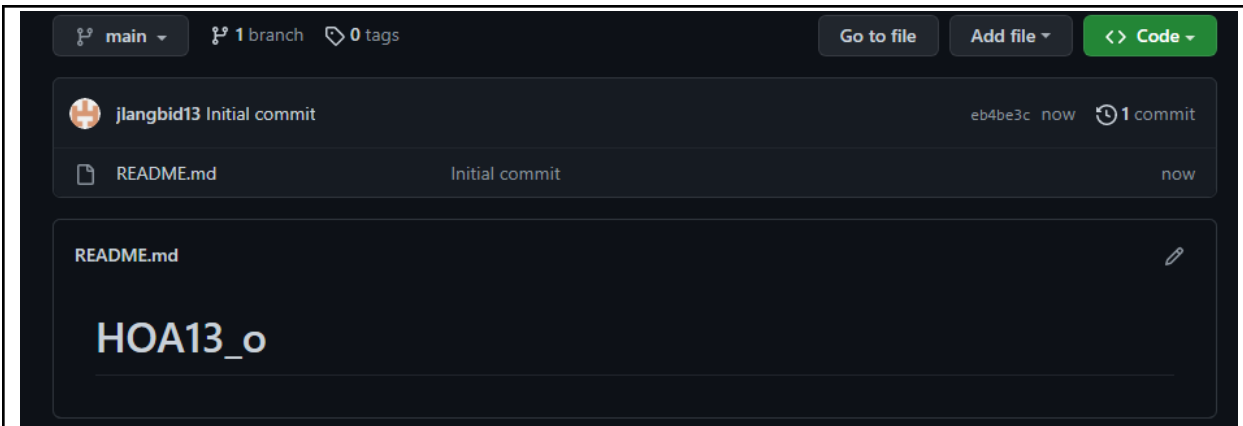


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<b>Course/Section: CPE 232-CPE31S23</b>	<b>Date Submitted:</b>
<b>Instructor: Dr. Taylor</b>	<b>Semester and SY:</b>
<b>Activity 13: OpenStack Prerequisite Installation</b>	
<b>1. Objectives</b>	
Create a workflow to install OpenStack using Ansible as your Infrastructure as Code (IaC).	
<b>2. Intended Learning Outcomes</b>	
<ol style="list-style-type: none"> <li>1. Analyze the advantages and disadvantages of cloud services</li> <li>2. Evaluate different Cloud deployment and service models</li> <li>3. Create a workflow to install and configure OpenStack base services using Ansible as documentation and execution.</li> </ol>	
<b>3. Resources</b>	
<p>Oracle VirtualBox (Hypervisor)</p> <p>1x Ubuntu VM or Centos VM</p>	
<b>4. Tasks</b>	
<ol style="list-style-type: none"> <li>1. Create a new repository for this activity.</li> <li>2. Create a playbook that converts the steps in the following items in <a href="https://docs.openstack.org/install-guide/">https://docs.openstack.org/install-guide/</a> <ol style="list-style-type: none"> <li>a. NTP</li> <li>b. OpenStack packages</li> <li>c. SQL Database</li> <li>d. Message Queue</li> <li>e. Memcached</li> <li>f. Etcd</li> <li>g. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in Inventory file.</li> <li>h. Add, commit and push it to your GitHub repo.</li> </ol> </li> </ol>	
<b>5. Output</b> (screenshots and explanations)	



I created a new github repository

```
jefferson@LocalMachine: ~/HOA13_o
GNU nano 6.2 ansible
[defaults]

inventory = inventory
host_key_checking = False

deprecation_warnings = False

ansible_user = jefferson
private_key_file = ~/.ssh/
```

```
GNU nano 6.2
[controller]
192.168.56.104

[computer]
192.168.56.104
```

I created the ansible.cfg and inventory for the ansible.

```
jefferson@LocalMachine: ~/HOA13_o/OpenStack
GNU nano 6.2                                OpenStack.yml
---
- hosts: all
  become: true
  pre_tasks:

  - name: Install updates for Ubuntu
    tags: always
    apt:
      update_cache: yes
      changed_when: false
      when: ansible_distribution == "Ubuntu"
```

I created the yml of the ansible

```
jefferson@LocalMachine: ~/HOA13_o/OpenStack/roles$ tree
.
├── etcd
│   └── tasks
│       └── main.yml
├── memCached
│   └── tasks
│       └── main.yml
├── messageQ
│   └── tasks
│       └── main.yml
├── ntp
│   └── tasks
│       └── main.yml
├── openStack
│   └── tasks
│       └── main.yml
└── sqlDb
    └── tasks
        └── main.yml

12 directories, 6 files
jefferson@LocalMachine: ~/HOA13_o/OpenStack/roles$
```

