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Course/Section: CPE31S4	Date Submitted: November 28, 2023
Instructor: Dr. Taylor	Semester and SY: 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	
<ol style="list-style-type: none"> 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	
<p>Oracle VirtualBox (Hypervisor)</p> <p>1x Ubuntu VM or Centos VM</p>	
4. Tasks	
<ol style="list-style-type: none"> 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"> 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)	

INPUT

```
lykaandaya@managenode: ~/HOA13.1
GNU nano 6.2 main.yml
---
- hosts: all
  become: true
  tasks:

  - 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
      Read 195 lines ]
```

```
lykaandaya@managenode: ~/HOA13.1
GNU nano 6.2 main.yml
- 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 }}"
  when: ansible_distribution == "Ubuntu"

- name: Install database server for Ubuntu
  package:
    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
```

```
lykaandaya@managenode: ~/HOA13.1
GNU nano 6.2 main.yml

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

- name: Set OpenStack packages for CentOS
  set_fact:
```

```
lykaandaya@managenode: ~/HOA13.1
GNU nano 6.2 main.yml
  enabled: yes
  when: ansible_distribution == "Ubuntu"

- name: Set OpenStack packages for CentOS
  set_fact:
    openstack_packages_centos:
      - openstack-packstack
      - mariadb-server
      - rabbitmq-server
      - memcached
      - etcd
  when: ansible_distribution == "CentOS"

- name: Install and configure EPEL repository for CentOS
  dnf:
    name: epel-release
    state: latest
  when: ansible_distribution == "CentOS"

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

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

- name: Install OpenStack packages for CentOS
  package:
```

```
lykaandaya@managenode: ~/HOA13.1
GNU nano 6.2 main.yml

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

- name: Update package cache for CentOS
  package:
    name: "{{ item }}"
    state: present
  with_items: "{{ openstack_packages_centos }}"
  when: ansible_distribution == "CentOS"

- name: Install and configure SQL Database for CentOS
  package:
    name: mariadb-server
    state: present
  tags: sql-database
  when: ansible_distribution == "CentOS"

- name: Install and configure Message Queue for CentOS
  package:
    name: rabbitmq-server
    state: present
  tags: message-queue
  when: ansible_distribution == "CentOS"

- name: Install and configure Memcached for CentOS
  package:
    name: memcached
    state: present
  tags: memcached
  when: ansible_distribution == "CentOS"
```

```
res  terminal
lykaandaya@managenode: ~/HOA13.1
GNU nano 6.2 main.yml
package:
  name: memcached
  state: present
tags: memcached
when: ansible_distribution == "CentOS"

- name: Install etcd package
  package:
    name: etcd
    state: present
  when: ansible_distribution == "CentOS"

- name: Enabling openstack repository
  yum:
    name: centos-release-openstack-train
    state: latest

- name: Downloading and installing the RDO repository to enable
  yum:
    name: https://rdoproject.org/repos/rdo-release.rpm
    state: present
    ignore_errors: true

- name: Updating repository and upgrading packages
  yum:
    name: '*'
    state: latest
    update_cache: true

- name: Installing openstack for CentOS
  yum:
    name:
      - openstack-selinux
      - python-openstackclient
      - openstack-utils
```

Explanation: The server 1 in linux and the server in CentOS will install NTP, OpenStack packages, SQL Database, Message Queue, Memcached, and Etcd

