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Course/Section: CPE232 – CPE31S24	**Date Submitted:** 12 / 02 / 2022
Instructor: Engr. Jonathan V. Taylar	**Semester and SY:** 1st Sem SY'22-'23

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)

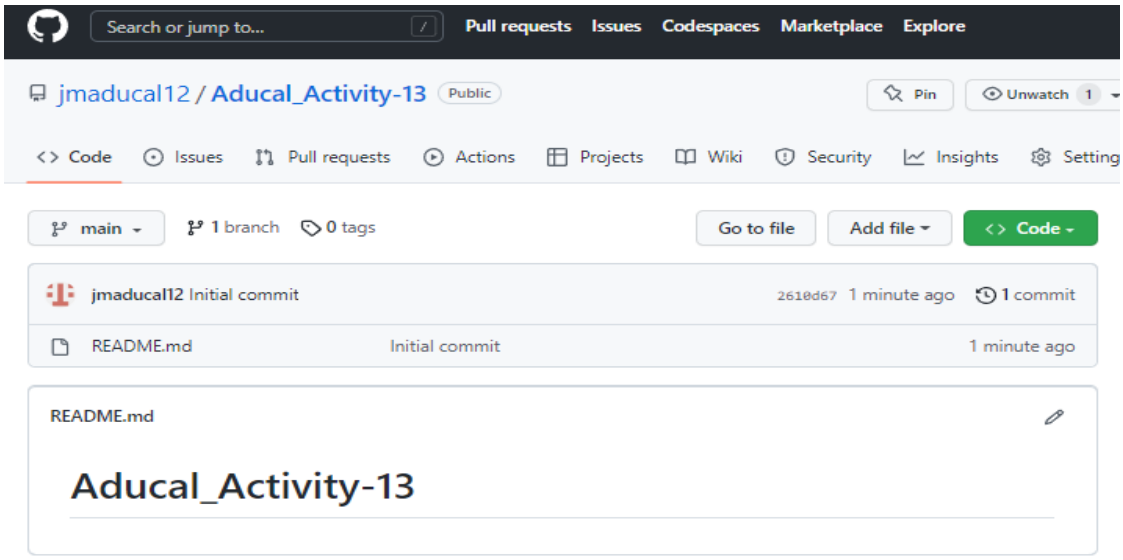
1x Ubuntu VM or Centos VM

4. Tasks

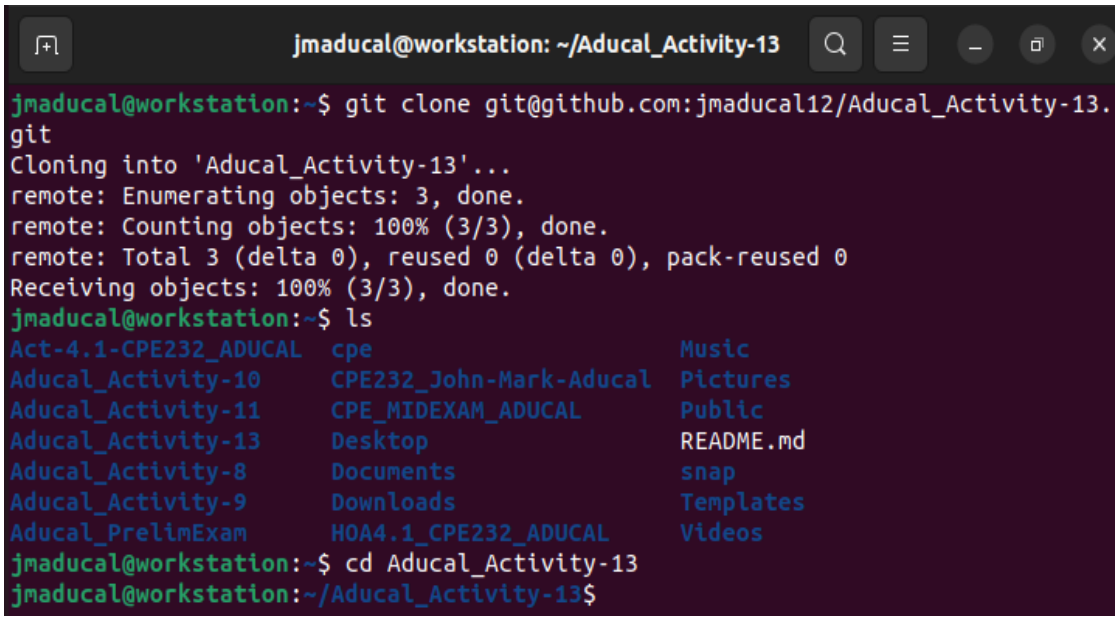
1. Create a new repository for this activity.
2. Create a playbook that converts the steps in the following items in https://docs.openstack.org/install-guide/
    a. NTP
    b. OpenStack packages
    c. SQL Database
    d. Message Queue
    e. Memcached
    f. Etcd
    g. Create different plays in installing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

