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Course/Section: CPE232/CPE31S4	**Date Submitted:** 11/28/2023
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<div align="center">

Activity 13: OpenStack Prerequisite Installation

</div>

1. Objectives

Create a workflow to install OpenStack using Ansible as your Infrastructure as Code (IaC).

2. Intended Learning Outcomes

1. Analyze the advantages and disadvantages of cloud services

2. Evaluate different Cloud deployment and service models

3. Create a workflow to install and configure OpenStack base services using Ansible as documentation and execution.

3. Resources

Oracle VirtualBox (Hypervisor)

1x Ubuntu VM or Centos VM

4. Tasks

1. Create a new repository for this activity.
2. Create a playbook that converts the steps in the following items in https://docs.openstack.org/install-guide/
   a. NTP
   b. OpenStack packages
   c. SQL Database
   d. Message Queue
   e. Memcached

   f. Etcd

   g. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in Inventory file.

   h. Add, commit and push it to your GitHub repo.

5. Output (screenshots and explanations)

Create a repository.

README.md   ✏️

CPE232_RABANG_HOA13

Clone the repository.

```
daniela@workstation:~$ git clone https://github.com/danielarabang/CPE232_RABANG_HOA13.git
Cloning into 'CPE232_RABANG_HOA13'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Receiving objects: 100% (3/3), done.
```

Create an inventory file.

```
  GNU nano 6.2                                        inventory *
[Ubuntu]
192.168.56.110   ansible_python_interpreter=/usr/bin/python3

[CentOS]
192.168.56.105   ansible_python_interpreter=/usr/bin/python
```

Create an ansible.cfg file

```
  GNU nano 6.2                                        ansible.cfg
[defaults]

inventory = inventory
host_key checking = False

deprecation_warning = False

remote_user = daniela
private_key_file = ~/.ssh/
```

Create a directory roles for both Ubuntu and CentOS that have a tasks directory and a main.yml

```
daniela@workstation:~/CPE232_RABANG_HOA13$ mkdir roles
daniela@workstation:~/CPE232_RABANG_HOA13$ cd roles
daniela@workstation:~/CPE232_RABANG_HOA13/roles$ mkdir CentOS
daniela@workstation:~/CPE232_RABANG_HOA13/roles$ cd CentOS
daniela@workstation:~/CPE232_RABANG_HOA13/roles/CentOS$ mkdir tasks
daniela@workstation:~/CPE232_RABANG_HOA13/roles/CentOS$ cd tasks
daniela@workstation:~/CPE232_RABANG_HOA13/roles/CentOS/tasks$ sudo nano main.yml
```

Create a playbook that installs the openstack packages for Ubuntu.

```
GNU nano 6.2                                    main.yml *
---
    - name: Set OpenStack packages for Ubuntu
      set_fact:
        openstack_packages_ubuntu:
          - python3-openstackclient
          - mariadb-server
          - rabbitmq-server
          - memcached
          - etcd

    - name: Update package cache for Ubuntu
      apt:
        update_cache: yes

    - name: Install and configure NTP for Ubuntu
      package:
        name: ntp
        state: present
```

Create a playbook that installs the openstack packages for CentOS

```
GNU nano 6.2                                    main.yml *
---
    - name: Set OpenStack packages for CentOS
      set_fact:
        openstack_packages_centos:
          - openstack-packstack
          - mariadb-server
          - rabbitmq-server
          - memcached
          - etcd

    - name: Install and configure EPEL repository for CentOS
      yum:
        name: epel-release
        state: latest

    - name: Installing OpenStack packages for CentOS
      yum:
        name: "{{ openstack_packages_centos }}"
        state: present
```

Create a playbook that will play the two different playbooks of two different roles.

```
GNU nano 6.2                                    install.yml *
- hosts: all
  become: true
  pre_tasks:

  - name: install updates CentOS
    yum:
      update_only: yes
      update_cache: yes
    when: ansible_distribution == "CentOS"

  - name: install updates Ubuntu
    apt:
      upgrade: dist
      update_cache: yes
    when: ansible_distribution == "Ubuntu"

- hosts: Ubuntu
  become: true
  roles:
    - Ubuntu

- hosts: CentOS
  become: true
  roles:
    - CentOS
```

