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Course/Section: CPE232/CPE31S1	**Date Submitted:**
Instructor: Dr. Jonathan Taylar	**Semester and SY:** 2023-2024

Activity 13: OpenStack Prerequisite Installation

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)

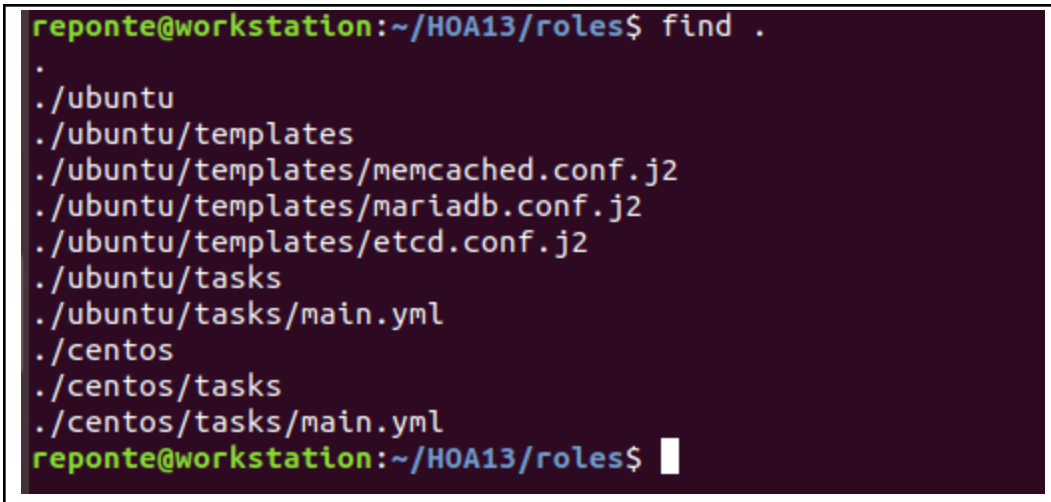
- **I created a new repository and cloned it to the machine.**

```
File  Edit  View  Search  Terminal  Help
reponte@workstation:~$ git clone git@github.com:meyreponte/HOA13.git
Cloning into '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.
reponte@workstation:~$
```

```
reponte@workstation:~/HOA13$ ls
ansible.cfg  inventory  openstack.yml  README.md  roles
reponte@workstation:~/HOA13$
```

- **Made sure that all necessary files are created and added to the repository such as inventory, ansible.cfg and yml playbook.**

```
 GNU nano 2.9.3                    openstack.yml                          Mo

---

 hosts: all
 become: true
 pre_tasks:

 - name: install updates (CentOS)
   tags: always
   yum:
     name: "*"
     update_only: yes
     update_cache: yes
   when: ansible_distribution == "CentOS"

 - name: install updates (Ubuntu)
   tags: always
   apt:
     upgrade: dist
     update_cache: yes
   when: ansible_distribution == "Ubuntu"

 hosts: ubuntu
 become: true

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify
```

