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Course/Section: CPE31S2	Date Submitted: 12/2/2024
Instructor: Engr. Robin Valenzuela	Semester and SY: 1st sem/2024-2025

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

Playbook:

hideki@workstation: ~/HOA13.1-chilagan × hideki@w

GNU nano 7.2 openstack.yml

```
---
- name: Update and Upgrade Ubuntu Packages
  hosts: ubuntu
  become: true
  tasks:
    - name: Update and upgrade Ubuntu packages
      apt:
        update_cache: yes
        upgrade: dist
      when: ansible_distribution == 'Ubuntu'
```

This part of the playbook is a necessary tasks in order to avoid any problems in terms of looking for packages needed for the activity

Installing NTP

```
- name: Install NTP on Ubuntu
  tags: ntp
  hosts: ubuntu
  become: true
  tasks:
    - name: Install NTP
      apt:
        name: ntp
        state: present
      tags:
        - ntp
```

Task to install openstack packages

```yaml
- name: Install OpenStack Packages on Ubuntu
  tags: setup
  hosts: ubuntu
  become: true
  tasks:
    - name: Install OpenStack packages (controller services)
      apt:
        name: "{{ item }}"
        state: present
      loop:
        - python3-openstackclient
        - nova-api
        - nova-scheduler
        - nova-conductor
        - openstack-dashboard
        - rabbitmq-server
        - memcached
        - apache2
        - libapache2-mod-wsgi-py3
        - neutron-server
        - keystone
        - glance
      when: ansible_distribution == 'Ubuntu'
      tags:
        - openstack_packages
```

Task to install and runmysql service

```yaml
- name: Install SQL Database (MySQL) on Ubuntu
  tags: mysql
  hosts: ubuntu
  become: true
  tasks:
    - name: Install MySQL Server Core
      apt:
        name: mysql-server-core-8.0
        state: present
      tags:
        - mysql

    - name: Install MySQL Server 8.0
      apt:
        name: mysql-server-8.0
        state: present

    - name: Start MySQL Service
      service:
        name: mysql
        state: restarted
        enabled: yes
      tags:
        - mysql_service
```

Task to install and start rabbitmq service

```yaml
- name: Install Message Queue (RabbitMQ) on Ubuntu
  tags: rabbit
  hosts: ubuntu
  become: true
  tasks:
    - name: Install RabbitMQ
      apt:
        name: rabbitmq-server
        state: present
      tags:
        - rabbitmq

    - name: Start RabbitMQ Service
      service:
        name: rabbitmq-server
        state: started
        enabled: yes
      tags:
        - rabbitmq_service
```

Task to install and run memcached service:

