ cd /var/log
zamora@workstation:/var/log$ ls
alternatives.log    cups             kern.log           ubuntu-advantage.log
alternatives.log.1  dist-upgrade     kern.log.1         ubuntu-advantage.log.1
apt                 dpkg.log         kern.log.2.gz      ufw.log
auth.log            dpkg.log.1       kern.log.3.gz      ufw.log.1
auth.log.1          faillog          lastlog            ufw.log.2.gz
auth.log.2.gz       fontconfig.log   speech-dispatcher  ufw.log.3.gz
auth.log.3.gz       gdm3             syslog             unattended-upgrades
boot.log            gpu-manager.log  syslog.1           wtmp
bootstrap.log       hp               syslog.2.gz        wtmp.1
btmp                installer        syslog.3.gz
btmp.1              journal          tallylog
zamora@workstation:/var/log$ cd apt
zamora@workstation:/var/log/apt$ ls
eipp.log.xz  history.log  history.log.1.gz  term.log  term.log.1.gz
zamora@workstation:/var/log/apt$ cat history.log

Start-Date: 2023-09-11  17:05:41
Commandline: apt install python3-pip
Requested-By: zamora (1000)
Install: libgcc-7-dev:amd64 (7.5.0-3ubuntu1~18.04, automatic), libmpx2:amd64 (8
.4.0-1ubuntu1~18.04, automatic), python3-dev:amd64 (3.6.7-1~18.04, automatic),
python3-distutils:amd64 (3.6.9-1~18.04, automatic), linux-libc-dev:amd64 (4.15.
0-213.224, automatic), libfakeroot:amd64 (1.22-2ubuntu1, automatic), libc6-dev:
amd64 (2.27-3ubuntu1.6, automatic), libpython3.6-dev:amd64 (3.6.9-1~18.04ubuntu
1.12, automatic), libexpat1-dev:amd64 (2.2.5-3ubuntu0.9, automatic), libalgorit
hm-diff-perl:amd64 (1.19.03-1, automatic), libalgorithm-merge-perl:amd64 (0.08-
```

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*

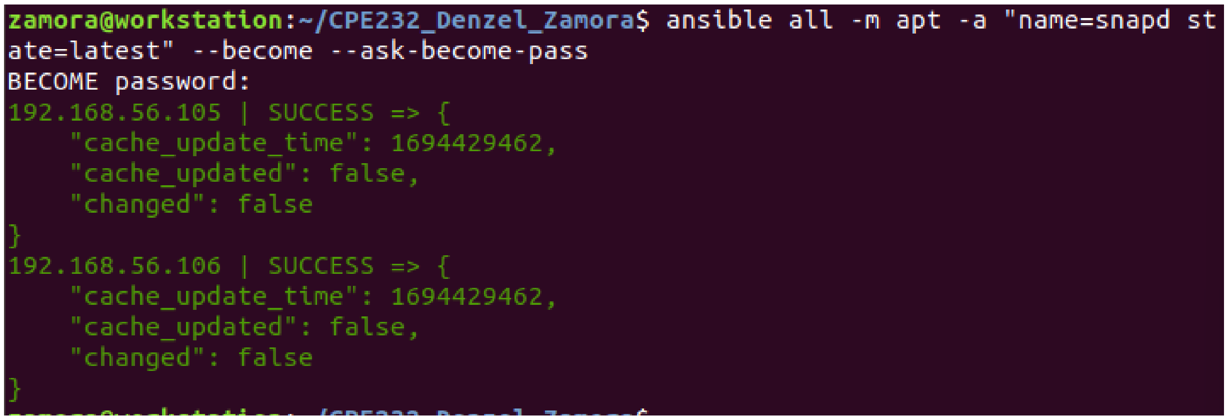


```
zamora@workstation:~/CPE232_Denzel_Zamora$ ansible all -m apt -a name=snapd --b
ecome --ask-become-pass
BECOME password:
192.168.56.105 | SUCCESS => {
    "cache_update_time": 1694429462,
    "cache_updated": false,
    "changed": false
}
192.168.56.106 | SUCCESS => {
    "cache_update_time": 1694429462,
    "cache_updated": false,
    "changed": false
}
```

   Can you describe the result of this command? Is it a success? Did it change anything in the remote servers?

   Yes, the cache was updated.

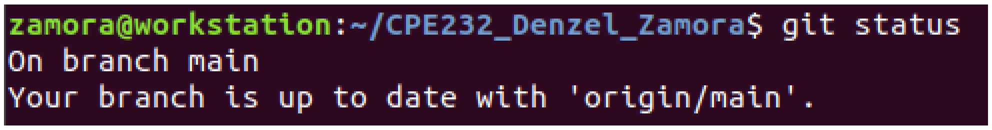
3.2 Now, try to issue this command: *ansible all -m apt -a "name=snapd state=latest" --become --ask-become-pass*



```
zamora@workstation:~/CPE232_Denzel_Zamora$ ansible all -m apt -a "name=snapd st
ate=latest" --become --ask-become-pass
BECOME password:
192.168.56.105 | SUCCESS => {
    "cache_update_time": 1694429462,
    "cache_updated": false,
    "changed": false
}
192.168.56.106 | SUCCESS => {
    "cache_update_time": 1694429462,
    "cache_updated": false,
    "changed": false
}
```

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

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

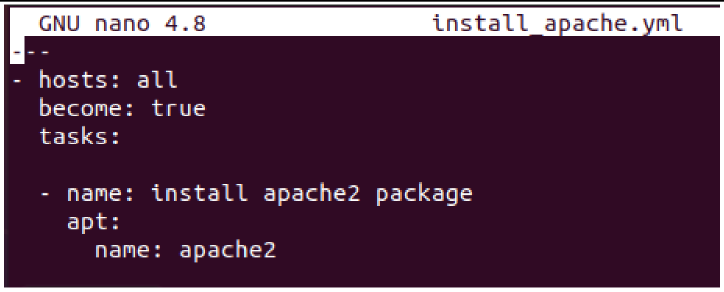


