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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

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. 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 the Inventory file.
    h. Add, commit and push it to your GitHub repo.

5. Output (screenshots and explanations)

In this activity, I have decided to use a different operating system for various reasons. In Ubuntu, I have encountered different errors when it comes to installing OpenStack Packages. The following offered packages are not suitable for the “Jammy Jellyfish” version; instead it is only working on the “Focal” version. In CentOS, I am having the same trouble in OpenStack Packages but this time, the problem is that I can’t add the one of the OpenStack Package to the repository.

Disclaimer, the statement above is not hundred percent sure if that is the main issue but it is based on my experience. I tried different methods on how to solve it but I can’t figure it out.

I used OpenSUSE as my alternative operating system since OpenStack provided a well documented instruction in performing pre-installation. As a result, it works fine for me and successfully accomplishes the tasks for this activity.

This are the following steps to consider before deploying an ansible script to a fresh installed OpenSUSE server:

1. **Updating the repository and upgrading the packages.**

```
opensuse@localhost:~/Desktop> sudo zypper update && sudo zypper dist-upgrade
[sudo] password for root:
Loading repository data...
Reading installed packages...
Nothing to do.
Loading repository data...
Reading installed packages...
Warning: You are about to do a distribution upgrade with all enabled repositorie
s. Make sure these repositories are compatible before you continue. See 'man zyp
per' for more information about this command.
Computing distribution upgrade...
Nothing to do.
```

Figure 1. Updating repository and upgrading the packages of the OpenSUSE server.

2. **Enabling SSH service and allowing its port to pass through the firewall.**

```
Terminal - opensuse@localhost.localdomain:~/Desktop
File  Edit  View  Terminal  Tabs  Help
opensuse@localhost:~/Desktop> sudo systemctl start sshd
[sudo] password for root:

opensuse@localhost:~/Desktop>
opensuse@localhost:~/Desktop> sudo systemctl enable sshd
Created symlink /etc/systemd/system/multi-user.target.wants/sshd.service → /usr/
lib/systemd/system/sshd.service.
opensuse@localhost:~/Desktop> sudo firewall-cmd --permanent --add-service=ssh
success
opensuse@localhost:~/Desktop> sudo firewall-cmd --reload
success
opensuse@localhost:~/Desktop>
```

Figure 2. Starting service of ssh and allowing ssh port to pass through the firewall.

3. **Checking if ansible can connect to the OpenSUSE server using the main control node.**

```
CPE232-Activity_13 on ᚠ master [?] took 8s ❯ ssh opensuse@192.168.30.152
The authenticity of host '192.168.30.152 (192.168.30.152)' can't be established.
ED25519 key fingerprint is SHA256:pzgTzX4BBlOsenjTuFBgK/87nmbnM9SVOWtxXV3xUp8.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.30.152' (ED25519) to the list of known hosts.
(opensuse@192.168.30.152) Password:
Last login: Thu Dec  1 14:35:51 2022 from console
Have a lot of fun...
opensuse@localhost:~> exit
logout
Connection to 192.168.30.152 closed.
CPE232-Activity_13 on ᚠ master [?] took 16s ❯ ssh-copy-id opensuse@192.168.30.152
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/papzi/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
(opensuse@192.168.30.152) Password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'opensuse@192.168.30.152'"
and check to make sure that only the key(s) you wanted were added.

CPE232-Activity_13 on ᚠ master [?] took 3s ❯ ansible all -m ping
[WARNING]: Platform linux on host 192.168.30.152 is using the discovered Python interpreter at /usr/bin/python3.6, but future
installation of another Python interpreter could change the meaning of that path. See https://docs.ansible.com/ansible-
core/2.13/reference_appendices/interpreter_discovery.html for more information.
192.168.30.152 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3.6"
    },
    "changed": false,
    "ping": "pong"
}
```

Figure 3. Checking if ansible can connect to the OpenSUSE server.

HANDS-ON ACTIVITY TASKS

Figure 4. Creating a new repository for this activity.

```
~/Desktop ✦ ❯ git clone git@github.com:piolotorrecampo/CPE232-Activity_13.g
it
Cloning into 'CPE232-Activity_13'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Receiving objects: 100% (3/3), done.
```

Figure 5. Cloning the created repository to the local machine.

```
CPE232-Activity_13 on  main ❯ touch ansible.cfg inventory install_openstack.yml
CPE232-Activity_13 on  main [?] ❯ mkdir roles
CPE232-Activity_13 on  main [?] ❯ cd roles
CPE232-Activity_13/roles on  main [?] ❯ mkdir ntp packages database message_queue memcached
etcd
CPE232-Activity_13/roles on  main [?] ❯ mkdir ntp/tasks packages/tasks database/tasks messag
e_queue/tasks memcached/tasks etcd/tasks
```

```
CPE232-Activity_13/roles on  main [?] ❯ touch ntp/tasks/main.yml packages/tasks/main.yml dat
abase/tasks/main.yml message_queue/tasks/main.yml memcached/tasks/main.yml etcd/tasks/main.ym
l
CPE232-Activity_13/roles on  main [?] ❯ touch ntp/tasks/install.yml packages/tasks/install.y
ml database/tasks/install.yml message_queue/tasks/install.yml memcached/tasks/install.yml etc
d/tasks/install.yml
CPE232-Activity_13/roles on  main [?] ❯ mkdir ntp/handlers message_queue/handlers memcached/
handlers etcd/handlers database/handlers
CPE232-Activity_13/roles on  main [?] ❯ mkdir ntp/files memcached/files etcd/files database/
files
CPE232-Activity_13/roles on  main [?] ❯ touch ntp/handlers/main.yml database/handlers/main.y
ml etcd/handlers/main.yml memcached/handlers/main.yml message_queue/handlers/main.yml
CPE232-Activity_13/roles on  main [?] ❯ touch ntp/files/chrony.conf memcached/files/memcache
d database/files/openstack.cnf etcd/files/etcd.conf.yml etcd/files/etcd.service
```

Figure 6. Creating the files and directories.

```
CPE232-Activity_13/roles on  main [?] ❯ tree
.
├── database
│   ├── files
│   │   └── openstack.cnf
│   ├── handlers
│   │   └── main.yml
│   └── tasks
│       ├── install.yml
│       └── main.yml
├── etcd
│   ├── files
│   │   ├── etcd.conf.yml
│   │   └── etcd.service
│   ├── handlers
│   │   └── main.yml
│   └── tasks
│       ├── install.yml
│       └── main.yml
├── memcached
│   ├── files
│   │   └── memcached
│   ├── handlers
│   │   └── main.yml
│   └── tasks
│       ├── install.yml
│       └── main.yml
├── message_queue
│   ├── handlers
│   │   └── main.yml
│   └── tasks
│       ├── install.yml
│       └── main.yml
```

```
├── ntp
│   ├── files
│   │   └── chrony.conf
│   ├── handlers
│   │   └── main.yml
│   └── tasks
│       ├── install.yml
│       └── main.yml
└── packages
    └── tasks
        ├── install.yml
        └── main.yml
```

Figure 7. The screenshot above shows the tree file structure.

File Name	Ansible Script (Screenshot)
install_openstack.yml	
ansible.cfg	
inventory	

```yaml
---

hosts: all
 become: true
 pre_tasks:

 - name: Updating and upgrading the operating system
   community.general.zypper:
     name: "*"
     state: latest
     update_cache: true

- hosts: controller_node
  become: true
  roles:
    - ntp
    - packages
    - database
    - message_queue
    - memcached
    - etcd

install_openstack.yml [+]                    1,1          All
```

```ini
[defaults]

inventory = inventory
host_key_checking = False
deprecation_warnings = False
private_key_file = ~/.ssh/id_rsa
~
ansible.cfg                    1,1          All
```

```ini
[controller_node]
192.168.30.153 ansible_user=opensuse
~
~
inventory                      2,1          All
```

Table 1. The table above shows the contents of ansible.cfg, inventory and instal_openstack.yml.

ROLES AND ITS CONTENT

Network Time Protocol (NTP)		
Directory Name	**File Name**	**Ansible Script (Screenshot)**
tasks	main.yml	

```
- import_tasks: install.yml
ntp/tasks/main.yml  1,0-1          All
```

install.yml

```
- name: Installing chrony
  community.general.zypper:
    name: chrony
    state: latest

- name: Starting chrony service
  service:
    name: chronyd.service
    state: started
    enabled: true

- name: Editing chrony.conf file
  copy:
    src: chrony.conf
    dest: /etc/chrony.conf
    owner: root
    group: root
    mode: 644

  notify: Restarting chrony

- block:
  - name: Verifying installation of chrony
    command: chronyd --version
    register: chrony_version

  - debug:
      msg="{{ chrony_version }}"

- block:
  - name: Verifying if chronyd is started and running in the background
    command: systemctl status chronyd
    register: chrony_service

  - debug:
      msg="{{ chrony_service }}"
ntp/tasks/install.yml [+]          1,0-1          All
```

handlers	main.yml	

```
name: Restarting chrony
  service:
    name: chronyd.service
    state: restarted
    enabled: true

ntp/handlers/main.yml          1,1          All
```

files	chrony.conf	

```
# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (http://www.pool.ntp.org/join.html).
server 0.centos.pool.ntp.org iburst
server 1.centos.pool.ntp.org iburst
server 2.centos.pool.ntp.org iburst
server 3.centos.pool.ntp.org iburst

# Record the rate at which the system clock gains/losses time.
driftfile /var/lib/chrony/drift

# Allow the system clock to be stepped in the first three updates
# if its offset is larger than 1 second.
makestep 1.0 3

# Enable kernel synchronization of the real-time clock (RTC).
rtcsync

# Enable hardware timestamping on all interfaces that support it.
#hwtimestamp *

# Increase the minimum number of selectable sources required to adjust
# the system clock.
#minsources 2

# Allow NTP client access from local network.
#allow 192.168.0.0/16

# Serve time even if not synchronized to a time source.
#local stratum 10

# Specify file containing keys for NTP authentication.
#keyfile /etc/chrony.keys

# Specify directory for log files.
logdir /var/log/chrony

# Select which information is logged.
#log measurements statistics tracking

allow 10.0.0.0/24

#server NTP_SERVER iburst
ntp/files/chrony.conf                                   1,25          All
```

Table 2. The table above shows the directories, files and its content under "NTP" ansible role.

