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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:

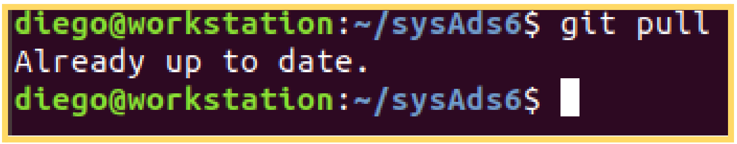
We are going to look at a way that we can differentiate a playbook by a host in terms of which distribution the host is running. It's very common in most Linux shops to run multiple distributions, for example, Ubuntu shop or Debian shop and you need a different distribution for a one off-case or perhaps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

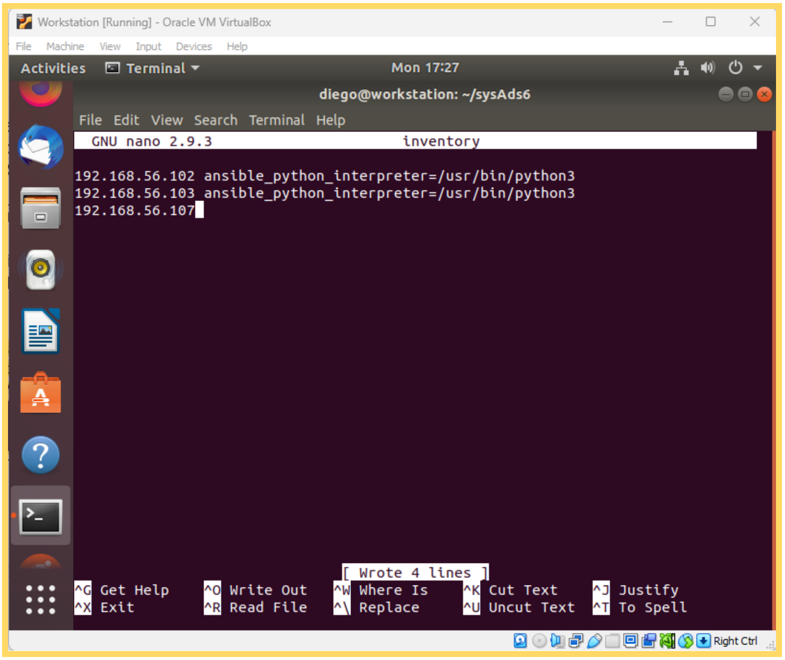
Task 1: Use when command for different distributions

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?
   When I use the command "git pull", and the result is "already up to date," it means that you didn't make any changes to the system. Therefore, there was no need for an update.

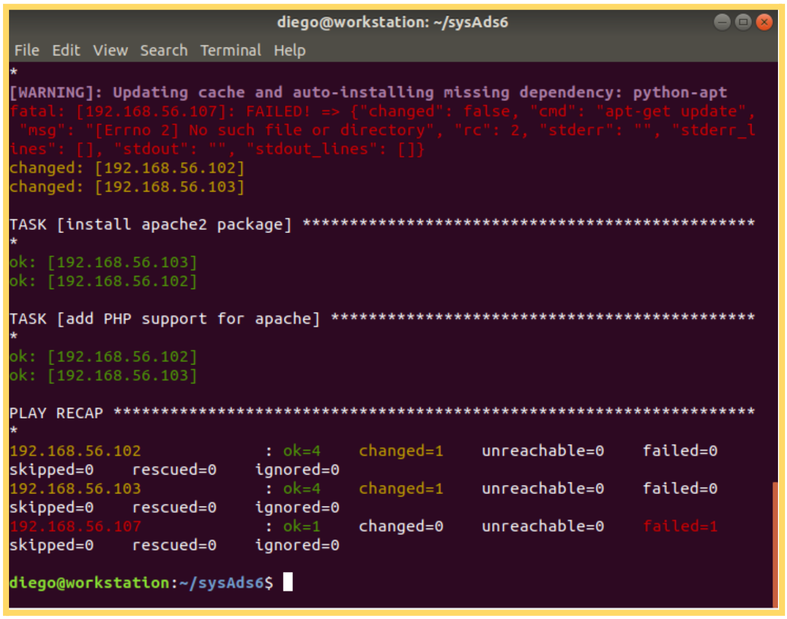


```
diego@workstation:~/sysAds6$ git pull
Already up to date.
diego@workstation:~/sysAds6$ 
```

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."

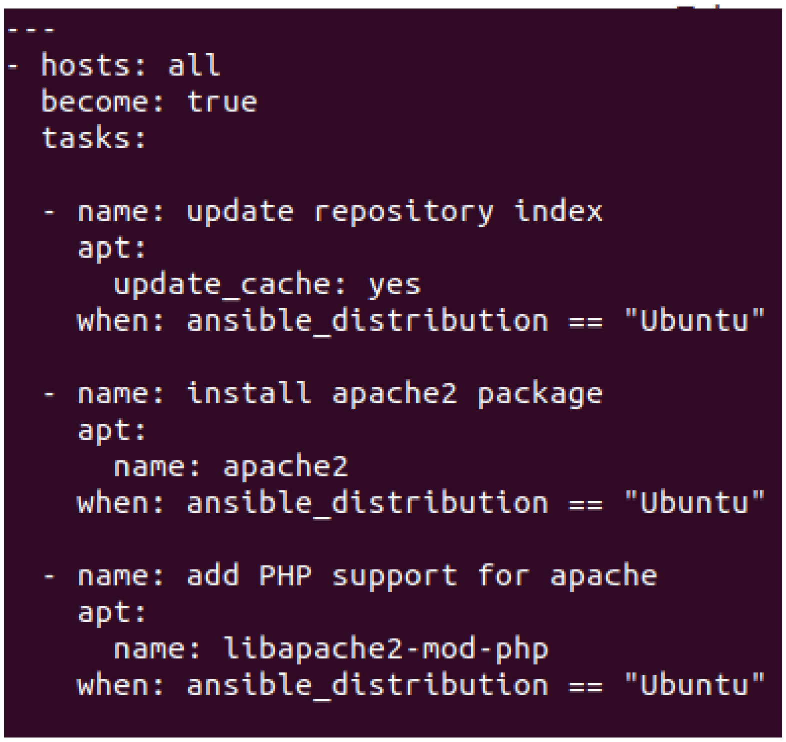

Workstation [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Mon 17:27
diego@workstation: ~/sysAds6
File Edit View Search Terminal Help
Right Ctrl

```
  GNU nano 2.9.3                    inventory

192.168.56.102 ansible_python_interpreter=/usr/bin/python3
192.168.56.103 ansible_python_interpreter=/usr/bin/python3
192.168.56.107

                            [ Wrote 4 lines ]
^G Get Help   ^O Write Out  ^W Where Is   ^K Cut Text   ^J Justify
^X Exit       ^R Read File  ^\ Replace    ^U Uncut Text ^T To Spell
```


diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

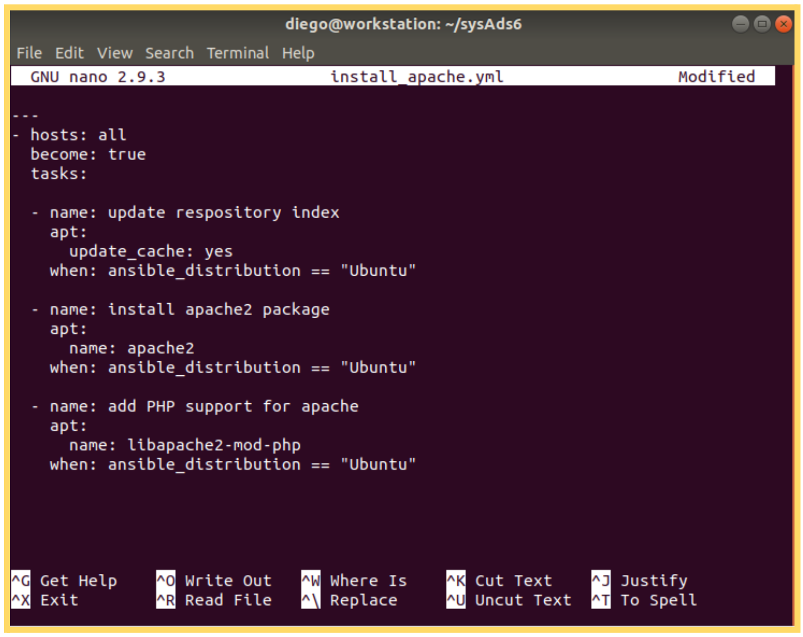
```
*
[WARNING]: Updating cache and auto-installing missing dependency: python-apt
fatal: [192.168.56.107]: FAILED! => {"changed": false, "cmd": "apt-get update",
 "msg": "[Errno 2] No such file or directory", "rc": 2, "stderr": "", "stderr_l
ines": [], "stdout": "", "stdout_lines": []}
changed: [192.168.56.102]
changed: [192.168.56.103]

TASK [install apache2 package] ************************************************
*
ok: [192.168.56.103]
ok: [192.168.56.102]

TASK [add PHP support for apache] *********************************************
*
ok: [192.168.56.102]
ok: [192.168.56.103]

PLAY RECAP ********************************************************************
*
192.168.56.102             : ok=4    changed=1    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
192.168.56.103             : ok=4    changed=1    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
192.168.56.107             : ok=1    changed=0    unreachable=0    failed=1
skipped=0    rescued=0    ignored=0

diego@workstation:~/sysAds6$ 
```

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.

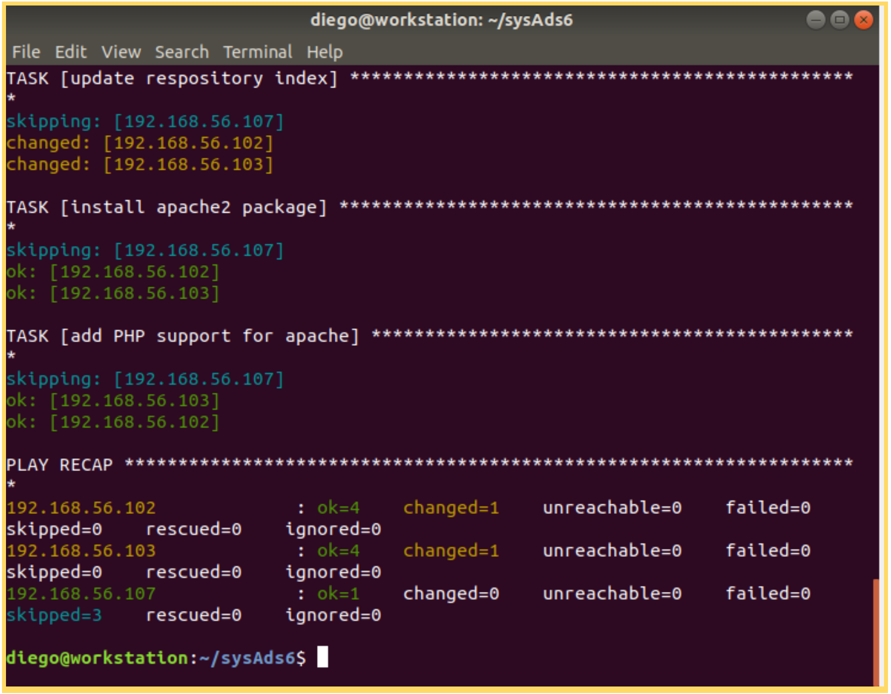


diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

```
  GNU nano 2.9.3              install_apache.yml              Modified

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

  - name: update respository 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"



^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify
^X Exit        ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Spell
```

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

After editing the “install_apache.yml” and executing the command to run the given task it is successful unlike the before there was an error.