```
zamora@workstation:~/CPE232_Denzel_Zamora$ git status
On branch main
Your branch is up to date with 'origin/main'.
```

Task 2: Writing our First Playbook

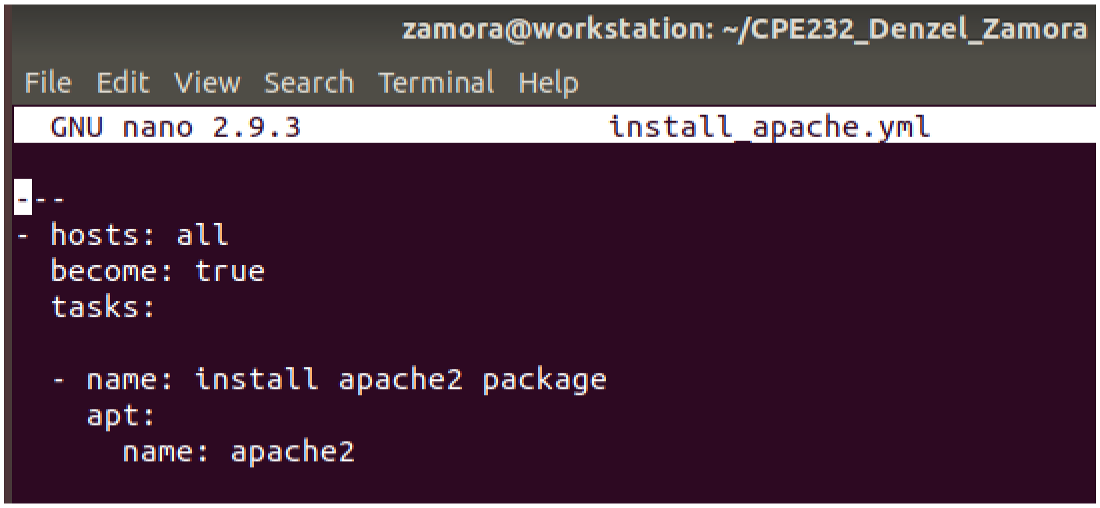
1. With ad hoc commands, we can simplify the administration of remote servers. For example, we can install updates, packages, and applications, etc. However, the real strength of Ansible comes from its playbooks. When we write a playbook, we can define the state that we want our servers to be in and 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 used 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:



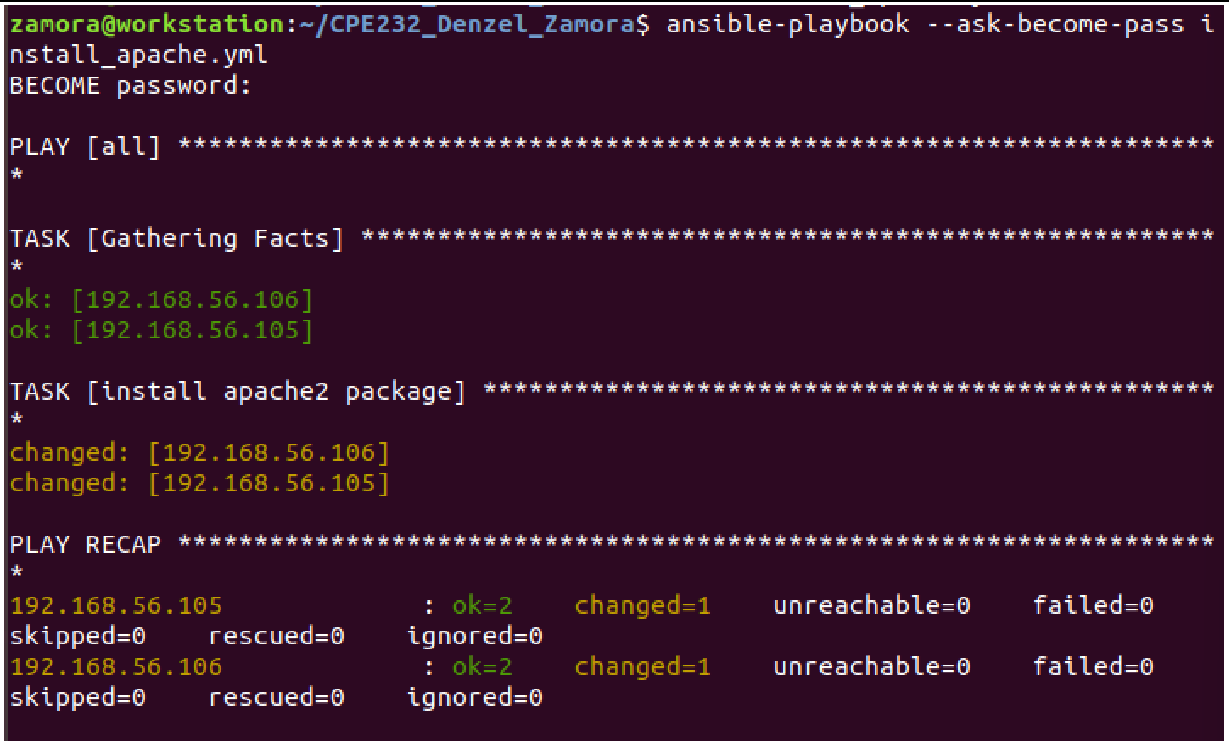
```
GNU nano 4.8                         install_apache.yml
---
- hosts: all
  become: true
  tasks:

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

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



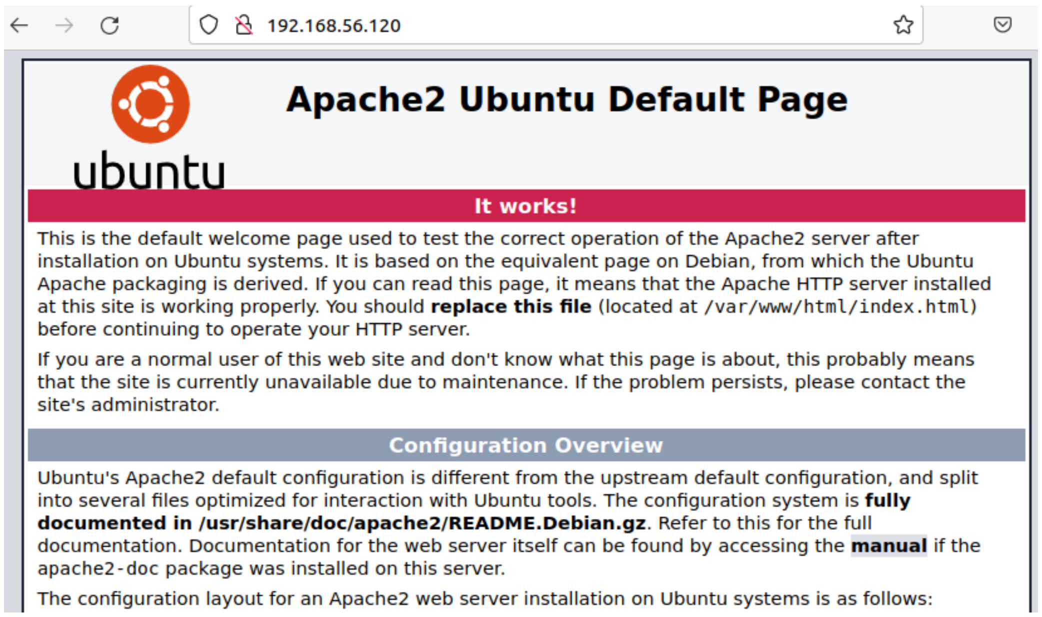
```
zamora@workstation: ~/CPE232_Denzel_Zamora
File  Edit  View  Search  Terminal  Help
GNU nano 2.9.3                         install_apache.yml

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

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

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



