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Course/Section: CpE31S2	Date Submitted: 12-02-2024
Instructor: Engr. Robin Valenzuela	Semester and SY: 1st Semester 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	
<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)

TASK 1: Create a new repository

```
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ ls
ansible.cfg  inventory  openstack.yml  README.md
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$
```

```
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ ls
ansible.cfg  inventory  openstack.yml  README.md
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ ansible all -m ping
192.168.56.103 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$
```

Inventory:

```
zamora@workstation: ~/TIP_HOA-13.1_ZAMORA_Angelo
GNU nano 6.2 inventory
[controller]
192.168.56.103
```

The content of the inventory.

ansible.cfg:

```
GNU nano 2.9.3 ansible.cfg
[defaults]
inventory = inventory
remote_user = zamora_admin
host_key_checking = True
```

Task 2: Creation of the openstack playbook

Unset

```
- name: Install NTP on Controller Node
  tags: ntp
  hosts: controller
  become: true
```

```

tasks:
  - name: Install NTP
    apt:
      name: ntp
      state: present
    tags:
      - ntp # Tag this task as 'ntp'

- name: Install OpenStack Packages on Controller Node
  tags: setup
  hosts: controller
  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 Controller Node
  tags: mysql
  hosts: controller
  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 Controller Node
  tags: rabbit
  hosts: controller
  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 Controller Node
  tags: memcached
  hosts: controller
  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 Controller Node
```

```
tags: etcd
hosts: controller
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
```

Task: Install NTP

```
zanora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ ansible-playbook --tags ntp --ask-become-pass openstack.yml
BECOME password:

PLAY [Install NTP on Controller Node] *****
*****

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

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

PLAY [Install OpenStack Packages on Controller Node] *****
*****

PLAY [Install SQL Database (MySQL) on Controller Node] *****
*****

PLAY [Install Message Queue (RabbitMQ) on Controller Node] *****
*****

PLAY [Install Memcached on Controller Node] *****
*****

PLAY [Install and Configure Etcd on Controller Node] *****
*****

PLAY RECAP *****
192.168.56.103      : ok=2    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

zanora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$
```

```
zanora@server2:~$ sudo systemctl status ntp
● ntp.service - Network Time Service
   Loaded: loaded (/lib/systemd/system/ntp.service; enabled; vendor preset: e>
   Active: active (running) since Wed 2024-11-27 15:33:42 +08; 29min ago
     Docs: man:ntpd(8)
    Main PID: 5114 (ntpd)
      Tasks: 2 (limit: 4608)
     Memory: 1.5M
        CPU: 255ms
    CGroup: /system.slice/ntp.service
            └─5114 /usr/sbin/ntpd -p /var/run/ntpd.pid -g -u 134:141

Nov 27 16:01:52 server2 ntpd[5114]: Soliciting pool server 2620:2d:4000:1::40
Nov 27 16:02:05 server2 ntpd[5114]: Soliciting pool server 222.127.1.19
Nov 27 16:02:11 server2 ntpd[5114]: Soliciting pool server 2406:da14:10c4:9aa0:~>
Nov 27 16:02:11 server2 ntpd[5114]: Soliciting pool server 222.127.1.24
Nov 27 16:02:16 server2 ntpd[5114]: Soliciting pool server 222.127.1.27
Nov 27 16:03:01 server2 ntpd[5114]: Soliciting pool server 2620:2d:4000:1::3f
Nov 27 16:03:12 server2 ntpd[5114]: Soliciting pool server 222.127.1.27
Nov 27 16:03:15 server2 ntpd[5114]: Soliciting pool server 222.127.1.27
```

