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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: <i>Provide screenshots for each task.</i> 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 <i>sudo apt update</i> when we want to download package information from all configured resources. The sources often defined in <i>/etc/apt/sources.list</i> file and other files located in <i>/etc/apt/sources.list.d/</i> 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?

```
valencia@workstation:~/VALENCIA_ACT4$ ansible all -m apt -a update_cache=true
server2 | FAILED! => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "msg": "Failed to lock apt for exclusive operation: Failed to lock directory /var/lib/apt/lists/: E:Could not open lock file /var/lib/apt/lists/lock - open (13: Permission denied)"
}
server1 | FAILED! => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "msg": "Failed to lock apt for exclusive operation: Failed to lock directory /var/lib/apt/lists/: E:Could not open lock file /var/lib/apt/lists/lock - open (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***. Enter the sudansibo 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.

```
valencia@workstation:~/VALENCIA_ACT4$ ansible all -m apt -a update_cache=true --become --ask-become-pass
BECOME password:
server1 | CHANGED => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "cache_update_time": 1726205897,
  "cache_updated": true,
  "changed": true
}
server2 | CHANGED => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "cache_update_time": 1726205897,
  "cache_updated": true,
  "changed": true
}
valencia@workstation:~/VALENCIA_ACT4$
```

- 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.

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?

```
valencia@workstation:~/VALENCIA_ACT4$ which vim
valencia@workstation:~/VALENCIA_ACT4$ apt search vim-nox
Sorting... Done
Full Text Search... Done
vim-nox/jammy-updates,jammy-security 2:8.2.3995-1ubuntu2.18 amd64
Vi IMproved - enhanced vi editor - with scripting languages support

vim-tiny/jammy-updates,jammy-security,now 2:8.2.3995-1ubuntu2.18 amd64 [installed,automatic]
Vi IMproved - enhanced vi editor - compact version

valencia@workstation:~/VALENCIA_ACT4$
```

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*.

```
GNU nano 6.2 history.log
Start-Date: 2024-09-11 14:19:13
Commandline: apt-get --yes -oDebug::pkgDepCache::AutoInstall=yes --force-yes upgrade
Upgrade: dpkg:amd64 (1.21.1ubuntu2, 1.21.1ubuntu2.3), libxtables12:amd64 (1.8.7-1ubuntu5, 1.8.7-1ubuntu5.2), networkd-dispatcher:amd64 (2.49.11-1ubuntu3, 2.49.11-1ubuntu3.12)
End-Date: 2024-09-11 14:19:27

Start-Date: 2024-09-11 14:19:28
Commandline: apt-get --yes -oDebug::pkgDepCache::AutoInstall=yes --force-yes dist-upgrade
Install: ubuntu-pro-client-l10n:amd64 (33.2-22.04, automatic), systemd-hwdb:amd64 (249.11.5, automatic), ubuntu-pro-client:amd64 (249.11-0ubuntu3, 249.11-0ubuntu3.12), libudev1:amd64 (249.11-0ubuntu3, 249.11-0ubuntu3.12), ubuntu-advantage-tools:amd64 (249.11-0ubuntu3, 249.11-0ubuntu3.12)
End-Date: 2024-09-11 14:19:30

Start-Date: 2024-09-11 14:19:40
Commandline: apt-get --yes -oDebug::pkgDepCache::AutoInstall=yes install linux-generic-hwe-22.04 adduser base-passwd console-setup
Install: kerneloops:amd64 (0.12+git20140509-6ubuntu5), openvpn:amd64 (2.5.9-0ubuntu0.22.04.3), fontconfig:amd64 (2.13.1-4.2ubuntu5)
End-Date: 2024-09-11 14:21:59

Start-Date: 2024-09-11 14:22:06
Commandline: apt-get --yes -oDebug::pkgDepCache::AutoInstall=yes install casper fonts-arphic-ukai fonts-arphic-uming gnome-user-docs
Install: libreoffice-l10n-en-gb:amd64 (1:7.3.7-0ubuntu0.22.04.6), libm17n-0:amd64 (1.8.0-4), libreoffice-l10n-en-za:amd64 (1:7.3.7-0ubuntu0.22.04.6)
End-Date: 2024-09-11 14:24:14

