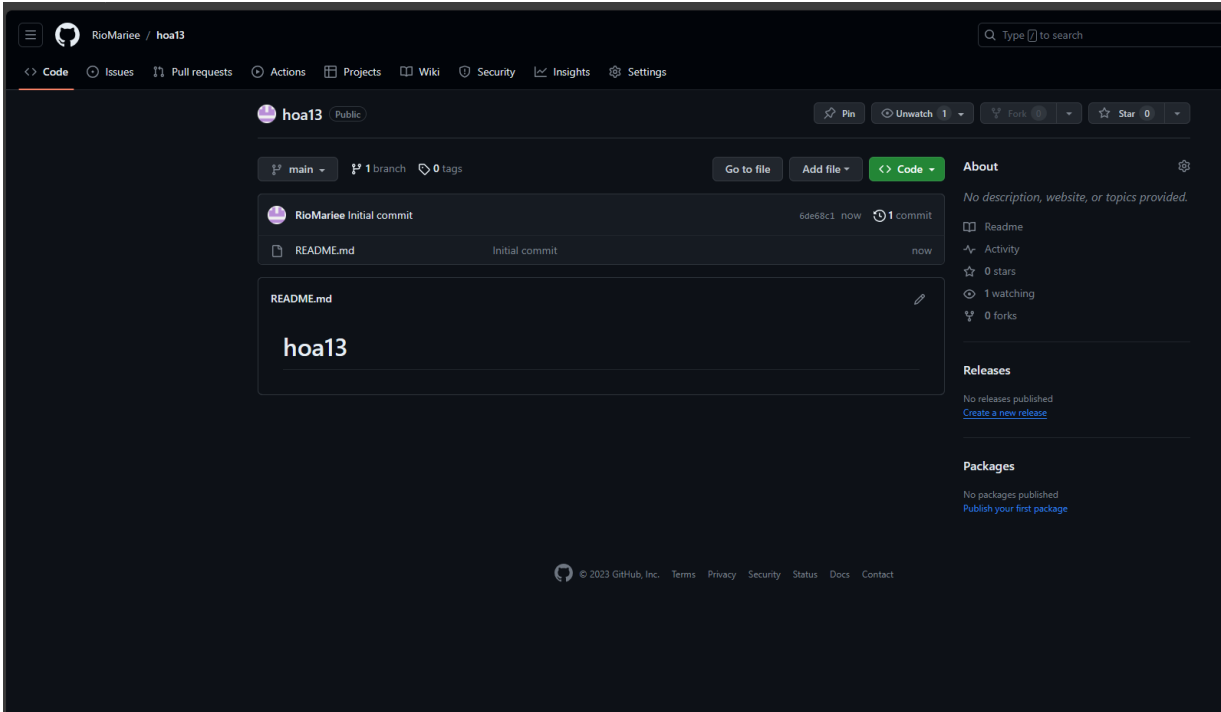
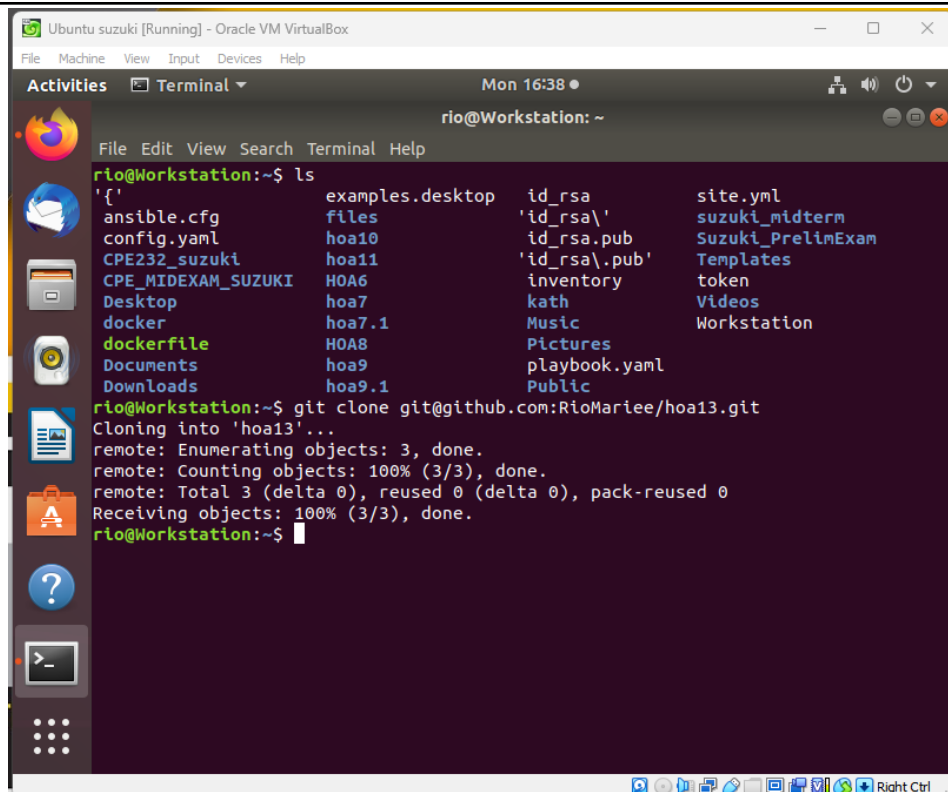


Name: Rio Marie G. Suzuki	Date Performed: 12/04/2023
Course/Section: CPE232S6	Date Submitted: 12/04/2023
Instructor: Dr. Jonathan Taylar	Semester and SY: 1st sem 2023-2024
Activity 13: OpenStack Prerequisite Installation	
1. Objectives	
Create a workflow to install OpenStack using Ansible as your Infrastructure 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. 	
	

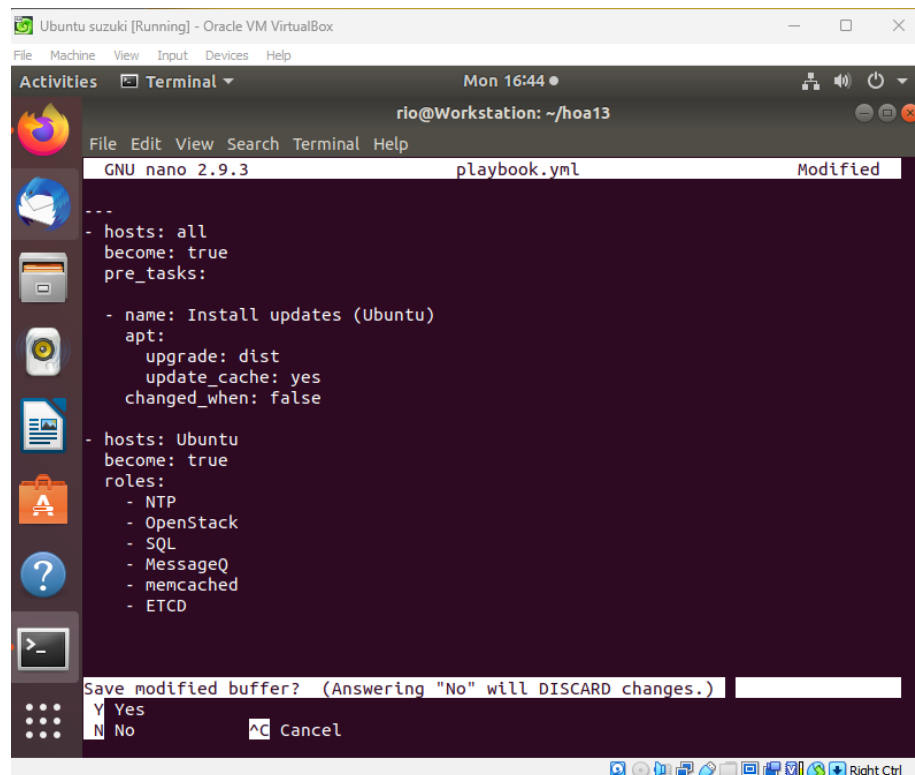


The terminal window shows the user 'rio@Workstation' in the home directory. They run 'ls' to list files, showing a directory structure with various configuration and example files. Then they run 'git clone git@github.com:RioMarlee/hoa13.git' to clone a repository. The output shows the cloning progress and completion.

```
File Edit View Search Terminal Help
rio@Workstation: ~
File Edit View Search Terminal Help
rio@Workstation:~$ ls
'{'          examples.desktop  id_rsa          site.yml
ansible.cfg  files             'id_rsa\'       suzuki_midterm
config.yaml  hoa10            'id_rsa.pub'    Suzuki_PrelimExam
CPE232_suzuki  hoa11          'id_rsa\.pub'   Templates
CPE_MIDEXAM_SUZUKI HOA6          inventory       token
Desktop      hoa7            kath            Videos
docker       hoa7.1          Music           Workstation
dockerfile   HOA8            Pictures
Documents    hoa9            playbook.yaml
Downloads    hoa9.1          Public

rio@Workstation:~$ git clone git@github.com:RioMarlee/hoa13.git
Cloning into 'hoa13'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Receiving objects: 100% (3/3), done.
rio@Workstation:~$
```