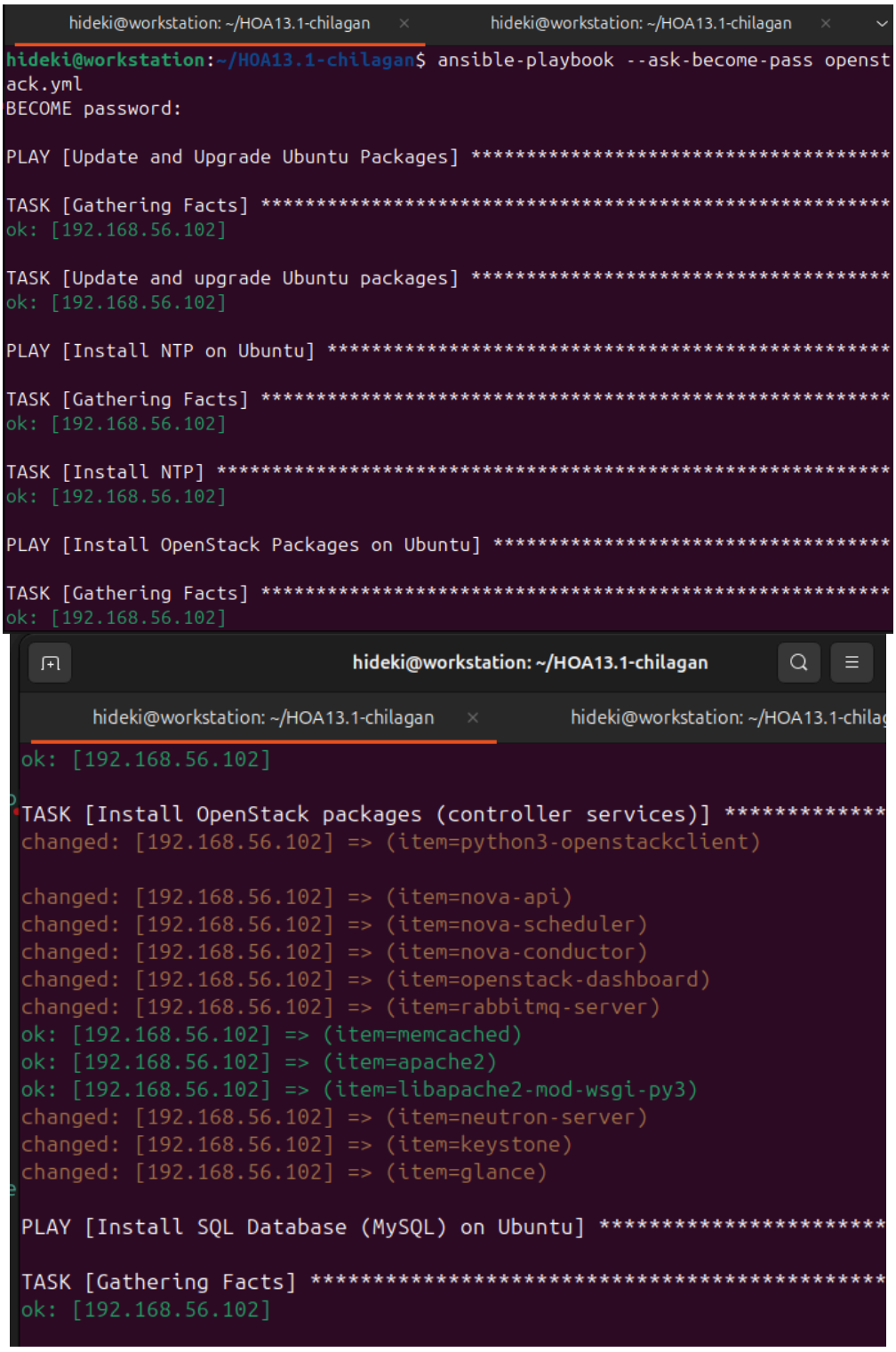
```yaml
- name: Install Memcached on Ubuntu
  tags: memcached
  hosts: ubuntu
  become: true
  tasks:
    - name: Install Memcached
      apt:
        name: memcached
        state: present
      tags:
        - memcached

    - name: Start Memcached Service
      service:
        name: memcached
        state: started
        enabled: yes
      tags:
        - memcached_service
```

Task to install and run etcd service:

```yaml
- name: Install and Configure Etcd on Ubuntu
  tags: etcd
  hosts: ubuntu
  become: true
  tasks:
    - name: Download Etcd Binary
      get_url:
        url: "https://github.com/etcd-io/etcd/releases/download/v3.5.9/etcd-v3.5.9-linux-amd64.tar.gz"
        dest: "/tmp/etcd-v3.5.9-linux-amd64.tar.gz"

    - name: Extract Etcd Binary
      unarchive:
        src: "/tmp/etcd-v3.5.9-linux-amd64.tar.gz"
        dest: "/usr/local/bin/"
        remote_src: yes

    - name: Move Etcd and Etcdctl to System Path
      copy:
        src: "/usr/local/bin/etcd-v3.5.9-linux-amd64/etcd"
        dest: "/usr/local/bin/etcd"
        remote_src: yes
        mode: '0755'

    - name: Move Etcdctl to System Path
      copy:
        src: "/usr/local/bin/etcd-v3.5.9-linux-amd64/etcdctl"
        dest: "/usr/local/bin/etcdctl"
        remote_src: yes
        mode: '0755'
```