Start-Date: 2024-09-13 09:47:19
Requested-By: ubuntu (999)
End-Date: 2024-09-13 09:47:19

Start-Date: 2024-09-13 09:47:34
Requested-By: ubuntu (999)
Purge: libreoffice-l10n-en-gb:amd64 (1:7.3.7-0ubuntu0.22.04.6), libm17n-0:amd64 (1.8.0-4), libreoffice-l10n-en-za:amd64 (1:7.3.7-0ubuntu0.22.04.6)
End-Date: 2024-09-13 09:49:18

Start-Date: 2024-09-13 09:49:20
Requested-By: ubuntu (999)
Purge: libdhash1:amd64 (0.6.2-1), libint-config5:amd64 (0.6.2-1), libcollection4:amd64 (0.6.2-1), libc-ares2:amd64 (1.18.1-1ubuntu0.2)
End-Date: 2024-09-13 09:49:23
```

- We can see here all the logs regarding installation of packages or apps.

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?

```

valencia@workstation:~/VALENCIA_ACT4$ ansible all -m apt -a name=snapd --become --ask-become-pass
BECOME password:
server2 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "cache_update_time": 1726205897,
  "cache_updated": false,
  "changed": false
}
server1 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "cache_update_time": 1726205897,
  "cache_updated": false,
  "changed": false
}
valencia@workstation:~/VALENCIA_ACT4$

```

- Nothing is changed because snapd is already installed in the 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.

```

valencia@workstation:~/VALENCIA_ACT4$ ansible all -m apt -a "name=snapd state=latest" --become --ask-become-pass
BECOME password:
server2 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "cache_update_time": 1726205897,
  "cache_updated": false,
  "changed": false
}
server1 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "cache_update_time": 1726205897,
  "cache_updated": false,
  "changed": false
}
valencia@workstation:~/VALENCIA_ACT4$

```

- *It is supposed to be installing the latest update but since I recently updated everything in both workstation and servers, there is nothing needed to be changed or updated so it shows false.*

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

```

valencia@workstation:~/VALENCIA_ACT4$ git add .
valencia@workstation:~/VALENCIA_ACT4$ git commit -m "1st push"
[main 1773b95] 1st push
2 files changed, 12 insertions(+)
create mode 100644 ansible.cfg
create mode 100644 inventory.yaml
valencia@workstation:~/VALENCIA_ACT4$ git push origin main
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 2 threads
Compressing objects: 100% (4/4), done.
Writing objects: 100% (4/4), 500 bytes | 500.00 KiB/s, done.
Total 4 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:a-valenc/VALENCIA_ACT4.git
1fc5c19..1773b95 main -> main
valencia@workstation:~/VALENCIA_ACT4$

```

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.