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



The terminal window shows the user 'rio@Workstation' in the directory '~/.hoa13'. They are editing a file named 'playbook.yml' using the nano text editor. The file content defines a playbook with two tasks: one to install updates on all hosts and another to install specific roles on Ubuntu hosts.

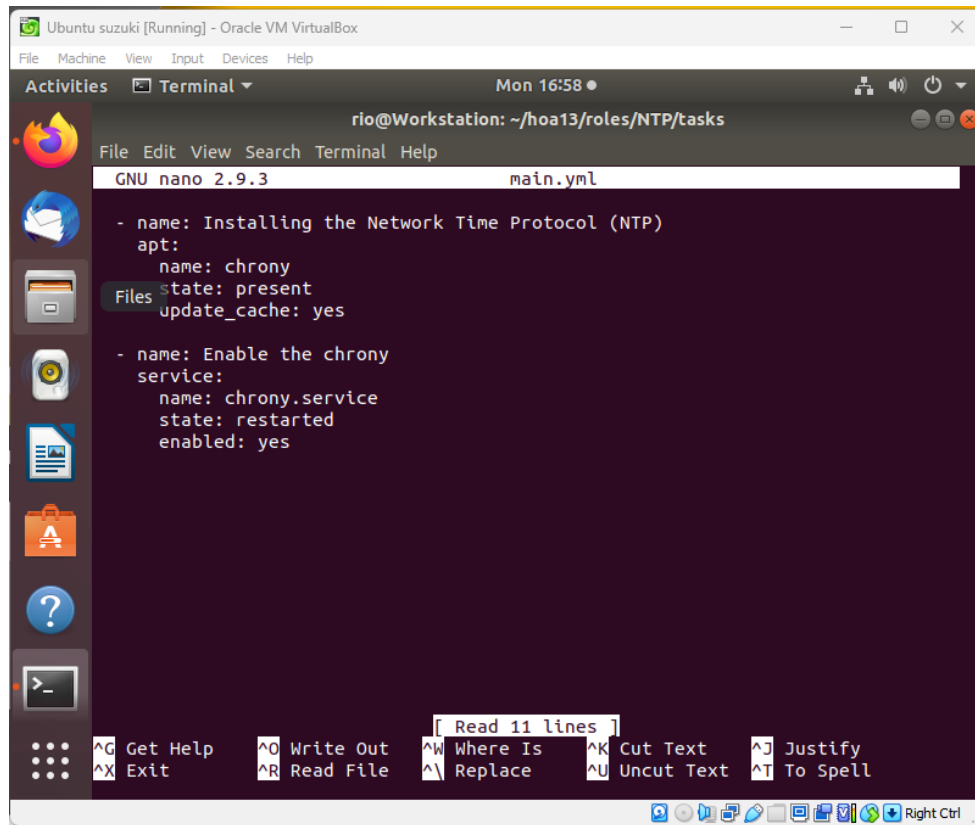
```
File Edit View Search Terminal Help
rio@Workstation: ~/.hoa13
GNU nano 2.9.3      playbook.yml      Modified
---
- hosts: all
  become: true
  pre_tasks:

  - name: Install updates (Ubuntu)
    apt:
      upgrade: dist
      update_cache: yes
      changed_when: false

- hosts: Ubuntu
  become: true
  roles:
    - NTP
    - OpenStack
    - SQL
    - MessageQ
    - memcached
    - ETCD

Save modified buffer? (Answering "No" will DISCARD changes.)
Y Yes
N No      ^C Cancel
```

a. NTP



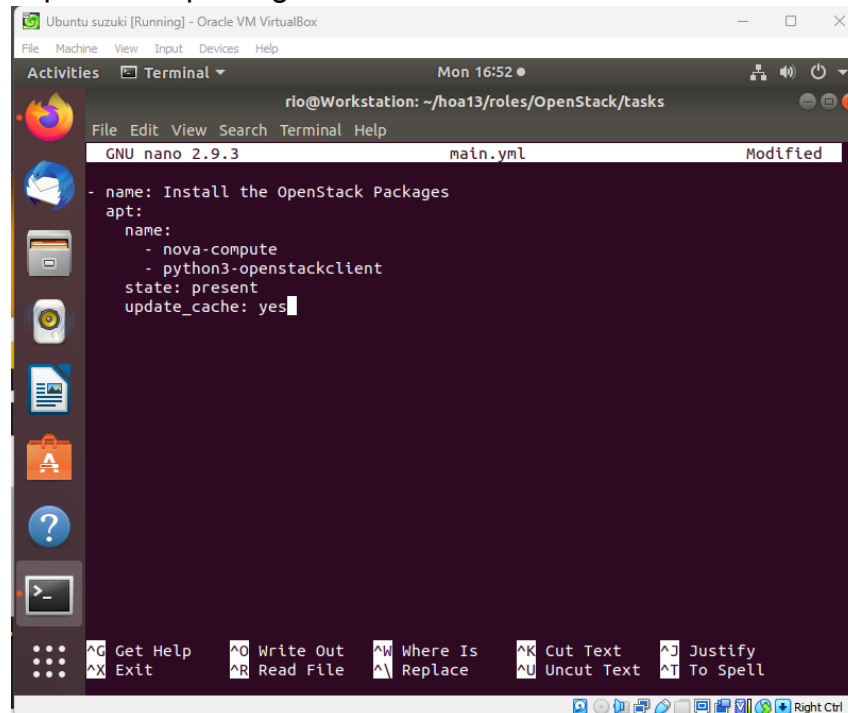
The screenshot shows a terminal window titled "Ubuntu suzuki [Running] - Oracle VM VirtualBox". The terminal is running the nano text editor, editing a file named "main.yml". The file contains two tasks for installing and enabling NTP (Chrony). The terminal window has a menu bar with "File", "Machine", "View", "Input", "Devices", and "Help". The status bar at the bottom shows "rio@Workstation: ~/hoa13/roles/NTP/tasks".

```
GNU nano 2.9.3 main.yml

- name: Installing the Network Time Protocol (NTP)
  apt:
    name: chrony
    state: present
    update_cache: yes

- name: Enable the chrony
  service:
    name: chrony.service
    state: restarted
    enabled: yes
```

