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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)

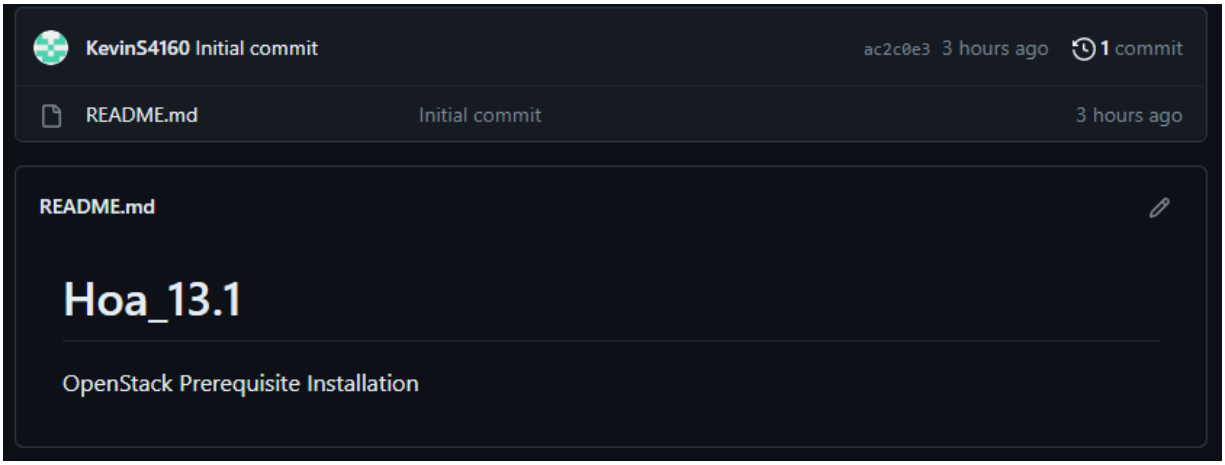
1x Ubuntu VM or Centos VM

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)

Step 1: Create a repository in github.



Step 2: Clone the created repository.

```
kevinadmin@KevinWorkstation:~$ git clone https://github.com/KevinS4160/Hoa_13.1
.git
Cloning into 'Hoa_13.1'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
kevinadmin@KevinWorkstation:~$ ls
Desktop    Downloads         Hoa_13.1  Pictures  Templates
Documents  examples.desktop  Music     Public    Videos
```

Step 3: Creating a file inside the directory (ansible.cfg, inventory).

```
kevinadmin@KevinWorkstation:~/Hoa_13.1$ touch ansible.cfg
kevinadmin@KevinWorkstation:~/Hoa_13.1$ touch inventory
kevinadmin@KevinWorkstation:~/Hoa_13.1$ ls
ansible.cfg  inventory  README.md
```

Step 4: Put the ip address of server1 and CentOS in the inventory

```
[defaults]
192.168.56.103
```

Step 5: Necessary file for ansible.cfg

```
  [1/1]                                ansible.cfg

[defaults]

inventory = inventory
host_key_checking = False

deprecation_warnings = False

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

Step 6: Ping the servers in ansible to make sure it is working and connected.

Step 7: Apply the concept of creating roles under the same directory, create a new directory and name it roles.

