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Name: Ballesteros, John Erwin S.	Date Performed: 9/25/2024
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Instructor: Engr. Robin Valenzuela	Semester and SY: 1st Sem '24-'25

Activity 5: Consolidating Playbook plays

1. **Objectives:**

1.1 Use **when** command in playbook for different OS distributions

1.2 Apply refactoring techniques in cleaning up the playbook codes

2. **Discussion**:

We are going to look at a way that we can differentiate a playbook by a host in terms of which distribution the host is running. It's very common in most Linux shops to run multiple distributions, for example, Ubuntu shop or Debian shop and you need a different distribution for a one off-case or perhaps you want to run plays only on certain distributions.

It is a best practice in ansible when you are working in a collaborative environment to use the command git pull. git pull is a Git command used to update the local version of a repository from a remote. By default, git pull does two things. Updates the current local working branch (currently checked out branch) and updates the remote-tracking branches for all other branches. git pull essentially pulls down any changes that may have happened since the last time you worked on the repository.

Requirement:

In this activity, you will need to create a CentOS VM. Likewise, you need to activate the second adapter to a host-only adapter after the installations. Take note of the IP address of the CentOS VM. Make sure to use the command *ssh-copy-id* to copy the public key to CentOS. Verify if you can successfully SSH to CentOS VM.

Task 1: Use when command for different distributions

1. In the local machine, make sure you are in the local repository directory (*CPE232_yourname*). Issue the command git pull. When prompted, enter the correct passphrase or password. Describe what happened when you issue this command. Did something happen? Why?

```
erwin@workstation:~$ cd CPE212_Ballesteros
erwin@workstation:~/CPE212_Ballesteros$ git pull
Already up to date.
```

When I performed the git pull to my repository it says that it is already up to date because there is no new files added to it.

2. Edit the inventory file and add the IP address of the Centos VM. Issue the command we used to execute the playbook (the one we used in the last activity): *ansible-playbook --ask-become-pass install_apache.yml*. After executing this command, you may notice that it did not become successful in the Centos VM. You can see that the Centos VM has failed=1. Only the two remote servers have been changed. The reason is that Centos VM does not support "apt" as the package manager. The default package manager for Centos is "yum."
3. Edit the *install_apache.yml* file and insert the lines shown below.

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

  - name: update repository index
    apt:
      update_cache: yes
    when: ansible_distribution == "Ubuntu"

  - name: install apache2 package
    apt:
      name: apache2
    when: ansible_distribution == "Ubuntu"

  - name: add PHP support for apache
    apt:
      name: libapache2-mod-php
    when: ansible_distribution == "Ubuntu"
```

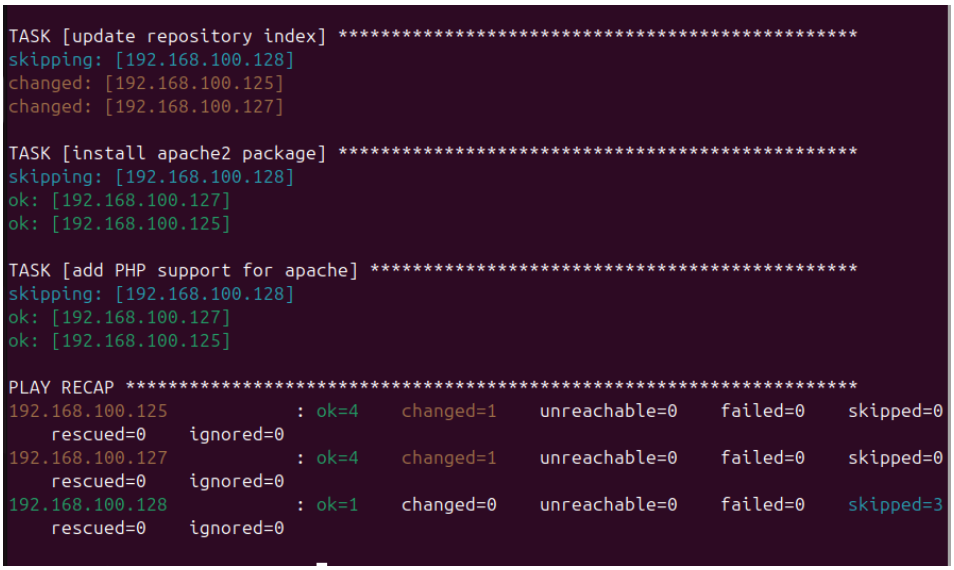
Make sure to save the file and exit.

Run *ansible-playbook --ask-become-pass install_apache.yml* and describe the result.