PROCESS

```
lykaandaya@managenode1: ~/H0A13.1$ sudo nano main.yml
lykaandaya@managenode:~/H0A13.1$ ansible-playbook --ask-become-pass main.yml
BECOME password:

PLAY [all] *****
*****

TASK [Gathering Facts] *****
*****
ok: [192.168.56.113]
ok: [192.168.56.116]

LibreOffice Writer
TASK [LibreOffice Writer ack packages] *****
*****
skipping: [192.168.56.116]
ok: [192.168.56.113]

TASK [Update package cache for Ubuntu] *****
*****
skipping: [192.168.56.116]
changed: [192.168.56.113]

TASK [Install and configure NTP for Ubuntu] *****
*****
skipping: [192.168.56.116]
ok: [192.168.56.113]

TASK [Start and enable NTP service for Ubuntu] *****
*****
skipping: [192.168.56.116]
ok: [192.168.56.113]

TASK [Install OpenStack packages for Ubuntu] *****
*****
```



```
TASK [Install OpenStack packages for Ubuntu] *****
*****
skipping: [192.168.56.116]
ok: [192.168.56.113] => (item=python3-openstackclient)
ok: [192.168.56.113] => (item=mariadb-server)
ok: [192.168.56.113] => (item=rabbitmq-server)
ok: [192.168.56.113] => (item=memcached)
ok: [192.168.56.113] => (item=etcd)

TASK [Update package cache for Ubuntu] *****
*****
skipping: [192.168.56.116]
ok: [192.168.56.113] => (item=python3-openstackclient)
ok: [192.168.56.113] => (item=mariadb-server)
ok: [192.168.56.113] => (item=rabbitmq-server)
ok: [192.168.56.113] => (item=memcached)
ok: [192.168.56.113] => (item=etcd)

TASK [Install database server for Ubuntu] *****
*****
skipping: [192.168.56.116]
ok: [192.168.56.113]

TASK [Install message queue server for Ubuntu] *****
*****
skipping: [192.168.56.116]
ok: [192.168.56.113]

TASK [Install Memcached for Ubuntu] *****
*****
skipping: [192.168.56.116]
ok: [192.168.56.113]

TASK [Install Etcd for Ubuntu] *****
*****
skipping: [192.168.56.116]
ok: [192.168.56.113]
```

```
lykaandaya@manageNode: ~/ROA13.1
TASK [Set OpenStack packages for CentOS] *****
*****
ok: [192.168.56.116]

TASK [Install and configure EPEL repository for CentOS] *****
*****
ok: [192.168.56.116]

TASK [Install and configure NTP for CentOS] *****
*****
ok: [192.168.56.116]

TASK [Start and enable NTP service for CentOS] *****
*****
ok: [192.168.56.116]

TASK [Install OpenStack packages for CentOS] *****
*****
ok: [192.168.56.116] => (item=openstack-packstack)
ok: [192.168.56.116] => (item=mariadb-server)
ok: [192.168.56.116] => (item=rabbitmq-server)
ok: [192.168.56.116] => (item=memcached)
ok: [192.168.56.116] => (item=etcd)

TASK [Update package cache for CentOS] *****
*****
ok: [192.168.56.116] => (item=openstack-packstack)
ok: [192.168.56.116] => (item=mariadb-server)
ok: [192.168.56.116] => (item=rabbitmq-server)
ok: [192.168.56.116] => (item=memcached)
ok: [192.168.56.116] => (item=etcd)

TASK [Install and configure SQL Database for CentOS] *****
*****
ok: [192.168.56.116]

TASK [Install and configure Message Queue for CentOS] *****
*****
ok: [192.168.56.116]
```

```

TASK [Install and configure Memcached for CentOS] *****
*****
ok: [192.168.56.116]

TASK [Install etcd package] *****
*****
ok: [192.168.56.116]

TASK [Enabling openstack repository] *****
*****
ok: [192.168.56.116]

TASK [Downloading and installing the RDO repository to enable openstack repository] ***
ok: [192.168.56.116]

TASK [Updating repository and upgrading packages] *****
*****
ok: [192.168.56.116]

TASK [Installing openstack for CentOS] *****
*****
ok: [192.168.56.116]

PLAY RECAP *****
*****
192.168.56.113 : ok=11 changed=1 unreachable=0
               failed=0 skipped=9 rescued=0 ignored=0
192.168.56.116 : ok=15 changed=0 unreachable=0
               failed=0 skipped=10 rescued=0 ignored=0