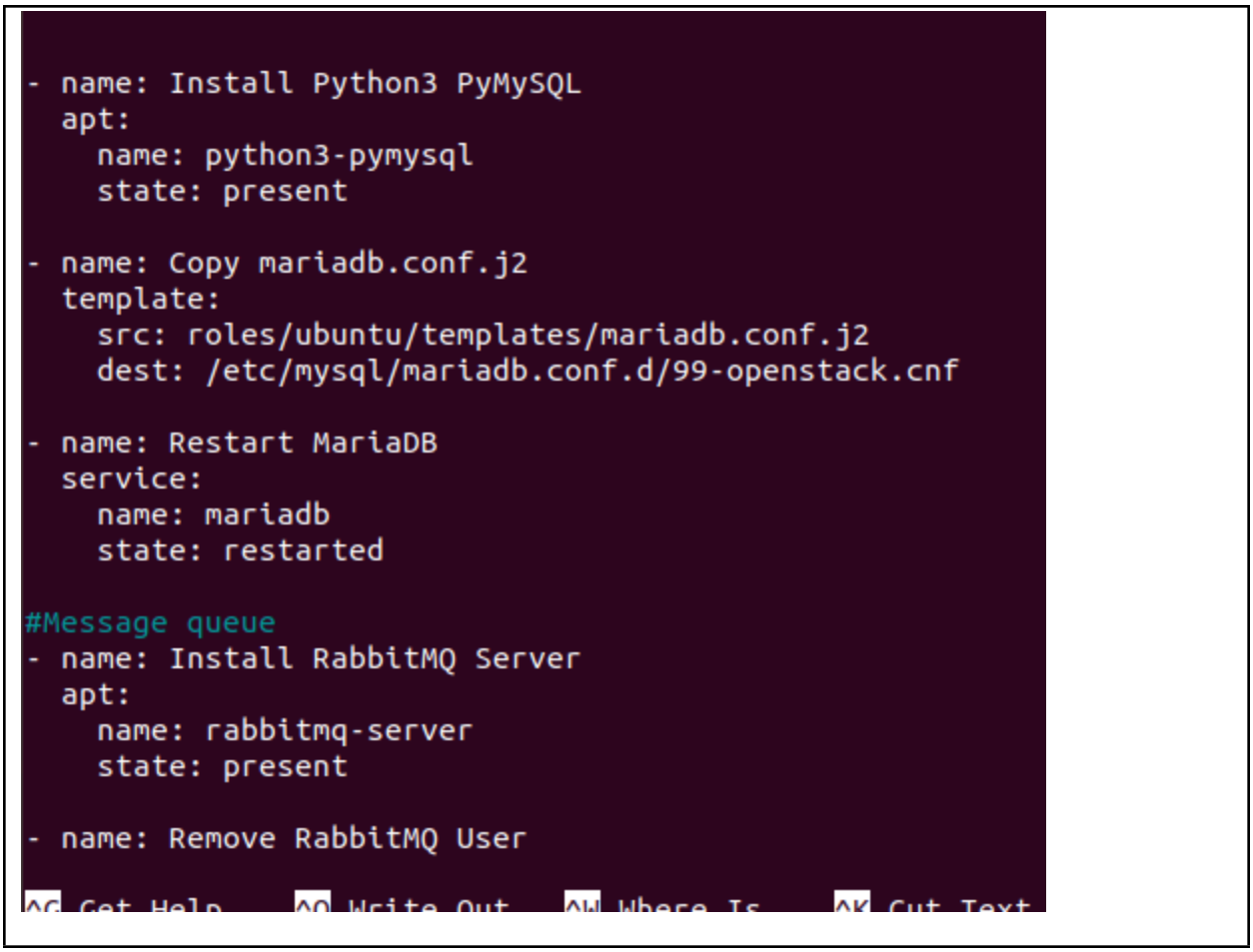


Ubuntu

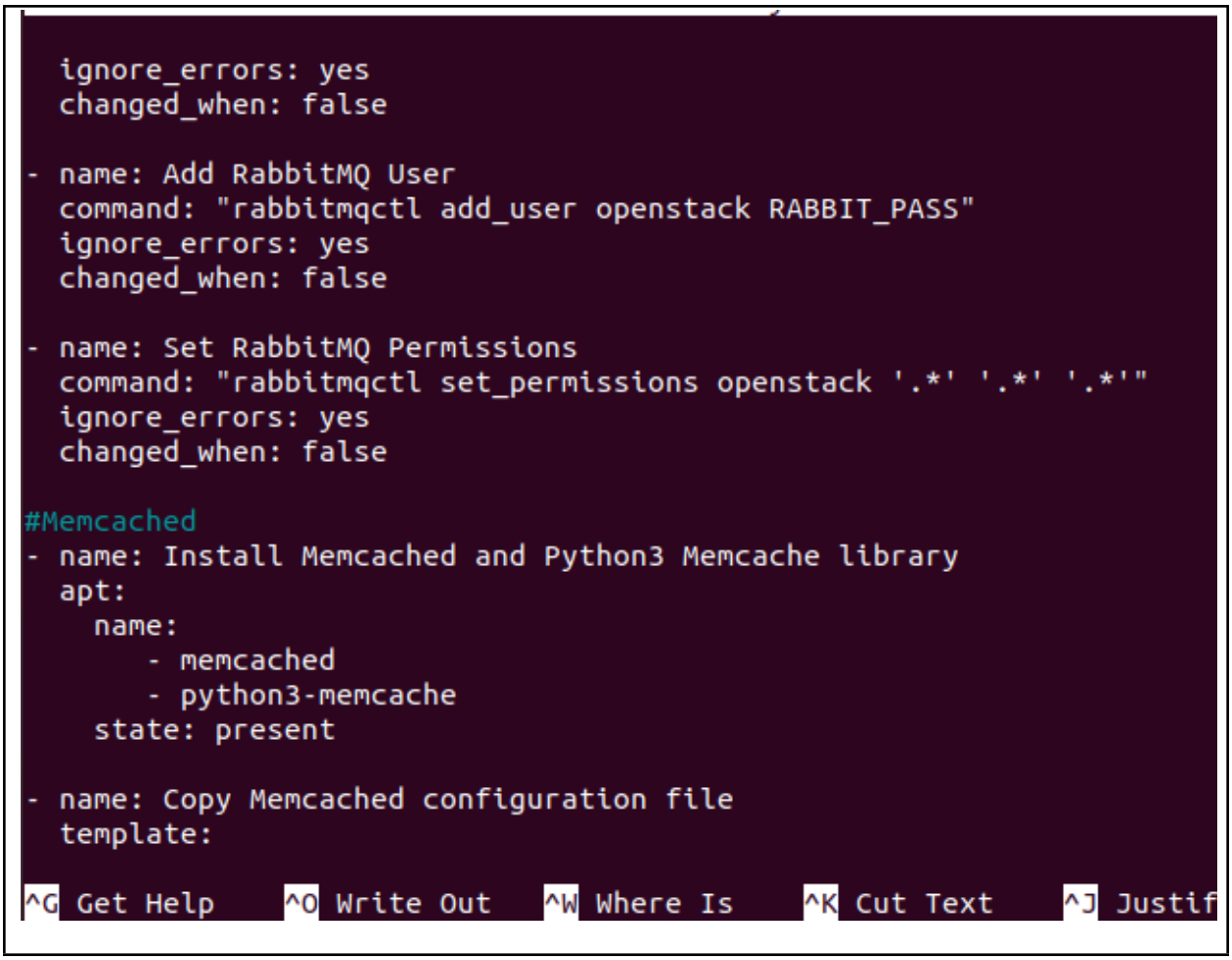
- **I prepared the scripts needed for the installation of NTP, OpenStack packages, SQL Database, Message Queue, Memcached, and Etcd for both Ubuntu and CentOS machines.**


GNU nano 2.9.3 main.yml

#NTP
- name: Install NTP
apt:
name: ntp
state: present
- name: Enable and Start NTP service
systemd:
name: ntp
enabled: yes
state: started
OpenStack package
- name: Install OpenStack packages
apt:
name: python3-openstackclient
state: latest
#SQL Database
- name: Install MariaDB server
apt:
name: mariadb-server



```
- name: Install Python3 PyMySQL
  apt:
    name: python3-pymysql
    state: present

- name: Copy mariadb.conf.j2
  template:
    src: roles/ubuntu/templates/mariadb.conf.j2
    dest: /etc/mysql/mariadb.conf.d/99-openstack.cnf

- name: Restart MariaDB
  service:
    name: mariadb
    state: restarted

#Message queue
- name: Install RabbitMQ Server
  apt:
    name: rabbitmq-server
    state: present

- name: Remove RabbitMQ User

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text
```



```
  ignore_errors: yes
  changed_when: false

- name: Add RabbitMQ User
  command: "rabbitmqctl add_user openstack RABBIT_PASS"
  ignore_errors: yes
  changed_when: false

- name: Set RabbitMQ Permissions
  command: "rabbitmqctl set_permissions openstack '.*' '.*' '.*'"
  ignore_errors: yes
  changed_when: false

#Memcached
- name: Install Memcached and Python3 Memcache library
  apt:
    name:
       - memcached
       - python3-memcache
    state: present

- name: Copy Memcached configuration file
  template:

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justif
```

```
  GNU nano 2.9.3                    main.yml                          Modified

    dest: /etc/memcached.conf
    mode: 0644

- name: Restart Memcached service
  service:
    name: memcached
    enabled: yes
    state: started

#Etcd
- name: Add Universe repository
  apt_repository:
    repo: "deb http://archive.ubuntu.com/ubuntu {{ ansible_distribution_releas$
    state: present

- name: Install etcd
  apt:
    name: etcd
    state: present

- name: Copy etcd configuration file
  template:
    src: roles/ubuntu/templates/etcd.conf.j2

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify
```

```
    repo: "deb http://archive.ubuntu.com/ubuntu {{ ansible_distribution_releas$
    state: present

- name: Install etcd
  apt:
    name: etcd
    state: present

- name: Copy etcd configuration file
  template:
    src: roles/ubuntu/templates/etcd.conf.j2
    dest: /etc/default/etcd

- name: Enable and start etcd service
  service:
    name: etcd
    enabled: yes
    state: restarted
```

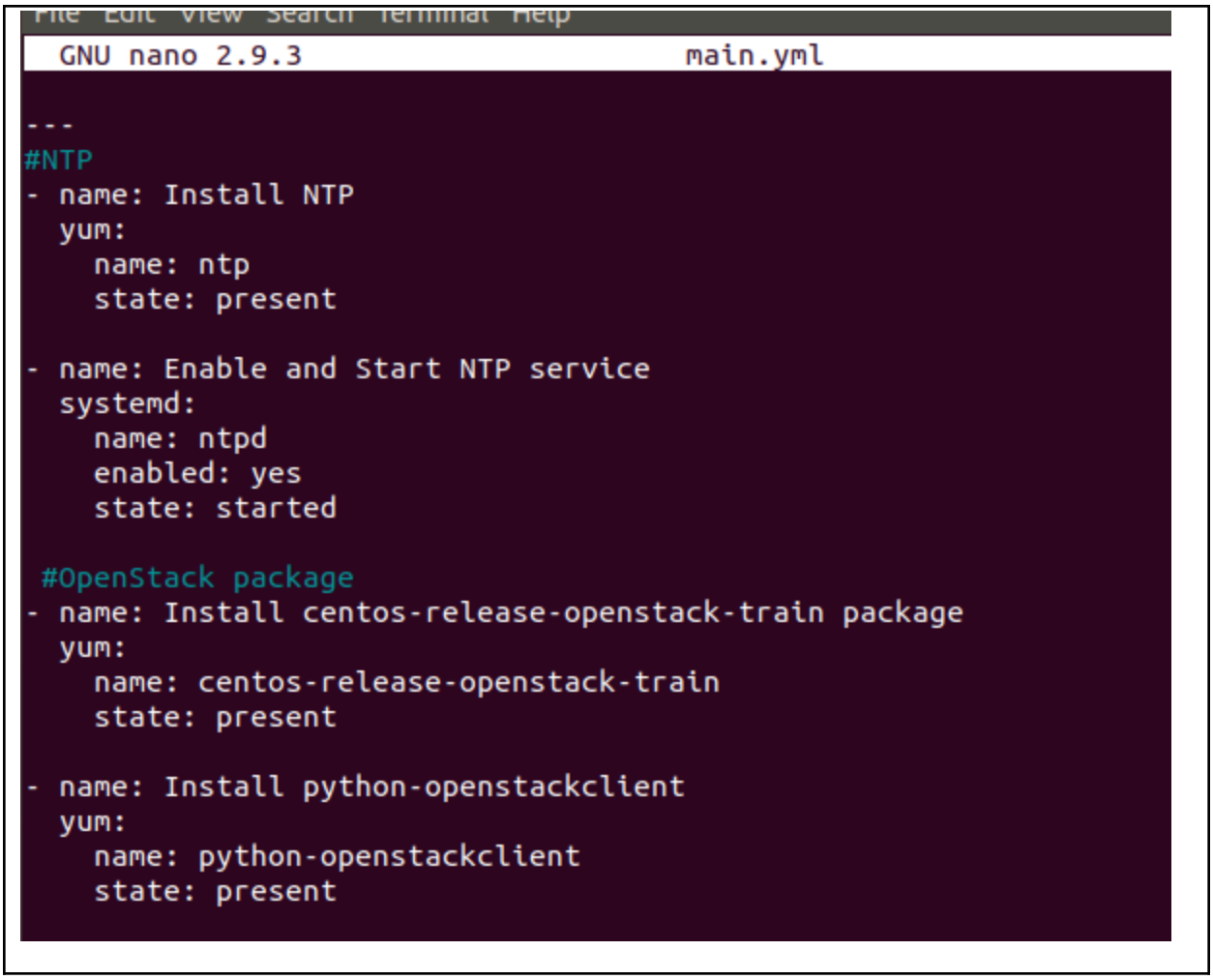
templates directory

```
 GNU nano 2.9.3                    etcd.conf.j2

ETCD_NAME="controller"
ETCD_DATA_DIR="/var/lib/etcd"
ETCD_INITIAL_CLUSTER_STATE="new"
ETCD_INITIAL_CLUSTER_TOKEN="etcd-cluster-01"
ETCD_INITIAL_CLUSTER="controller=http://192.168.56.104:2380"
ETCD_INITIAL_ADVERTISE_PEER_URLS="http://192.168.56.104:2380"
ETCD_ADVERTISE_CLIENT_URLS="http://192.168.56.104:2379"
ETCD_LISTEN_PEER_URLS="http://0.0.0.0:2380"
ETCD_LISTEN_CLIENT_URLS="http://192.168.56.104:2379"
```

