Name:LAUS,DOMONDON,ESPIRITU	Date Performed:
Course/Section:CPE232-CPE31S1	Date Submitted:
Instructor: Dr. Jonathan Taylar	Semester and SY:

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

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)

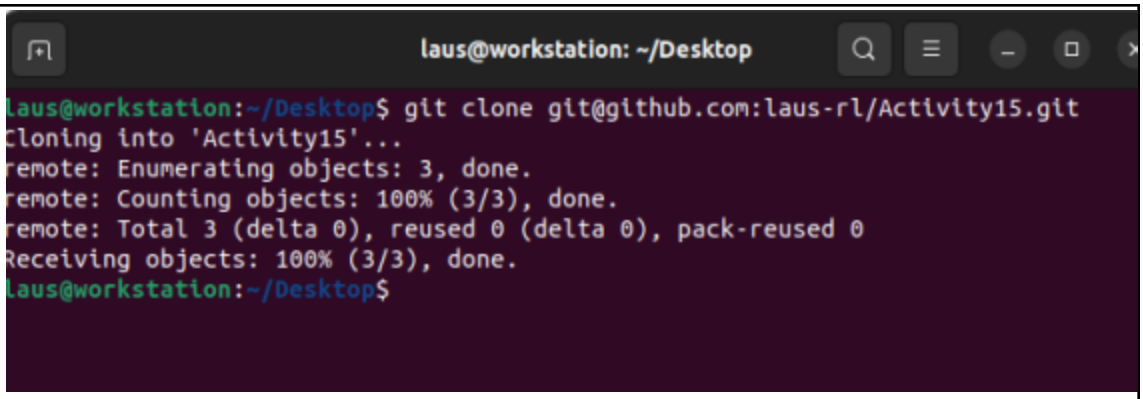
1x Ubuntu VM or Centos VM

4. Tasks

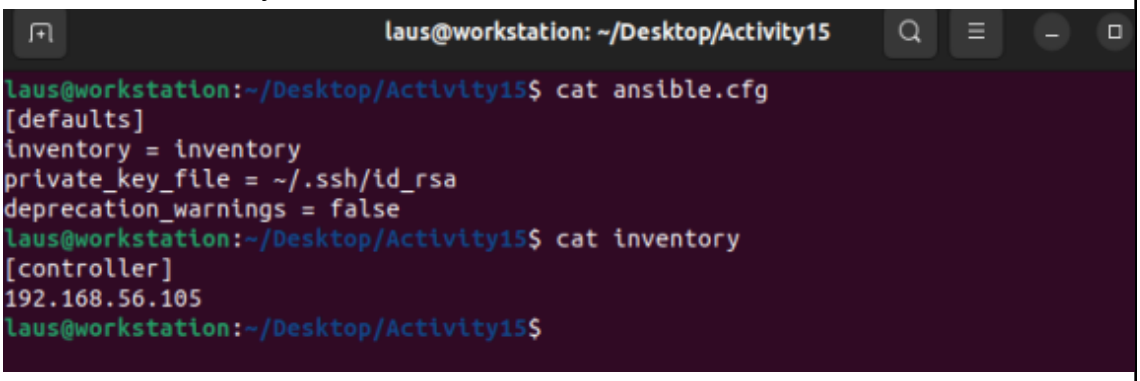
1. Create a new repository for this activity.
2. Create a playbook that converts the steps in the following items in https://docs.openstack.org/install-guide/
   a. Neutron
   b. Horizon
   c. Cinder
   d. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in the Inventory file.
   e. Add, commit and push it to your GitHub repo.

5. Output (screenshots and explanations)

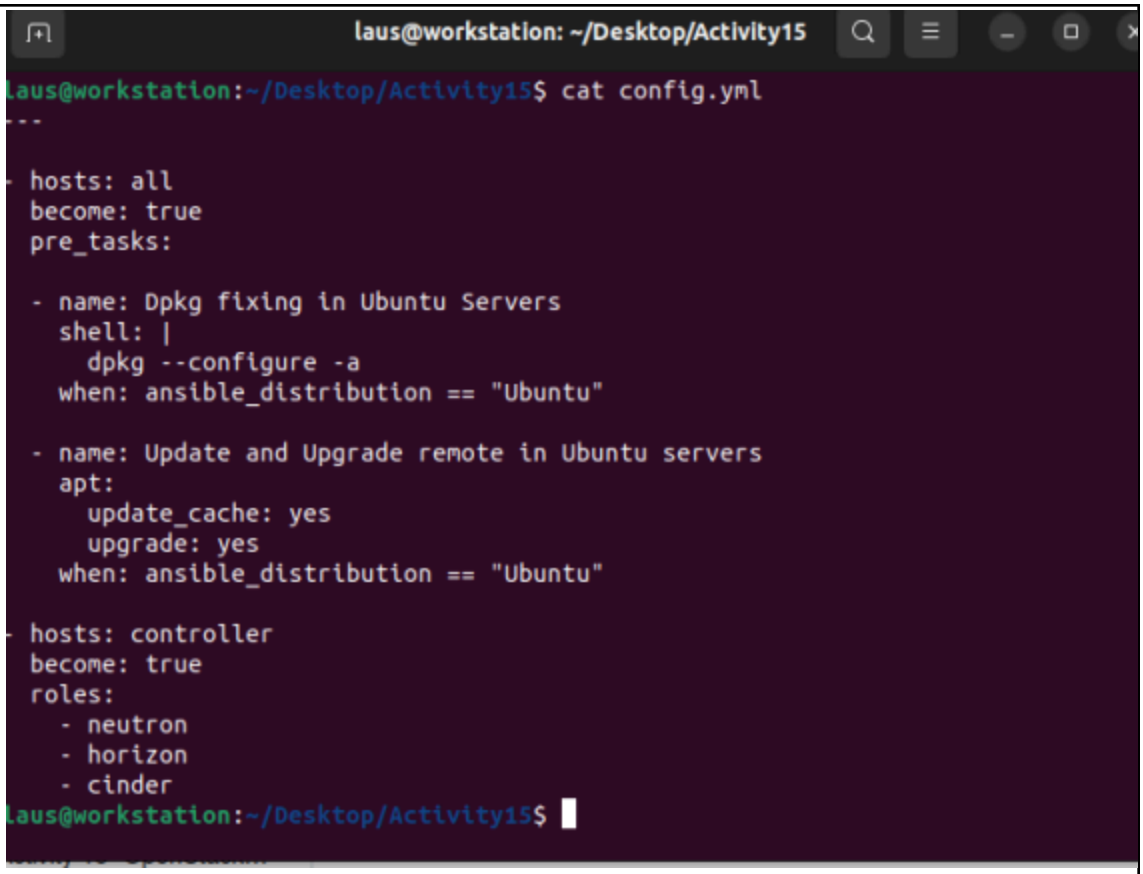
1. Create a new repository for this activity.



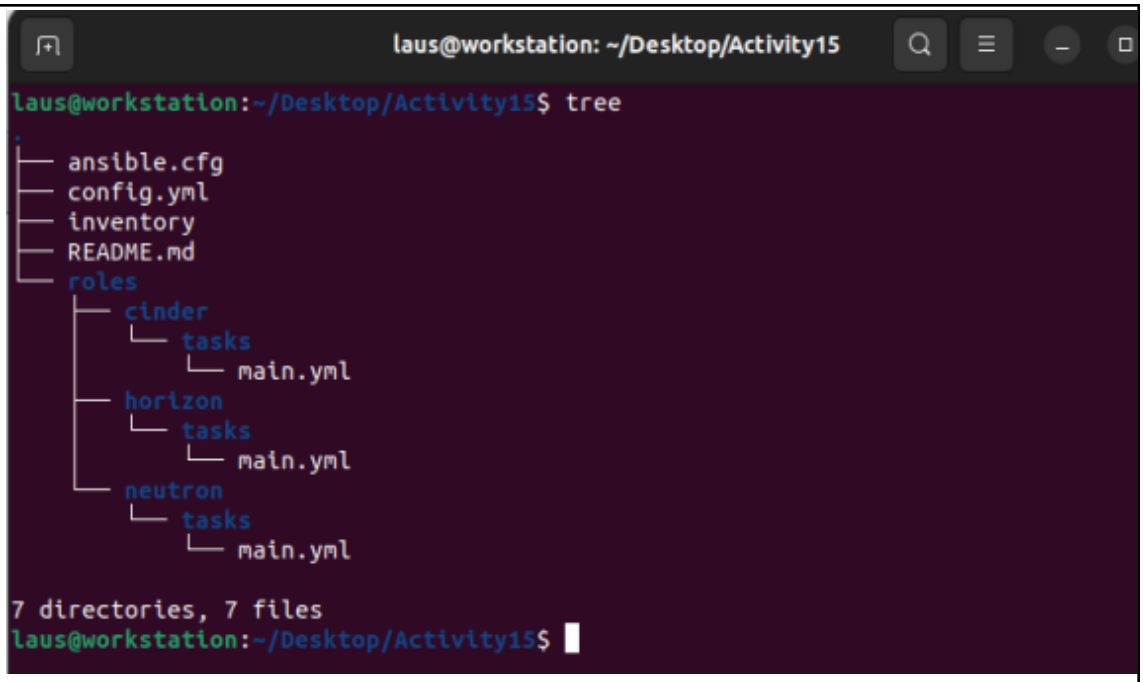
For this activity, I created a repository named “Activity15” on my GitHub and then cloned it to my workstation.



After successfully cloning the created repository, I changed my directory to the added repository and then worked on creating my ansible.cfg and inventory files.