```
valencia@workstation: ~/CPE232_VALENCIA
GNU nano 6.2                                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.

```
valencia@workstation:~/CPE232_VALENCIA$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

PLAY [all] *****

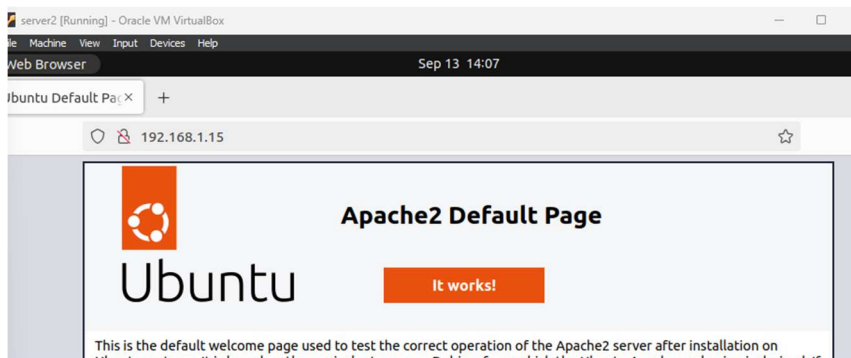
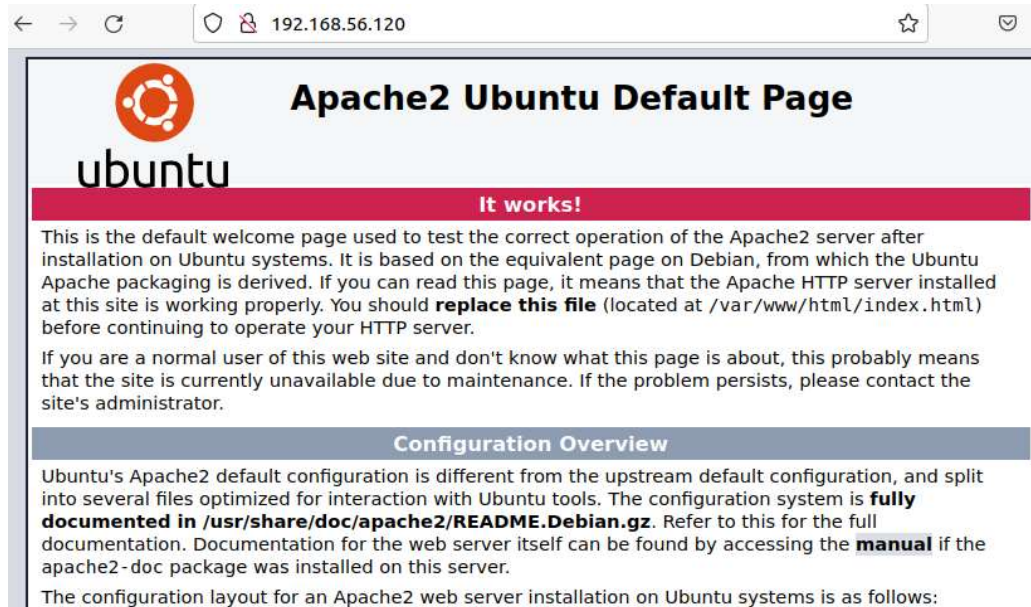
TASK [Gathering Facts] *****
ok: [server2]
ok: [server1]

TASK [install apache2 package] *****
changed: [server1]
changed: [server2]

PLAY RECAP *****
server1      : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
server2      : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```


- It shows that the apache is installed by the “changed=1” text.

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?

```
valencia@workstation: /CPE132-VALENCIA$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************************
ok: [server2]
ok: [server1]

TASK [install apache2 package] *********************************************************************
fatal: [server2]: FAILED! => [{"changed": false, "msg": "No package matching 'nanoapache2' is available"}]
fatal: [server1]: FAILED! => [{"changed": false, "msg": "No package matching 'nanoapache2' is available"}]

PLAY RECAP *********************************************************************
server1      : ok=1    changed=0    unreachable=0    failed=1    skipped=0    rescued=0    ignored=0
server2      : ok=1    changed=0    unreachable=0    failed=1    skipped=0    rescued=0    ignored=0

valencia@workstation: /CPE132-VALENCIA$
```

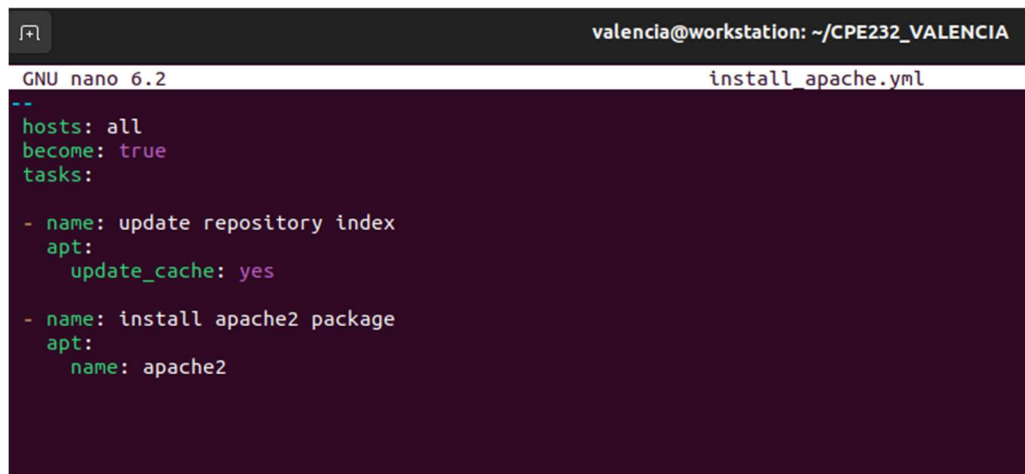
5. This time, we are going to put additional task to our playbook. Edit the *install_apache.yml*. As you can see, we are now adding an additional command, which is the *update_cache*. This command updates existing package-indexes on a supporting distro but not upgrading installed-packages (utilities)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



