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Course/Section: CPE232	Date Submitted: 08/15/23
Instructor: Dr. Jonathan V. Taylar	Semester and SY: 2023-2024 1st Sem

Activity 1: Configure Network using Virtual Machines

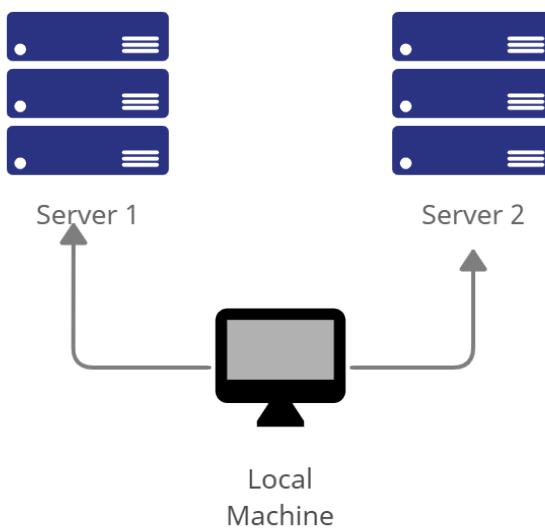
1. Objectives:

- 1.1. Create and configure Virtual Machines in Microsoft Azure or VirtualBox
- 1.2. Set-up a Virtual Network and Test Connectivity of VMs

2. Discussion:

Network Topology:

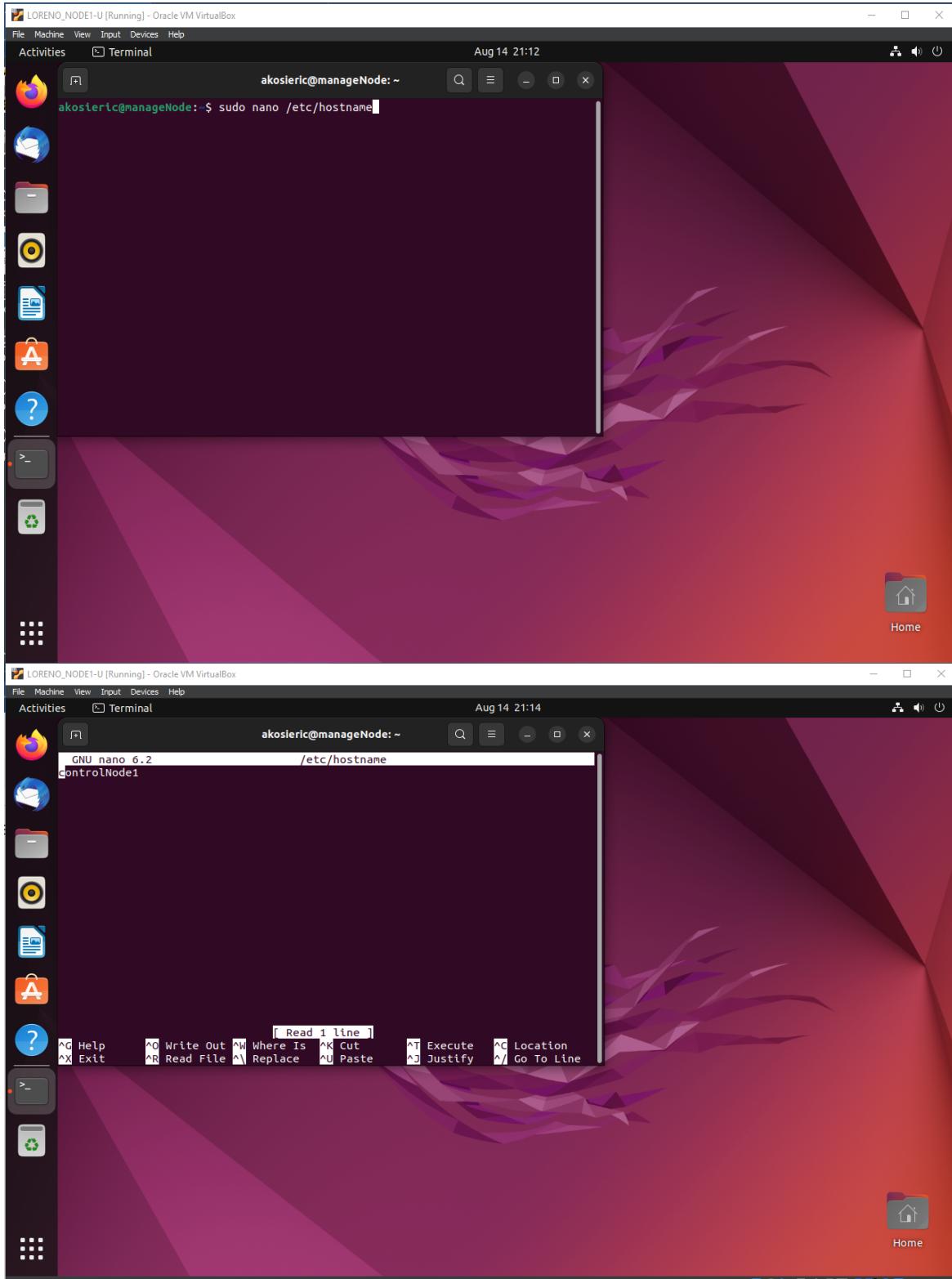
Assume that you have created the following network topology in Virtual Machines, **provide screenshots for each task**. (Note: *it is assumed that you have the prior knowledge of cloning and creating snapshots in a virtual machine*).