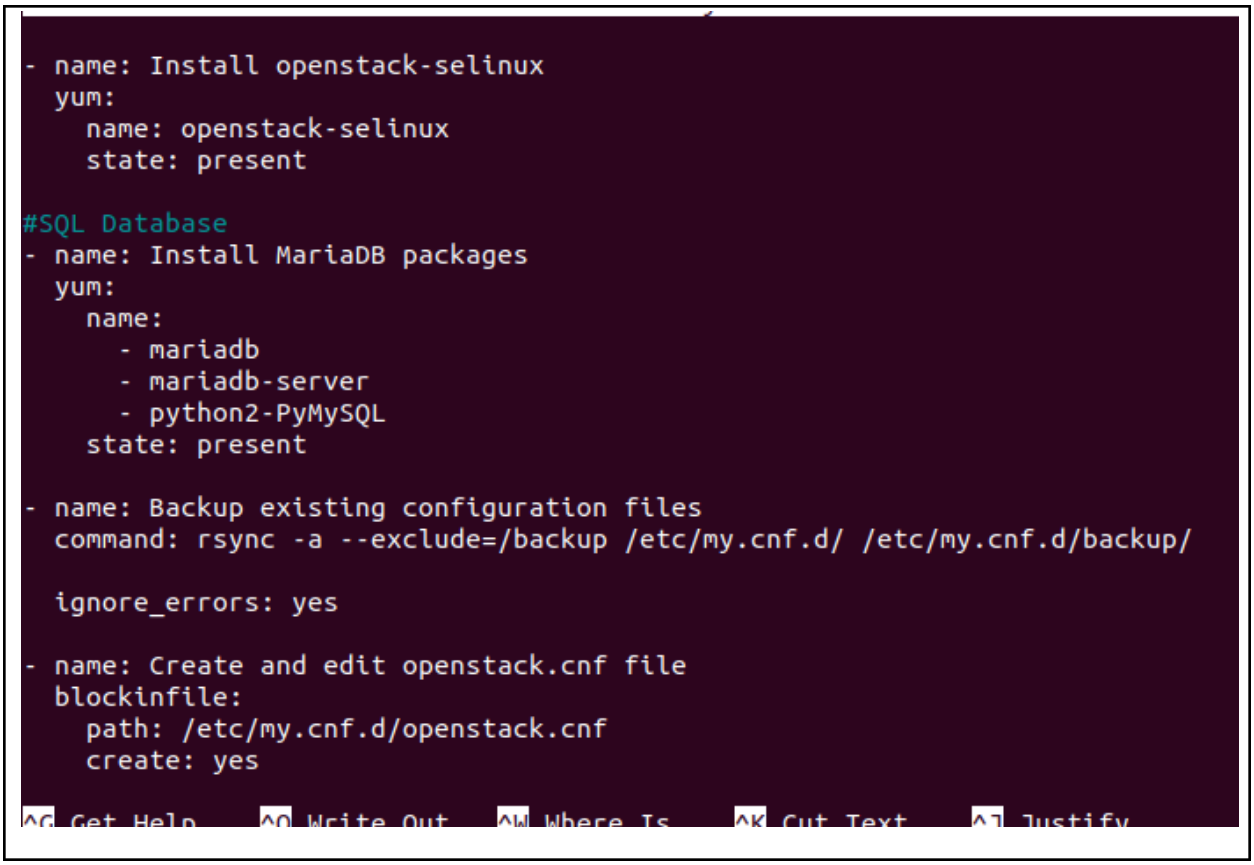
```
 GNU nano 2.9.3                    mariadb.conf.j2

[mysqld]
bind-address = 192.168.56.104
default-storage-engine = innodb
innodb_file_per_table = on
max_connections = 4096
collation-server = utf8_general_ci
character-set-server = utf8
```

```
 GNU nano 2.9.3                    memcached.conf.j2

-l 10.0.2.15
-p 11211
-U 11211
-m 64
-c 1024
```