diego@workstation: ~/sysAds6

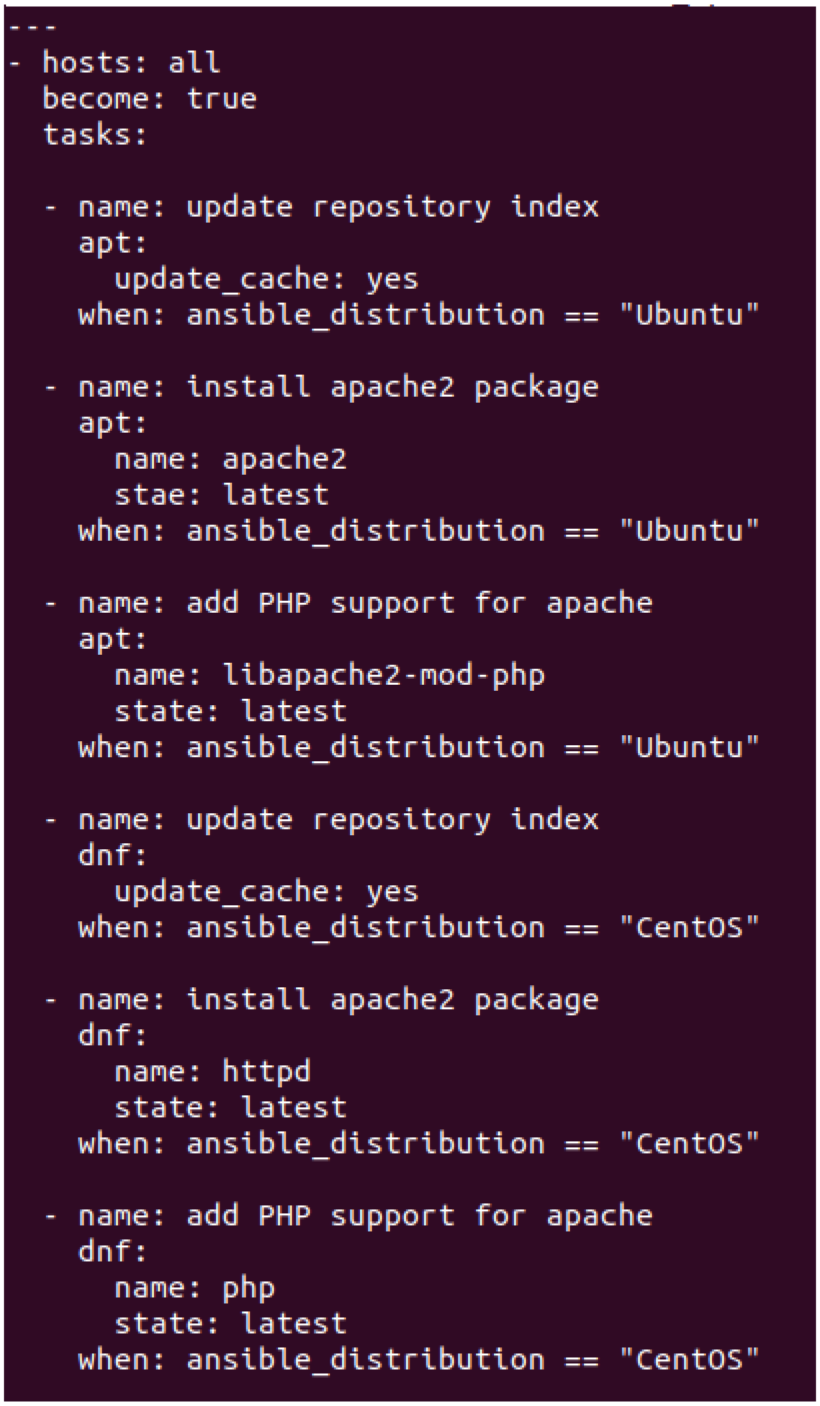
```
TASK [update respository index] *************************************************
*
skipping: [192.168.56.107]
changed: [192.168.56.102]
changed: [192.168.56.103]

TASK [install apache2 package] **************************************************
*
skipping: [192.168.56.107]
ok: [192.168.56.102]
ok: [192.168.56.103]

TASK [add PHP support for apache] ***********************************************
*
skipping: [192.168.56.107]
ok: [192.168.56.103]
ok: [192.168.56.102]

PLAY RECAP **********************************************************************
*
192.168.56.102             : ok=4    changed=1    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
192.168.56.103             : ok=4    changed=1    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
192.168.56.107             : ok=1    changed=0    unreachable=0    failed=0
skipped=3    rescued=0    ignored=0

diego@workstation:~/sysAds6$
```

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]
```

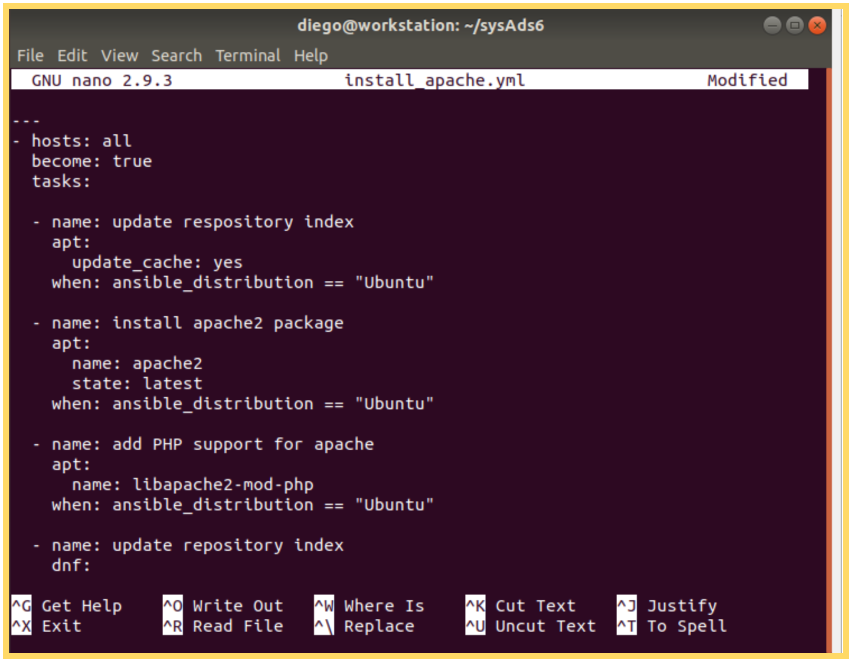
Note: This will work also if you try. Notice the changes are highlighted.

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"
```

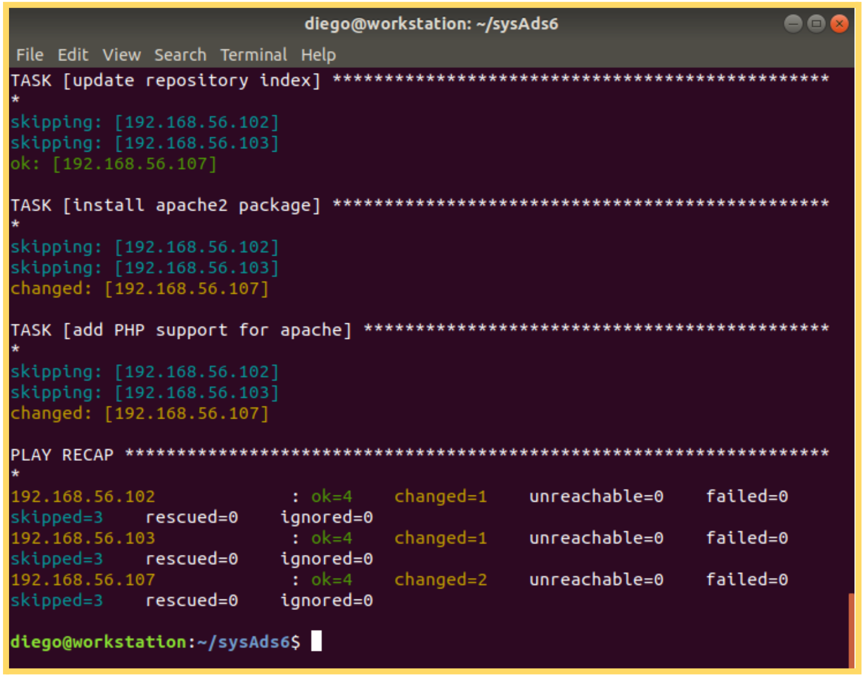
Make sure to save and exit.


diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

```
  GNU nano 2.9.3                install_apache.yml                  Modified

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

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

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

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

  - name: update repository index
    dnf:

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify
^X Exit        ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Spell
```

