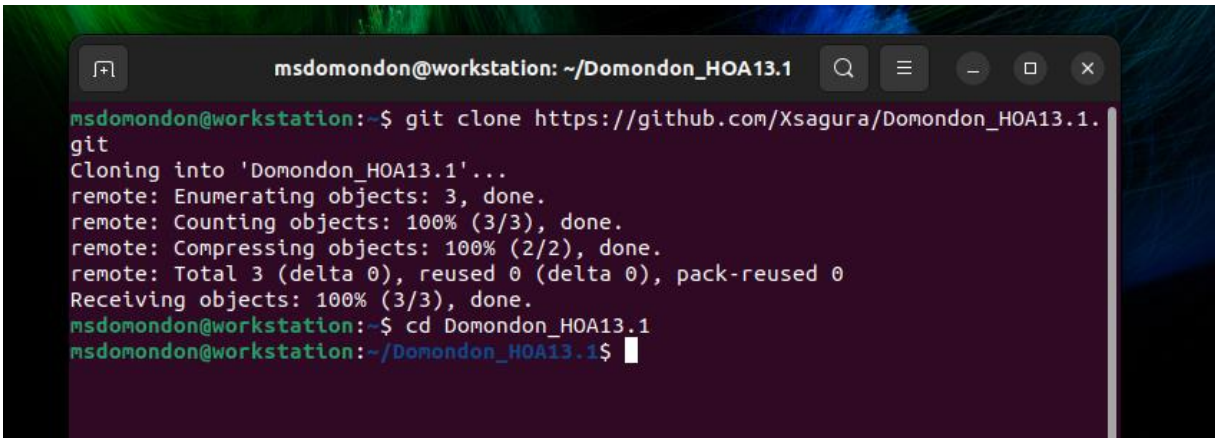
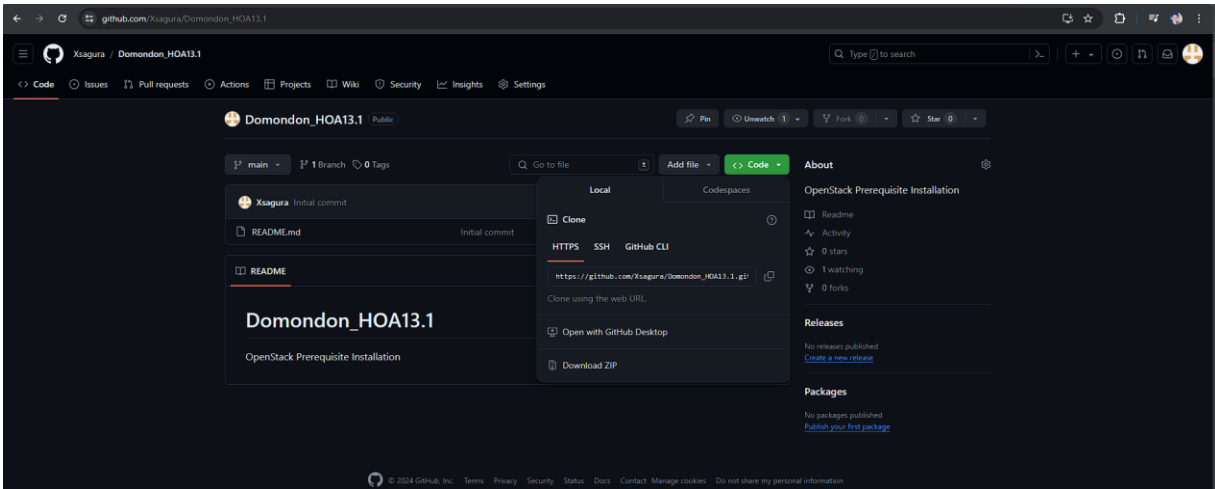