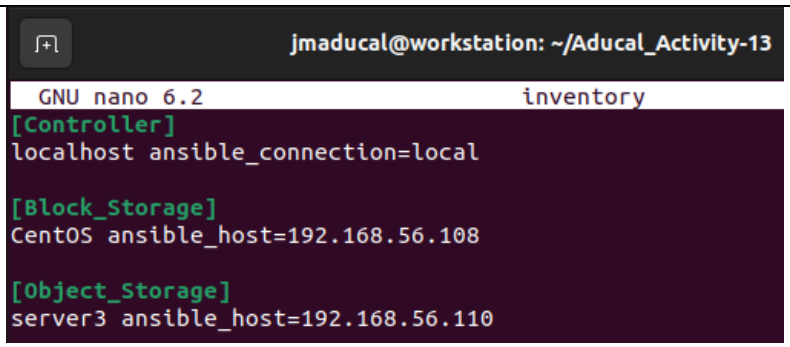
Task 1: Create a new repository



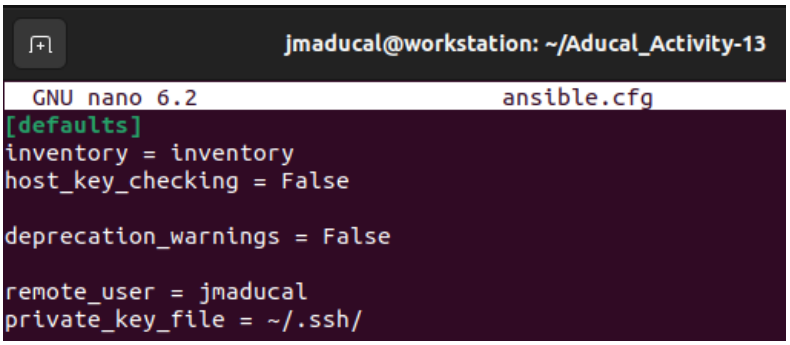
I created a new repository named Aducal_Activity-13.



I used the git clone command to link my new repository to my workstation and use the cd command to change directory to Aducal_Activity-13.

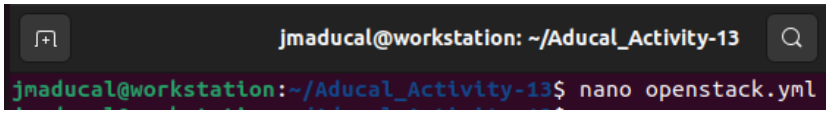


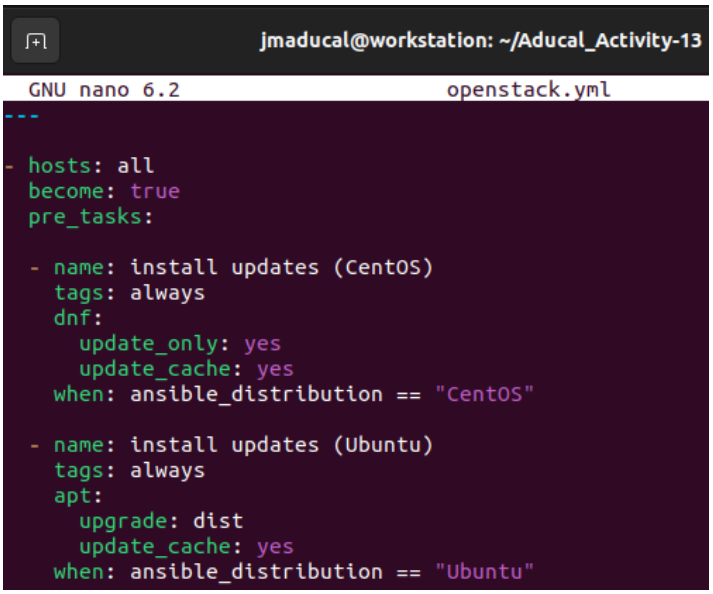
This are the contents of inventory file including three groups such as controller, block storage and object storage nodes.



This are the contents of ansible.cfg file

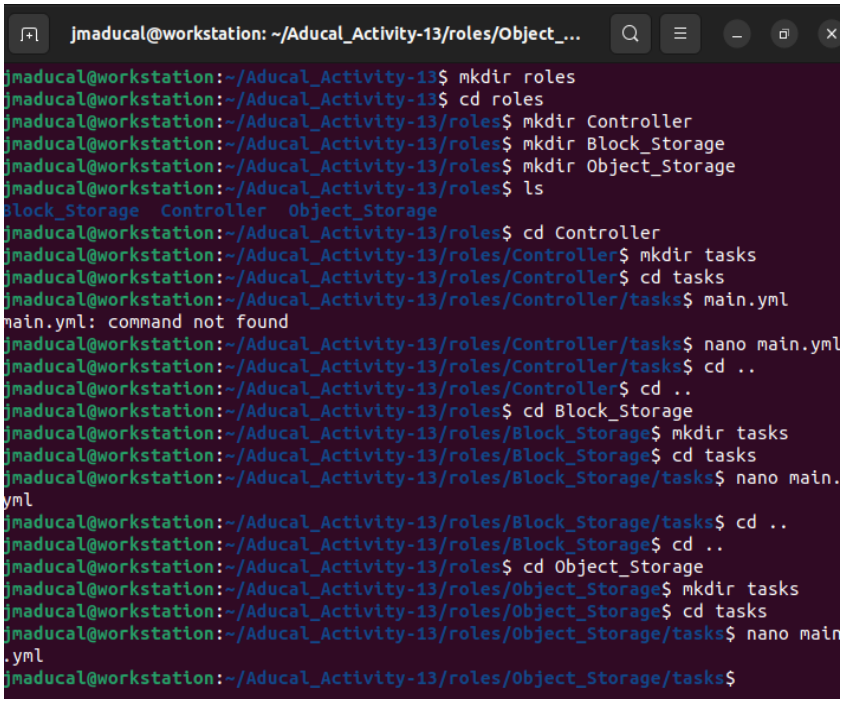
Task 1.2 Creating a roles

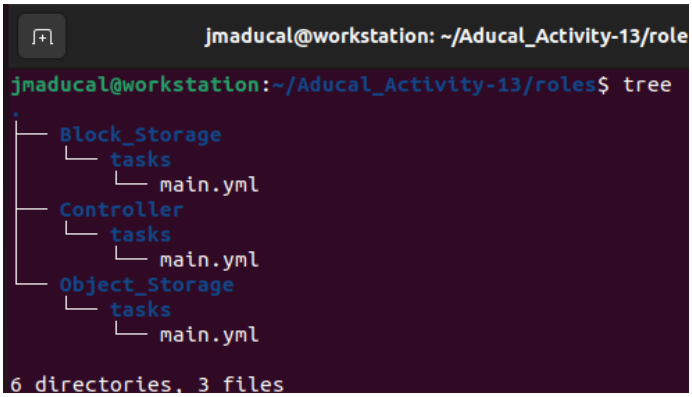




```
- hosts: Controller
  become: true
  roles:
    - Controller

- hosts: Block_Storage
  become: true
  roles:
    - Block_Storage

- hosts: Object_Storage
  become: true
  roles:
    - Object_Storage
```