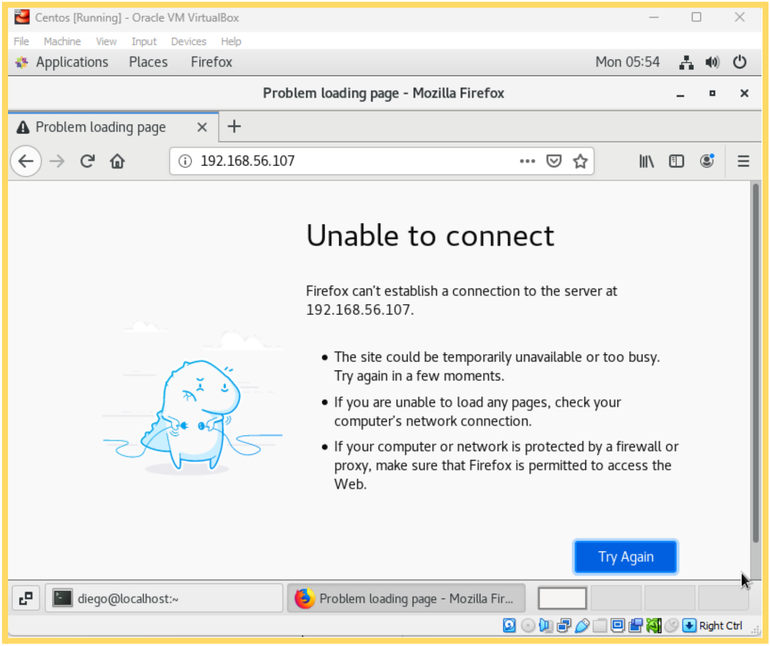
Run *ansible-playbook --ask-become-pass install_apache.yml* and describe the result.

After running the command it shows the six task that we input in the sudo nano install_apache.yml


diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

```
TASK [update repository index] *************************************************
*
skipping: [192.168.56.102]
skipping: [192.168.56.103]
ok: [192.168.56.107]

TASK [install apache2 package] *************************************************
*
skipping: [192.168.56.102]
skipping: [192.168.56.103]
changed: [192.168.56.107]

TASK [add PHP support for apache] **********************************************
*
skipping: [192.168.56.102]
skipping: [192.168.56.103]
changed: [192.168.56.107]

PLAY RECAP *********************************************************************
*
192.168.56.102             : ok=4    changed=1    unreachable=0    failed=0
skipped=3    rescued=0    ignored=0
192.168.56.103             : ok=4    changed=1    unreachable=0    failed=0
skipped=3    rescued=0    ignored=0
192.168.56.107             : ok=4    changed=2    unreachable=0    failed=0
skipped=3    rescued=0    ignored=0

diego@workstation:~/sysAds6$
```

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.


Centos [Running] - Oracle VM VirtualBox

Problem loading page - Mozilla Firefox

192.168.56.107

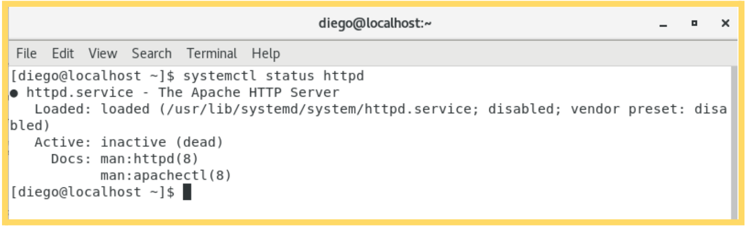
Unable to connect

Firefox can't establish a connection to the server at 192.168.56.107.

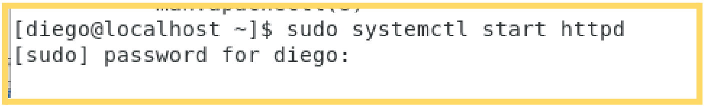
- The site could be temporarily unavailable or too busy. Try again in a few moments.
- If you are unable to load any pages, check your computer's network connection.
- If your computer or network is protected by a firewall or proxy, make sure that Firefox is permitted to access the Web.

File Machine View Input Devices Help
Applications Places Firefox
Mon 05:54
Problem loading page
Try Again
diego@localhost:~
Problem loading page - Mozilla Fir...
Right Ctrl

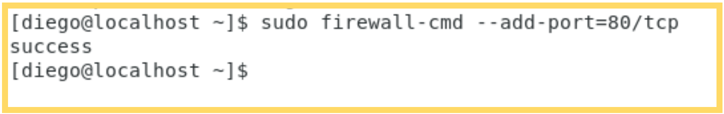
5.1 To activate, go to the CentOS VM terminal and enter the following:
systemctl status httpd
The result of this command tells you that the service is inactive.


```
[diego@localhost ~]$ systemctl status httpd
● httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; disabled; vendor preset: disa
bled)
   Active: inactive (dead)
     Docs: man:httpd(8)
           man:apachectl(8)
[diego@localhost ~]$
```

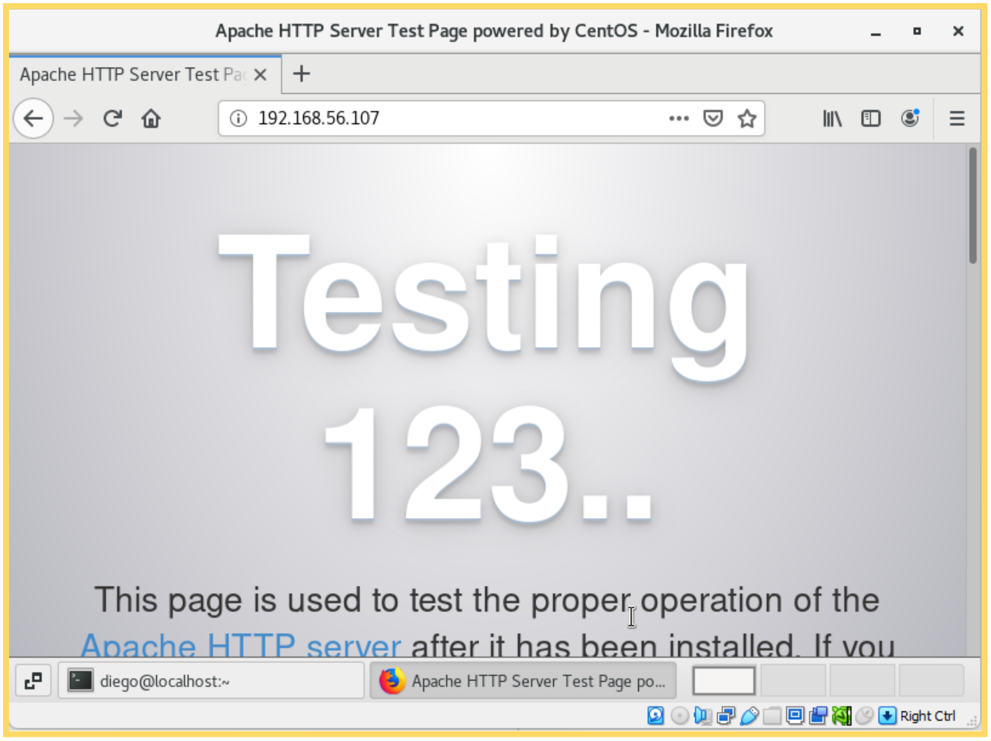
5.2 Issue the following command to start the service:
sudo systemctl start httpd


```
[diego@localhost ~]$ sudo systemctl start httpd
[sudo] password for diego:
```

