Name: Gabiano, Chris Leonard A.	**Date Performed: Sept 14, 2023**
Course/Section: CPE31-S6	**Date Submitted: Sept 14, 2023**
Instructor: Dr. Jonathan 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

```
leonard@WORKSTATION:~/CPE232_Gabiano$ ansible all -m apt -a update_cache=true
192.168.56.104 | 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)"
}
192.168.56.103 | 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)"
}
```

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

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.

```
leonard@WORKSTATION:~/CPE232_Gabiano$ ansible all -m apt -a update_cache=true -
-become --ask-become-pass
BECOME password:
192.168.56.104 | CHANGED => {
    "cache_update_time": 1694681574,
    "cache_updated": true,
    "changed": true
}
192.168.56.103 | CHANGED => {
    "cache_update_time": 1694681577,
    "cache_updated": true,
    "changed": true
}
```

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 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.

```
leonard@WORKSTATION:~/CPE232_Gabiano$ ansible all -m apt -a name=vim-nox --beco
me --ask-become-pass
BECOME password:
192.168.56.104 | CHANGED => {
    "cache_update_time": 1694681574,
    "cache_updated": false,
    "changed": true,
    "stderr": "",
    "stderr_lines": [],
    "stdout": "Reading package lists...\nBuilding dependency tree...\nReading s
tate information...\nThe following packages were automatically installed and ar
e no longer required:\n  libflashrom1 libftdi1-2 libllvm13\nUse 'sudo apt autor
emove' to remove them.\nThe following additional packages will be installed:\n
 fonts-lato javascript-common libjs-jquery liblua5.2-0 libruby3.0 rake ruby\n
ruby-net-telnet ruby-rubygems ruby-webrick ruby-xmlrpc ruby3.0\n  rubygems-inte
gration vim-runtime\nSuggested packages:\n  apache2 | lighttpd | httpd ri ruby-
```

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?

```
leonard@SERVER1:~$ apt search vim-nox
Sorting... Done
Full Text Search... Done
vim-nox/jammy-updates,jammy-security,now 2:8.2.3995-1ubuntu2.11 amd64 [installe
d]
  Vi IMproved - enhanced vi editor - with scripting languages support

vim-tiny/jammy-updates,jammy-security,now 2:8.2.3995-1ubuntu2.11 amd64 [install
ed,automatic]
  Vi IMproved - enhanced vi editor - compact version

leonard@SERVER1:~$
```

```
ies  Terminal                    Sep 14 16:59
                    leonard@SERVER2: ~
leonard@SERVER2:~$ which vim
/usr/bin/vim
leonard@SERVER2:~$ apt search vim-nox
Sorting... Done
Full Text Search... Done
vim-nox/jammy-updates,jammy-security,now 2:8.2.3995-1ubuntu2.11 amd64 [installe
d]
  Vi IMproved - enhanced vi editor - with scripting languages support

vim-tiny/jammy-updates,jammy-security,now 2:8.2.3995-1ubuntu2.11 amd64 [install
ed,automatic]
  Vi IMproved - enhanced vi editor - compact version

leonard@SERVER2:~$
```

3.