OpenStack Packages		
Directory Name	**File Name**	**Ansible Script (Screenshot)**
tasks	main.yml	

```
- import_tasks: install.yml
packages/tasks/main.yml          1,0-1          All
```

	install.yml	

```
- name: Enabling openstack repository
  community.general.zypper_repository:
    repo: 'obs://Cloud:OpenStack:Stein/openSUSE_Leap_15.0'
    name: Stein
    auto_import_keys: true
    runrefresh: true
```

		``yaml
		- name: Refreshing the opensuse repository
		  community.general.zypper:
		    name: '*'
		    state: latest
		    update_cache: true
		
		- name: Installing openstackclient
		  pip:
		    name: python-openstackclient
		
		- block:
		  - name: Verifying installation of openstackclient
		    shell: openstack --version
		    register: openstack_version
		
		  - debug:
		      msg="{{ openstack_version }}"
		
		packages/tasks/install.yml 1,0-1 All
		``

Table 3. The table above shows the directories, files and its content under "packages" ansible role.

SQL database		
Directory Name	**File Name**	**Ansible Script (Screenshot)**

tasks	main.yml	```yaml
		import_tasks: install.yml
		~
		database/tasks/main.yml 2,1 All
		``

	install.yml	```yaml
		- name: Installing database components
		  community.general.zypper:
		    name:
		      - mariadb-client
		      - mariadb
		
		- name: Installing python-PyMySQL (Components)
		  expect:
		    command: zypper install python-PyMySQL
		    responses:
		      (?i)Choose from above solutions by number or cancel: 2
		      (?i)Overall download size: y
		
		- name: Copying openstack.cnf file
		  copy:
		    src: openstack.cnf
		    dest: /etc/my.cnf.d/openstack.cnf
		    owner: root
		    group: root
		    mode: 644
		
		  notify: Restarting database service
		
		- name: Starting and enabling database service
		  service:
		    name: mysql
		    state: started
		    enabled: true
		
		- name: Set the root password
		  mysql_user: login_user=root login_password="{{ root_password }}" user=root password="{{ root_password }}"
		
		- name: Secure the root user for IPV6 localhost (::1)
		  mysql_user: login_user=root login_password="{{ root_password }}" user=root password="{{ root_password }}" host="::1"
		
		- name: Secure the root user for IPV4 localhost (127.0.0.1)
		  mysql_user: login_user=root login_password="{{ root_password }}" user=root password="{{ root_password }}" host="127.0.0.1"
		
		- name: Secure the root user for localhost domain
		  mysql_user: login_user=root login_password="{{ root_password }}" user=root password="{{ root_password }}" host="localhost"
		
		- name: Secure the root user for server_hostname domain
		  mysql_user: login_user=root login_password="{{ root_password }}" user=root password="{{ root_password }}" host="{{ ansible_fqdn }}"
		``

handlers	main.yml	

Table 4. The table above shows the directories, files and its content under "database" ansible role.

Message queue		
Directory Name	**File Name**	**Ansible Script (Screenshot)**
tasks	main.yml	
	install.yml	

| | | ```
19  - debug:
20      msg="{{ rabbitmq_version }}"
21
22 - block:
23  - name: Verifying rabbitmq-server installation
24    command: sudo systemctl status rabbitmq-server
25    register: rabbitmq_service
26
27  - debug:
28      msg="{{ rabbitmq_service }}"
29
message_queue/tasks/install.yml  1,0-1  All
```  |
| handlers | main.yml | ```
3 - name: Configuring rabbitmq-server
2   shell: |
1     rabbitmqctl add_user openstack server54321
4     rabbitmqctl set_permissions openstack ".*" ".*" ".*"
1
message_queue/handlers/main.yml  4,1  All
```  |

Table 5. The table above shows the directories, files and its content under "message_queue" ansible role.

Memcached		
Directory Name	**File Name**	**Ansible Script (Screenshot)**
| tasks | main.yml | ```
2  import_tasks: install.yml
~
memcached/tasks/main.yml  2,1  Bot
```  |
| | install.yml | ```
1
1 - name: Installing memcached
2   community.general.zypper:
3     name:
4       - memcached
5       - python-python-memcached
6     state: latest
7
8 - name: Editing memcached.conf file
9   copy:
10    src: memcached
11    dest: /etc/sysconfig/memcached
12    owner: root
13    group: root
14    mode: 644
15
16  notify: Restarting memcached
17
18 - name: Starting memcached service
19  service:
20    name: memcached
21    state: started
```  |

| | | ```
22  enabled: true
23
24 - block:
25   - name: Verifying installation of memcached
26     command: memcached --version
27     register: memcached_version
28
29   - debug:
30       msg="{{ memcached_version }}"
31
32 - block:
33   - name: Verifying if memcached is started and running in the background
34     command: systemctl status memcached
35     register: memcached_service
36
37   - debug:
38       msg="{{ memcached_service }}"
39
memcached/tasks/install.yml  1,1  All
-- INSERT --
```  |
| handler | main.yml | ```
4 - name: Restarting memcached
3   service:
2     name: memcached
1     state: restarted
5     enabled: true
~
memcached/handlers/main.yml  5,1  All
```  |
| files | memcached | ```
1  ## Path:  Network/WWW/Memcached
1  ## Description: start parameters for memcached.
2  ## Type:  string
3  ## Default:  "-l 127.0.0.1"
4  ## Config:  memcached
5  #
6  # start parameters for memcached.
7  #
8  # see man 1 memcached for more
9  #
10 MEMCACHED_PARAMS="-l 192.168.30.153"
11
12 ## Path:  Network/WWW/Memcached
13 ## Description: username memcached should run as
14 ## Type:  string
15 ## Default:  "memcached"
16 ## Config:  memcached
17 #
18 # username memcached should run as
19 #
20 MEMCACHED_USER="memcached"
21
22 ## Path:  Network/WWW/Memcached
23 ## Description: group memcached should be run as
24 ## Type:  string
```  |
```

| | | ```
## Default:     "memcached"
## Config:      memcached
#
# group memcached should be run as
#
MEMCACHED_GROUP="memcached"
memcached/files/memcached          1,1          All
```<br>*Table 6. The table above shows the directories, files and its content under "memcached" ansible role.* |

Etcd		
Directory Name	**File Name**	**Ansible Script (Screenshot)**
| tasks | main.yml | ```
1 - import_tasks: install.yml
etcd/tasks/main.yml        1,0-1        All
```<br>*Table 7. The table above shows the directories, files and its content under "etcd" ansible role.* |
| | tasks.yml | ```
- name: Creating etcd user
  group:
    name: etcd
    system: true
    state: present

- name: Creating user for etcd
  user:
    name: etcd
    home: "/var/lib/etcd"
    shell: /bin/false
    group: etcd
    system: true

- name: Creating /etc/etcd directory
  file:
    path: /etc/etcd
    state: directory
    owner: etcd
    group: etcd

- name: Creating /var/lib/etcd directory
  file:
    path: /var/lib/etcd
    state: directory
    owner: etcd
    group: etcd

- name: Installing etcd tarball for x86_64/amd64
  shell: |
    ETCD_VER=v3.2.7
    rm -rf /tmp/etcd && mkdir -p /tmp/etcd
    curl -L https://github.com/coreos/etcd/releases/download/${ETCD_VER}/etcd-${ETCD_VER}-linux-amd64.tar.gz -o /tmp/etcd-${ETCD_VER}-linux-amd64.tar.gz
    tar xzvf /tmp/etcd-${ETCD_VER}-linux-amd64.tar.gz -C /tmp/etcd --strip-components=1
    cp /tmp/etcd/etcd /usr/bin/etcd
    cp /tmp/etcd/etcdctl /usr/bin/etcdctl

- name: Creating a config file for etcd
  copy:
    src: etcd.conf.yml
    dest: /etc/etcd/etcd.conf.yml
    owner: root
    group: root
    mode: 644

- name: Copying the service file for etcd
  copy:
    src: etcd.service
    dest: /usr/lib/systemd/system/etcd.service
    owner: root
    group: root
    mode: 644

  notify: Reloading systemd service files

- name: Starting and enabling service of etcd
  service:
    name: etcd
    state: started
    enabled: true

- block:
  - name: Verifying installation of etcd
    command: etcd --version
```<br>*Table 8. The table above shows the directories, files and its content under "etcd" ansible role.* |
```

| | | ```
56  register: etcd_version
57
58 - debug:
59     msg="{{ etcd_version }}"
60
61 - block:
62 - name: Verifying if etcd is started and running in the background
63   command: systemctl status etcd
64   register: etcd_service
65
66 - debug:
67     msg="{{ etcd_service }}"
68
etcd/tasks/install.yml  10,1  Top
```  |
| **handlers** | | ```
5
4 - name: Reloading systemd service files
3   systemd:
2     daemon_reload: yes
1   ignore_errors: yes
6
etcd/handlers/main.yml  6,0-1  All
```  |
| **files** | service | ```
1  [Unit]
1 After=network.target
2 Description=etcd - highly-available key value store
3
4 [Service]
5 # Uncomment this on ARM64.
6 # Environment="ETCD_UNSUPPORTED_ARCH=arm64"
7 LimitNOFILE=65536
8 Restart=on-failure
9 Type=notify
10 ExecStart=/usr/bin/etcd --config-file /etc/etcd/etcd.conf.yml
11 User=etcd
12
13 [Install]
14 WantedBy=multi-user.target
15
etcd/files/etcd.service  1,1  All
```  |
| | etcd.conf.yml | ```
1  name: controller
1 data-dir: /var/lib/etcd
2 initial-cluster-state: 'new'
3 initial-cluster-token: 'etcd-cluster-01'
4 initial-cluster: controller=http://192.168.30.153:2380
5 initial-advertise-peer-urls: http://192.168.30.153:2380
6 advertise-client-urls: http://192.168.30.153:2379
7 listen-peer-urls: http://0.0.0.0:2380
8 listen-client-urls: http://192.168.30.153:2379
9
etcd/files/etcd.conf.yml  1,1  All
```  |

