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Instructor:	Semester and SY: 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. <div> <pre>dldperez@workstation: ~/HOA_13.1 dldperez@workstation: \$ git clone git@github.com:dldperez/HOA_13.1.git Cloning into 'HOA_13.1'... remote: Enumerating objects: 3, done. remote: Counting objects: 100% (3/3), done. remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0) Receiving objects: 100% (3/3), done. dldperez@workstation: \$ ls Desktop HOA_10.1 HOA_4.1 midterms PEREZ snap Documents HOA_13.1 HOA_5.1 Music Pictures Templates Downloads HOA_2.1 HOA_6.1 perez Public Videos dldperez@workstation: \$ cd HOA_13.1 dldperez@workstation: ~/HOA_13.1\$</pre> </div> <div> <pre>dldperez@workstation:~/HOA_13.1\$ cat ansible.cfg [defaults] inventory = inventory host_key_checking = False deprecation_warnings = False remote_user = dldperez retry_files_enabled = False</pre> </div> <div> <p>Ansible</p> </div> <div> <pre>GNU nano 6.2 install openstack.yml * #Playbook for openstack installation --- - hosts: all become: true roles: - role: ntp - role: openstack - role: sql - role: mesq - role: memcached - role: etcd</pre> </div> <div> <p>roles</p> </div> <div> <pre>dldperez@workstation:~/HOA_13.1\$ cat inventory [ubuntu] 192.168.56.113</pre> </div> <div> <p>inventory</p> </div>	

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

```
dldperez@workstation:~/H0A_13.1$ tree
.
├── ansible.cfg
├── etcd
│   └── tasks
│       └── main.yml
├── install_openstack.yml
├── inventory
├── memcached
│   └── tasks
│       └── main.yml
├── mesq
│   └── tasks
│       └── main.yml
├── ntp
│   └── tasks
│       └── main.yml
├── openstack
│   └── tasks
│       └── main.yml
├── README.md
├── sql
│   └── tasks
│       └── main.yml
└── 12 directories, 10 files
```

Created directories and playbook files for each item.

a. NTP

```
GNU nano 6.2          ntp/tasks/main.yml *
- name: Installing Chrony (Ubuntu)
  apt:
    name: chrony
    state: latest

- replace:
  dest: /etc/chrony/chrony.conf
  regexp: server NTP_SERVER iburst
  replace: server 192.168.56.112 iburst
  backup: yes

- name: add key to chrony.conf
  ansible.builtin.lineinfile:
    dest: /etc/chrony/chrony.conf
    line: allow 10.0.0.0/24
    backup: yes

- name: Verifying Installation (Chrony for Ubuntu)
  service:
    name: chrony
    state: restarted
    enabled: true
```

b. OpenStack packages

```
GNU nano 6.2 openstack/tasks/main.yml *
- name: Installing OpenStack (Ubuntu)
  apt:
    name:
      - nova-compute
      - python3-openstackclient
    state: latest
```

c. SQL Database

```
GNU nano 6.2 sql/tasks/main.yml
- name: Install the SQL Database
  apt:
    name:
      - mariadb-server
      - python3-pymysql
    state: present
    update_cache: yes

- name: Edit the maria-db.conf file
  copy:
    content: |
      default-storage-engine = innodb
      innodb_file_per_table = on
      max_conenctions = 4096
      collation-server = utf_general_ci
      character-set-server = utf8
    dest: /etc/mysql/mariadb.conf.d/99-openstack.cnf
    mode: "0755"

- name: Restart the mariadb-server
  service:
    name: mysql
    state: restarted
    enabled: yes
```

d. Message Queue

```
GNU nano 6.2 mesq/tasks/main.yml *
- name: Install Message Queue
  apt:
    name: rabbitmq-server
    state: present
    update_cache: yes

- name: Starting service
  service:
    name: rabbitmq-server.service
    state: started
    enabled: true
```

e. Memcached

```
dldperez@workstation: ~/HOA_13.1
GNU nano 6.2 memcached/tasks/main.yml *
- name: Installing MemCached (Ubuntu)
  apt:
    name:
      - memcached
      - python3-memcache
    state: latest

- name: Editing Config File
  lineinfile:
    dest: /etc/memcached.conf
    regexp: "-1 127.0.0.1"
    line: "-1 10.0.0.11"
    state: present
    backup: yes

- name: Restart Service
  service:
    name: memcached
    state: restarted
    enabled: true
```