Inside of openstack file, there are pre_tasks for installing updates for CentOS and Ubuntu servers and particular roles for Controller, Block and Object Storages.






jmaducal@workstation: ~/Aducal_Activity-13/roles/Controll...
GNU nano 6.2 main.yml
- name: Install Network Time Protocol(NTP) in Ubuntu
apt:
name:
- chrony
state: latest
when: ansible_distribution == "Ubuntu"
- name: "NTP service restart/enable"
service:
name: chrony
state: restarted
enabled: true
- name: Install OpenStack package (Client) in Ubuntu
apt:
name:
- python3-openstackclient
state: latest
when: ansible_distribution == "Ubuntu"
- name: Install SQL database for Ubuntu
apt:
name:
- mariadb-server
- python3-pymysql
state: latest
when: ansible_distribution == "Ubuntu"
- name: "mysql service restart/enable"
service:
name: mysql
state: restarted
enabled: true
- name: Install Message Queue in Ubuntu
apt:
name:
- rabbitmq-server
state: latest
when: ansible_distribution == "Ubuntu"

```
- name: Add the openstack user
  command: rabbitmqctl add_user openstack RABBIT_PASS
  when: ansible_distribution == "Ubuntu"

- name: Permit Configuration (write and read) access for openstack user
  command: rabbitmqctl set_permissions openstack ".*" ".*" ".*"
  when: ansible_distribution == "Ubuntu"
```

The contents of main.yml file inside of Controller Directory.

jmaducal@workstation: ~/Aducal_Activity-13/roles/Block_St...

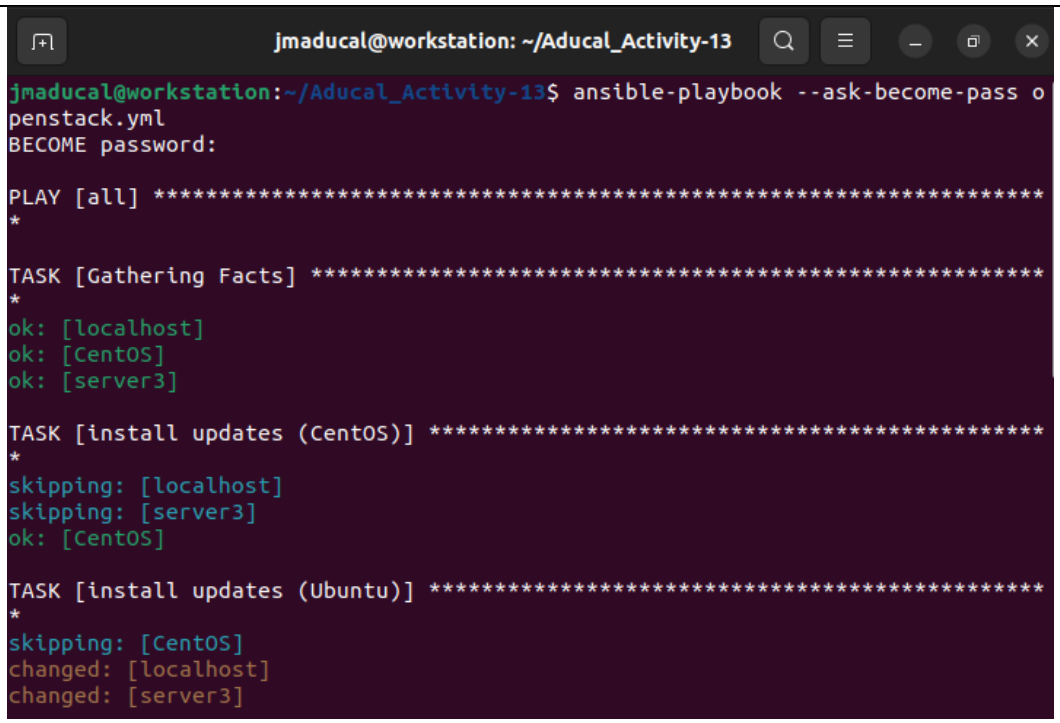
GNU nano 6.2 main.yml

```
- name: Install Network Time Protocol(NTP) in CentOS
  yum:
    name:
      - chrony
    state: latest
  when: ansible_distribution == "CentOS"

- name: "NTP service restart/enable"
  service:
    name: chronyd
    state: restarted
    enabled: true

- name: Install OpenStack package (Client) in CentOS
  yum:
    name:
      - python-openstackclient
    state: latest
  when: ansible_distribution == "CentOS"
```

```
- name: Install etcd in CentOS
  yum:
    name:
      - etcd
    state: latest
  when: ansible_distribution == "CentOS"

- name: "etcd service restart/enable"
  service:
    name: etcd
    state: restarted
    enabled: true
```

The contents of main.yml file inside of Block_Storage Directory.