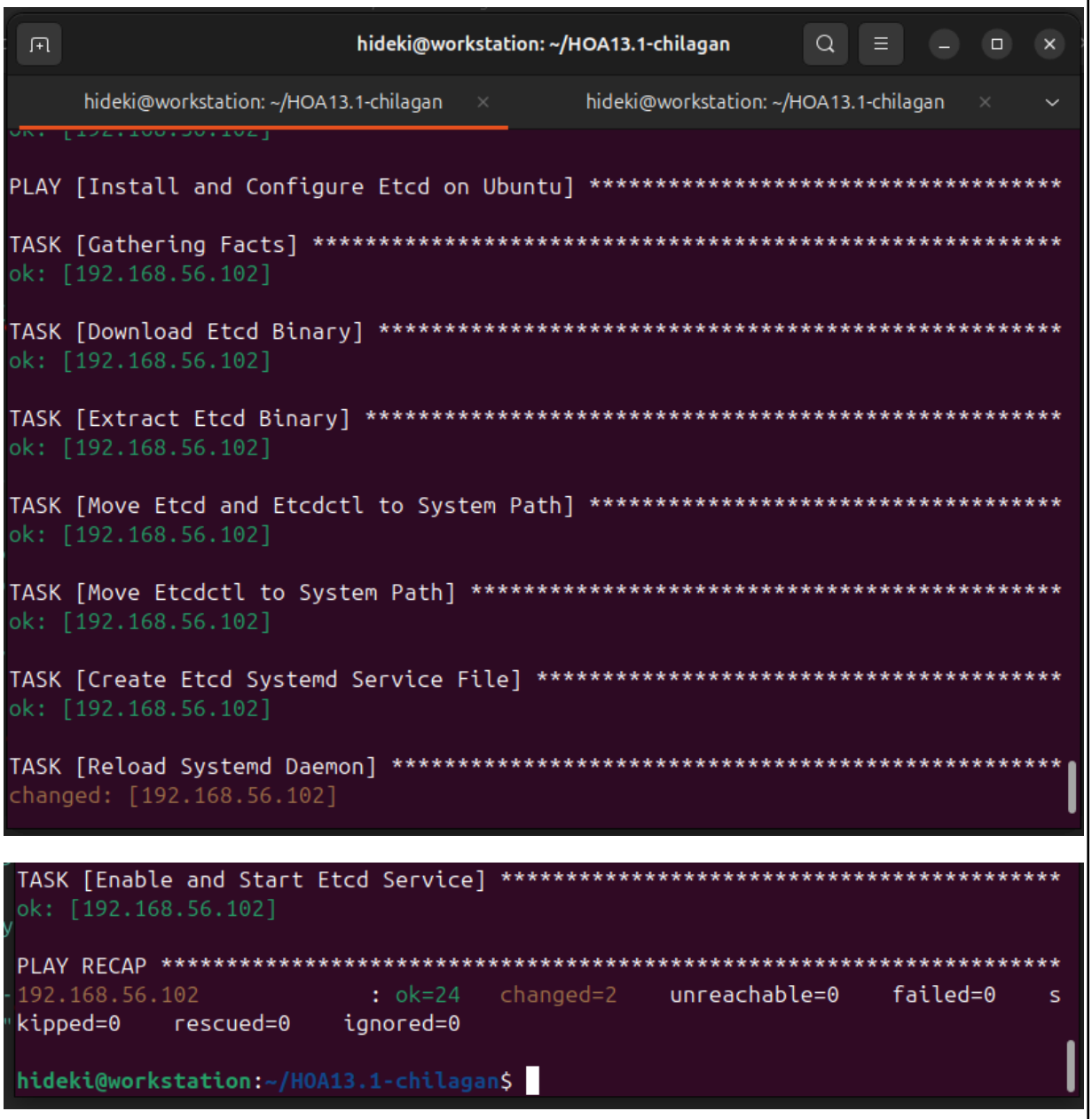
```yaml
- name: Create Etcd Systemd Service File
  copy:
    content: |
      [Unit]
      Description=etcd
      Documentation=https://github.com/etcd-io/etcd
      After=network.target

      [Service]
      ExecStart=/usr/local/bin/etcd
      Restart=always
      RestartSec=5

      [Install]
      WantedBy=multi-user.target
    dest: /etc/systemd/system/etcd.service
    mode: '0644'

- name: Reload Systemd Daemon
  command: systemctl daemon-reload

- name: Enable and Start Etcd Service
  service:
    name: etcd
    state: started
    enabled: yes
  tags:
    - etcd_service
```