f. Etcd

```
GNU nano 6.2 etcd/tasks/main.yml *
- name: Installing Packages (etcd for ubuntu)
  apt:
    name:
      - etcd
    state: latest

- name: Editing Config File
  lineinfile:
    dest: /etc/default/etcd
    regexp: '{{ item.regexp }}'
    line: '{{ item.line }}'
    state: present
    backup: yes

  with_items:
    - { regexp: 'ETCD_INITIAL_CLUSTER=', line: 'ETCD_INITIAL_CLUSTER="controller=http://10.0.0.11:2380"' }
    - { regexp: 'ETCD_INITIAL_ADVERTISE_PEER_URLS=', line: 'ETCD_INITIAL_ADVERTISE_PEER_URLS="http://10.0.0.11:2380"' }
    - { regexp: 'ETCD_ADVERTISE_CLIENT_URLS=', line: 'ETCD_ADVERTISE_CLIENT_URLS="http://10.0.0.11:2379"' }
    - { regexp: 'ETCD_LISTEN_PEER_URLS=', line: 'ETCD_LISTEN_PEER_URLS="http:// 0.0.0.0:2380"' }
    - { regexp: 'ETCD_LISTEN_CLIENT_URLS=', line: 'ETCD_LISTEN_CLIENT_URLS="http://10.0.0.11:2379"' }
```

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.

```
dldperez@workstation:~/HOA_13.1$ git add .
dldperez@workstation:~/HOA_13.1$ git commit -m "HOA13.1"
[main fd44058] HOA13.1
 9 files changed, 158 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 etcd/tasks/main.yml
 create mode 100644 install_openstack.yml
 create mode 100644 inventory
 create mode 100644 memcached/tasks/main.yml
 create mode 100644 mesq/tasks/main.yml
 create mode 100644 ntp/tasks/main.yml
 create mode 100644 openstack/tasks/main.yml
 create mode 100644 sql/tasks/main.yml
dldperez@workstation:~/HOA_13.1$ git push origin main
Enumerating objects: 24, done.
Counting objects: 100% (24/24), done.
Compressing objects: 100% (10/10), done.
Writing objects: 100% (23/23), 2.62 KiB | 2.62 MiB/s, done.
Total 23 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:dldperez/HOA_13.1.git
   8e428b8..fd44058  main -> main
dldperez@workstation:~/HOA_13.1$
```

HOA_13.1 (Public) Pin Unwatch 1

main 1 Branch 0 Tags Go to file + <> Code

File/Folder	Commit	Time	Commits
etcd/tasks	fd44058	2 minutes ago	2
memcached/tasks	fd44058	2 minutes ago	2
mesq/tasks	fd44058	2 minutes ago	2
ntp/tasks	fd44058	2 minutes ago	2
openstack/tasks	fd44058	2 minutes ago	2
sql/tasks	fd44058	2 minutes ago	2
README.md	Initial commit	1 hour ago	2
ansible.cfg	fd44058	2 minutes ago	2
install_openstack.yml	fd44058	2 minutes ago	2
inventory	fd44058	2 minutes ago	2

GITHUB LINK: https://github.com/dldperez/HOA_13.1.git

5. Output (screenshots and explanations)

```
dldperez@workstation:~/HOA_13.1$ ansible-playbook --ask-become-pass install_openstack.yml
BECOME password:

PLAY [all] *****

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

TASK [ntp : Installing Chrony (Ubuntu)] *****
ok: [192.168.56.113]

TASK [ntp : replace] *****
ok: [192.168.56.113]

TASK [ntp : add key to chrony.conf] *****
ok: [192.168.56.113]

TASK [ntp : Verifying Installation (Chrony for Ubuntu)] *****
changed: [192.168.56.113]

TASK [openstack : Installing OpenStack (Ubuntu)] *****
ok: [192.168.56.113]

TASK [sql : Install the SQL Database] *****
changed: [192.168.56.113]

TASK [sql : Edit the maria-db.conf file] *****
changed: [192.168.56.113]

TASK [sql : Restart the mariadb-server] *****
changed: [192.168.56.113]

TASK [mesq : Install Message Queue] *****
changed: [192.168.56.113]

TASK [mesq : Starting service] *****
ok: [192.168.56.113]

TASK [mesq : Starting service] *****
ok: [192.168.56.113]

TASK [mencached : Installing MemCached (Ubuntu)] *****
changed: [192.168.56.113]

TASK [mencached : Editing Config File] *****
changed: [192.168.56.113]

TASK [mencached : Restart Service] *****
changed: [192.168.56.113]

TASK [etcd : Installing Packages (etcd for ubuntu)] *****
changed: [192.168.56.113]

TASK [etcd : Editing Config File] *****
changed: [192.168.56.113] => (item={'regex': 'ETCD_INITIAL_CLUSTER=', 'line': 'ETCD_INITIAL_CLUSTER="controller=http://10.0.0.11:2380"'})
changed: [192.168.56.113] => (item={'regex': 'ETCD_INITIAL_ADVERTISE_PEER_URLS=', 'line': 'ETCD_INITIAL_ADVERTISE_PEER_URLS="http://10.0.0.11:2380"'})
changed: [192.168.56.113] => (item={'regex': 'ETCD_ADVERTISE_CLIENT_URLS=', 'line': 'ETCD_ADVERTISE_CLIENT_URLS="http://10.0.0.11:2379"'})
changed: [192.168.56.113] => (item={'regex': 'ETCD_LISTEN_PEER_URLS=', 'line': 'ETCD_LISTEN_PEER_URLS="http://0.0.0.0:2380"'})
changed: [192.168.56.113] => (item={'regex': 'ETCD_LISTEN_CLIENT_URLS=', 'line': 'ETCD_LISTEN_CLIENT_URLS="http://10.0.0.11:2379"'})

PLAY RECAP *****
192.168.56.113 : ok=16 changed=10 unreachable=0 failed=0 skipped=0 rescued=0 ignored=0
```