```
---
- hosts: all
  become: true
  tasks:
    - name: update repository index
      apt:
          update_cache: yes
      when: ansible_distribution == "Ubuntu"

    - name: install apache2 package
      apt:
         name: apache2
      when: ansible_distribution == "Ubuntu"

    - name: add PHP support for apache
      apt:
        name: libapache2-mod-php
      when: ansible_distribution == "Ubuntu"
```



```
TASK [update repository index] *********************************************
skipping: [192.168.100.128]
changed: [192.168.100.125]
changed: [192.168.100.127]

TASK [install apache2 package] *********************************************
skipping: [192.168.100.128]
ok: [192.168.100.127]
ok: [192.168.100.125]

TASK [add PHP support for apache] ******************************************
skipping: [192.168.100.128]
ok: [192.168.100.127]
ok: [192.168.100.125]

PLAY RECAP *****************************************************************
192.168.100.125            : ok=4    changed=1    unreachable=0    failed=0    skipped=0
    rescued=0    ignored=0
192.168.100.127            : ok=4    changed=1    unreachable=0    failed=0    skipped=0
    rescued=0    ignored=0
192.168.100.128            : ok=1    changed=0    unreachable=0    failed=0    skipped=3
    rescued=0    ignored=0
```

When running the ansible playbook it says it has skipped some IP address, it is because of the command that we integrated which skips when it is not a Ubuntus OS.

If you have a mix of Debian and Ubuntu servers, you can change the configuration of your playbook like this.

- name: update repository index
  apt:
    update_cache: yes
  when: ansible_distribution in [“Debian”, “Ubuntu]

Note: This will work also if you try. Notice the changes are highlighted.

4. Edit the *install_apache.yml* file and insert the lines shown below.

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

  - name: update repository index
    apt:
      update_cache: yes
    when: ansible_distribution == "Ubuntu"

  - name: install apache2 package
    apt:
      name: apache2
      stae: latest
    when: ansible_distribution == "Ubuntu"

  - name: add PHP support for apache
    apt:
      name: libapache2-mod-php
      state: latest
    when: ansible_distribution == "Ubuntu"

  - name: update repository index
    dnf:
      update_cache: yes
    when: ansible_distribution == "CentOS"

  - name: install apache2 package
    dnf:
      name: httpd
      state: latest
    when: ansible_distribution == "CentOS"

  - name: add PHP support for apache
    dnf:
      name: php
      state: latest
    when: ansible_distribution == "CentOS"
```

Make sure to save and exit.

Run *ansible-playbook --ask-become-pass install_apache.yml* and describe the result.

```
- name: add PHP support for apache
  apt:
    name: libapache2-mod-php
  when: ansible_distribution == "Ubuntu"

- name: update repository index
  dnf:
    update_cache: yes
  when: ansible_distribution == "CentOS"

- name: install apache2 package
  dnf:
    name: httpd
    state: latest
  when: ansible_distribution == "CentOS"

- name: add PHP support for apache
  dnf:
    name: php
    state: latest
  when: ansible_distribution == "CentOS"
```

```
TASK [update repository index] ****************
skipping: [192.168.100.127]
skipping: [192.168.100.125]
ok: [192.168.100.128]

TASK [install apache2 package] ****************
skipping: [192.168.100.127]
skipping: [192.168.100.125]
changed: [192.168.100.128]

TASK [add PHP support for apache] *************
skipping: [192.168.100.127]
skipping: [192.168.100.125]
changed: [192.168.100.128]

PLAY RECAP ************************************
192.168.100.125            : ok=4    changed=1
    rescued=0    ignored=0
192.168.100.127            : ok=4    changed=1
    rescued=0    ignored=0
192.168.100.128            : ok=4    changed=2
    rescued=0    ignored=0
```

On this code there are more skipped IP address because it only looks for OS that is CentOS.

5. To verify the installations, go to CentOS VM and type its IP address on the browser. Was it successful? The answer is no. It's because the httpd service or the Apache HTTP server in the CentOS is not yet active. Thus, you need to activate it first.