```

Explanation: It shows that It executed the tasks that I created in the playbook

OUTPUT

UBUNTU

```
lykaandaya@controlnode2:~$ sudo systemctl status ntp
● ntp.service - Network Time Service
   Loaded: loaded (/lib/systemd/system/ntp.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-11-22 17:37:36 PST; 1min 15s ago
     Docs: man:ntpd(8)
  Process: 31211 ExecStart=/usr/lib/ntp/ntp-systemd-wrapper (code=exited, status=0/SUCCESS)
 Main PID: 31217 (ntpd)
    Tasks: 2 (limit: 2313)
   Memory: 2.4M
      CPU: 30ms
   CGroup: /system.slice/ntp.service
           └─31217 /usr/sbin/ntpd -p /var/run/ntpd.pid -g -u 1:1

Nov 22 17:37:41 controlnode2 ntpd[31217]: Soliciting pool server
Nov 22 17:37:41 controlnode2 ntpd[31217]: Soliciting pool server
Nov 22 17:37:42 controlnode2 ntpd[31217]: Soliciting pool server
Nov 22 17:37:42 controlnode2 ntpd[31217]: Soliciting pool server
Nov 22 17:37:43 controlnode2 ntpd[31217]: Soliciting pool server
Nov 22 17:37:44 controlnode2 ntpd[31217]: Soliciting pool server
Nov 22 17:37:45 controlnode2 ntpd[31217]: Soliciting pool server
Nov 22 17:37:58 controlnode2 ntpd[31217]: receive: Unexpected operation
Nov 22 17:37:58 controlnode2 ntpd[31217]: receive: Unexpected operation
Nov 22 17:37:58 controlnode2 ntpd[31217]: receive: Unexpected operation
lines 1-22/22 (END)
```

```
0 upgraded, 0 newly installed, 0 to remove and 0 not installed.
lykaandaya@controlnode2:~$ openstack --version
openstack 5.8.0
```

```
lykaandaya@controlnode2:~$ sudo systemctl status mariadb
● mariadb.service - MariaDB 10.6.12 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-11-22 15:00:34 PST; 1min 15s ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
  Main PID: 14900 (mariabdb)
    Status: "Taking your SQL requests now..."
    Tasks: 8 (limit: 2313)
   Memory: 61.8M
      CPU: 993ms
   CGroup: /system.slice/mariadb.service
           └─14900 /usr/sbin/mariabdb

Nov 22 15:00:34 controlnode2 mariabdb[14900]: Version: '10.6.12'
Nov 22 15:00:34 controlnode2 systemd[1]: Started MariaDB 10.6.12 database server.
Nov 22 15:00:34 controlnode2 /etc/mysql/debian-start[14916]: Upgrading debian start script
Nov 22 15:00:34 controlnode2 /etc/mysql/debian-start[14921]: Loading configuration files
Nov 22 15:00:34 controlnode2 /etc/mysql/debian-start[14921]: Loading configuration files
Nov 22 15:00:34 controlnode2 /etc/mysql/debian-start[14921]: Threading
Nov 22 15:00:34 controlnode2 /etc/mysql/debian-start[14921]: The
Nov 22 15:00:34 controlnode2 /etc/mysql/debian-start[14921]: You
Nov 22 15:00:34 controlnode2 /etc/mysql/debian-start[14929]: Check
Nov 22 15:00:34 controlnode2 /etc/mysql/debian-start[14933]: Try
lines 1-23/23 (END)
```

```
lykaandaya@controlnode2:~$ sudo systemctl status rabbitmq-server
lykaandaya@controlnode2:~$ sudo 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 Wed 2023-11-22 15:00:52 PST; 1min 1s ago
     Main PID: 15371 (beam.smp)
        Tasks: 21 (limit: 2313)
      Memory: 77.9M
         CPU: 20.780s
       CGroup: /system.slice/rabbitmq-server.service
              └─15371 /usr/lib/erlang/erts-12.2.1/bin/beam.smp -W
                 └─15382 erl_child_setup 65536
                    └─15429 inet_gethost 4
                       └─15430 inet_gethost 4

Nov 22 15:00:50 controlnode2 systemd[1]: Starting RabbitMQ Messag>
Nov 22 15:00:52 controlnode2 systemd[1]: Started RabbitMQ Messag>
lines 1-15/15 (END)
```

```
lykaandaya@controlnode2:~$ sudo systemctl status memcached
● memcached.service - memcached daemon
   Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-11-22 15:02:13 PST; 1min 1s ago
     Docs: man:memcached(1)
     Main PID: 16316 (memcached)
        Tasks: 10 (limit: 2313)
      Memory: 2.0M
         CPU: 654ms
       CGroup: /system.slice/memcached.service
              └─16316 /usr/bin/memcached -m 64 -p 11211 -u memcac>

Nov 22 15:02:13 controlnode2 systemd[1]: Started memcached daemo>
lines 1-12/12 (END)
```