Run the playbook install.yml (full version of the Process that I included in the table below)

```
daniela@workstation:~/CPE232_RABANG_HOA13$ ansible-playbook --ask-become-pass install.yml
BECOME password:

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

TASK [Gathering Facts] ***********************************************************************
ok: [192.168.56.105]
ok: [192.168.56.110]

TASK [install updates CentOS] ****************************************************************
skipping: [192.168.56.110]
ok: [192.168.56.105]

TASK [install updates Ubuntu] ****************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.110]

PLAY [Ubuntu] ********************************************************************************

TASK [Gathering Facts] ***********************************************************************
ok: [192.168.56.110]

TASK [Ubuntu : Set OpenStack packages for Ubuntu] ******************************************
ok: [192.168.56.110]

TASK [Ubuntu : Update package cache for Ubuntu] ********************************************
changed: [192.168.56.110]

TASK [Ubuntu : Install and configure NTP for Ubuntu] **************************************
ok: [192.168.56.110]

PLAY [CentOS] *******************************************************************************

TASK [Gathering Facts] ***********************************************************************
ok: [192.168.56.105]

TASK [CentOS : Set OpenStack packages for CentOS] *****************************************
ok: [192.168.56.105]

TASK [CentOS : Install and configure EPEL repository for CentOS] *************************
ok: [192.168.56.105]

TASK [CentOS : Installing OpenStack packages for CentOS] *********************************
ok: [192.168.56.105]

PLAY RECAP **********************************************************************************
192.168.56.105             : ok=6    changed=0    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
192.168.56.110             : ok=6    changed=1    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
```
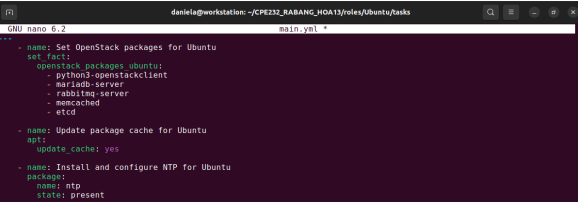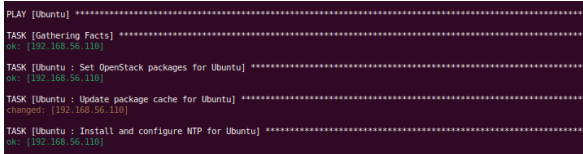
Input	Process

Output

```
daniela@server1:~$ sudo systemctl status ntp
[sudo] password for daniela:
● ntp.service - Network Time Service
     Loaded: loaded (/lib/systemd/system/ntp.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2023-11-28 15:05:51 PST; 15min ago
       Docs: man:ntpd(8)
   Main PID: 3266 (ntpd)
      Tasks: 2 (limit: 4484)
     Memory: 1.4M
        CPU: 329ms
     CGroup: /system.slice/ntp.service
             └─3266 /usr/sbin/ntpd -p /var/run/ntpd.pid -g -u 130:137

Nov 28 15:19:31 server1 ntpd[3266]: Soliciting pool server 2620:2d:4000:1::41
Nov 28 15:20:03 server1 ntpd[3266]: Soliciting pool server 203.177.21.122
Nov 28 15:20:08 server1 ntpd[3266]: Soliciting pool server 203.177.21.124
Nov 28 15:20:09 server1 ntpd[3266]: Soliciting pool server 203.177.21.121
Nov 28 15:20:11 server1 ntpd[3266]: Soliciting pool server 203.177.21.122
Nov 28 15:20:39 server1 ntpd[3266]: Soliciting pool server 2620:2d:4000:1::40
Nov 28 15:21:09 server1 ntpd[3266]: Soliciting pool server 203.177.21.124
Nov 28 15:21:14 server1 ntpd[3266]: Soliciting pool server 203.177.21.121
Nov 28 15:21:15 server1 ntpd[3266]: Soliciting pool server 203.177.21.124
Nov 28 15:21:16 server1 ntpd[3266]: Soliciting pool server 203.177.21.124
```