CentOS

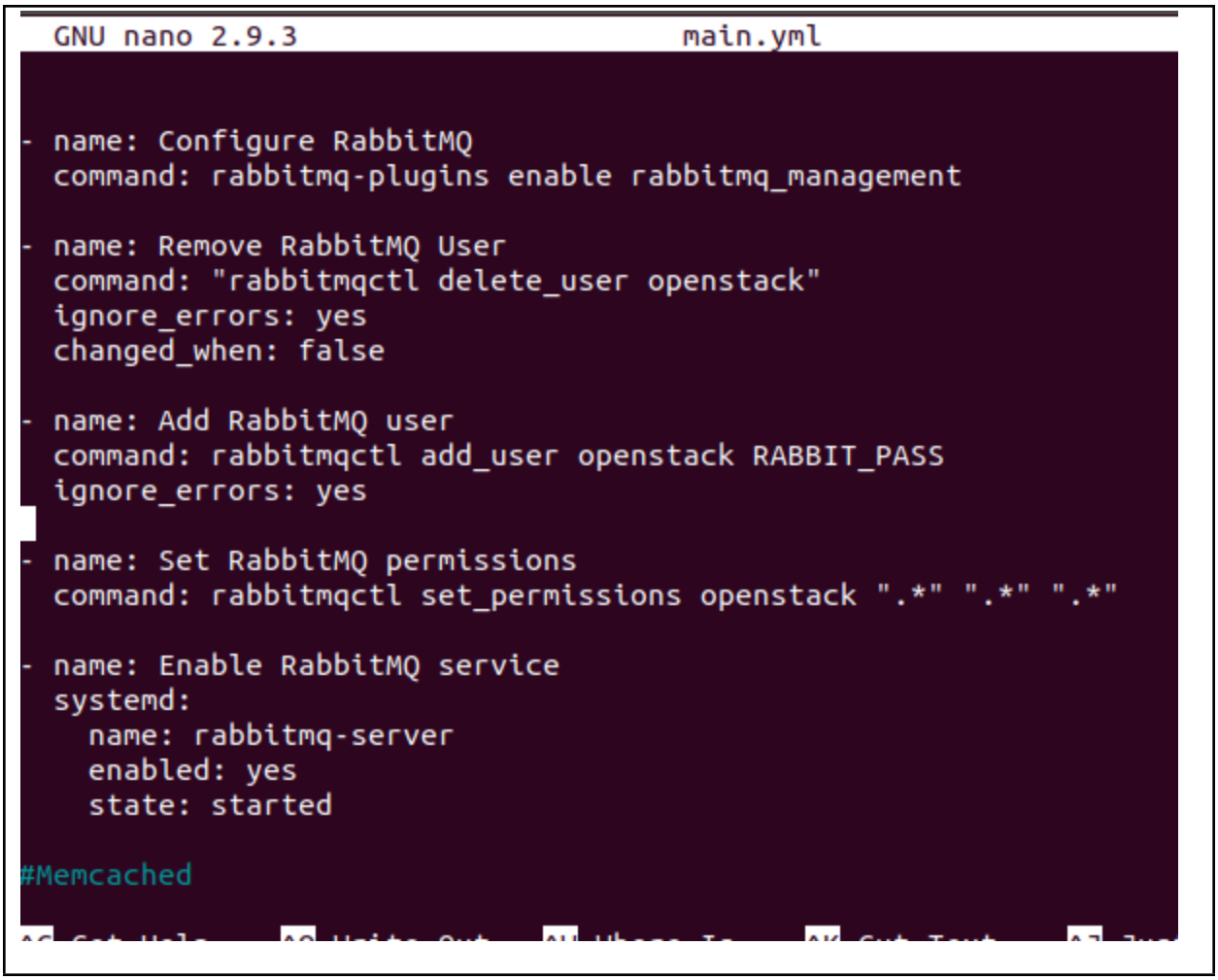

File Edit View Search Terminal Help
GNU nano 2.9.3 main.yml

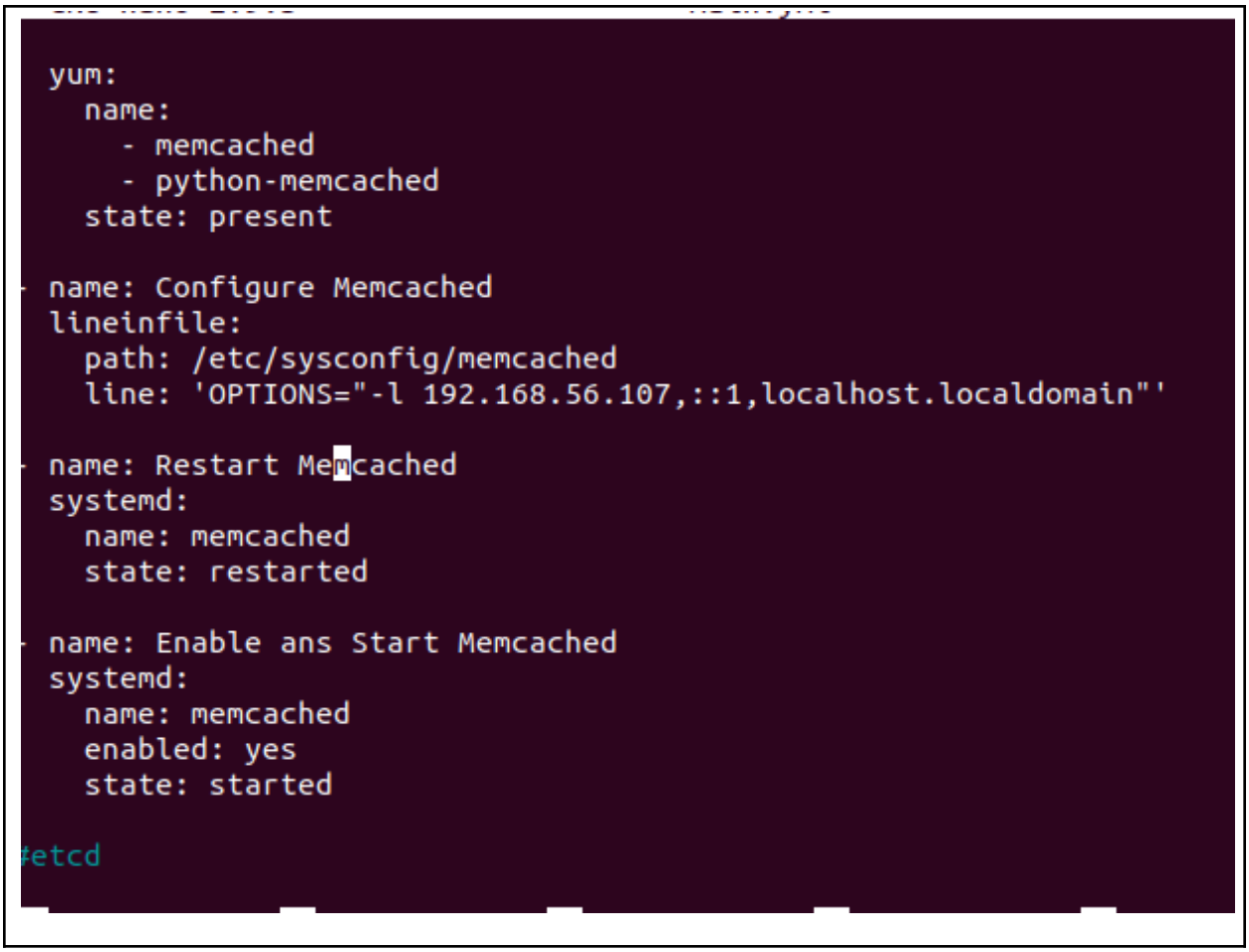
#NTP
- name: Install NTP
yum:
name: ntp
state: present
- name: Enable and Start NTP service
systemd:
name: ntpd
enabled: yes
state: started
#OpenStack package
- name: Install centos-release-openstack-train package
yum:
name: centos-release-openstack-train
state: present
- name: Install python-openstackclient
yum:
name: python-openstackclient
state: present



```
- name: Install openstack-selinux
  yum:
    name: openstack-selinux
    state: present

#SQL Database
- name: Install MariaDB packages
  yum:
    name:
      - mariadb
      - mariadb-server
      - python2-PyMySQL
    state: present

- name: Backup existing configuration files
  command: rsync -a --exclude=/backup /etc/my.cnf.d/ /etc/my.cnf.d/backup/

  ignore_errors: yes

- name: Create and edit openstack.cnf file
  blockinfile:
    path: /etc/my.cnf.d/openstack.cnf
    create: yes

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify
```


[mysqld]
bind-address = 192.168.56.107
default-storage-engine = innodb
innodb_file_per_table = on
max_connections = 4096
collation-server = utf8_general_ci
character-set-server = utf8
- name: Enable MariaDB service
systemd:
name: mariadb
enabled: yes
state: started
#Message queue
- name: Install RabbitMQ server
yum:
name: rabbitmq-server
state: present
- name: Run RabbitMQ service
systemd:
name: rabbitmq-server


GNU nano 2.9.3 main.yml
- name: Configure RabbitMQ
command: rabbitmq-plugins enable rabbitmq_management
- name: Remove RabbitMQ User
command: "rabbitmqctl delete_user openstack"
ignore_errors: yes
changed_when: false
- name: Add RabbitMQ user
command: rabbitmqctl add_user openstack RABBIT_PASS
ignore_errors: yes
- name: Set RabbitMQ permissions
command: rabbitmqctl set_permissions openstack ".*" ".*" ".*"
- name: Enable RabbitMQ service
systemd:
name: rabbitmq-server
enabled: yes
state: started
#Memcached


yum:
name:
- memcached
- python-memcached
state: present
- name: Configure Memcached
lineinfile:
path: /etc/sysconfig/memcached
line: 'OPTIONS="-l 192.168.56.107,::1,localhost.localdomain"'
- name: Restart Memcached
systemd:
name: memcached
state: restarted
- name: Enable ans Start Memcached
systemd:
name: memcached
enabled: yes
state: started
#etcd

```
  yum:
    name: etcd
    state: present

- name: Configure etcd
  blockinfile:
    path: /etc/etcd/etcd.conf
    block: |
      #[Member]
      ETCD_DATA_DIR="/var/lib/etcd/default.etcd"
      ETCD_LISTEN_PEER_URLS="http://192.168.56.107:2380"
      ETCD_LISTEN_CLIENT_URLS="http://192.168.56.107:2379"
      ETCD_NAME="controller"

      #[Clustering]
      ETCD_INITIAL_ADVERTISE_PEER_URLS="http://192.168.56.107:2380"
      ETCD_ADVERTISE_CLIENT_URLS="http://192.168.56.107:2379"
      ETCD_INITIAL_CLUSTER="controller=http://192.168.56.107:2380"
      ETCD_INITIAL_CLUSTER_TOKEN="etcd-cluster-01"
      ETCD_INITIAL_CLUSTER_STATE="new"

- name: Enable and Start etcd service
  systemd:
```

```
- name: Enable and Start etcd service
  systemd:
    name: etcd
    enabled: yes
    state: started
```