```
zamora@workstation:~/CPE232_Denzel_Zamora$ ansible-playbook --ask-become-pass i
nstall_apache.yml
BECOME password:

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

TASK [Gathering Facts] ********************************************************
*
ok: [192.168.56.106]
ok: [192.168.56.105]

TASK [install apache2 package] ************************************************
*
changed: [192.168.56.106]
changed: [192.168.56.105]

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

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.



192.168.56.120

Apache2 Ubuntu Default Page

ubuntu

It works!

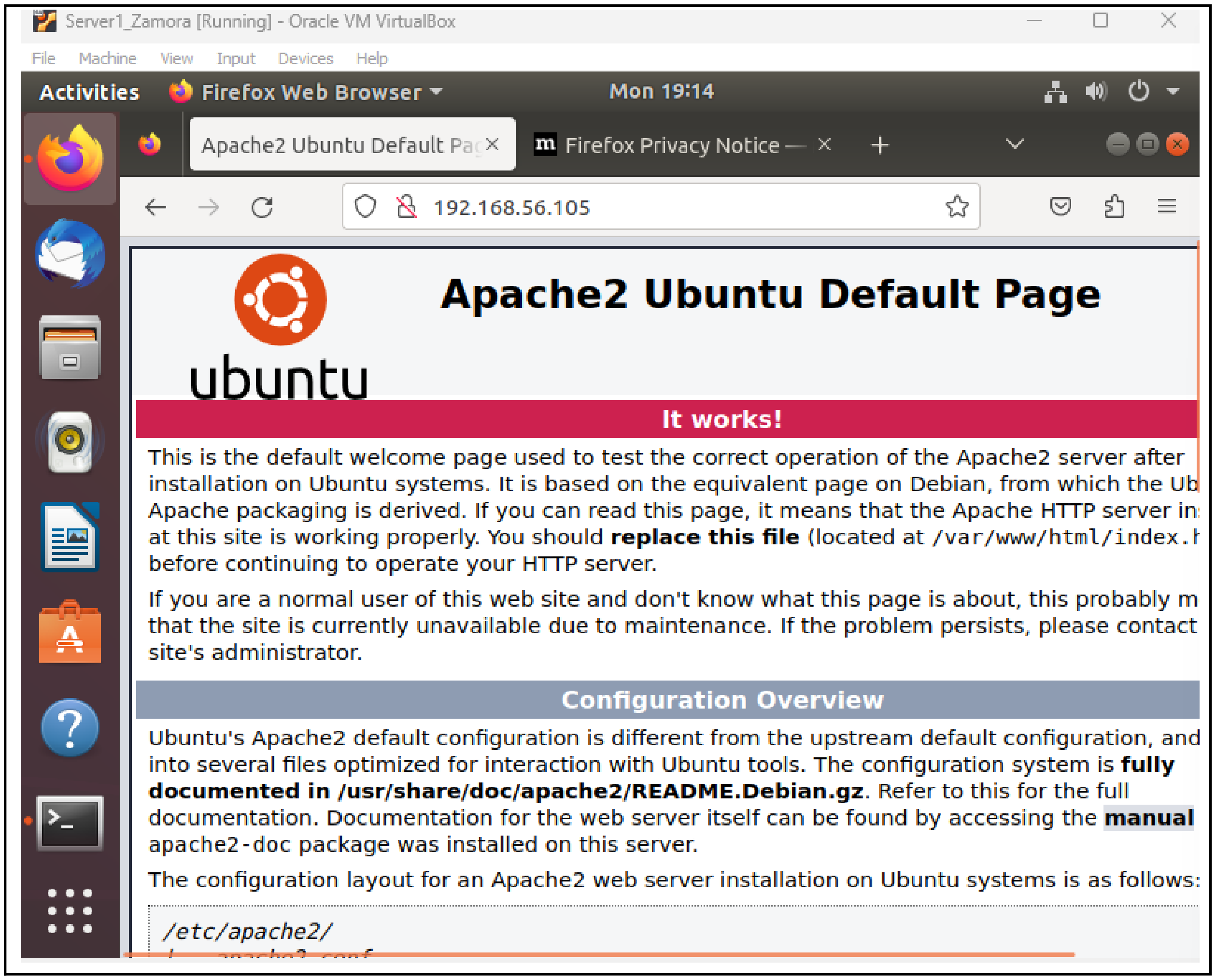
This is the default welcome page used to test the correct operation of the Apache2 server after installation on Ubuntu systems. It is based on the equivalent page on Debian, from which the Ubuntu Apache packaging is derived. If you can read this page, it means that the Apache HTTP server installed at this site is working properly. You should **replace this file** (located at `/var/www/html/index.html`) before continuing to operate your HTTP server.

If you are a normal user of this web site and don't know what this page is about, this probably means that the site is currently unavailable due to maintenance. If the problem persists, please contact the site's administrator.

Configuration Overview

Ubuntu's Apache2 default configuration is different from the upstream default configuration, and split into several files optimized for interaction with Ubuntu tools. The configuration system is **fully documented in /usr/share/doc/apache2/README.Debian.gz**. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the **manual** if the apache2-doc package was installed on this server.

The configuration layout for an Apache2 web server installation on Ubuntu systems is as follows:


Server1_Zamora [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Firefox Web Browser
Mon 19:14
Apache2 Ubuntu Default Pa
Firefox Privacy Notice —
192.168.56.105
ubuntu

Apache2 Ubuntu Default Page

It works!