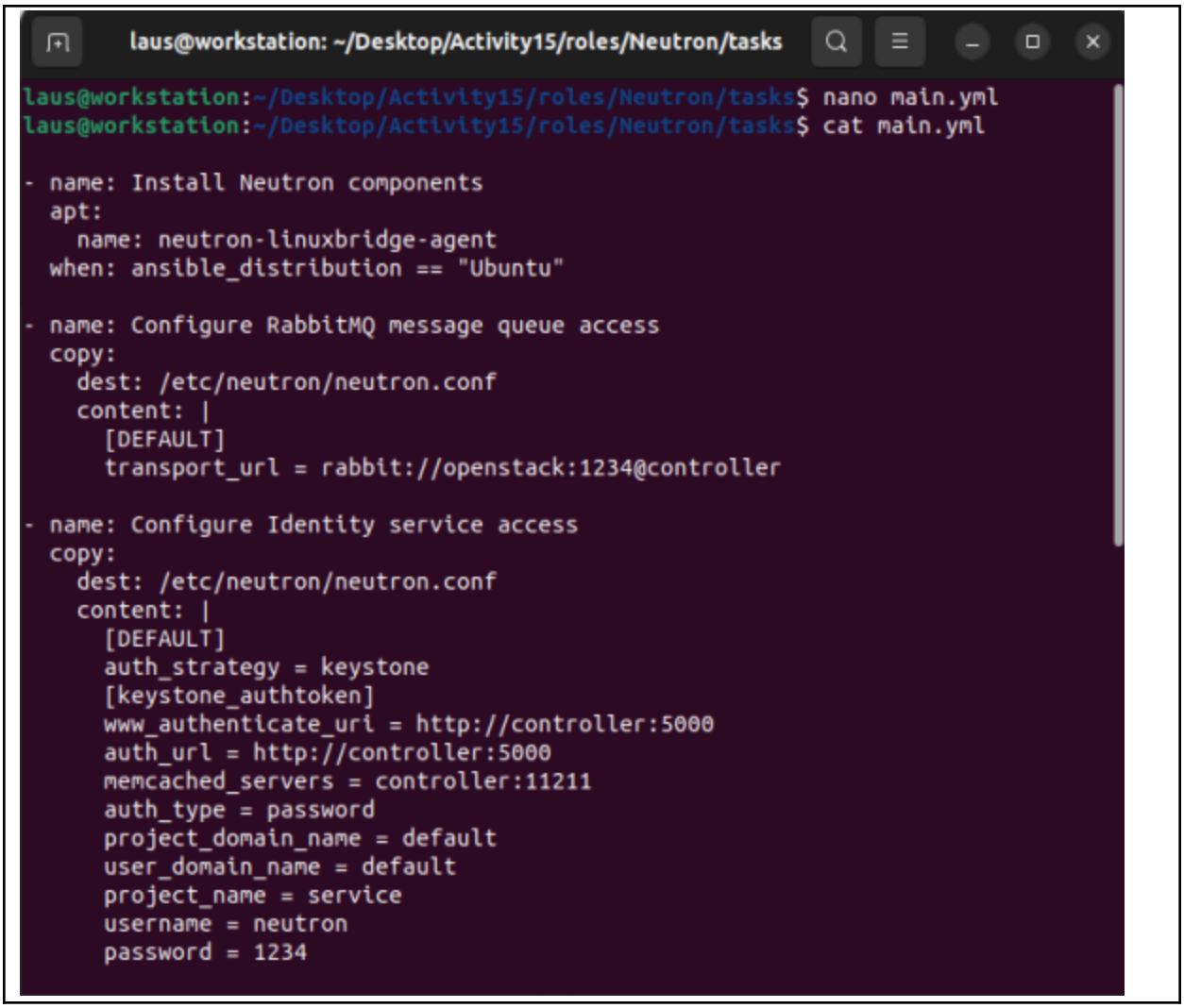


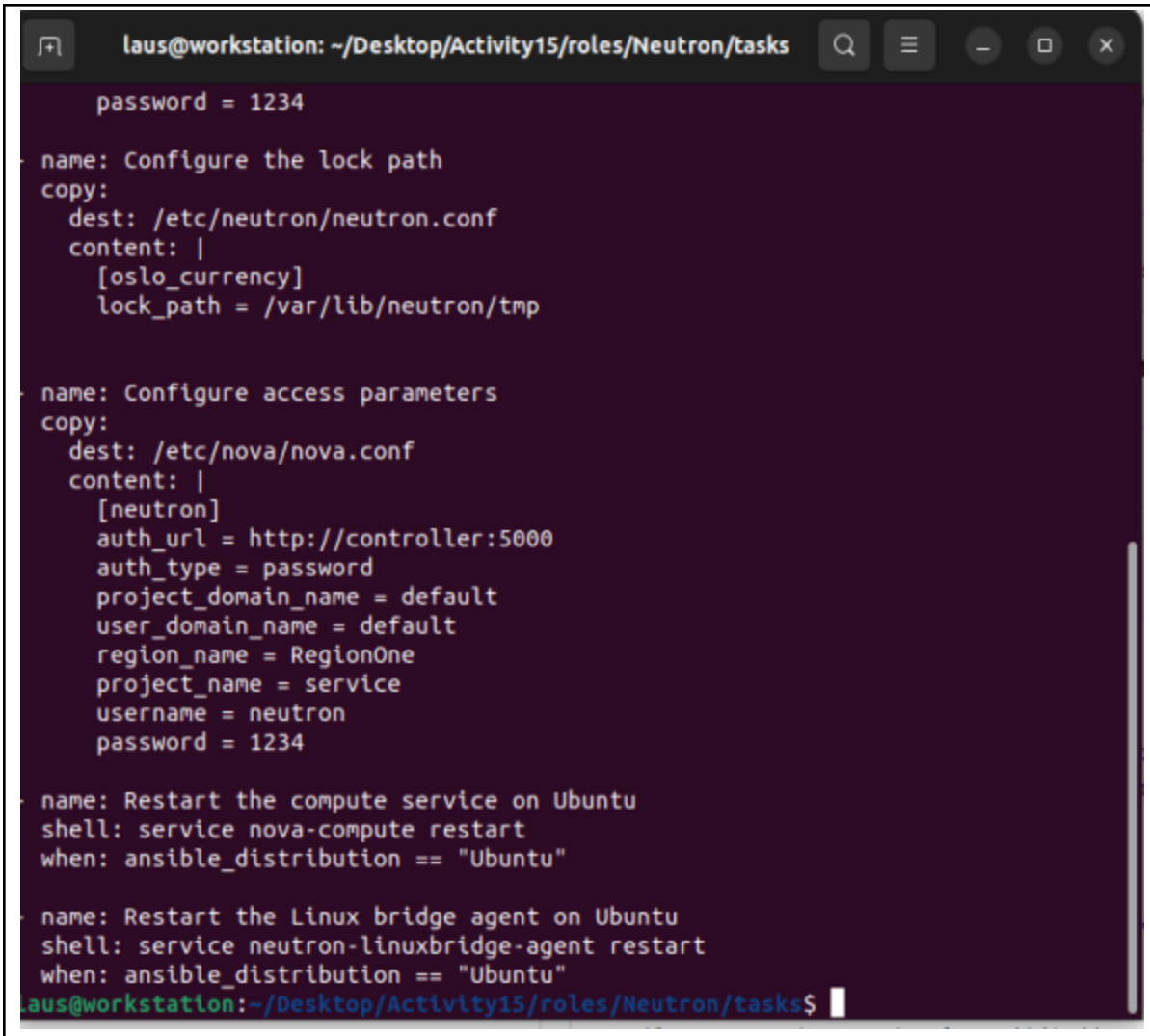
I also created “config.yml” which is designed to handle maintenance tasks, for Ubuntu servers. It focuses on resolving dpkg problems and ensuring that packages are up, to date. Additionally, it simplifies the process of configuring hosts within the controller group by assigning them roles related to Neutron, Horizon and Cinder.



This is a tree of how I structured the directories, for the next steps of my tasks.

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

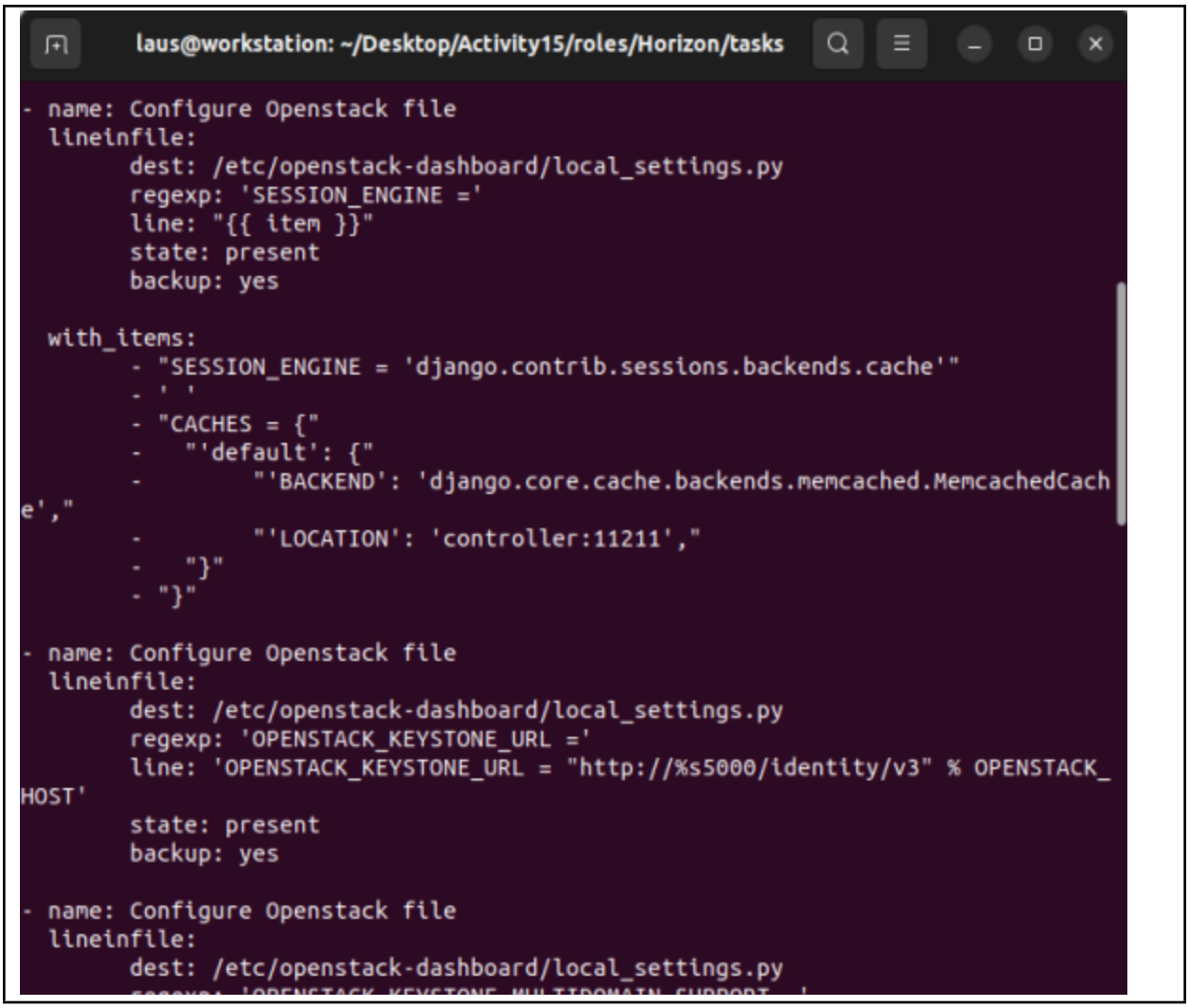

laus@workstation: ~/Desktop/Activity15/roles/Neutron/tasks
laus@workstation:~/Desktop/Activity15/roles/Neutron/tasks$ nano main.yml
laus@workstation:~/Desktop/Activity15/roles/Neutron/tasks$ cat main.yml
- name: Install Neutron components
apt:
name: neutron-linuxbridge-agent
when: ansible_distribution == "Ubuntu"
- name: Configure RabbitMQ message queue access
copy:
dest: /etc/neutron/neutron.conf
content: |
[DEFAULT]
transport_url = rabbit://openstack:1234@controller
- name: Configure Identity service access
copy:
dest: /etc/neutron/neutron.conf
content: |
[DEFAULT]
auth_strategy = keystone
[keystone_authtoken]
www_authenticate_uri = http://controller:5000
auth_url = http://controller:5000
memcached_servers = controller:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = neutron
password = 1234