I created the roles for the installation of OpenStack

```
jefferson@LocalMachine: ~/HOA13_o/OpenStack/roles/etc...
GNU nano 6.2 main.yml
---
- name: Install Etcd for Ubuntu
  apt:
    name:
      - etcd
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Edit etcd file for ubuntu
  copy:
    dest: /etc/default/etcd
    content: |
      ETCD_NAME="controller"
      ETCD_DATA_DIR="/var/lib/etcd"
      ETCD_INITIAL_CLUSTER_STATE="new"
      ETCD_INITIAL_CLUSTER_TOKEN="etcd-cluster-01"
      ETCD_INITIAL_CLUSTER="controller=http://127.0.0.1:2380"
      ETCD_INITIAL_ADVERTISE_PEER_URLS="http://127.0.0.1:2380"
      ETCD_ADVERTISE_CLIENT_URLS="http://127.0.0.1:2379"
      ETCD_LISTEN_PEER_URLS="http://0.0.0.0:2380"
      ETCD_LISTEN_CLIENT_URLS="http://127.0.0.1:2379"
    mode: 0755
  when: ansible_distribution == "Ubuntu"
```

main.yml of etcd

```
jefferson@LocalMachine: ~/HOA13_o/OpenStack/roles/me...
GNU nano 6.2 main.yml
---
- name: Install Memcached for ubuntu
  apt:
    name:
      - memcached
      - python3-memcache
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Edit the memcached file for ubuntu
  copy:
    dest: /etc/memcached.conf
    content: |
      memcached_user = memcache
      memcached_port = 11211
      memcached_listen_ip = 127.0.0.1
      memcached_connections = 1024
      memcached_log_file = /var/log/memcached.log
      memcached_log_verbosity = ""
      memcached_max_item_size = 1m
      memcached_threads = 4
    mode: 0644
    owner: root
```

Main.yml for memcached

```
jefferson@LocalMachine: ~/HOA13_o/OpenStack/roles/mes...
GNU nano 6.2 main.yml
---
- name: Install Message queue for ubuntu
  apt:
    name:
      - rabbitmq-server
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Adding the openstack user for ubuntu
  community.rabbitmq.rabbitmq_user:
    user: openstack
    password: RABBIT_PASS
    vhost: /
    configure_priv: .*
    read_priv: .*
    write_priv: .*
    state: present
  when: ansible_distribution == "Ubuntu"
```

Main.yml of Message queue

```
jefferson@LocalMachine: ~/HOA13_o/OpenStack/roles/ntp...
GNU nano 6.2 main.yml
---
- name: Install NTP for ubuntu
  apt:
    name:
      - chrony
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Editing the chrony file for ubuntu
  copy:
    dest: /etc/chrony/chrony.conf
    content: |
      server NTP_SERVER iburst
      allow 10.0.0.0/24
    mode: 0755
  when: ansible_distribution == "Ubuntu"

- name: Enabling the NTP for ubuntu
  service:
    name: chrony
    enabled: yes
  when: ansible_distribution == "Ubuntu"
```

Main.yml of NTP

```
jefferson@LocalMachine: ~/HOA13_o/OpenStack/roles/ope...
GNU nano 6.2 main.yml *
---
- name: Install OpenStack for ubuntu
  apt:
    name:
      - nova-compute
      - python3-openstackclient
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"
```

Main.yml for OpenStack

```
jefferson@LocalMachine: ~/HOA13_o/OpenStack/roles/sql...
GNU nano 6.2 main.yml
---
- name: Installing SQL Database for ubuntu
  apt:
    name:
      - mariadb-server
      - python3-pymysql
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Editing the MariaDB file for ubuntu
  copy:
    dest: /etc/mysql/mariadb.conf.d/99-openstack.cnf
    content: |
      [mysqld]
      bind-address = 127.0.0.1

      default-storage-engine = innodb
      innodb_file_per_table = on
      max_connections = 4096
      collation-server = utf8_general_ci
      character-set-server = utf8
    mode: 0755
  when: ansible_distribution == "Ubuntu"

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute
```