	<pre> lykaandaya@controlnode2:~\$ sudo systemctl status etcd ● etcd.service - etcd - highly-available key value store Loaded: loaded (/lib/systemd/system/etcd.service; enabled; > Active: active (running) since Wed 2023-11-22 15:02:20 PST; > Docs: https://etcd.io/docs man:etcd Main PID: 16582 (etcd) Tasks: 7 (limit: 2313) Memory: 5.7M CPU: 10.997s CGroup: /system.slice/etcd.service └─16582 /usr/bin/etcd Nov 22 15:02:20 controlnode2 etcd[16582]: 8e9e05c52164694d recei> Nov 22 15:02:20 controlnode2 etcd[16582]: 8e9e05c52164694d becam> Nov 22 15:02:20 controlnode2 etcd[16582]: raft.node: 8e9e05c5216> Nov 22 15:02:20 controlnode2 etcd[16582]: setting up the initial> Nov 22 15:02:20 controlnode2 etcd[16582]: published {Name:contro> Nov 22 15:02:20 controlnode2 etcd[16582]: ready to serve client > Nov 22 15:02:20 controlnode2 etcd[16582]: serving insecure clien> Nov 22 15:02:20 controlnode2 systemd[1]: Started etcd - highly-a> Nov 22 15:02:20 controlnode2 etcd[16582]: set the initial cluste> Nov 22 15:02:20 controlnode2 etcd[16582]: enabled capabilities f> lines 1-22/22 (END) </pre>
CENTOS	<pre> [lykaandaya@localhost ~]\$ sudo systemctl status chronyd ● chronyd.service - NTP client/server Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; vendor preset: ena bled) Active: active (running) since Wed 2023-11-22 00:22:02 PST; 3h 30min ago Docs: man:chronyd(8) man:chrony.conf(5) Main PID: 737 (chronyd) Tasks: 1 CGroup: /system.slice/chronyd.service └─737 /usr/sbin/chronyd Nov 22 02:59:38 localhost.localdomain chronyd[737]: Source 47.243.51.23 online Nov 22 02:59:38 localhost.localdomain chronyd[737]: Source 58.176.194.67 online Nov 22 02:59:38 localhost.localdomain chronyd[737]: Source 162.159.200.1 online Nov 22 02:59:38 localhost.localdomain chronyd[737]: Source 157.119.101.135 online Nov 22 03:02:58 localhost.localdomain chronyd[737]: Source 58.176.194.67 replaced w...7 Nov 22 03:06:12 localhost.localdomain chronyd[737]: Selected source 194.36.178.157 Nov 22 03:06:12 localhost.localdomain chronyd[737]: System clock wrong by 6451.8437...d Nov 22 03:15:18 localhost.localdomain chronyd[737]: Selected source 157.119.101.135 Nov 22 03:15:18 localhost.localdomain chronyd[737]: System clock wrong by 2404.9639...d Nov 22 03:16:23 localhost.localdomain chronyd[737]: Selected source 47.243.51.23 Hint: Some lines were ellipsized, use -l to show in full. [lykaandaya@workstation ~]\$ sudo yum list installed grep openstack-selinux [sudo] password for lykaandaya: Repository rdo-trunk-train-tested is listed more than once in the configuration openstack-selinux.noarch 0.8.26-1.el7 @centos-openstack-train </pre>


```
[lykaandaya@localhost ~]$ sudo systemctl status mariadb
● mariadb.service - MariaDB database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; disabled; vendor preset: disabled)
   Active: active (running) since Wed 2023-11-22 03:53:23 PST; 1min 6s ago
   Process: 6972 ExecStartPost=/usr/libexec/mariadb-wait-ready $MAINPID (code=exited, status=0/SUCCESS)
   Process: 6884 ExecStartPre=/usr/libexec/mariadb-prepare-db-dir %n (code=exited, status=0/SUCCESS)
   Main PID: 6971 (mysqld_safe)
   Tasks: 20
   CGroup: /system.slice/mariadb.service
           └─6971 /bin/sh /usr/bin/mysqld_safe --basedir=/usr
             └─7136 /usr/libexec/mysqld --basedir=/usr --datadir=/var/lib/mysql --plug...

Nov 22 03:53:21 localhost.localdomain mariadb-prepare-db-dir[6884]: which will also ...
Nov 22 03:53:21 localhost.localdomain mariadb-prepare-db-dir[6884]: databases and an...
Nov 22 03:53:21 localhost.localdomain mariadb-prepare-db-dir[6884]: strongly recomme...
Nov 22 03:53:21 localhost.localdomain mariadb-prepare-db-dir[6884]: See the MariaDB ...
Nov 22 03:53:21 localhost.localdomain mariadb-prepare-db-dir[6884]: MySQL manual for...