Input	Process

```
⬚                daniela@workstation: ~/CPEZ32_RABANG_HOA13/roles/Ubuntu/tasks    🔍 ≡ _ ⊡ ✕
  GNU nano 6.2                          main.yml *
- name: Set OpenStack packages for Ubuntu
  set_fact:
    openstack_packages_ubuntu:
      - python3-openstackclient
      - mariadb-server
      - rabbitmq-server
      - memcached
      - etcd

- name: Update package cache for Ubuntu
  apt:
    update_cache: yes

- name: Install and configure NTP for Ubuntu
  package:
    name: ntp
    state: present
```

```
PLAY [Ubuntu] ***********************************************************************

TASK [Gathering Facts] *************************************************************
ok: [192.168.56.110]

TASK [Ubuntu : Set OpenStack packages for Ubuntu] **********************************
ok: [192.168.56.110]

TASK [Ubuntu : Update package cache for Ubuntu] ***********************************
changed: [192.168.56.110]

TASK [Ubuntu : Install and configure NTP for Ubuntu] *****************************
ok: [192.168.56.110]
```

Output

```
daniela@server1:~$ sudo systemctl status mariadb
● mariadb.service - MariaDB 10.6.12 database server
     Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2023-11-28 15:07:12 PST; 16min ago
       Docs: man:mariadbd(8)
             https://mariadb.com/kb/en/library/systemd/
   Main PID: 5058 (mariadbd)
     Status: "Taking your SQL requests now..."
      Tasks: 8 (limit: 4484)
     Memory: 61.3M
        CPU: 1.257s
     CGroup: /system.slice/mariadb.service
             └─5058 /usr/sbin/mariadbd

Nov 28 15:07:12 server1 mariadbd[5058]: 2023-11-28 15:07:12 0 [Note] /usr/sbin/mariadbd: ready for connections.
Nov 28 15:07:12 server1 mariadbd[5058]: Version: '10.6.12-MariaDB-0ubuntu0.22.04.1'  socket: '/run/mysqld/mysqld.sock'  port: 3306 ⬚
Nov 28 15:07:12 server1 systemd[1]: Started MariaDB 10.6.12 database server.
Nov 28 15:07:12 server1 /etc/mysql/debian-start[5078]: Looking for 'mariadb' as: /usr/bin/mariadb
Nov 28 15:07:12 server1 /etc/mysql/debian-start[5078]: Looking for 'mariadb-check' as: /usr/bin/mariadb-check
Nov 28 15:07:12 server1 /etc/mysql/debian-start[5078]: This installation of MariaDB is already upgraded to 10.6.12-MariaDB.
Nov 28 15:07:12 server1 /etc/mysql/debian-start[5078]: There is no need to run mysql_upgrade again for 10.6.12-MariaDB.
Nov 28 15:07:12 server1 /etc/mysql/debian-start[5078]: You can use --force if you still want to run mysql_upgrade
Nov 28 15:07:12 server1 /etc/mysql/debian-start[5086]: Checking for insecure root accounts.
Nov 28 15:07:12 server1 /etc/mysql/debian-start[5090]: Triggering myisam-recover for all MyISAM tables and aria-recover for all Ari⬚
lines 1-23/23 (END)
```

Input | Process

GNU nano 6.2   main.yml *

```
- name: Set OpenStack packages for Ubuntu
  set_fact:
    openstack_packages_ubuntu:
      - python3-openstackclient
      - mariadb-server
      - rabbitmq-server
      - memcached
      - etcd

- name: Update package cache for Ubuntu
  apt:
    update_cache: yes

- name: Install and configure NTP for Ubuntu
  package:
    name: ntp
    state: present
```

```
PLAY [Ubuntu] ************************************************************

TASK [Gathering Facts] **************************************************
ok: [192.168.56.110]

TASK [Ubuntu : Set OpenStack packages for Ubuntu] **********************
ok: [192.168.56.110]

TASK [Ubuntu : Update package cache for Ubuntu] ***********************
changed: [192.168.56.110]

TASK [Ubuntu : Install and configure NTP for Ubuntu] ******************
ok: [192.168.56.110]
```