Process:


hideki@workstation: ~/HOA13.1-chilagan
hideki@workstation: ~/HOA13.1-chilagan
hideki@workstation:~/HOA13.1-chilagan$ ansible-playbook --ask-become-pass openst
ack.yml
BECOME password:
PLAY [Update and Upgrade Ubuntu Packages] ***********************************
TASK [Gathering Facts] **
ok: [192.168.56.102]
TASK [Update and upgrade Ubuntu packages] ***********************************
ok: [192.168.56.102]
PLAY [Install NTP on Ubuntu] **
TASK [Gathering Facts] **
ok: [192.168.56.102]
TASK [Install NTP] **
ok: [192.168.56.102]
PLAY [Install OpenStack Packages on Ubuntu] *********************************
TASK [Gathering Facts] **
ok: [192.168.56.102]
hideki@workstation: ~/HOA13.1-chilagan
hideki@workstation: ~/HOA13.1-chilagan
hideki@workstation: ~/HOA13.1-chilag
ok: [192.168.56.102]
TASK [Install OpenStack packages (controller services)] **********
changed: [192.168.56.102] => (item=python3-openstackclient)
changed: [192.168.56.102] => (item=nova-api)
changed: [192.168.56.102] => (item=nova-scheduler)
changed: [192.168.56.102] => (item=nova-conductor)
changed: [192.168.56.102] => (item=openstack-dashboard)
changed: [192.168.56.102] => (item=rabbitmq-server)
ok: [192.168.56.102] => (item=memcached)
ok: [192.168.56.102] => (item=apache2)
ok: [192.168.56.102] => (item=libapache2-mod-wsgi-py3)
changed: [192.168.56.102] => (item=neutron-server)
changed: [192.168.56.102] => (item=keystone)
changed: [192.168.56.102] => (item=glance)
PLAY [Install SQL Database (MySQL) on Ubuntu] ***********************
TASK [Gathering Facts] **
ok: [192.168.56.102]

```
PLAY [Install SQL Database (MySQL) on Ubuntu] *********************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.102]

TASK [Install MySQL Server Core] ***********************************************
ok: [192.168.56.102]

TASK [Install MySQL Server 8.0] ************************************************
ok: [192.168.56.102]

TASK [Start MySQL Service] *****************************************************
changed: [192.168.56.102]
```

```
PLAY [Install Message Queue (RabbitMQ) on Ubuntu] ******************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.102]

TASK [Install RabbitMQ] ********************************************************
ok: [192.168.56.102]

TASK [Start RabbitMQ Service] **************************************************
ok: [192.168.56.102]

PLAY [Install Memcached on Ubuntu] *********************************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.102]

TASK [Install Memcached] *******************************************************
ok: [192.168.56.102]

TASK [Start Memcached Service] *************************************************
ok: [192.168.56.102]

PLAY [Install and Configure Etcd on Ubuntu] ************************************
```


hideki@workstation: ~/HOA13.1-chilagan
hideki@workstation: ~/HOA13.1-chilagan
hideki@workstation: ~/HOA13.1-chilagan
PLAY [Install and Configure Etcd on Ubuntu] ***********************************
TASK [Gathering Facts] ***
ok: [192.168.56.102]
TASK [Download Etcd Binary] **
ok: [192.168.56.102]
TASK [Extract Etcd Binary] ***
ok: [192.168.56.102]
TASK [Move Etcd and Etcdctl to System Path] ************************************
ok: [192.168.56.102]
TASK [Move Etcdctl to System Path] ***
ok: [192.168.56.102]
TASK [Create Etcd Systemd Service File] **
ok: [192.168.56.102]
TASK [Reload Systemd Daemon] ***
changed: [192.168.56.102]
TASK [Enable and Start Etcd Service] ***
ok: [192.168.56.102]
PLAY RECAP ***
192.168.56.102 : ok=24 changed=2 unreachable=0 failed=0 s
kipped=0 rescued=0 ignored=0
hideki@workstation:~/HOA13.1-chilagan$