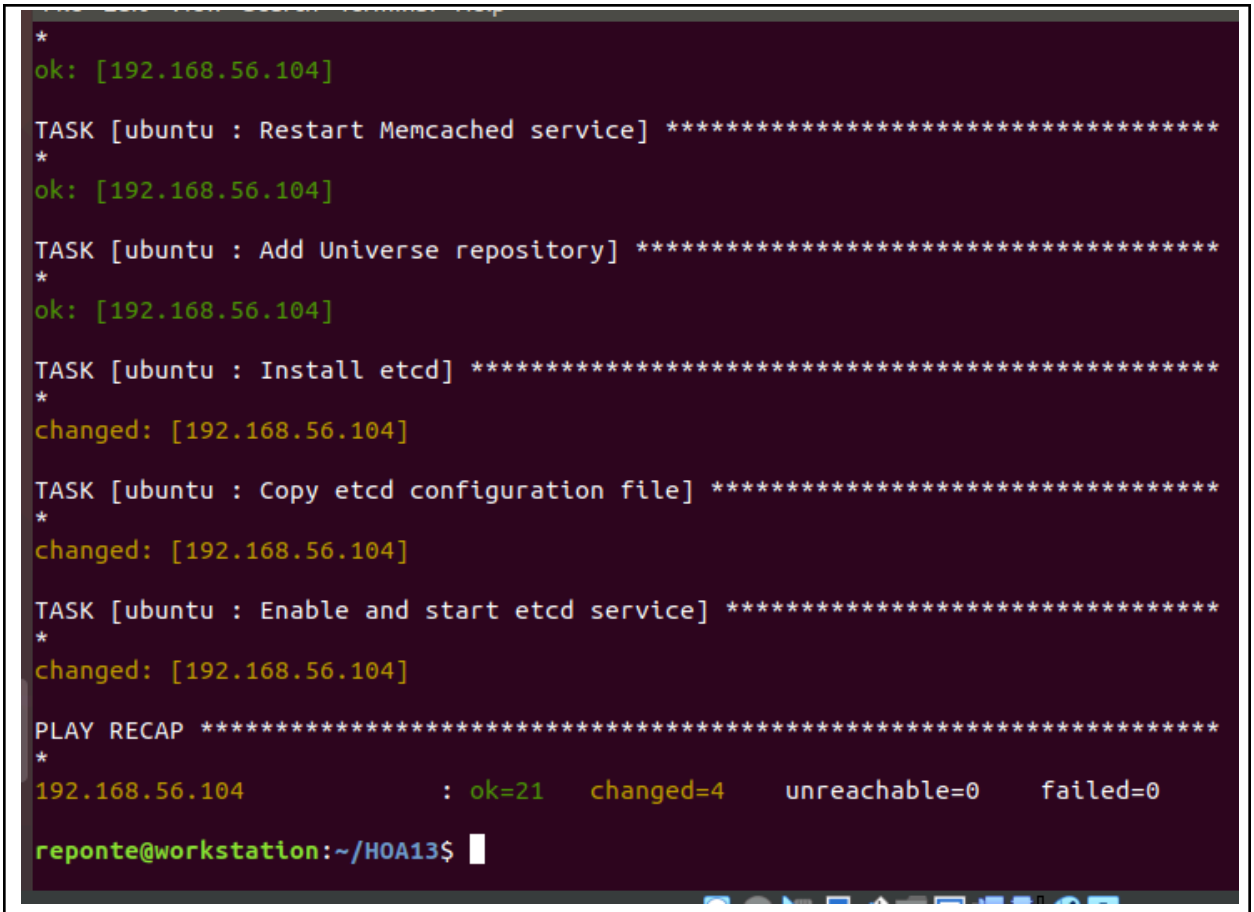
Recap of Installation

- **Here's the recap of the whole processes of the needed packages for both Ubuntu and CentOS**