The contents of main.yml file inside of Object_Storage Directory.




```
PLAY [Controller] ****************************************************************
*

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

TASK [Controller : Install Network Time Protocol(NTP) in Ubuntu] **************
*
changed: [localhost]

TASK [Controller : NTP service restart/enable] ********************************
*
changed: [localhost]

TASK [Controller : Install OpenStack package (Client) in Ubuntu] **************
*
changed: [localhost]
```

```
TASK [Controller : Install SQL database for Ubuntu] ***************************
*
changed: [localhost]

TASK [Controller : mysql service restart/enable] ******************************
*
changed: [localhost]

TASK [Controller : Install Message Queue in Ubuntu] ***************************
*
changed: [localhost]
```

```
TASK [Controller : Add the openstack user] ***********************************
*
changed: [localhost]

TASK [Controller : Permit Configuration (write and read) access for openstack u
ser] ***
changed: [localhost]
```

```
PLAY [Block_Storage] *********************************************************
*

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

TASK [Block_Storage : Install Network Time Protocol(NTP) in CentOS] **********
*
ok: [CentOS]

TASK [Block_Storage : NTP service restart/enable] ****************************
*
changed: [CentOS]

TASK [Block_Storage : Install OpenStack package (Client) in CentOS] **********
*
changed: [CentOS]

TASK [Block_Storage : Install etcd in CentOS] ********************************
*
changed: [CentOS]

TASK [Block_Storage : etcd service restart/enable] ***************************
*
changed: [CentOS]
```

```
PLAY [Object_Storage] ********************************************************
*

TASK [Gathering Facts] *******************************************************
*
ok: [server3]

TASK [Object_Storage : Install Network Time Protocol(NTP) in Ubuntu] **********
*
changed: [server3]

TASK [Object_Storage : NTP service restart/enable] ***************************
*
changed: [server3]

TASK [Object_Storage : Install OpenStack package (Client) in Ubuntu] **********
*
changed: [server3]

TASK [Object_Storage : Install Memcached in Ubuntu] **************************
*
changed: [server3]
```

```
PLAY RECAP *********************************************************************
*
CentOS                     : ok=8    changed=4    unreachable=0    failed=0
skipped=1    rescued=0    ignored=0
localhost                  : ok=9    changed=2    unreachable=0    failed=0
skipped=1    rescued=0    ignored=0
server3                    : ok=8    changed=5    unreachable=0    failed=0
skipped=1    rescued=0    ignored=0

jmaducal@workstation:~/Aducal_Activity-13$
```

After executing the openstack.yml file using ansible play, I have noticed that roles (Controller, Block and Object Storages) plays the tasks in main.yml file of installing the NTP, OpenStack packages, SQL Database, Message Queue, Memcached and Etcd to the remote servers (server3 and CentOS) also in localhost.

Task 2: Create a playbook that converts the steps in the following items in https://docs.openstack.org/install-guide/

Next is to verify whether we successfully installed those items in our remote servers.

a) NTP

Controller Node (localhost)

```
jmaducal@workstation: ~/Aducal_Activity-13
jmaducal@workstation:~/Aducal_Activity-13$ chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================
^? Block_Storage                 0   7     0     -     +0ns[   +0ns] +/-    0ns
^? Object_Storage                0   7     0     -     +0ns[   +0ns] +/-    0ns
jmaducal@workstation:~/Aducal_Activity-13$
```

Block_Storage Node (CentOS)

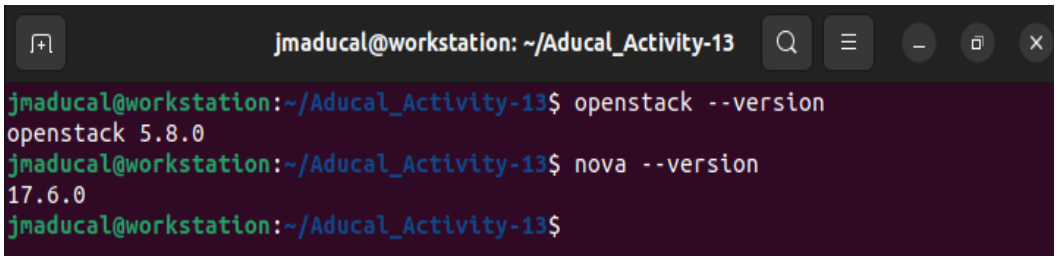
```
jmaducal@CentOS:~
File  Edit  View  Search  Terminal  Help
[jmaducal@CentOS ~]$ chronyc sources
210 Number of sources = 1
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================
^? Controller                    0   7     0     -     +0ns[   +0ns] +/-    0ns
[jmaducal@CentOS ~]$
```

Object_Storage Node (Server 3)

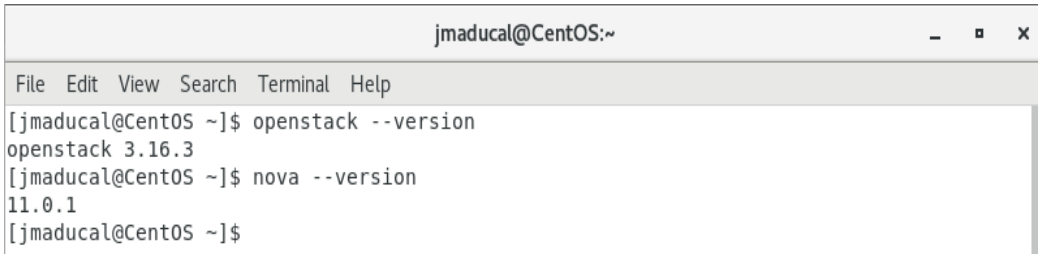
```
jmaducal@server3: ~
jmaducal@server3:~$ chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================
^? Controller                    0   7     0     -     +0ns[   +0ns] +/-    0ns
jmaducal@server3:~$
```