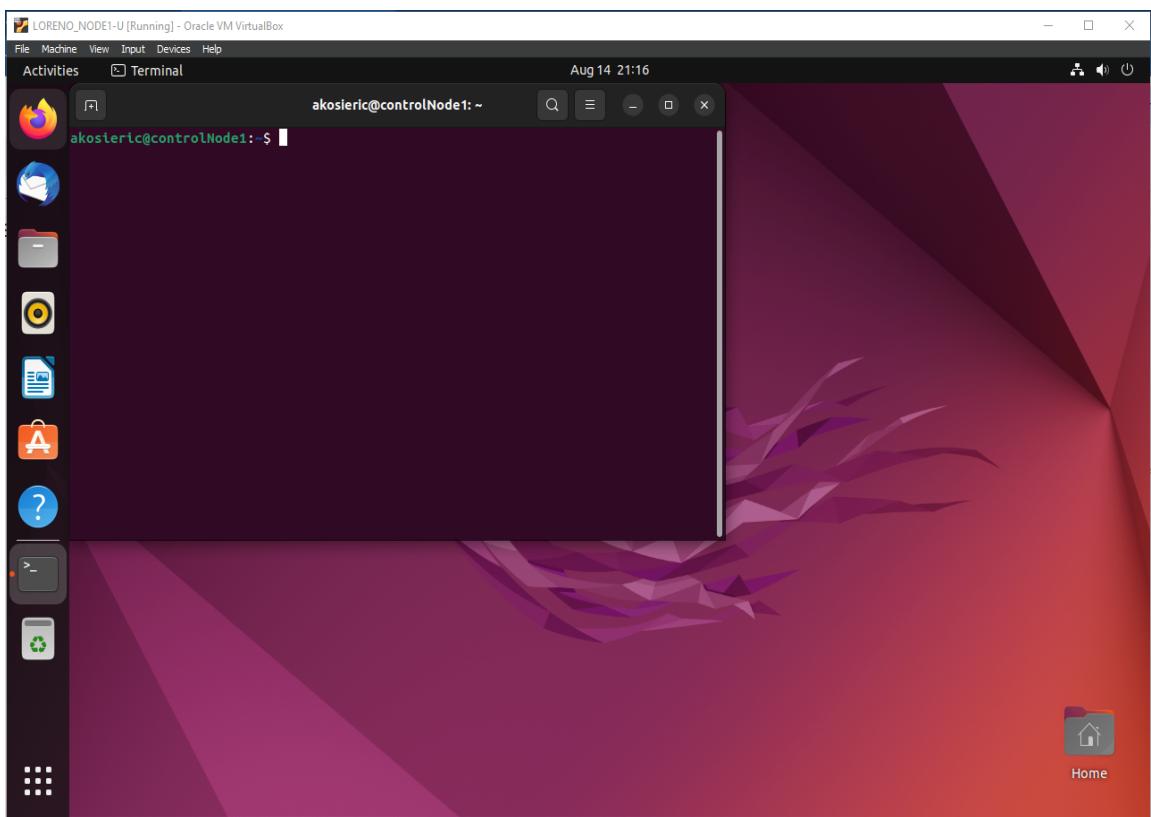


Task 1: Do the following on Server 1, Server 2, and Local Machine. In editing the file using nano command, press control + O to write out (save the