Checking the services:

etcd status:

```
hideki@server1:~$ systemctl status etcd
● etcd.service - etcd
     Loaded: loaded (/etc/systemd/system/etcd.service; enabled; preset: enabled)
     Active: active (running) since Mon 2024-12-02 18:28:42 PST; 15s ago
       Docs: https://github.com/etcd-io/etcd
   Main PID: 14907 (etcd)
      Tasks: 7 (limit: 6923)
     Memory: 6.9M (peak: 7.2M)
        CPU: 80ms
     CGroup: /system.slice/etcd.service
             └─14907 /usr/local/bin/etcd

Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
Dec 02 18:28:42 server1 etcd[14907]: {"level":"info","ts":"2024-12-02T18:28:42.>
```

memcached status:

```
hideki@server1:~$ systemctl status memcached
● memcached.service - memcached daemon
     Loaded: loaded (/usr/lib/systemd/system/memcached.service; enabled; preset>
     Active: active (running) since Mon 2024-12-02 18:17:36 PST; 23min ago
       Docs: man:memcached(1)
   Main PID: 1509 (memcached)
      Tasks: 10 (limit: 6923)
     Memory: 1.9M (peak: 2.9M)
        CPU: 151ms
     CGroup: /system.slice/memcached.service
             └─1509 /usr/bin/memcached -m 64 -p 11211 -u memcache -l 127.0.0.1 >

Dec 02 18:17:36 server1 systemd[1]: Started memcached.service - memcached daemo>
```

mysql status:

```
hideki@server1:~$ systemctl status mysql
● mysql.service - MySQL Community Server
     Loaded: loaded (/usr/lib/systemd/system/mysql.service; enabled; preset: en>
     Active: active (running) since Mon 2024-12-02 18:30:11 PST; 11min ago
   Main PID: 16839 (mysqld)
     Status: "Server is operational"
      Tasks: 37 (limit: 6923)
     Memory: 379.7M (peak: 399.8M)
        CPU: 3.501s
     CGroup: /system.slice/mysql.service
             └─16839 /usr/sbin/mysqld
```

ntp status:

```
hideki@server1:~$ systemctl status ntp
● ntpsec.service - Network Time Service
     Loaded: loaded (/usr/lib/systemd/system/ntpsec.service; enabled; preset: e>
     Active: active (running) since Mon 2024-12-02 18:17:37 PST; 24min ago
       Docs: man:ntpd(8)
   Main PID: 1547 (ntpd)
      Tasks: 1 (limit: 6923)
     Memory: 12.1M (peak: 12.7M)
        CPU: 209ms
     CGroup: /system.slice/ntpsec.service
             └─1547 /usr/sbin/ntpd -p /run/ntpd.pid -c /etc/ntpsec/ntp.conf -g >

Dec 02 18:39:04 server1 ntpd[1547]: DNS: Pool taking: 2a02:2a50:6::123
Dec 02 18:39:04 server1 ntpd[1547]: DNS: Pool taking: 2001:ac8:81:65:0:2:0:2
Dec 02 18:39:04 server1 ntpd[1547]: DNS: dns_take_status: 2.ubuntu.pool.ntp.org>
Dec 02 18:41:24 server1 ntpd[1547]: PROTO: 222.127.1.21 unlink local addr 10.0.>
Dec 02 18:41:28 server1 ntpd[1547]: PROTO: 222.127.1.25 unlink local addr 10.0.>
Dec 02 18:41:30 server1 ntpd[1547]: PROTO: 222.127.1.23 unlink local addr 10.0.>
Dec 02 18:41:31 server1 ntpd[1547]: PROTO: 222.127.1.27 unlink local addr 10.0.>
Dec 02 18:41:31 server1 ntpd[1547]: PROTO: 222.127.1.24 unlink local addr 10.0.>
Dec 02 18:41:35 server1 ntpd[1547]: PROTO: 222.127.1.19 unlink local addr 10.0.>
Dec 02 18:41:36 server1 ntpd[1547]: PROTO: 222.127.1.22 unlink local addr 10.0.>
```