Output

```
daniela@server1:~$ sudo systemctl status rabbitmq-server
● rabbitmq-server.service - RabbitMQ Messaging Server
     Loaded: loaded (/lib/systemd/system/rabbitmq-server.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2023-11-28 15:07:56 PST; 19min ago
   Main PID: 5537 (beam.smp)
      Tasks: 23 (limit: 4484)
     Memory: 92.9M
        CPU: 24.428s
     CGroup: /system.slice/rabbitmq-server.service
             ├─5537 /usr/lib/erlang/erts-12.2.1/bin/beam.smp -W w -MBas ageffcbf -MHas ageffcbf -MBlmbcs 512 -MHlmbcs 512 -MMmcs 30>
             ├─5548 erl_child_setup 65536
             ├─5599 inet_gethost 4
             └─5600 inet_gethost 4

Nov 28 15:07:40 server1 systemd[1]: Starting RabbitMQ Messaging Server...
Nov 28 15:07:56 server1 systemd[1]: Started RabbitMQ Messaging Server.
lines 1-15/15 (END)
```

Input | Process

GNU nano 6.2   main.yml *

```
- name: Set OpenStack packages for Ubuntu
  set_fact:
    openstack_packages_ubuntu:
      - python3-openstackclient
      - mariadb-server
      - rabbitmq-server
      - memcached
      - etcd

- name: Update package cache for Ubuntu
  apt:
    update_cache: yes

- name: Install and configure NTP for Ubuntu
  package:
    name: ntp
    state: present
```

```
PLAY [Ubuntu] ************************************************************

TASK [Gathering Facts] **************************************************
ok: [192.168.56.110]

TASK [Ubuntu : Set OpenStack packages for Ubuntu] **********************
ok: [192.168.56.110]

TASK [Ubuntu : Update package cache for Ubuntu] ***********************
changed: [192.168.56.110]

TASK [Ubuntu : Install and configure NTP for Ubuntu] ******************
ok: [192.168.56.110]
```

Output

```
daniela@server1:~$ sudo systemctl status memcached
● memcached.service - memcached daemon
     Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2023-11-28 15:08:05 PST; 19min ago
       Docs: man:memcached(1)
   Main PID: 5857 (memcached)
      Tasks: 10 (limit: 4484)
     Memory: 2.0M
        CPU: 421ms
     CGroup: /system.slice/memcached.service
             └─5857 /usr/bin/memcached -m 64 -p 11211 -u memcache -l 127.0.0.1 -P /var/run/memcached/memcached.pid

Nov 28 15:08:05 server1 systemd[1]: Started memcached daemon.
```

Input	Process

```
daniela@workstation: ~/CPE232_RABANG_HOA13/roles/Ubuntu/tasks
GNU nano 6.2                          main.yml *

 - name: Set OpenStack packages for Ubuntu
   set_fact:
     openstack_packages_ubuntu:
       - python3-openstackclient
       - mariadb-server
       - rabbitmq-server
       - memcached
       - etcd

 - name: Update package cache for Ubuntu
   apt:
     update_cache: yes

 - name: Install and configure NTP for Ubuntu
   package:
     name: ntp
     state: present
```

```
PLAY [Ubuntu] ***********************************************************

TASK [Gathering Facts] *************************************************
ok: [192.168.56.110]

TASK [Ubuntu : Set OpenStack packages for Ubuntu] *********************
ok: [192.168.56.110]

TASK [Ubuntu : Update package cache for Ubuntu] **********************
changed: [192.168.56.110]

TASK [Ubuntu : Install and configure NTP for Ubuntu] ****************
ok: [192.168.56.110]
```