file). Press enter when asked for the name of the file. Press control + X to end.

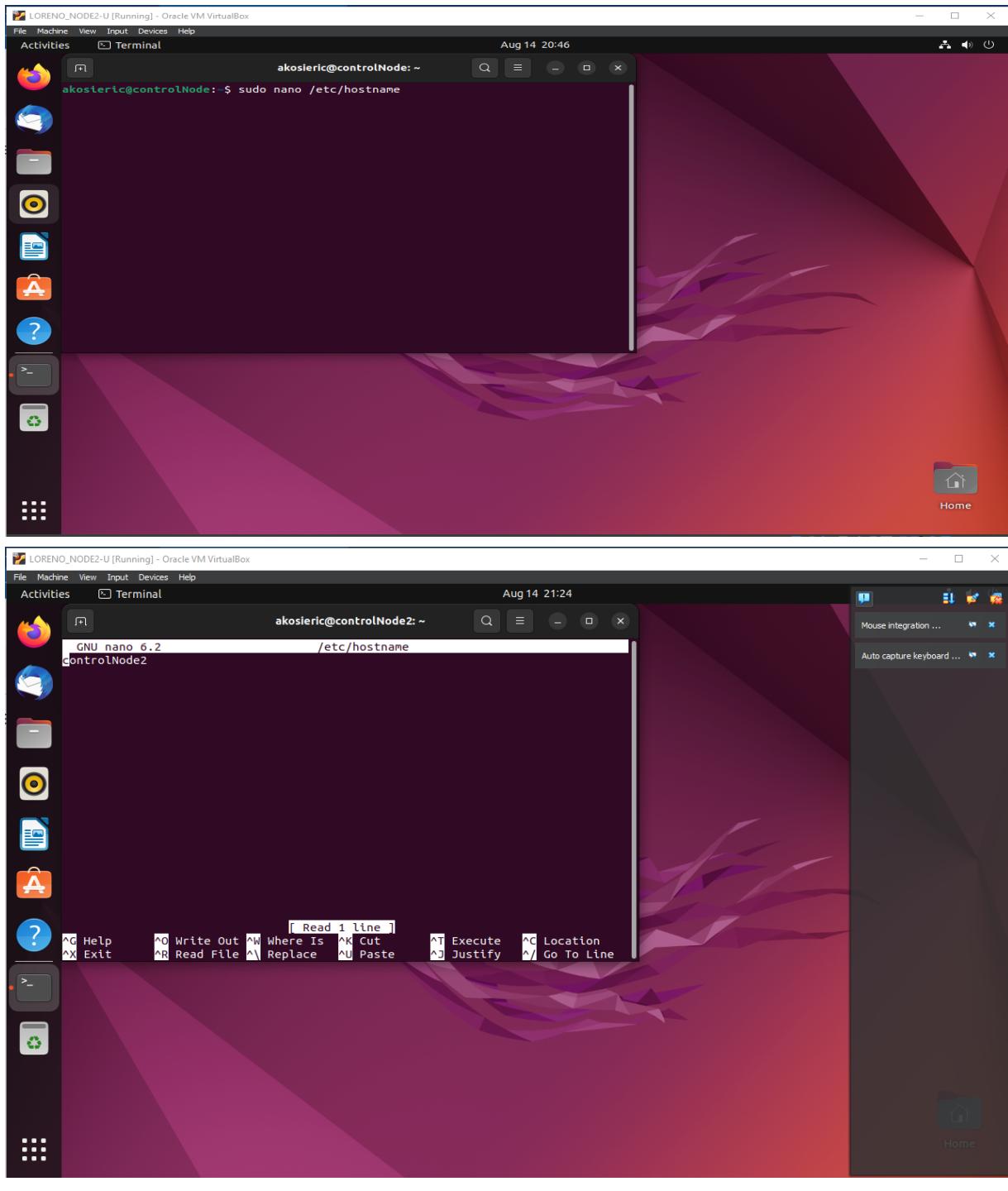
1. Change the hostname using the command ***sudo nano /etc/hostname***