b. OpenStack packages

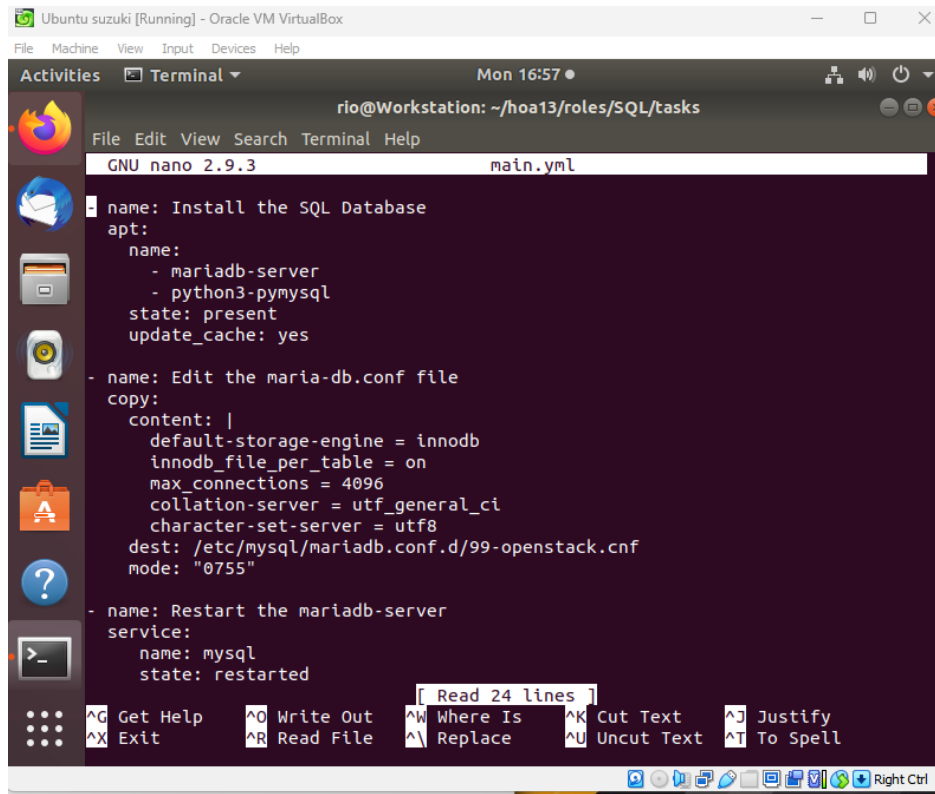


The screenshot shows a terminal window titled "Ubuntu suzuki [Running] - Oracle VM VirtualBox". The terminal is running the nano text editor, editing a file named "main.yml". The file contains a task for installing OpenStack packages. The terminal window has a menu bar with "File", "Machine", "View", "Input", "Devices", and "Help". The status bar at the bottom shows "rio@Workstation: ~/hoa13/roles/OpenStack/tasks".

```
GNU nano 2.9.3 main.yml Modified

- name: Install the OpenStack Packages
  apt:
    name:
      - nova-compute
      - python3-openstackclient
    state: present
    update_cache: yes
```

c. SQL Database



```
Ubuntu suzuki [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mon 16:57
rio@Workstation: ~/hoa13/roles/SQL/tasks

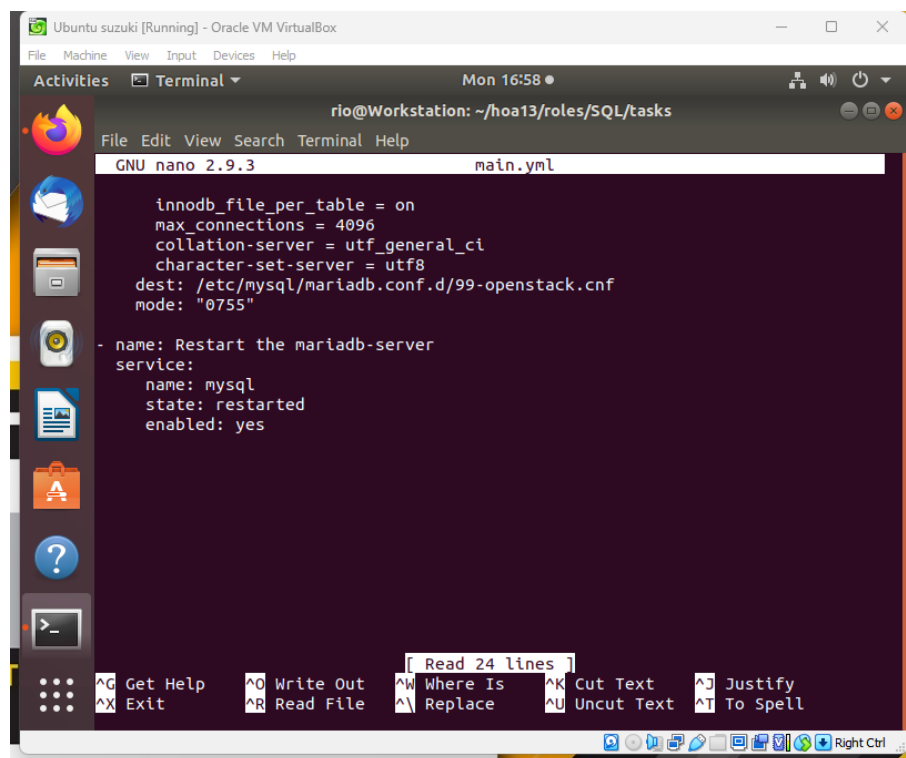
GNU nano 2.9.3 main.yml

- 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_connections = 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

^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify
^X Exit ^R Read File ^_ Replace ^U Uncut Text ^T To Spell
```



```
Ubuntu suzuki [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mon 16:58
rio@Workstation: ~/hoa13/roles/SQL/tasks

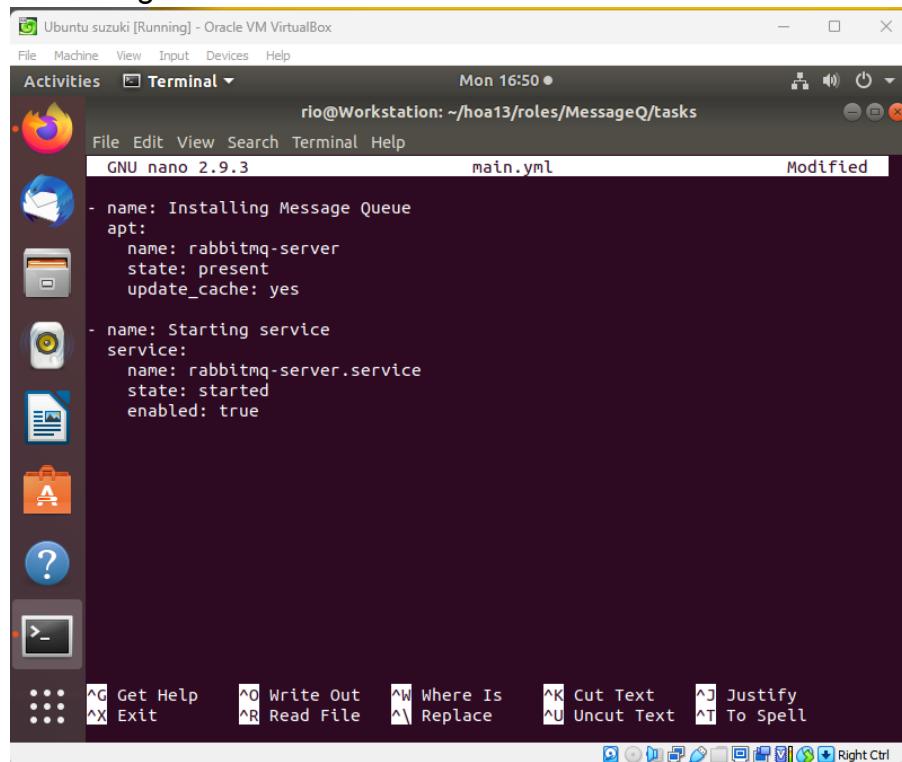
GNU nano 2.9.3 main.yml

innodb_file_per_table = on
max_connections = 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

^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify
^X Exit ^R Read File ^_ Replace ^U Uncut Text ^T To Spell
```

d. Message Queue



The screenshot shows a terminal window titled "Ubuntu suzuki [Running] - Oracle VM VirtualBox". The user is logged in as "rio" at "Workstation" in the directory "~/hoa13/roles/MessageQ/tasks". The terminal is running the GNU nano 2.9.3 editor, editing a file named "main.yml". The content of the file is as follows:

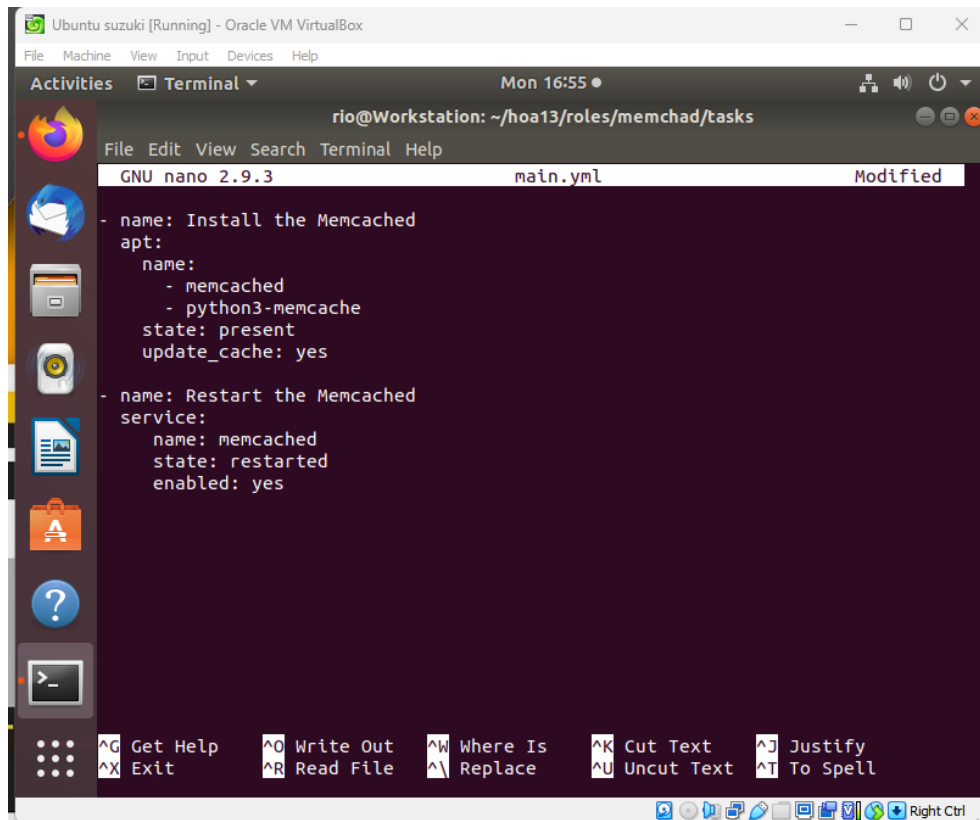
```
File Edit View Search Terminal Help
GNU nano 2.9.3 main.yml Modified

- name: Installing Message Queue
  apt:
    name: rabbitmq-server
    state: present
    update_cache: yes

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

The terminal window includes a sidebar with application icons and a bottom status bar with system icons and keyboard shortcuts.

e. Memcached



The screenshot shows a terminal window titled "Ubuntu suzuki [Running] - Oracle VM VirtualBox". The user is logged in as "rio" at "Workstation" in the directory "~/hoa13/roles/memchad/tasks". The terminal is running the GNU nano 2.9.3 editor, editing a file named "main.yml". The content of the file is as follows:

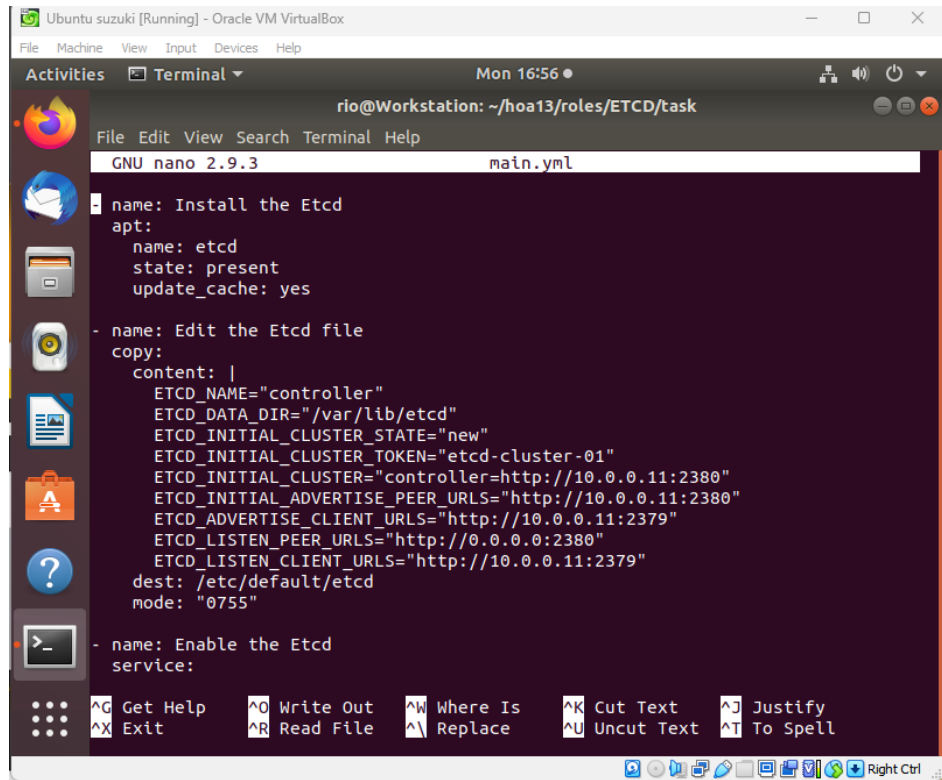
```
File Edit View Search Terminal Help
GNU nano 2.9.3 main.yml Modified

- name: Install the Memcached
  apt:
    name:
      - memcached
      - python3-memcache
    state: present
    update_cache: yes

- name: Restart the Memcached
  service:
    name: memcached
    state: restarted
    enabled: yes
```

The terminal window includes a sidebar with application icons and a bottom status bar with system icons and keyboard shortcuts.

f. Etcd



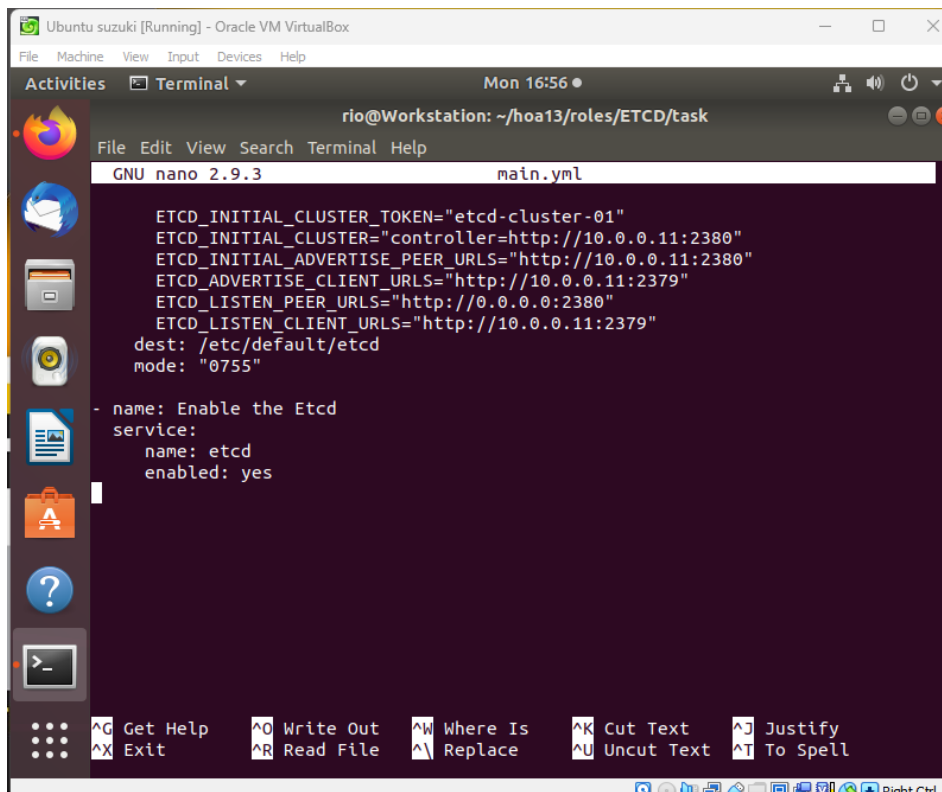
The screenshot shows a terminal window titled "Ubuntu suzuki [Running] - Oracle VM VirtualBox". The terminal prompt is "rio@Workstation: ~/hoa13/roles/ETCD/task". The user is editing a file named "main.yml" using "GNU nano 2.9.3". The content of the file is as follows:

```
- name: Install the Etcd
  apt:
    name: etcd
    state: present
    update_cache: yes

- name: Edit the Etcd file
  copy:
    content: |
      ETCD_NAME="controller"
      ETCD_DATA_DIR="/var/lib/etcd"
      ETCD_INITIAL_CLUSTER_STATE="new"
      ETCD_INITIAL_CLUSTER_TOKEN="etcd-cluster-01"
      ETCD_INITIAL_CLUSTER="controller=http://10.0.0.11:2380"
      ETCD_INITIAL_ADVERTISE_PEER_URLS="http://10.0.0.11:2380"
      ETCD_ADVERTISE_CLIENT_URLS="http://10.0.0.11:2379"
      ETCD_LISTEN_PEER_URLS="http://0.0.0.0:2380"
      ETCD_LISTEN_CLIENT_URLS="http://10.0.0.11:2379"
    dest: /etc/default/etcd
    mode: "0755"

- name: Enable the Etcd
  service:
```

The terminal window also shows a menu at the bottom with options like "Get Help", "Write Out", "Where Is", "Cut Text", "Justify", "Exit", "Read File", "Replace", "Uncut Text", and "To Spell".



The screenshot shows the same terminal window as above, but the content of the "main.yml" file has been updated. The new content is as follows:

```
ETCD_INITIAL_CLUSTER_TOKEN="etcd-cluster-01"
ETCD_INITIAL_CLUSTER="controller=http://10.0.0.11:2380"
ETCD_INITIAL_ADVERTISE_PEER_URLS="http://10.0.0.11:2380"
ETCD_ADVERTISE_CLIENT_URLS="http://10.0.0.11:2379"
ETCD_LISTEN_PEER_URLS="http://0.0.0.0:2380"
ETCD_LISTEN_CLIENT_URLS="http://10.0.0.11:2379"
dest: /etc/default/etcd
mode: "0755"

- name: Enable the Etcd
  service:
    name: etcd
    enabled: yes
```

The terminal window also shows the same menu at the bottom as the previous screenshot.

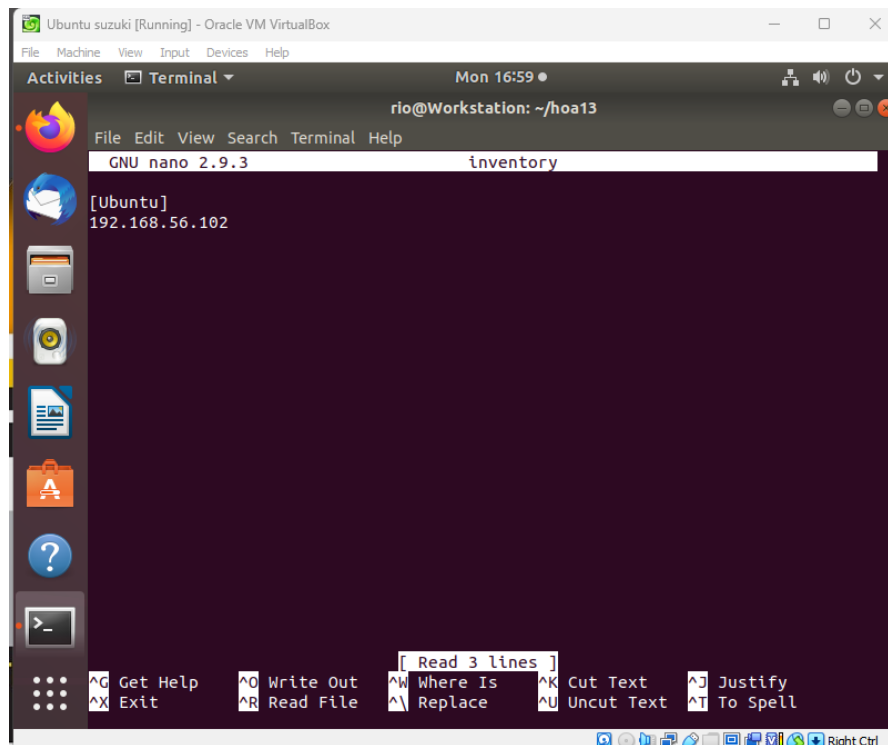
```

rio@Workstation: ~/hoa13/roles$ tree
.
├── Etcd
│   └── tasks
│       └── main.yml
├── Memcached
│   └── tasks
│       └── main.yml
├── Message_Queue
│   └── tasks
│       └── main.yml
├── NTP
│   └── tasks
│       └── main.yml
├── OpenStack
│   └── tasks
│       └── main.yml
└── SQL_Database
    └── tasks
        └── main.yml

12 directories, 6 files
rio@Workstation: ~/hoa13/roles$

```

- 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.

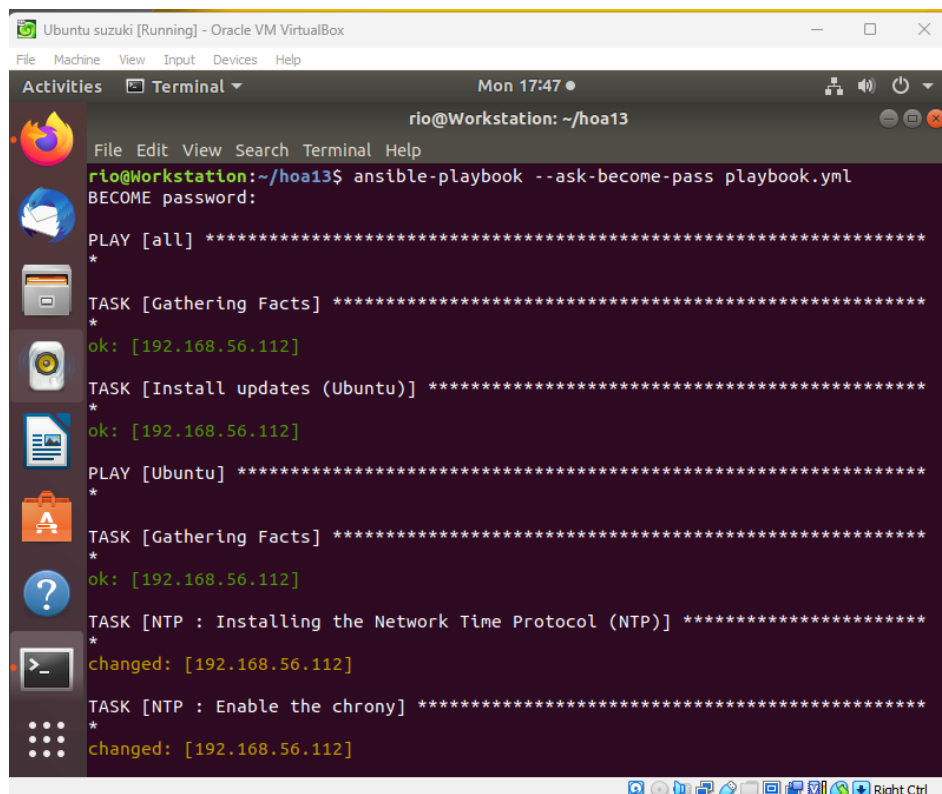
```

rio@Workstation:~/hoa13$ git add .
rio@Workstation:~/hoa13$ git commit -m "hoa13"
[main c0bad25] hoa13
9 files changed, 124 insertions(+)
create mode 100644 ansible.cfg
create mode 100644 inventory
create mode 100644 playbook.yml
create mode 100644 roles/ETCD/task/main.yml
create mode 100644 roles/MessageQ/tasks/main.yml
create mode 100644 roles/NTP/tasks/main.yml
create mode 100644 roles/OpenStack/tasks/main.yml
create mode 100644 roles/SQL/tasks/main.yml
create mode 100644 roles/memchad/tasks/main.yml
rio@Workstation:~/hoa13$ git push
Counting objects: 24, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (11/11), done.
Writing objects: 100% (24/24), 2.52 KiB | 2.52 MiB/s, done.
Total 24 (delta 0), reused 0 (delta 0)
To github.com:RioMarieee/hoa13.git
fb4b35f..c0bad25 main -> main
rio@Workstation:~/hoa13$

```

5. Output (screenshots and explanations)

Process:



```

Ubuntu suzuki [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mon 17:47
rio@Workstation: ~/hoa13
File Edit View Search Terminal Help
rio@Workstation:~/hoa13$ ansible-playbook --ask-become-pass playbook.yml
BECOME password:

PLAY [all] *****
*

TASK [Gathering Facts] *****
*
ok: [192.168.56.112]

TASK [Install updates (Ubuntu)] *****
*
ok: [192.168.56.112]

PLAY [Ubuntu] *****
*

TASK [Gathering Facts] *****
*
ok: [192.168.56.112]

TASK [NTP : Installing the Network Time Protocol (NTP)] *****
*
changed: [192.168.56.112]

TASK [NTP : Enable the chrony] *****
*
changed: [192.168.56.112]

```



```
Ubuntu suzuki [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mon 17:48
rio@Workstation: ~/hoa13
File Edit View Search Terminal Help
TASK [NTP : Enable the chrony] *****
*
changed: [192.168.56.112]
TASK [OpenStack : Install the OpenStack Packages] *****
*
changed: [192.168.56.112]
TASK [SQL : Install the SQL Database] *****
*
ok: [192.168.56.112]
TASK [SQL : Edit the maria-db.conf file] *****
*
changed: [192.168.56.112]
TASK [SQL : Restart the mariadb-server] *****
*
changed: [192.168.56.112]
TASK [MessageQ : Installing Message Queue] *****
*
changed: [192.168.56.112]
TASK [MessageQ : Starting service] *****
*
ok: [192.168.56.112]
```

```
Ubuntu suzuki [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mon 17:48
rio@Workstation: ~/hoa13
File Edit View Search Terminal Help
changed: [192.168.56.112]
TASK [SQL : Restart the mariadb-server] *****
*
changed: [192.168.56.112]
TASK [MessageQ : Installing Message Queue] *****
*
changed: [192.168.56.112]
TASK [MessageQ : Starting service] *****
*
ok: [192.168.56.112]
TASK [memchad : Install the Memcached] *****
*
changed: [192.168.56.112]
TASK [memchad : Restart the Memcached] *****
*
changed: [192.168.56.112]
PLAY RECAP *****
*
192.168.56.112 : ok=13 changed=8 unreachable=0 failed=0
skipped=0 rescued=0 ignored=0
rio@Workstation:~/hoa13$
```

Output:

NTP

```
Server2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Dec 4 17:57
rio@Server2: ~
rio@Server2:~$ ntpq -p
      remote           refid      st t when poll reach  delay  offset  jitter
=====
0.ubuntu.pool.n .POOL.          16 p   -   64    0   0.000   0.000   0.000
1.ubuntu.pool.n .POOL.          16 p   -   64    0   0.000   0.000   0.000
2.ubuntu.pool.n .POOL.          16 p   -   64    0   0.000   0.000   0.000
3.ubuntu.pool.n .POOL.          16 p   -   64    0   0.000   0.000   0.000
ntp.ubuntu.com .POOL.          16 p   -   64    0   0.000   0.000   0.000
185.125.190.58 86.23.195.30    2 u   26   64    1 189.278   1.465   0.000
185.125.190.57 201.68.88.106   2 u   24   64    1 194.246   0.692   0.000
185.125.190.56 194.121.207.249 2 u   26   64    1 194.142   0.561   0.000
alphyn.canonica 132.163.96.1    2 u   26   64    1 232.657 -10.870   0.000
rio@Server2:~$
```

Server2 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Dec 4 17:58

rio@Server2: ~

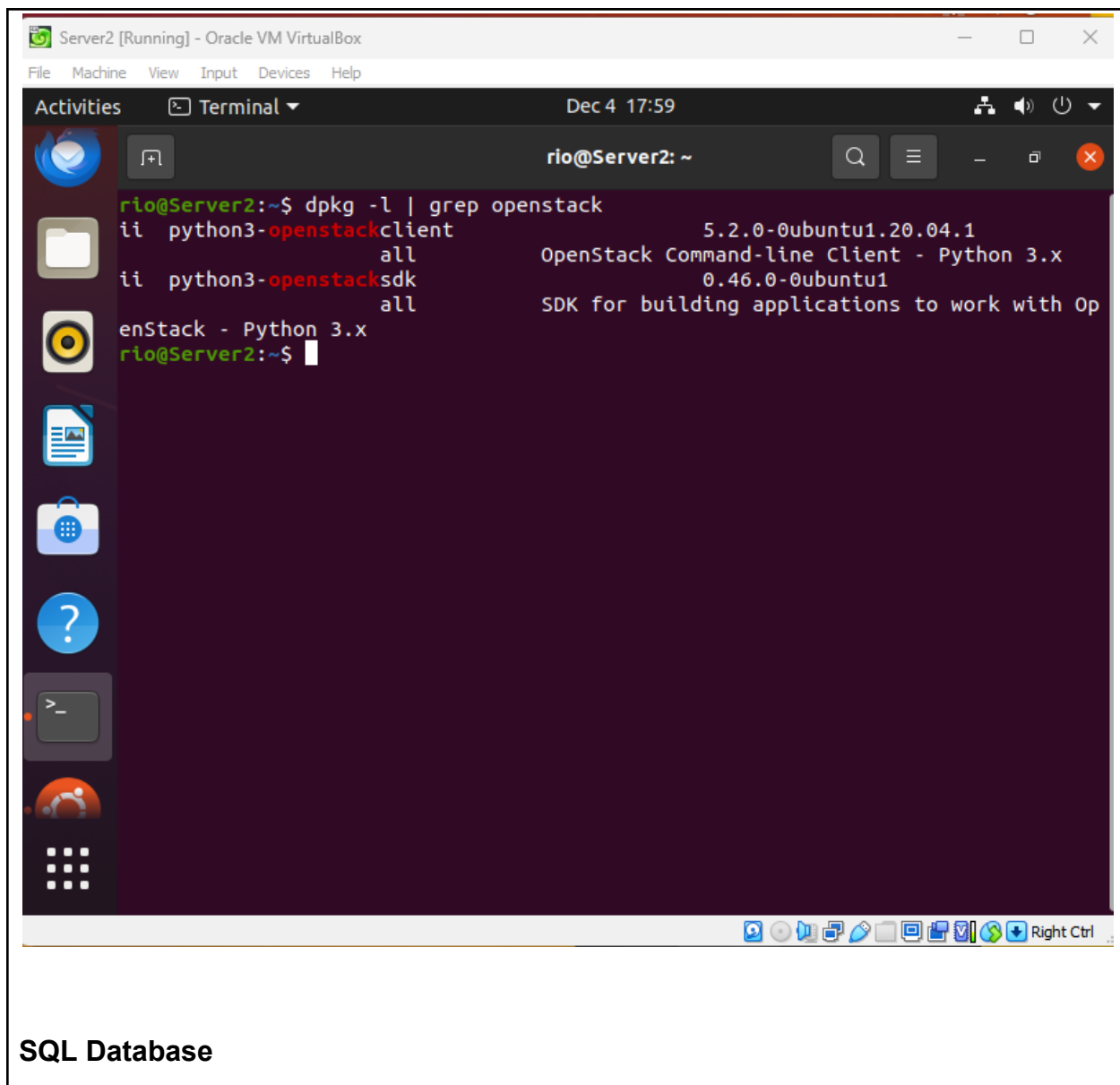
```
alphyn.canonica 132.163.96.1 2 u 26 64 1 232.657 -10.870 0.000
rio@Server2:~$ sudo systemctl status chrony.service
● chrony.service
   Loaded: masked (Reason: Unit chrony.service is masked.)
   Active: inactive (dead) since Mon 2023-12-04 17:57:03 PST; 1min 16s ago
   Main PID: 29034 (code=exited, status=0/SUCCESS)