This is the default welcome page used to test the correct operation of the Apache2 server after installation on Ubuntu systems. It is based on the equivalent page on Debian, from which the Ub Apache packaging is derived. If you can read this page, it means that the Apache HTTP server in at this site is working properly. You should **replace this file** (located at `/var/www/html/index.h` before continuing to operate your HTTP server.

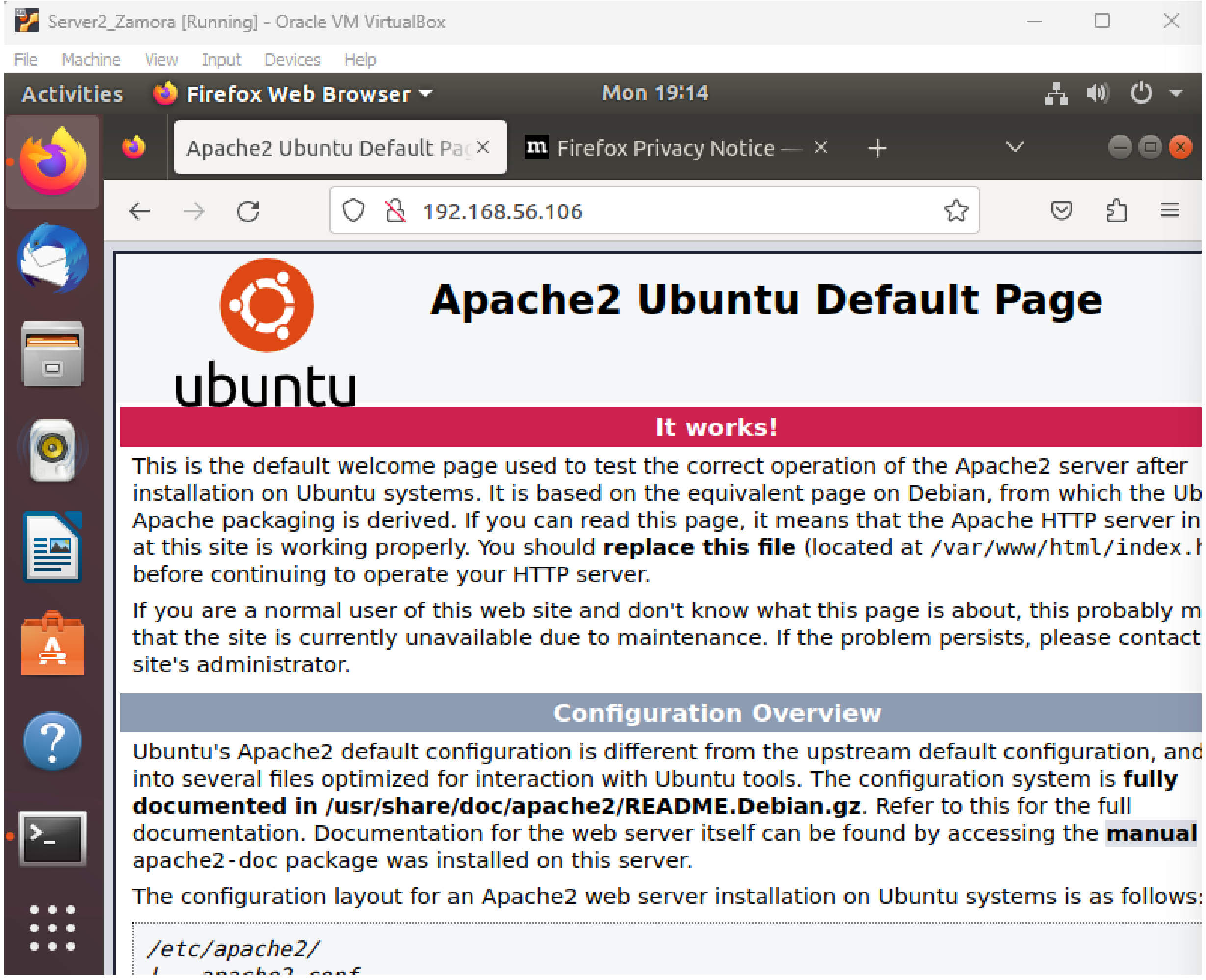
If you are a normal user of this web site and don't know what this page is about, this probably m that the site is currently unavailable due to maintenance. If the problem persists, please contact site's administrator.

Configuration Overview

Ubuntu's Apache2 default configuration is different from the upstream default configuration, and into several files optimized for interaction with Ubuntu tools. The configuration system is **fully documented in /usr/share/doc/apache2/README.Debian.gz**. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the **manual** apache2-doc package was installed on this server.

The configuration layout for an Apache2 web server installation on Ubuntu systems is as follows:

```
/etc/apache2/
```


Server2_Zamora [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Firefox Web Browser Mon 19:14
Apache2 Ubuntu Default Pa
Firefox Privacy Notice —
192.168.56.106
ubuntu

Apache2 Ubuntu Default Page

It works!

This is the default welcome page used to test the correct operation of the Apache2 server after installation on Ubuntu systems. It is based on the equivalent page on Debian, from which the Ub Apache packaging is derived. If you can read this page, it means that the Apache HTTP server in at this site is working properly. You should **replace this file** (located at `/var/www/html/index.h` before continuing to operate your HTTP server.

If you are a normal user of this web site and don't know what this page is about, this probably m that the site is currently unavailable due to maintenance. If the problem persists, please contact site's administrator.

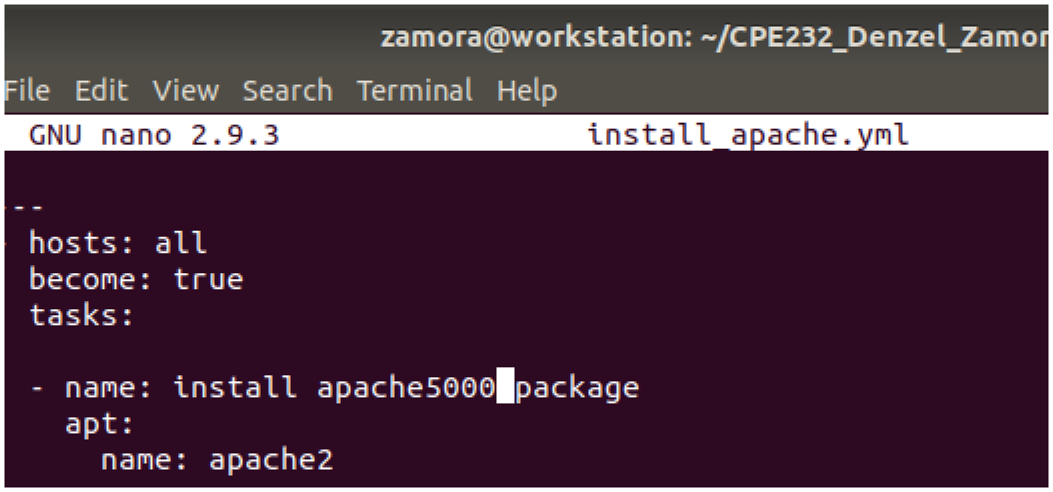
Configuration Overview

Ubuntu's Apache2 default configuration is different from the upstream default configuration, and into several files optimized for interaction with Ubuntu tools. The configuration system is **fully documented in /usr/share/doc/apache2/README.Debian.gz**. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the **manual** apache2-doc package was installed on this server.