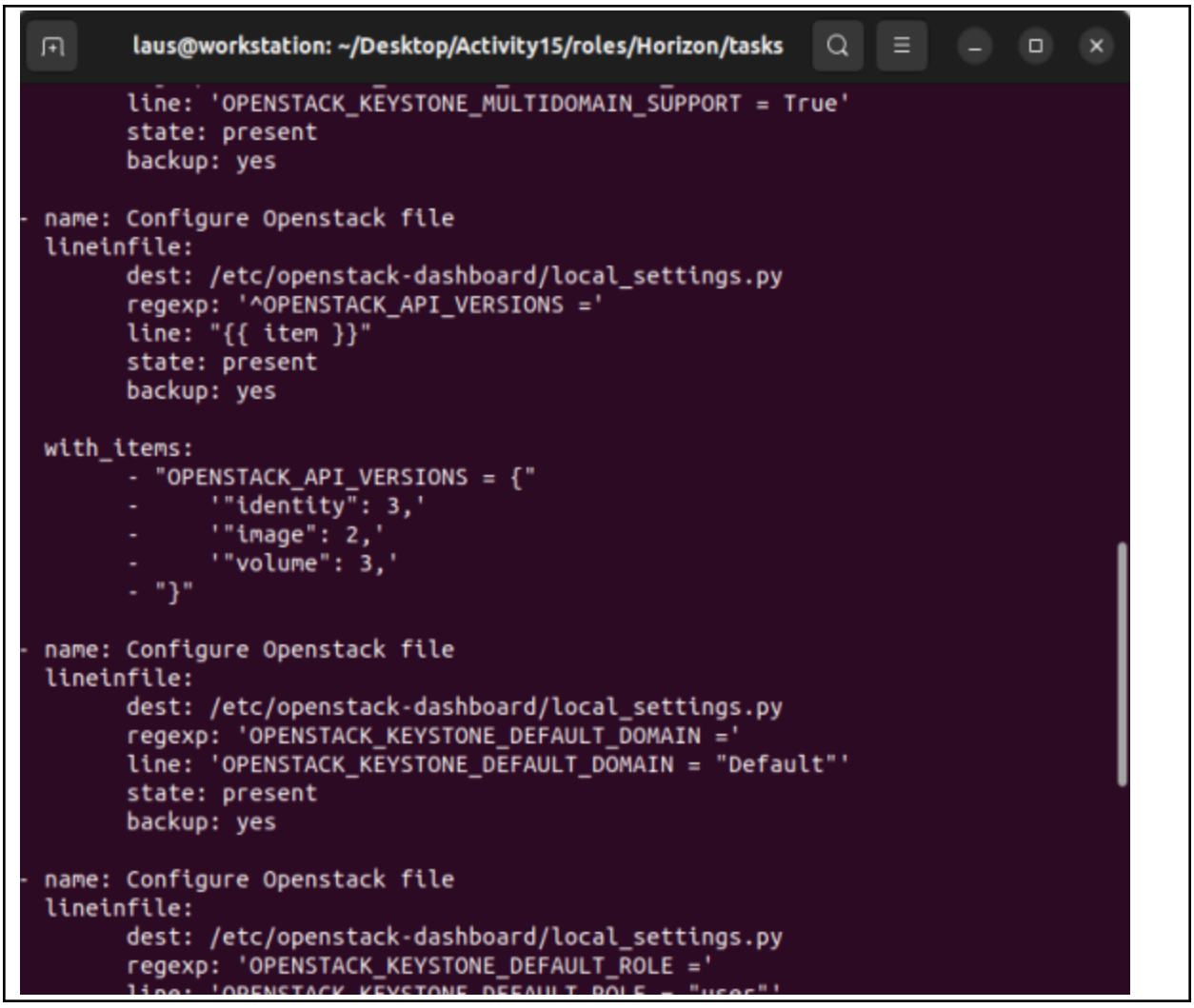


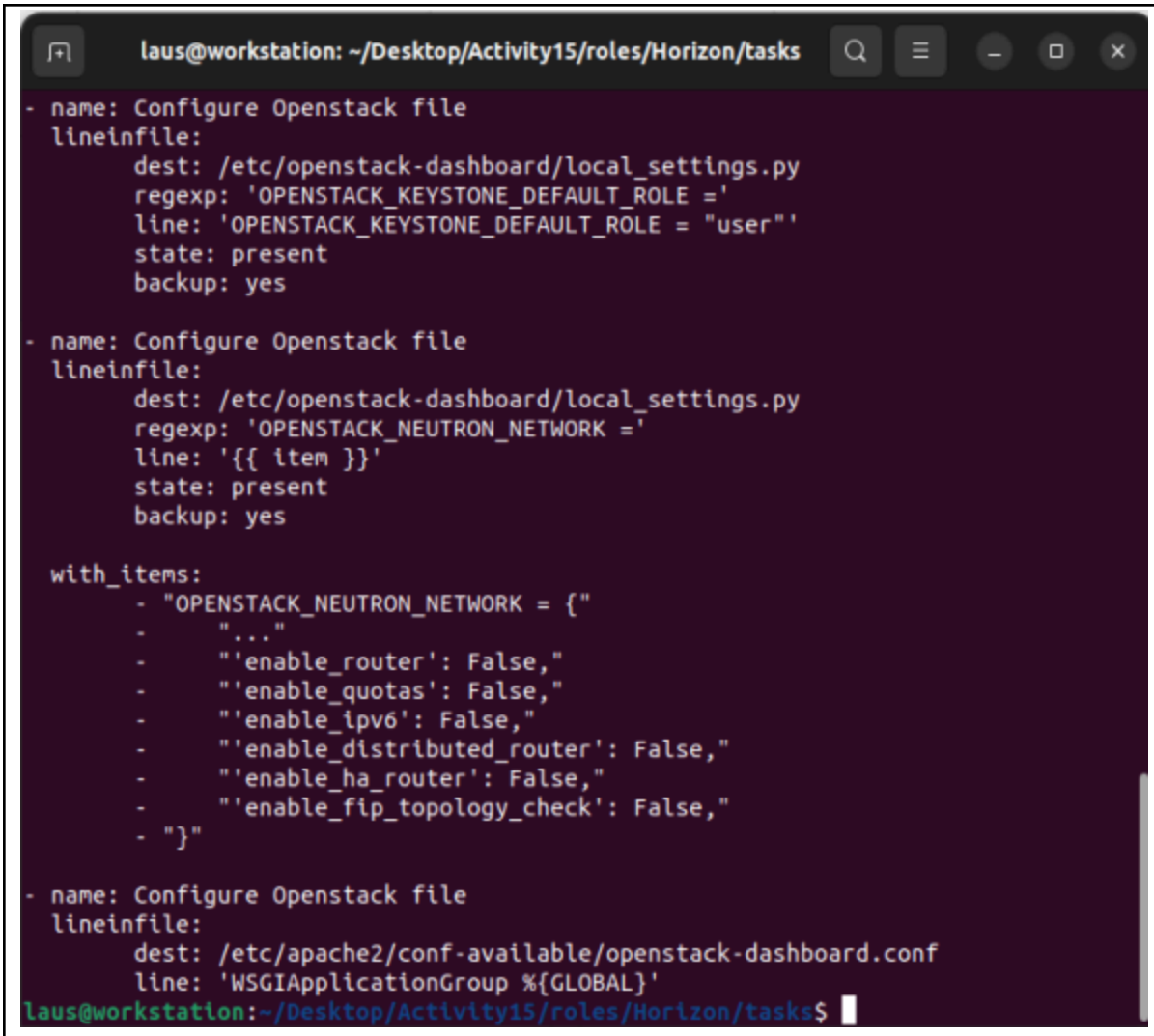
This is for installing the required packages configuring access, to the RabbitMQ message queue setting up access to the Identity service and specifying the lock path. Next, it configures the compute service to use the networking service. It adjusts access parameters and restarts services based on whether the distribution's Ubuntu.

b. Horizon

```
laus@workstation:~/Desktop/Activity15/roles/Horizon/tasks$ cat main.yml

- name: Installing Horizon
  apt:
    name:
      - openstack-dashboard
    state: latest

- name: Configure Openstack file
  lineinfile:
        dest: /etc/openstack-dashboard/local_settings.py
        regexp: 'OPENSTACK_HOST ='
        line: 'OPENSTACK_HOST = "controller"'
        state: present
        backup: yes

- name: Configure Openstack file
  lineinfile:
        dest: /etc/openstack-dashboard/local_settings.py
        regexp: '^ALLOWED_HOST ='
        line: "ALLOWED_HOST = ['localhost', '*']"
        state: present
        backup: yes
        backrefs: yes

- name: Configure Openstack file
  lineinfile:
        dest: /etc/openstack-dashboard/local_settings.py
        regexp: 'SESSION_ENGINE ='
        line: "{{ item }}"
        state: present
        backup: yes
```

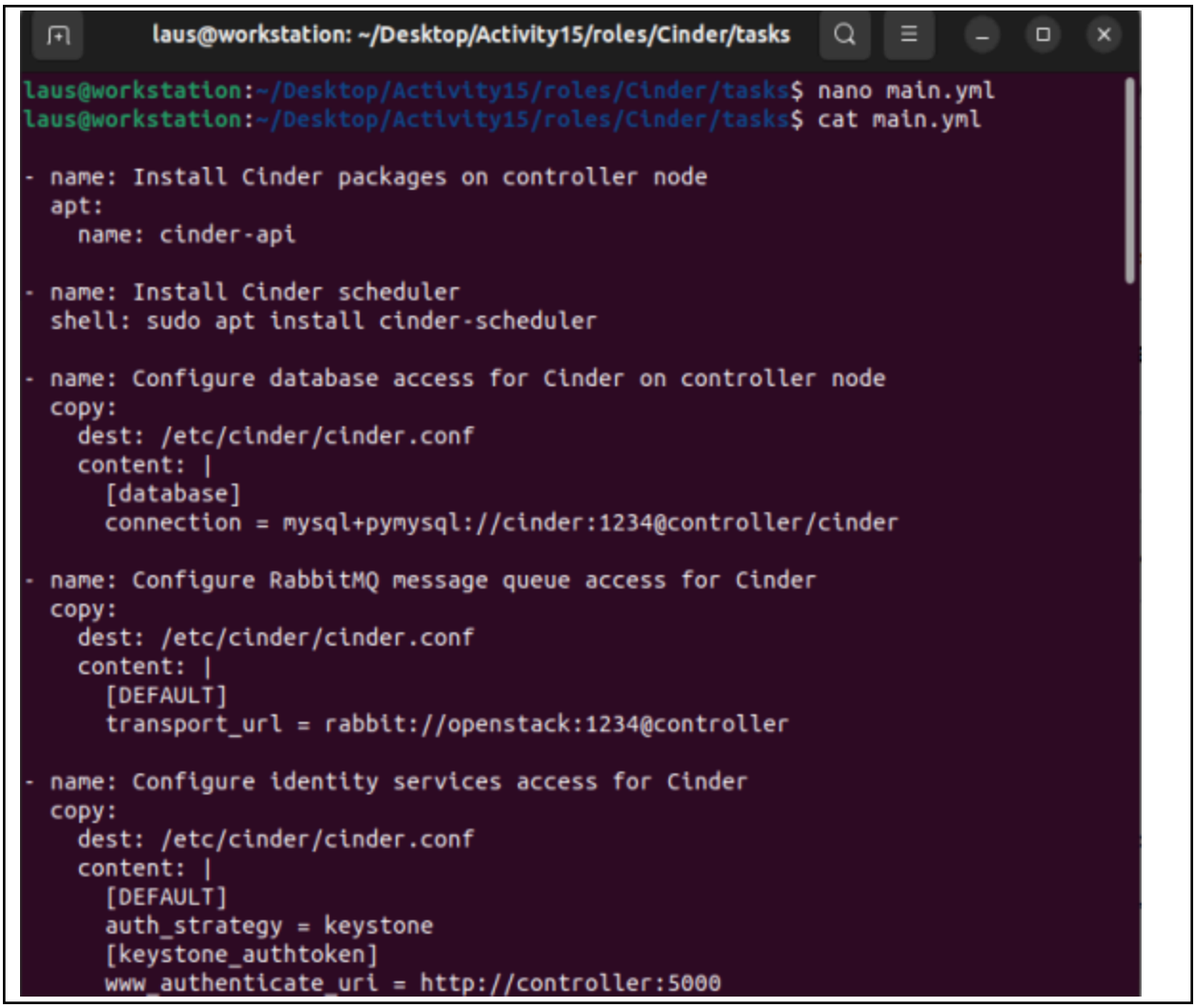

laus@workstation: ~/Desktop/Activity15/roles/Horizon/tasks
- name: Configure Openstack file
  lineinfile:
        dest: /etc/openstack-dashboard/local_settings.py
        regexp: 'SESSION_ENGINE ='
        line: "{{ item }}"
        state: present
        backup: yes
  with_items:
        - "SESSION_ENGINE = 'django.contrib.sessions.backends.cache'"
        - ' '
        - "CACHES = {"
        -   "'default': {"
        -        "'BACKEND': 'django.core.cache.backends.memcached.MemcachedCache',"
        -        "'LOCATION': 'controller:11211',"
        -   "}"
        - "}"
- name: Configure Openstack file
  lineinfile:
        dest: /etc/openstack-dashboard/local_settings.py
        regexp: 'OPENSTACK_KEYSTONE_URL ='
        line: 'OPENSTACK_KEYSTONE_URL = "http://%s5000/identity/v3" % OPENSTACK_HOST'
        state: present
        backup: yes
- name: Configure Openstack file
  lineinfile:
        dest: /etc/openstack-dashboard/local_settings.py