Output

```
daniela@server1:~$ sudo systemctl status etcd
● etcd.service - etcd - highly-available key value store
     Loaded: loaded (/lib/systemd/system/etcd.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2023-11-28 15:08:18 PST; 19min ago
       Docs: https://etcd.io/docs
             man:etcd
   Main PID: 6104 (etcd)
      Tasks: 8 (limit: 4484)
     Memory: 5.9M
        CPU: 14.336s
     CGroup: /system.slice/etcd.service
             └─6104 /usr/bin/etcd

Nov 28 15:08:18 server1 etcd[6104]: 8e9e05c52164694d received MsgVoteResp from 8e9e05c52164694d at term 2
Nov 28 15:08:18 server1 etcd[6104]: 8e9e05c52164694d became leader at term 2
Nov 28 15:08:18 server1 etcd[6104]: raft.node: 8e9e05c52164694d elected leader 8e9e05c52164694d at term 2
Nov 28 15:08:18 server1 etcd[6104]: setting up the initial cluster version to 3.3
Nov 28 15:08:18 server1 etcd[6104]: set the initial cluster version to 3.3
Nov 28 15:08:18 server1 etcd[6104]: published {Name:server1 ClientURLs:[http://localhost:2379]} to cluster cdf818194e3a8c32
Nov 28 15:08:18 server1 etcd[6104]: enabled capabilities for version 3.3
Nov 28 15:08:18 server1 etcd[6104]: ready to serve client requests
Nov 28 15:08:18 server1 etcd[6104]: serving insecure client requests on 127.0.0.1:2379, this is strongly discouraged!
Nov 28 15:08:18 server1 systemd[1]: Started etcd - highly-available key value store.
```

```
daniela@server1:~$ openstack --version
openstack 5.8.0
```

Input	Process

```
daniela@workstation: ~/CPE232_RABANG_HOA13/roles/CentOS/tasks
GNU nano 6.2                          main.yml *

 - name: Set OpenStack packages for CentOS
   set_fact:
     openstack_packages_centos:
       - openstack-packstack
       - mariadb-server
       - rabbitmq-server
       - memcached
       - etcd

 - name: Install and configure EPEL repository for CentOS
   yum:
     name: epel-release
     state: latest

 - name: Installing OpenStack packages for CentOS
   yum:
     name: "{{ openstack_packages_centos }}"
     state: present
```

```
PLAY [CentOS] **********************************************************

TASK [Gathering Facts] ************************************************
ok: [192.168.56.105]

TASK [CentOS : Set OpenStack packages for CentOS] *******************
ok: [192.168.56.105]

TASK [CentOS : Install and configure EPEL repository for CentOS] ****
ok: [192.168.56.105]

TASK [CentOS : Installing OpenStack packages for CentOS] ***********
ok: [192.168.56.105]

PLAY RECAP ***********************************************************
192.168.56.105      : ok=6    changed=0    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
192.168.56.110      : ok=6    changed=1    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
```

Output

```
[daniela@localhost ~]$ sudo systemctl status chronyd
● chronyd.service - NTP client/server
   Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; vendor preset: ena
bled)
   Active: active (running) since Tue 2023-11-28 16:03:26 PST; 17min ago
     Docs: man:chronyd(8)
           man:chrony.conf(5)
 Main PID: 11393 (chronyd)
   CGroup: /system.slice/chronyd.service
           └─11393 /usr/sbin/chronyd

Nov 28 16:03:26 localhost.localdomain systemd[1]: Starting NTP client/server...
Nov 28 16:03:26 localhost.localdomain chronyd[11393]: chronyd version 3.4 starting ...)
Nov 28 16:03:26 localhost.localdomain systemd[1]: Started NTP client/server.
Nov 28 16:19:47 localhost.localdomain chronyd[11393]: Forward time jump detected!
Hint: Some lines were ellipsized, use -l to show in full.
```