Table 7. The table above shows the directories, files and its content under “etcd” ansible role.

```
CPE232-Activity_13 on  master [?] took 22s ❯ ansible-playbook --ask-become-pass install_opens
tack.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************************
[WARNING]: Platform linux on host 192.168.30.153 is using the discovered Python interpreter
at /usr/bin/python3.6, but future installation of another Python interpreter could change the
meaning of that path. See https://docs.ansible.com/ansible-
core/2.13/reference_appendices/interpreter_discovery.html for more information.
ok: [192.168.30.153]

TASK [Updating and upgrading the operating system] *****************************************
ok: [192.168.30.153]

PLAY [controller_node] *********************************************************************

TASK [Gathering Facts] *********************************************************************
ok: [192.168.30.153]

TASK [ntp : Installing chrony] *************************************************************
ok: [192.168.30.153]

TASK [ntp : Starting chrony service] *******************************************************
ok: [192.168.30.153]

TASK [ntp : Editing chrony.conf file] ******************************************************
changed: [192.168.30.153]

TASK [ntp : Verifying installation of chrony] **********************************************
changed: [192.168.30.153]

TASK [ntp : debug] *************************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": [
            "chronyd",
            "--version"
        ],
        "delta": "0:00:00.050249",
        "end": "2022-12-01 23:11:12.602150",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:11:12.551901",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "chronyd (chrony) version 4.1 (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +SCFILT
ER +SIGND +ASYNCDNS +NTS +SECHASH +IPV6 -DEBUG)",
        "stdout_lines": [
            "chronyd (chrony) version 4.1 (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +SCFILTER +SI
GND +ASYNCDNS +NTS +SECHASH +IPV6 -DEBUG)"
        ]
    }
}

TASK [ntp : Verifying if chronyd is started and running in the background] *******************
changed: [192.168.30.153]

TASK [ntp : debug] *************************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": [
            "systemctl",
            "status",
            "chronyd"
        ],
        "delta": "0:00:00.030352",
        "end": "2022-12-01 23:11:13.875672",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:11:13.845320",
        "stderr": "",
```

```
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● chronyd.service - NTP client/server\n     Loaded: loaded (/usr/lib/system
d/system/chronyd.service; enabled; vendor preset: disabled)\n     Active: active (running) sin
ce Thu 2022-12-01 15:16:08 PST; 7h ago\n       Docs: man:chronyd(8)\n             man:chrony.c
onf(5)\n    Process: 916 ExecStart=/usr/sbin/chronyd $OPTIONS (code=exited, status=0/SUCCESS)\
n    Process: 933 ExecStartPost=/usr/lib/chrony/helper update-daemon (code=exited, status=0/SU
CCESS)\n   Main PID: 932 (chronyd)\n      Tasks: 1 (limit: 2244)\n     CGroup: /system.slice/c
hronyd.service\n             └─ 932 /usr/sbin/chronyd\n\nDec 01 15:16:07 localhost systemd[1]:
 Starting NTP client/server...\nDec 01 15:16:08 localhost chronyd[932]: chronyd version 4.1 st
arting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +SCFILTER +SIGND +ASYNCDNS +NTS +SECHASH +IPV6 -
DEBUG)\nDec 01 15:16:08 localhost chronyd[932]: Frequency -10.285 +/- 0.231 ppm read from /var
/lib/chrony/drift\nDec 01 15:16:08 localhost systemd[1]: Started NTP client/server.\nDec 01 15
:16:23 localhost.localdomain chronyd[932]: Selected source 162.159.200.1 (3.opensuse.pool.ntp.
org)\nDec 01 23:10:02 localhost.localdomain chronyd[932]: Forward time jump detected!\nDec 01
23:10:02 localhost.localdomain chronyd[932]: Can't synchronise: no selectable sources",
        "stdout_lines": [
            "● chronyd.service - NTP client/server",
            "     Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; vendor pre
set: disabled)",
            "     Active: active (running) since Thu 2022-12-01 15:16:08 PST; 7h ago",
            "       Docs: man:chronyd(8)",
            "             man:chrony.conf(5)",
            "    Process: 916 ExecStart=/usr/sbin/chronyd $OPTIONS (code=exited, status=0/SUCC
ESS)",
            "    Process: 933 ExecStartPost=/usr/lib/chrony/helper update-daemon (code=exited,
 status=0/SUCCESS)",
            "   Main PID: 932 (chronyd)",
            "      Tasks: 1 (limit: 2244)",
            "     CGroup: /system.slice/chronyd.service",
            "             └─ 932 /usr/sbin/chronyd",
            "",
            "Dec 01 15:16:07 localhost systemd[1]: Starting NTP client/server...",
            "Dec 01 15:16:08 localhost chronyd[932]: chronyd version 4.1 starting (+CMDMON +NT
P +REFCLOCK +RTC +PRIVDROP +SCFILTER +SIGND +ASYNCDNS +NTS +SECHASH +IPV6 -DEBUG)",
            "Dec 01 15:16:08 localhost chronyd[932]: Frequency -10.285 +/- 0.231 ppm read from
 /var/lib/chrony/drift",
            "Dec 01 15:16:08 localhost systemd[1]: Started NTP client/server.",
            "Dec 01 15:16:23 localhost.localdomain chronyd[932]: Selected source 162.159.200.1
 (3.opensuse.pool.ntp.org)",
            "Dec 01 23:10:02 localhost.localdomain chronyd[932]: Forward time jump detected!",
            "Dec 01 23:10:02 localhost.localdomain chronyd[932]: Can't synchronise: no selecta
ble sources"
        ]
    }
}

TASK [packages : Enabling openstack repository] ********************************************
changed: [192.168.30.153]

TASK [packages : Refreshing the opensuse repository] ***************************************
ok: [192.168.30.153]

TASK [packages : Installing openstackclient] ***********************************************
changed: [192.168.30.153]

TASK [packages : Verifying installation of openstackclient] ********************************
changed: [192.168.30.153]

TASK [packages : debug] ********************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": "openstack --version",
        "delta": "0:00:02.841435",
        "end": "2022-12-01 23:12:54.693307",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:12:51.851872",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "openstack 5.8.0",
        "stdout_lines": [
            "openstack 5.8.0"
        ]
    }
```

```
    }
}

TASK [database : Installing database components] ******************************************
changed: [192.168.30.153]

TASK [database : Installing python-PyMySQL (components)] ***********************************
changed: [192.168.30.153]

TASK [database : Copying openstack.cnf file] ***********************************************
changed: [192.168.30.153]

TASK [database : Starting and enabling database service] ***********************************
changed: [192.168.30.153]

TASK [database : Set the root password] ****************************************************
changed: [192.168.30.153]

TASK [database : Secure the root user for IPV6 localhost (::1)] ****************************
changed: [192.168.30.153]

TASK [database : Secure the root user for IPV4 localhost (127.0.0.1)] **********************
changed: [192.168.30.153]

TASK [database : Secure the root user for localhost domain] ********************************
ok: [192.168.30.153]

TASK [database : Secure the root user for server_hostname domain] **************************
ok: [192.168.30.153]

TASK [database : Deletes anonymous server user] ********************************************
changed: [192.168.30.153]

TASK [database : Removes the test database] ************************************************
changed: [192.168.30.153]

TASK [database : Verifying installation of mysql] ******************************************
changed: [192.168.30.153]

TASK [database : debug] ********************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": "mysql --version",
        "delta": "0:00:00.062833",
        "end": "2022-12-01 23:15:12.147289",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:15:12.084456",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "mysql  Ver 15.1 Distrib 10.6.10-MariaDB, for Linux (x86_64) using  EditLine
 wrapper",
        "stdout_lines": [
            "mysql  Ver 15.1 Distrib 10.6.10-MariaDB, for Linux (x86_64) using  EditLine wrapp
er"
        ]
    }
}

TASK [database : Verifying if mysql is started and running in the background] ***************
changed: [192.168.30.153]

TASK [database : debug] ********************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": "systemctl status mysql",
        "delta": "0:00:00.034160",
        "end": "2022-12-01 23:15:13.488407",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:15:13.454247",
        "stderr": "",
        "stderr_lines": [],
```

```
        "stderr_lines": [],
        "stdout": "openstack 5.8.0",
        "stdout_lines": [
            "openstack 5.8.0"
        ]
    }
}

TASK [database : Installing database components] ******************************************
changed: [192.168.30.153]

TASK [database : Installing python-PyMySQL (components)] ************************************
changed: [192.168.30.153]

TASK [database : Copying openstack.cnf file] ************************************************
changed: [192.168.30.153]

TASK [database : Starting and enabling database service] ************************************
changed: [192.168.30.153]

TASK [database : Set the root password] *****************************************************
changed: [192.168.30.153]

TASK [database : Secure the root user for IPV6 localhost (::1)] *****************************
changed: [192.168.30.153]

TASK [database : Secure the root user for IPV4 localhost (127.0.0.1)] ***********************
changed: [192.168.30.153]

TASK [database : Secure the root user for localhost domain] *********************************
ok: [192.168.30.153]

TASK [database : Secure the root user for server_hostname domain] ***************************
ok: [192.168.30.153]

TASK [database : Deletes anonymous server user] *********************************************
changed: [192.168.30.153]

TASK [database : Removes the test database] *************************************************
changed: [192.168.30.153]

TASK [database : Verifying installation of mysql] *******************************************
changed: [192.168.30.153]

TASK [database : debug] *********************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": "mysql --version",
        "delta": "0:00:00.062833",
        "end": "2022-12-01 23:15:12.147289",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:15:12.084456",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "mysql  Ver 15.1 Distrib 10.6.10-MariaDB, for Linux (x86_64) using  EditLine
 wrapper",
        "stdout_lines": [
            "mysql  Ver 15.1 Distrib 10.6.10-MariaDB, for Linux (x86_64) using  EditLine wrapp
er"
        ]
    }
}

TASK [database : Verifying if mysql is started and running in the background] ***************
changed: [192.168.30.153]

TASK [database : debug] *********************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": "systemctl status mysql",
        "delta": "0:00:00.034160",
        "end": "2022-12-01 23:15:13.488407",
        "failed": false,
```

```
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:15:13.454247",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● mariadb.service - MariaDB database server\n     Loaded: loaded (/usr/lib/
systemd/system/mariadb.service; enabled; vendor preset: disabled)\n     Active: active (runnin
g) since Thu 2022-12-01 23:15:00 PST; 12s ago\n       Docs: man:mysqld(8)\n             https:
//mariadb.com/kb/en/library/systemd/\n    Process: 6721 ExecStartPre=/usr/lib/mysql/mysql-syst
emd-helper install (code=exited, status=0/SUCCESS)\n    Process: 6770 ExecStartPre=/usr/lib/my
sql/mysql-systemd-helper upgrade (code=exited, status=0/SUCCESS)\n   Main PID: 6776 (mysqld)\n
     Status: \"Taking your SQL requests now...\"\n      Tasks: 12 (limit: 2244)\n     CGroup:
/system.slice/mariadb.service\n             └─6776 /usr/sbin/mysqld --defaults-file=/etc/my.c
nf --user=mysql\n\nDec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: you need
to be the system 'mysql' user to connect.\nDec 01 23:14:58 localhost.localdomain mysql-systemd
-helper[6727]: After connecting you can set the password, if you would need to be\nDec 01 23:1
4:58 localhost.localdomain mysql-systemd-helper[6727]: able to connect as any of these users w
ith a password and without sudo\nDec 01 23:14:58 localhost.localdomain mysql-systemd-helper[67
27]: See the MariaDB Knowledgebase at https://mariadb.com/kb\nDec 01 23:14:58 localhost.locald
omain mysql-systemd-helper[6727]: Please report any problems at https://mariadb.org/jira\nDec
01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: The latest information about Mar
iaDB is available at https://mariadb.org/.\nDec 01 23:14:58 localhost.localdomain mysql-system
d-helper[6727]: Consider joining MariaDB's strong and vibrant community:\nDec 01 23:14:58 loca
lhost.localdomain mysql-systemd-helper[6727]: https://mariadb.org/get-involved/\nDec 01 23:14:
58 localhost.localdomain mysql-systemd-helper[6776]: 2022-12-01 23:14:58 0 [Note] /usr/sbin/my
sqld (server 10.6.10-MariaDB) starting as process 6776 ...\nDec 01 23:15:00 localhost.localdom
ain systemd[1]: Started MariaDB database server.",
        "stdout_lines": [
            "● mariadb.service - MariaDB database server",
            "     Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; vendor pre
set: disabled)",
            "     Active: active (running) since Thu 2022-12-01 23:15:00 PST; 12s ago",
            "       Docs: man:mysqld(8)",
            "             https://mariadb.com/kb/en/library/systemd/",
            "    Process: 6721 ExecStartPre=/usr/lib/mysql/mysql-systemd-helper install (code=
exited, status=0/SUCCESS)",
            "    Process: 6770 ExecStartPre=/usr/lib/mysql/mysql-systemd-helper upgrade (code=
exited, status=0/SUCCESS)",
            "   Main PID: 6776 (mysqld)",
            "     Status: \"Taking your SQL requests now...\"",
            "      Tasks: 12 (limit: 2244)",
            "     CGroup: /system.slice/mariadb.service",
            "             └─6776 /usr/sbin/mysqld --defaults-file=/etc/my.cnf --user=mysql",
            "",
            "Dec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: you need to be
the system 'mysql' user to connect.",
            "Dec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: After connectin
g you can set the password, if you would need to be",
            "Dec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: able to connect
 as any of these users with a password and without sudo",
            "Dec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: See the MariaDB
 Knowledgebase at https://mariadb.com/kb",
            "Dec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: Please report a
ny problems at https://mariadb.org/jira",
            "Dec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: The latest info
rmation about MariaDB is available at https://mariadb.org/.",
            "Dec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: Consider joinin
g MariaDB's strong and vibrant community:",
            "Dec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6727]: https://mariadb
.org/get-involved/",
            "Dec 01 23:14:58 localhost.localdomain mysql-systemd-helper[6776]: 2022-12-01 23:1
4:58 0 [Note] /usr/sbin/mysqld (server 10.6.10-MariaDB) starting as process 6776 ...",
            "Dec 01 23:15:00 localhost.localdomain systemd[1]: Started MariaDB database server
."
        ]
    }
}

TASK [message_queue : Installing rabbitmq-server] ******************************************
changed: [192.168.30.153]