openstack packages status:

```
hideki@server1:~$ systemctl status nova-api
● nova-api.service - OpenStack Compute API
     Loaded: loaded (/usr/lib/systemd/system/nova-api.service; enabled; preset:>
     Active: active (running) since Mon 2024-12-02 18:18:20 PST; 24min ago
       Docs: man:nova-api(1)
   Main PID: 2190 (nova-api)
      Tasks: 4 (limit: 6923)
     Memory: 189.3M (peak: 244.4M)
        CPU: 7min 32.432s
     CGroup: /system.slice/nova-api.service
             ├─ 2190 /usr/bin/python3 /usr/bin/nova-api --config-file=/etc/nova>
             ├─22461 "[nova-api]"
             └─22462 /usr/bin/python3 /usr/bin/nova-api --config-file=/etc/nova>

Dec 02 18:18:20 server1 systemd[1]: Started nova-api.service - OpenStack Comput>
Dec 02 18:18:26 server1 nova-api[2190]: 3 RLock(s) were not greened, to fix thi>
lines 1-15/15 (END)
```

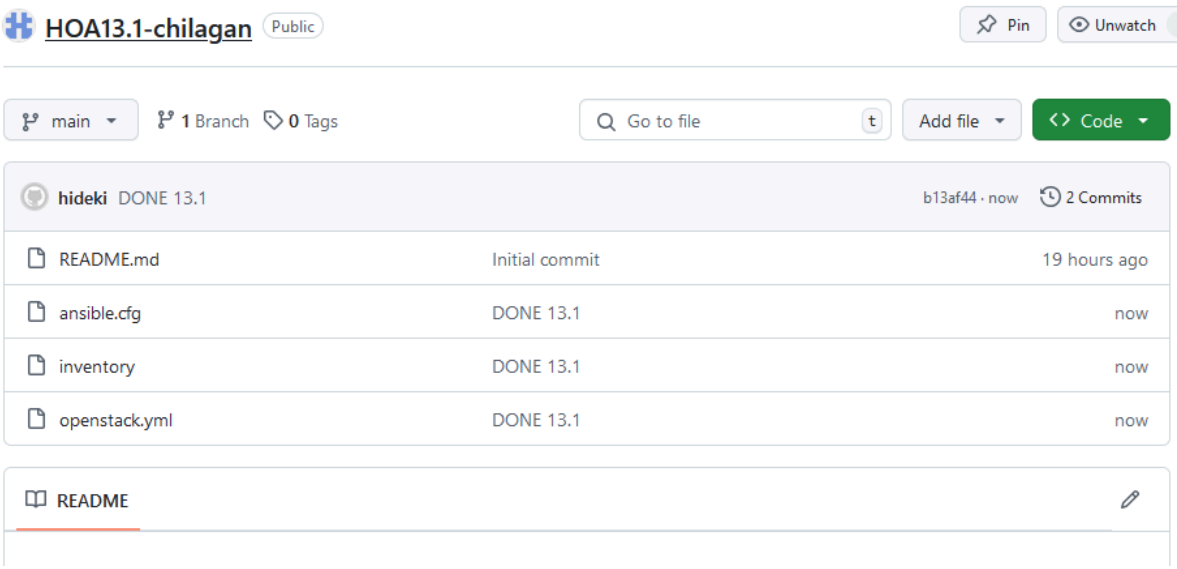
```
hideki@server1: ~
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: >
     Active: active (running) since Mon 2024-12-02 18:17:47 PST; 25min ago
       Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 1780 (apache2)
      Tasks: 65 (limit: 6923)
     Memory: 84.8M (peak: 93.5M)
        CPU: 1.029s
     CGroup: /system.slice/apache2.service
             ├─1780 /usr/sbin/apache2 -k start
             ├─1904 "(wsgi:horizon)   " -k start
             ├─1905 "(wsgi:horizon)   " -k start
             ├─1906 "(wsgi:horizon)   " -k start
             ├─1907 "(wsgi:keystone-pu" -k start
             ├─1908 "(wsgi:keystone-pu" -k start
             ├─1909 "(wsgi:keystone-pu" -k start
             ├─1910 "(wsgi:keystone-pu" -k start
             ├─1911 "(wsgi:keystone-pu" -k start
             ├─1912 /usr/sbin/apache2 -k start
             ├─1913 /usr/sbin/apache2 -k start
             ├─1914 /usr/sbin/apache2 -k start
             ├─1915 /usr/sbin/apache2 -k start
             └─1916 /usr/sbin/apache2 -k start
```

```
hideki@server1:~$ systemctl status neutron-server
● neutron-server.service - OpenStack Neutron Server
     Loaded: loaded (/usr/lib/systemd/system/neutron-server.service; enabled; p>
     Active: active (running) since Mon 2024-12-02 18:44:13 PST; 1s ago
       Docs: man:neutron-server(1)
   Main PID: 22901 (neutron-server)
      Tasks: 1 (limit: 6923)
     Memory: 38.7M (peak: 40.3M)
        CPU: 699ms
     CGroup: /system.slice/neutron-server.service
             └─22901 /usr/bin/python3 /usr/bin/neutron-server --config-file=/et>

Dec 02 18:44:13 server1 systemd[1]: neutron-server.service: Main process exited>
```