Input	Process

Output

```
[daniela@localhost ~]$ sudo systemctl status mariadb
● mariadb.service - MariaDB 10.3 database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; vendor preset: dis
abled)
   Active: active (running) since Tue 2023-11-28 16:21:48 PST; 20s ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
 Main PID: 14890 (mysqld)
   Status: "Taking your SQL requests now..."
   CGroup: /system.slice/mariadb.service
           └─14890 /usr/libexec/mysqld --basedir=/usr

Nov 28 16:21:47 localhost.localdomain mysql-prepare-db-dir[14786]: Please report any...
Nov 28 16:21:47 localhost.localdomain mysql-prepare-db-dir[14786]: The latest inform...
Nov 28 16:21:47 localhost.localdomain mysql-prepare-db-dir[14786]: You can find addi...
Nov 28 16:21:47 localhost.localdomain mysql-prepare-db-dir[14786]: http://dev.mysql.com
Nov 28 16:21:47 localhost.localdomain mysql-prepare-db-dir[14786]: Consider joining ...
Nov 28 16:21:47 localhost.localdomain mysql-prepare-db-dir[14786]: https://mariadb.o...
Nov 28 16:21:48 localhost.localdomain mysqld[14890]: 2023-11-28 16:21:48 0 [Note] /....
Nov 28 16:21:48 localhost.localdomain mysqld[14890]: 2023-11-28 16:21:48 0 [Warning...)
Nov 28 16:21:48 localhost.localdomain mysqld[14890]: 2023-11-28 16:21:48 0 [Warning...)
Nov 28 16:21:48 localhost.localdomain systemd[1]: Started MariaDB 10.3 database server.
Hint: Some lines were ellipsized, use -l to show in full.
```

Input	Process

GNU nano 6.2 — main.yml

```
- name: Set OpenStack packages for CentOS
  set_fact:
    openstack_packages_centos:
      - openstack-packstack
      - mariadb-server
      - rabbitmq-server
      - memcached
      - etcd

- name: Install and configure EPEL repository for CentOS
  yum:
    name: epel-release
    state: latest

- name: Installing OpenStack packages for CentOS
  yum:
    name: "{{ openstack_packages_centos }}"
    state: present
```
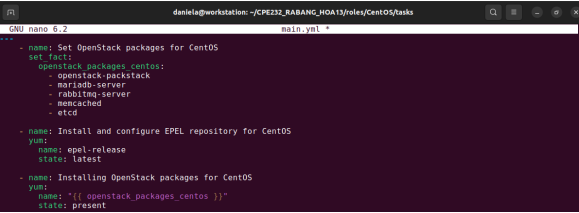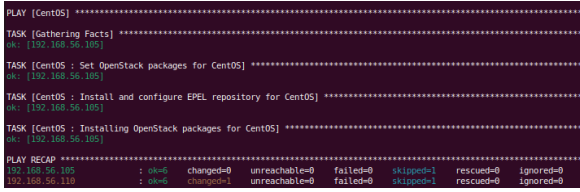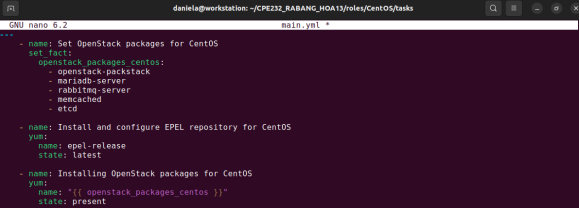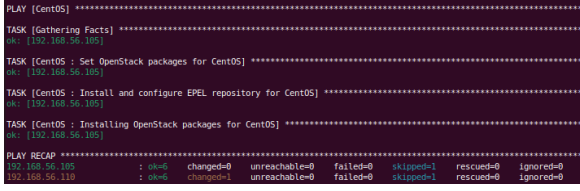


```
PLAY [CentOS] *******************************************************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.105]

TASK [CentOS : Set OpenStack packages for CentOS] ******************************
ok: [192.168.56.105]

TASK [CentOS : Install and configure EPEL repository for CentOS] ***************
ok: [192.168.56.105]

TASK [CentOS : Installing OpenStack packages for CentOS] ***********************
ok: [192.168.56.105]

PLAY RECAP *********************************************************************
192.168.56.105    : ok=6   changed=0   unreachable=0   failed=0   skipped=1   rescued=0   ignored=0
192.168.56.110    : ok=6   changed=1   unreachable=0   failed=0   skipped=1   rescued=0   ignored=0
```