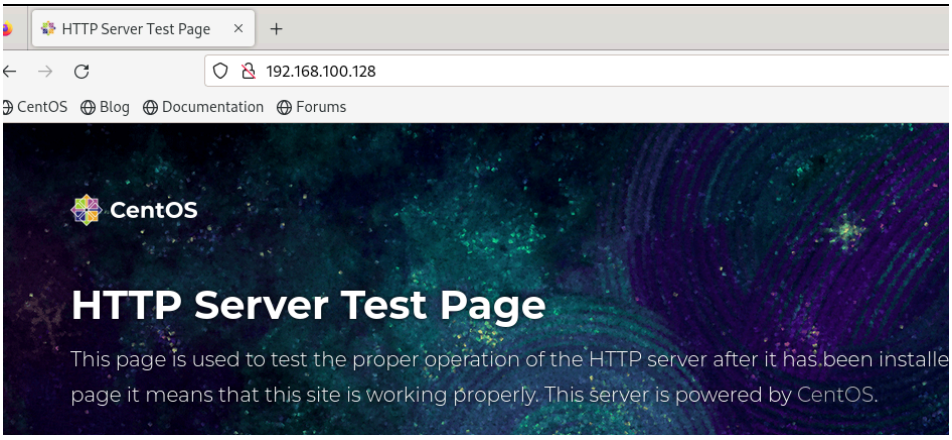
   5.1 To activate, go to the CentOS VM terminal and enter the following:
   systemctl status httpd
   The result of this command tells you that the service is inactive.

   5.2 Issue the following command to start the service:
   sudo systemctl start httpd
   (When prompted, enter the sudo password)
   sudo firewall-cmd --add-port=80/tcp
   (The result should be a success)

```
[erwin@centos ~]$ systemctl status httpd
○ httpd.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/httpd.service; disabled; preset: d>
    Drop-In: /usr/lib/systemd/system/httpd.service.d
             └─php-fpm.conf
     Active: inactive (dead)
       Docs: man:httpd.service(8)

[1]+  Stopped                 systemctl status httpd
[erwin@centos ~]$ sudo systemctl start httpd
[sudo] password for erwin:
[erwin@centos ~]$ sudo firewall-cmd --add-port=80/tcp
success
[erwin@centos ~]$
```

5.3 To verify the service is already running, go to CentOS VM and type its IP address on the browser. Was it successful? (Screenshot the browser)



Task 2: Refactoring playbook

This time, we want to make sure that our playbook is efficient and that the codes are easier to read. This will also makes run ansible more quickly if it has to execute fewer tasks to do the same thing.

1. Edit the playbook *install_apache.yml*. Currently, we have three tasks targeting our Ubuntu machines and 3 tasks targeting our CentOS machine. Right now, we try to consolidate some tasks that are typically the same. For example, we can consolidate two plays that install packages. We can do that by creating a list of installation packages as shown below:

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

  - name: update repository index Ubuntu
    apt:
      update_cache: yes
    when: ansible_distribution == "Ubuntu"

  - name: install apache2 and php packages for Ubuntu
    apt:
      name:
        - apache2
        - libapache2-mod-php
      state: latest
    when: ansible_distribution == "Ubuntu"

  - name: update repository index for CentOS
    dnf:
      update_cache: yes
    when: ansible_distribution == "CentOS"

  - name: install apache and php packages for CentOS
    dnf:
      name:
        - httpd
        - php
      state: latest
    when: ansible_distribution == "CentOS"
```

Make sure to save the file and exit.

Run *ansible-playbook --ask-become-pass install_apache.yml* and describe the result.

```
- name: install apache2 package
  apt:
     name:
      - apache2
      - libapache2-mod-php
  when: ansible_distribution == "Ubuntu"

- name: update repository index for CentOS
  dnf:
    update_cache: yes
  when: ansible_distribution == "CentOS"

- name: install apache2 and php package for CentOS
  dnf:
    name:
     - httpd
     - php
    state: latest
  when: ansible_distribution == "CentOS"
```

```
TASK [Gathering Facts] *********************************************************
ok: [192.168.100.127]
ok: [192.168.100.128]
ok: [192.168.100.125]

TASK [update repository index] *************************************************
skipping: [192.168.100.128]
changed: [192.168.100.127]
changed: [192.168.100.125]

TASK [install apache2 package] *************************************************
skipping: [192.168.100.128]
ok: [192.168.100.127]
ok: [192.168.100.125]