Dec 04 17:42:30 Server2 chronyd[29034]: chronyd version 3.5 starting (+CMDMON
Dec 04 17:42:30 Server2 chronyd[29034]: Frequency -2.408 +/- 1000000.000 ppm r
Dec 04 17:42:30 Server2 chronyd[29034]: Loaded seccomp filter
Dec 04 17:42:30 Server2 systemd[1]: Started chrony, an NTP client/server.
Dec 04 17:42:37 Server2 chronyd[29034]: Selected source 185.125.190.58
Dec 04 17:44:32 Server2 chronyd[29034]: Source 2001:fd8:f0cf:8777:227c:14ff:fe
Dec 04 17:57:03 Server2 systemd[1]: Stopping chrony, an NTP client/server...
Dec 04 17:57:03 Server2 chronyd[29034]: chronyd exiting
Dec 04 17:57:03 Server2 systemd[1]: chrony.service: Succeeded.
Dec 04 17:57:03 Server2 systemd[1]: Stopped chrony, an NTP client/server.
...skipping...
● chrony.service
   Loaded: masked (Reason: Unit chrony.service is masked.)
   Active: inactive (dead) since Mon 2023-12-04 17:57:03 PST; 1min 16s ago
   Main PID: 29034 (code=exited, status=0/SUCCESS)

Dec 04 17:42:30 Server2 chronyd[29034]: chronyd version 3.5 starting (+CMDMON
Dec 04 17:42:30 Server2 chronyd[29034]: Frequency -2.408 +/- 1000000.000 ppm r
Dec 04 17:42:30 Server2 chronyd[29034]: Loaded seccomp filter
Dec 04 17:42:30 Server2 systemd[1]: Started chrony, an NTP client/server.
Dec 04 17:42:37 Server2 chronyd[29034]: Selected source 185.125.190.58
Dec 04 17:44:32 Server2 chronyd[29034]: Source 2001:fd8:f0cf:8777:227c:14ff:fe
```

Right Ctrl

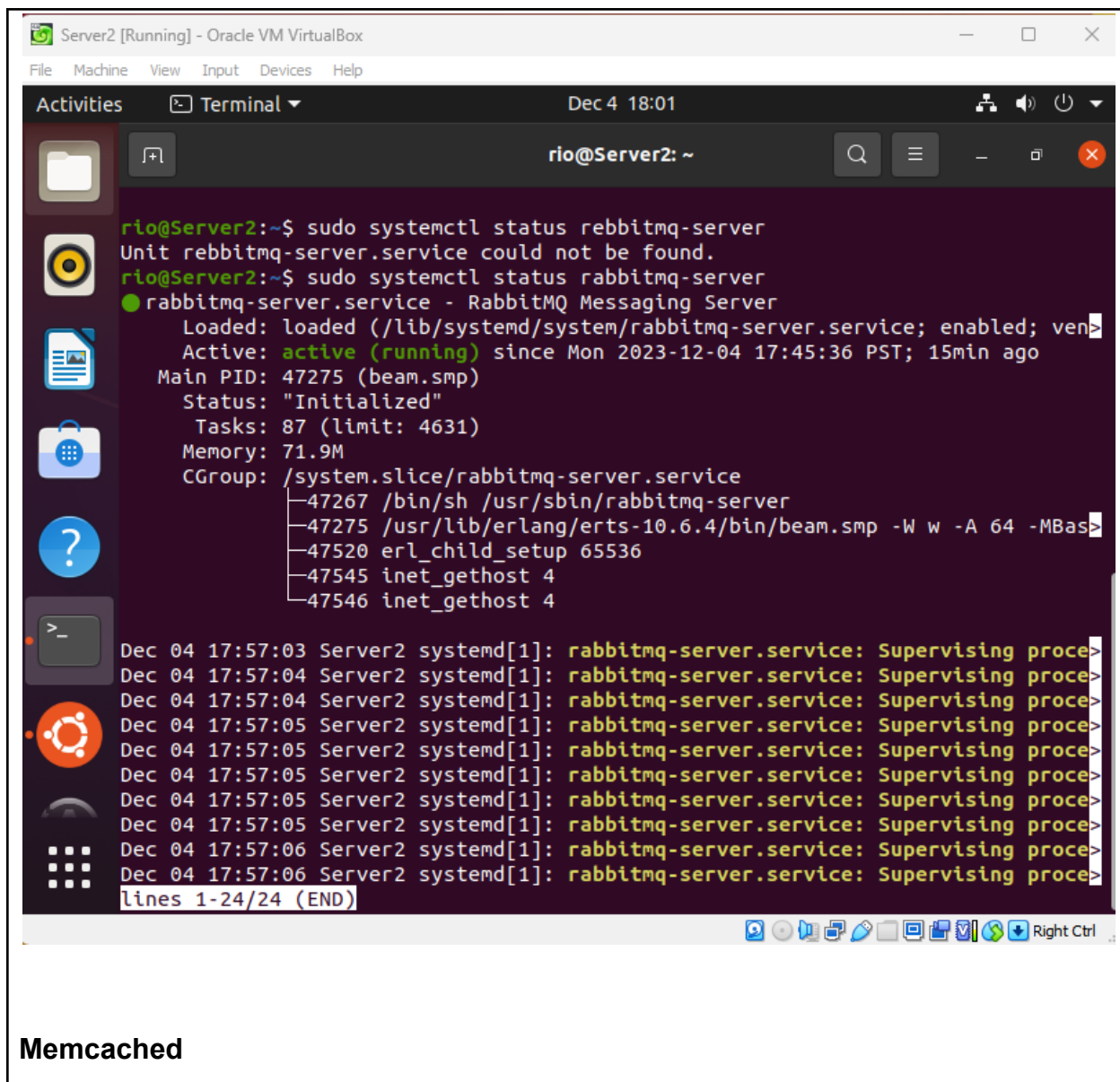
OpenStack packages



```
rio@Server2:~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.3.38 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
   Active: active (running) since Mon 2023-12-04 17:45:03 PST; 14min ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
   Main PID: 46196 (mysqld)
    Status: "Taking your SQL requests now..."
     Tasks: 30 (limit: 4631)
    Memory: 67.7M
    CGroup: /system.slice/mariadb.service
            └─46196 /usr/sbin/mysqld