Output

```
[daniela@localhost ~]$ sudo systemctl status rabbitmq-server
● rabbitmq-server.service - RabbitMQ broker
   Loaded: loaded (/usr/lib/systemd/system/rabbitmq-server.service; enabled; vendor pre
set: disabled)
   Active: active (running) since Tue 2023-11-28 16:23:10 PST; 19s ago
 Main PID: 15035 (beam.smp)
   Status: "Initialized"
   CGroup: /system.slice/rabbitmq-server.service
           ├─15035 /usr/lib64/erlang/erts-8.3.5.3/bin/beam.smp -W w -A 64 -P 1048576...
           ├─15226 erl_child_setup 1024
           ├─15236 inet_gethost 4
           └─15237 inet_gethost 4

Nov 28 16:23:05 localhost.localdomain systemd[1]: Starting RabbitMQ broker...
Nov 28 16:23:07 localhost.localdomain rabbitmq-server[15035]: RabbitMQ 3.6.16. Copyr...
Nov 28 16:23:07 localhost.localdomain rabbitmq-server[15035]: ##  ##        Licensed u...
Nov 28 16:23:07 localhost.localdomain rabbitmq-server[15035]: ##  ##
Nov 28 16:23:07 localhost.localdomain rabbitmq-server[15035]: ##########  Logs: /var...
Nov 28 16:23:07 localhost.localdomain rabbitmq-server[15035]: ######  ##        /var...
Nov 28 16:23:07 localhost.localdomain rabbitmq-server[15035]: ##########
Nov 28 16:23:07 localhost.localdomain rabbitmq-server[15035]: Starting broker...
Nov 28 16:23:10 localhost.localdomain systemd[1]: Started RabbitMQ broker.
Nov 28 16:23:10 localhost.localdomain rabbitmq-server[15035]: completed with 0 plugins.
Hint: Some lines were ellipsized, use -l to show in full.
```

Input	Process

GNU nano 6.2 — main.yml

```
- name: Set OpenStack packages for CentOS
  set_fact:
    openstack_packages_centos:
      - openstack-packstack
      - mariadb-server
      - rabbitmq-server
      - memcached
      - etcd

- name: Install and configure EPEL repository for CentOS
  yum:
    name: epel-release
    state: latest

- name: Installing OpenStack packages for CentOS
  yum:
    name: "{{ openstack_packages_centos }}"
    state: present
```



```
PLAY [CentOS] *******************************************************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.105]

TASK [CentOS : Set OpenStack packages for CentOS] ******************************
ok: [192.168.56.105]

TASK [CentOS : Install and configure EPEL repository for CentOS] ***************
ok: [192.168.56.105]

TASK [CentOS : Installing OpenStack packages for CentOS] ***********************
ok: [192.168.56.105]

PLAY RECAP *********************************************************************
192.168.56.105    : ok=6   changed=0   unreachable=0   failed=0   skipped=1   rescued=0   ignored=0
192.168.56.110    : ok=6   changed=1   unreachable=0   failed=0   skipped=1   rescued=0   ignored=0
```

Output

```
[daniela@localhost ~]$ sudo systemctl status memcached
● memcached.service - memcached daemon
   Loaded: loaded (/usr/lib/systemd/system/memcached.service; enabled; vendor preset: d
isabled)
   Active: active (running) since Tue 2023-11-28 16:24:11 PST; 11s ago
 Main PID: 15341 (memcached)
   CGroup: /system.slice/memcached.service
           └─15341 /usr/bin/memcached -p 11211 -u memcached -m 64 -c 1024 -l 127.0.0...

Nov 28 16:24:11 localhost.localdomain systemd[1]: Started memcached daemon.
```
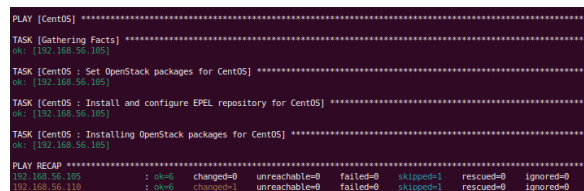
Input	Process