TASK [update repository index for CentOS] **************************************
skipping: [192.168.100.127]
skipping: [192.168.100.125]
ok: [192.168.100.128]

TASK [install apache2 and php package for CentOS] ******************************
skipping: [192.168.100.127]
skipping: [192.168.100.125]
ok: [192.168.100.128]

PLAY RECAP *********************************************************************
192.168.100.125            : ok=3    changed=1    unreachable=0    failed=0    skipped=2
    rescued=0    ignored=0
192.168.100.127            : ok=3    changed=1    unreachable=0    failed=0    skipped=2
    rescued=0    ignored=0
```

When the playbook is entered the process on which checking each files significantly takes less time compared to the first one.

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2. Edit the playbook *install_apache.yml* again. In task 2.1, we consolidated the plays into one play. This time we can actually consolidated everything in just 2 plays. This can be done by removing the update repository play and putting the

command *update_cache: yes* below the command *state: latest*. See below for reference:

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

   - name: install apache2 and php packages for Ubuntu
     apt:
      name:
        - apache2
        - libapache2-mod-php
      state: latest
      update_cache: yes
     when: ansible_distribution == "Ubuntu"

   - name: install apache and php packages for CentOS
     dnf:
       name:
         - httpd
         - php
       state: latest
       update_cache: yes
     when: ansible_distribution == "CentOS"
```

Make sure to save the file and exit.

Run *ansible-playbook --ask-become-pass install_apache.yml* and describe the result.

```
   - name: install apache2 and php package for Ubuntu
     apt:
        name:
         - apache2
         - libapache2-mod-php
        state: latest
        update_cache: yes
     when: ansible_distribution == "Ubuntu"

   - name: install apache2 and php package for CentOS
     dnf:
       name:
        - httpd
        - php
       state: latest
       update_cache: yes
     when: ansible_distribution == "CentOS"
```

```
TASK [Gathering Facts] ************************************
ok: [192.168.100.127]
ok: [192.168.100.125]
ok: [192.168.100.128]

TASK [install apache2 and php package for Ubuntu] ***********
skipping: [192.168.100.128]
ok: [192.168.100.127]
ok: [192.168.100.125]

TASK [install apache2 and php package for CentOS] ***********
skipping: [192.168.100.127]
skipping: [192.168.100.125]
ok: [192.168.100.128]

PLAY RECAP ************************************************
192.168.100.125            : ok=2    changed=0    unreachable=
    rescued=0    ignored=0
192.168.100.127            : ok=2    changed=0    unreachable=
    rescued=0    ignored=0
192.168.100.128            : ok=2    changed=0    unreachable=
    rescued=0    ignored=0
```

When entered the revised playbook the updating of the cache saves more time because it is integrated on both of the tasks. It also took less time to perform all of the tasks.

3. Finally, we can consolidate these 2 plays in just 1 play. This can be done by declaring variables that will represent the packages that we want to install. Basically, the apache_package and php_package are variables. The names are arbitrary, which means we can choose different names. We also take out the line when: ansible_distribution. Edit the playbook *install_apache.yml* again and make sure to follow the below image. Make sure to save the file and exit.