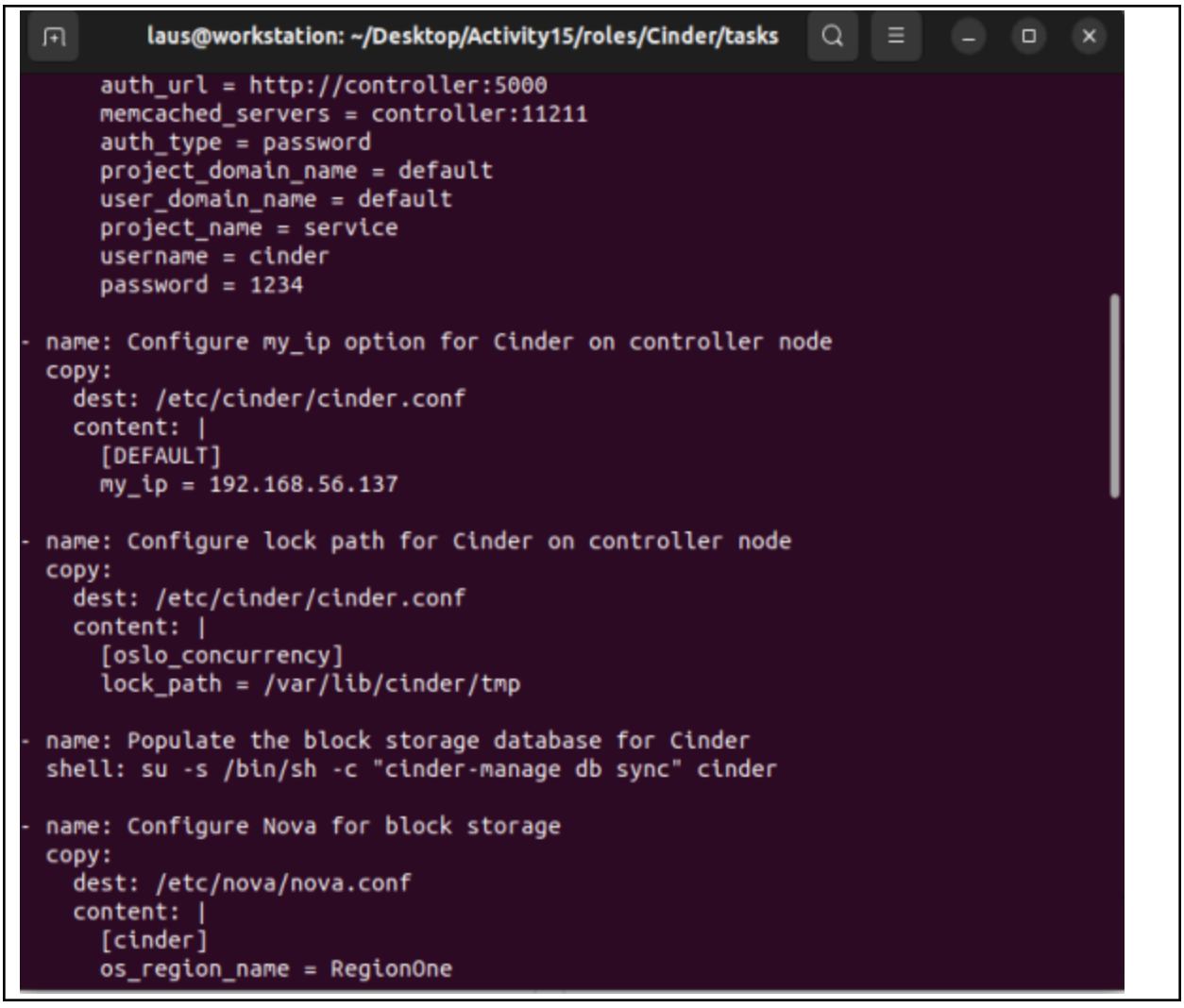

laus@workstation: ~/Desktop/Activity15/roles/Horizon/tasks
line: 'OPENSTACK_KEYSTONE_MULTIDOMAIN_SUPPORT = True'
state: present
backup: yes
- name: Configure Openstack file
lineinfile:
dest: /etc/openstack-dashboard/local_settings.py
regexp: '^OPENSTACK_API_VERSIONS ='
line: "{{ item }}"
state: present
backup: yes
with_items:
- "OPENSTACK_API_VERSIONS = {"
- '"identity": 3,'
- '"image": 2,'
- '"volume": 3,'
- "}"
- name: Configure Openstack file
lineinfile:
dest: /etc/openstack-dashboard/local_settings.py
regexp: 'OPENSTACK_KEYSTONE_DEFAULT_DOMAIN ='
line: 'OPENSTACK_KEYSTONE_DEFAULT_DOMAIN = "Default"'
state: present
backup: yes
- name: Configure Openstack file
lineinfile:
dest: /etc/openstack-dashboard/local_settings.py
regexp: 'OPENSTACK_KEYSTONE_DEFAULT_ROLE ='

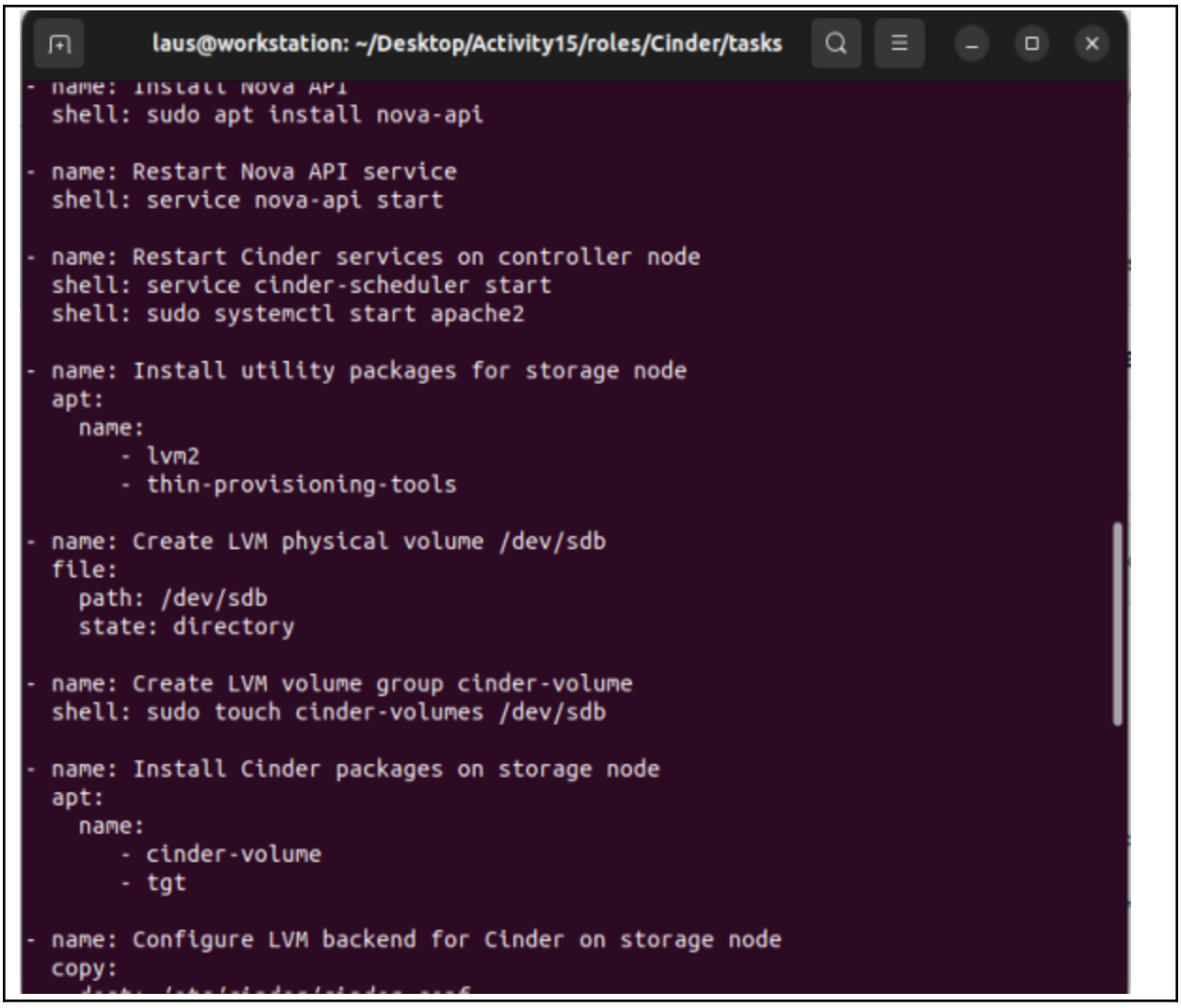


This sets up the OpenStack Dashboard by configuring parameters such, as host, access, storage and API. It ensures that it is compatible with Identity API version 3 supports domains and defines default settings, for user creation. The script has the capability to disable networking services if needed.

c. Cinder


laus@workstation: ~/Desktop/Activity15/roles/Cinder/tasks
laus@workstation:~/Desktop/Activity15/roles/Cinder/tasks$ nano main.yml
laus@workstation:~/Desktop/Activity15/roles/Cinder/tasks$ cat main.yml
- name: Install Cinder packages on controller node
apt:
name: cinder-api
- name: Install Cinder scheduler
shell: sudo apt install cinder-scheduler
- name: Configure database access for Cinder on controller node
copy:
dest: /etc/cinder/cinder.conf
content: |
[database]
connection = mysql+pymysql://cinder:1234@controller/cinder
- name: Configure RabbitMQ message queue access for Cinder
copy:
dest: /etc/cinder/cinder.conf
content: |
[DEFAULT]
transport_url = rabbit://openstack:1234@controller
- name: Configure identity services access for Cinder
copy:
dest: /etc/cinder/cinder.conf
content: |
[DEFAULT]
auth_strategy = keystone
[keystone_authtoken]
www_authenticate_uri = http://controller:5000


laus@workstation: ~/Desktop/Activity15/roles/Cinder/tasks
auth_url = http://controller:5000
memcached_servers = controller:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = cinder
password = 1234
- name: Configure my_ip option for Cinder on controller node
copy:
dest: /etc/cinder/cinder.conf
content: |
[DEFAULT]
my_ip = 192.168.56.137
- name: Configure lock path for Cinder on controller node
copy:
dest: /etc/cinder/cinder.conf
content: |
[oslo_concurrency]
lock_path = /var/lib/cinder/tmp
- name: Populate the block storage database for Cinder
shell: su -s /bin/sh -c "cinder-manage db sync" cinder
- name: Configure Nova for block storage
copy:
dest: /etc/nova/nova.conf
content: |
[cinder]
os_region_name = RegionOne


laus@workstation: ~/Desktop/Activity15/roles/Cinder/tasks
- name: Install Nova API
  shell: sudo apt install nova-api

- name: Restart Nova API service
  shell: service nova-api start

- name: Restart Cinder services on controller node
  shell: service cinder-scheduler start
  shell: sudo systemctl start apache2

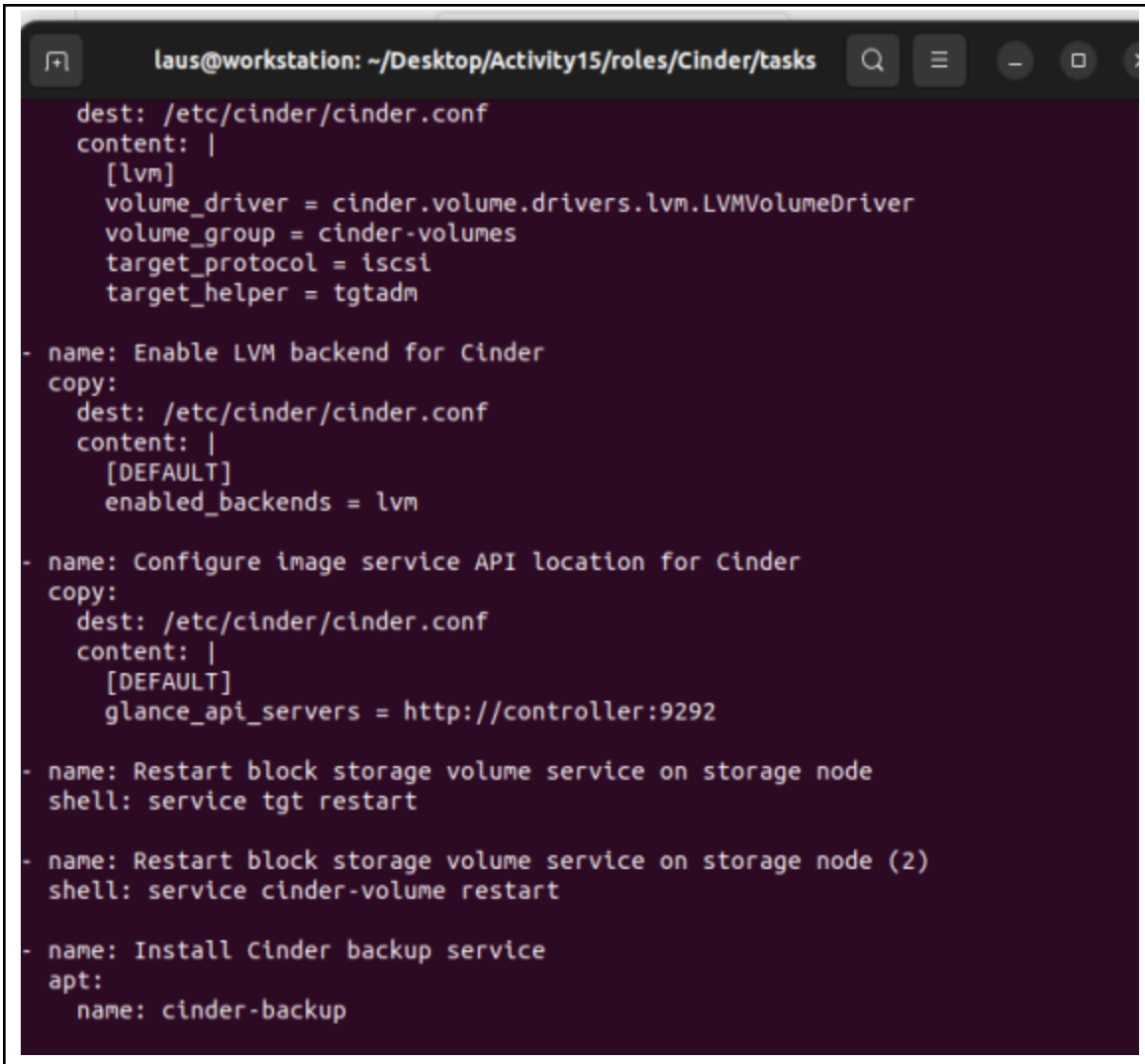
- name: Install utility packages for storage node
  apt:
    name:
      - lvm2
      - thin-provisioning-tools