```
sumaya@Workstation:~/Hoa_13.1$ ls
sumaya@Workstation:~/Hoa_13.1$ mkdir roles
sumaya@Workstation:~/Hoa_13.1$ touch ansible.cfg
sumaya@Workstation:~/Hoa_13.1$ touch controller.yaml
sumaya@Workstation:~/Hoa_13.1$ touch inventory
sumaya@Workstation:~/Hoa_13.1$ cd roles
sumaya@Workstation:~/Hoa_13.1/roles$ mkdir ubuntu
sumaya@Workstation:~/Hoa_13.1/roles$ cd ubuntu
sumaya@Workstation:~/Hoa_13.1/roles/ubuntu$ mkdir tasks
sumaya@Workstation:~/Hoa_13.1/roles/ubuntu$ cd tasks
sumaya@Workstation:~/Hoa_13.1/roles/ubuntu/tasks$ sudo nano main.yml
sumaya@Workstation:~/Hoa_13.1/roles/ubuntu/tasks$ cd ..
sumaya@Workstation:~/Hoa_13.1/roles/ubuntu$ cd ..
sumaya@Workstation:~/Hoa_13.1/roles$ cd ..
sumaya@Workstation:~/Hoa_13.1$ sudo nano ansible.cfg
sumaya@Workstation:~/Hoa_13.1$ sudo nano controller.yaml
sumaya@Workstation:~/Hoa_13.1$ sudo nano inventory
sumaya@Workstation:~/Hoa_13.1$ ansible-playbook --ask-become-pass controller.ya
ml
```

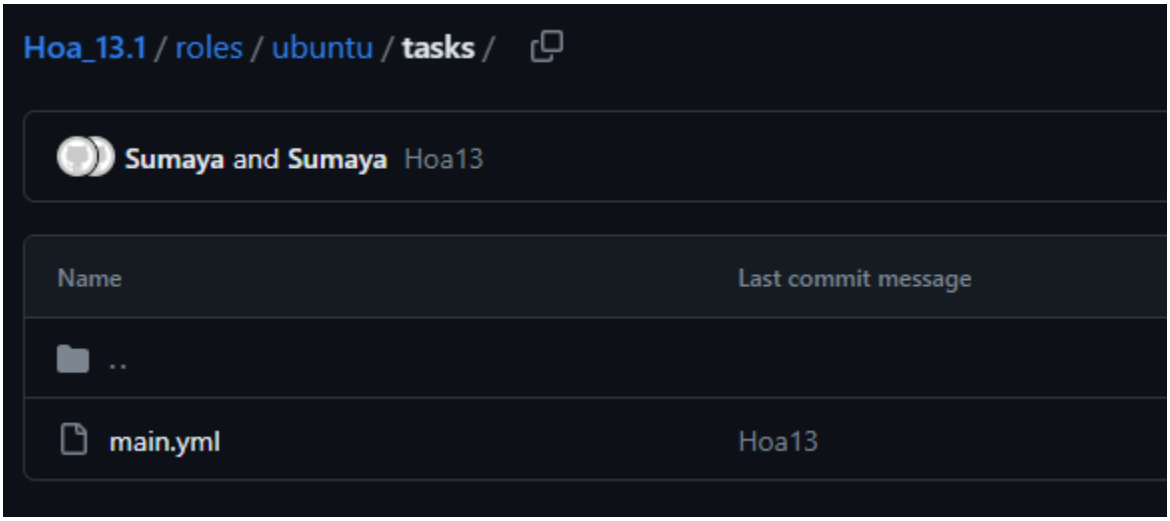
Step 8: Create new directories: Ubuntu, CentOS. For each directory, create a directory and name it tasks.

```
sumaya@Workstation:~/Hoa_13.1/roles$ mkdir ubuntu
sumaya@Workstation:~/Hoa_13.1/roles$ cd ubuntu
```

Step 9: Go to tasks for all directory and create a file. Name it main.yml for each of the tasks for all directories.

```
sumaya@Workstation:~/Hoa_13.1$ tree
.
├── ansible.cfg
├── controller.retry
├── controller.yaml
├── inventory
└── roles
    └── ubuntu
        └── tasks
            └── main.yml
```

Step 10: Create a file inside of the main directory



```yaml
- name: Set OpenStack packages
  set_fact:
    openstack_packages:
      - python3-openstackclient
      - mariadb-server
      - rabbitmq-server
      - memcached
      - etcd
  when: ansible_distribution == "Ubuntu"

- name: Update package cache for Ubuntu
  apt:
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Install and configure NTP for Ubuntu
  package:
    name: ntp
    state: present
  when: ansible_distribution == "Ubuntu"

- name: Start and enable NTP service for Ubuntu
  service:
    name: ntp
    state: started
    enabled: yes
  when: ansible_distribution == "Ubuntu"

- name: Install OpenStack for Ubuntu
  apt:
    name: python3-openstackclient
    state: present
  when: ansible_distribution == "Ubuntu"

- name: Install OpenStack packages for Ubuntu
  package:
    name: "{{ item }}"
    state: present
  with_items: "{{ openstack_packages }}"
  tags: openstack-packages
  when: ansible_distribution == "Ubuntu"

- name: Update package cache for Ubuntu
  package:
    name: "{{ item }}"
```

```
      name: mariadb-server
      state: present
    when: ansible_distribution == "Ubuntu"

  - name: Install message queue server for Ubuntu
    package:
      name: rabbitmq-server
      state: present
    when: ansible_distribution == "Ubuntu"

  - name: Start and enable rabbitmq-server service for Ubuntu
    service:
      name: rabbitmq-server
      state: started
      enabled: yes
    when: ansible_distribution == "Ubuntu"

  - name: Install Memcached for Ubuntu
    package:
      name: memcached
      state: present
    when: ansible_distribution == "Ubuntu"

  - name: Start and enable memcached service for Ubuntu
    service:
      name: memcached
      state: started
      enabled: yes
    when: ansible_distribution == "Ubuntu"