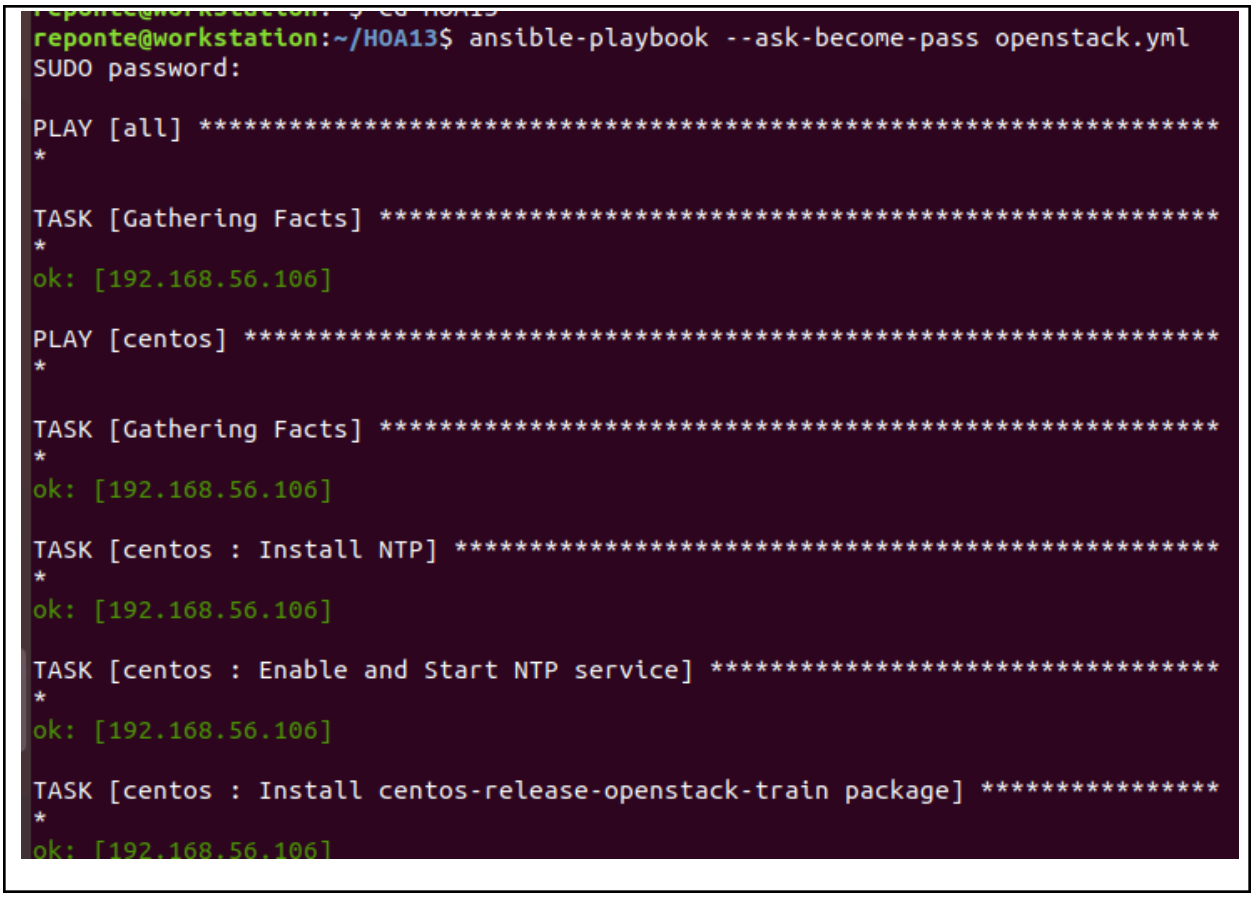
Ubuntu

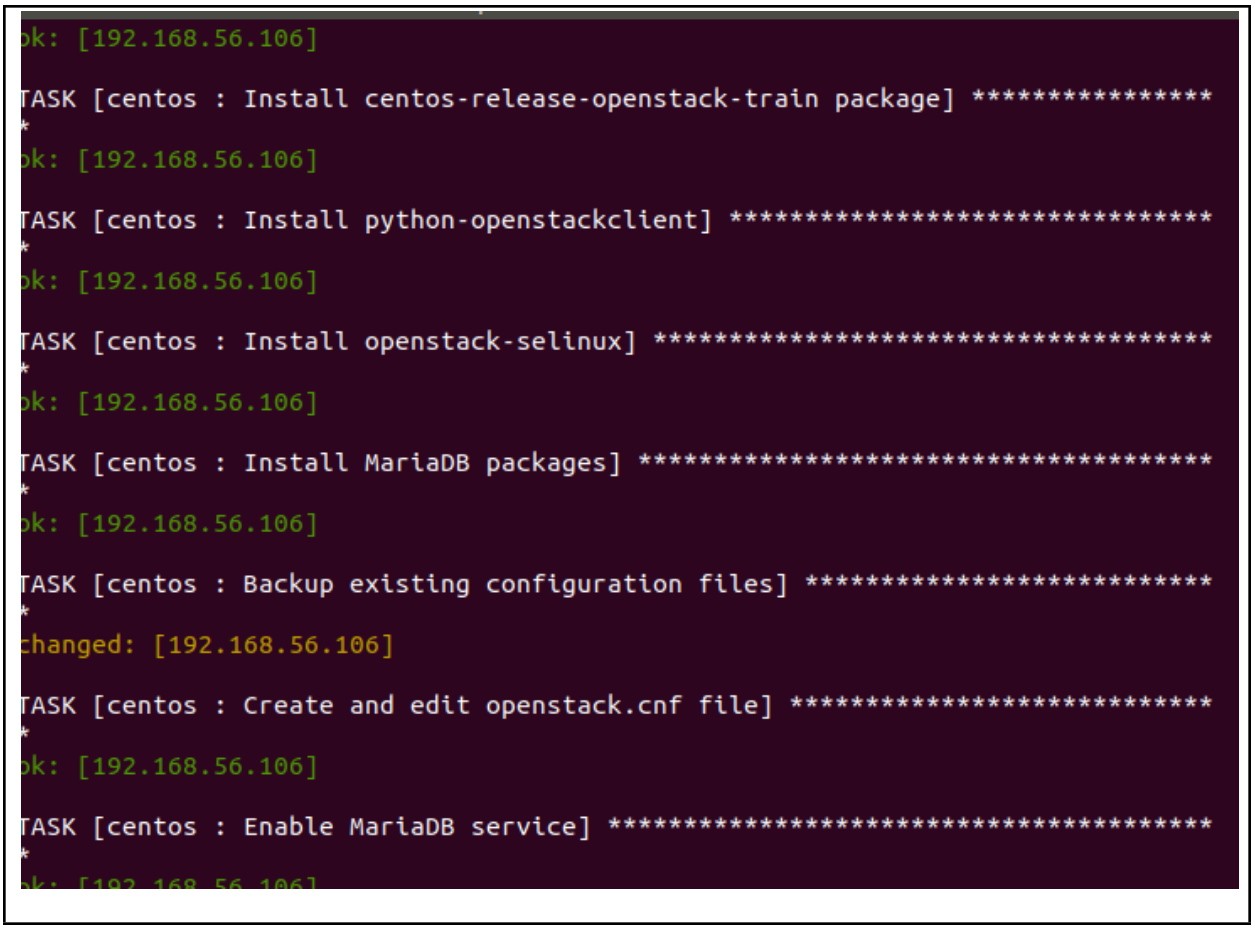
```
reponte@workstation:~/HOA13$ ansible-playbook --ask-become-pass openstack.yml
SUDO password:

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

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.104]

PLAY [ubuntu] ******************************************************************
*

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.104]

TASK [ubuntu : Install NTP] ****************************************************
*
ok: [192.168.56.104]

TASK [ubuntu : Enable and Start NTP service] ***********************************
*
ok: [192.168.56.104]

TASK [ubuntu : Install OpenStack packages] *************************************
*
```

```
TASK [ubuntu : Install MariaDB server] ************************************
*
ok: [192.168.56.104]

TASK [ubuntu : Install Python3 PyMySQL] ***********************************
*
ok: [192.168.56.104]

TASK [ubuntu : Copy mariadb.conf.j2] **************************************
*
ok: [192.168.56.104]

TASK [ubuntu : Restart MariaDB] *******************************************
*
changed: [192.168.56.104]

TASK [ubuntu : Install RabbitMQ Server] ***********************************
*
ok: [192.168.56.104]

TASK [ubuntu : Check if the RabbitMQ user exists] *************************
*
ok: [192.168.56.104]

TASK [ubuntu : Remove RabbitMQ User] **************************************
*
ok: [192.168.56.104]
```


*
ok: [192.168.56.104]
TASK [ubuntu : Restart Memcached service] ***********************************
*
ok: [192.168.56.104]
TASK [ubuntu : Add Universe repository] *************************************
*
ok: [192.168.56.104]
TASK [ubuntu : Install etcd] **
*
changed: [192.168.56.104]
TASK [ubuntu : Copy etcd configuration file] ********************************
*
changed: [192.168.56.104]
TASK [ubuntu : Enable and start etcd service] *******************************
*
changed: [192.168.56.104]
PLAY RECAP **
*
192.168.56.104 : ok=21 changed=4 unreachable=0 failed=0
reponte@workstation:~/HOA13$

CentOS


reponte@workstation:~/HOA13$ ansible-playbook --ask-become-pass openstack.yml
SUDO password:
PLAY [all] ***
*
TASK [Gathering Facts] ***
*
ok: [192.168.56.106]
PLAY [centos] **
*
TASK [Gathering Facts] ***
*
ok: [192.168.56.106]
TASK [centos : Install NTP] **
*
ok: [192.168.56.106]
TASK [centos : Enable and Start NTP service] *************************************
*
ok: [192.168.56.106]
TASK [centos : Install centos-release-openstack-train package] ***************
*
ok: [192.168.56.106]


ok: [192.168.56.106]
TASK [centos : Install centos-release-openstack-train package] ***************
*
ok: [192.168.56.106]
TASK [centos : Install python-openstackclient] *******************************
*
ok: [192.168.56.106]
TASK [centos : Install openstack-selinux] ************************************
*
ok: [192.168.56.106]
TASK [centos : Install MariaDB packages] *************************************
*
ok: [192.168.56.106]
TASK [centos : Backup existing configuration files] **************************
*
changed: [192.168.56.106]
TASK [centos : Create and edit openstack.cnf file] ***************************
*
ok: [192.168.56.106]
TASK [centos : Enable MariaDB service] ***************************************
*

```
ok: [192.168.56.106]

TASK [centos : Restart Memcached] ******************************************
changed: [192.168.56.106]

TASK [centos : Enable ans Start Memcached] *********************************
changed: [192.168.56.106]

TASK [centos : Install etcd] ***********************************************
ok: [192.168.56.106]

TASK [centos : Configure etcd] *********************************************
changed: [192.168.56.106]

TASK [centos : Enable and Start etcd service] ******************************
changed: [192.168.56.106]

PLAY RECAP *********************************************************************
192.168.56.106             : ok=25   changed=8    unreachable=0    failed=0

reponte@workstation:~/HOA13$
```