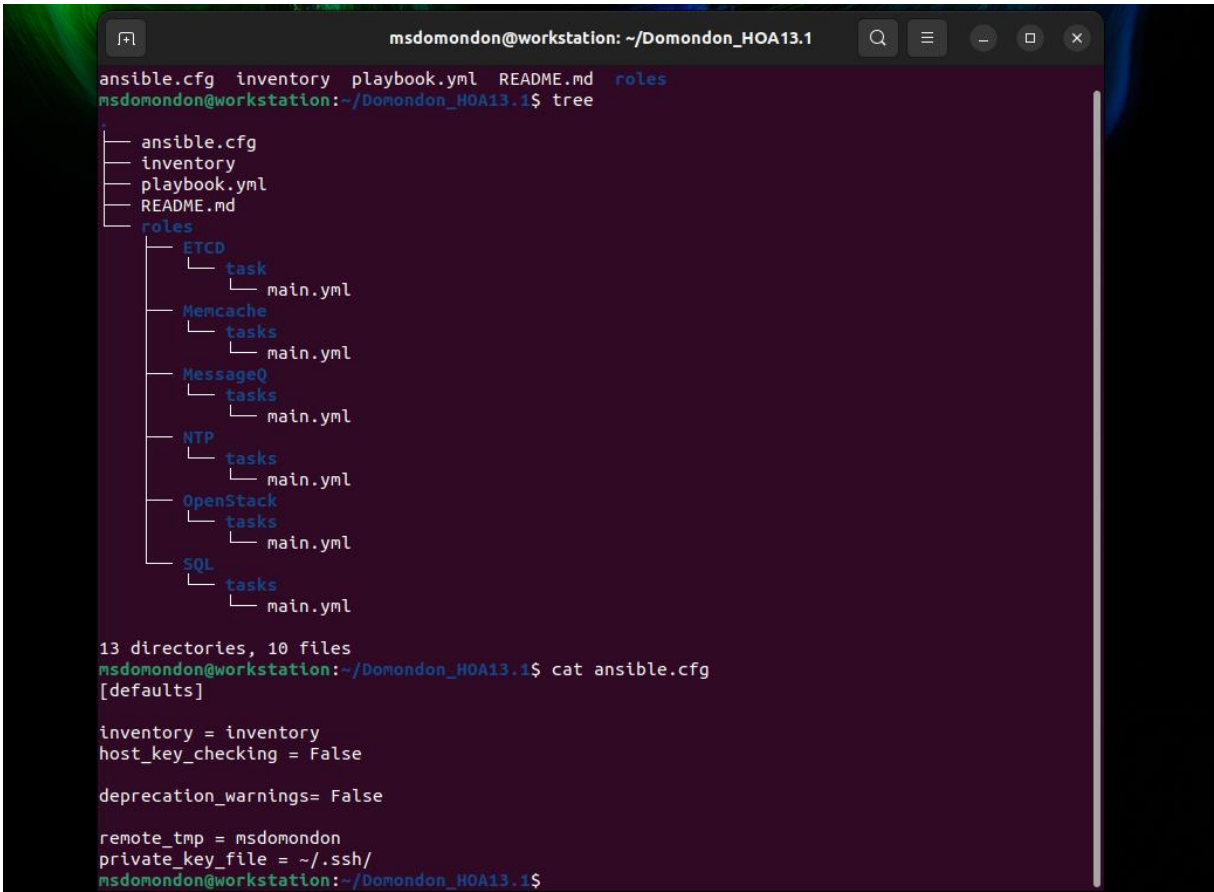
Group 3: Domondon, Mark Stefan P. John Edward Miles Espiritu Ruffer Laus	Date Performed: April 23, 2024
Course/Section: CPE232-CPE31S1	Date Submitted: April 30, 2024
Instructor: Dr. Jonathan V. Taylar	Semester and SY: 2nd sem 2023-2024
Activity 13: OpenStack Prerequisite Installation	
1. Objectives	
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/ <ol style="list-style-type: none"> NTP OpenStack packages SQL Database Message Queue Memcached Etcd Create different plays in installing per server type (controller, compute etc.) and identify it as a group in Inventory file. Add, commit and push it to your GitHub repo. 	

5. Output (screenshots and explanations)

Creating the repository for the activity



🌈 I included the necessary functions for the tasks, applied for the playbook.