TASK [message_queue : Starting service] ****************************************************
changed: [192.168.30.153]

TASK [message_queue : Verifying rabbitmq-server installation] ******************************
changed: [192.168.30.153]
```

```
TASK [message_queue : debug] ***********************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": [
            "rabbitmq-server",
            "--version"
        ],
        "delta": "0:00:07.434197",
        "end": "2022-12-01 23:16:31.610278",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:16:24.176081",
        "stderr": "Configuring logger redirection\n\nBOOT FAILED\n===========\nERROR: distribu
tion port 25672 in use by another node: rabbit@localhost\n\nKernel pid terminated (application
_controller) ({application_start_failure,rabbitmq_prelaunch,{{shutdown,{failed_to_start_child,
prelaunch,{dist_port_already_used,25672,\"rabbit\",\"localhost\"}}},{rabbit_\r\n\r\nCrash dump
 is being written to: erl_crash.dump...done",
        "stderr_lines": [
            "Configuring logger redirection",
            "",
            "BOOT FAILED",
            "===========",
            "ERROR: distribution port 25672 in use by another node: rabbit@localhost",
            "",
            "Kernel pid terminated (application_controller) ({application_start_failure,rabbit
mq_prelaunch,{{shutdown,{failed_to_start_child,prelaunch,{dist_port_already_used,25672,\"rabbi
t\",\"localhost\"}}},{rabbit_",
            "",
            "Crash dump is being written to: erl_crash.dump...done"
        ],
        "stdout": "23:16:28.773 [error] \r\n23:16:28.794 [error] BOOT FAILED\r\n23:16:28.794 [
error] ===========\r\n23:16:28.795 [error] ERROR: distribution port 25672 in use by another no
de: rabbit@localhost\r\n23:16:28.795 [error] \r\n23:16:29.797 [error] Supervisor rabbit_prelau
nch_sup had child prelaunch started with rabbit_prelaunch:run_prelaunch_first_phase() at undef
ined exit with reason {dist_port_already_used,25672,\"rabbit\",\"localhost\"} in context start
_error\r\n23:16:29.798 [error] CRASH REPORT Process <0.147.0> with 0 neighbours exited with re
ason: {{shutdown,{failed_to_start_child,prelaunch,{dist_port_already_used,25672,\"rabbit\",\"l
ocalhost\"}}},{rabbit_prelaunch_app,start,[normal,[]]}} in application_master:init/4 line 138\
r\n{\"Kernel pid terminated\",application_controller,\"{application_start_failure,rabbitmq_pre
launch,{{shutdown,{failed_to_start_child,prelaunch,{dist_port_already_used,25672,\\\"rabbit\\\
",\\\"localhost\\\"}}},{rabbit_prelaunch_app,start,[normal,[]]}}}\"}",
        "stdout_lines": [
            "23:16:28.773 [error] ",
            "23:16:28.794 [error] BOOT FAILED",
            "23:16:28.794 [error] ===========",
            "23:16:28.795 [error] ERROR: distribution port 25672 in use by another node: rabbi
t@localhost",
            "23:16:28.795 [error] ",
            "23:16:29.797 [error] Supervisor rabbit_prelaunch_sup had child prelaunch started
with rabbit_prelaunch:run_prelaunch_first_phase() at undefined exit with reason {dist_port_alr
eady_used,25672,\"rabbit\",\"localhost\"} in context start_error",
            "23:16:29.798 [error] CRASH REPORT Process <0.147.0> with 0 neighbours exited with
 reason: {{shutdown,{failed_to_start_child,prelaunch,{dist_port_already_used,25672,\"rabbit\",
\"localhost\"}}},{rabbit_prelaunch_app,start,[normal,[]]}} in application_master:init/4 line 1
38",
            "{\"Kernel pid terminated\",application_controller,\"{application_start_failure,ra
bbitmq_prelaunch,{{shutdown,{failed_to_start_child,prelaunch,{dist_port_already_used,25672,\\\
"rabbit\\\",\\\"localhost\\\"}}},{rabbit_prelaunch_app,start,[normal,[]]}}}\"}"
        ]
    }
}

TASK [message_queue : Verifying rabbitmq-server installation] ******************************
changed: [192.168.30.153]

TASK [message_queue : debug] ***********************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": [
            "sudo",
            "systemctl",
            "status",
            "rabbitmq-server"
        ],
```

```
        "delta": "0:00:00.421559",
        "end": "2022-12-01 23:16:33.337406",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:16:32.915847",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● rabbitmq-server.service - RabbitMQ broker\n     Loaded: loaded (/usr/lib/
systemd/system/rabbitmq-server.service; enabled; vendor preset: disabled)\n     Active: active
 (running) since Thu 2022-12-01 23:16:22 PST; 10s ago\n   Main PID: 9531 (beam.smp)\n     Stat
us: \"Initialized\"\n      Tasks: 22 (limit: 8192)\n     CGroup: /system.slice/rabbitmq-server
.service\n             ├─ 9527 /bin/sh /usr/sbin/rabbitmq-server\n             ├─ 9531 /usr/li
b64/erlang/erts-10.7/bin/beam.smp -W w -MBas ageffcbf -MHas ageffcbf -MBlmbcs 512 -MHlmbcs 512
 -MMmcs 30 -P 1048576 -t 5000000 -stbt db -zdbbl 128000 -- -root /usr/lib64/erlang -progname e
rl -- -home /var/lib/rabbitmq -- -pa \"\" -noshell -noinput -s rabbit boot -boot start_sasl -l
ager crash_log false -lager handlers \"[]\" --\n             ├─ 9542 erl_child_setup 65535\n
           ├─ 9584 inet_gethost 4\n             └─ 9585 inet_gethost 4\n\nDec 01 23:16:04 loca
lhost.localdomain systemd[1]: Starting RabbitMQ broker...\nDec 01 23:16:22 localhost.localdoma
in systemd[1]: rabbitmq-server.service: Supervising process 9531 which is not our child. We'll
 most likely not notice when it exits.\nDec 01 23:16:22 localhost.localdomain systemd[1]: Star
ted RabbitMQ broker.",
        "stdout_lines": [
            "● rabbitmq-server.service - RabbitMQ broker",
            "     Loaded: loaded (/usr/lib/systemd/system/rabbitmq-server.service; enabled; ve
ndor preset: disabled)",
            "     Active: active (running) since Thu 2022-12-01 23:16:22 PST; 10s ago",
            "   Main PID: 9531 (beam.smp)",
            "     Status: \"Initialized\"",
            "      Tasks: 22 (limit: 8192)",
            "     CGroup: /system.slice/rabbitmq-server.service",
            "             ├─ 9527 /bin/sh /usr/sbin/rabbitmq-server",
            "             ├─ 9531 /usr/lib64/erlang/erts-10.7/bin/beam.smp -W w -MBas ageffcbf
 -MHas ageffcbf -MBlmbcs 512 -MHlmbcs 512 -MMmcs 30 -P 1048576 -t 5000000 -stbt db -zdbbl 1280
00 -- -root /usr/lib64/erlang -progname erl -- -home /var/lib/rabbitmq -- -pa \"\" -noshell -n
oinput -s rabbit boot -boot start_sasl -lager crash_log false -lager handlers \"[]\" --",
            "             ├─ 9542 erl_child_setup 65535",
            "             ├─ 9584 inet_gethost 4",
            "             └─ 9585 inet_gethost 4",
            "",
            "Dec 01 23:16:04 localhost.localdomain systemd[1]: Starting RabbitMQ broker...",
            "Dec 01 23:16:22 localhost.localdomain systemd[1]: rabbitmq-server.service: Superv
ising process 9531 which is not our child. We'll most likely not notice when it exits.",
            "Dec 01 23:16:22 localhost.localdomain systemd[1]: Started RabbitMQ broker."
        ]
    }
}

TASK [memcached : Installing memcached] ****************************************************
changed: [192.168.30.153]

TASK [memcached : Editing memcached.conf file] *********************************************
changed: [192.168.30.153]

TASK [memcached : Starting memcached service] **********************************************
changed: [192.168.30.153]

TASK [memcached : Verifying installation of memcached] *************************************
changed: [192.168.30.153]

TASK [memcached : debug] *******************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": [
            "memcached",
            "--version"
        ],
        "delta": "0:00:00.008156",
        "end": "2022-12-01 23:17:03.626810",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:17:03.618654",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "memcached 1.5.6",
```

```
        "stdout_lines": [
            "memcached 1.5.6"
        ]
    }
}

TASK [memcached : Verifying if memcached is started and running in the background] ***********
changed: [192.168.30.153]

TASK [memcached : debug] ******************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": [
            "systemctl",
            "status",
            "memcached"
        ],
        "delta": "0:00:00.059665",
        "end": "2022-12-01 23:17:05.045642",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:17:04.985977",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● memcached.service - memcached daemon\n     Loaded: loaded (/usr/lib/syste
md/system/memcached.service; enabled; vendor preset: disabled)\n     Active: active (running)
since Thu 2022-12-01 23:17:02 PST; 2s ago\n   Main PID: 11643 (memcached)\n      Tasks: 10 (li
mit: 2244)\n     CGroup: /system.slice/memcached.service\n             └─11643 /usr/sbin/memc
ached -u memcached -l 192.168.30.153\n\nDec 01 23:17:02 localhost.localdomain systemd[1]: Star
ted memcached daemon.",
        "stdout_lines": [
            "● memcached.service - memcached daemon",
            "     Loaded: loaded (/usr/lib/systemd/system/memcached.service; enabled; vendor p
reset: disabled)",
            "     Active: active (running) since Thu 2022-12-01 23:17:02 PST; 2s ago",
            "   Main PID: 11643 (memcached)",
            "      Tasks: 10 (limit: 2244)",
            "     CGroup: /system.slice/memcached.service",
            "             └─11643 /usr/sbin/memcached -u memcached -l 192.168.30.153",
            "",
            "Dec 01 23:17:02 localhost.localdomain systemd[1]: Started memcached daemon."
        ]
    }
}

TASK [etcd : Creating etcd user] ***********************************************************
changed: [192.168.30.153]

TASK [etcd : Creating user for etcd] *******************************************************
changed: [192.168.30.153]

TASK [etcd : Creating /etc/etcd directory] *************************************************
changed: [192.168.30.153]

TASK [etcd : Creating /var/lib/etcd directory] *********************************************
ok: [192.168.30.153]

TASK [etcd : Installing etcd tarball for x86_64/amd64] *************************************
changed: [192.168.30.153]

TASK [etcd : Creating a config file for etcd] **********************************************
changed: [192.168.30.153]

TASK [etcd : Copying the service file for etcd] ********************************************
changed: [192.168.30.153]

TASK [etcd : Starting and enabling service of etcd] ****************************************
changed: [192.168.30.153]

TASK [etcd : Verifying installation of etcd] ***********************************************
changed: [192.168.30.153]

TASK [etcd : debug] ************************************************************************
ok: [192.168.30.153] => {
    "msg": {
```

```
        "changed": true,
        "cmd": [
            "etcd",
            "--version"
        ],
        "delta": "0:00:00.024245",
        "end": "2022-12-01 23:17:27.632121",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:17:27.607876",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "etcd Version: 3.2.7\nGit SHA: bb66589\nGo Version: go1.8.3\nGo OS/Arch: lin
ux/amd64",
        "stdout_lines": [
            "etcd Version: 3.2.7",
            "Git SHA: bb66589",
            "Go Version: go1.8.3",
            "Go OS/Arch: linux/amd64"
        ]
    }
}

TASK [etcd : Verifying if etcd is started and running in the background] ********************
changed: [192.168.30.153]

TASK [etcd : debug] ************************************************************************
ok: [192.168.30.153] => {
    "msg": {
        "changed": true,
        "cmd": [
            "systemctl",
            "status",
            "etcd"
        ],
        "delta": "0:00:00.032399",
        "end": "2022-12-01 23:17:28.944187",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-01 23:17:28.911788",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● etcd.service - etcd - highly-available key value store\n     Loaded: load
ed (/usr/lib/systemd/system/etcd.service; enabled; vendor preset: disabled)\n     Active: acti
ve (running) since Thu 2022-12-01 23:17:26 PST; 2s ago\n   Main PID: 13542 (etcd)\n      Tasks
: 8 (limit: 2244)\n     CGroup: /system.slice/etcd.service\n             └─ 13542 /usr/bin/etc
d --config-file /etc/etcd/etcd.conf.yml\n\nDec 01 23:17:26 localhost.localdomain etcd[13542]:
348d82d6feeeac63 received MsgVoteResp from 348d82d6feeeac63 at term 2\nDec 01 23:17:26 localho
st.localdomain etcd[13542]: 348d82d6feeeac63 became leader at term 2\nDec 01 23:17:26 localhos
t.localdomain etcd[13542]: raft.node: 348d82d6feeeac63 elected leader 348d82d6feeeac63 at term
 2\nDec 01 23:17:26 localhost.localdomain etcd[13542]: setting up the initial cluster version
to 3.2\nDec 01 23:17:26 localhost.localdomain etcd[13542]: set the initial cluster version to
3.2\nDec 01 23:17:26 localhost.localdomain systemd[1]: Started etcd - highly-available key val
ue store.\nDec 01 23:17:26 localhost.localdomain etcd[13542]: enabled capabilities for version
 3.2\nDec 01 23:17:26 localhost.localdomain etcd[13542]: published {Name:controller ClientURLs
:[http://192.168.30.153:2379]} to cluster ead168bde148449d\nDec 01 23:17:26 localhost.localdom
ain etcd[13542]: ready to serve client requests\nDec 01 23:17:26 localhost.localdomain etcd[13
542]: serving insecure client requests on 192.168.30.153:2379, this is strongly discouraged!",
        "stdout_lines": [
            "● etcd.service - etcd - highly-available key value store",
            "     Loaded: loaded (/usr/lib/systemd/system/etcd.service; enabled; vendor preset
: disabled)",
            "     Active: active (running) since Thu 2022-12-01 23:17:26 PST; 2s ago",
            "   Main PID: 13542 (etcd)",
            "      Tasks: 8 (limit: 2244)",
            "     CGroup: /system.slice/etcd.service",
            "             └─ 13542 /usr/bin/etcd --config-file /etc/etcd/etcd.conf.yml",
            "",
            "Dec 01 23:17:26 localhost.localdomain etcd[13542]: 348d82d6feeeac63 received MsgV
oteResp from 348d82d6feeeac63 at term 2",
            "Dec 01 23:17:26 localhost.localdomain etcd[13542]: 348d82d6feeeac63 became leader
 at term 2",
            "Dec 01 23:17:26 localhost.localdomain etcd[13542]: raft.node: 348d82d6feeeac63 el
ected leader 348d82d6feeeac63 at term 2",
            "Dec 01 23:17:26 localhost.localdomain etcd[13542]: setting up the initial cluster
```

```
 version to 3.2",
            "Dec 01 23:17:26 localhost.localdomain etcd[13542]: set the initial cluster versio
n to 3.2",
            "Dec 01 23:17:26 localhost.localdomain systemd[1]: Started etcd - highly-available
 key value store.",
            "Dec 01 23:17:26 localhost.localdomain etcd[13542]: enabled capabilities for versi
on 3.2",
            "Dec 01 23:17:26 localhost.localdomain etcd[13542]: published {Name:controller Cli
entURLs:[http://192.168.30.153:2379]} to cluster ead168bde148449d",
            "Dec 01 23:17:26 localhost.localdomain etcd[13542]: ready to serve client requests
",
            "Dec 01 23:17:26 localhost.localdomain etcd[13542]: serving insecure client reques
ts on 192.168.30.153:2379, this is strongly discouraged!"
        ]
    }
}

RUNNING HANDLER [ntp : Restarting chrony] ***************************************************
changed: [192.168.30.153]

RUNNING HANDLER [database : Restarting database service] ************************************
changed: [192.168.30.153]

RUNNING HANDLER [message_queue : Configuring rabbitmq-server] *******************************
changed: [192.168.30.153]

RUNNING HANDLER [memcached : Restarting memcached] ******************************************
changed: [192.168.30.153]

RUNNING HANDLER [etcd : Reloading systemd service files] ************************************
ok: [192.168.30.153]

PLAY RECAP *********************************************************************************
192.168.30.153             : ok=60   changed=39   unreachable=0    failed=0    skipped=0    re
scued=0    ignored=0
```

