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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 happens when you issue this command. Did something happen? Why?

```
pastrana@localmachina:~/CPE232_Pastrana$ git pull
Already up to date.
```

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."

```
pastrana@localmachina:~/CPE232_Pastrana$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************************************************************************
ok: [192.168.56.108]
ok: [192.168.56.107]
ok: [192.168.56.109]

TASK [update repository index] *************************************************************************************************************
[WARNING]: Updating cache and auto-installing missing dependency: python-apt
fatal: [192.168.56.109]: FAILED! => {"changed": false, "cmd": "apt-get update", "msg": "[Errno 2] No such file or directory", "rc": 2
, "stderr": "", "stderr_lines": [], "stdout": "", "stdout_lines": []}
changed: [192.168.56.108]
changed: [192.168.56.107]

TASK [install apache2 package] *************************************************************************************************************
ok: [192.168.56.108]
ok: [192.168.56.107]

TASK [add PHP support for apache] **********************************************************************************************************
ok: [192.168.56.107]
ok: [192.168.56.108]

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

pastrana@localmachina:~/CPE232_Pastrana$
```

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

```
  GNU nano 6.2

---
- 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.

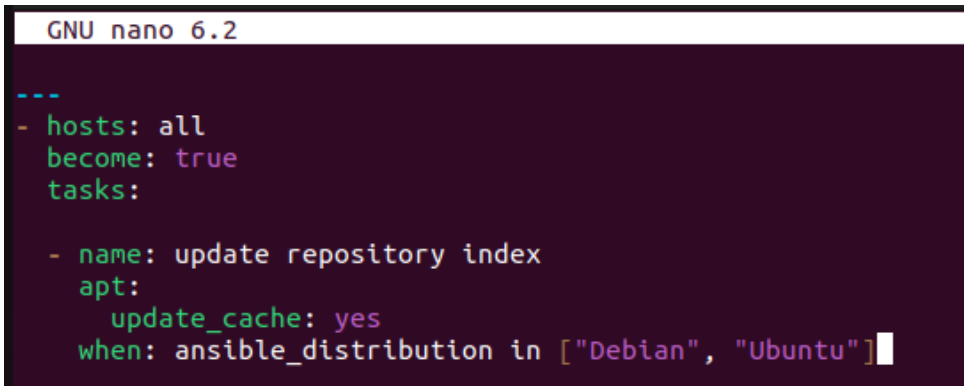
INPUT & OUTPUT:

```
pastrana@localmachina:~/CPE232_Pastrana$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

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

TASK [Gathering Facts] ***********************************************************************************************
ok: [192.168.56.107]
ok: [192.168.56.108]
ok: [192.168.56.109]

TASK [update repository index] ***************************************************************************************
skipping: [192.168.56.109]
changed: [192.168.56.108]
changed: [192.168.56.107]

TASK [install apache2 package] ***************************************************************************************
skipping: [192.168.56.109]
ok: [192.168.56.107]
ok: [192.168.56.108]

TASK [add PHP support for apache] ************************************************************************************
skipping: [192.168.56.109]
ok: [192.168.56.108]
ok: [192.168.56.107]

PLAY RECAP ***********************************************************************************************************
192.168.56.107             : ok=4    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
192.168.56.108             : ok=4    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
192.168.56.109             : ok=1    changed=0    unreachable=0    failed=0    skipped=3    rescued=0    ignored=0
```

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]

INPUT:



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.
   INPUT:

```
GNU nano 6.2
tasks:

- name: update repository 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
    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.

RESULT:

```
pastrana@localmachina:~/CPE232_Pastrana$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************************
ok: [192.168.56.108]
ok: [192.168.56.107]
ok: [192.168.56.109]

TASK [update repository index] *************************************************************
skipping: [192.168.56.109]
changed: [192.168.56.107]
changed: [192.168.56.108]

TASK [install apache2 package] *************************************************************
skipping: [192.168.56.109]
ok: [192.168.56.108]
ok: [192.168.56.107]

TASK [add PHP support for apache] **********************************************************
skipping: [192.168.56.109]
ok: [192.168.56.107]
ok: [192.168.56.108]

TASK [update repository index] *************************************************************
skipping: [192.168.56.107]
skipping: [192.168.56.108]
skipping: [192.168.56.109]

TASK [install apache2 package] *************************************************************
skipping: [192.168.56.107]
skipping: [192.168.56.108]
skipping: [192.168.56.109]

TASK [add PHP support for apache] **********************************************************
skipping: [192.168.56.107]
skipping: [192.168.56.108]
skipping: [192.168.56.109]
```

```
PLAY RECAP *********************************************************************************************************************
192.168.56.107             : ok=4    changed=1    unreachable=0    failed=0    skipped=3    rescued=0    ignored=0
192.168.56.108             : ok=4    changed=1    unreachable=0    failed=0    skipped=3    rescued=0    ignored=0
192.168.56.109             : ok=1    changed=0    unreachable=0    failed=0    skipped=6    rescued=0    ignored=0
```

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.