A terminal window titled 'msdomondon@workstation: ~/Domondon_HOA13.1' with search, menu, and window control icons. The terminal shows the output of the 'tree' command, displaying a directory structure with files like 'ansible.cfg', 'inventory', 'playbook.yml', 'README.md', and a 'roles' directory containing sub-directories for 'ETCD', 'Memcache', 'MessageQ', 'NTP', 'OpenStack', and 'SQL', each with 'tasks' and 'main.yml' files. Below the tree command output, it shows '13 directories, 10 files' and the output of 'cat ansible.cfg', which lists configuration defaults such as 'inventory = inventory', 'host_key_checking = False', 'deprecation_warnings= False', 'remote_tmp = msdomondon', and 'private_key_file = ~/.ssh/'.

```
msdomondon@workstation: ~/Domondon_HOA13.1
ansible.cfg  inventory  playbook.yml  README.md  roles
msdomondon@workstation:~/Domondon_HOA13.1$ tree
.
├── ansible.cfg
├── inventory
├── playbook.yml
├── README.md
└── roles
    ├── ETCD
    │   └── task
    │       └── main.yml
    ├── Memcache
    │   └── tasks
    │       └── main.yml
    ├── MessageQ
    │   └── tasks
    │       └── main.yml
    ├── NTP
    │   └── tasks
    │       └── main.yml
    ├── OpenStack
    │   └── tasks
    │       └── main.yml
    └── SQL
        └── tasks
            └── main.yml

13 directories, 10 files
msdomondon@workstation:~/Domondon_HOA13.1$ cat ansible.cfg
[defaults]

inventory = inventory
host_key_checking = False

deprecation_warnings= False

remote_tmp = msdomondon
private_key_file = ~/.ssh/
msdomondon@workstation:~/Domondon_HOA13.1$
```

🌈 Calling parts

```
msdomondon@workstation:~/Domondon_H0A13.1$ cat inventory
[Ubuntu]
192.168.56.108

msdomondon@workstation:~/Domondon_H0A13.1$ cat playbook.yml
---
- hosts: all
  become: true
  pre_tasks:

  - name: Install updates (Ubuntu)
    apt:
      upgrade: dist
      update_cache: yes
      changed_when: false

- hosts: Ubuntu
  become: true
  roles:
    - NTP
    - OpenStack
    - SQL
    - MessageQ
    - Memcache
    - ETCD

msdomondon@workstation:~/Domondon_H0A13.1$
```

```
msdomondon@workstation:~/Domondon_H0A13.1$ tree roles
roles
├── ETCD
│   └── task
│       └── main.yml
├── Memcache
│   └── tasks
│       └── main.yml
├── MessageQ
│   └── tasks
│       └── main.yml
├── NTP
│   └── tasks
│       └── main.yml
├── OpenStack
│   └── tasks
│       └── main.yml
└── SQL
    └── tasks
        └── main.yml

12 directories, 6 files
msdomondon@workstation:~/Domondon_H0A13.1$
```

🚦 Inside the roles main.yml of "ETCD"

```
msdomondon@workstation: ~/Domondon_HOA13.1
GNU nano 6.2 roles/ETCD/task/main.yml
- name: Install the Etcd
  apt:
    name: etcd
    state: present
    update_cache: yes

- name: Edit the Etcd file
  copy:
    content: |
      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://10.0.0.11:2380"
      ETCD_INITIAL_ADVERTISE_PEER_URLS="http://10.0.0.11:2380"
      ETCD_ADVERTISE_CLIENT_URLS="http://10.0.0.11:2379"
      ETCD_LISTEN_PEER_URLS="http://0.0.0.0:2380"
      ETCD_LISTEN_CLIENT_URLS="http://10.0.0.11:2379"
    dest: /etc/default/etcd
    mode: "0755"

- name: Enable the Etcd
  service:
    name: etcd
    enabled: yes
```

🚦 Inside the roles main.yml of "Memcache"

```
msdomondon@workstation: ~/Domondon_HOA13.1
GNU nano 6.2 roles/Memcache/tasks/main.yml
- name: Install the Memcached
  apt:
    name:
      - memcached
      - python3-memcache
    state: present
    update_cache: yes

- name: Restart the Memcached
  service:
    name: memcached
    state: restarted
    enabled: yes
```

🚦 Inside the roles main.yml of “MessageQ”

```
msdomondon@workstation: ~/Domondon_HOA13.1
GNU nano 6.2 roles/MessageQ/tasks/main.yml
- name: Installing Message Queue
  apt:
    name: rabbitmq-server
    state: present
    update_cache: yes
- name: Starting service
  service:
    name: rabbitmq-server.service
    state: started
    enabled: true
```

