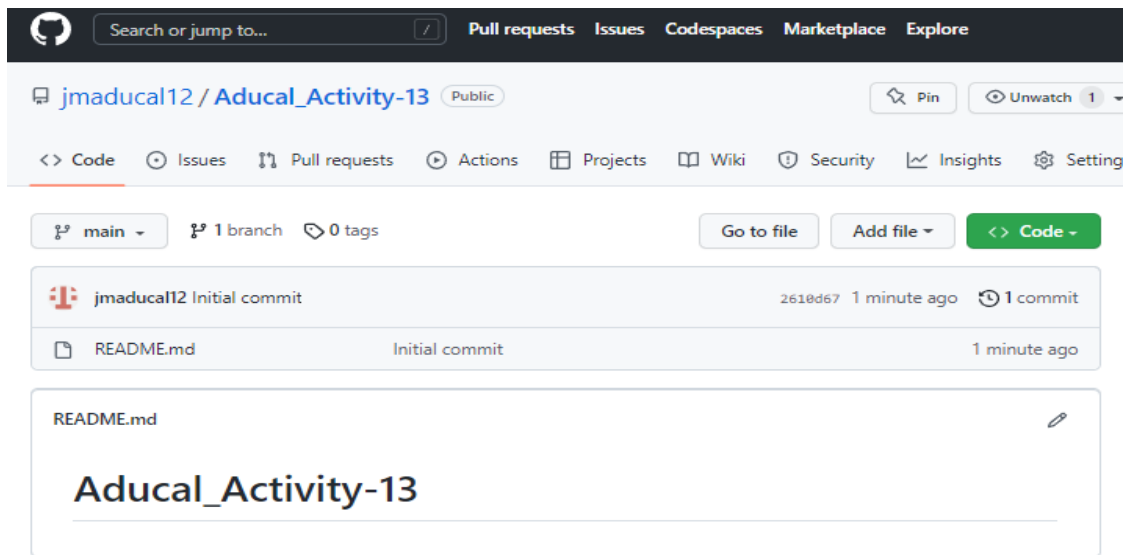


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<b>Course/Section:</b> CPE232 – CPE31S24	<b>Date Submitted:</b> 12 / 02 / 2022
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<b>Activity 13: OpenStack Prerequisite Installation</b>	
<b>1. Objectives</b>	
Create a workflow to install OpenStack using Ansible as your Infrastructure as Code (IaC).	
<b>2. Intended Learning Outcomes</b>	
<ol style="list-style-type: none"> <li>1. Analyze the advantages and disadvantages of cloud services</li> <li>2. Evaluate different Cloud deployment and service models</li> <li>3. Create a workflow to install and configure OpenStack base services using Ansible as documentation and execution.</li> </ol>	
<b>3. Resources</b>	
<p>Oracle VirtualBox (Hypervisor)</p> <p>1x Ubuntu VM or Centos VM</p>	
<b>4. Tasks</b>	
<ol style="list-style-type: none"> <li>1. Create a new repository for this activity.</li> <li>2. Create a playbook that converts the steps in the following items in <a href="https://docs.openstack.org/install-guide/">https://docs.openstack.org/install-guide/</a> <ol style="list-style-type: none"> <li>a. NTP</li> <li>b. OpenStack packages</li> <li>c. SQL Database</li> <li>d. Message Queue</li> <li>e. Memcached</li> <li>f. Etcd</li> <li>g. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in Inventory file.</li> <li>h. Add, commit and push it to your GitHub repo.</li> </ol> </li> </ol>	
<b>5. Output</b> (screenshots and explanations)	

## Task 1: Create a new repository



I created a new repository named Aducal\_Activity-13.

```
jmaducal@workstation: ~/Aducal_Activity-13
jmaducal@workstation:~$ git clone git@github.com:jmaducal12/Aducal_Activity-13.
git
Cloning into 'Aducal_Activity-13'...
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.
jmaducal@workstation:~$ ls
Act-4.1-CPE232_ADUCAL  cpe          Music
Aducal_Activity-10     CPE232_John-Mark-Aducal  Pictures
Aducal_Activity-11     CPE_MIDEXAM_ADUCAL      Public
Aducal_Activity-13     Desktop        README.md
Aducal_Activity-8      Documents      snap
Aducal_Activity-9      Downloads      Templates
Aducal_PrelimExam     HOA4.1_CPE232_ADUCAL    Videos
jmaducal@workstation:~$ cd Aducal_Activity-13
jmaducal@workstation:~/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.