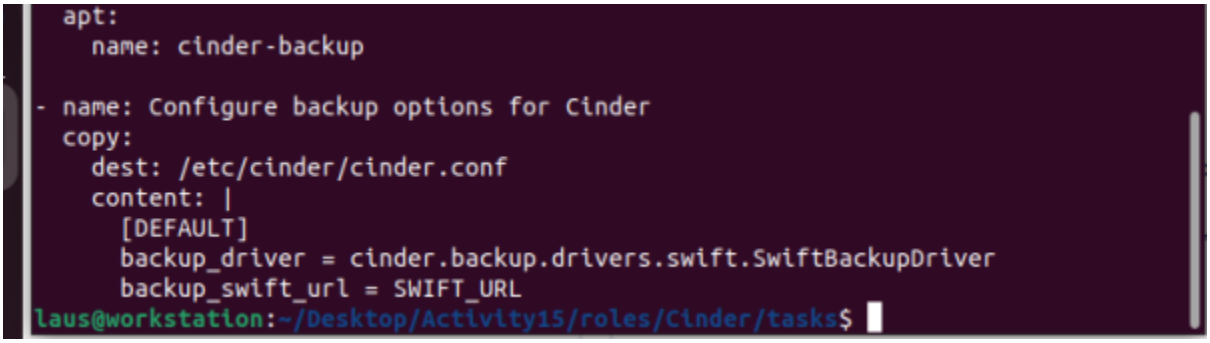
- name: Create LVM physical volume /dev/sdb
  file:
    path: /dev/sdb
    state: directory

- name: Create LVM volume group cinder-volume
  shell: sudo touch cinder-volumes /dev/sdb

- name: Install Cinder packages on storage node
  apt:
    name:
      - cinder-volume
      - tgt

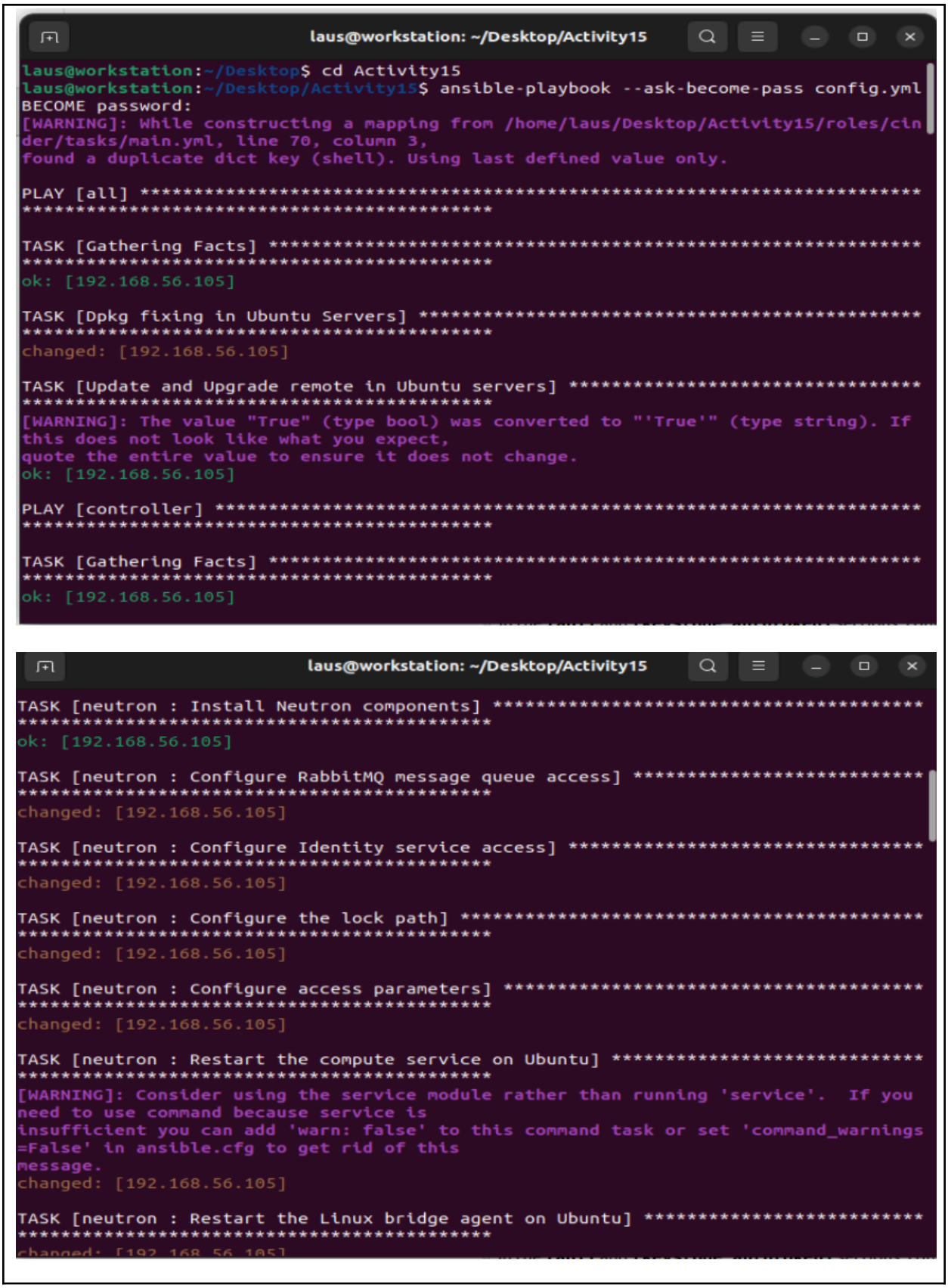
- name: Configure LVM backend for Cinder on storage node
  copy:

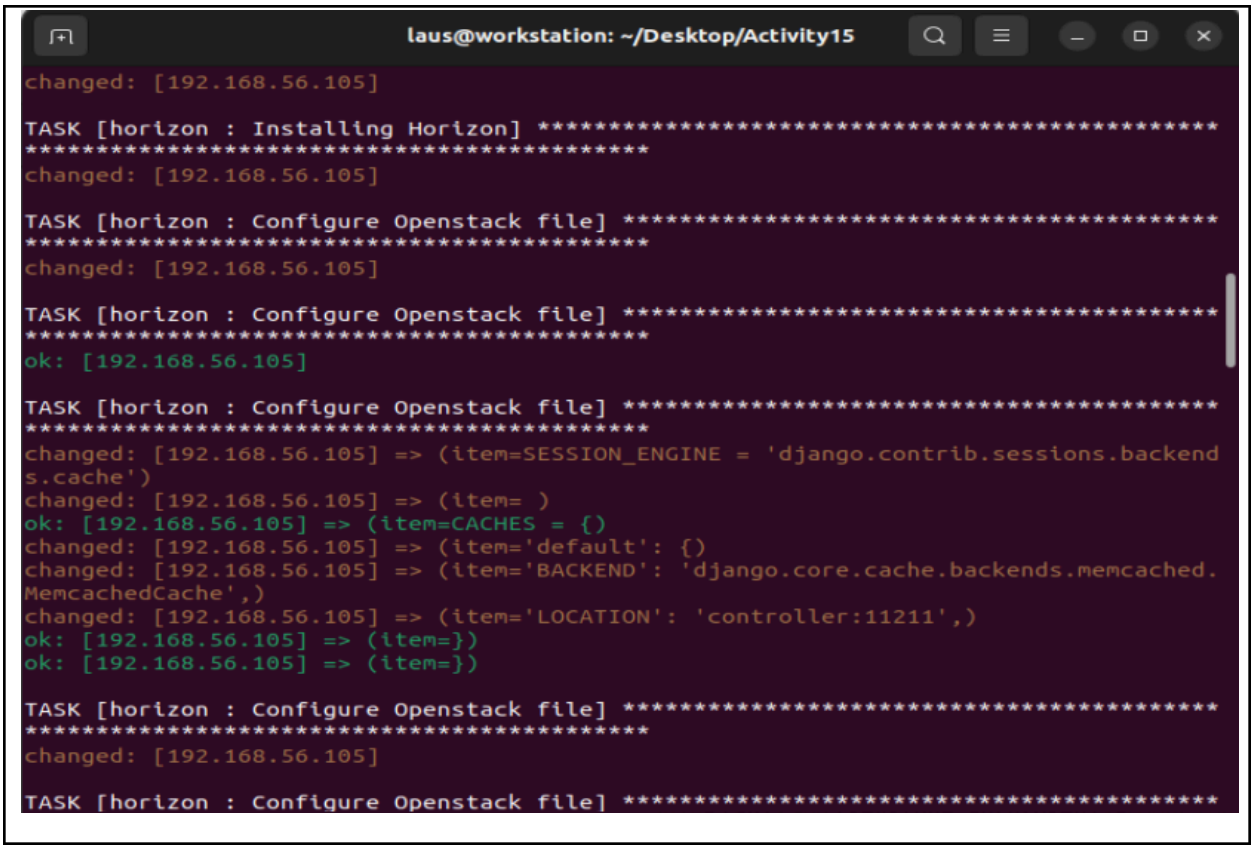


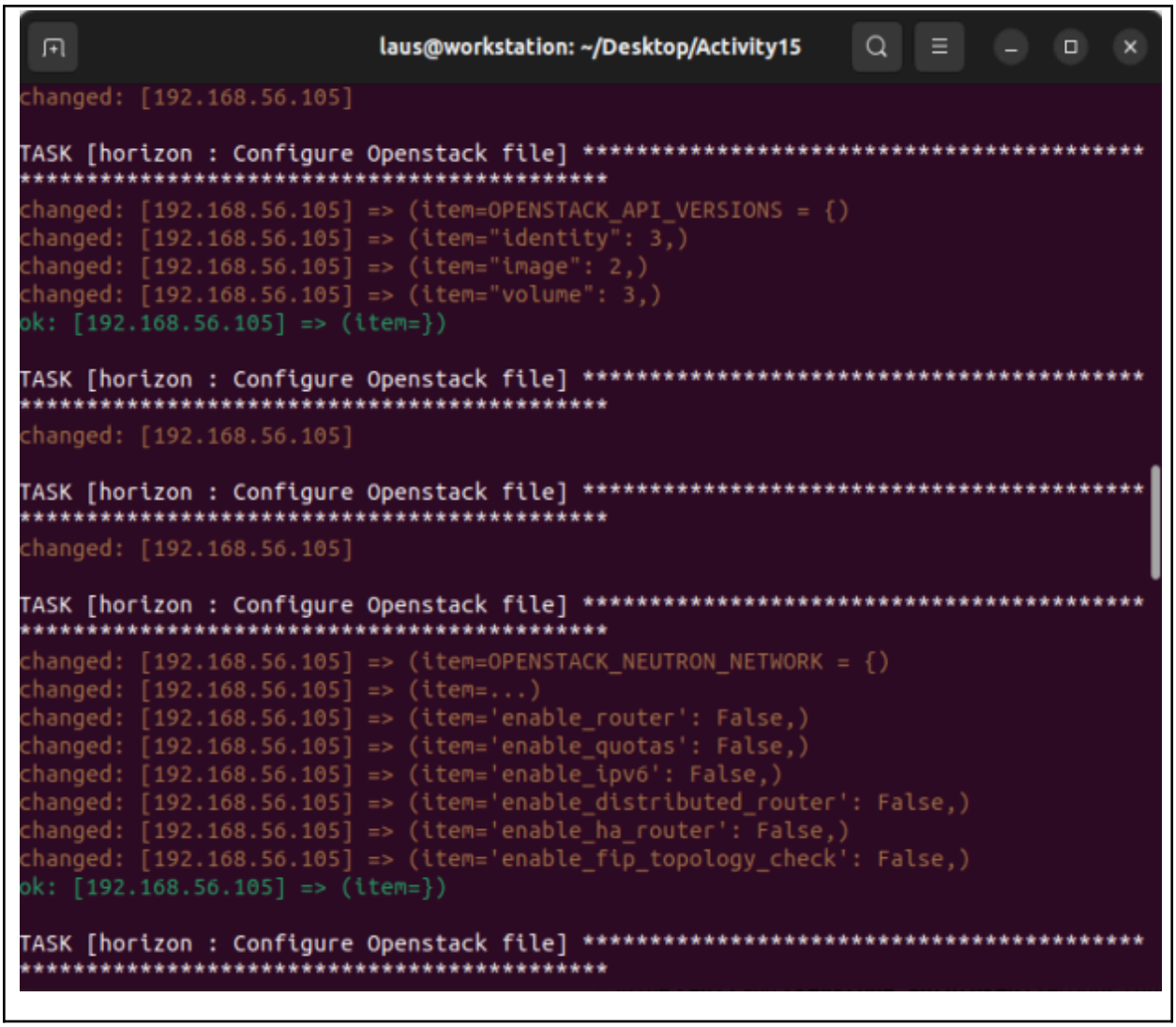


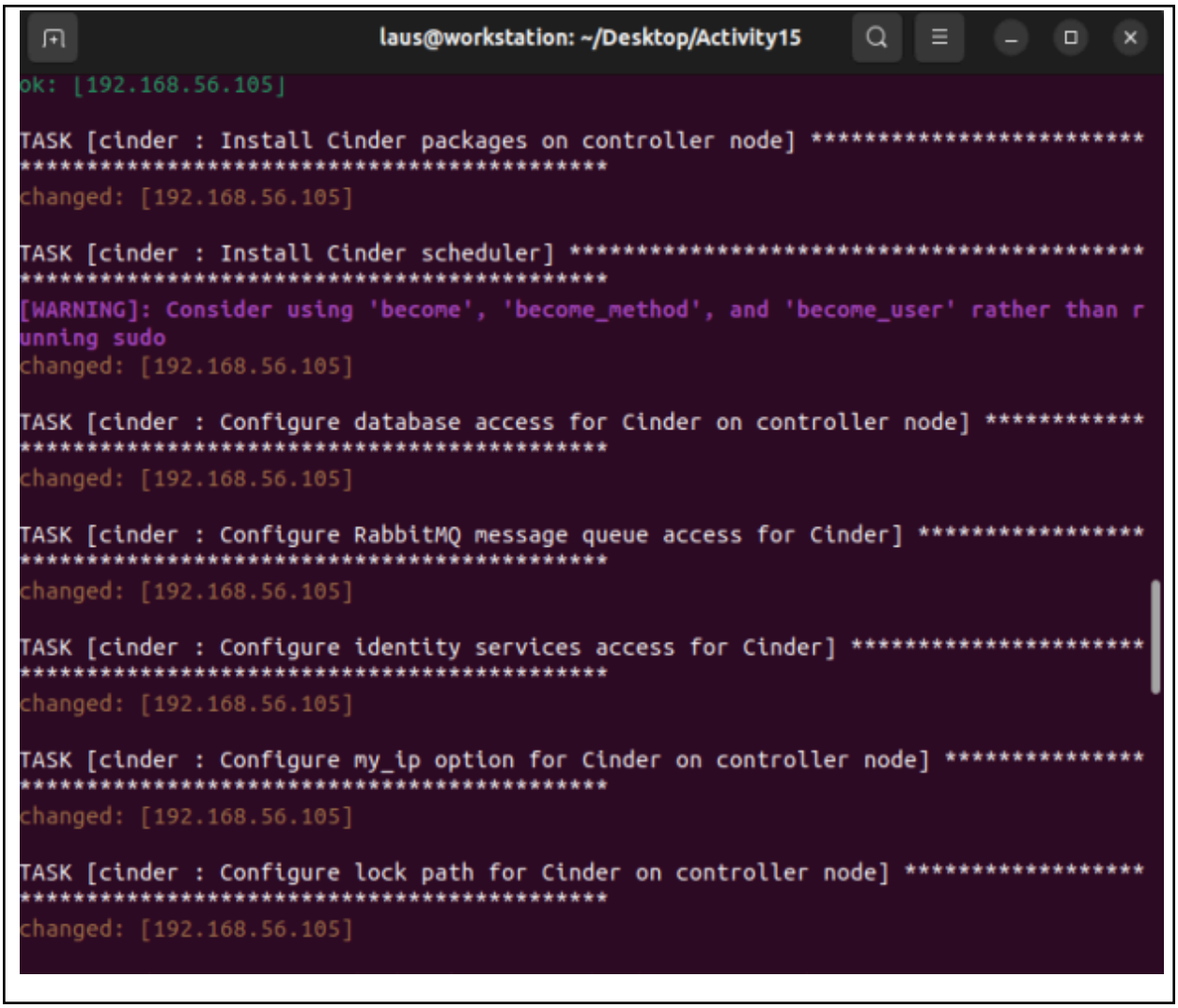
d. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in the Inventory file.

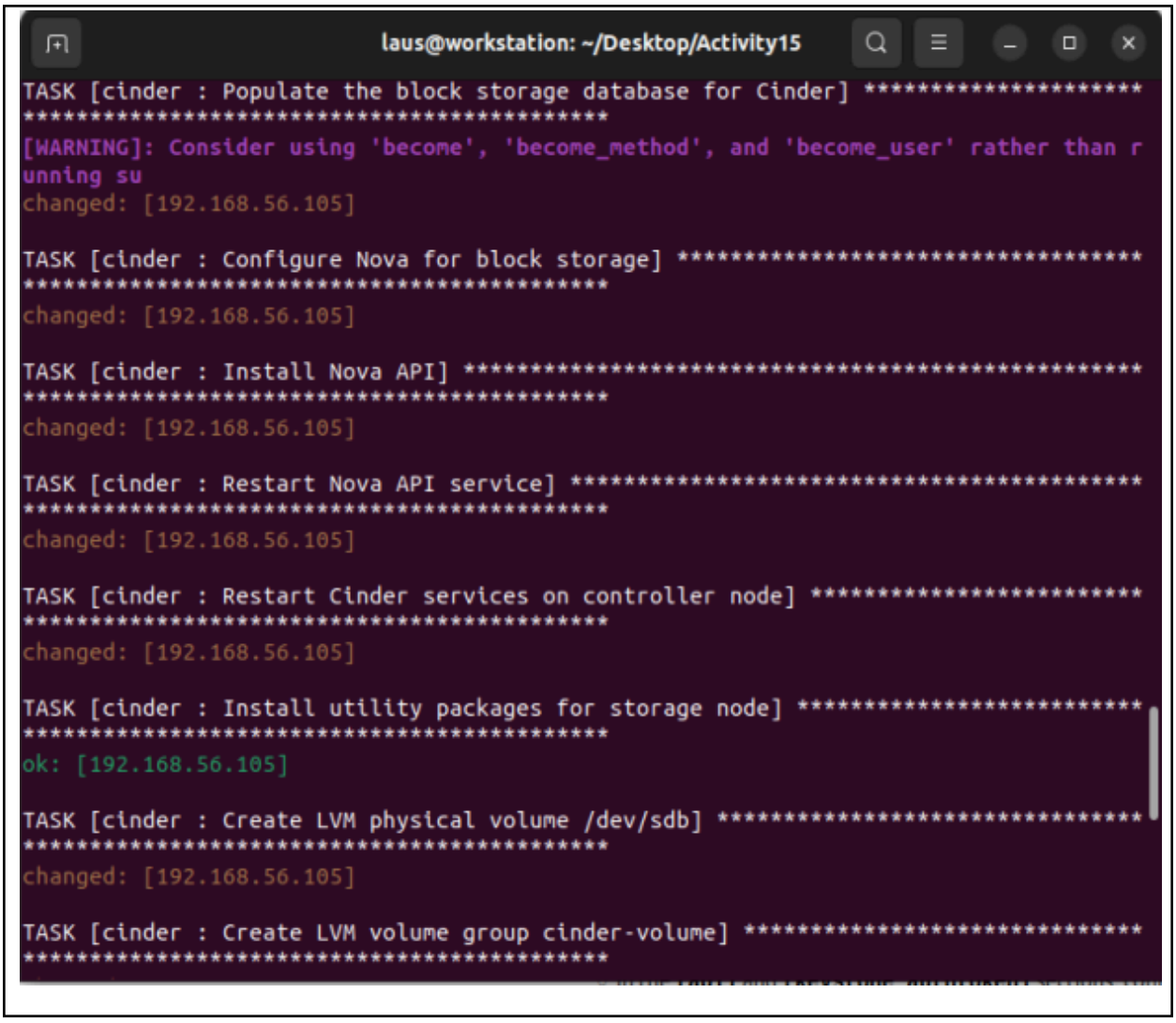
Running config.yml:

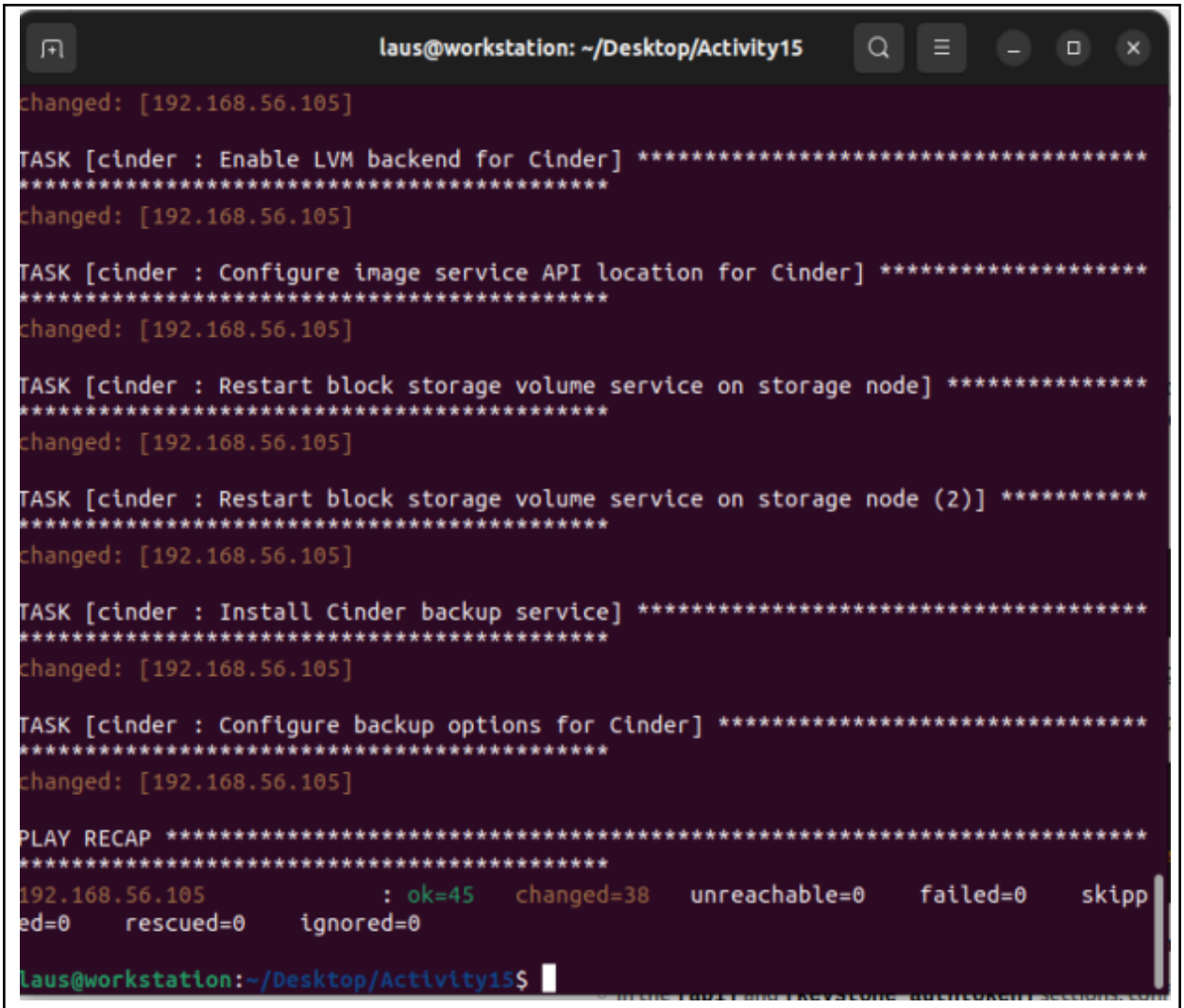

laus@workstation: ~/Desktop/Activity15
laus@workstation:~/Desktop$ cd Activity15
laus@workstation:~/Desktop/Activity15$ ansible-playbook --ask-become-pass config.yml
BECOME password:
[WARNING]: While constructing a mapping from /home/laus/Desktop/Activity15/roles/cinder/tasks/main.yml, line 70, column 3,
found a duplicate dict key (shell). Using last defined value only.
PLAY [all] ********** ********** **********
TASK [Gathering Facts] ********** ********** **********
ok: [192.168.56.105]
TASK [Dpkg fixing in Ubuntu Servers] ********** ********** **********
changed: [192.168.56.105]
TASK [Update and Upgrade remote in Ubuntu servers] ********** ********** **********
[WARNING]: The value "True" (type bool) was converted to "'True'" (type string). If this does not look like what you expect,
quote the entire value to ensure it does not change.
ok: [192.168.56.105]
PLAY [controller] ********** ********** **********
TASK [Gathering Facts] ********** ********** **********
ok: [192.168.56.105]
laus@workstation: ~/Desktop/Activity15
TASK [neutron : Install Neutron components] ********** ********** **********
ok: [192.168.56.105]
TASK [neutron : Configure RabbitMQ message queue access] ********** ********** **********
changed: [192.168.56.105]
TASK [neutron : Configure Identity service access] ********** ********** **********
changed: [192.168.56.105]
TASK [neutron : Configure the lock path] ********** ********** **********
changed: [192.168.56.105]
TASK [neutron : Configure access parameters] ********** ********** **********
changed: [192.168.56.105]
TASK [neutron : Restart the compute service on Ubuntu] ********** ********** **********
[WARNING]: Consider using the service module rather than running 'service'. If you need to use command because service is
insufficient you can add 'warn: false' to this command task or set 'command_warnings=False' in ansible.cfg to get rid of this
message.
changed: [192.168.56.105]
TASK [neutron : Restart the Linux bridge agent on Ubuntu] ********** ********** **********


laus@workstation: ~/Desktop/Activity15
changed: [192.168.56.105]
TASK [horizon : Installing Horizon] **
changed: [192.168.56.105]
TASK [horizon : Configure Openstack file] **
changed: [192.168.56.105]
TASK [horizon : Configure Openstack file] **
ok: [192.168.56.105]
TASK [horizon : Configure Openstack file] **
changed: [192.168.56.105] => (item=SESSION_ENGINE = 'django.contrib.sessions.backends.cache')
changed: [192.168.56.105] => (item=)
ok: [192.168.56.105] => (item=CACHES = {)
changed: [192.168.56.105] => (item='default': {)
changed: [192.168.56.105] => (item='BACKEND': 'django.core.cache.backends.memcached.MemcachedCache',)
changed: [192.168.56.105] => (item='LOCATION': 'controller:11211',)
ok: [192.168.56.105] => (item=})
ok: [192.168.56.105] => (item=})
TASK [horizon : Configure Openstack file] **
changed: [192.168.56.105]
TASK [horizon : Configure Openstack file] **

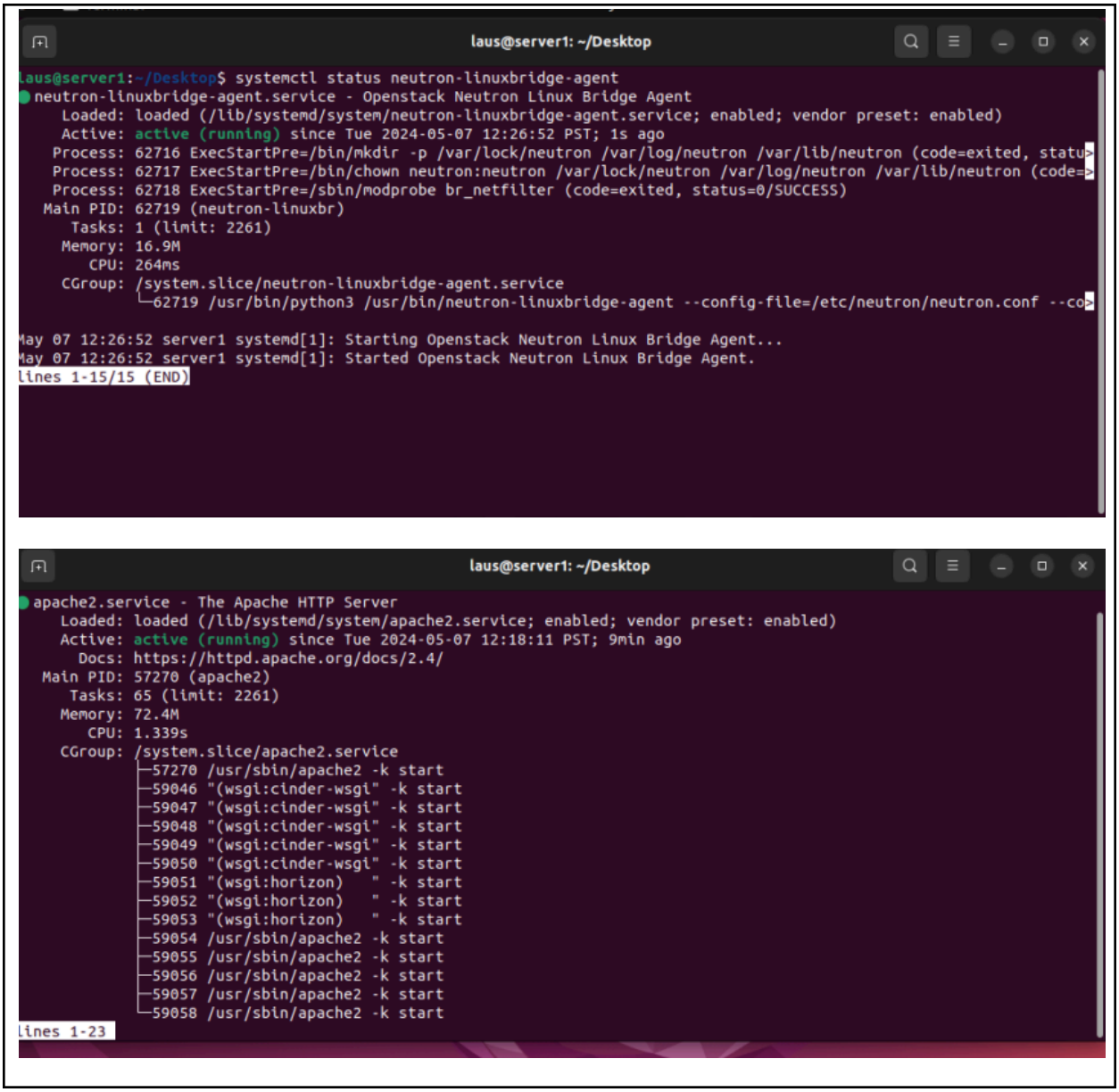

laus@workstation: ~/Desktop/Activity15
changed: [192.168.56.105]
TASK [horizon : Configure Openstack file] **
****
changed: [192.168.56.105] => (item=OPENSTACK_API_VERSIONS = {)
changed: [192.168.56.105] => (item="identity": 3,)
changed: [192.168.56.105] => (item="image": 2,)
changed: [192.168.56.105] => (item="volume": 3,)
ok: [192.168.56.105] => (item=})
TASK [horizon : Configure Openstack file] **
****
changed: [192.168.56.105]
TASK [horizon : Configure Openstack file] **
****
changed: [192.168.56.105]
TASK [horizon : Configure Openstack file] **
****
changed: [192.168.56.105] => (item=OPENSTACK_NEUTRON_NETWORK = {)
changed: [192.168.56.105] => (item=...)
changed: [192.168.56.105] => (item='enable_router': False,)
changed: [192.168.56.105] => (item='enable_quotas': False,)
changed: [192.168.56.105] => (item='enable_ipv6': False,)
changed: [192.168.56.105] => (item='enable_distributed_router': False,)
changed: [192.168.56.105] => (item='enable_ha_router': False,)
changed: [192.168.56.105] => (item='enable_fip_topology_check': False,)
ok: [192.168.56.105] => (item=})
TASK [horizon : Configure Openstack file] **
****

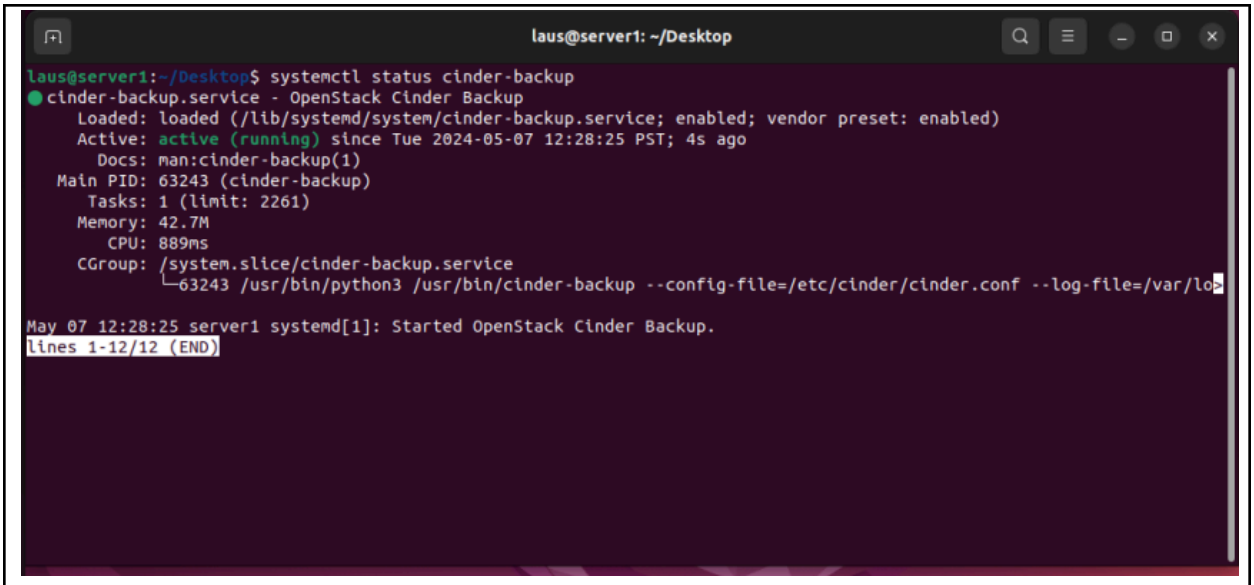

laus@workstation: ~/Desktop/Activity15
ok: [192.168.56.105]
TASK [cinder : Install Cinder packages on controller node] **********
changed: [192.168.56.105]
TASK [cinder : Install Cinder scheduler] **********
[WARNING]: Consider using 'become', 'become_method', and 'become_user' rather than r
unning sudo
changed: [192.168.56.105]
TASK [cinder : Configure database access for Cinder on controller node] ***********
changed: [192.168.56.105]
TASK [cinder : Configure RabbitMQ message queue access for Cinder] ****************
changed: [192.168.56.105]
TASK [cinder : Configure identity services access for Cinder] **********
changed: [192.168.56.105]
TASK [cinder : Configure my_ip option for Cinder on controller node] ***************
changed: [192.168.56.105]
TASK [cinder : Configure lock path for Cinder on controller node] ******************
changed: [192.168.56.105]


laus@workstation: ~/Desktop/Activity15
TASK [cinder : Populate the block storage database for Cinder] **********
****
[WARNING]: Consider using 'become', 'become_method', and 'become_user' rather than r
unning su
changed: [192.168.56.105]
TASK [cinder : Configure Nova for block storage] **********
****
changed: [192.168.56.105]
TASK [cinder : Install Nova API] **********
****
changed: [192.168.56.105]
TASK [cinder : Restart Nova API service] **********
****
changed: [192.168.56.105]
TASK [cinder : Restart Cinder services on controller node] **********
****
changed: [192.168.56.105]
TASK [cinder : Install utility packages for storage node] **********
****
ok: [192.168.56.105]
TASK [cinder : Create LVM physical volume /dev/sdb] **********
****
changed: [192.168.56.105]
TASK [cinder : Create LVM volume group cinder-volume] **********
****