  - name: Install Etcd for Ubuntu
    package:
      name: etcd
      state: present
    when: ansible_distribution == "Ubuntu"

  - name: Start and enable etcd service for Ubuntu
    service:
      name: etcd
      state: started
      enabled: yes
    when: ansible_distribution == "Ubuntu"
```

Step 11: Create a playbook in main.yml

```
 GNU nano 2.9.3                          main.yml

- name: Set OpenStack packages
  set_fact:
    openstack_packages:
      - python3-openstackclient
      - mariadb-server
      - rabbitmq-server
      - memcached
      - etcd
  when: ansible_distribution == "Ubuntu"

- name: Update package cache for Ubuntu
  apt:
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Install and configure NTP for Ubuntu
  package:
    name: ntp
    state: present
  when: ansible_distribution == "Ubuntu"

- name: Start and enable NTP service for Ubuntu
  service:
```

```
sumaya@Workstation: ~/Hoa_13.1/roles/ubuntu/tasks
File  Edit  View  Search  Terminal  Help
 GNU nano 2.9.3                          main.yml

    state: started
    enabled: yes
  when: ansible_distribution == "Ubuntu"

- name: Install OpenStack for Ubuntu
  apt:
    name: python3-openstackclient
    state: present
  when: ansible_distribution == "Ubuntu"

- name: Install OpenStack packages for Ubuntu
  package:
    name: "{{ item }}"
    state: present
  with_items: "{{ openstack_packages }}"
  tags: openstack-packages
  when: ansible_distribution == "Ubuntu"

- name: Update package cache for Ubuntu
  package:
    name: "{{ item }}"
    state: present
  with_items: "{{ openstack_packages }}"
```

```
- name: Start and enable rabbitmq-server service for Ubuntu
  service:
    name: rabbitmq-server
    state: started
    enabled: yes
  when: ansible_distribution == "Ubuntu"

- name: Install Memcached for Ubuntu
  package:
    name: memcached
    state: present
  when: ansible_distribution == "Ubuntu"

- name: Start and enable memcached service for Ubuntu
  service:
    name: memcached
    state: started
    enabled: yes
  when: ansible_distribution == "Ubuntu"

- name: Install Etcd for Ubuntu
  package:
```

```
- name: Start and enable etcd service for Ubuntu
  service:
    name: etcd
    state: started
    enabled: yes
  when: ansible_distribution == "Ubuntu"
```

Step 12: Run the created playbook in the main directory.

```
sumaya@Workstation:~/Hoa_13.1$ ansible-playbook --ask-become-pass controller.ya
ml
SUDO password:

PLAY [ubuntu] ******************************************************************
*

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.105]

TASK [ubuntu : Set OpenStack packages] *****************************************
*
ok: [192.168.56.105]

TASK [ubuntu : Update package cache for Ubuntu] ********************************
*
changed: [192.168.56.105]

TASK [ubuntu : Install and configure NTP for Ubuntu] ***************************
*
changed: [192.168.56.105]

TASK [ubuntu : Start and enable NTP service for Ubuntu] ************************
*
ok: [192.168.56.105]
```

```
TASK [ubuntu : Install OpenStack for Ubuntu] ***********************************
*
changed: [192.168.56.105]

TASK [ubuntu : Install OpenStack packages for Ubuntu] **************************
*
ok: [192.168.56.105] => (item=python3-openstackclient)
changed: [192.168.56.105] => (item=mariadb-server)
changed: [192.168.56.105] => (item=rabbitmq-server)
changed: [192.168.56.105] => (item=memcached)
changed: [192.168.56.105] => (item=etcd)

TASK [ubuntu : Update package cache for Ubuntu] ********************************
*
ok: [192.168.56.105] => (item=python3-openstackclient)
ok: [192.168.56.105] => (item=mariadb-server)
ok: [192.168.56.105] => (item=rabbitmq-server)
ok: [192.168.56.105] => (item=memcached)
ok: [192.168.56.105] => (item=etcd)

TASK [ubuntu : Install database server for Ubuntu] *****************************
*
ok: [192.168.56.105]

TASK [ubuntu : Install message queue server for Ubuntu] ************************
*
ok: [192.168.56.105]

TASK [ubuntu : Start and enable rabbitmq-server service for Ubuntu] ************
```

```
*
ok: [192.168.56.105]

TASK [ubuntu : Install message queue server for Ubuntu] ***********************
*
ok: [192.168.56.105]

TASK [ubuntu : Start and enable rabbitmq-server service for Ubuntu] ***********
*
ok: [192.168.56.105]