Figure 8. The image above shows the full ansible result in pre installing OpenStack.

VERIFYING INSTALLATIONS	
Role Name	**Screenshot**
NTP	

```
TASK [../../ntp : Verifying installation of chrony] ****************************
changed: [192.168.30.160]

TASK [../../ntp : debug] *******************************************************
ok: [192.168.30.160] => {
    "msg": {
        "changed": true,
        "cmd": [
            "chronyd",
            "--version"
        ],
        "delta": "0:00:00.183380",
        "end": "2022-12-02 08:45:44.246733",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-02 08:45:44.063353",
        "stderr": "",
```

```
        "stderr_lines": [],
        "stdout": "chronyd (chrony) version 4.1 (+CMDMON +NTP +REFCLOCK +RTC +PRI
VDROP +SCFILTER +SIGND +ASYNCDNS +NTS +SECHASH +IPV6 -DEBUG)",
        "stdout_lines": [
            "chronyd (chrony) version 4.1 (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP
+SCFILTER +SIGND +ASYNCDNS +NTS +SECHASH +IPV6 -DEBUG)"
        ]
    }
}
```

```
TASK [../../ntp : Verifying if chronyd is started and running in the background]
***
changed: [192.168.30.160]

TASK [../../ntp : debug] ******************************************************
ok: [192.168.30.160] => {
    "msg": {
        "changed": true,
        "cmd": [
            "systemctl",
            "status",
            "chronyd"
        ],
        "delta": "0:00:00.053333",
        "end": "2022-12-02 08:45:47.508129",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-02 08:45:47.454796",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● chronyd.service - NTP client/server\n     Loaded: loaded (/u
sr/lib/systemd/system/chronyd.service; enabled; vendor preset: disabled)\n     Ac
tive: active (running) since Fri 2022-12-02 08:42:33 PST; 3min 14s ago\n       Do
cs: man:chronyd(8)\n             man:chrony.conf(5)\n    Process: 865 ExecStart=/
usr/sbin/chronyd $OPTIONS (code=exited, status=0/SUCCESS)\n    Process: 904 ExecS
tartPost=/usr/lib/chrony/helper update-daemon (code=exited, status=0/SUCCESS)\n
 Main PID: 903 (chronyd)\n      Tasks: 1 (limit: 2244)\n     CGroup: /system.slic
e/chronyd.service\n             └─ 903 /usr/sbin/chronyd\n\nDec 02 08:42:30 local
host systemd[1]: Starting NTP client/server...\nDec 02 08:42:32 localhost chronyd
[903]: chronyd version 4.1 starting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +SCFIL
TER +SIGND +ASYNCDNS +NTS +SECHASH +IPV6 -DEBUG)\nDec 02 08:42:32 localhost chron
yd[903]: Frequency -10.459 +/- 1.824 ppm read from /var/lib/chrony/drift\nDec 02
08:42:33 localhost systemd[1]: Started NTP client/server.\nDec 02 08:42:48 localh
ost.localdomain chronyd[903]: Selected source 162.159.200.123 (1.centos.pool.ntp.
org)",
```

```
        "stdout_lines": [
            "● chronyd.service - NTP client/server",
            "     Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enable
d; vendor preset: disabled)",
            "     Active: active (running) since Fri 2022-12-02 08:42:33 PST; 3mi
n 14s ago",
            "       Docs: man:chronyd(8)",
            "             man:chrony.conf(5)",
            "    Process: 865 ExecStart=/usr/sbin/chronyd $OPTIONS (code=exited,
status=0/SUCCESS)",
            "    Process: 904 ExecStartPost=/usr/lib/chrony/helper update-daemon
(code=exited, status=0/SUCCESS)",
            "   Main PID: 903 (chronyd)",
            "      Tasks: 1 (limit: 2244)",
            "     CGroup: /system.slice/chronyd.service",
            "             └─ 903 /usr/sbin/chronyd",
            "",
```