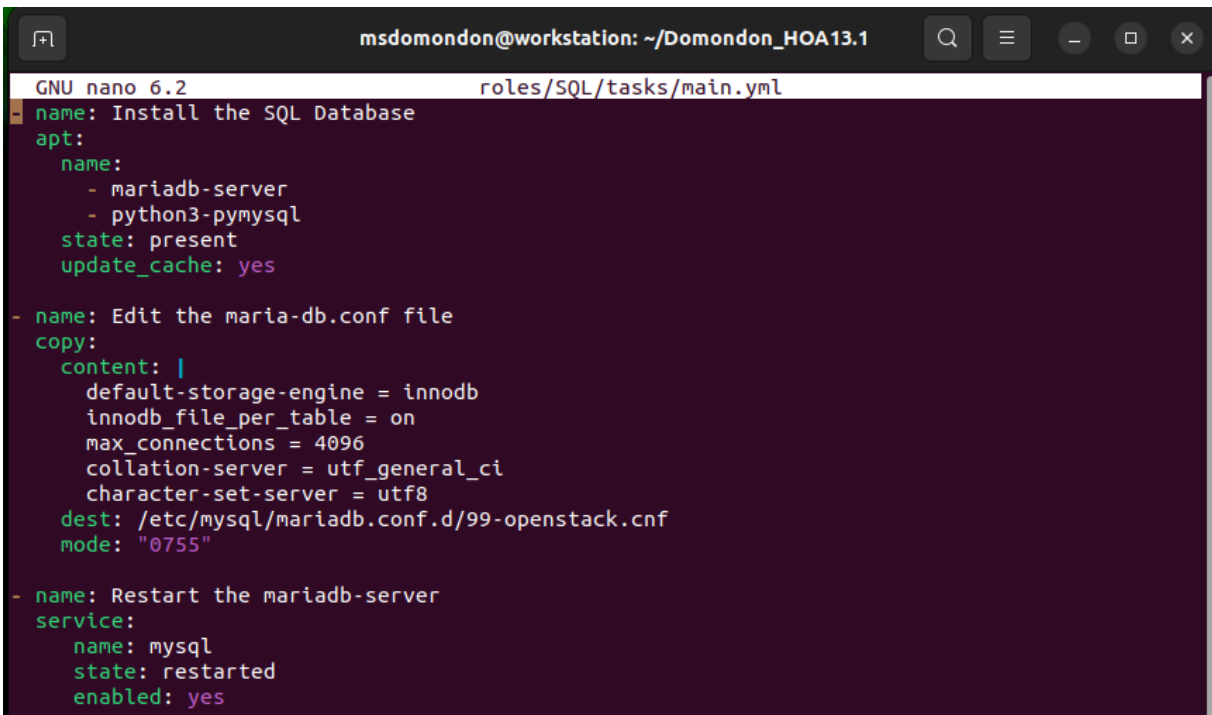
🚦 Inside the roles main.yml of “NTP”

```
msdomondon@workstation: ~/Domondon_HOA13.1
GNU nano 6.2 roles/NTP/tasks/main.yml
- name: Installing the Network Time Protocol (NTP)
  apt:
    name: chrony
    state: present
    update_cache: yes
- name: Enable the chrony
  service:
    name: chrony.service
    state: restarted
    enabled: yes
```

🚦 Inside the roles main.yml of “OpenStack”

```
msdomondon@workstation: ~/Domondon_HOA13.1
GNU nano 6.2 roles/OpenStack/tasks/main.yml
- name: Install the OpenStack Packages
  apt:
    name:
      - nova-compute
      - python3-openstackclient
    state: present
    update_cache: yes
```