TASK [ubuntu : Install Memcached for Ubuntu] **********************************
*
ok: [192.168.56.105]

TASK [ubuntu : Start and enable memcached service for Ubuntu] *****************
*
ok: [192.168.56.105]

TASK [ubuntu : Install Etcd for Ubuntu] ***************************************
*
ok: [192.168.56.105]

TASK [ubuntu : Start and enable etcd service for Ubuntu] **********************
*
ok: [192.168.56.105]

PLAY RECAP ********************************************************************
```

sumaya@Workstation: ~/Hoa_13.1

File Edit View Search Terminal Help

```
ok: [192.168.56.105]

TASK [ubuntu : Start and enable etcd service for Ubuntu] **********************
*
ok: [192.168.56.105]

PLAY RECAP ********************************************************************
*
192.168.56.105             : ok=15   changed=4    unreachable=0    failed=0

sumaya@Workstation:~/Hoa_13.1$ Git commit -m Hoa13

Command 'Git' not found, did you mean:

  command 'vit' from deb vit
  command 'git' from deb git
  command 'wit' from deb wit
  command 'nit' from deb python-nevow
```

Output:

Ubuntu (NTP)

```
sumaya@Server1:~$ systemctl status ntp
● ntp.service - Network Time Service
   Loaded: loaded (/lib/systemd/system/ntp.service; enabled; vendor preset: ena
   Active: active (running) since Wed 2023-11-29 00:45:09 +08; 23min ago
     Docs: man:ntpd(8)
 Main PID: 3831 (ntpd)
    Tasks: 2 (limit: 4656)
   CGroup: /system.slice/ntp.service
           └─3831 /usr/sbin/ntpd -p /var/run/ntpd.pid -g -u 123:127

[1]+  Stopped                 systemctl status ntp
```

Openstack

```
sumaya@Server1:~$ openstack --version
openstack 3.14.2
```

Mariadb

```
sumaya@Server1:~$ systemctl status mariadb
● mariadb.service - MariaDB 10.1.48 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset:
   Active: active (running) since Wed 2023-11-29 00:47:26 +08; 22min ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
 Main PID: 8235 (mysqld)
   Status: "Taking your SQL requests now..."
    Tasks: 27 (limit: 4656)
   CGroup: /system.slice/mariadb.service
           └─8235 /usr/sbin/mysqld

[2]+  Stopped                 systemctl status mariadb
```

Rabbitmq-server

```
sumaya@Server1:~$ systemctl status rabbitmq-server
● rabbitmq-server.service - RabbitMQ Messaging Server
   Loaded: loaded (/lib/systemd/system/rabbitmq-server.service; enabled; vendor
   Active: active (running) since Wed 2023-11-29 00:48:12 +08; 22min ago
 Main PID: 10326 (beam.smp)
   Status: "Initialized"
    Tasks: 87 (limit: 4656)
   CGroup: /system.slice/rabbitmq-server.service
           ├─10322 /bin/sh /usr/sbin/rabbitmq-server
           ├─10326 /usr/lib/erlang/erts-9.2/bin/beam.smp -W w -A 64 -P 1048576
           ├─10402 /usr/lib/erlang/erts-9.2/bin/epmd -daemon
           ├─10542 erl_child_setup 65536
           ├─10564 inet_gethost 4
           └─10565 inet_gethost 4

[3]+  Stopped                 systemctl status rabbitmq-server
```

memcached

```
sumaya@Server1:~$ systemctl status memcached
● memcached.service - memcached daemon
   Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor prese
   Active: active (running) since Wed 2023-11-29 00:48:28 +08; 22min ago
     Docs: man:memcached(1)
 Main PID: 11414 (memcached)
    Tasks: 10 (limit: 4656)
   CGroup: /system.slice/memcached.service
           └─11414 /usr/bin/memcached -m 64 -p 11211 -u memcache -l 127.0.0.1 -