		``"Dec 02 08:42:30 localhost systemd[1]: Starting NTP client/server..."
		,
		"Dec 02 08:42:32 localhost chronyd[903]: chronyd version 4.1 starting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +SCFILTER +SIGND +ASYNCDNS +NTS +SECHASH +IPV6 -DEBUG)",
		"Dec 02 08:42:32 localhost chronyd[903]: Frequency -10.459 +/- 1.824 ppm read from /var/lib/chrony/drift",
		"Dec 02 08:42:33 localhost systemd[1]: Started NTP client/server.",
		"Dec 02 08:42:48 localhost.localdomain chronyd[903]: Selected source 162.159.200.123 (1.centos.pool.ntp.org)"
		]
		}
		}```	

	OpenStack Package	```TASK [../../packages : debug] ***********
		ok: [192.168.30.160] => {
		"msg": {
		"changed": true,
		"cmd": "openstack --version",
		"delta": "0:00:05.647175",
		"end": "2022-12-02 08:57:39.886873",
		"failed": false,
		"msg": "",
		"rc": 0,
		"start": "2022-12-02 08:57:34.239698",
		"stderr": "",
		"stderr_lines": [],
		"stdout": "openstack 5.8.0",
		"stdout_lines": [
		"openstack 5.8.0"
		]
		}
		}```	

	SQL Database	```TASK [../../database : Verifying installation of mysql] ***********
		changed: [192.168.30.160]
		
		TASK [../../database : debug] ***********
		ok: [192.168.30.160] => {
		"msg": {
		"changed": true,
		"cmd": "mysql --version",
		"delta": "0:00:00.727163",
		"end": "2022-12-02 09:01:20.332226",
		"failed": false,
		"msg": "",
		"rc": 0,
		"start": "2022-12-02 09:01:19.605063",
		"stderr": "",
		"stderr_lines": [],
		"stdout": "mysql Ver 15.1 Distrib 10.6.10-MariaDB, for Linux (x86_64) using EditLine wrapper",
		"stdout_lines": [
		"mysql Ver 15.1 Distrib 10.6.10-MariaDB, for Linux (x86_64) using EditLine wrapper"
		]
		}
		}```	

```
TASK [../../database : Verifying if mysql is started and running in the backgroun
d] ***
changed: [192.168.30.160]

TASK [../../database : debug] ***************************************************
ok: [192.168.30.160] => {
    "msg": {
        "changed": true,
        "cmd": "systemctl status mysql",
        "delta": "0:00:00.042620",
        "end": "2022-12-02 09:01:22.050414",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-02 09:01:22.007794",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● mariadb.service - MariaDB database server\n     Loaded: load
ed (/usr/lib/systemd/system/mariadb.service; enabled; vendor preset: disabled)\n
    Active: active (running) since Fri 2022-12-02 08:42:44 PST; 18min ago\n
 Docs: man:mysqld(8)\n             https://mariadb.com/kb/en/library/systemd/\n
  Process: 947 ExecStartPre=/usr/lib/mysql/mysql-systemd-helper install (code=exi
ted, status=0/SUCCESS)\n    Process: 996 ExecStartPre=/usr/lib/mysql/mysql-system
d-helper upgrade (code=exited, status=0/SUCCESS)\n   Main PID: 1018 (mysqld)\n
  Status: \"Taking your SQL requests now...\"\n      Tasks: 10 (limit: 2244)\n
  CGroup: /system.slice/mariadb.service\n             └─ 1018 /usr/sbin/mysqld --
defaults-file=/etc/my.cnf --user=mysql\n\nDec 02 08:42:33 localhost systemd[1]: S
tarting MariaDB database server...\nDec 02 08:42:37 localhost mysql-systemd-helpe
r[1018]: 2022-12-02  8:42:37 0 [Note] /usr/sbin/mysqld (server 10.6.10-MariaDB) s
tarting as process 1018 ...\nDec 02 08:42:44 localhost.localdomain systemd[1]: St
arted MariaDB database server.",
        "stdout_lines": [
            "● mariadb.service - MariaDB database server",
            "     Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enable
d; vendor preset: disabled)",
            "     Active: active (running) since Fri 2022-12-02 08:42:44 PST; 18m
in ago",
            "       Docs: man:mysqld(8)",
            "             https://mariadb.com/kb/en/library/systemd/",
```

```
            "    Process: 947 ExecStartPre=/usr/lib/mysql/mysql-systemd-helper in
stall (code=exited, status=0/SUCCESS)",
            "    Process: 996 ExecStartPre=/usr/lib/mysql/mysql-systemd-helper up
grade (code=exited, status=0/SUCCESS)",
            "   Main PID: 1018 (mysqld)",
            "     Status: \"Taking your SQL requests now...\"",
            "      Tasks: 10 (limit: 2244)",
            "     CGroup: /system.slice/mariadb.service",
            "             └─ 1018 /usr/sbin/mysqld --defaults-file=/etc/my.cnf --
user=mysql",
            "",
            "Dec 02 08:42:33 localhost systemd[1]: Starting MariaDB database serv
er...",
            "Dec 02 08:42:37 localhost mysql-systemd-helper[1018]: 2022-12-02  8:
42:37 0 [Note] /usr/sbin/mysqld (server 10.6.10-MariaDB) starting as process 1018
 ...",
            "Dec 02 08:42:44 localhost.localdomain systemd[1]: Started MariaDB da
tabase server."
        ]
    }
}
```