b) OpenStack packages

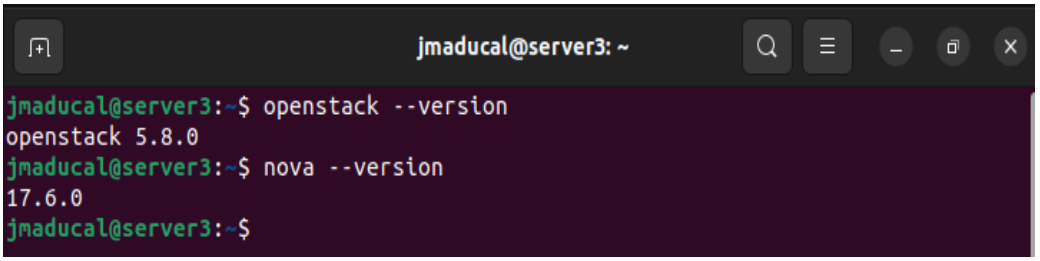
Controller Node (localhost)



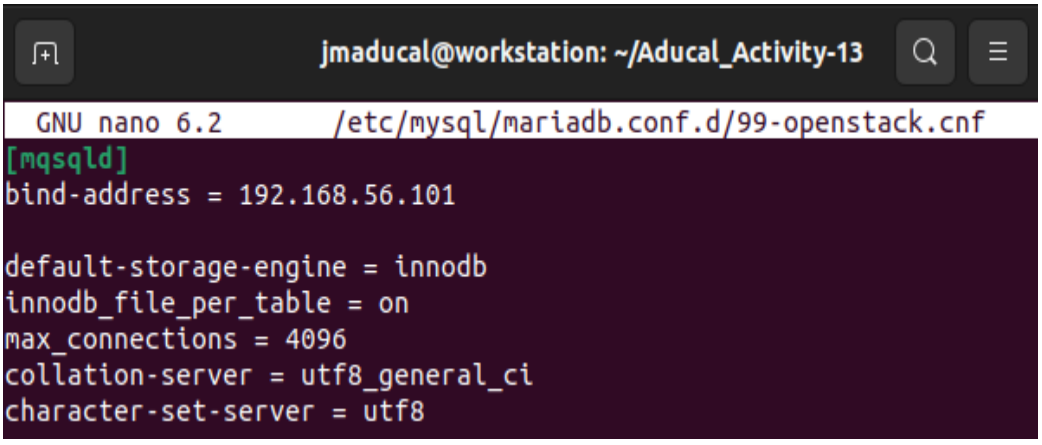
Block_Storage Node (CentOS)

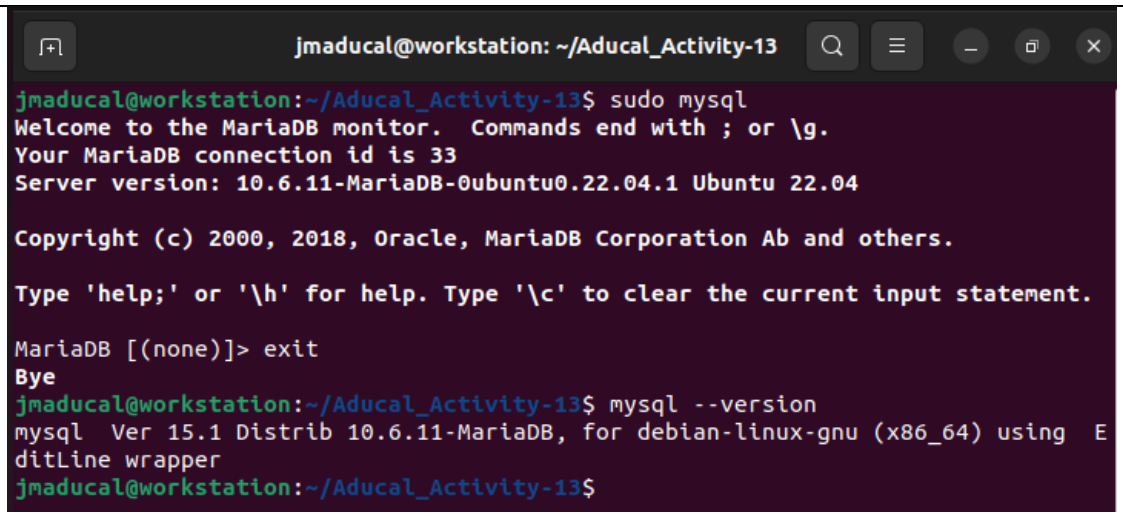


Object_Storage Node (Server 3)



c) SQL Database



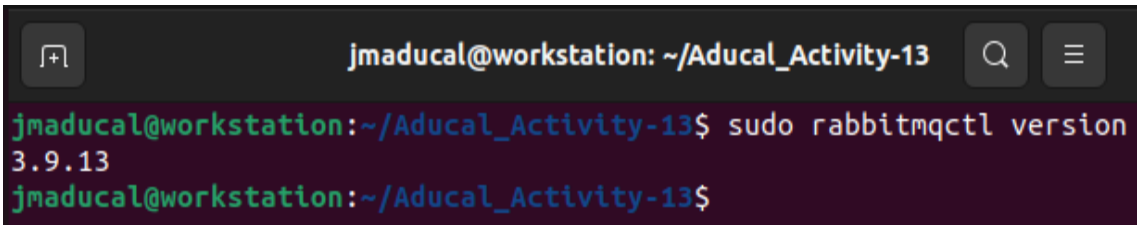


Checking the mysql version in controller node (localhost)