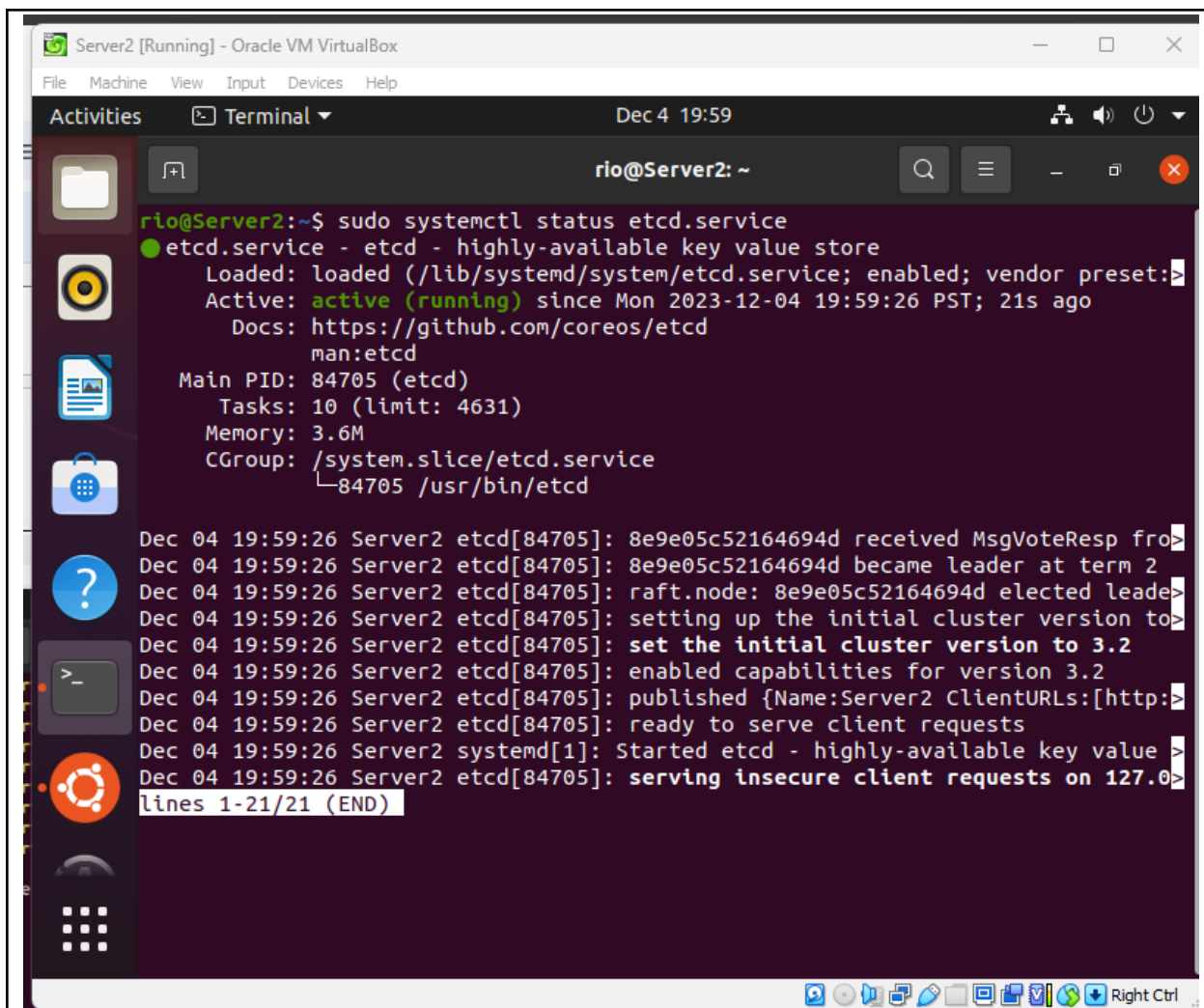
Dec 04 17:45:03 Server2 systemd[1]: Started MariaDB 10.3.38 database server.
Dec 04 17:45:03 Server2 /etc/mysql/debian-start[46231]: Upgrading MySQL tables>
Dec 04 17:45:03 Server2 /etc/mysql/debian-start[46234]: error: Found option wi>
Dec 04 17:45:03 Server2 /etc/mysql/debian-start[46234]: /usr/bin/mysql_upgrade>
Dec 04 17:45:03 Server2 /etc/mysql/debian-start[46234]: Looking for 'mysql' as>
Dec 04 17:45:03 Server2 /etc/mysql/debian-start[46234]: Looking for 'mysqlhec>
Dec 04 17:45:03 Server2 /etc/mysql/debian-start[46234]: This installation of M>
Dec 04 17:45:03 Server2 /etc/mysql/debian-start[46234]: There is no need to ru>
Dec 04 17:45:03 Server2 /etc/mysql/debian-start[46234]: You can use --force if>
Dec 04 17:45:03 Server2 /etc/mysql/debian-start[46250]: Triggering myisam-reco>
lines 1-22/22 (END)
```

Message Queue



```
Server2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Dec 4 18:02
rio@Server2: ~
Dec 04 17:57:04 Server2 systemd[1]: rabbitmq-server.service: Supervising process>
Dec 04 17:57:04 Server2 systemd[1]: rabbitmq-server.service: Supervising process>
Dec 04 17:57:05 Server2 systemd[1]: rabbitmq-server.service: Supervising process>
Dec 04 17:57:05 Server2 systemd[1]: rabbitmq-server.service: Supervising process>
Dec 04 17:57:05 Server2 systemd[1]: rabbitmq-server.service: Supervising process>
Dec 04 17:57:05 Server2 systemd[1]: rabbitmq-server.service: Supervising process>
Dec 04 17:57:05 Server2 systemd[1]: rabbitmq-server.service: Supervising process>
Dec 04 17:57:06 Server2 systemd[1]: rabbitmq-server.service: Supervising process>
Dec 04 17:57:06 Server2 systemd[1]: rabbitmq-server.service: Supervising process>
[3]+ Stopped sudo systemctl status rabbitmq-server
rio@Server2:~$ sudo systemctl start memcached.service
Failed to start memcached.service: Unit memcached.service not found.
rio@Server2:~$ sudo systemctl start memcached.service
rio@Server2:~$
rio@Server2:~$ sudo systemctl start memcached.service
rio@Server2:~$ sudo systemctl status memcached.service
● memcached.service - memcached daemon
   Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor preset: ena>
   Active: active (running) since Mon 2023-12-04 17:45:52 PST; 16min ago
     Docs: man:memcached(1)
    Main PID: 52220 (memcached)
      Tasks: 10 (limit: 4631)
     Memory: 1.8M
    CGroup: /system.slice/memcached.service
            └─52220 /usr/bin/memcached -m 64 -p 11211 -u memcache -l 127.0.0.1>
Dec 04 17:45:52 Server2 systemd[1]: Started memcached daemon.
lines 1-11/11 (END)
```

Etcd



The screenshot shows a terminal window titled "Server2 [Running] - Oracle VM VirtualBox". The terminal output is as follows:

```
rio@Server2: ~  
rio@Server2:~$ sudo systemctl status etcd.service  
● etcd.service - etcd - highly-available key value store  
   Loaded: loaded (/lib/systemd/system/etcd.service; enabled; vendor preset: enabled)  
   Active: active (running) since Mon 2023-12-04 19:59:26 PST; 21s ago  
     Docs: https://github.com/coreos/etcd  
    Main PID: 84705 (etcd)  
      Tasks: 10 (limit: 4631)  
     Memory: 3.6M  
    CGroup: /system.slice/etcd.service  
            └─84705 /usr/bin/etcd  
  
Dec 04 19:59:26 Server2 etcd[84705]: 8e9e05c52164694d received MsgVoteResp from 8e9e05c52164694d  
Dec 04 19:59:26 Server2 etcd[84705]: 8e9e05c52164694d became leader at term 2  
Dec 04 19:59:26 Server2 etcd[84705]: raft.node: 8e9e05c52164694d elected leader 8e9e05c52164694d  
Dec 04 19:59:26 Server2 etcd[84705]: setting up the initial cluster version to 3.2  
Dec 04 19:59:26 Server2 etcd[84705]: set the initial cluster version to 3.2  
Dec 04 19:59:26 Server2 etcd[84705]: enabled capabilities for version 3.2  
Dec 04 19:59:26 Server2 etcd[84705]: published {Name:Server2 ClientURLs:[http://127.0.0.1:2379, http://127.0.0.1:2380]}  
Dec 04 19:59:26 Server2 etcd[84705]: ready to serve client requests  
Dec 04 19:59:26 Server2 systemd[1]: Started etcd - highly-available key value store.  
Dec 04 19:59:26 Server2 etcd[84705]: serving insecure client requests on 127.0.0.1:2379  
lines 1-21/21 (END)
```

Github link: <https://github.com/RioMarieee/hoa13.git>

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?
 - Integrating OpenStack provides significant benefits, such as increased scalability, flexibility, and cost-effectiveness in managing cloud infrastructure. This empowers organizations to design and manage private and public clouds efficiently, optimizing resource allocation and automation. OpenStack prioritizes interoperability, enabling smooth integration with various technologies, encouraging collaboration in an open-source environment conducive to ongoing enhancements. Additionally, it supports a range of hypervisors, storage solutions, and networking alternatives, offering a versatile solution customized for various IT environments.

Conclusions:

To conclude, this activity delved into the complex domain of cloud services, meticulously examining their pros and cons. We explored a variety of cloud deployment and service models, conducting a comprehensive assessment to identify their strengths and limitations. Additionally, we undertook a practical initiative, creating a detailed workflow for installing and configuring OpenStack base services. By employing Ansible as both documentation and execution tool, this undertaking not only enhanced my comprehension of cloud technologies but also provided hands-on experience in deploying and managing the infrastructure. As we navigate the dynamic landscape of cloud computing, it is valuable for making informed decisions and ensuring the efficient utilization of cloud resources specially for us Computer engineering students.