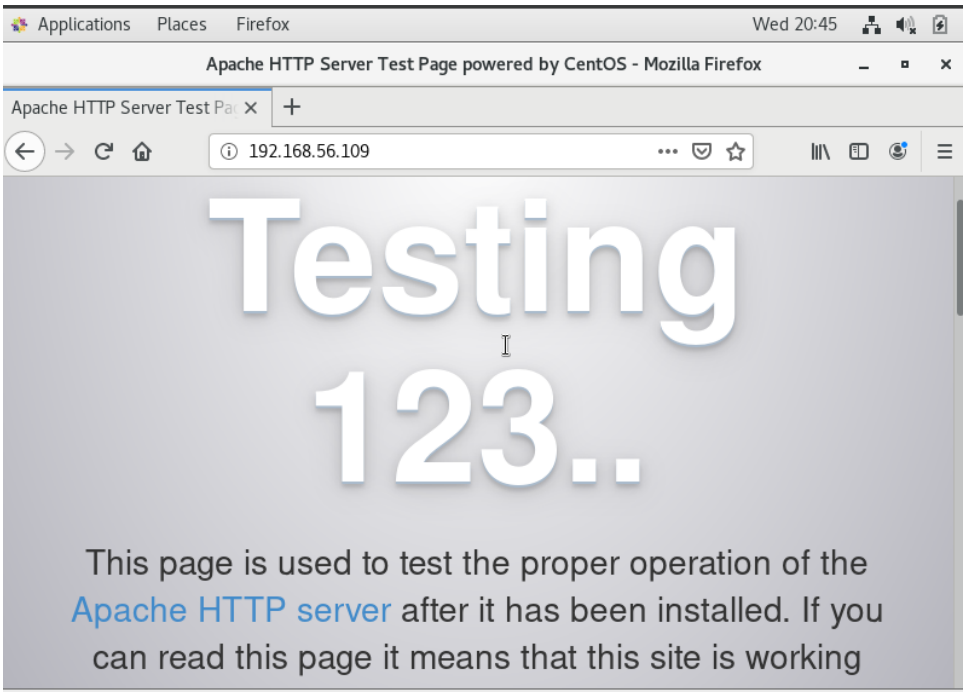
   5.1 To activate, go to the CentOS VM terminal and enter the following:
   systemctl status httpd
   The result of this command tells you that the service is inactive.

   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)

   RESULT:

```
[pastrana@localhost ~]$ systemctl status hhtpd
Unit hhtpd.service could not be found.
[pastrana@localhost ~]$ sudo systemctl start httpd
[sudo] password for pastrana:
[pastrana@localhost ~]$ sudo firewall-cmd --add-port=80/tcp
success
[pastrana@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)



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:

```
- 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 apache2 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.

```
pastrana@localmachina:~/CPE232_Pastrana$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************************************************
ok: [192.168.56.107]
ok: [192.168.56.108]
ok: [192.168.56.109]

TASK [update repository index Ubuntu] ******************************************************************************
skipping: [192.168.56.109]
changed: [192.168.56.107]
changed: [192.168.56.108]

TASK [install apache2 and php packages for Ubuntu] *****************************************************************
skipping: [192.168.56.109]
ok: [192.168.56.107]
ok: [192.168.56.108]

TASK [update repository index for CentOS] **************************************************************************
skipping: [192.168.56.107]
skipping: [192.168.56.108]
skipping: [192.168.56.109]

TASK [install apache2 and php packages for CentOS] *****************************************************************
skipping: [192.168.56.107]
skipping: [192.168.56.108]
skipping: [192.168.56.109]

PLAY RECAP *********************************************************************************************************
192.168.56.107             : ok=3    changed=1    unreachable=0    failed=0    skipped=2    rescued=0    ignored=0
192.168.56.108             : ok=3    changed=1    unreachable=0    failed=0    skipped=2    rescued=0    ignored=0
192.168.56.109             : ok=1    changed=0    unreachable=0    failed=0    skipped=4    rescued=0    ignored=0
```

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.