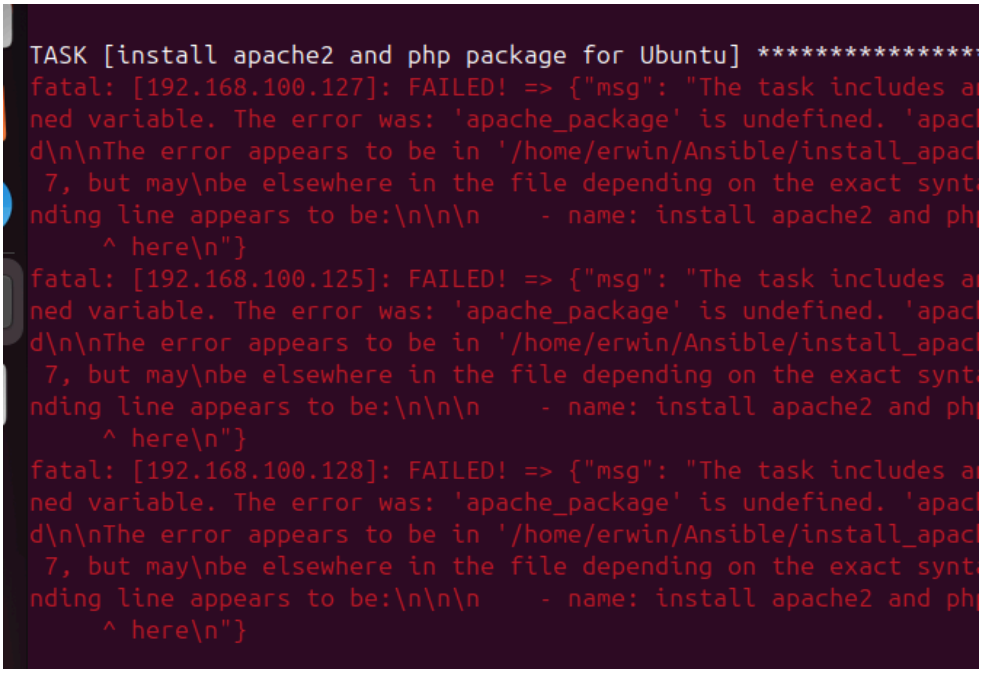
```
---
- hosts: all
  become: true
  tasks:

  - name: install apache and php
    apt:
      name:
        - "{{ apache_package }}"
        - "{{ php_package }}"
      state: latest
      update_cache: yes
```

Run *ansible-playbook --ask-become-pass install_apache.yml* and describe the result.

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

    - name: install apache2 and php package for Ubuntu
      apt:
         name:
          - "{{ apache_package }}"
          - "{{ php_package }}"
         state: latest
         update_cache: yes
```



It does not work because there is no appropriate value for the variable that we made.

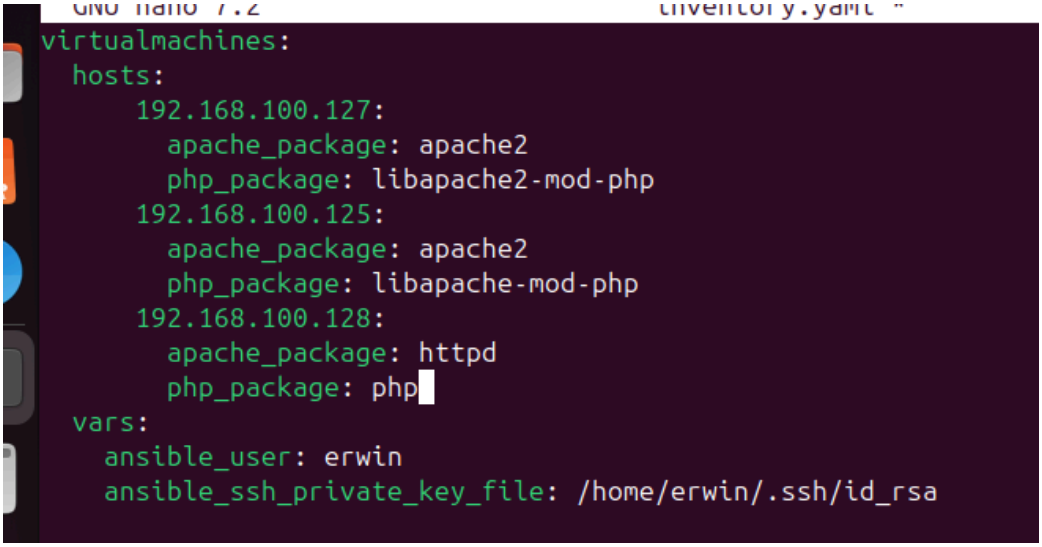
4. Unfortunately, task 2.3 was not successful. It's because we need to change something in the inventory file so that the variables we declared will be in place. Edit the *inventory* file and follow the below configuration:

```
192.168.56.120 apache_package=apache2 php_package=libapache2-mod-php
192.168.56.121 apache_package=apache2 php_package=libapache2-mod-php
192.168.56.122 apache_package=httpd php_package=php
```

Make sure to save the *inventory* file and exit.

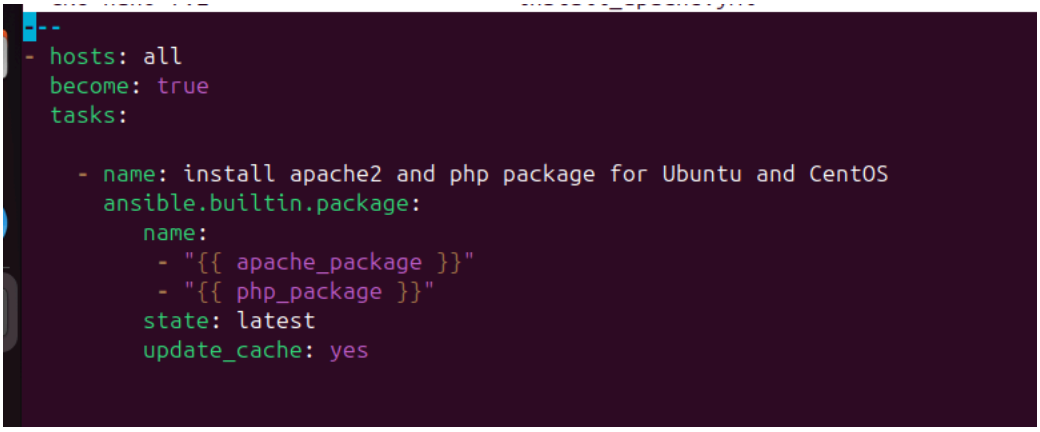
Finally, we still have one more thing to change in our *install_apache.yml* file. In task 2.3, you may notice that the package is assign as apt, which will not run in CentOS. Replace the *apt* with *package*. Package is a module in ansible that is generic, which is going to use whatever package manager the underlying host or the target server uses. For Ubuntu it will automatically use *apt*, and for CentOS it will automatically use *dnf*. Make sure to save the file and exit. For more details about the ansible package, you may refer to this documentation: ansible.builtin.package – Generic OS package manager — Ansible Documentation

Run *ansible-playbook --ask-become-pass install_apache.yml* and describe the result.



```
virtualmachines:
  hosts:
      192.168.100.127:
        apache_package: apache2
        php_package: libapache2-mod-php
      192.168.100.125:
        apache_package: apache2
        php_package: libapache-mod-php
      192.168.100.128:
        apache_package: httpd
        php_package: php
  vars:
    ansible_user: erwin
    ansible_ssh_private_key_file: /home/erwin/.ssh/id_rsa
```

Inventory file



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

    - name: install apache2 and php package for Ubuntu and CentOS
      ansible.builtin.package:
         name:
          - "{{ apache_package }}"
          - "{{ php_package }}"
         state: latest
         update_cache: yes
```

Install Apache

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

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

TASK [Gathering Facts] *********************************************************
ok: [192.168.100.127]
ok: [192.168.100.125]
ok: [192.168.100.128]

TASK [install apache2 and php package for Ubuntu and CentOS] *******************
ok: [192.168.100.127]
ok: [192.168.100.128]
ok: [192.168.100.125]

PLAY RECAP *********************************************************************
192.168.100.125            : ok=2    changed=0    unreachable=0    failed=0    skipped=0
    rescued=0    ignored=0
192.168.100.127            : ok=2    changed=0    unreachable=0    failed=0    skipped=0
    rescued=0    ignored=0
192.168.100.128            : ok=2    changed=0    unreachable=0    failed=0    skipped=0
    rescued=0    ignored=0
```

When running the ansible playbook it does not have any skipped IP address that checks for the specific OS of the machine as it utilizes the ansible.builtin.package where it automatically checks it. We assigned the value of the variable in the inventory yaml where CentOS and Ubuntu have differing package names.

Supplementary Activity:

1. Create a playbook that could do the previous tasks in Red Hat OS.

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

    - name: install apache2 and php package for RedHat OS
      ansible.builtin.package:
          name:
           #variables are set in the inventory which are
           #httpd for apache2 and php for php support
           #192.168.100.xxx:
             #apache_package: httpd
             #php_package: php
           - "{{ apache_package }}"
           - "{{ php_package }}"
          state: latest
          update_cache: yes
```

Reflections:

Answer the following:

1. Why do you think refactoring of playbook codes is important?
   Refactoring playbook codes allow us to make it cleaner and easier to read. Refactoring can also make certain processes faster as it can combine some redundant tasks into one.
2. When do we use the “when” command in the playbook?

   We can use the when command in a playbook when we want to perform some tasks in certain conditions. We can also use them to handle different environments, one example is whether we want to check if the OS is Ubuntu or CentOS. Lastly we can also use it to control the flow of the tasks, when a task is successful for example it will then proceed to the next task.