d) Message Queue

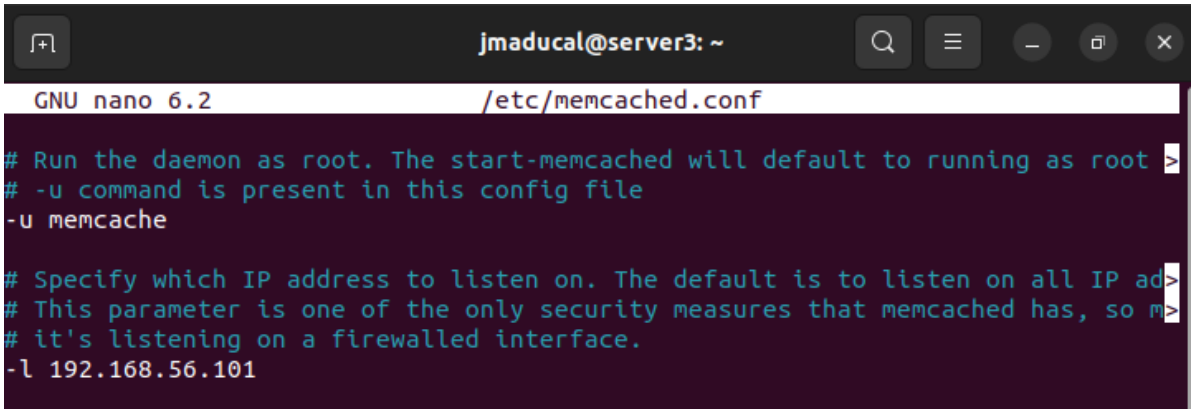
```
- name: Add the openstack user
  command: rabbitmqctl add_user openstack RABBIT_PASS
  when: ansible_distribution == "Ubuntu"

- name: Permit Configuration (write and read) access for openstack user
  command: rabbitmqctl set_permissions openstack ".*" ".*" ".*"
  when: ansible_distribution == "Ubuntu"
```

This command is located in Controller Node's main.yml file.

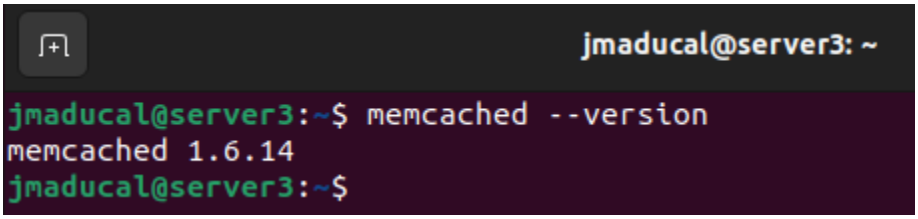


Checking the Message Queue service RabbitMQ version.

e) Memcached

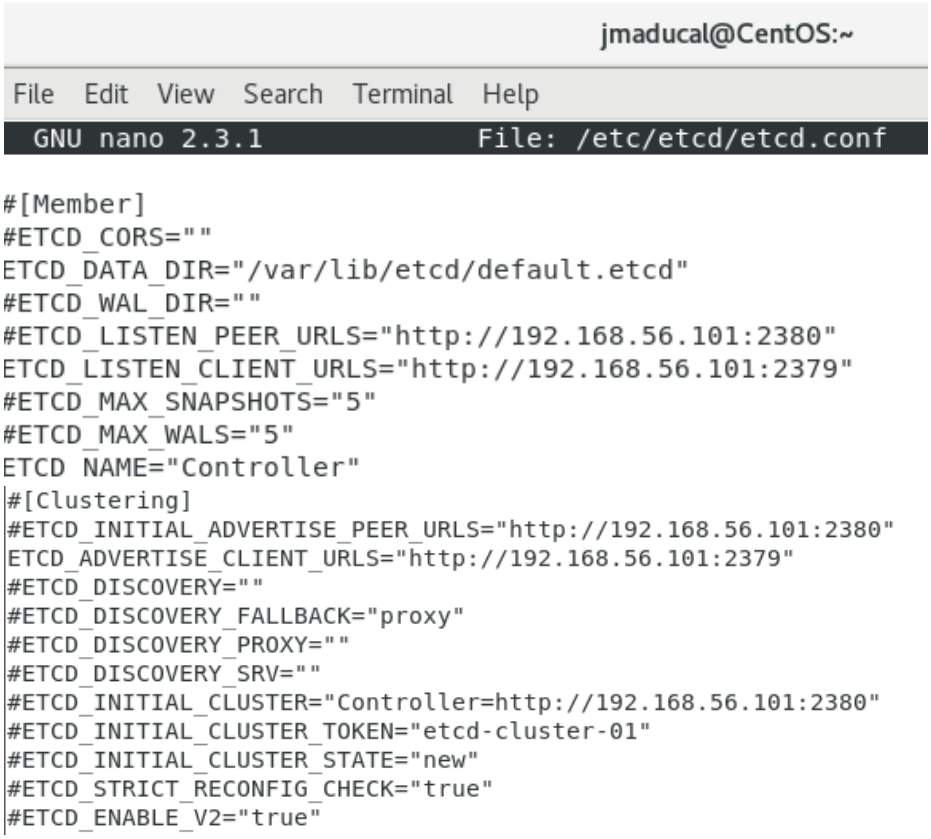


Using the management IP address of the controller node (localhost) which is 192.168.56.101 to enable access by other nodes via management network.