(When prompted, enter the sudo password)
sudo firewall-cmd --add-port=80/tcp
(The result should be a success)


```
[diego@localhost ~]$ sudo firewall-cmd --add-port=80/tcp
success
[diego@localhost ~]$
```

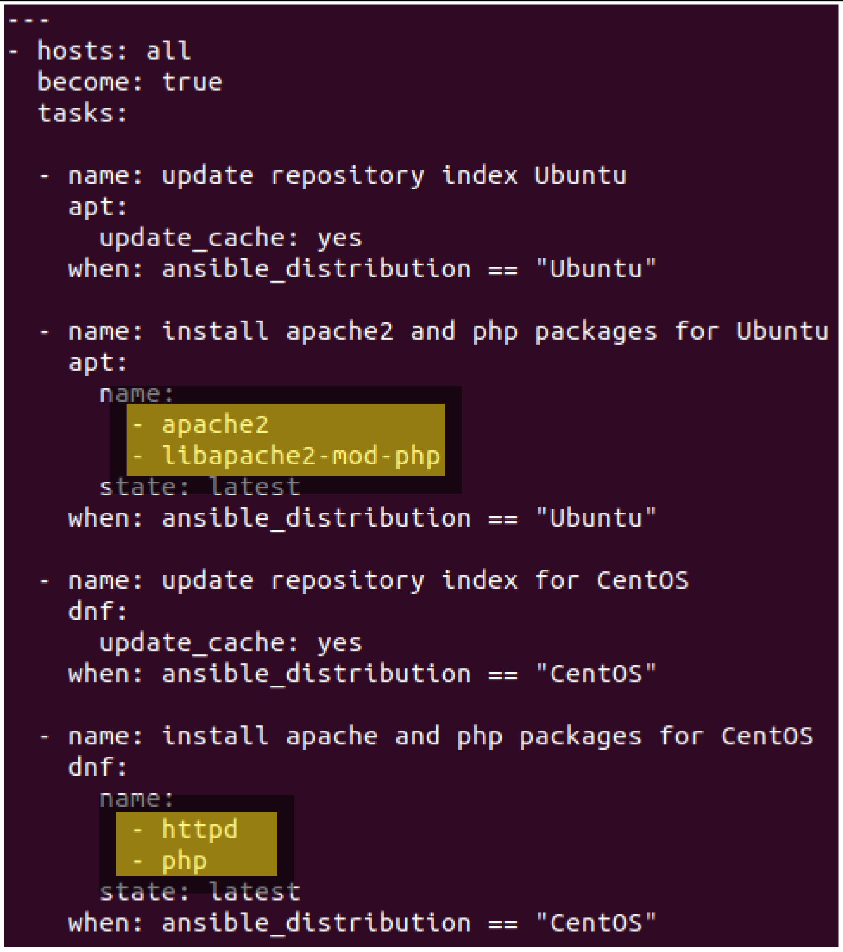
5.3 To verify the service is already running, go to CentOS VM and type its IP address on the browser. Was it successful? (Screenshot the browser)


Apache HTTP Server Test Page powered by CentOS - Mozilla Firefox
Apache HTTP Server Test Pa
192.168.56.107
Testing 123..
This page is used to test the proper operation of the
Apache HTTP server after it has been installed. If you
diego@localhost:~
Apache HTTP Server Test Page po...
Right Ctrl

Task 2: Refactoring playbook

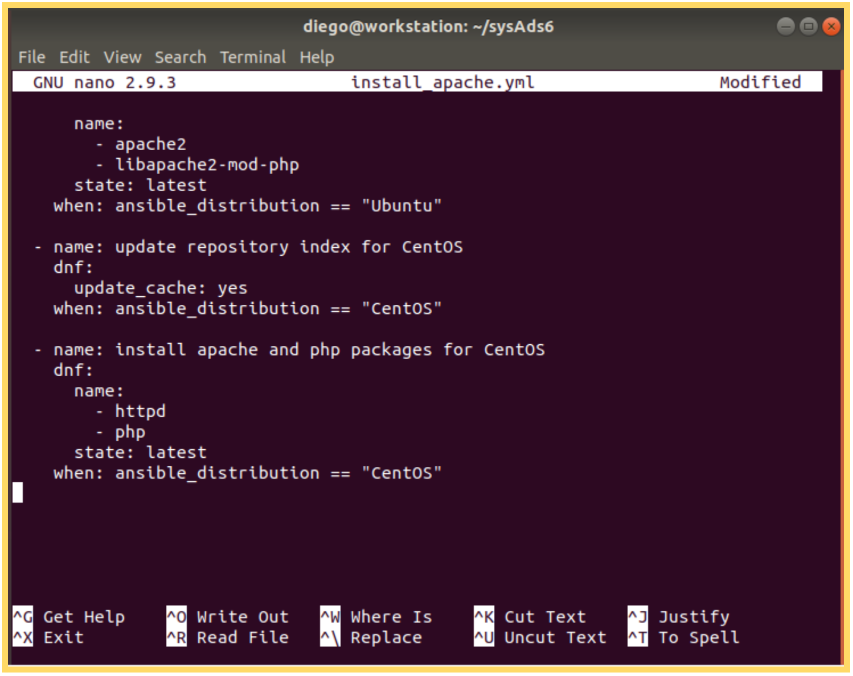
This time, we want to make sure that our playbook is efficient and that the codes are easier to read. This will also makes run ansible more quickly if it has to execute fewer tasks to do the same thing.