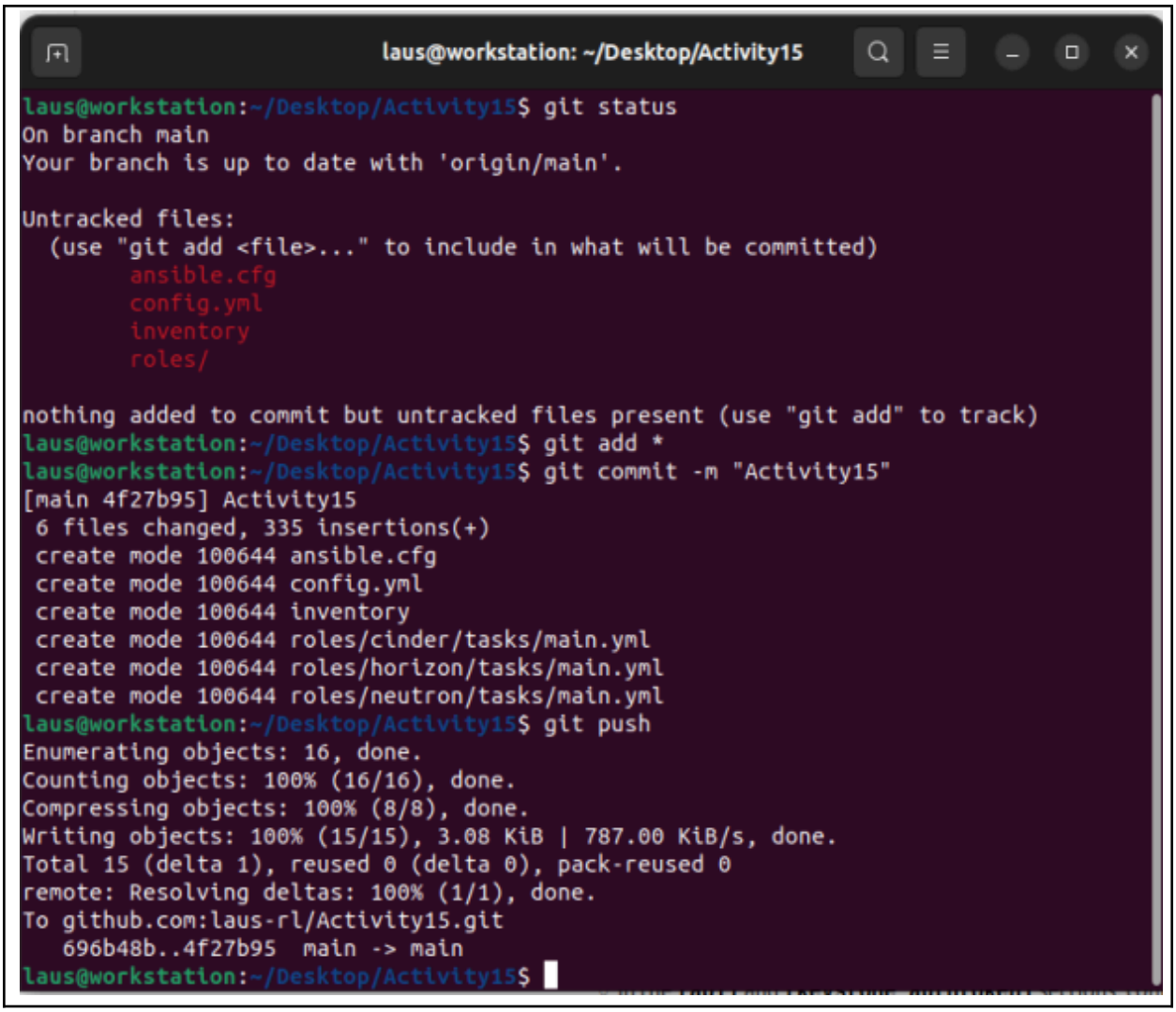


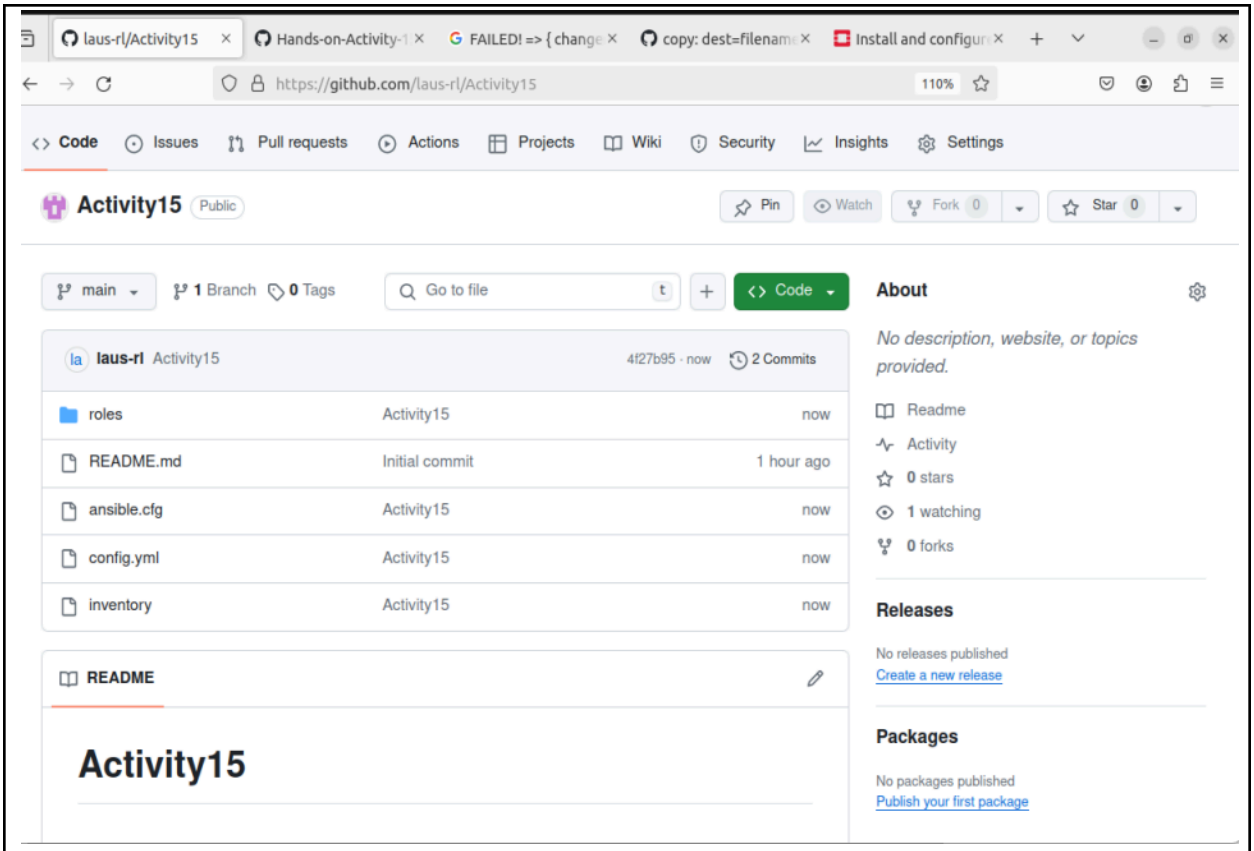
Verifying successful installations:


laus@server1: ~/Desktop
laus@server1:~/Desktop$ systemctl status neutron-linuxbridge-agent
neutron-linuxbridge-agent.service - Openstack Neutron Linux Bridge Agent
Loaded: loaded (/lib/systemd/system/neutron-linuxbridge-agent.service; enabled; vendor preset: enabled)
Active: active (running) since Tue 2024-05-07 12:26:52 PST; 1s ago
Process: 62716 ExecStartPre=/bin/mkdir -p /var/lock/neutron /var/log/neutron /var/lib/neutron (code=exited, statu>
Process: 62717 ExecStartPre=/bin/chown neutron:neutron /var/lock/neutron /var/log/neutron /var/lib/neutron (code=>
Process: 62718 ExecStartPre=/sbin/modprobe br_netfilter (code=exited, status=0/SUCCESS)
Main PID: 62719 (neutron-linuxbr)
Tasks: 1 (limit: 2261)
Memory: 16.9M
CPU: 264ms
CGroup: /system.slice/neutron-linuxbridge-agent.service
└─62719 /usr/bin/python3 /usr/bin/neutron-linuxbridge-agent --config-file=/etc/neutron/neutron.conf --co>
May 07 12:26:52 server1 systemd[1]: Starting Openstack Neutron Linux Bridge Agent...
May 07 12:26:52 server1 systemd[1]: Started Openstack Neutron Linux Bridge Agent.
lines 1-15/15 (END)
laus@server1: ~/Desktop
apache2.service - The Apache HTTP Server
Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
Active: active (running) since Tue 2024-05-07 12:18:11 PST; 9min ago
Docs: https://httpd.apache.org/docs/2.4/
Main PID: 57270 (apache2)
Tasks: 65 (limit: 2261)
Memory: 72.4M
CPU: 1.339s
CGroup: /system.slice/apache2.service
├─57270 /usr/sbin/apache2 -k start
├─59046 "(wsgi:cinder-wsgi" -k start
├─59047 "(wsgi:cinder-wsgi" -k start
├─59048 "(wsgi:cinder-wsgi" -k start
├─59049 "(wsgi:cinder-wsgi" -k start
├─59050 "(wsgi:cinder-wsgi" -k start
├─59051 "(wsgi:horizon) " -k start
├─59052 "(wsgi:horizon) " -k start
├─59053 "(wsgi:horizon) " -k start
├─59054 /usr/sbin/apache2 -k start
├─59055 /usr/sbin/apache2 -k start
├─59056 /usr/sbin/apache2 -k start
├─59057 /usr/sbin/apache2 -k start
└─59058 /usr/sbin/apache2 -k start
lines 1-23



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


laus@workstation: ~/Desktop/Activity15
laus@workstation:~/Desktop/Activity15$ git status
On branch main
Your branch is up to date with 'origin/main'.
Untracked files:
(use "git add <file>..." to include in what will be committed)
ansible.cfg
config.yml
inventory
roles/
nothing added to commit but untracked files present (use "git add" to track)
laus@workstation:~/Desktop/Activity15$ git add *
laus@workstation:~/Desktop/Activity15$ git commit -m "Activity15"
[main 4f27b95] Activity15
6 files changed, 335 insertions(+)
create mode 100644 ansible.cfg
create mode 100644 config.yml
create mode 100644 inventory
create mode 100644 roles/cinder/tasks/main.yml
create mode 100644 roles/horizon/tasks/main.yml
create mode 100644 roles/neutron/tasks/main.yml
laus@workstation:~/Desktop/Activity15$ git push
Enumerating objects: 16, done.
Counting objects: 100% (16/16), done.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (15/15), 3.08 KiB | 787.00 KiB/s, done.
Total 15 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), done.
To github.com:laus-rl/Activity15.git
696b48b..4f27b95 main -> main
laus@workstation:~/Desktop/Activity15$



GITHUB LINK: https://github.com/laus-rl/Activity15

Reflections:

Answer the following:

1. Describe Neutron, Horizon and Cinder services

   Neutron: Neutron plays a role in the OpenStack ecosystem as it handles networking capabilities for OpenStack services. It facilitates the management and creation of networks, subnets, routers and floating IPs. These components are essential for facilitating communication between instances and external networks.

   Horizon: Horizon serves as the web based graphical user interface dashboard for OpenStack. It offers users a centralized platform to interact with and manage OpenStack services. This simplifies the experience of managing resources within the OpenStack environment.

   Cinder: Cinder acts as the Block Storage service in OpenStack providing block storage for compute instances. Users can easily. Detach volumes to their instances ensuring that data persists beyond the lifecycle of virtual machines

Conclusions:

Completing this activity involved developing an Ansible based workflow to install OpenStack using Infrastructure as Code (IaC) principles. The main objectives included analyzing advantages and disadvantages of cloud services, evaluating deployment and service models and creating a step-by-step workflow for installing OpenStack with Ansible. Throughout this process we utilized Oracle VirtualBox as our hypervisor along with either an Ubuntu VM or Centos VM. Tasks included creating repositories, developing playbooks for Neutron, Horizon and Cinder services, organizing servers in the inventory file and pushing code to GitHub.