3.1 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.

```
eonard@SERVER2:/var/log$ ls
lternatives.log  dmesg.0          kern.log.1
pport.log        dmesg.1.gz       lastlog
pport.log.1      dmesg.2.gz       openvpn
pt               dmesg.3.gz       private
uth.log          dmesg.4.gz       speech-dispatcher
uth.log.1        dpkg.log         syslog
oot.log          faillog          syslog.1
oot.log.1        fontconfig.log   ubuntu-advantage.log
oot.log.2        gdm3             ubuntu-advantage-timer.log
ootstrap.log     gpu-manager.log  ufw.log
tmp              hp               unattended-upgrades
ups              installer        vboxpostinstall.log
ist-upgrade      journal          wtmp
mesg             kern.log
eonard@SERVER2:/var/log$ cd apt
eonard@SERVER2:/var/log/apt$ ls
ipp.log.xz  history.log  term.log
eonard@SERVER2:/var/log/apt$ cat history.log
```

```
Start-Date: 2022-08-09  11:48:47
Commandline: apt-get --yes -oDebug::pkgDepCache::AutoInstall=yes --force-yes up
grade
Upgrade: dpkg:amd64 (1.21.1ubuntu2, 1.21.1ubuntu2.1), networkd-dispatcher:amd64
 (2.1-2, 2.1-2ubuntu0.22.04.2), udev:amd64 (249.11-0ubuntu3, 249.11-0ubuntu3.4)
, python3.10:amd64 (3.10.4-3, 3.10.4-3ubuntu0.1), python3-gi:amd64 (3.42.0-3bui
ld1, 3.42.1-0ubuntu1), libext2fs2:amd64 (1.46.5-2ubuntu1, 1.46.5-2ubuntu1.1), a
pt:amd64 (2.4.5, 2.4.6), systemd-timesyncd:amd64 (249.11-0ubuntu3, 249.11-0ubun
tu3.4), libtirpc-common:amd64 (1.3.2-2build1, 1.3.2-2ubuntu0.1), libpcre3:amd64
 (2:8.39-13build5, 2:8.39-13ubuntu0.22.04.1), libpam-systemd:amd64 (249.11-0ubu
ntu3, 249.11-0ubuntu3.4), libpython3.10-minimal:amd64 (3.10.4-3, 3.10.4-3ubuntu
0.1), libapt-pkg6.0:amd64 (2.4.5, 2.4.6), libfribidi0:amd64 (1.0.8-2ubuntu3, 1.
0.8-2ubuntu3.1), libpython3.10-stdlib:amd64 (3.10.4-3, 3.10.4-3ubuntu0.1), libs
ystemd0:amd64 (249.11-0ubuntu3, 249.11-0ubuntu3.4), libnss-systemd:amd64 (249.1
1-0ubuntu3, 249.11-0ubuntu3.4), logrotate:amd64 (3.19.0-1ubuntu1, 3.19.0-1ubunt
u1.1), libapparmor1:amd64 (3.0.4-2ubuntu2, 3.0.4-2ubuntu2.1), libxml2:amd64 (2.
9.13+dfsg-1build1, 2.9.13+dfsg-1ubuntu0.1), python-apt-common:amd64 (2.3.0ubunt
u2, 2.3.0ubuntu2.1), systemd:amd64 (249.11-0ubuntu3, 249.11-0ubuntu3.4), libude
v1:amd64 (249.11-0ubuntu3, 249.11-0ubuntu3.4), isc-dhcp-common:amd64 (4.4.1-2.3
```

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*

```
leonard@WORKSTATION:~/CPE232_Gabiano$ ansible all -m apt -a name=snapd -become
--ask-become-pass
BECOME password:
192.168.56.103 | SUCCESS => {
    "cache_update_time": 1694681577,
    "cache_updated": false,
    "changed": false
}
192.168.56.104 | SUCCESS => {
    "cache_update_time": 1694681574,
    "cache_updated": false,
    "changed": false
}
leonard@WORKSTATION:~/CPE232_Gabiano$
```

Can you describe the result of this command? Is it a success? Did it 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*

```
leonard@WORKSTATION:~/CPE232_Gabiano$ ansible all -m apt -a "name=snapd state=l
atest" --become --ask-become-pass
BECOME password:
192.168.56.103 | SUCCESS => {
    "cache_update_time": 1694681577,
    "cache_updated": false,
    "changed": false
}
192.168.56.104 | SUCCESS => {
    "cache_update_time": 1694681574,
    "cache_updated": false,
    "changed": false
}
leonard@WORKSTATION:~/CPE232_Gabiano$
```

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.

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:

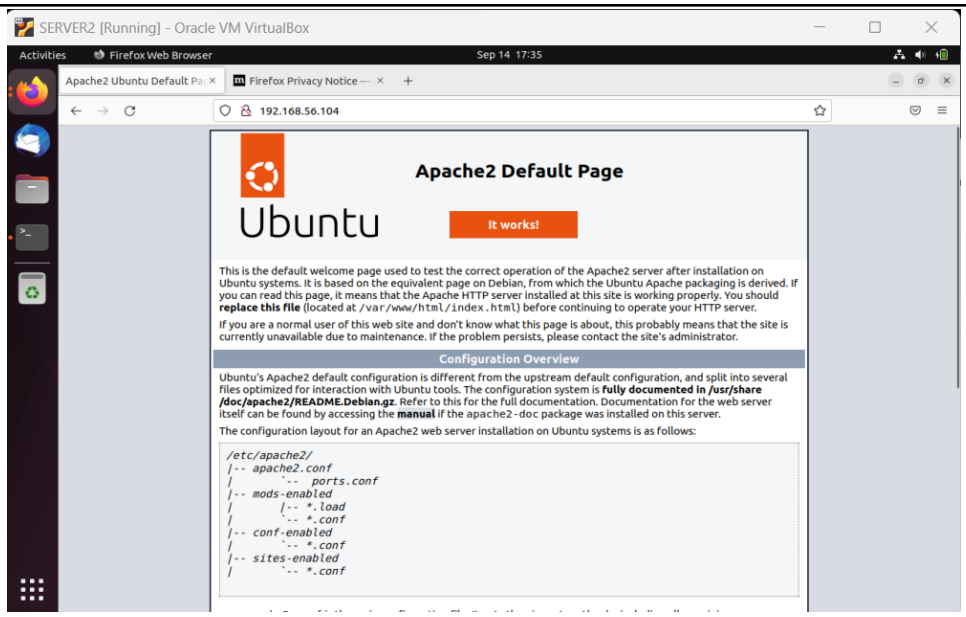
```
  GNU nano 4.8                  install_apache.yml
---
- hosts: all
  become: true
  tasks:

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

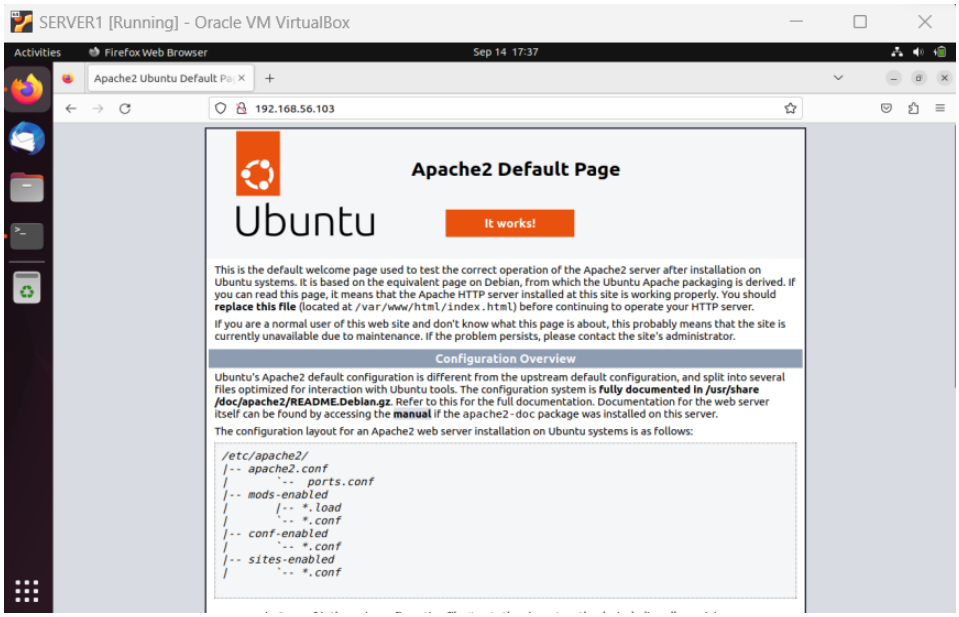
Make sure to save the file. Take note also of the alignments of the texts.

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

```
BECOME password:

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

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.103]
ok: [192.168.56.104]

TASK [install apache2 package] *************************************************
*
changed: [192.168.56.103]
changed: [192.168.56.104]

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

leonard@WORKSTATION:~/CPE232_Gabiano$
```

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?

5. This time, we are going to put additional task to 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.

```
  GNU nano 6.2                          install_apache.yml
---
- hosts: all
  become: true
  tasks:

  - name:  update repository index
    apt:
      update_cache: yes

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

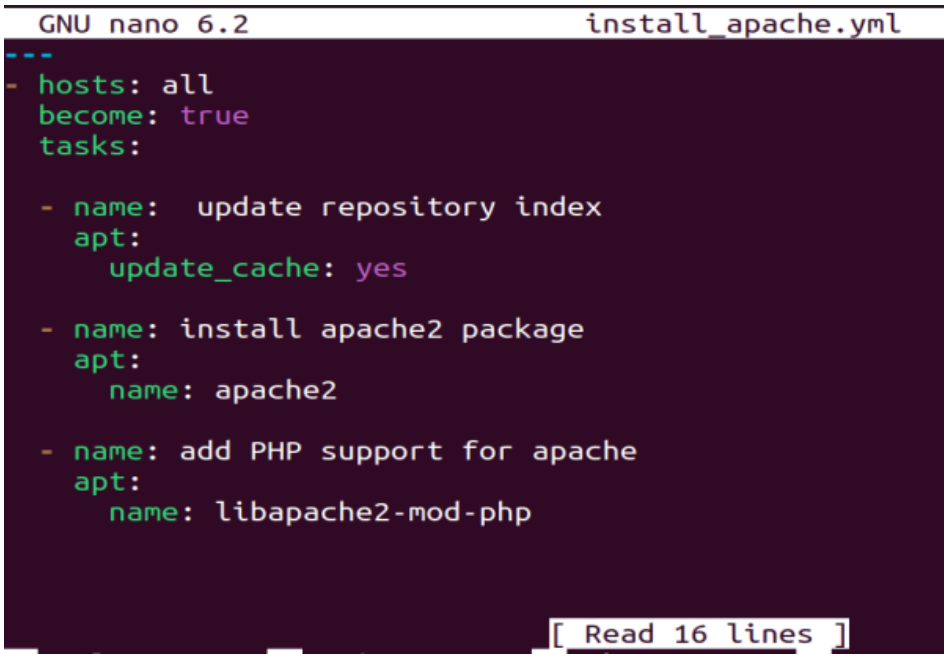
6. Run the playbook and describe the output. Did the new command change anything on the remote servers?

```
leonard@WORKSTATION:~/CPE232_Gabiano$ ansible-playbook --ask-become-pass instal
l_apache.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.104]
ok: [192.168.56.103]

TASK [update repository index] *************************************************
*
changed: [192.168.56.103]
changed: [192.168.56.104]

TASK [install apache2 package] *************************************************
*
ok: [192.168.56.103]
ok: [192.168.56.104]

PLAY RECAP *********************************************************************
*
192.168.56.103             : ok=3    changed=1    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
192.168.56.104             : ok=3    changed=1    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0

leonard@WORKSTATION:~/CPE232_Gabiano$
```

