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Course/Section: CpE31S2	**Date Submitted:** 12-13-2024
Instructor: Engr. Robin Valenzuela	**Semester and SY:** 1st Semester 2024 - 2025

Activity 15: OpenStack Installation (Neutron, Horizon, Cinder)

- **Objectives**

Create a workflow to install OpenStack using Ansible as your Infrastructure as Code (IaC).

- **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.

- **Resources**

Oracle VirtualBox (Hypervisor)

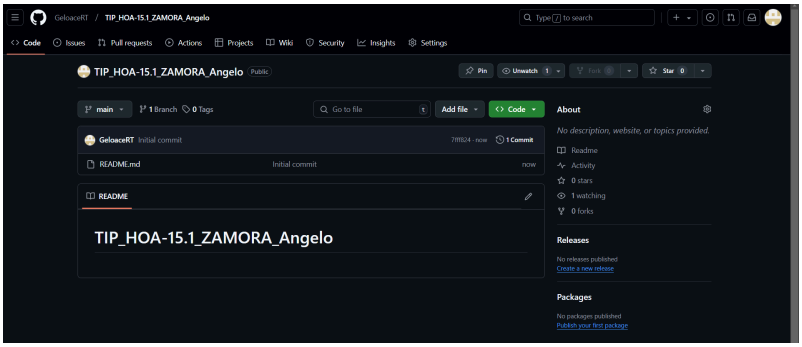
1x Ubuntu VM or Centos VM

- **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. Neutron
    b. Horizon
    c. Cinder
    d. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in the Inventory file.
    e. Add, commit and push it to your GitHub repo.

Output (screenshots and explanations)

- Create a new repository for this activity.




```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ ls
ansible.cfg  inventory  README.md
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

Inventory:

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ cat inventory
[defaults]
192.168.56.103

zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

Ansible Config:

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ cat ansible.cfg
[defaults]
inventory = inventory
remote_user = zamora
host_key_checking = True
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

- Create a playbook that converts the steps in the following items in https://docs.openstack.org/install-guide/

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo/roles$ tree
.
├── cinder
├── horizon
└── neutron

3 directories, 0 files
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo/roles$
```

Creation of the main playbook

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ cat openstack.yml
- hosts: all
  become: true
  pre_tasks:


  - name: install updates (Ubuntu)
    tags: always
    apt:
      update_cache: yes
    changed_when: false
    when: ansible_distribution == "Ubuntu"

- hosts: all
  become: true
  roles:
        - cinder
        - horizon
        - neutron
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ tree roles
roles
├── cinder
│   └── tasks
│       └── main.yml
├── horizon
│   └── tasks
│       └── main.yml
└── neutron
    └── tasks
        └── main.yml

6 directories, 3 files
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

- Neutron
  main playbook:

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ cat roles/neutron/tasks/main.yml
- name: installing neutron
  tags: neutron
  apt:
     name:
        - neutron-server
        - neutron-l3-agent
        - neutron-plugin-ml2
        - neutron-dhcp-agent
        - neutron-linuxbridge-agent
        - python3-neutronclient
     state: latest
     update_cache: yes
  when: ansible_distribution == "Ubuntu"
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

Running the playbook:

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ ansible-playbook --tags neutron --ask-become-pass openstack.yml
BECOME password:

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

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

TASK [install updates (Ubuntu)] ************************************************************************************
ok: [192.168.56.103]

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

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

TASK [neutron : installing neutron] ********************************************************************************
changed: [192.168.56.103]

PLAY RECAP *********************************************************************************************************
192.168.56.103             : ok=4    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