rabbitmq status:

```
hideki@server1:~$ systemctl status rabbitmq-server
● rabbitmq-server.service - RabbitMQ Messaging Server
     Loaded: loaded (/usr/lib/systemd/system/rabbitmq-server.service; enabled; >
     Active: active (running) since Mon 2024-12-02 18:18:20 PST; 26min ago
   Main PID: 1514 (beam.smp)
      Tasks: 24 (limit: 6923)
     Memory: 95.7M (peak: 157.6M)
        CPU: 17.209s
     CGroup: /system.slice/rabbitmq-server.service
             ├─1514 /usr/lib/erlang/erts-13.2.2.5/bin/beam.smp -W w -MBas ageff>
             ├─1596 erl_child_setup 65536
             ├─1901 /usr/lib/erlang/erts-13.2.2.5/bin/inet_gethost 4
             ├─1902 /usr/lib/erlang/erts-13.2.2.5/bin/inet_gethost 4
             └─2183 /bin/sh -s rabbit_disk_monitor

Dec 02 18:17:36 server1 systemd[1]: Starting rabbitmq-server.service - RabbitMQ>
Dec 02 18:18:20 server1 systemd[1]: Started rabbitmq-server.service - RabbitMQ >
```

github repository:



github link:

https://github.com/chilagan-github/HOA13.1-chilagan

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?
   OpenStack has many benefits for companies that want to build and manage their own cloud systems. It is flexible and can grow easily as the business needs change. Being open-source, it is free to use, reduces dependency on specific vendors, and can be customized for unique needs. OpenStack includes different tools for computing, storage, and networking, making it useful for many purposes. It also helps businesses save time by automating tasks and managing everything from one place. With support from a large community, OpenStack keeps improving, making it a strong choice for creating modern cloud systems.

Conclusions:

In conclusion, I was able to install all the needed applications and software for the openstack. This covers tasks such as updating the system, installing NTP, OpenStack components, MySQL, RabbitMQ, Memcached, and Etcd. After addressing an issue with the unavailability of the etcd package in default repositories, a manual installation method using binaries was implemented. This ensures that all components are correctly installed, configured, and running as system services, streamlining the setup process for a controller node in OpenStack.