```
jmaducal@workstation: ~/Aducal_Activity-13
GNU nano 6.2 inventory
[Controller]
localhost ansible_connection=local

[Block_Storage]
CentOS ansible_host=192.168.56.108

[Object_Storage]
server3 ansible_host=192.168.56.110
```

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

```
jmaducal@workstation: ~/Aducal_Activity-13
GNU nano 6.2 ansible.cfg
[defaults]
inventory = inventory
host_key_checking = False

deprecation_warnings = False

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

This are the contents of ansible.cfg file

## Task 1.2 Creating a roles

```
jmaducal@workstation: ~/Aducal_Activity-13
jmaducal@workstation:~/Aducal_Activity-13$ nano openstack.yml
```

```
jmaducal@workstation: ~/Aducal_Activity-13
GNU nano 6.2 openstack.yml
---
- hosts: all
  become: true
  pre_tasks:
    - name: install updates (CentOS)
      tags: always
      dnf:
        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: 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/Object_...
jmaducal@workstation: ~/Aducal_Activity-13$ mkdir roles
jmaducal@workstation: ~/Aducal_Activity-13$ cd roles
jmaducal@workstation: ~/Aducal_Activity-13/roles$ mkdir Controller
jmaducal@workstation: ~/Aducal_Activity-13/roles$ mkdir Block_Storage
jmaducal@workstation: ~/Aducal_Activity-13/roles$ mkdir Object_Storage
jmaducal@workstation: ~/Aducal_Activity-13/roles$ ls
Block_Storage  Controller  Object_Storage
jmaducal@workstation: ~/Aducal_Activity-13/roles$ cd Controller
jmaducal@workstation: ~/Aducal_Activity-13/roles/Controller$ mkdir tasks
jmaducal@workstation: ~/Aducal_Activity-13/roles/Controller$ cd tasks
jmaducal@workstation: ~/Aducal_Activity-13/roles/Controller/tasks$ main.yml
main.yml: command not found
jmaducal@workstation: ~/Aducal_Activity-13/roles/Controller/tasks$ nano main.yml
jmaducal@workstation: ~/Aducal_Activity-13/roles/Controller/tasks$ cd ..
jmaducal@workstation: ~/Aducal_Activity-13/roles/Controller$ cd ..
jmaducal@workstation: ~/Aducal_Activity-13/roles$ cd Block_Storage
jmaducal@workstation: ~/Aducal_Activity-13/roles/Block_Storage$ mkdir tasks
jmaducal@workstation: ~/Aducal_Activity-13/roles/Block_Storage$ cd tasks
jmaducal@workstation: ~/Aducal_Activity-13/roles/Block_Storage/tasks$ nano main.
.yml
jmaducal@workstation: ~/Aducal_Activity-13/roles/Block_Storage/tasks$ cd ..
jmaducal@workstation: ~/Aducal_Activity-13/roles/Block_Storage$ cd ..
jmaducal@workstation: ~/Aducal_Activity-13/roles$ cd Object_Storage
jmaducal@workstation: ~/Aducal_Activity-13/roles/Object_Storage$ mkdir tasks
jmaducal@workstation: ~/Aducal_Activity-13/roles/Object_Storage$ cd tasks
jmaducal@workstation: ~/Aducal_Activity-13/roles/Object_Storage/tasks$ nano main.
.yml
jmaducal@workstation: ~/Aducal_Activity-13/roles/Object_Storage/tasks$

```

```

jmaducal@workstation: ~/Aducal_Activity-13/role
jmaducal@workstation: ~/Aducal_Activity-13/roles$ tree
.
├── Block_Storage
│   └── tasks
│       └── main.yml
├── Controller
│   └── tasks
│       └── main.yml
└── Object_Storage
    └── tasks
        └── main.yml

6 directories, 3 files

```



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.



jmaducal@workstation: ~/Aducal\_Activity-13/roles/Object\_...

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 Memcached in Ubuntu
  apt:
    name:
      - memcached
      - python3-memcache
    state: latest
  when: ansible_distribution == "Ubuntu"

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

The contents of main.yml file inside of Object\_Storage Directory.

```
jmaducal@workstation: ~/Aducal_Activity-13
jmaducal@workstation:~/Aducal_Activity-13$ ansible-playbook --ask-become-pass o
penstack.yml
BECOME password:

PLAY [all] *****
*

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

TASK [install updates (CentOS)] *****
*
skipping: [localhost]
skipping: [server3]
ok: [CentOS]

TASK [install updates (Ubuntu)] *****
*
skipping: [CentOS]
changed: [localhost]
changed: [server3]
```

```
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 Etc 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)

```
jmaducal@workstation: ~/Aducal_Activity-13
jmaducal@workstation:~/Aducal_Activity-13$ openstack --version
openstack 5.8.0
jmaducal@workstation:~/Aducal_Activity-13$ nova --version
17.6.0
jmaducal@workstation:~/Aducal_Activity-13$
```

### Block\_Storage Node (CentOS)

```
jmaducal@CentOS:~
File Edit View Search Terminal Help
[jmaducal@CentOS ~]$ openstack --version
openstack 3.16.3
[jmaducal@CentOS ~]$ nova --version
11.0.1
[jmaducal@CentOS ~]$
```

### Object\_Storage Node (Server 3)

```
jmaducal@server3: ~
jmaducal@server3:~$ openstack --version
openstack 5.8.0
jmaducal@server3:~$ nova --version
17.6.0
jmaducal@server3:~$
```

## c) SQL Database