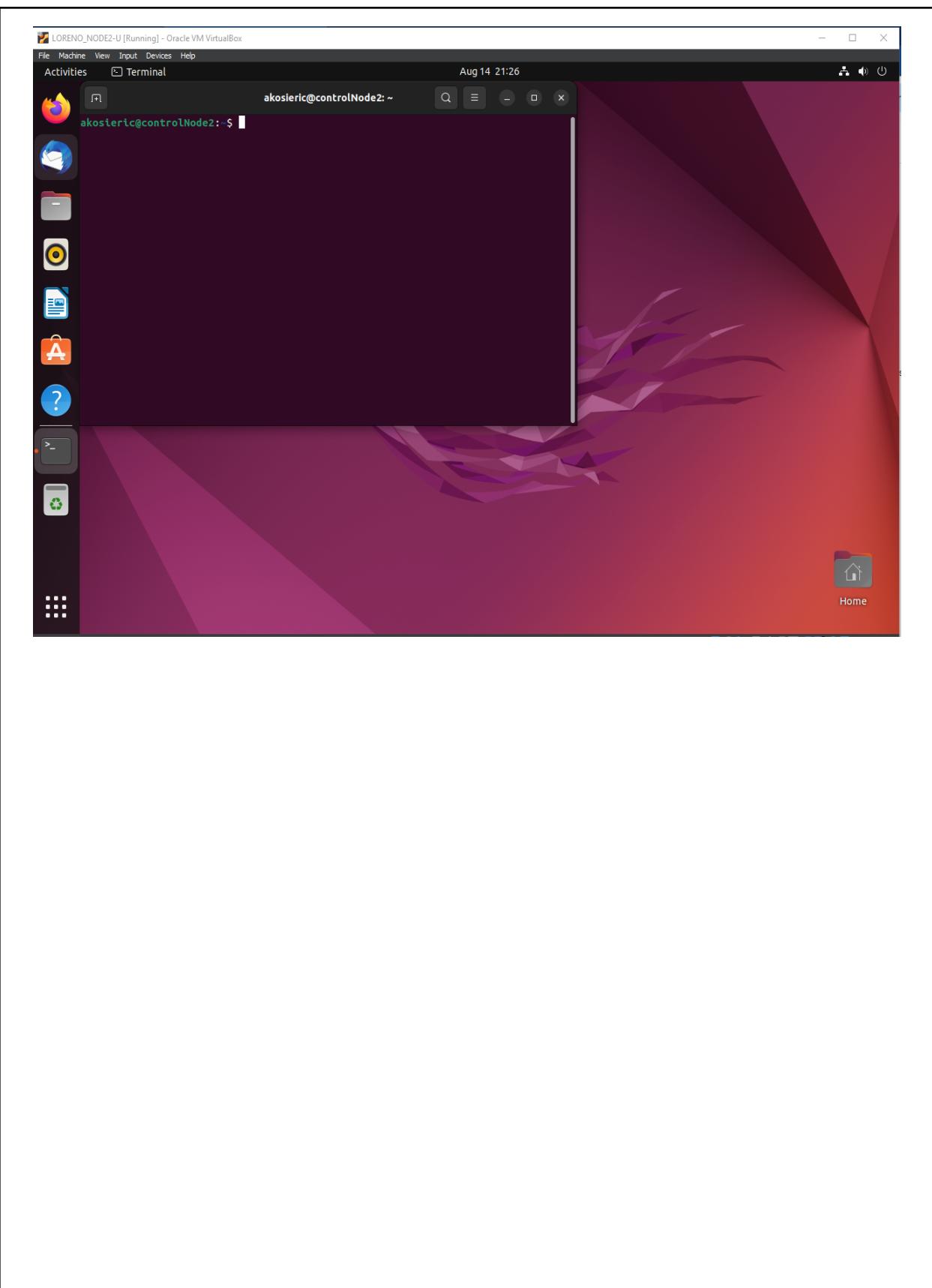
1.1 Use server1 for Server 1