Nov 22 03:53:21 localhost.localdomain mariadb-prepare-db-dir[6884]: Please report an...
Nov 22 03:53:21 localhost.localdomain mariadb-prepare-db-dir[6884]: The latest infor...
Nov 22 03:53:21 localhost.localdomain mysqld_safe[6971]: 231122 03:53:21 mysqld safe...
Nov 22 03:53:21 localhost.localdomain mysqld_safe[6971]: 231122 03:53:21 mysqld safe...
Nov 22 03:53:23 localhost.localdomain systemd[1]: Started MariaDB database server.
Hint: Some lines were ellipsized, use -l to show in full.

[lykaandaya@localhost ~]$ sudo systemctl status rabbitmq-server
● rabbitmq-server.service - RabbitMQ broker
   Loaded: loaded (/usr/lib/systemd/system/rabbitmq-server.service; disabled; vendor preset: disabled)
   Active: active (running) since Wed 2023-11-22 03:50:56 PST; 4min 49s ago
   Main PID: 6461 (beam.smp)
   Tasks: 40
   CGroup: /system.slice/rabbitmq-server.service
           └─6461 /usr/lib64/erlang/erts-5.10.4/bin/beam.smp -W w -K true -A30 -P 1048576 -- -root /usr/li
             └─6478 /usr/lib64/erlang/erts-5.10.4/bin/epmd -daemon
               └─6543 inet_gethost 4
                 └─6544 inet_gethost 4

Nov 22 03:50:56 localhost.localdomain systemd[1]: Starting RabbitMQ broker...
Nov 22 03:50:56 localhost.localdomain systemd[1]: Got notification message from PID 6478, but reception o...
Nov 22 03:50:56 localhost.localdomain rabbitmq-server[6461]: RabbitMQ 3.3.5. Copyright (C) 2007-2014 GoPiv...
Nov 22 03:50:56 localhost.localdomain rabbitmq-server[6461]: ## ## Licensed under the MPL. See http
Nov 22 03:50:56 localhost.localdomain rabbitmq-server[6461]: ## ##
Nov 22 03:50:56 localhost.localdomain rabbitmq-server[6461]: ##### Logs: /var/log/rabbitmq/rabbit@lo
Nov 22 03:50:56 localhost.localdomain rabbitmq-server[6461]: ##### /var/log/rabbitmq/rabbit@lo
Nov 22 03:50:56 localhost.localdomain rabbitmq-server[6461]: #####
Nov 22 03:50:56 localhost.localdomain rabbitmq-server[6461]: Starting broker... completed with 0 plugins.
Nov 22 03:50:56 localhost.localdomain systemd[1]: Started RabbitMQ broker.
Hint: Some lines were ellipsized, use -l to show in full.

[lykaandaya@localhost ~]$ sudo systemctl status memcached
● memcached.service - Memcached
   Loaded: loaded (/usr/lib/systemd/system/memcached.service; disabled; vendor preset: disabled)
   Active: active (running) since Wed 2023-11-22 03:51:27 PST; 4min 47s ago
   Main PID: 6621 (memcached)
   Tasks: 6
   CGroup: /system.slice/memcached.service
           └─6621 /usr/bin/memcached -u memcached -p 11211 -m 64 -c 1024

Nov 22 03:51:27 localhost.localdomain systemd[1]: Started Memcached.

[lykaandaya@workstation ~]$ sudo systemctl status etcd
● etcd.service - Etcd Server
   Loaded: loaded (/usr/lib/systemd/system/etcd.service; disabled; vendor preset: disabled)
   Active: active (running) since Wed 2023-11-22 23:35:17 PST; 11s ago
   Main PID: 6021 (etcd)
   Tasks: 9
   CGroup: /system.slice/etcd.service
           └─6021 /usr/bin/etcd --name=default --data-dir=/var/lib/etcd/default.etcd...

Nov 22 23:35:17 workstation etcd[6021]: 8e9e05c52164694d received MsgVoteResp from... 2
Nov 22 23:35:17 workstation etcd[6021]: 8e9e05c52164694d became leader at term 2
Nov 22 23:35:17 workstation etcd[6021]: raft.node: 8e9e05c52164694d elected leader... 2
Nov 22 23:35:17 workstation etcd[6021]: setting up the initial cluster version to 3.3
Nov 22 23:35:17 workstation etcd[6021]: set the initial cluster version to 3.3
Nov 22 23:35:17 workstation etcd[6021]: enabled capabilities for version 3.3
Nov 22 23:35:17 workstation etcd[6021]: published {Name:default ClientURLs:[http://...32
Nov 22 23:35:17 workstation etcd[6021]: ready to serve client requests
Nov 22 23:35:17 workstation etcd[6021]: serving insecure client requests on 127.0...d!
Nov 22 23:35:17 workstation systemd[1]: Started Etcd Server.
Hint: Some lines were ellipsized, use -l to show in full.
```