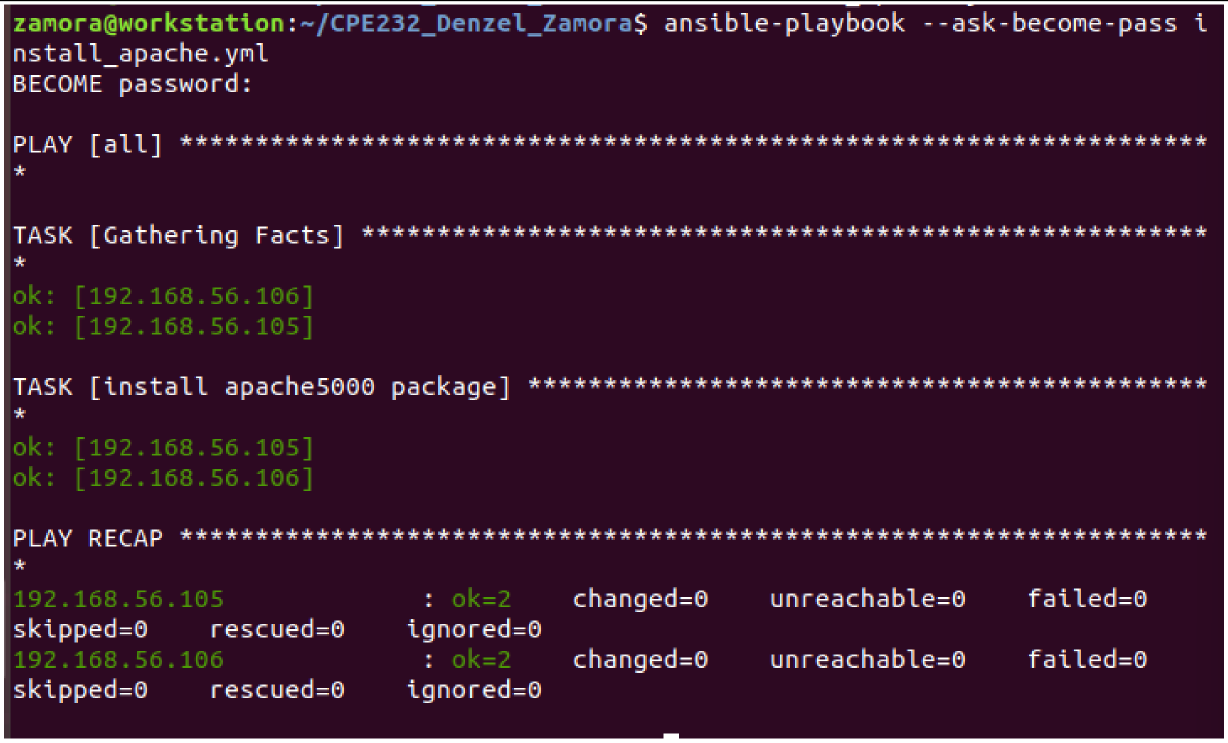
The configuration layout for an Apache2 web server installation on Ubuntu systems is as follows:

```
/etc/apache2/
```

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?
   Some unrecognized names will not be installed as they are not within the library.

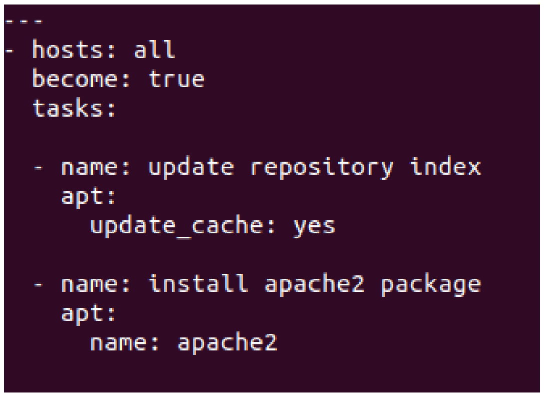

zamora@workstation: ~/CPE232_Denzel_Zamor
File Edit View Search Terminal Help

```
 GNU nano 2.9.3                    install_apache.yml

--
 hosts: all
 become: true
 tasks:

 - name: install apache5000 package
   apt:
     name: apache2
```