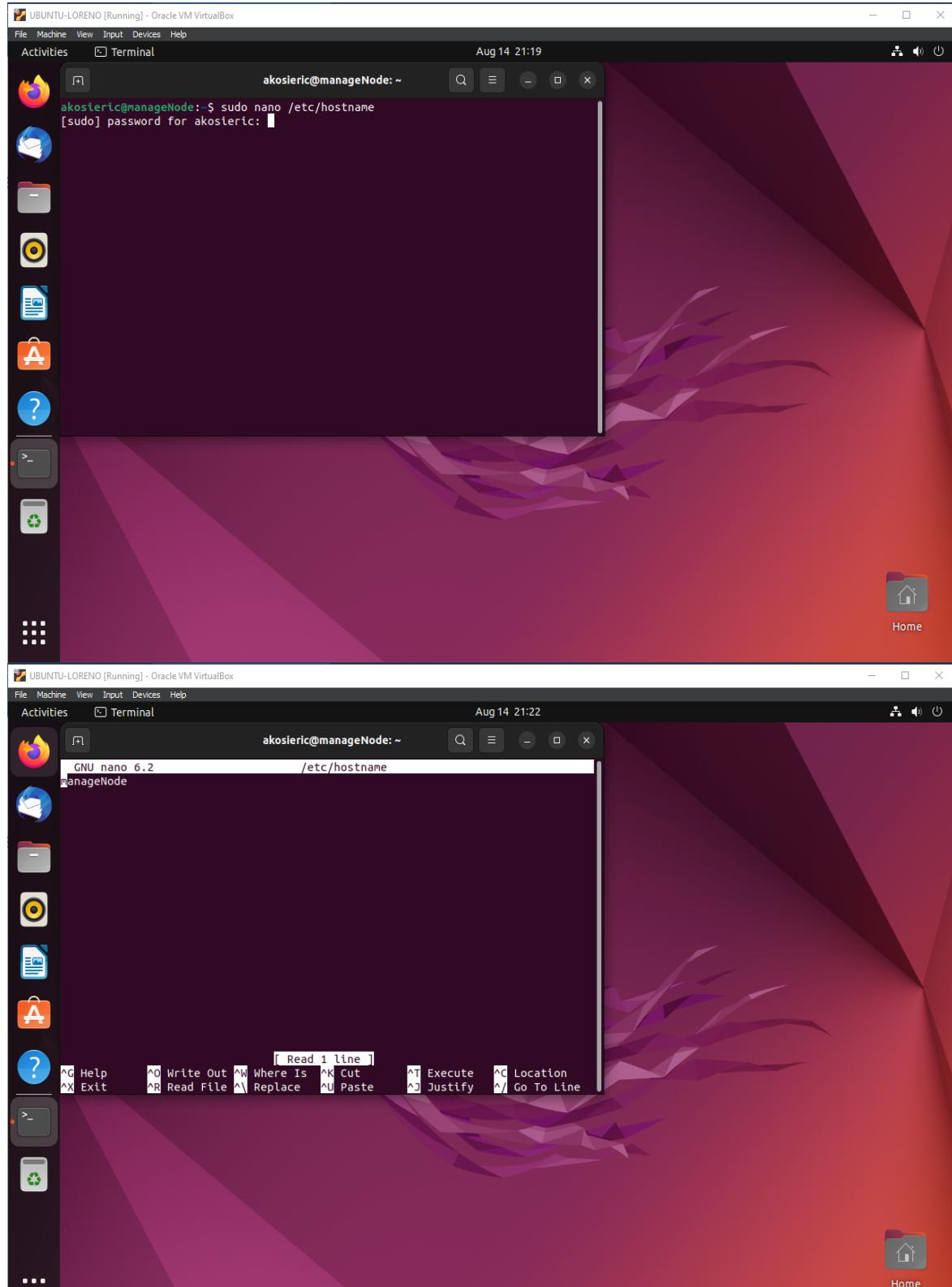


1.2 Use