Verification

Ubuntu

NTP

```
reponte@server1:~$ sudo systemctl status ntp
● ntp.service - Network Time Service
   Loaded: loaded (/lib/systemd/system/ntp.service; enabled; vendor preset: ena
   Active: active (running) since Sun 2024-04-28 15:19:18 PST; 26min ago
     Docs: man:ntpd(8)
 Main PID: 6692 (ntpd)
    Tasks: 2 (limit: 2318)
   CGroup: /system.slice/ntp.service
           └─6692 /usr/sbin/ntpd -p /var/run/ntpd.pid -g -u 130:137
```

OpenStack packages

```
File  Edit  View  Search  Terminal  Help
reponte@server1:~$ dpkg -l | grep openstack
ii  python3-openstackclient                    3.14.2-0ubuntu1
                all          OpenStack Command-line Client - Python 3.x
ii  python3-openstacksdk                       0.11.3+repack-0ubuntu1
                all          SDK for building applications to work with OpenSta
ck - Python 3.x
reponte@server1:~$
```

SQL Database

```
reponte@server1:~$ systemctl status mysql
● mariadb.service - MariaDB 10.1.48 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset:
   Active: active (running) since Mon 2024-04-29 20:43:07 PST; 17min ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
  Process: 3430 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_STA
  Process: 3328 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SU
  Process: 1589 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VA
  Process: 1584 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_STAR
  Process: 1578 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/r
 Main PID: 1926 (mysqld)
   Status: "Taking your SQL requests now..."
    Tasks: 27 (limit: 2318)
   CGroup: /system.slice/mariadb.service
           └─1926 /usr/sbin/mysqld
```

```
reponte@server1:~$ systemctl status mariadb
● mariadb.service - MariaDB 10.1.48 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset:
   Active: active (running) since Mon 2024-04-29 20:43:07 PST; 17min ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
  Process: 3430 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_STA
  Process: 3328 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SU
  Process: 1589 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VA
  Process: 1584 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_STAR
  Process: 1578 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/r
 Main PID: 1926 (mysqld)
   Status: "Taking your SQL requests now..."
    Tasks: 27 (limit: 2318)
   CGroup: /system.slice/mariadb.service
           └─1926 /usr/sbin/mysqld

Apr 29 20:42:45 server1 systemd[1]: Starting MariaDB 10.1.48 database server...
Apr 29 20:42:55 server1 mysqld[1926]: 2024-04-29 20:42:53 140294737505408 [Note
```

Message Queue

```
reponte@server1:~$ systemctl status rabbitmq-server
● rabbitmq-server.service - RabbitMQ Messaging Server
   Loaded: loaded (/lib/systemd/system/rabbitmq-server.service; enabled; vendor
   Active: active (running) since Mon 2024-04-29 20:43:54 PST; 17min ago
 Main PID: 1825 (beam.smp)
   Status: "Initialized"
    Tasks: 87 (limit: 2318)
   CGroup: /system.slice/rabbitmq-server.service
           ├─1574 /bin/sh /usr/sbin/rabbitmq-server
           ├─1825 /usr/lib/erlang/erts-9.2/bin/beam.smp -W w -A 64 -P 1048576 -
           ├─2081 /usr/lib/erlang/erts-9.2/bin/epmd -daemon
           ├─3403 erl_child_setup 65536
           ├─4651 inet_gethost 4
           └─4652 inet_gethost 4

Apr 29 20:42:45 server1 systemd[1]: Starting RabbitMQ Messaging Server...
Apr 29 20:43:54 server1 systemd[1]: rabbitmq-server.service: Supervising proces
```

```
reponte@server1:~$ sudo rabbitmqctl status
[sudo] password for reponte:
Status of node rabbit@server1
[{pid,1825},
 {running_applications,
     [{rabbit,"RabbitMQ","3.6.10"},
      {ranch,"Socket acceptor pool for TCP protocols.","1.3.0"},
      {ssl,"Erlang/OTP SSL application","8.2.3"},
      {public_key,"Public key infrastructure","1.5.2"},
      {asn1,"The Erlang ASN1 compiler version 5.0.4","5.0.4"},
      {rabbit_common,
          "Modules shared by rabbitmq-server and rabbitmq-erlang-client",
          "3.6.10"},
      {xmerl,"XML parser","1.3.16"},
      {crypto,"CRYPTO","4.2"},
      {os_mon,"CPO  CXC 138 46","2.4.4"},
      {compiler,"ERTS  CXC 138 10","7.1.4"},
      {mnesia,"MNESIA  CXC 138 12","4.15.3"},
      {syntax_tools,"Syntax tools","2.1.4"},
      {sasl,"SASL  CXC 138 11","3.1.1"},
      {stdlib,"ERTS  CXC 138 10","3.4.3"},
      {kernel,"ERTS  CXC 138 10","5.4.1"}]},
 {os,{unix,linux}},
 {erlang_version,
     "Erlang/OTP 20 [erts-9.2] [source] [64-bit] [smp:2:2] [ds:2:2:10] [async-
hreads:64] [kernel-poll:true]\n"},
 {memory,
     [{total,51315104},
```

Memcached

```
reponte@server1:~$ systemctl status memcached
● memcached.service - memcached daemon
   Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor prese
   Active: active (running) since Mon 2024-04-29 21:08:31 PST; 1s ago
     Docs: man:memcached(1)
 Main PID: 8424 ((-wrapper))
    Tasks: 1 (limit: 2318)
   CGroup: /system.slice/memcached.service
           └─8424 (-wrapper)
```

Etcd

```
reponte@server1:~$ systemctl status etcd
● etcd.service - etcd - highly-available key value store
   Loaded: loaded (/lib/systemd/system/etcd.service; disabled; vendor preset: e
   Active: active (running) since Mon 2024-04-29 21:12:01 PST; 2s ago
     Docs: https://github.com/coreos/etcd
           man:etcd
 Main PID: 8878 (etcd)
    Tasks: 11 (limit: 2318)
   CGroup: /system.slice/etcd.service
           └─8878 /usr/bin/etcd

Apr 29 21:12:01 server1 etcd[8878]: enabled capabilities for version 3.2
Apr 29 21:12:01 server1 etcd[8878]: 3efafda55e396efe is starting a new election
```

CentOS

NTP

```
[reponte@server3 ~]$ sudo systemctl status ntpd
● ntpd.service - Network Time Service
   Loaded: loaded (/usr/lib/systemd/system/ntpd.service; enabled; vendor preset: dis
ed)
   Active: active (running) since Mon 2024-04-29 00:40:46 PST; 3h 17min ago
 Main PID: 5771 (ntpd)
    Tasks: 1
   CGroup: /system.slice/ntpd.service
           └─5771 /usr/sbin/ntpd -u ntp:ntp -g

Apr 29 00:40:46 server3 ntpd[5771]: Listen normally on 3 enp0s3 10.0.2.15 UDP 123
Apr 29 00:40:46 server3 ntpd[5771]: Listen normally on 4 enp0s8 192.168.56.106 UDP 1
Apr 29 00:40:46 server3 ntpd[5771]: Listen normally on 5 virbr0 192.168.122.1 UDP 12
Apr 29 00:40:46 server3 ntpd[5771]: Listen normally on 6 lo ::1 UDP 123
Apr 29 00:40:46 server3 ntpd[5771]: Listen normally on 7 enp0s8 fe80::6c98:f67c:e...
Apr 29 00:40:46 server3 ntpd[5771]: Listen normally on 8 enp0s3 fe80::c75e:da6e:5...
Apr 29 00:40:46 server3 ntpd[5771]: Listening on routing socket on fd #25 for int...
Apr 29 00:40:46 server3 ntpd[5771]: 0.0.0.0 c016 06 restart
Apr 29 00:40:46 server3 ntpd[5771]: 0.0.0.0 c012 02 freq_set kernel 0.000 PPM
Apr 29 00:40:46 server3 ntpd[5771]: 0.0.0.0 c011 01 freq_not_set
Hint: Some lines were ellipsized, use -l to show in full.
[reponte@server3 ~]$
```