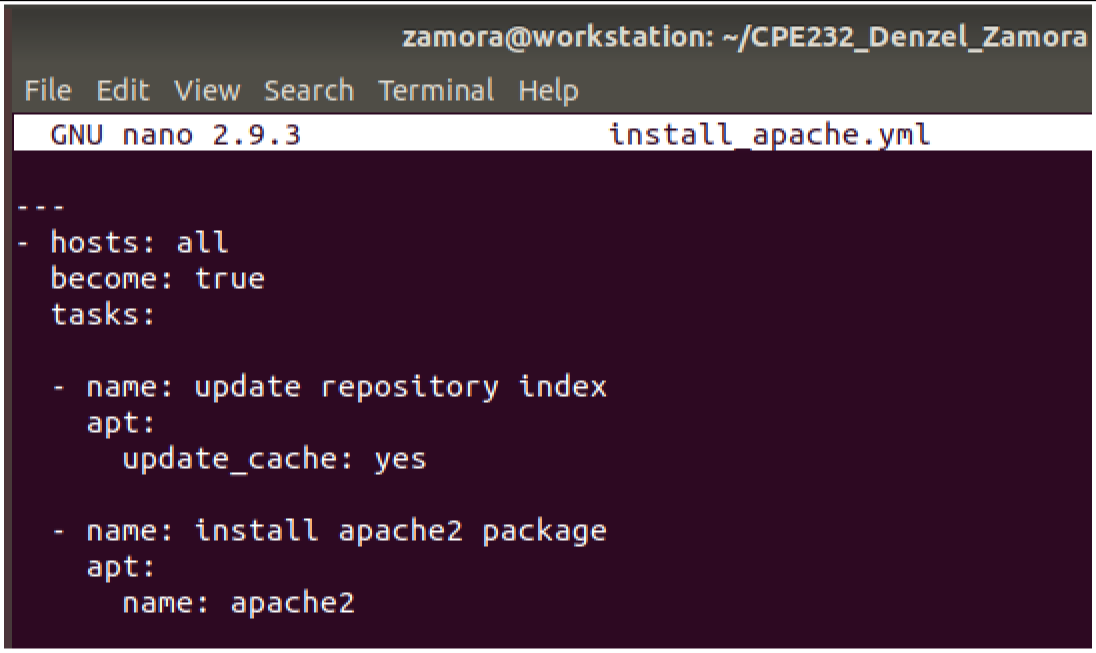
```
zamora@workstation:~/CPE232_Denzel_Zamora$ ansible-playbook --ask-become-pass i
nstall_apache.yml
BECOME password:

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

TASK [Gathering Facts] *******************************************************
*
ok: [192.168.56.106]
ok: [192.168.56.105]

TASK [install apache5000 package] ********************************************
*
ok: [192.168.56.105]
ok: [192.168.56.106]

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

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.



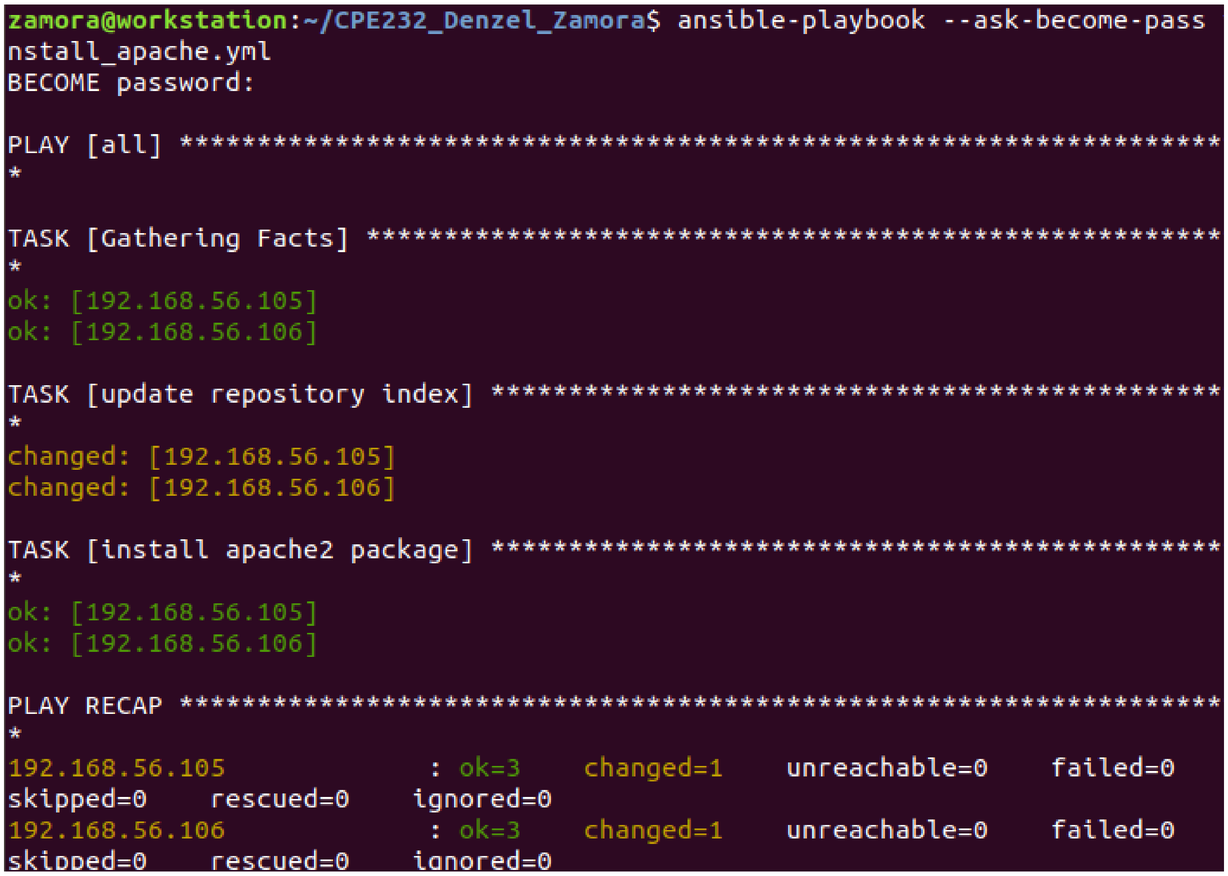
```
---
- hosts: all
  become: true
  tasks:

  - name: update repository index
    apt:
      update_cache: yes

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

Save the changes to this file and exit.