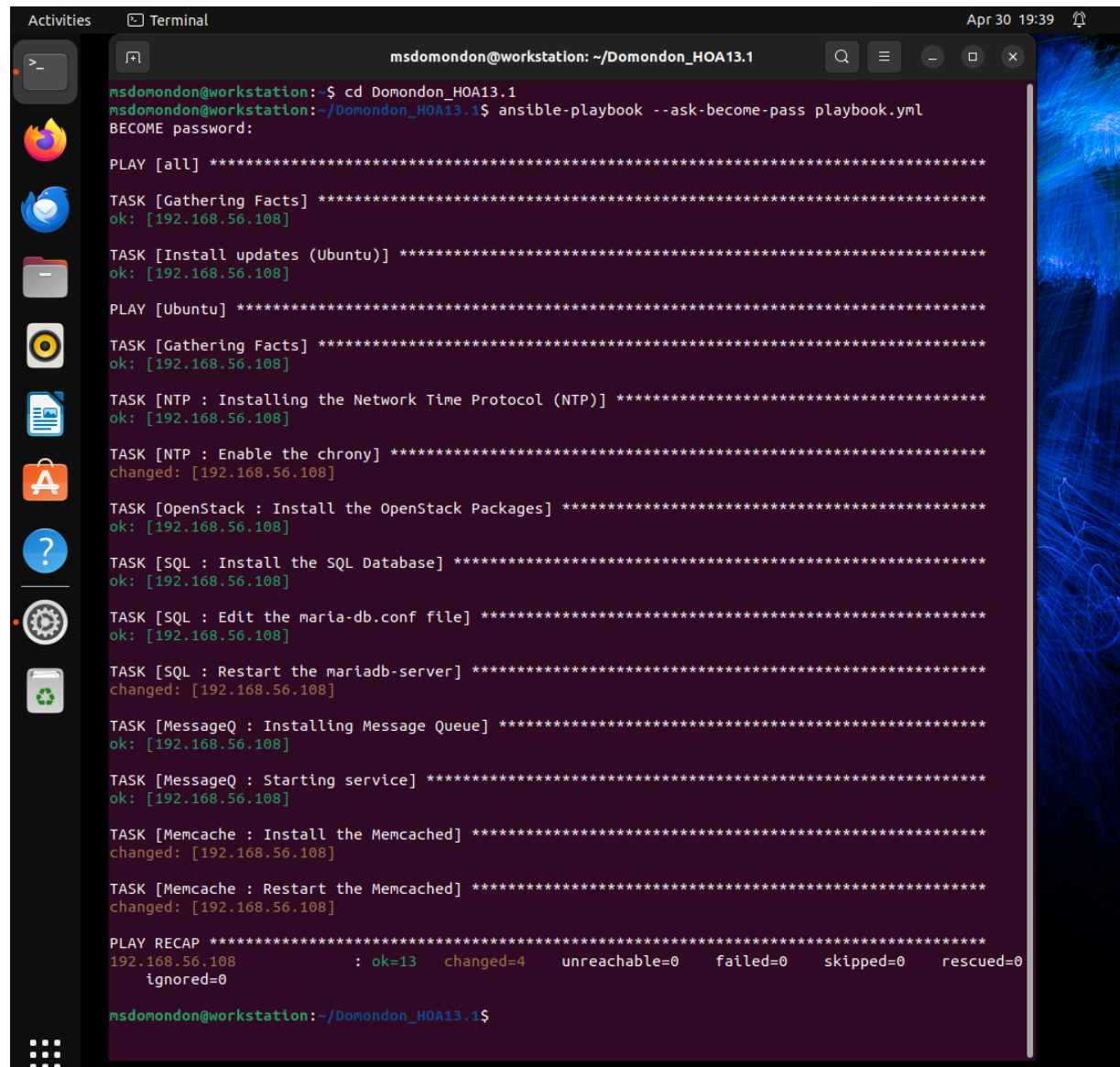
🚦 Inside the roles main.yml of "SQL"



```
msdomondon@workstation: ~/Domondon_HOA13.1
GNU nano 6.2 roles/SQL/tasks/main.yml
- name: Install the SQL Database
  apt:
    name:
      - mariadb-server
      - python3-pymysql
    state: present
    update_cache: yes
- name: Edit the maria-db.conf file
  copy:
    content: |
      default-storage-engine = innodb
      innodb_file_per_table = on
      max_connections = 4096
      collation-server = utf_general_ci
      character-set-server = utf8
    dest: /etc/mysql/mariadb.conf.d/99-openstack.cnf
    mode: "0755"
- name: Restart the mariadb-server
  service:
    name: mysql
    state: restarted
    enabled: yes
```