Main.yml of SQL Database



```
jefferson@LocalMachine: ~/HOA13_o/OpenStack

*
TASK [Gathering Facts] *****
*
ok: [192.168.56.104]

TASK [SQLDB : Installing SQL Database for ubuntu] *****
*
changed: [192.168.56.104]

TASK [SQLDB : Editing the MariaDB file for ubuntu] *****
*
changed: [192.168.56.104]

TASK [SQLDB : Stopping the database for ubuntu] *****
*
changed: [192.168.56.104]

TASK [SQLDB : Starting the database for ubuntu] *****
*
changed: [192.168.56.104]

TASK [SQLDB : Enabling the database for ubuntu] *****
*
ok: [192.168.56.104]

TASK [Messqueue : Installi Message queue for ubuntu] *****

TASK [Messqueue : Installi Message queue for ubuntu] *****
*
changed: [192.168.56.104]

TASK [Messqueue : Adding the openstack user for ubuntu] *****
*
changed: [192.168.56.104]
```

```
TASK [NTP : Install NTP for ubuntu] *****
*
changed: [192.168.56.104]

TASK [NTP : Editing the chrony file for ubuntu] *****
*
changed: [192.168.56.104]

TASK [NTP : Enabling the NTP for ubuntu] *****
*
ok: [192.168.56.104]

TASK [NTP : Restarting the NTP for ubuntu] *****
*
changed: [192.168.56.104]

PLAY [computer] *****
*
```

```
ok: [192.168.56.104]

TASK [OS : Install OpenStack for ubuntu] *****
*
^[OPchanged: [192.168.56.104]
```

```
TASK [Memcached : Install Memcached for ubuntu] *****
*
changed: [192.168.56.104]

TASK [Memcached : Edit the memcached file for ubuntu] *****
*
changed: [192.168.56.104]

TASK [Memcached : Stopping Memcached for ubuntu] *****
*
changed: [192.168.56.104]

TASK [Memcached : Starting Memcached for ubuntu] *****
*
changed: [192.168.56.104]
```

```

TASK [ETCD : Install Etcd for Ubuntu] *****
*
changed: [192.168.56.104]

TASK [ETCD : Edit etcd file for ubuntu] *****
*
changed: [192.168.56.104]

TASK [ETCD : Stopping the Etcd for ubuntu] *****
*
changed: [192.168.56.104]

TASK [ETCD : Starting the Etcd for ubuntu] *****
*
changed: [192.168.56.104]

TASK [ETCD : Enabling the Etcd for ubuntu] *****
*
ok: [192.168.56.104]

PLAY RECAP *****
192.168.56.104      : ok=26   changed=9    unreachable=0    failed=0
skipped=0         rescued=0   ignored=0

```

The code ran successfully and installed the OpenStack prerequisites.

```

jefferson@Server2:~$ sudo systemctl status memcached
● memcached.service - memcached daemon
   Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor pr
   Active: active (running) since Wed 2022-12-07 20:34:39 PST; 4min 50s ago
     Docs: man:memcached(1)
   Main PID: 27817 (memcached)
    Tasks: 10 (limit: 1080)
   Memory: 2.4M
      CPU: 183ms
   CGroup: /system.slice/memcached.service
           └─27817 /usr/bin/memcached -u root

Dec 07 20:34:39 Server2 systemd[1]: Started memcached daemon.
lines 1-12/12 (END)

```

```
jefferson@Server2:~$ sudo systemctl status rabbitmq-server
● rabbitmq-server.service - RabbitMQ Messaging Server
   Loaded: loaded (/lib/systemd/system/rabbitmq-server.service; enabled; ven
   Active: active (running) since Wed 2022-12-07 20:14:08 PST; 26min ago
 Main PID: 7996 (beam.smp)
    Tasks: 21 (limit: 1080)
   Memory: 31.3M
      CPU: 16.566s
   CGroup: /system.slice/rabbitmq-server.service
           └─7996 /usr/lib/erlang/erts-12.2.1/bin/beam.smp -W w -MBas ageffc
             └─8007 erl_child_setup 65536
               └─8055 inet_gethost 4
                 └─8056 inet_gethost 4

Dec 07 20:14:02 Server2 systemd[1]: Starting RabbitMQ Messaging Server...
Dec 07 20:14:08 Server2 systemd[1]: Started RabbitMQ Messaging Server.
lines 1-15/15 (END)
```

```
jefferson@Server2:~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.6.11 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
   Active: active (running) since Wed 2022-12-07 20:33:27 PST; 7min ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
 Main PID: 26008 (mariadb)
    Status: "Taking your SQL requests now..."
     Tasks: 7 (limit: 1080)
    Memory: 40.8M
       CPU: 889ms
   CGroup: /system.slice/mariadb.service
           └─26008 /usr/sbin/mariadb
```

```
jefferson@Server2:~$ sudo systemctl status nove-compute
Unit nove-compute.service could not be found.
jefferson@Server2:~$ sudo systemctl status nova-compute
● nova-compute.service - OpenStack Compute
   Loaded: loaded (/lib/systemd/system/nova-compute.service; enabled; vendor>
   Active: active (running) since Wed 2022-12-07 20:21:02 PST; 20min ago
 Main PID: 23156 (nova-compute)
     Tasks: 2 (limit: 1080)
    Memory: 33.4M
       CPU: 3.841s
   CGroup: /system.slice/nova-compute.service
           └─23156 /usr/bin/python3 /usr/bin/nova-compute --config-file=/etc>

Dec 07 20:21:02 Server2 systemd[1]: Started OpenStack Compute.
Dec 07 20:21:06 Server2 nova-compute[23156]: Modules with known eventlet monke>
lines 1-12/12 (END)
```

```
jefferson@Server2:~$ sudo systemctl status chronyd
● chronyd.service - chrony, an NTP client/server
   Loaded: loaded (/lib/systemd/system/chronyd.service; enabled; vendor prese
   Active: active (running) since Wed 2022-12-07 20:33:48 PST; 8min ago
     Docs: man:chronyd(8)
           man:chronyc(1)
           man:chrony.conf(5)
   Main PID: 26964 (chronyd)
     Tasks: 2 (limit: 1080)
    Memory: 1.5M
       CPU: 54ms
    CGroup: /system.slice/chronyd.service
            └─26964 /usr/sbin/chronyd -F 1
              └─26965 /usr/sbin/chronyd -F 1
```

```
jefferson@Server2:~$ chronyc -n sourcestats -v
```