[4]+  Stopped                 systemctl status memcached
```

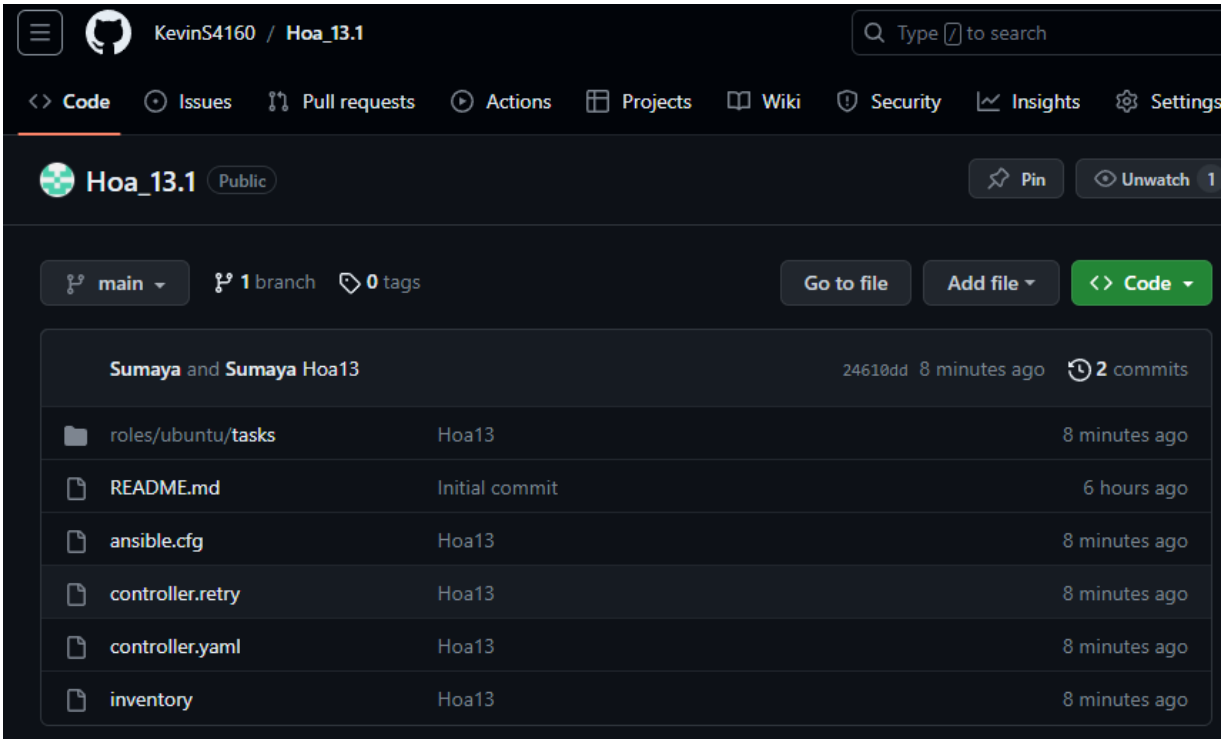
etcd

```
sumaya@Server1:~$ systemctl status etcd
● etcd.service - etcd - highly-available key value store
   Loaded: loaded (/lib/systemd/system/etcd.service; disabled; vendor preset: e
   Active: active (running) since Wed 2023-11-29 00:48:49 +08; 22min ago
     Docs: https://github.com/coreos/etcd
           man:etcd
 Main PID: 12313 (etcd)
    Tasks: 11 (limit: 4656)
   CGroup: /system.slice/etcd.service
           └─12313 /usr/bin/etcd

[5]+  Stopped                 systemctl status etcd
```

Github:

```
sumaya@Workstation:~/Hoa_13.1$ git push origin main
Username for 'https://github.com': KevinS4160
Password for 'https://KevinS4160@github.com':
Counting objects: 10, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (6/6), done.
Writing objects: 100% (10/10), 1.21 KiB | 1.21 MiB/s, done.
Total 10 (delta 0), reused 0 (delta 0)
To https://github.com/KevinS4160/Hoa_13.1.git
   ac2c0e3..24610dd  main -> main
```



Link: https://github.com/KevinS4160/Hoa_13.1.git

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

   - The use of the platform is however, accompanied by numerous advantages, but its successful implementation is usually contingent upon the existence of a comprehensive plan, skilled manpower, and continuous monitoring.

Conclusions:

Implementing an OpenStack playbook on Ubuntu provides a strong and adaptable solution for businesses looking to reap the benefits of cloud computing. As a well-supported and widely used Linux distribution, Ubuntu provides a solid platform for deploying OpenStack services, providing stability and ease of administration.

Organizations can gain scalability, flexibility, and cost efficiency in their infrastructure by employing an OpenStack playbook on Ubuntu. Because OpenStack is modular and configurable, it enables for personalized deployments that align the cloud environment with specific business demands. Automation and orchestration capabilities of the platform streamline processes, reducing manual intervention and accelerating service delivery.

OpenStack on Ubuntu private cloud deployment solutions provide a secure and controlled environment for enterprises managing sensitive data or conforming to regulatory standards. Multi-tenancy allows for the efficient sharing of resources among several user groups, enabling collaboration and resource efficiency.