Running the playbook

Note: the functions of each roles are designed to be installed properly allocated size is (5GB)



```
msdomondon@workstation: ~/Domondon_HOA13.1
msdomondon@workstation:~$ cd Domondon_HOA13.1
msdomondon@workstation:~/Domondon_HOA13.1$ ansible-playbook --ask-become-pass playbook.yml
BECOME password:

PLAY [all] *****

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

TASK [Install updates (Ubuntu)] *****
ok: [192.168.56.108]

PLAY [Ubuntu] *****

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

TASK [NTP : Installing the Network Time Protocol (NTP)] *****
ok: [192.168.56.108]

TASK [NTP : Enable the chrony] *****
changed: [192.168.56.108]

TASK [OpenStack : Install the OpenStack Packages] *****
ok: [192.168.56.108]

TASK [SQL : Install the SQL Database] *****
ok: [192.168.56.108]

TASK [SQL : Edit the maria-db.conf file] *****
ok: [192.168.56.108]

TASK [SQL : Restart the mariadb-server] *****
changed: [192.168.56.108]

TASK [MessageQ : Installing Message Queue] *****
ok: [192.168.56.108]

TASK [MessageQ : Starting service] *****
ok: [192.168.56.108]

TASK [Memcache : Install the Memcached] *****
changed: [192.168.56.108]

TASK [Memcache : Restart the Memcached] *****
changed: [192.168.56.108]

PLAY RECAP *****
192.168.56.108      : ok=13  changed=4  unreachable=0  failed=0  skipped=0  rescued=0
ignored=0

msdomondon@workstation:~/Domondon_HOA13.1$
```



```

TASK [ETCD : Install the Etcd] *****
changed: [192.168.56.108]

TASK [ETCD : Edit the Etcd file] *****
changed: [192.168.56.108]

TASK [ETCD : Enable the Etcd] *****
ok: [192.168.56.108]

PLAY RECAP *****
192.168.56.108      : ok=16   changed=5    unreachable=0    failed=0    skipped=0    resc
ued=0    ignored=0

msdomondon@workstation:~/Domondon_H0A13.1$

```

Verification of installations

```

msdomondon@PC1:~$ systemctl status etcd
* etcd.service - etcd - highly-available key value store
   Loaded: loaded (/lib/systemd/system/etcd.service; enabled; vendor preset: >
   Active: failed (Result: exit-code) since Tue 2024-04-30 19:50:25 PST; 40s >
     Docs: https://etcd.io/docs
           man:etcd
   Process: 35468 ExecStart=/usr/bin/etcd $DAEMON_ARGS (code=exited, status=2)
   Main PID: 35468 (code=exited, status=2)
      CPU: 14ms

Apr 30 19:50:25 PC1 etcd[35468]:      github.com/coreos/etcd/etcdmain/etcd.g>
Apr 30 19:50:25 PC1 etcd[35468]: github.com/coreos/etcd/etcdmain.startEtcdOrPro>
Apr 30 19:50:25 PC1 etcd[35468]:      github.com/coreos/etcd/etcdmain/etcd.g>
Apr 30 19:50:25 PC1 etcd[35468]: github.com/coreos/etcd/etcdmain.Main()
Apr 30 19:50:25 PC1 etcd[35468]:      github.com/coreos/etcd/etcdmain/main.g>
Apr 30 19:50:25 PC1 etcd[35468]: main.main()
Apr 30 19:50:25 PC1 etcd[35468]:      github.com/coreos/etcd/main.go:28 +0x17
Apr 30 19:50:25 PC1 systemd[1]: etcd.service: Main process exited, code=exited,>
Apr 30 19:50:25 PC1 systemd[1]: etcd.service: Failed with result 'exit-code'.
Apr 30 19:50:25 PC1 systemd[1]: Failed to start etcd - highly-available key val>
lines 1-19/19 (END)