	Message_queue		

```
TASK [../../message_queue : Verifying rabbitmq-server installation] *************
changed: [192.168.30.160]

TASK [../../message_queue : debug] ********************************************
ok: [192.168.30.160] => {
    "msg": {
        "changed": true,
        "cmd": [
            "rabbitmq-server",
            "--version"
        ],
        "delta": "0:00:08.731491",
        "end": "2022-12-02 09:07:34.981290",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-02 09:07:26.249799",
        "stderr": "Configuring logger redirection\n\nBOOT FAILED\n===========\nER
ROR: distribution port 25672 in use by another node: rabbit@localhost\n\nKernel p
id terminated (application_controller) ({application_start_failure,rabbitmq_prela
unch,{{shutdown,{failed_to_start_child,prelaunch,{dist_port_already_used,25672,\"
rabbit\",\"localhost\"}}}},{rabbit_\r\n\r\nCrash dump is being written to: erl_cra
sh.dump...done",
        "stderr_lines": [
            "Configuring logger redirection",
            "",
            "BOOT FAILED",
            "===========",
            "ERROR: distribution port 25672 in use by another node: rabbit@localh
ost",
            "",
            "Kernel pid terminated (application_controller) ({application_start_f
ailure,rabbitmq_prelaunch,{{shutdown,{failed_to_start_child,prelaunch,{dist_port_
already_used,25672,\"rabbit\",\"localhost\"}}}},{rabbit_",
            "",
            "Crash dump is being written to: erl_crash.dump...done"
        ],
        "stdout": "09:07:32.067 [error] \r\n09:07:32.085 [error] BOOT FAILED\r\n0
9:07:32.086 [error] ===========\r\n09:07:32.087 [error] ERROR: distribution port
```

```
33.089 [error] Supervisor rabbit_prelaunch_sup had child prelaunch started with r
abbit_prelaunch:run_prelaunch_first_phase() at undefined exit with reason {dist_p
ort_already_used,25672,\"rabbit\",\"localhost\"} in context start_error\r\n09:07:
33.090 [error] CRASH REPORT Process <0.147.0> with 0 neighbours exited with reaso
n: {{shutdown,{failed_to_start_child,prelaunch,{dist_port_already_used,25672,\"ra
bbit\",\"localhost\"}}},{rabbit_prelaunch_app,start,[normal,[]]}} in application_
master:init/4 line 138\r\n{\"Kernel pid terminated\",application_controller,\"{ap
plication_start_failure,rabbitmq_prelaunch,{{shutdown,{failed_to_start_child,prel
aunch,{dist_port_already_used,25672,\\\"rabbit\\\",\\\"localhost\\\"}}},{rabbit_p
relaunch_app,start,[normal,[]]}}}\"}",
        "stdout_lines": [
            "09:07:32.067 [error] ",
            "09:07:32.085 [error] BOOT FAILED",
            "09:07:32.086 [error] ===========",
            "09:07:32.087 [error] ERROR: distribution port 25672 in use by anothe
r node: rabbit@localhost",
            "09:07:32.087 [error] ",
            "09:07:33.089 [error] Supervisor rabbit_prelaunch_sup had child prela
unch started with rabbit_prelaunch:run_prelaunch_first_phase() at undefined exit
with reason {dist_port_already_used,25672,\"rabbit\",\"localhost\"} in context st
art_error",
```

```
            "09:07:33.090 [error] CRASH REPORT Process <0.147.0> with 0 neighbour
s exited with reason: {{shutdown,{failed_to_start_child,prelaunch,{dist_port_alre
ady_used,25672,\"rabbit\",\"localhost\"}}},{rabbit_prelaunch_app,start,[normal,[]
]}} in application_master:init/4 line 138",
            "{\"Kernel pid terminated\",application_controller,\"{application_sta
rt_failure,rabbitmq_prelaunch,{{shutdown,{failed_to_start_child,prelaunch,{dist_p
ort_already_used,25672,\\\"rabbit\\\",\\\"localhost\\\"}}},{rabbit_prelaunch_app,
start,[normal,[]]}}}\"}"
        ]
    }
}
```

```
TASK [../../message_queue : Verifying rabbitmq-server installation] *************
changed: [192.168.30.160]

TASK [../../message_queue : debug] ********************************************
ok: [192.168.30.160] => {
    "msg": {
        "changed": true,
        "cmd": [
            "sudo",
            "systemctl",
            "status",
            "rabbitmq-server"
        ],
        "delta": "0:00:00.058939",
        "end": "2022-12-02 09:07:36.484281",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-02 09:07:36.425342",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● rabbitmq-server.service - RabbitMQ broker\n     Loaded: load
ed (/usr/lib/systemd/system/rabbitmq-server.service; enabled; vendor preset: disa
bled)\n     Active: active (running) since Fri 2022-12-02 08:44:18 PST; 23min ago
\n   Main PID: 893 (beam.smp)\n     Status: \"Initialized\"\n      Tasks: 22 (lim
it: 8192)\n     CGroup: /system.slice/rabbitmq-server.service\n             ├─ 8
70 /bin/sh /usr/sbin/rabbitmq-server\n             ├─ 893 /usr/lib64/erlang/erts
-10.7/bin/beam.smp -W w -MBas ageffcbf -MHas ageffcbf -MBlmbcs 512 -MHlmbcs 512 -
MMmcs 30 -P 1048576 -t 5000000 -stbt db -zdbbl 128000 -- -root /usr/lib64/erlang
-progname erl -- -home /var/lib/rabbitmq -- -pa \"\" -noshell -noinput -s rabbit
boot -boot start_sasl -lager crash_log false -lager handlers \"[]\" --\n
    ├─ 912 erl_child_setup 65535\n             ├─ 1740 inet_gethost 4\n
    └─ 1742 inet_gethost 4\n\nDec 02 08:42:30 localhost systemd[1]: Starting Rabb
itMQ broker...\nDec 02 08:44:18 localhost.localdomain systemd[1]: rabbitmq-server
.service: Supervising process 893 which is not our child. We'll most likely not n
otice when it exits.\nDec 02 08:44:18 localhost.localdomain systemd[1]: Started R
abbitMQ broker.",
        "stdout_lines": [
            "● rabbitmq-server.service - RabbitMQ broker",
```

```
            "     Loaded: loaded (/usr/lib/systemd/system/rabbitmq-server.service
; enabled; vendor preset: disabled)",
            "     Active: active (running) since Fri 2022-12-02 08:44:18 PST; 23m
in ago",
            "   Main PID: 893 (beam.smp)",
            "     Status: \"Initialized\"",
            "      Tasks: 22 (limit: 8192)",
            "     CGroup: /system.slice/rabbitmq-server.service",
            "             ├─ 870 /bin/sh /usr/sbin/rabbitmq-server",
            "             ├─ 893 /usr/lib64/erlang/erts-10.7/bin/beam.smp -W w -
MBas ageffcbf -MHas ageffcbf -MBlmbcs 512 -MHlmbcs 512 -MMmcs 30 -P 1048576 -t 50
```

```
00000 -stbt db -zdbbl 128000 -- -root /usr/lib64/erlang -progname erl -- -home /v
ar/lib/rabbitmq -- -pa \"\" -noshell -noinput -s rabbit boot -boot start_sasl -la
ger crash_log false -lager handlers \"[]\" --",
            "             ├─  912 erl_child_setup 65535",
            "             ├─ 1740 inet_gethost 4",
            "             └─ 1742 inet_gethost 4",
            "",
            "Dec 02 08:42:30 localhost systemd[1]: Starting RabbitMQ broker...",
            "Dec 02 08:44:18 localhost.localdomain systemd[1]: rabbitmq-server.se
rvice: Supervising process 893 which is not our child. We'll most likely not noti
ce when it exits.",
            "Dec 02 08:44:18 localhost.localdomain systemd[1]: Started RabbitMQ b
roker."
        ]
    }
}
```

memcached

```
            "     Loaded: loaded (/usr/lib/systemd/system/rabbitmq-server.service
; enabled; vendor preset: disabled)",
            "     Active: active (running) since Fri 2022-12-02 08:44:18 PST; 23m
in ago",
            "   Main PID: 893 (beam.smp)",
            "     Status: \"Initialized\"",
            "      Tasks: 22 (limit: 8192)",
            "     CGroup: /system.slice/rabbitmq-server.service",
            "             ├─  870 /bin/sh /usr/sbin/rabbitmq-server",
            "             ├─  893 /usr/lib64/erlang/erts-10.7/bin/beam.smp -W w -
MBas ageffcbf -MHas ageffcbf -MBlmbcs 512 -MHlmbcs 512 -MMmcs 30 -P 1048576 -t 50
00000 -stbt db -zdbbl 128000 -- -root /usr/lib64/erlang -progname erl -- -home /v
ar/lib/rabbitmq -- -pa \"\" -noshell -noinput -s rabbit boot -boot start_sasl -la
ger crash_log false -lager handlers \"[]\" --",
            "             ├─  912 erl_child_setup 65535",
            "             ├─ 1740 inet_gethost 4",
            "             └─ 1742 inet_gethost 4",
            "",
            "Dec 02 08:42:30 localhost systemd[1]: Starting RabbitMQ broker...",
            "Dec 02 08:44:18 localhost.localdomain systemd[1]: rabbitmq-server.se
rvice: Supervising process 893 which is not our child. We'll most likely not noti
ce when it exits.",
            "Dec 02 08:44:18 localhost.localdomain systemd[1]: Started RabbitMQ b
roker."
        ]
    }
}
```

```
TASK [../../memcached : Verifying if memcached is started and running in the back
ground] ***
changed: [192.168.30.160]

TASK [../../memcached : debug] ***************************************************
ok: [192.168.30.160] => {
    "msg": {
        "changed": true,
        "cmd": [
            "systemctl",
            "status",
            "memcached"
        ],
        "delta": "0:00:00.034166",
        "end": "2022-12-02 09:21:15.939136",
        "failed": false,
        "msg": "",
```

```
        "rc": 0,
        "start": "2022-12-02 09:21:15.904970",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● memcached.service - memcached daemon\n     Loaded: loaded (/
usr/lib/systemd/system/memcached.service; enabled; vendor preset: disabled)\n
 Active: active (running) since Fri 2022-12-02 09:21:12 PST; 3s ago\n   Main PID:
 12568 (memcached)\n      Tasks: 10 (limit: 2244)\n     CGroup: /system.slice/mem
cached.service\n             └─ 12568 /usr/sbin/memcached -u memcached -l 192.168
.30.160\n\nDec 02 09:21:12 localhost.localdomain systemd[1]: Started memcached da
emon.",
        "stdout_lines": [
            "● memcached.service - memcached daemon",
            "     Loaded: loaded (/usr/lib/systemd/system/memcached.service; enab
led; vendor preset: disabled)",
            "     Active: active (running) since Fri 2022-12-02 09:21:12 PST; 3s
ago",
            "   Main PID: 12568 (memcached)",
            "      Tasks: 10 (limit: 2244)",
            "     CGroup: /system.slice/memcached.service",
            "             └─ 12568 /usr/sbin/memcached -u memcached -l 192.168.30
.160",
```

```
            "",
            "Dec 02 09:21:12 localhost.localdomain systemd[1]: Started memcached
daemon."
        ]
    }
}
```