Explanation: In the linux server 1 it shows that the NTP, SQL Database, Message Queue, Memcached, Etcd are installed and the service is currently active and

running. and the installed OpenStack packages are version 5.8.0. In the CentOS server it shows that NTP, SQL Database, Message Queue, Memcached, Etc are installed and the service is currently active and running and the installed Openstack packages (openstack-selinux.noarch) are version 0.8.26-1.el7

```
Create mode 100644 roles/ubuntu/tasks/install.yml
lykaandaya@managenode:~/HOA13.1$ git add *
lykaandaya@managenode:~/HOA13.1$ git commit -m "HOA13"
On branch main
Your branch is ahead of 'origin/main' by 1 commit.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
lykaandaya@managenode:~/HOA13.1$ git push
Enumerating objects: 13, done.
Counting objects: 100% (13/13), done.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (12/12), 1.91 KiB | 1.92 MiB/s, done.
Total 12 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), done.
To github.com:andayalyka/HOA13.1.git
   e426e61..ee133f4  main -> main
```

Explanation: All of the created files has been push in the github and has a commit message "HOA13"

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

- Integrating OpenStack provides organizations with a versatile and scalable cloud computing solution, allowing for the seamless administration of virtualized resources to boost agility and efficiency. OpenStack promotes interoperability among different infrastructure components, emphasizing vendor neutrality. Its modular architecture enables users to tailor deployments to specific requirements, facilitating automation to minimize manual intervention and expedite provisioning processes. OpenStack's open-source nature fosters community collaboration and ongoing innovation. This framework supports a range of hypervisors and storage options, accommodating diverse workloads. In essence, OpenStack empowers businesses to construct and oversee robust, cost-efficient private and public cloud environments, promoting resource optimization and technological resilience.

Conclusions:

In conclusion, implementing a workflow for OpenStack installation using Ansible as the Infrastructure as Code (IaC) solution presents a strategic method

for cloud deployment. This approach leverages the robust cloud computing capabilities of OpenStack alongside Ansible's automation proficiency. With IaC, the deployment process becomes more efficient, uniform, and easily replicable. Ansible's role in orchestrating OpenStack installation not only boosts efficiency through task automation but also ensures a standardized and dependable infrastructure. This strategy facilitates smooth management, adaptability, and scalability for future needs. In essence, the adoption of Ansible for OpenStack deployment reflects a dedication to agility, efficiency, and the sustained manageability of cloud infrastructure.