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"
```

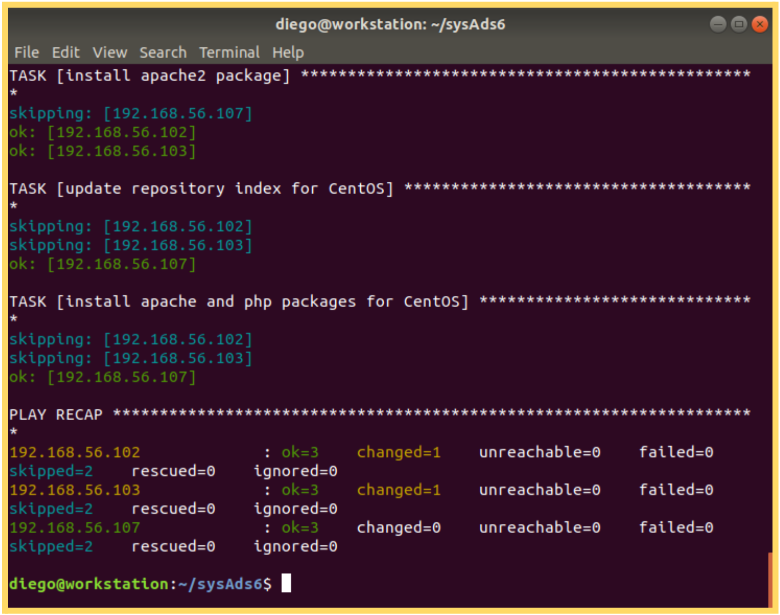
Make sure to save the file and exit.



```
diego@workstation: ~/sysAds6
File  Edit  View  Search  Terminal  Help
 GNU nano 2.9.3                install_apache.yml                  Modified

      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"

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify
^X Exit        ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Spell
```

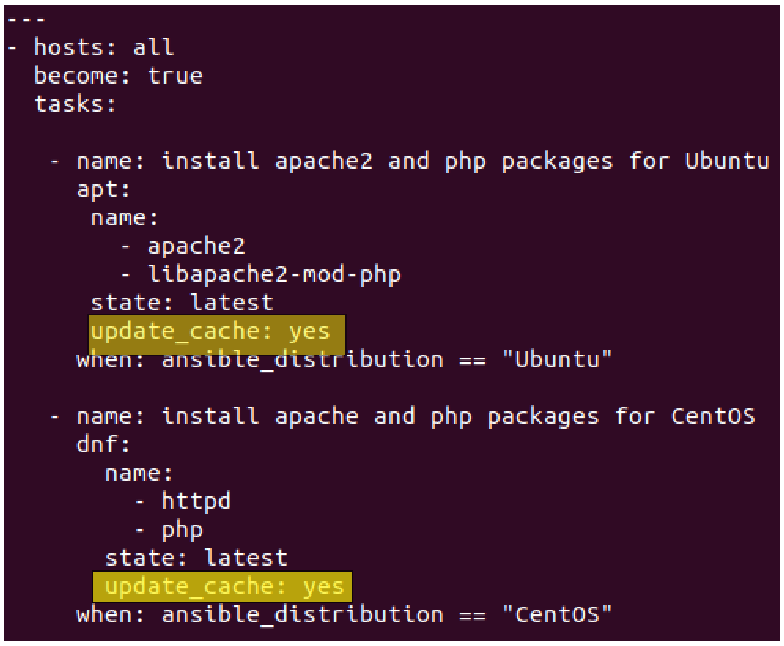
Run *ansible-playbook --ask-become-pass install_apache.yml* and describe the result.

After running the edited input It shows 4 tasks which have 2 Ubuntu and 2 CentOS.


diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

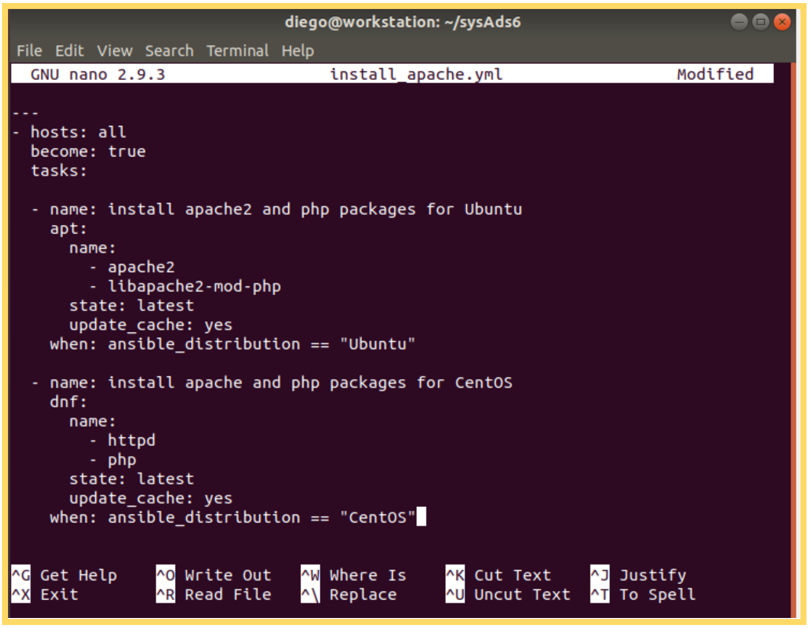
```
TASK [install apache2 package] **************************************************
*
skipping: [192.168.56.107]
ok: [192.168.56.102]
ok: [192.168.56.103]

TASK [update repository index for CentOS] ***************************************
*
skipping: [192.168.56.102]
skipping: [192.168.56.103]
ok: [192.168.56.107]

TASK [install apache and php packages for CentOS] *******************************
*
skipping: [192.168.56.102]
skipping: [192.168.56.103]
ok: [192.168.56.107]

PLAY RECAP **********************************************************************
*
192.168.56.102             : ok=3    changed=1    unreachable=0    failed=0
skipped=2    rescued=0    ignored=0
192.168.56.103             : ok=3    changed=1    unreachable=0    failed=0
skipped=2    rescued=0    ignored=0
192.168.56.107             : ok=3    changed=0    unreachable=0    failed=0
skipped=2    rescued=0    ignored=0

diego@workstation:~/sysAds6$ 
```

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"
```

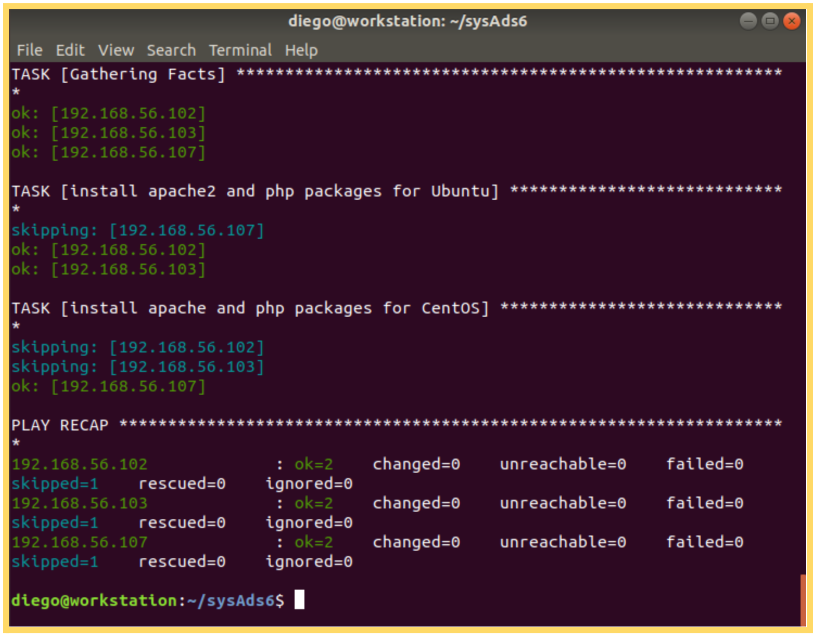
Make sure to save the file and exit.



```
diego@workstation: ~/sysAds6
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                install_apache.yml                  Modified

---
- 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"

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify
^X Exit        ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Spell
```