```
jmaducal@workstation: ~/Aducal_Activity-13
GNU nano 6.2 /etc/mysql/mariadb.conf.d/99-openstack.cnf
[mysqld]
bind-address = 192.168.56.101

default-storage-engine = innodb
innodb_file_per_table = on
max_connections = 4096
collation-server = utf8_general_ci
character-set-server = utf8
```

```
jmaducal@workstation: ~/Aducal_Activity-13
jmaducal@workstation:~/Aducal_Activity-13$ sudo mysql
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 33
Server version: 10.6.11-MariaDB-0ubuntu0.22.04.1 Ubuntu 22.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> exit
Bye
jmaducal@workstation:~/Aducal_Activity-13$ mysql --version
mysql Ver 15.1 Distrib 10.6.11-MariaDB, for debian-linux-gnu (x86_64) using EditLine wrapper
jmaducal@workstation:~/Aducal_Activity-13$
```

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.

```
jmaducal@workstation: ~/Aducal_Activity-13
jmaducal@workstation:~/Aducal_Activity-13$ sudo rabbitmqctl version
3.9.13
jmaducal@workstation:~/Aducal_Activity-13$
```

Checking the Message Queue service RabbitMQ version.

#### e) Memcached

```
jmaducal@server3: ~
GNU nano 6.2 /etc/memcached.conf

# Run the daemon as root. The start-memcached will default to running as root
# -u command is present in this config file
-u memcache

# Specify which IP address to listen on. The default is to listen on all IP ad
# This parameter is one of the only security measures that memcached has, so m
# it's listening on a firewalled interface.
-l 192.168.56.101
```

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.

```
jmaducal@server3: ~  
jmaducal@server3:~$ memcached --version  
memcached 1.6.14  
jmaducal@server3:~$
```

Checking the memcached version in Object\_Storage node (Ubuntu Server 3)

f) Etcd

```
jmaducal@CentOS:~  
File Edit View Search Terminal Help  
GNU nano 2.3.1 File: /etc/etcd/etcd.conf  
  
#[Member]  
#ETCD_CORS=""  
ETCD_DATA_DIR="/var/lib/etcd/default.etcd"  
#ETCD_WAL_DIR=""  
#ETCD_LISTEN_PEER_URLS="http://192.168.56.101:2380"  
ETCD_LISTEN_CLIENT_URLS="http://192.168.56.101:2379"  
#ETCD_MAX_SNAPSHOTS="5"  
#ETCD_MAX_WALS="5"  
ETCD_NAME="Controller"  
#[Clustering]  
#ETCD_INITIAL_ADVERTISE_PEER_URLS="http://192.168.56.101:2380"  
ETCD_ADVERTISE_CLIENT_URLS="http://192.168.56.101:2379"  
#ETCD_DISCOVERY=""  
#ETCD_DISCOVERY_FALLBACK="proxy"  
#ETCD_DISCOVERY_PROXY=""  
#ETCD_DISCOVERY_SRV=""  
#ETCD_INITIAL_CLUSTER="Controller=http://192.168.56.101:2380"  
#ETCD_INITIAL_CLUSTER_TOKEN="etcd-cluster-01"  
#ETCD_INITIAL_CLUSTER_STATE="new"  
#ETCD_STRICT_RECONFIG_CHECK="true"  
#ETCD_ENABLE_V2="true"
```

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

```
[jmaducal@CentOS ~]$ etcd --version  
etcd Version: 3.3.11  
Git SHA: 2cf9e51  
Go Version: go1.10.3  
Go OS/Arch: linux/amd64  
[jmaducal@CentOS ~]$
```

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

```
jmaducal@workstation: ~/Aducal_Activity-13
GNU nano 6.2 inventory
[Controller]
localhost ansible_connection=local

[Block_Storage]
CentOS ansible_host=192.168.56.108

[Object_Storage]
server3 ansible_host=192.168.56.110
```

The contents of inventory file includes the (Controller, Block\_Storage and Object\_Storage) Groups.

```
jmaducal@workstation: ~/Aducal_Activity-13
jmaducal@workstation:~/Aducal_Activity-13$ ansible-playbook --ask-become-pass o
penstack.yml
BECOME password:

PLAY [all] *****
*

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

TASK [install updates (CentOS)] *****
*
skipping: [localhost]
skipping: [server3]
ok: [CentOS]

TASK [install updates (Ubuntu)] *****
*
skipping: [CentOS]
ok: [localhost]
ok: [server3]

PLAY [Controller] *****
*

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

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

```
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$
```

main
1 branch
0 tags
Go to file
Add file
Code

John Mark Aducal Aducal_Activity-13		5b91f4e 3 minutes ago	2 commits
roles	Aducal_Activity-13	3 minutes ago	
README.md	Initial commit	yesterday	
ansible.cfg	Aducal_Activity-13	3 minutes ago	
inventory	Aducal_Activity-13	3 minutes ago	
openstack.yml	Aducal_Activity-13	3 minutes ago	

README.md

## Aducal\_Activity-13

GitHub Repository Link:

[https://github.com/jmaducal12/Aducal\\_Activity-13.git](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 infrastructure. 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.