```

```
msdomondon@PC1:~$ systemctl status NTP
Unit NTP.service could not be found.
msdomondon@PC1:~$ systemctl status nova-compute
● nova-compute.service - OpenStack Compute
   Loaded: loaded (/lib/systemd/system/nova-compute.service; enabled; vendor prese>
   Active: active (running) since Tue 2024-04-30 19:31:11 PST; 14min ago
 Main PID: 2378 (nova-compute)
    Tasks: 2 (limit: 2254)
   Memory: 14.0M
      CPU: 5.286s
   CGroup: /system.slice/nova-compute.service
           └─2378 /usr/bin/python3 /usr/bin/nova-compute --config-file=/etc/n>

Apr 30 19:31:11 PC1 systemd[1]: Started OpenStack Compute.
Apr 30 19:31:13 PC1 nova-compute[2378]: Modules with known eventlet monkey patch>
msdomondon@PC1:~$ systemctl status mariadb
● mariadb.service - MariaDB 10.6.16 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor prese>
   Active: active (running) since Tue 2024-04-30 19:35:09 PST; 10min ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
 Main PID: 9761 (mariabdb)
    Status: "Taking your SQL requests now..."
     Tasks: 10 (limit: 2254)
    Memory: 12.7M
       CPU: 584ms
   CGroup: /system.slice/mariadb.service
           └─9761 /usr/sbin/mariabdb

Apr 30 19:35:08 PC1 mariabdb[9761]: 2024-04-30 19:35:08 0 [Note] InnoDB: 10.6.1>
Apr 30 19:35:08 PC1 mariabdb[9761]: 2024-04-30 19:35:08 0 [Note] Plugin 'FEEDBA>
Apr 30 19:35:08 PC1 mariabdb[9761]: 2024-04-30 19:35:08 0 [Note] InnoDB: Loadin>
Apr 30 19:35:08 PC1 mariabdb[9761]: 2024-04-30 19:35:08 0 [Warning] You need to>
Apr 30 19:35:08 PC1 mariabdb[9761]: 2024-04-30 19:35:08 0 [Note] InnoDB: Buffer>
Apr 30 19:35:08 PC1 mariabdb[9761]: 2024-04-30 19:35:08 0 [Note] Server socket >
Apr 30 19:35:08 PC1 mariabdb[9761]: 2024-04-30 19:35:08 0 [Note] /usr/sbin/mari>
Apr 30 19:35:08 PC1 mariabdb[9761]: Version: '10.6.16-MariaDB-0ubuntu0.22.04.1'>
Apr 30 19:35:09 PC1 systemd[1]: Started MariaDB 10.6.16 database server.
Apr 30 19:35:09 PC1 /etc/mysql/debian-start[9813]: Triggering mysam-recover fo>
```

```
msdomondon@PC1:~$ sudo systemctl status chrony
● chrony.service - chrony, an NTP client/server
   Loaded: loaded (/lib/systemd/system/chrony.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2024-04-30 19:49:53 PST; 7min ago
     Docs: man:chronyd(8)
           man:chronyc(1)
           man:chrony.conf(5)
    Main PID: 31427 (chronyd)
      Tasks: 2 (limit: 2254)
     Memory: 1.2M
        CPU: 92ms
    CGroup: /system.slice/chrony.service
            └─31427 /usr/sbin/chronyd -F 1
              └─31428 /usr/sbin/chronyd -F 1

Apr 30 19:49:53 PC1 systemd[1]: Starting chrony, an NTP client/server...
Apr 30 19:49:53 PC1 chronyd[31427]: chronyd version 4.2 starting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDR>
Apr 30 19:49:53 PC1 chronyd[31427]: Frequency -6.507 +/- 15.747 ppm read from /var/lib/chrony/chrony.>
Apr 30 19:49:53 PC1 chronyd[31427]: Using right/UTC timezone to obtain leap second data
Apr 30 19:49:53 PC1 chronyd[31427]: Loaded seccomp filter (level 1)
Apr 30 19:49:53 PC1 systemd[1]: Started chrony, an NTP client/server.
Apr 30 19:50:01 PC1 chronyd[31427]: Selected source 91.189.91.157 (ntp.ubuntu.com)
Apr 30 19:50:01 PC1 chronyd[31427]: System clock TAI offset set to 37 seconds
Apr 30 19:50:03 PC1 chronyd[31427]: Selected source 38.54.86.251 (2.ubuntu.pool.ntp.org)
lines 1-23/23 (END)
```

```
msdomondon@PC1:~$ chronyc
chrony version 4.2
Copyright (C) 1997-2003, 2007, 2009-2021 Richard P. Curnow and others
chrony comes with ABSOLUTELY NO WARRANTY. This is free software, and
you are welcome to redistribute it under certain conditions. See the
GNU General Public License version 2 for details.

chronyc>
chronyc>
msdomondon@PC1:~$ sudo mysql -u root -p
[sudo] password for msdomondon:
error: Found option without preceding group in config file: /etc/mysql/mariadb.conf.d/99-openstack.cnf
at line: 1
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 31
Server version: 10.6.16-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)]> Ctrl-C -- exit!
Aborted
```

```
msdomondon@PC1:~$ 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 2024-04-30 19:31:11 PST; 15min ago
     Main PID: 750 (beam.smp)
        Tasks: 27 (limit: 2254)
      Memory: 21.6M
         CPU: 46.642s
    CGroup: /system.slice/rabbitmq-server.service
            └─ 750 /usr/lib/erlang/erts-12.2.1/bin/beam.smp -W w -MBas ageffcbv
               938 erl_child_setup 65536
              2157 inet_gethost 4
              2164 inet_gethost 4

Apr 30 19:30:49 PC1 systemd[1]: Starting RabbitMQ Messaging Server...
Apr 30 19:31:11 PC1 systemd[1]: Started RabbitMQ Messaging Server.
msdomondon@PC1:~$ systemctl status memcached
● memcached.service - memcached daemon
   Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2024-04-30 19:35:33 PST; 11min ago
     Docs: man:memcached(1)
   Main PID: 11738 (memcached)
        Tasks: 10 (limit: 2254)
      Memory: 1.1M
         CPU: 160ms
    CGroup: /system.slice/memcached.service
            └─ 11738 /usr/bin/memcached -m 64 -p 11211 -u memcache -l 127.0.0.1

Apr 30 19:35:33 PC1 systemd[1]: Stopped memcached daemon.
Apr 30 19:35:33 PC1 systemd[1]: Started memcached daemon.
```