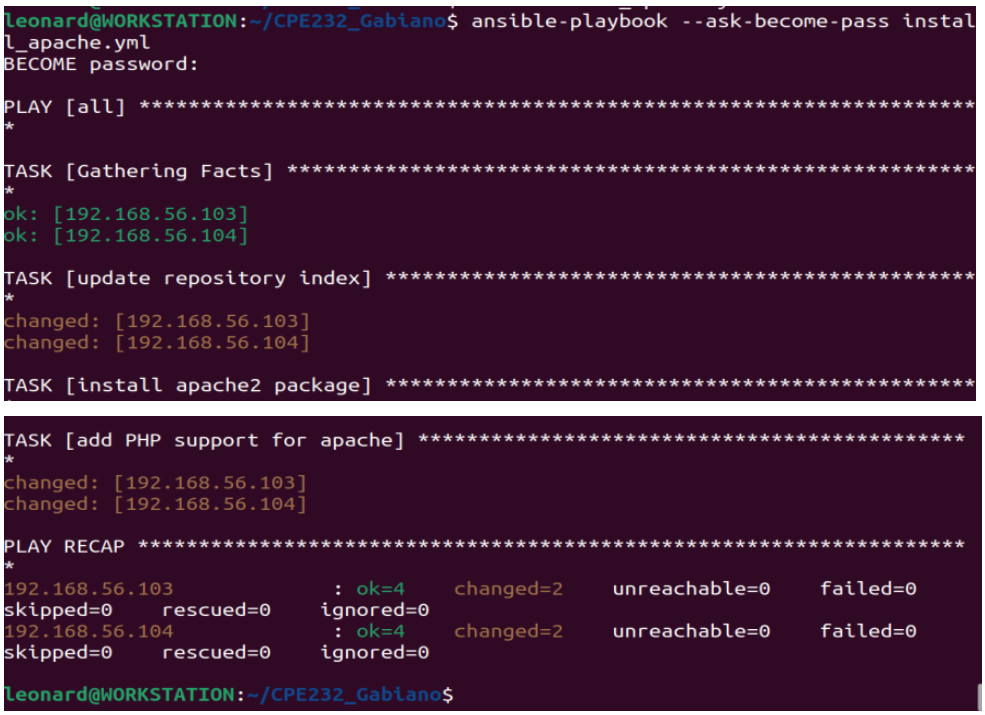
7. Edit again the *install_apache.yml*. This time, we are going to add a PHP support for the apache package we installed earlier.

```
---
- 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?



9. Finally, make sure that we are in sync with GitHub. Provide the link of your GitHub repository.4

   https://github.com/LeoGabiano03/CPE232_Gabiano.git

Reflections:

Answer the following:

1. **What is the importance of using a playbook?**

A playbook in computer engineering is like a step-by-step manual for tackling technical challenges. It helps students by providing clear instructions and best practices for solving common problems, ensuring consistency and efficiency in their work. Playbooks are vital because they act as a guide, preventing errors, and helping students build valuable problem-solving skills as they navigate the complex world of computer engineering.

2. **Summarize what we have done on this activity.**

   We have learned how to use linux and ansible in this activity to create We also have a consensus with regards to remote servers and accessing them. How to implement automation in our systems and use Ansible to do so Overall, playbook is an excellent resource for learning how to remotely manage systems. several servers, and provide automation that makes work easier.

Conclusion:

In conclusion, the objectives involve utilizing Ansible to execute commands that bring about modifications on remote machines, thereby facilitating efficient and centralized system management. Additionally, the use of playbooks further enhances automation capabilities, allowing for the creation of repeatable and standardized procedures for managing remote systems. This combination of remote command execution and playbook automation empowers system administrators to streamline their operations and maintain consistency across diverse environments.