```
valencia@workstation: ~/CPE232_VALENCIA
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?

```
valencia@workstation:~/CPE232_VALENCIA$ nano install_apache.yml
valencia@workstation:~/CPE232_VALENCIA$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

PLAY [all] *****
TASK [Gathering Facts] *****
ok: [server2]
ok: [server1]

TASK [update repository index] *****
changed: [server1]
changed: [server2]

TASK [install apache2 package] *****
ok: [server2]
ok: [server1]

PLAY RECAP *****
server1 : ok=3  changed=1  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0
server2 : ok=3  changed=1  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0

valencia@workstation:~/CPE232_VALENCIA$
```

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

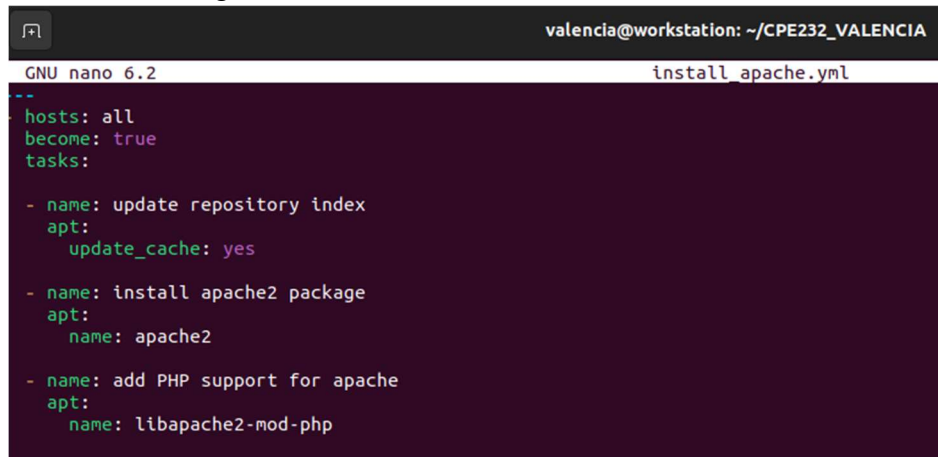
```
---
- hosts: all
  become: true
  tasks:

    - 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.



```
valencia@workstation: ~/CPE232_VALENCIA
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

    - 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?
- Yes


```

valencia@workstation:~/CPE232_VALENCIA$ nano install_apache.yml
valencia@workstation:~/CPE232_VALENCIA$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

PLAY [all] *****

TASK [Gathering Facts] *****
ok: [server2]
ok: [server1]

TASK [update repository index] *****
changed: [server1]
changed: [server2]

TASK [install apache2 package] *****
ok: [server1]
ok: [server2]

TASK [add PHP support for apache] *****
changed: [server1]
changed: [server2]

PLAY RECAP *****
server1 : ok=4    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
server2 : ok=4    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
valencia@workstation:~/CPE232_VALENCIA$

```

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

```

valencia@workstation:~/CPE232_VALENCIA$ git add .
valencia@workstation:~/CPE232_VALENCIA$ git commit "ACT 4 changes
error: pathspec 'ACT 4 changes' did not match any file(s) known to
valencia@workstation:~/CPE232_VALENCIA$ git commit -m "ACT 4 changes
[main 175612b] ACT 4 changes
 2 files changed, 20 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 install_apache.yml
valencia@workstation:~/CPE232_VALENCIA$ git push origin main
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 2 threads
Compressing objects: 100% (4/4), done.
Writing objects: 100% (4/4), 572 bytes | 572.00 KiB/s, done.
Total 4 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:a-valenc/CPE232_VALENCIA.git
 2aa7a31..175612b  main -> main
valencia@workstation:~/CPE232_VALENCIA$

```

- LINK: https://github.com/a-valenc/CPE232_VALENCIA.git

Reflections:

Answer the following:

1. What is the importance of using a playbook?
2. Summarize what we have done on this activity.