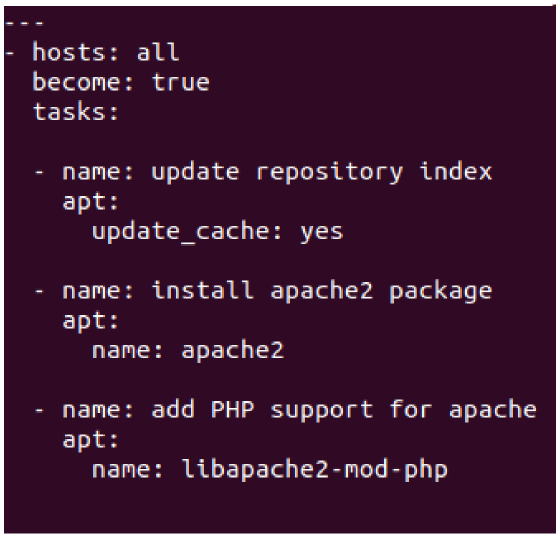
```
zamora@workstation: ~/CPE232_Denzel_Zamora
File  Edit  View  Search  Terminal  Help
 GNU nano 2.9.3                     install_apache.yml

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

  - name: update repository index
    apt:
      update_cache: yes

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

6. Run the playbook and describe the output. Did the new command change anything on the remote servers?
   <u>**Yes, the update repository index worked and there was 1 change on each of the two servers.**</u>



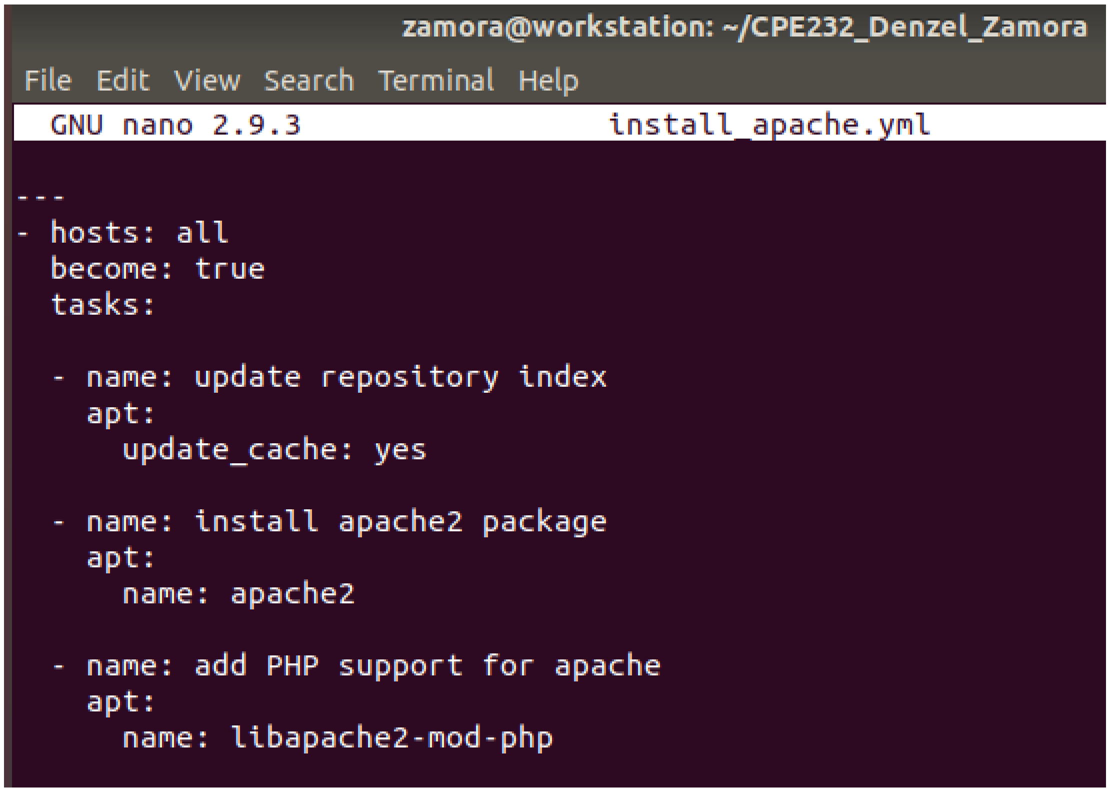
```
zamora@workstation:~/CPE232_Denzel_Zamora$ ansible-playbook --ask-become-pass
nstall_apache.yml
BECOME password:

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

TASK [Gathering Facts] *******************************************************
*
ok: [192.168.56.105]
ok: [192.168.56.106]

TASK [update repository index] ***********************************************
*
changed: [192.168.56.105]
changed: [192.168.56.106]

TASK [install apache2 package] ***********************************************
*
ok: [192.168.56.105]
ok: [192.168.56.106]

PLAY RECAP *******************************************************************
*
192.168.56.105             : ok=3    changed=1    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
192.168.56.106             : ok=3    changed=1    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
```

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.

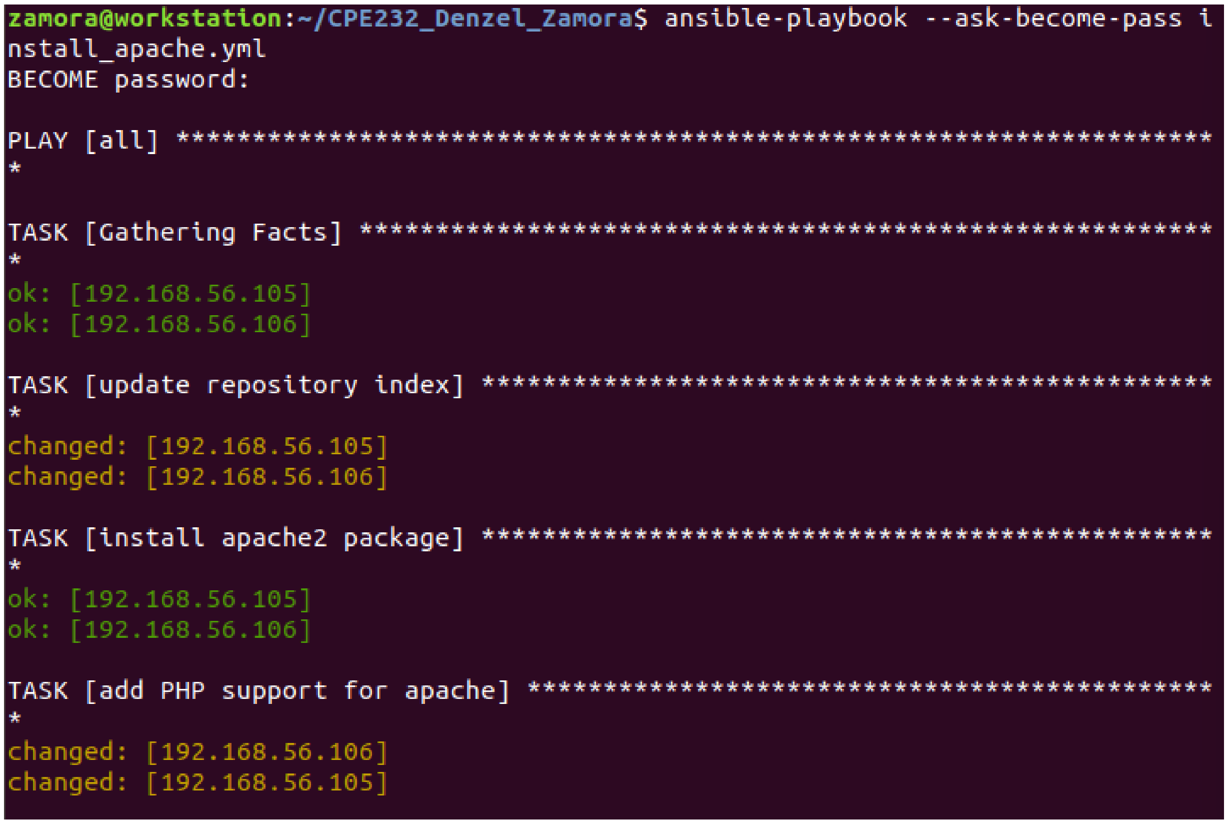


zamora@workstation: ~/CPE232_Denzel_Zamora
File Edit View Search Terminal Help