This playbook performed various tasks and all of it was successful. Nothing was skipped or failed.

CONFIRMATIONS

```
dldperez@server1:~$ systemctl status chrony
● chrony.service - chrony, an NTP client/server
   Loaded: loaded (/lib/systemd/system/chrony.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2024-11-29 20:44:20 +08; 10min ago
     Docs: man:chronyd(8)
           man:chronyc(1)
           man:chrony.conf(5)
  Main PID: 30851 (chronyd)
    Tasks: 2 (limit: 2270)
   Memory: 1.5M
      CPU: 289ms
   CGroup: /system.slice/chrony.service
           └─30851 /usr/sbin/chronyd -F 1
             30852 /usr/sbin/chronyd -F 1
```

```
dldperez@server1:~$ systemctl status mariadb
● mariadb.service - MariaDB 10.6.18 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2024-11-29 20:45:13 +08; 9min ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
  Main PID: 32223 (mariabdd)
    Status: "Taking your SQL requests now..."
    Tasks: 8 (limit: 14983)
   Memory: 63.7M
      CPU: 1.024s
   CGroup: /system.slice/mariadb.service
           └─32223 /usr/sbin/mariabdd
```

```
dldperez@server1:~$ 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 Fri 2024-11-29 20:46:06 +08; 12min ago
  Main PID: 33138 (beam.smp)
    Tasks: 26 (limit: 2270)
   Memory: 91.2M
      CPU: 36.294s
   CGroup: /system.slice/rabbitmq-server.service
           └─33138 /usr/lib/erlang/erts-12.2.1/bin/beam.smp -W w -MBas ageffcbf -MHAs ageffcbf -MBlnbcs 512 -MHLnbcs 512 -MMMcs
             33150 erl_child_setup 65536
             33205 inet_gethost 4
             33206 inet_gethost 4
             33211 /bin/sh -s rabbit_disk_monitor
```

lines 1-13/13 (END)

```
dldperez@server1:~$ systemctl status etcd
● etcd.service - etcd - highly-available key value store
   Loaded: loaded (/lib/systemd/system/etcd.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2024-11-29 20:46:44 +08; 13min ago
     Docs: https://etcd.io/docs
           man:etcd
  Main PID: 33808 (etcd)
    Tasks: 9 (limit: 2270)
   Memory: 6.3M
      CPU: 13.486s
   CGroup: /system.slice/etcd.service
           └─33808 /usr/bin/etcd
```

dldperez@server1:~\$

```
dldperez@server1:~$ systemctl status nova-compute
● nova-compute.service - OpenStack Compute
   Loaded: loaded (/lib/systemd/system/nova-compute.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2024-11-29 20:41:23 +08; 19min ago
  Main PID: 30325 (nova-compute)
    Tasks: 1 (limit: 2270)
   Memory: 128.2M
      CPU: 6.822s
   CGroup: /system.slice/nova-compute.service
           └─30325 /usr/bin/python3 /usr/bin/nova-compute --config-file=/etc/nova/nova.conf --config-file=/etc/nova/nova-compute
```

```
dldperez@server1:~$ openstack --version
openstack 5.8.0
```

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

The benefits of implementing OpenStack include easy scalability, easy automation, fast development, strong community, ready-made. It improves business agility; it increases the efficiency of core processes and it enhance the availability of resources.

Conclusions:

This activity successfully shows us how we create a workflow and configure OpenStack using ansible as our documentation and execution. This exercise made us understand the key components of OpenStack such as ntp, sql, message queue, Memcached, and etcd. In conclusion, this activity helped us have a hands-on experience in deploying OpenStack and its components.