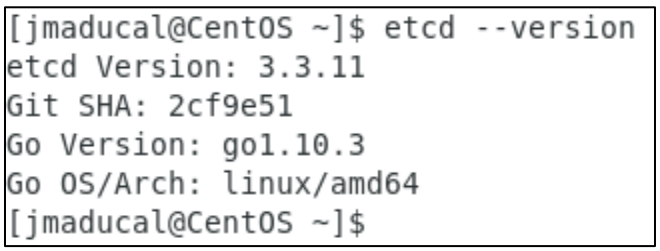


Checking the memcached version in Object_Storage node (Ubuntu Server 3)

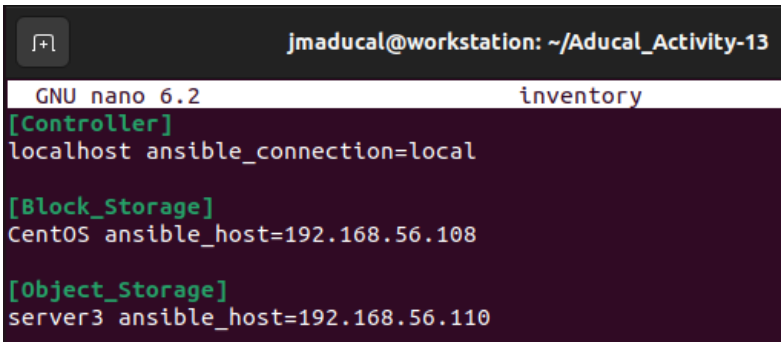
f) Etcd



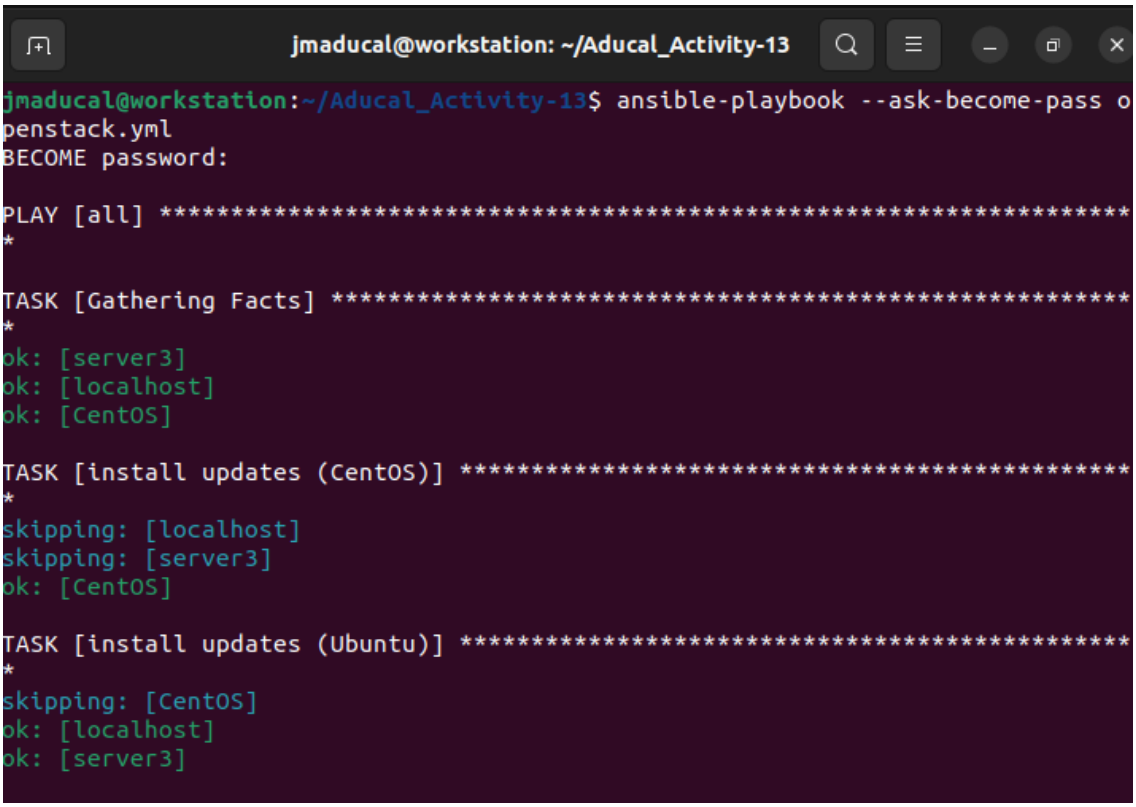
Changing some values to the management IP address of the controller node to enable access by other nodes via the management network.



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



The contents of inventory file includes the (Controller, Block_Storage and Object_Storage) Groups.



```
TASK [Controller : NTP service restart/enable] ********************************
*
changed: [localhost]

TASK [Controller : Install OpenStack package (Client) in Ubuntu] **************
*
ok: [localhost]

TASK [Controller : Install SQL database for Ubuntu] ***************************
*
ok: [localhost]

TASK [Controller : mysql service restart/enable] ******************************
*
changed: [localhost]

TASK [Controller : Install Message Queue in Ubuntu] ***************************
*
ok: [localhost]
```

```
PLAY [Block_Storage] **********************************************************
*

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

TASK [Block_Storage : Install Network Time Protocol(NTP) in CentOS] ************
*
ok: [CentOS]

TASK [Block_Storage : NTP service restart/enable] *****************************
*
changed: [CentOS]

TASK [Block_Storage : Install OpenStack package (Client) in CentOS] ************
*
ok: [CentOS]

TASK [Block_Storage : Install etcd in CentOS] *********************************
*
ok: [CentOS]

TASK [Block_Storage : etcd service restart/enable] ****************************
*
changed: [CentOS]
```

