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**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

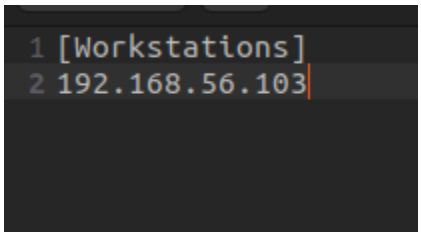
## 4. Tasks

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.

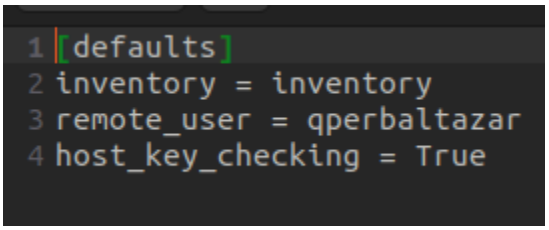
**5. Output** (screenshots and explanations)

```
qperbaltazar@workstation:~/HOA_13$ tree
.
├── ansible.cfg
├── inventory
├── openstack.yml
└── README.md
```

New repository and its contents




Inventory File




ansible.cfg file

Unset

```
---
- name: Install NTP on Remote Computer
  tags: ntp
  hosts: Workstations
  become: true
  tasks:
       - name: Install NTP
       apt:
       name: ntp
       state: present
```

```
      tags:
      - ntp  # Tag this task as 'ntp'

- name: Install OpenStack Packages on Remote Computer
  tags: setup
  hosts: Workstations
  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_os_family == 'Debian'
      tags:
      - openstack_packages  # Tag for the OpenStack packages

- name: Install SQL Database (MySQL) on Remote Computer
  tags: mysql
  hosts: Workstations
  become: true
  tasks:
      - name: Install MySQL Server Core
      apt:
      name: mysql-server-core-8.0
      state: present
      tags:
      - mysql  # Tag for MySQL installation

      - 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  # Tag for MySQL service

- name: Install Message Queue (RabbitMQ) on Remote Computer
  tags: rabbit
  hosts: Workstations
  become: true
  tasks:
      - name: Install RabbitMQ
      apt:
      name: rabbitmq-server
      state: present
      tags:
      - rabbitmq  # Tag for RabbitMQ installation

      - name: Start RabbitMQ Service
      service:
      name: rabbitmq-server
      state: started
      enabled: yes
      tags:
      - rabbitmq_service  # Tag for RabbitMQ service

- name: Install Memcached on Remote Computer
  tags: memcached
  hosts: Workstations
  become: true
  tasks:
      - name: Install Memcached
      apt:
      name: memcached
      state: present
      tags:
      - memcached  # Tag for Memcached installation

      - name: Start Memcached Service
      service:
      name: memcached
      state: started
      enabled: yes
      tags:
      - memcached_service  # Tag for Memcached service

- name: Install and Configure Etcd on Remote Computer
  tags: etcd
  hosts: Workstations
  become: true
  tasks:
      - name: Install Etcd
```

```
        apt:
        name: etcd
        state: present
        tags:
        - etcd  # Tag for Etcd installation

        - name: Start Etcd Service
        service:
        name: etcd
        state: started
        enabled: yes
        tags:
        - etcd_service  # Tag for Etcd service
```

Openstack.yml

```
TASK [Gathering Facts] *******
ok: [192.168.56.103]

TASK [Install NTP] ***********
ok: [192.168.56.103]
```

```
qperbaltazar@server2:~$ sudo systemctl status ntp
[sudo] password for qperbaltazar:
× ntp.service - Network Time Service
     Loaded: loaded (/lib/systemd/system/ntp.service; enabled; vendor preset: e>
     Active: failed (Result: exit-code) since Mon 2024-12-02 15:45:23 +08; 50mi>
       Docs: man:ntpd(8)
   Main PID: 881 (code=exited, status=255/EXCEPTION)
        CPU: 84ms
```

NTP Installation on Remote Server

```
TASK [Gathering Facts] ************************************
ok: [192.168.56.103]

TASK [Install OpenStack packages (controller services)] ****
ok: [192.168.56.103] => (item=python3-openstackclient)
ok: [192.168.56.103] => (item=nova-api)
ok: [192.168.56.103] => (item=nova-scheduler)
ok: [192.168.56.103] => (item=nova-conductor)
ok: [192.168.56.103] => (item=openstack-dashboard)
ok: [192.168.56.103] => (item=rabbitmq-server)
ok: [192.168.56.103] => (item=memcached)
ok: [192.168.56.103] => (item=apache2)
ok: [192.168.56.103] => (item=libapache2-mod-wsgi-py3)
ok: [192.168.56.103] => (item=neutron-server)
ok: [192.168.56.103] => (item=keystone)
ok: [192.168.56.103] => (item=glance)
```

```
qperbaltazar@server2:~$ sudo systemctl status nova-api
● nova-api.service - OpenStack Compute API
     Loaded: loaded (/lib/systemd/system/nova-api.service; enabled; vendor pres>
     Active: active (running) since Mon 2024-12-02 15:33:13 +08; 1h 7min ago
       Docs: man:nova-api(1)
   Main PID: 1512 (nova-api)
      Tasks: 8 (limit: 4592)
     Memory: 73.6M
        CPU: 18min 28.954s
     CGroup: /system.slice/nova-api.service
             └─1512 /usr/bin/python3 /usr/bin/nova-api --config-file=/etc/nova/>
```

```
qperbaltazar@server2:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor prese>
     Active: active (running) since Mon 2024-12-02 15:32:21 +08; 1h 9min ago
       Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 1160 (apache2)
      Tasks: 114 (limit: 4592)
     Memory: 33.4M
        CPU: 1.336s
     CGroup: /system.slice/apache2.service
             ├─1160 /usr/sbin/apache2 -k start
             ├─1161 "(wsgi:horizon)    " -k start
```

```
qperbaltazar@server2:~$ sudo systemctl status neutron-server
● neutron-server.service - OpenStack Neutron Server
     Loaded: loaded (/lib/systemd/system/neutron-server.service; enabled; vendo>
     Active: active (running) since Mon 2024-12-02 16:42:49 +08; 181ms ago
       Docs: man:neutron-server(1)
   Main PID: 42740 (neutron-server)
      Tasks: 1 (limit: 4592)
     Memory: 10.5M
        CPU: 113ms
     CGroup: /system.slice/neutron-server.service
             └─42740 /usr/bin/python3 /usr/bin/neutron-server --config-file=/et>
```