Etcd

```
TASK [../../etcd : Verifying installation of etcd] ******************************
changed: [192.168.30.160]

TASK [../../etcd : debug] *******************************************************
ok: [192.168.30.160] => {
    "msg": {
        "changed": true,
        "cmd": [
            "etcd",
            "--version"
        ],
        "delta": "0:00:00.048353",
        "end": "2022-12-02 10:04:34.135691",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-02 10:04:34.087338",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "etcd Version: 3.2.7\nGit SHA: bb66589\nGo Version: go1.8.3\nGo
 OS/Arch: linux/amd64",
        "stdout_lines": [
            "etcd Version: 3.2.7",
            "Git SHA: bb66589",
            "Go Version: go1.8.3",
            "Go OS/Arch: linux/amd64"
        ]
    }
}
```

```
TASK [../../etcd : Verifying if etcd is started and running in the background] **
*
changed: [192.168.30.160]

TASK [../../etcd : debug] ******************************************************
ok: [192.168.30.160] => {
    "msg": {
        "changed": true,
        "cmd": [
            "systemctl",
            "status",
            "etcd"
        ],
        "delta": "0:00:00.057390",
        "end": "2022-12-02 10:04:35.418816",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2022-12-02 10:04:35.361426",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "● etcd.service - etcd - highly-available key value store\n
 Loaded: loaded (/usr/lib/systemd/system/etcd.service; enabled; vendor preset: di
sabled)\n     Active: active (running) since Fri 2022-12-02 10:04:32 PST; 2s ago\
n   Main PID: 16996 (etcd)\n      Tasks: 8 (limit: 2244)\n     CGroup: /system.sl
ice/etcd.service\n             └─16996 /usr/bin/etcd --config-file /etc/etcd/etc
d.conf.yml\n\nDec 02 10:04:32 localhost.localdomain etcd[16996]: enabled capabili
ties for version 3.2\nDec 02 10:04:32 localhost.localdomain etcd[16996]: 348d82d6
feeeac63 is starting a new election at term 2\nDec 02 10:04:32 localhost.localdom
ain etcd[16996]: 348d82d6feeeac63 became candidate at term 3\nDec 02 10:04:32 loc
alhost.localdomain etcd[16996]: 348d82d6feeeac63 received MsgVoteResp from 348d82
d6feeeac63 at term 3\nDec 02 10:04:32 localhost.localdomain etcd[16996]: 348d82d6
feeeac63 became leader at term 3\nDec 02 10:04:32 localhost.localdomain etcd[1699
6]: raft.node: 348d82d6feeeac63 elected leader 348d82d6feeeac63 at term 3\nDec 02
 10:04:32 localhost.localdomain etcd[16996]: published {Name:controller ClientURL
s:[http://192.168.30.160:2379]} to cluster ead168bde148449d\nDec 02 10:04:32 loca
lhost.localdomain systemd[1]: Started etcd - highly-available key value store.\nD
ec 02 10:04:32 localhost.localdomain etcd[16996]: ready to serve client requests\
nDec 02 10:04:32 localhost.localdomain etcd[16996]: serving insecure client reque
```

```
sts on 192.168.30.160:2379, this is strongly discouraged!",
        "stdout_lines": [
            "● etcd.service - etcd - highly-available key value store",
            "     Loaded: loaded (/usr/lib/systemd/system/etcd.service; enabled;
vendor preset: disabled)",
            "     Active: active (running) since Fri 2022-12-02 10:04:32 PST; 2s
ago",
            "   Main PID: 16996 (etcd)",
            "      Tasks: 8 (limit: 2244)",
            "     CGroup: /system.slice/etcd.service",
            "             └─16996 /usr/bin/etcd --config-file /etc/etcd/etcd.con
f.yml",
            "",
            "Dec 02 10:04:32 localhost.localdomain etcd[16996]: enabled capabilit
ies for version 3.2",
            "Dec 02 10:04:32 localhost.localdomain etcd[16996]: 348d82d6feeeac63
is starting a new election at term 2",
            "Dec 02 10:04:32 localhost.localdomain etcd[16996]: 348d82d6feeeac63
became candidate at term 3",
            "Dec 02 10:04:32 localhost.localdomain etcd[16996]: 348d82d6feeeac63
received MsgVoteResp from 348d82d6feeeac63 at term 3",
            "Dec 02 10:04:32 localhost.localdomain etcd[16996]: 348d82d6feeeac63
```

```
became leader at term 3",
            "Dec 02 10:04:32 localhost.localdomain etcd[16996]: raft.node: 348d82
d6feeeac63 elected leader 348d82d6feeeac63 at term 3",
            "Dec 02 10:04:32 localhost.localdomain etcd[16996]: published {Name:c
ontroller ClientURLs:[http://192.168.30.160:2379]} to cluster ead168bde148449d",
            "Dec 02 10:04:32 localhost.localdomain systemd[1]: Started etcd - hig
hly-available key value store.",
            "Dec 02 10:04:32 localhost.localdomain etcd[16996]: ready to serve cl
ient requests",
            "Dec 02 10:04:32 localhost.localdomain etcd[16996]: serving insecure
client requests on 192.168.30.160:2379, this is strongly discouraged!"
        ]
    }
}
```

Table 8. The table above shows the verification in the following package is installed and running by checking its command and service status.

```
CPE232-Activity_13 on ᚠ main [?] ❯ git add *
CPE232-Activity_13 on ᚠ main [+] ❯ git commit -m "first commit"
[main 39c65e7] first commit
 26 files changed, 466 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 install_openstack.yml
 create mode 100644 inventory
 create mode 100644 roles/database/files/openstack.cnf
 create mode 100644 roles/database/handlers/main.yml
 create mode 100644 roles/database/tasks/install.yml
 create mode 100644 roles/database/tasks/main.yml
 create mode 100644 roles/database/vars/main.yml
 create mode 100644 roles/etcd/files/etcd.conf.yml
 create mode 100644 roles/etcd/files/etcd.service
 create mode 100644 roles/etcd/handlers/main.yml
 create mode 100644 roles/etcd/tasks/install.yml
 create mode 100644 roles/etcd/tasks/main.yml
 create mode 100644 roles/memcached/files/memcached
 create mode 100644 roles/memcached/handlers/main.yml
 create mode 100644 roles/memcached/tasks/install.yml
 create mode 100644 roles/memcached/tasks/main.yml
 create mode 100644 roles/message_queue/handlers/main.yml
 create mode 100644 roles/message_queue/tasks/install.yml
 create mode 100644 roles/message_queue/tasks/main.yml
 create mode 100644 roles/ntp/files/chrony.conf
 create mode 100644 roles/ntp/handlers/main.yml
 create mode 100644 roles/ntp/tasks/install.yml
 create mode 100644 roles/ntp/tasks/main.yml
 create mode 100644 roles/packages/tasks/install.yml
 create mode 100644 roles/packages/tasks/main.yml
CPE232-Activity_13 on ᚠ main [↑] ❯ git push git@github.com-school:piolotorrecampo/CPE232-Activity_13.git
Enumerating objects: 47, done.
Counting objects: 100% (47/47), done.
Delta compression using up to 4 threads
Compressing objects: 100% (34/34), done.
Writing objects: 100% (46/46), 6.77 KiB | 770.00 KiB/s, done.
Total 46 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com-school:piolotorrecampo/CPE232-Activity_13.git
   0f74a8a..39c65e7  main -> main
CPE232-Activity_13 on ᚠ main [↑] took 3s ❯
```

Figure 9. The screenshot above shows the commands used in pushing the contents of the directory to Github.

Figure 10. The picture above shows the github page after pushing the contents of the activity.

Links:

Github Repository: https://github.com/piolotorrecampo/CPE232-Activity_13.git

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

   - In implementing OpenStack, an enterprise can host their own private cloud. OpenStack allows you to fully customize your workflow depending on the needs of the company for free. It is composed of a group of open-source tools for managing and building platforms for cloud computing. The data in your company is secured because you are the one who implements it and the data are also in your hand not in any public cloud services like AWS or Linode. Also, it allows the programing of virtual machines to handle tasks like processing, identity, services, storage, and provisioning within the network. In the industry, OpenStack improves its agility, increasing the efficiency of core processes, enhancing the availability of resources, and adding flexibility and adaptability to a private infrastructure.

Conclusions:

This activity achieves its objective to introduce and create a workflow to install OpenStack using Ansible as my Infrastructure as Code (IaC). In performing this activity, I relied on the documentation given by OpenStack in installing its prerequisite tools such as Networking Time Protocol (NTP), OpenStack Packages, SQL database, Message queue, memcached and etcd. These prerequisites of OpenStack are installed in the controller node using ansible.

NTP

The NTP is used to properly synchronize services among nodes. In this activity I used Chrony as an implementation of NTP.

OpenStack Packages

OpenStack packages as part of the distribution or using other methods because of differing release schedules. The installation of these packages are done in all nodes (controller, computer, and block storage).

SQL Database

This prerequisite package is used to store information and typically runs on the controller node. Since I used OpenSUSE, the documentation provides an installation for mariadb as my sql database.

Message Queue

The message queue is used to coordinate operations and status information among services and typically runs on the controller node. Since I used OpenSUSE, the documentation provides an installation for RabbitMQ as a message queue.

Memcached

The Identity service authentication mechanism for services uses Memcached to cache tokens. The memcached service typically runs on the controller node. For production deployments, we recommend enabling a combination of firewalling, authentication, and encryption to secure it.

Etcd

Etcd is a distributed reliable key-value store for distributed key locking, storing configuration, keeping track of service live-ness and other scenarios.

Honor Pledge: *"I affirm that I will not give or receive unauthorized help on this activity and that all will be my own."*