```
  GNU nano 2.9.3                    install_apache.yml

---
- 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
```

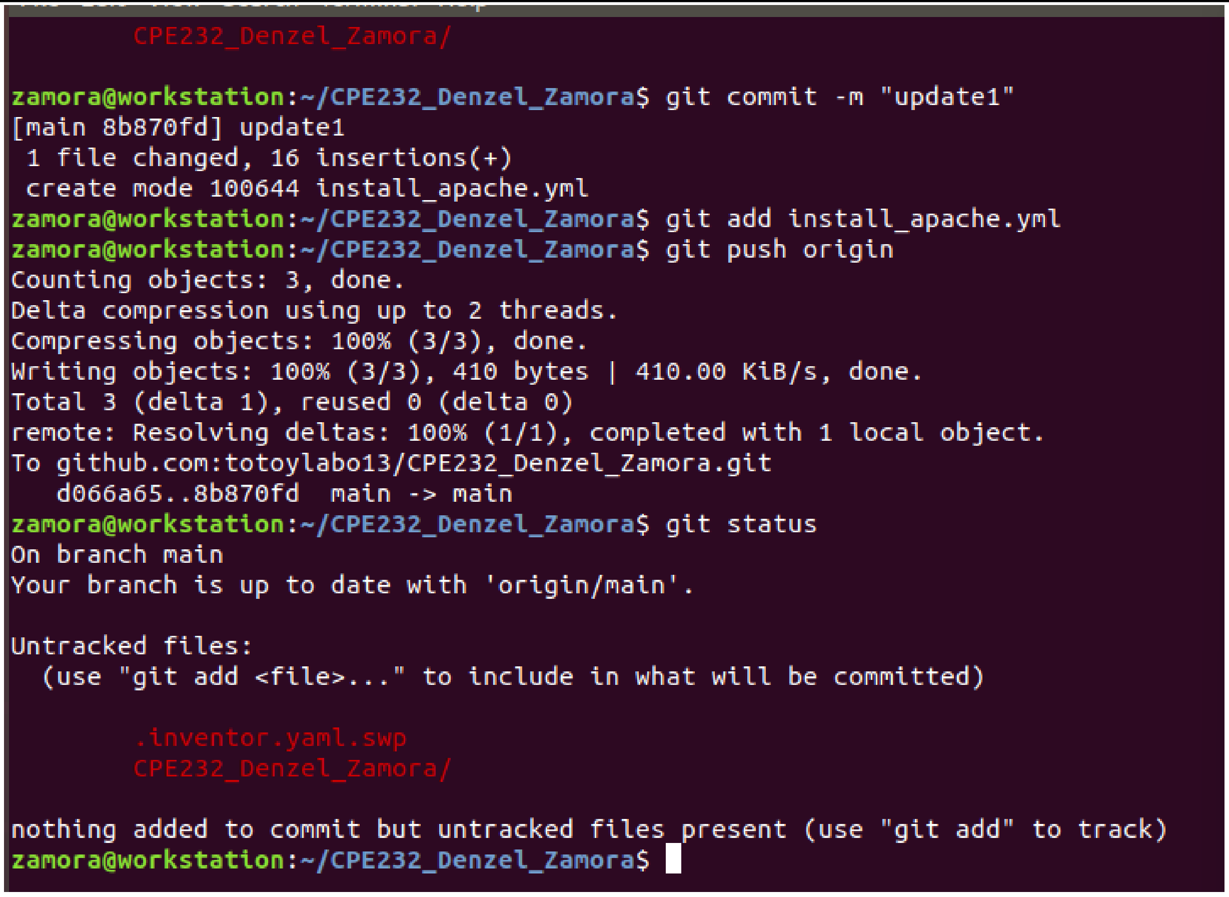
8. Run the playbook and describe the output. Did the new command change anything on the remote servers?

<u>Yes, there was additional PHP support for apache that was added to each server.</u>



```
zamora@workstation:~/CPE232_Denzel_Zamora$ ansible-playbook --ask-become-pass i
nstall_apache.yml
BECOME password:

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

TASK [Gathering Facts] ********************************************************
*
ok: [192.168.56.105]
ok: [192.168.56.106]

TASK [update repository index] ************************************************
*
changed: [192.168.56.105]
changed: [192.168.56.106]

TASK [install apache2 package] ************************************************
*
ok: [192.168.56.105]
ok: [192.168.56.106]

TASK [add PHP support for apache] *********************************************
*
changed: [192.168.56.106]
changed: [192.168.56.105]
```

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



```
        CPE232_Denzel_Zamora/

zamora@workstation:~/CPE232_Denzel_Zamora$ git commit -m "update1"
[main 8b870fd] update1
 1 file changed, 16 insertions(+)
 create mode 100644 install_apache.yml
zamora@workstation:~/CPE232_Denzel_Zamora$ git add install_apache.yml
zamora@workstation:~/CPE232_Denzel_Zamora$ git push origin
Counting objects: 3, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 410 bytes | 410.00 KiB/s, done.
Total 3 (delta 1), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To github.com:totoylabo13/CPE232_Denzel_Zamora.git
   d066a65..8b870fd  main -> main
zamora@workstation:~/CPE232_Denzel_Zamora$ 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)

        .inventor.yaml.swp
        CPE232_Denzel_Zamora/

nothing added to commit but untracked files present (use "git add" to track)
zamora@workstation:~/CPE232_Denzel_Zamora$ 
```

https://github.com/totoylabo13/CPE232_Denzel_Zamora.git

Reflections:

Answer the following:

1. What is the importance of using a playbook?
   - **The importance of playbook was to easily install, add, or update files in one go by the usage of git.**
2. Summarize what we have done on this activity.
   - **In summary this activity taught us how to use ansible and playbook in which can easily install, update, and add files in by recording its commands to a text editor making them easier to access and simplify deployment, management, and automation.**