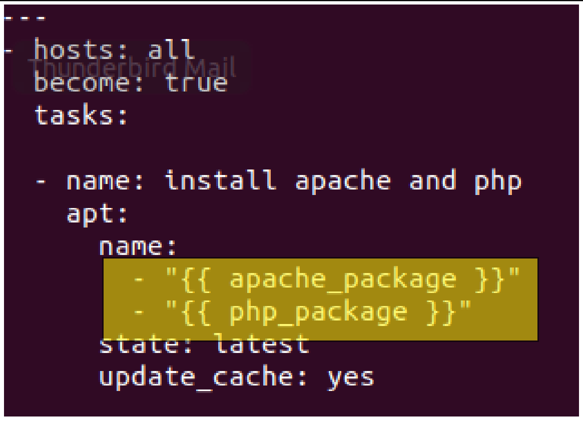
Run *ansible-playbook --ask-become-pass install_apache.yml* and describe the result.

After changing the install_apache.yml to a more efficient way it shows 2 tasks which have Ubuntu and Centos results.

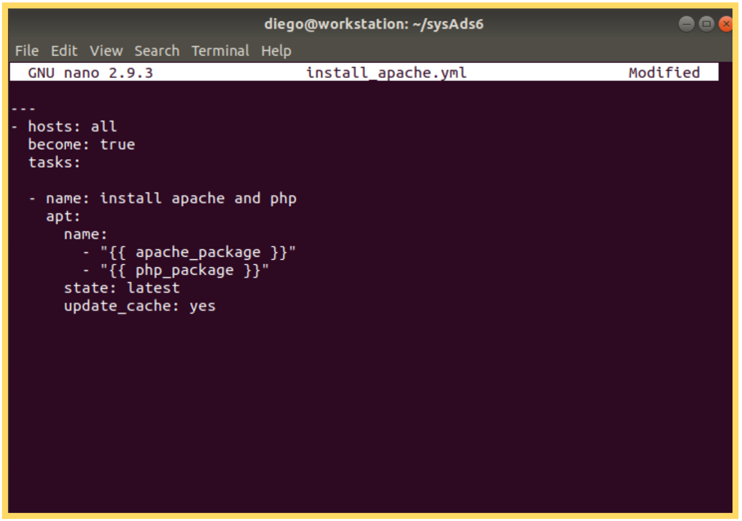


```
diego@workstation: ~/sysAds6
File  Edit  View  Search  Terminal  Help
TASK [Gathering Facts] *******************************************************
*
ok: [192.168.56.102]
ok: [192.168.56.103]
ok: [192.168.56.107]

TASK [install apache2 and php packages for Ubuntu] ****************************
*
skipping: [192.168.56.107]
ok: [192.168.56.102]
ok: [192.168.56.103]

TASK [install apache and php packages for CentOS] *****************************
*
skipping: [192.168.56.102]
skipping: [192.168.56.103]
ok: [192.168.56.107]

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

diego@workstation:~/sysAds6$
```

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.



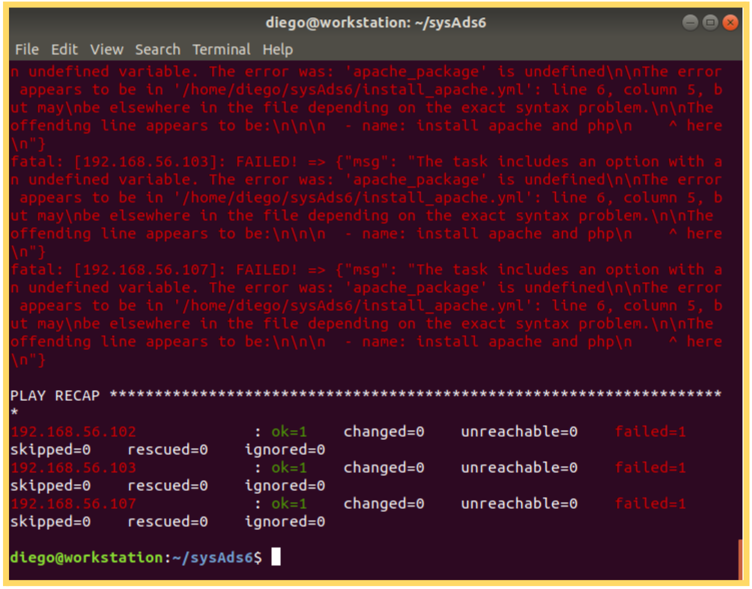
```
---
- hosts: all
  become: true
  tasks:

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


diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

```
  GNU nano 2.9.3                install_apache.yml                    Modified

---
- 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.

It shows that the result is an error because the task has an undefined variable.

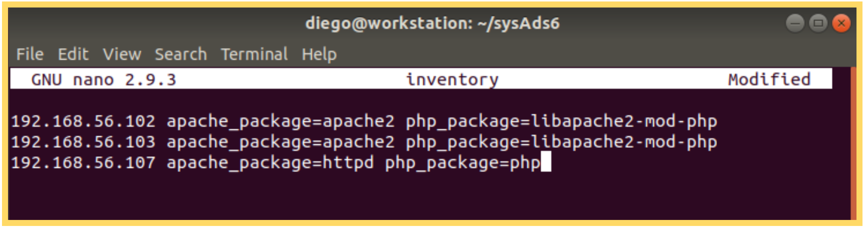

diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

```
n undefined variable. The error was: 'apache_package' is undefined\n\nThe error
 appears to be in '/home/diego/sysAds6/install_apache.yml': line 6, column 5, b
ut may\nbe elsewhere in the file depending on the exact syntax problem.\n\nThe
offending line appears to be:\n\n\n  - name: install apache and php\n    ^ here
\n"}
fatal: [192.168.56.103]: FAILED! => {"msg": "The task includes an option with a
n undefined variable. The error was: 'apache_package' is undefined\n\nThe error
 appears to be in '/home/diego/sysAds6/install_apache.yml': line 6, column 5, b
ut may\nbe elsewhere in the file depending on the exact syntax problem.\n\nThe
offending line appears to be:\n\n\n  - name: install apache and php\n    ^ here
\n"}
fatal: [192.168.56.107]: FAILED! => {"msg": "The task includes an option with a
n undefined variable. The error was: 'apache_package' is undefined\n\nThe error
 appears to be in '/home/diego/sysAds6/install_apache.yml': line 6, column 5, b
ut may\nbe elsewhere in the file depending on the exact syntax problem.\n\nThe
offending line appears to be:\n\n\n  - name: install apache and php\n    ^ here
\n"}

PLAY RECAP *********************************************************************
*
192.168.56.102             : ok=1    changed=0    unreachable=0    failed=1
skipped=0    rescued=0    ignored=0
192.168.56.103             : ok=1    changed=0    unreachable=0    failed=1
skipped=0    rescued=0    ignored=0
192.168.56.107             : ok=1    changed=0    unreachable=0    failed=1
skipped=0    rescued=0    ignored=0

diego@workstation:~/sysAds6$ 
```