INPUT:

```
  GNU nano 6.2
---
- hosts: all
  become: true
  tasks:

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

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

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

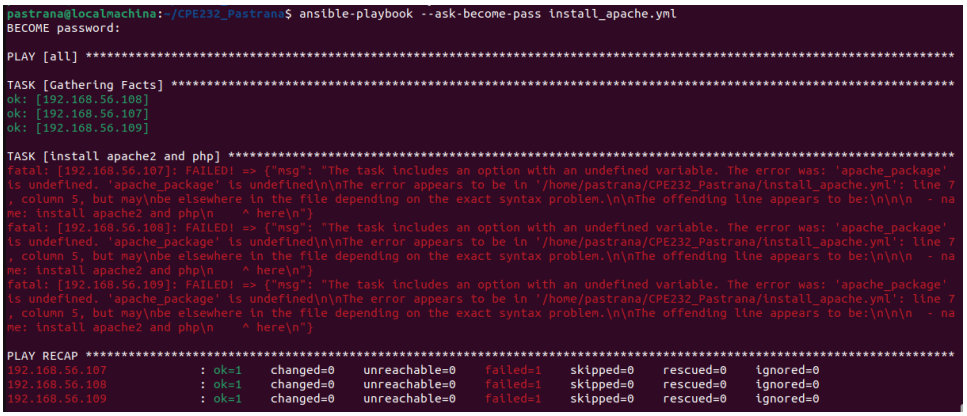
```
pastrana@localmachina:~/CPE232_Pastrana$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************************************************
ok: [192.168.56.108]
ok: [192.168.56.107]
ok: [192.168.56.109]

TASK [install apache2 and php packages for Ubuntu] *****************************************************************
skipping: [192.168.56.109]
ok: [192.168.56.107]
ok: [192.168.56.108]

TASK [install apache2 and php packages for CentOS] *****************************************************************
skipping: [192.168.56.107]
skipping: [192.168.56.108]
skipping: [192.168.56.109]

PLAY RECAP *********************************************************************************************************
192.168.56.107             : ok=2    changed=0    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
192.168.56.108             : ok=2    changed=0    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
192.168.56.109             : ok=1    changed=0    unreachable=0    failed=0    skipped=2    rescued=0    ignored=0
```

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
```

```
 GNU nano 6.2

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

  - name: install apache2 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.



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
```

```
  GNU nano 6.2                                                  inventory
[servers]

192.168.56.107 ansible_python_interpreter=/usr/bin/python3
192.168.56.107 apache_package=apache2 php_package=libapache2-mod-php

192.168.56.108 ansible_python_interpreter=/usr/bin/python3
192.168.56.108 apache_package=apache2 php_package=libapache2-mod-php

192.168.56.109 ansible_python_interpreted=/usr/bin/python3
192.168.56.109 apache_package=httpd php_package=php
```

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

```
pastrana@localmachina:~/CPE232_Pastrana$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************************************************
ok: [192.168.56.108]
ok: [192.168.56.107]
ok: [192.168.56.109]

TASK [install apache2 and php] *************************************************************************************
ok: [192.168.56.107]
ok: [192.168.56.108]
changed: [192.168.56.109]

PLAY RECAP *********************************************************************************************************
192.168.56.107             : ok=2    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
192.168.56.108             : ok=2    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
192.168.56.109             : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

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]

```
  GNU nano 6.2

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

  - name: install apache2 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.

```
pastrana@localmachina:~/CPE232_Pastrana$ ansible-playbook --ask-become-pass install_apache.yml
BECOME password:

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

TASK [Gathering Facts] *****************************************************************************************
ok: [192.168.56.108]
ok: [192.168.56.107]
ok: [192.168.56.109]

TASK [install apache2 and php] *********************************************************************************
ok: [192.168.56.108]
ok: [192.168.56.107]
ok: [192.168.56.109]

PLAY RECAP *****************************************************************************************************
192.168.56.107             : ok=2    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
192.168.56.108             : ok=2    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
192.168.56.109             : ok=2    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

```
pastrana@localmachina:~/CPE232_Pastrana$ git add *
pastrana@localmachina:~/CPE232_Pastrana$ git commit -m "Latest Update 09/27"
[main 4d526a2] Latest Update 09/27
 3 files changed, 18 insertions(+), 10 deletions(-)
pastrana@localmachina:~/CPE232_Pastrana$ git push origin
Enumerating objects: 9, done.
Counting objects: 100% (9/9), done.
Delta compression using up to 4 threads
Compressing objects: 100% (5/5), done.
Writing objects: 100% (5/5), 774 bytes | 774.00 KiB/s, done.
Total 5 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:Sora-105/CPE232_Pastrana.git
   f3f8e07..4d526a2  main -> main
pastrana@localmachina:~/CPE232_Pastrana$
```

git@github.com:Sora-105/CPE232_Pastrana.git

Reflections:

Answer the following:

1. Why do you think refactoring of playbook codes is important?

- Readability, maintainability, performance optimization, adherence to best practices, streamlined collaboration, adaptability to changing requirements, reduction of technical debt, enhanced security, scalability preparation, and creating self-explanatory, well-structured code all benefit from refactoring playbook codes. It is a crucial practice in automation for code improvement and long-term sustainability.

2. When do we use the “when” command in the playbook?
    - "When" is run when the requirements specified in that job are met.