Openstack Packages Installation

```
TASK [Gathering Facts] ******************
ok: [192.168.56.103]

TASK [Install MySQL Server Core] ********
ok: [192.168.56.103]

TASK [Install MySQL Server 8.0] *********
ok: [192.168.56.103]

TASK [Start MySQL Service] **************
changed: [192.168.56.103]
```

```
qperbaltazar@server2:~$ sudo systemctl status mysql.service
● mysql.service - MySQL Community Server
     Loaded: loaded (/lib/systemd/system/mysql.service; enabled; vendor preset:>
     Active: active (running) since Mon 2024-12-02 16:12:32 +08; 30min ago
    Process: 24771 ExecStartPre=/usr/share/mysql/mysql-systemd-start pre (code=>
   Main PID: 24781 (mysqld)
     Status: "Server is operational"
      Tasks: 37 (limit: 4592)
     Memory: 367.6M
        CPU: 9.315s
     CGroup: /system.slice/mysql.service
             └─24781 /usr/sbin/mysqld
```

MySQL Installation on remote server

```
TASK [Gathering Facts] **********
ok: [192.168.56.103]

TASK [Install RabbitMQ] *********
ok: [192.168.56.103]

TASK [Start RabbitMQ Service] ***
ok: [192.168.56.103]
```

```
qperbaltazar@server2:~$ sudo systemctl status service rabbitmq-server
Unit service.service could not be found.
● rabbitmq-server.service - RabbitMQ Messaging Server
     Loaded: loaded (/lib/systemd/system/rabbitmq-server.service; enabled; vend>
     Active: active (running) since Mon 2024-12-02 15:33:13 +08; 1h 11min ago
   Main PID: 824 (beam.smp)
      Tasks: 28 (limit: 4592)
     Memory: 25.3M
        CPU: 26.998s
     CGroup: /system.slice/rabbitmq-server.service
             ├─ 824 /usr/lib/erlang/erts-12.2.1/bin/beam.smp -W w -MBas ageffcb>
             ├─ 938 erl_child_setup 65536
             ├─1383 inet_gethost 4
             ├─1384 inet_gethost 4
             └─1507 /bin/sh -s rabbit_disk_monitor
```

RabbitMQ Installation

```
TASK [Gathering Facts] *********
ok: [192.168.56.103]

TASK [Install Memcached] *******
ok: [192.168.56.103]

TASK [Start Memcached Service] *
ok: [192.168.56.103]
```

```
qperbaltazar@server2:~$ sudo systemctl status memcached
● memcached.service - memcached daemon
     Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor pre>
     Active: active (running) since Mon 2024-12-02 15:32:05 +08; 1h 13min ago
       Docs: man:memcached(1)
   Main PID: 820 (memcached)
      Tasks: 10 (limit: 4592)
     Memory: 1.1M
        CPU: 375ms
     CGroup: /system.slice/memcached.service
             └─820 /usr/bin/memcached -m 64 -p 11211 -u memcache -l 127.0.0.1 -p>
```

Memcached Installation

```
TASK [Gathering Facts] *********
ok: [192.168.56.103]

TASK [Install Etcd] ************
ok: [192.168.56.103]

TASK [Start Etcd Service] ******
ok: [192.168.56.103]
```

```
qperbaltazar@server2:~$ sudo systemctl status etcd
● etcd.service - etcd - highly-available key value store
     Loaded: loaded (/lib/systemd/system/etcd.service; enabled; vendor preset: >
     Active: active (running) since Mon 2024-12-02 15:32:22 +08; 1h 14min ago
       Docs: https://etcd.io/docs
             man:etcd
   Main PID: 819 (etcd)
      Tasks: 10 (limit: 4592)
     Memory: 10.3M
        CPU: 13.374s
     CGroup: /system.slice/etcd.service
             └─819 /usr/bin/etcd
```

ETCD Installation

**Reflections:**

Answer the following:

1. What are the benefits of implementing OpenStack?

OpenStack offers great advantages to businesses looking for a flexible and budget-friendly cloud solution. Being open-source, it eliminates the high costs of software licenses. Its modular design makes it easy to connect with different hardware and software, giving businesses a high level of flexibility. Additionally, OpenStack's scalability allows companies to adapt to changing workloads, ensuring efficient use of resources.

Another strength of OpenStack is its large and active community of developers and users. This community continuously improves the platform, keeping it updated with the latest technologies and best practices. With OpenStack, organizations can simplify operations, cut costs, and accelerate their digital transformation efforts.

**Conclusions:**

I have learned the practical aspects of deploying OpenStack using Ansible. Automating the installation and setup processes allows for faster deployments, reduces errors, and speeds up time-to-market. This hands-on experience has deepened my knowledge of OpenStack and its capabilities, allowing me to use this powerful platform more effectively in future projects.