	.	-	N	u	m	b	e	r	o	f	s	a	m	p	l	e	s	i	n	m	e	a	s	u	r	e	m	e	n	t	s	e	t	.
/	.	-	N	u	m	b	e	r	o	f	r	e	s	i	d	u	a	l	r	u	n	s	w	i	t	h	s	a	m	e	s	i	g	n
	/	.	-	L	e	n	g	t	h	o	f	m	e	a	s	u	r	e	m	e	n	t	s	e	t	(t	i	m	e	)	.			
		/	.	-	E	s	t	.	c	l	o	c	k	f	r	e	q	e	r	r	o	r	(p	p	m	)	.							
			/	.	-	E	s	t	.	e	r	r	o	r	i	n	f	r	e	q	.													
				/	.	-	E	s	t	.	o	f	f	s	e	t	.																	
					O	n	t	h	e	-																								
					s	a	m	p	l	e	s	.	\																					
					S	t	d	D	e	v																								

```
Name/IP Address NP NR Span Frequency Freq Skew Offset Std Dev
=====
```

```
jefferson@Server2:~$
```

```
jefferson@Server2:~$ sudo 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 2022-12-07 20:35:25 PST; 7min ago
     Docs: https://etcd.io/docs
           man:etcd
 Main PID: 28561 (etcd)
    Tasks: 6 (limit: 1080)
   Memory: 5.6M
      CPU: 3.095s
   CGroup: /system.slice/etcd.service
           └─28561 /usr/bin/etcd
```

## Proofs that the prerequisites are already installed.

```
jefferson@LocalMachine: ~/HOA13_o/OpenStack
Untracked files:
  (use "git add <file>..." to include in what will be committed)
  roles/ETCD/
  roles/Memcached/
  roles/Messqueue/
  roles/NTP/
  roles/OS/
  roles/SQLDB/

no changes added to commit (use "git add" and/or "git commit -a")
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git add roles/ETCD/
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git add roles/Memcached/
Command 'git' not found, but there are 17 similar ones.
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git add roles/Memcached
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git add roles/Messqueue/
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git add roles/Memcached/
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git add roles/NTP/
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git add roles/OS/
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git add roles/SQLDB/
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git commit -m "HOA13"
[main 04fa4f7] HOA13
6 files changed, 191 insertions(+)
create mode 100644 OpenStack/roles/ETCD/tasks/main.yml
create mode 100644 OpenStack/roles/Memcached/tasks/main.yml
create mode 100644 OpenStack/roles/Messqueue/tasks/main.yml
create mode 100644 OpenStack/roles/NTP/tasks/main.yml
create mode 100644 OpenStack/roles/OS/tasks/main.yml
create mode 100644 OpenStack/roles/SQLDB/tasks/main.yml
jefferson@LocalMachine:~/HOA13_o/OpenStack$ git push origin main
```

I added, committed, and pushed it to my github repository.

[jlangbid13/HOA13\\_o \(github.com\)](https://github.com/jlangbid13/HOA13_o)

### Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

The benefits of Implementing Openstack is that it has few prerequisites that are needed. As long as you have the internet you can use it in the cloud servers. It also has high data security, reliability, scalable storage volume and performance.

### Conclusions:

All in all, in this activity, we are tasked to install the prerequisites of openstack using ansible to another server. First, I created a github repository and cloned it to the local machine and also created the ansible.cfg and then the inventory for the ansible. After that I created the roles for the computer and controller. I created the yml for the installation of the prerequisites which are NTP, OpenStack packages, SQL database, Message Queue, memcached, and Etc. I created the role directory to store the

main.yml of each role and after inputting the codes the ansible ran successfully. I added, committed, and pushed the files to my github repository