OpenStack packages

```
[reponte@server3 ~]$ rpm -qa | grep openstack
openstack-selinux-0.8.26-1.el7.noarch
python2-openstacksdk-0.36.5-1.el7.noarch
python-openstackclient-lang-4.0.2-1.el7.noarch
python2-openstackclient-4.0.2-1.el7.noarch
centos-release-openstack-train-1-1.el7.centos.noarch
[reponte@server3 ~]$
```

SQL Database

```
[reponte@server3 ~]$ systemctl status mariadb.service
● 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 2024-04-30 22:26:20 PST; 4s ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
  Process: 5798 ExecStartPost=/usr/libexec/mysql-check-upgrade (code=exited, status=0/S
UCCESS)
  Process: 5728 ExecStartPre=/usr/libexec/mysql-prepare-db-dir %n (code=exited, status=
0/SUCCESS)
  Process: 5695 ExecStartPre=/usr/libexec/mysql-check-socket (code=exited, status=0/SUC
CESS)
 Main PID: 5766 (mysqld)
   Status: "Taking your SQL requests now..."
    Tasks: 30
   CGroup: /system.slice/mariadb.service
           └─5766 /usr/libexec/mysqld --basedir=/usr
```

Message Queue

```
● rabbitmq-server.service - RabbitMQ broker
   Loaded: loaded (/usr/lib/systemd/system/rabbitmq-server.service; enabled; vendor pre
set: disabled)
   Active: active (running) since Tue 2024-04-30 22:05:33 PST; 36min ago
 Main PID: 1265 (beam.smp)
   Status: "Initialized"
    Tasks: 73
   CGroup: /system.slice/rabbitmq-server.service
           ├─1265 /usr/lib64/erlang/erts-8.3.5.3/bin/beam.smp -W w -A 64 -P 1048576 ...
           ├─2559 erl_child_setup 1024
           ├─2759 inet_gethost 4
           └─2760 inet_gethost 4

Apr 30 22:04:52 server3 systemd[1]: Starting RabbitMQ broker...
```

```
[reponte@server3 ~]$ 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 2024-04-30 22:05:33 PST; 36min ago
 Main PID: 1265 (beam.smp)
   Status: "Initialized"
    Tasks: 73
   CGroup: /system.slice/rabbitmq-server.service
           ├─1265 /usr/lib64/erlang/erts-8.3.5.3/bin/beam.smp -W w -A 64 -P 1048576 ...
           ├─2559 erl_child_setup 1024
           ├─2759 inet_gethost 4
           └─2760 inet_gethost 4

Apr 30 22:04:52 server3 systemd[1]: Starting RabbitMQ broker...
Apr 30 22:05:21 server3 rabbitmq-server[1265]: RabbitMQ 3.6.16. Copyright (C) 2007-
```

Memcached

```
hint: Some lines were ellipsized, use -l to show in full.
[reponte@server3 ~]$ 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 2024-04-30 22:57:54 PST; 3min 24s ago
 Main PID: 11014 (memcached)
    Tasks: 10
   CGroup: /system.slice/memcached.service
           └─11014 /usr/bin/memcached -p 11211 -u memcached -m 64 -c 1024 -l 192.168...

Apr 30 22:57:54 server3 systemd[1]: Started memcached daemon.
[reponte@server3 ~]$
```

Etcd

```
[reponte@server3 ~]$ 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 2024-04-30 22:05:03 PST; 38min ago
 Main PID: 1281 (etcd)
    Tasks: 11
   CGroup: /system.slice/etcd.service
           └─1281 /usr/bin/etcd --name=controller --data-dir=/var/lib/etcd/default.e...

Apr 30 22:05:01 server3 etcd[1281]: enabled capabilities for version 3.3
Apr 30 22:05:03 server3 etcd[1281]: 5550f865839a4cf3 is starting a new election a...m 3
Apr 30 22:05:03 server3 etcd[1281]: 5550f865839a4cf3 became candidate at term 4
Apr 30 22:05:03 server3 etcd[1281]: 5550f865839a4cf3 received MsgVoteResp from 55...m 4
Apr 30 22:05:03 server3 etcd[1281]: 5550f865839a4cf3 became leader at term 4
Apr 30 22:05:03 server3 etcd[1281]: raft.node: 5550f865839a4cf3 elected leader 55...m 4
Apr 30 22:05:03 server3 etcd[1281]: published {Name:controller ClientURLs:[http://...867
```

GIT CLONE

Reponte:

```
reponte@workstation:~/HOA13$ git add *
reponte@workstation:~/HOA13$ git commit -m "HOA13"
[main 70a83c1] HOA13
 9 files changed, 320 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 inventory
 create mode 100644 openstack.retry
 create mode 100644 openstack.yml
 create mode 100644 roles/centos/tasks/main.yml
 create mode 100644 roles/ubuntu/tasks/main.yml
 create mode 100644 roles/ubuntu/templates/etcd.conf.j2
 create mode 100644 roles/ubuntu/templates/mariadb.conf.j2
 create mode 100644 roles/ubuntu/templates/memcached.conf.j2
reponte@workstation:~/HOA13$ git push origin
Counting objects: 17, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (12/12), done.
Writing objects: 100% (17/17), 3.16 KiB | 3.16 MiB/s, done.
Total 17 (delta 1), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), done.
To github.com:meyreponte/HOA13.git
   a140687..70a83c1  main -> main
reponte@workstation:~/HOA13$
```

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

- OpenStack is a cost-effective, open-source solution for building both public and private clouds, offering significant advantages. It's free to use, reducing costs and preventing vendor lock-in. OpenStack is highly customizable and scalable, making it suitable for a wide range of deployment demands. Supported by a robust community, it benefits from frequent updates and a wealth of shared knowledge. OpenStack provides comprehensive cloud services and supports extensive API integration, making it versatile for various applications. It features robust security options and multi-tenancy capabilities that ensure resource isolation and protection. Ideal for private, public, and hybrid cloud setups, OpenStack supports innovative cloud technologies and facilitates operational automation, making it an excellent choice for businesses looking to leverage advanced cloud computing capabilities.

Conclusions:

Reponte: In this activity, we deal with the complexities of software installation and system configuration, as exemplified by the challenges faced while installing OpenStack on CentOS and managing service issues, highlights the importance of robust troubleshooting skills and a deep understanding of system dependencies. From resolving repository and package errors to ensuring essential services like etcd are correctly configured, each step teaches the critical lesson of patience and precision in system administration. The exercise not only enhances technical skills but also underscores the value of methodical problem-solving and the benefits of open-source solutions like OpenStack for scalable, customizable cloud infrastructure.
Sales:

I draw the conclusion that by using ansible playbooks to install openstack i successfully applied my knowledge of ansible roles in this tasks additionaly i know that openstack is an operating system for clouds that manages virtual resources that are pooled together to create clouds since containers speed up application delivery while streaming application deployment and maintenance we use them to stabilize the foundation for clouds operating containers on openstack enables scaling from solitary compartmentalized teams to create operation

Yu: In this hands on activity we've encountered software installation and system. As we proceed, we dealt also of troubleshooting repository and package errors, which requires patience and careful attention to detail. Furthermore, configuring essential services like etc proved to be a challenge, emphasizing the importance of understanding system dependencies and ensuring accurate configuration. Despite these challenges, the experience demonstrated the importance of methodical problem solving and the advantages of using open-source solutions such as OpenStack to create scalable and customizable cloud infrastructure.

Rife: After doing this activity, I can say that the hands-on activities in this course have given me a big-picture view and useful skills that are crucial for understanding and working in cloud computing, which is always changing. These activities have helped me see how different parts of cloud computing fit together and how to use them effectively. For example, I've learned how to set up and manage virtual machines, which are like computers that run in the cloud. This has taught me about the infrastructure side of things, like how data is stored and accessed. I've also practiced using cloud services like storage and databases, which are essential for storing and managing data securely. This has given me practical experience in working with

real-world cloud tools. Additionally, I've delved into topics like networking in the cloud, understanding how different devices and systems communicate with each other. This has broadened my understanding of how cloud environments operate as a whole.
Overall, these hands-on activities have equipped me with a solid foundation in cloud computing, preparing me to tackle the challenges of this fast-paced and dynamic field.