Output

```
[daniela@localhost ~]$ sudo systemctl status etcd
● etcd.service - Etcd Server
   Loaded: loaded (/usr/lib/systemd/system/etcd.service; enabled; vendor preset: disabl
ed)
   Active: active (running) since Tue 2023-11-28 16:24:48 PST; 11s ago
 Main PID: 15438 (etcd)
    Tasks: 10
   CGroup: /system.slice/etcd.service
           └─15438 /usr/bin/etcd --name=default --data-dir=/var/lib/etcd/default.etc...

Nov 28 16:24:48 localhost.localdomain etcd[15438]: 8e9e05c52164694d received MsgVot...2
Nov 28 16:24:48 localhost.localdomain etcd[15438]: 8e9e05c52164694d became leader a...2
Nov 28 16:24:48 localhost.localdomain etcd[15438]: raft.node: 8e9e05c52164694d elec...2
Nov 28 16:24:48 localhost.localdomain etcd[15438]: published {Name:default ClientUR...2
Nov 28 16:24:48 localhost.localdomain etcd[15438]: setting up the initial cluster v...3
Nov 28 16:24:48 localhost.localdomain etcd[15438]: ready to serve client requests
Nov 28 16:24:48 localhost.localdomain etcd[15438]: set the initial cluster version ...3
Nov 28 16:24:48 localhost.localdomain etcd[15438]: enabled capabilities for version 3.3
Nov 28 16:24:48 localhost.localdomain etcd[15438]: serving insecure client requests...!
Nov 28 16:24:48 localhost.localdomain systemd[1]: Started Etcd Server.
Hint: Some lines were ellipsized, use -l to show in full.
```

```
[daniela@localhost ~]$ openstack --version
openstack 4.0.2
```

Push all the files and directories that you have made.

```
daniela@workstation:~/CPE232_RABANG_HOA13$ git add *
daniela@workstation:~/CPE232_RABANG_HOA13$ git status
On branch main
Your branch is up to date with 'origin/main'.

Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        new file:   ansible.cfg
        new file:   install.yml
        new file:   inventory
        new file:   roles/CentOS/tasks/main.yml
        new file:   roles/Ubuntu/tasks/main.yml

daniela@workstation:~/CPE232_RABANG_HOA13$ git commit -m "final"
[main c50d191] final
 5 files changed, 80 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 install.yml
 create mode 100644 inventory
 create mode 100644 roles/CentOS/tasks/main.yml
 create mode 100644 roles/Ubuntu/tasks/main.yml
```

```
daniela@workstation:~/CPE232_RABANG_HOA13$ git push
Username for 'https://github.com': daniela
Password for 'https://daniela@github.com':
Enumerating objects: 13, done.
Counting objects: 100% (13/13), done.
Delta compression using up to 2 threads
Compressing objects: 100% (8/8), done.
Writing objects: 100% (12/12), 1.38 KiB | 1.38 MiB/s, done.
Total 12 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/danielarabang/CPE232_RABANG_HOA13.git
   560b1f0..c50d191  main -> main
```

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

- The benefits of OpenStack is that it offers numerous benefits for cloud management, including scalability, cost-effectiveness, adaptability, customization, open-source community support, automation, high availability, security.

Conclusions:

In this hands-on activity where we are asked to install the following openstack packages into our Ubuntu and CentOS servers. By this I had created a playbook that installed the following packages that are needed into the two servers with the use of the ansible where I implemented the command in my workstation. Therefore, I can say that after I finish this activity I have gained knowledge on how I can install the packages into different servers.