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:

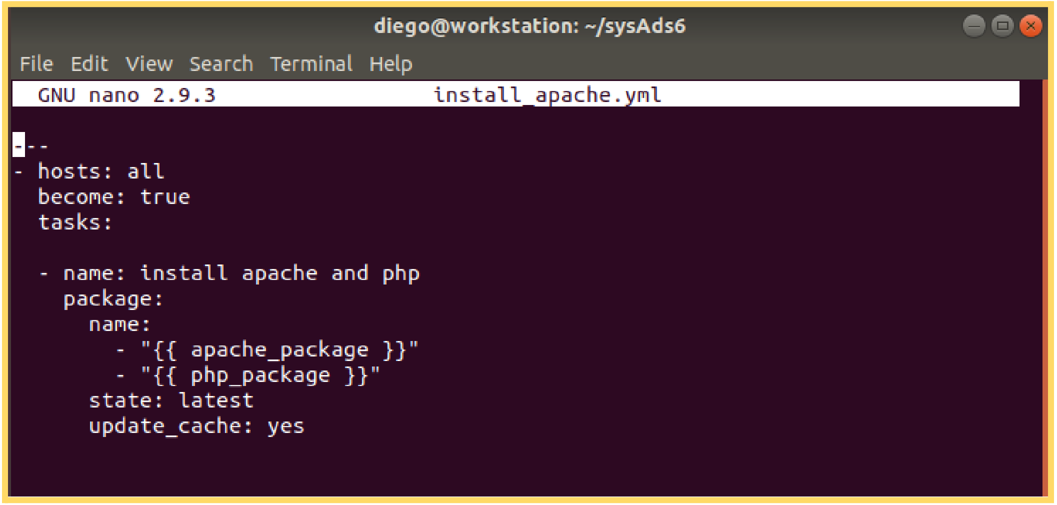
```
192.168.56.120 apache_package=apache2 php_package=libapache2-mod-php
192.168.56.121 apache_package=apache2 php_package=libapache2-mod-php
192.168.56.122 apache_package=httpd php_package=php
```

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


diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

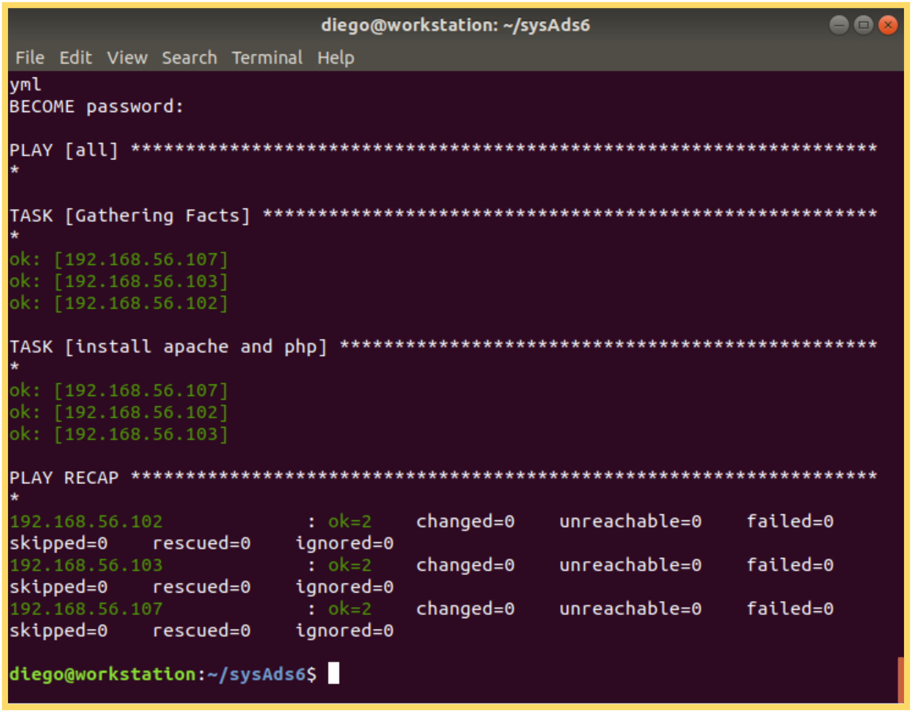
```
 GNU nano 2.9.3                   inventory                         Modified

192.168.56.102 apache_package=apache2 php_package=libapache2-mod-php
192.168.56.103 apache_package=apache2 php_package=libapache2-mod-php
192.168.56.107 apache_package=httpd php_package=php
```

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]()


diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

```
 GNU nano 2.9.3                   install_apache.yml

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

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

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



diego@workstation: ~/sysAds6
File Edit View Search Terminal Help

```
yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.107]
ok: [192.168.56.103]
ok: [192.168.56.102]

TASK [install apache and php] **************************************************
*
ok: [192.168.56.107]
ok: [192.168.56.102]
ok: [192.168.56.103]

PLAY RECAP *********************************************************************
*
192.168.56.102             : ok=2    changed=0    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
192.168.56.103             : ok=2    changed=0    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
192.168.56.107             : ok=2    changed=0    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0

diego@workstation:~/sysAds6$ 
```

Supplementary Activity:

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

Reflections:

Answer the following:

1. Why do you think refactoring of playbook codes is important?
   -The process of refactoring the playbook codes, in my opinion, is crucial because it enhances the method through which the code is developed or executed. It produces more and when you look at it, it is less complex and has a cleaner and simpler appearance and is simple to comprehend.

2. When do we use the "when" command in playbook?
   -When working with Ansible playbooks, you can use the "when command" in the playbook to evaluate a condition for a number of tasks. The "when command" is similar to an if-else clause and helps in evaluating each host's test.

Conclusion:

In this activity, I learned how to create a playbook in the most efficient and easy-to-comprehend way. This activity has helped me gain a better understanding of playbooks and also sharpen my understanding about managing enterprise servers.