Proof of installation:

```
zamora@server2:~$ systemctl status neutron-server
● neutron-server.service - OpenStack Neutron Server
     Loaded: loaded (/lib/systemd/system/neutron-server.service; enabled; vendo>
     Active: active (running) since Sat 2024-12-07 11:18:11 +08; 12s ago
       Docs: man:neutron-server(1)
   Main PID: 27327 (neutron-server)
      Tasks: 1 (limit: 4603)
     Memory: 94.2M
        CPU: 2.673s
     CGroup: /system.slice/neutron-server.service
             └─27327 /usr/bin/python3 /usr/bin/neutron-server --config-file=/et>
lines 1-10/10 (END)
```

```
zamora@server2:~$ dpkg -l | grep neutron
ii  neutron-common                           2:20.5.0-0ubuntu1
all           Neutron is a virtual network service for Openstack - common
ii  neutron-dhcp-agent                       2:20.5.0-0ubuntu1
all           Neutron is a virtual network service for Openstack - DHCP agent
ii  neutron-l3-agent                         2:20.5.0-0ubuntu1
all           Neutron is a virtual network service for Openstack - l3 agent
ii  neutron-linuxbridge-agent                2:20.5.0-0ubuntu1
all           Neutron is a virtual network service for Openstack - linuxbridge agent
ii  neutron-metadata-agent                   2:20.5.0-0ubuntu1
all           Neutron is a virtual network service for Openstack - metadata agent
ii  neutron-plugin-ml2                       2:20.5.0-0ubuntu1
all           Neutron is a virtual network service for Openstack - ML2 plugin
ii  neutron-server                           2:20.5.0-0ubuntu1
all           Neutron is a virtual network service for Openstack - server
ii  python3-neutron                          2:20.5.0-0ubuntu1
all           Neutron is a virtual network service for Openstack - Python library
ii  python3-neutron-lib                      2.20.0-0ubuntu1
all           Neutron shared routines and utilities - Python 3.x
ii  python3-neutronclient                    1:7.8.0-0ubuntu1
all           client API library for Neutron - Python 3.x
zamora@server2:~$
```

- Horizon

Main playbook:

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ cat roles/horizon/tasks/main.yml
- name: installing horizon
  tags: horizon
  apt:
     name:
          - openstack-dashboard
     state: latest
     update_cache: yes
  when: ansible_distribution == "Ubuntu"
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

Running the playbook:

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ ansible-playbook --tags horizon --ask-become-pass openstack.yml
BECOME password:

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

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

TASK [install updates (Ubuntu)] ************************************************************************************
ok: [192.168.56.103]

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

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

TASK [horizon : installing horizon] ********************************************************************************
ok: [192.168.56.103]

PLAY RECAP *********************************************************************************************************
192.168.56.103             : ok=4    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

Proof of installation:

```
zamora@server2:~$ dpkg -l | grep openstack-dashboard
ii  openstack-dashboard                         4:22.1.1-0ubuntu1.1
                      all          Django web interface for OpenStack
ii  openstack-dashboard-common                  4:22.1.1-0ubuntu1.1
                      all          Django web interface for OpenStack - common fil
es
zamora@server2:~$
```

- Cinder

main playbook:

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ cat roles/cinder/tasks/main.yml
- name: installing cinder
  tags: cinder
  apt:
    name:
        - cinder-volume
        - python3-mysqldb
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

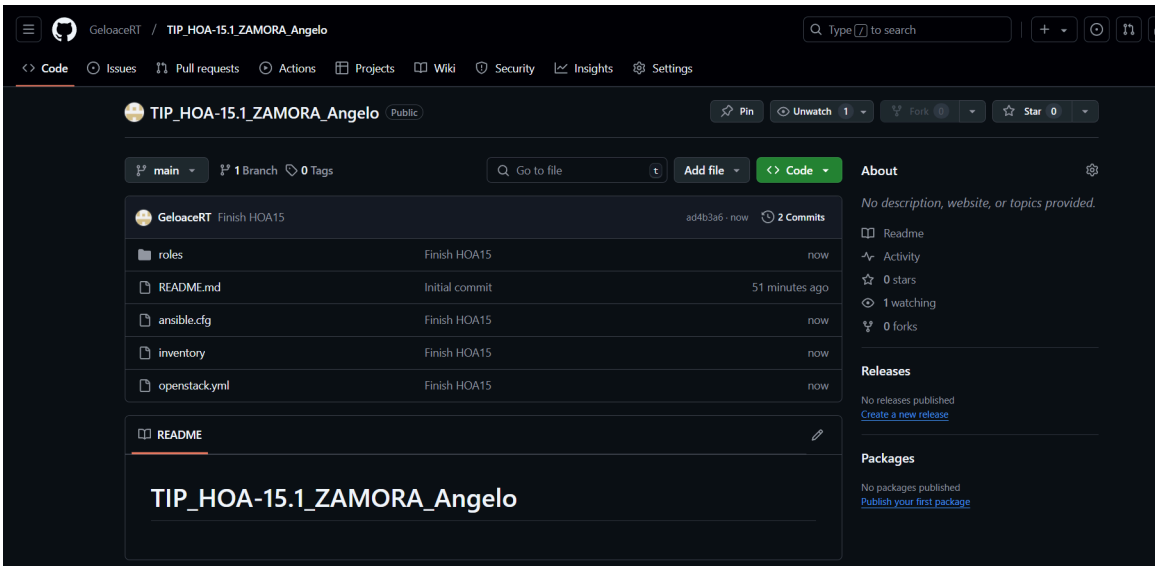
```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ ansible-playbook --tags cinder --ask-become-pass openstack.yml
BECOME password:

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

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

TASK [install updates (Ubuntu)] ************************************************
ok: [192.168.56.103]

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

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

TASK [cinder : installing cinder] **********************************************
changed: [192.168.56.103]

PLAY RECAP *********************************************************************
192.168.56.103             : ok=4    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```

Proof of Installation:

```
zamora@server2:~$ systemctl status cinder-volume
● cinder-volume.service - OpenStack Cinder Volume
     Loaded: loaded (/lib/systemd/system/cinder-volume.service; enabled; vendor>
    Drop-In: /usr/lib/systemd/system/cinder-volume.service.d
             └─cinder-volume.service.conf
     Active: active (running) since Sat 2024-12-07 11:08:51 +08; 11s ago
       Docs: man:cinder-volume(1)
   Main PID: 21488 (cinder-volume)
      Tasks: 1 (limit: 4603)
     Memory: 68.8M
        CPU: 1.538s
     CGroup: /system.slice/cinder-volume.service
             └─21488 /usr/bin/python3 /usr/bin/cinder-volume --config-file=/etc>
lines 1-12/12 (END)
```

- Add, commit and push it to your GitHub repo.

```
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ git add *
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ git commit -m "Finish HOA15"
[main ad4b3a6] Finish HOA15
 6 files changed, 55 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 inventory
 create mode 100755 openstack.yml
 create mode 100755 roles/cinder/tasks/main.yml
 create mode 100755 roles/horizon/tasks/main.yml
 create mode 100755 roles/neutron/tasks/main.yml
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$ git push
Enumerating objects: 16, done.
Counting objects: 100% (16/16), done.
Delta compression using up to 2 threads
Compressing objects: 100% (8/8), done.
Writing objects: 100% (15/15), 1.45 KiB | 495.00 KiB/s, done.
Total 15 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:GeloaceRT/TIP_HOA-15.1_ZAMORA_Angelo.git
   7fff824..ad4b3a6  main -> main
zamora@workstation:~/TIP_HOA-15.1_ZAMORA_Angelo$
```



GitHub Link: https://github.com/GeloaceRT/TIP_HOA-15.1_ZAMORA_Angelo

Reflections:

Answer the following:

1. Describe Neutron, Horizon and Cinder services

   Neutron in OpenStack's networking service, which enables dynamic and flexible networking in cloud environments. It handles duties like virtual network creation, IP assignment, and instance connectivity. Neutron includes complex features including network segmentation (VLAN, VXLAN), load balancing, and security groups, and it works with both physical and software-defined networking systems via plugins and drivers. This flexibility enables administrators to adjust networking to their own infrastructure requirements.

   Cinder in OpenStack's block storage service, which provides durable and high-performance storage for virtual machines. Users can create and attach volumes as separate storage units to handle operations such as database hosting and application storage. Cinder supports a variety of backends (e.g., Ceph, NetApp), allowing for snapshots, backups, and scaling, ensuring reliable storage for a wide range of workloads.

Conclusions:

Cloud services provide substantial benefits such as scalability, cost-efficiency, and flexibility, allowing businesses to quickly adjust to changing workloads while reducing infrastructure expenditures. However, they also present issues such as potential vendor lock-in, data security concerns, and reliance on consistent internet access. Evaluating cloud deployment methods (public, private, and hybrid) as well as service models (IaaS, PaaS, and SaaS) is critical for meeting organizational needs. For example, public cloud delivers cost savings but less control, whereas private cloud provides better security at a higher cost. Hybrid models combine these traits, providing both flexibility and control.

The use of Ansible to deploy and configure OpenStack base services like Neutron for networking, Horizon for dashboard administration, and Cinder for block storage ensures consistency and repeatability. By automating the configuration, I can speed OpenStack deployments across CentOS 9 machines. Based on this, I conclude that OpenStack, when combined with automation tools, is a strong platform for constructing cloud infrastructure, allowing flexibility and control over resources, but it requires careful design to manage complexity and assure optimal performance.