TASK: Installing OpenStack Packages

```
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ ansible-playbook --tags setup --ask-become-pass openstack.yml
BECOME password:

PLAY [Install NTP on Controller Node] *****

PLAY [Install OpenStack Packages on Controller Node] *****

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=mysql-server)
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)
```

```
zamora@server2:~$ sudo systemctl status nova-api
● nova-api.service - OpenStack Compute API
   Loaded: loaded (/lib/systemd/system/nova-api.service; enabled; vendor prese>
   Active: active (running) since Wed 2024-11-27 15:49:37 +08; 15min ago
     Docs: man:nova-api(1)
   Main PID: 24032 (nova-api)
    Tasks: 5 (limit: 4608)
   Memory: 196.0M
      CPU: 5min 44.012s
   CGroup: /system.slice/nova-api.service
           └─24032 /usr/bin/python3 /usr/bin/nova-api --config-file=/etc/nova>
             └─31658 /usr/bin/python3 /usr/bin/nova-api --config-file=/etc/nova>
               └─31659 /usr/bin/python3 /usr/bin/nova-api --config-file=/etc/nova>
                 └─31660 /usr/bin/python3 /usr/bin/nova-api --config-file=/etc/nova>
                   └─31661 /usr/bin/python3 /usr/bin/nova-api --config-file=/etc/nova>

Nov 27 15:49:37 server2 systemd[1]: Started OpenStack Compute API.
Nov 27 15:49:38 server2 nova-api[24032]: Modules with known eventlet monkey pat>
lines 1-17/17 (END)
```

```
zamora@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 Wed 2024-11-27 15:36:24 +08; 38min ago
     Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 7733 (apache2)
    Tasks: 65 (limit: 4608)
```

```

zamora@server2:~$ sudo systemctl status neutron-server
● neutron-server.service - OpenStack Neutron Server
   Loaded: loaded (/lib/systemd/system/neutron-server.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 16:17:02 +08; 7s ago
     Docs: man:neutron-server(1)
   Main PID: 35508 (neutron-server)
    Tasks: 1 (limit: 4608)
   Memory: 114.0M
      CPU: 2.921s
   CGroup: /system.slice/neutron-server.service
           └─35508 /usr/bin/python3 /usr/bin/neutron-server --config-file=/etc/neutron/neutron.conf

Nov 27 16:17:02 server2 systemd[1]: Started OpenStack Neutron Server.
lines 1-12/12 (END)

```

TASK:MySQL

```

zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ ansible-playbook --tags mysql --ask-become-pass openstack.yml
BECOME password:

PLAY [Install NTP on Controller Node] *****
*****

PLAY [Install OpenStack Packages on Controller Node] *****
*****

PLAY [Install SQL Database (MySQL) on Controller Node] *****
*****

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

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

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

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

```

```

zamora@server2:~$ systemctl status mysql.service
● mysql.service - MySQL Community Server
   Loaded: loaded (/lib/systemd/system/mysql.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 17:25:22 +08; 31s ago
     Process: 4992 ExecStartPre=/usr/share/mysql/mysql-systemd-start pre (code=exited, status=0/SUCCESS)
   Main PID: 5001 (mysqld)
    Status: "Server is operational"
     Tasks: 38 (limit: 4603)
   Memory: 367.1M
      CPU: 1.149s
   CGroup: /system.slice/mysql.service
           └─5001 /usr/sbin/mysqld

lines 1-11/11 (END)

```


TASK: RabbitMQ Server

```
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ ansible-playbook --tags rabbit --ask-become-pass openstack.yml
BECOME password:

PLAY [Install NTP on Controller Node] *****
PLAY [Install OpenStack Packages on Controller Node] *****
PLAY [Install SQL Database (MySQL) on Controller Node] *****
PLAY [Install Message Queue (RabbitMQ) on Controller Node] *****
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]
PLAY [Install Memcached on Controller Node] *****
PLAY [Install and Configure Etcd on Controller Node] *****
PLAY RECAP *****
192.168.56.103      : ok=3    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

```
zamora@server2:~$ 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 2024-11-27 17:20:04 +08; 9min ago
     Main PID: 1011 (beam.smp)
        Tasks: 24 (limit: 4603)
       Memory: 125.7M
          CPU: 9.698s
        CGroup: /system.slice/rabbitmq-server.service
               └─1011 /usr/lib/erlang/erts-12.2.1/bin/beam.smp -W w -MBas ageffcb
                  1087 erl_child_setup 65536
                  1448 inet_gethost 4
                  1449 inet_gethost 4
                  1615 /bin/sh -s rabbit_disk_monitor

Warning: some journal files were not opened due to insufficient permissions.
lines 1-15/15 (END)
```

TASK: Memcached

```
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ ansible-playbook --tags memcached --ask-become-pass openstack.yml
BECOME password:

PLAY [Install NTP on Controller Node] *****
PLAY [Install OpenStack Packages on Controller Node] *****
PLAY [Install SQL Database (MySQL) on Controller Node] *****
PLAY [Install Message Queue (RabbitMQ) on Controller Node] *****
PLAY [Install Memcached on Controller Node] *****

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]

PLAY [Install and Configure EtcD on Controller Node] *****

PLAY RECAP *****
192.168.56.103      : ok=3    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$
```

```
zamora@server2:~$ systemctl status memcached
● memcached.service - memcached daemon
   Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor pre>
   Active: active (running) since Wed 2024-11-27 17:19:05 +08; 12min ago
     Docs: man:memcached(1)
  Main PID: 1007 (memcached)
    Tasks: 10 (limit: 4603)
   Memory: 2.4M
      CPU: 157ms
   CGroup: /system.slice/memcached.service
           └─1007 /usr/bin/memcached -m 64 -p 11211 -u memcache -l 127.0.0.1 >

Warning: some journal files were not opened due to insufficient permissions.
lines 1-12/12 (END)
```

TASK: ETCD

```
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ ansible-playbook --tags etcd --ask-become-pass openstack.yml
BECOME password:

PLAY [Install NTP on Controller Node] *****
PLAY [Install OpenStack Packages on Controller Node] *****
PLAY [Install SQL Database (MySQL) on Controller Node] *****
PLAY [Install Message Queue (RabbitMQ) on Controller Node] *****
PLAY [Install Memcached on Controller Node] *****
PLAY [Install and Configure Etcd on Controller Node] *****

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

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

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

PLAY RECAP *****
192.168.56.103      : ok=3    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$
```

```
zamora@server2:~$ 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 Wed 2024-11-27 17:33:49 +08; 2min 26s ago
     Docs: https://etcd.io/docs
           man:etcd
   Main PID: 8269 (etcd)
      Tasks: 8 (limit: 4603)
     Memory: 5.3M
        CPU: 792ms
    CGroup: /system.slice/etcd.service
            └─8269 /usr/bin/etcd

lines 1-11/11 (END)
```

TASK 3:

```
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ git add *
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ git commit -m "HOA13 FILES"
[main 6c784f6] HOA13 FILES
 3 files changed, 16 insertions(+), 7 deletions(-)
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$ git push
Enumerating objects: 9, done.
Counting objects: 100% (9/9), done.
Delta compression using up to 2 threads
Compressing objects: 100% (4/4), done.
Writing objects: 100% (5/5), 684 bytes | 684.00 KiB/s, done.
Total 5 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To github.com:GeloacERT/TIP_HOA-13.1_ZAMORA_Angelo.git
   5cd8408..6c784f6  main -> main
zamora@workstation:~/TIP_HOA-13.1_ZAMORA_Angelo$
```



GitHub Link: https://github.com/GeloaceRT/TIP_HOA-13.1_ZAMORA_Angelo

Reflections:

Answer the following:

What are the benefits of implementing OpenStack?

OpenStack provides substantial benefits to enterprises seeking a versatile and cost-effective cloud solution. As an open-source platform, it reduces the license expenses that come with proprietary software. Furthermore, its modular architecture allows for seamless connection with a variety of hardware and software components, resulting in unrivaled flexibility. Furthermore, OpenStack's scalability enables enterprises to easily adjust to changing workloads, resulting in optimal resource use.

Beyond these key features, OpenStack has a huge and active developer and user community that promotes continual innovation and provides substantial support. This community-driven approach ensures that the platform is up to speed on the newest technology and best practices. Organizations can use OpenStack to streamline operations, decrease expenses, and expedite digital transformation initiatives.

Conclusions:

I have gotten a thorough understanding of cloud services, including their benefits and potential downsides. Organizations that use cloud technologies can save money, increase scalability, and improve operational efficiency. However, it is critical to

carefully examine your organization's specific needs before choosing the suitable cloud deployment and service models.

I've also looked into the practical elements of deploying OpenStack with Ansible. By automating the installation and configuration processes, I can improve deployment efficiency, eliminate human error, and reduce time-to-market. This hands-on experience has strengthened my understanding of OpenStack and its possibilities, allowing me to more effectively use this powerful platform in future projects.