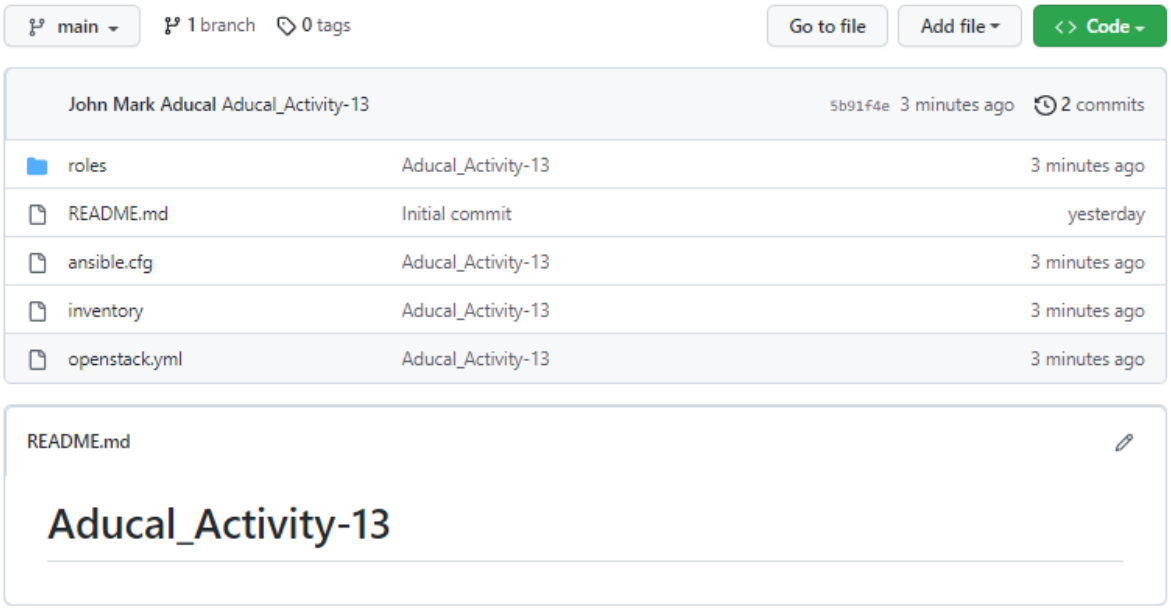
```
PLAY [Object_Storage] *********************************************************
*

TASK [Gathering Facts] ********************************************************
*
ok: [server3]

TASK [Object_Storage : Install Network Time Protocol(NTP) in Ubuntu] ***********
*
ok: [server3]
```

```
TASK [Object_Storage : NTP service restart/enable] ****************************
*
changed: [server3]

TASK [Object_Storage : Install OpenStack package (Client) in Ubuntu] **********
*
ok: [server3]

TASK [Object_Storage : Install Memcached in Ubuntu] ***************************
*
ok: [server3]

TASK [Object_Storage : Memcached service restart/enable] **********************
*
changed: [server3]

PLAY RECAP ********************************************************************
*
CentOS                     : ok=8    changed=2    unreachable=0    failed=0
skipped=1    rescued=0    ignored=0
localhost                  : ok=9    changed=2    unreachable=0    failed=0
skipped=1    rescued=0    ignored=0
server3                    : ok=8    changed=2    unreachable=0    failed=0
skipped=1    rescued=0    ignored=0

jmaducal@workstation:~/Aducal_Activity-13$
```

h) Add, commit and push it to your github repository.

```
jmaducal@workstation: ~/Aducal_Activity-13
jmaducal@workstation:~/Aducal_Activity-13$ git status
On branch main
Your branch is up to date with 'origin/main'.

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        ansible.cfg
        inventory
        openstack.yml
        roles/

nothing added to commit but untracked files present (use "git add" to track)
jmaducal@workstation:~/Aducal_Activity-13$ git add ansible.cfg
jmaducal@workstation:~/Aducal_Activity-13$ git add inventory
jmaducal@workstation:~/Aducal_Activity-13$ git add openstack.yml
jmaducal@workstation:~/Aducal_Activity-13$ git add roles/
jmaducal@workstation:~/Aducal_Activity-13$ git commit -m "Aducal_Activity-13"
[main 5b91f4e] Aducal_Activity-13
 7 files changed, 160 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 inventory
 create mode 100644 openstack.yml
 create mode 100644 roles/Block_Storage/tasks/main.yml
 create mode 100644 roles/Controller/tasks/main
 create mode 100644 roles/Controller/tasks/main.yml
 create mode 100644 roles/Object_Storage/tasks/main.yml
jmaducal@workstation:~/Aducal_Activity-13$
```

```
jmaducal@workstation:~/Aducal_Activity-13$ git push origin main
Enumerating objects: 17, done.
Counting objects: 100% (17/17), done.
Compressing objects: 100% (11/11), done.
Writing objects: 100% (16/16), 1.75 KiB | 896.00 KiB/s, done.
Total 16 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), done.
To github.com:jmaducal12/Aducal_Activity-13.git
   2610d67..5b91f4e  main -> main
jmaducal@workstation:~/Aducal_Activity-13$
```



GitHub Repository Link:
https://github.com/jmaducal12/Aducal_Activity-13.git

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack? OpenStack is a cloud computing service as a user we don't need to invest for our own data center or infrastracture. Instead we can use a part of a huge data-centers like amazon, google ect. And to scale up as we needed.

Conclusions:

After doing this activity, I learned the what is openstack and what are the benefits of it as a user and also some big companies use it instead of buying, owning and maintaining a physical data centers and servers they have choose to go on cloud computing services paying for a cloud provider such as AWS and Google. Because it much cheaper and the data stored in cloud is encrypted. Cloud computing services hired some of the world's best data security experts.