🚀 GitHub add, commit, and push.

```
msdomondon@workstation:~/Domondon_HOA13.1$ git add *
msdomondon@workstation:~/Domondon_HOA13.1$ git commit -m "Operational Status"
[main e58c251] Operational Status
 9 files changed, 124 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 inventory
 create mode 100644 playbook.yml
 create mode 100644 roles/ETCD/tasks/main.yml
 create mode 100644 roles/Memcache/tasks/main.yml
 create mode 100644 roles/MessageQ/tasks/main.yml
 create mode 100644 roles/NTP/tasks/main.yml
 create mode 100644 roles/OpenStack/tasks/main.yml
 create mode 100644 roles/SQL/tasks/main.yml
msdomondon@workstation:~/Domondon_HOA13.1$ git push
Username for 'https://github.com': xsagura
Password for 'https://xsagura@github.com':
Enumerating objects: 25, done.
Counting objects: 100% (25/25), done.
Delta compression using up to 4 threads
Compressing objects: 100% (11/11), done.
Writing objects: 100% (24/24), 2.53 KiB | 1.27 MiB/s, done.
Total 24 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/Xsagura/Domondon_HOA13.1.git
   b64de11..e58c251  main -> main
msdomondon@workstation:~/Domondon_HOA13.1$
```

GitHub link: https://github.com/Xsagura/Domondon_HOA13.1.git

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

OpenStack is a open source cloud computing platform much like AWS, only it is free.

Basically when you get OpenStack, you get a software suite that enables you to set up your own **Cloud** environment.

There are a few ways to deploy your cloud infrastructure using OpenStack.

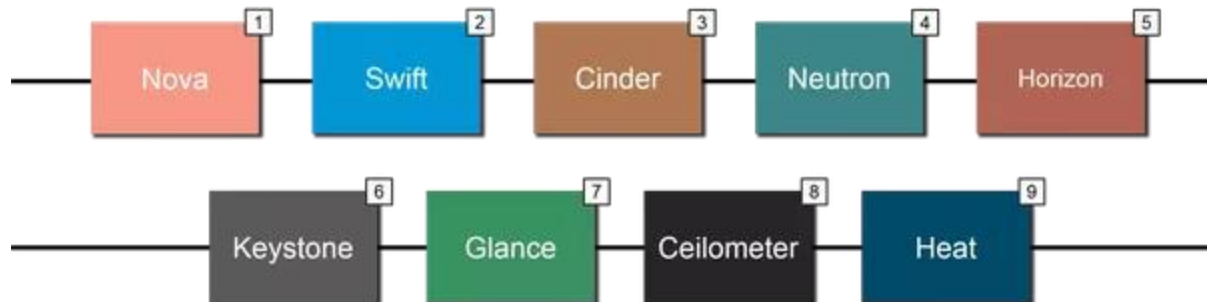
I found and checked the web:

1. **OpenStack-based Public Cloud:** A vendor provides a public cloud computing system based on the OpenStack project
2. **On-Premises Distribution:** In this model, a customer downloads and installs an OpenStack distribution within their internal network.
3. **Hosted OpenStack Private Cloud:** A vendor hosts a OpenStack based private cloud including the underlying hardware and the OpenStack software.
4. **OpenStack-as-a-service:** A vendor hosts OpenStack Management software as a service and customers use it.

Now comes the services that you will be able to enable. The services can be broadly divided into 3 categories:

- **Compute**
- **Storage**
- **Networking**

Now, these services also have attractive names and they are broken down according to different functionalities.



Conclusions:

In this activity I learned OpenStack from scratch can be both challenging and rewarding. It requires good networking, virtualization, and Linux skills. The installation process can be lengthy due to its aggregation of plug-and-play services. Despite difficulties, the experience teaches valuable lessons about system administration, Proxmox, and Ansible.