server2 for Server 2

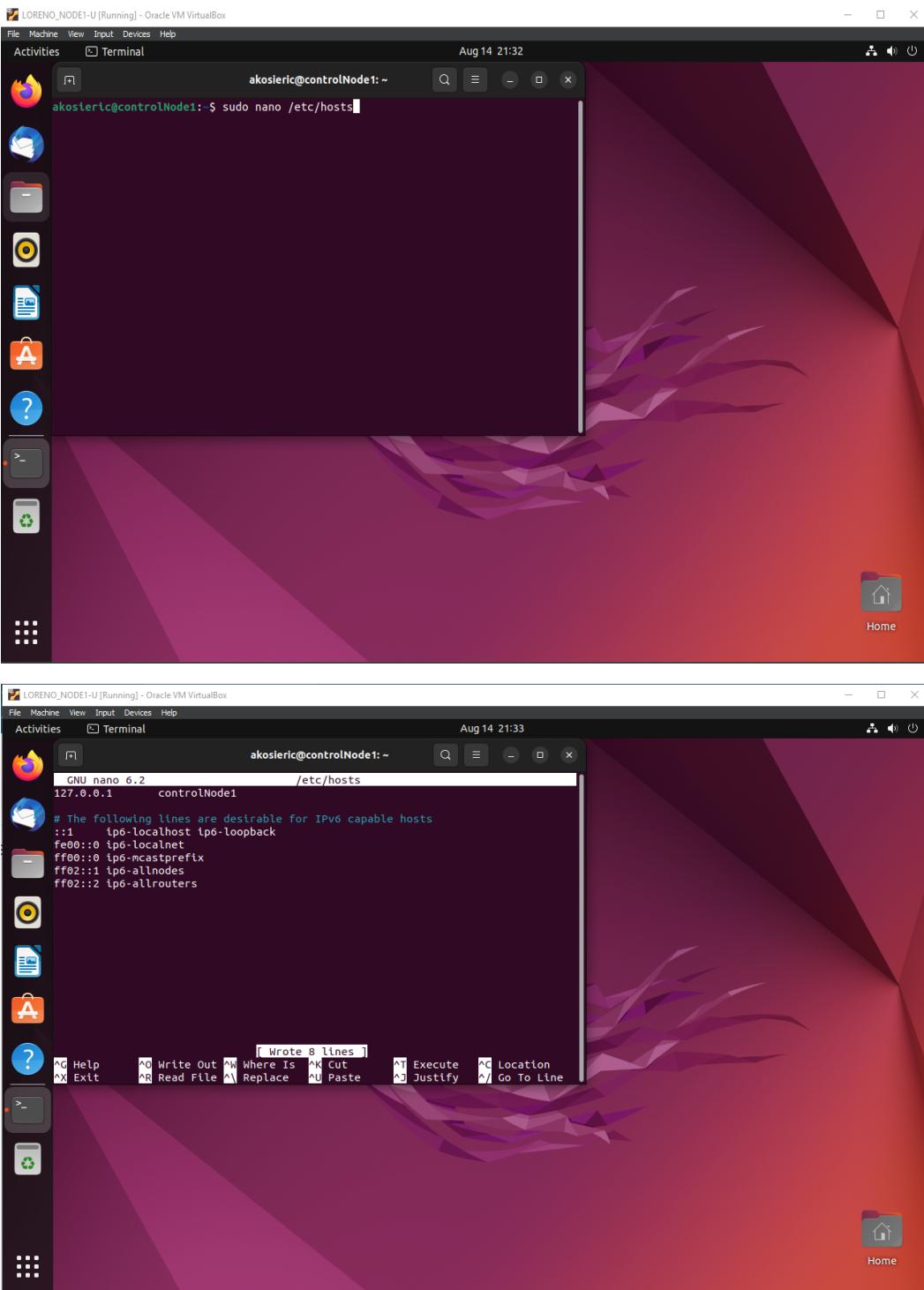




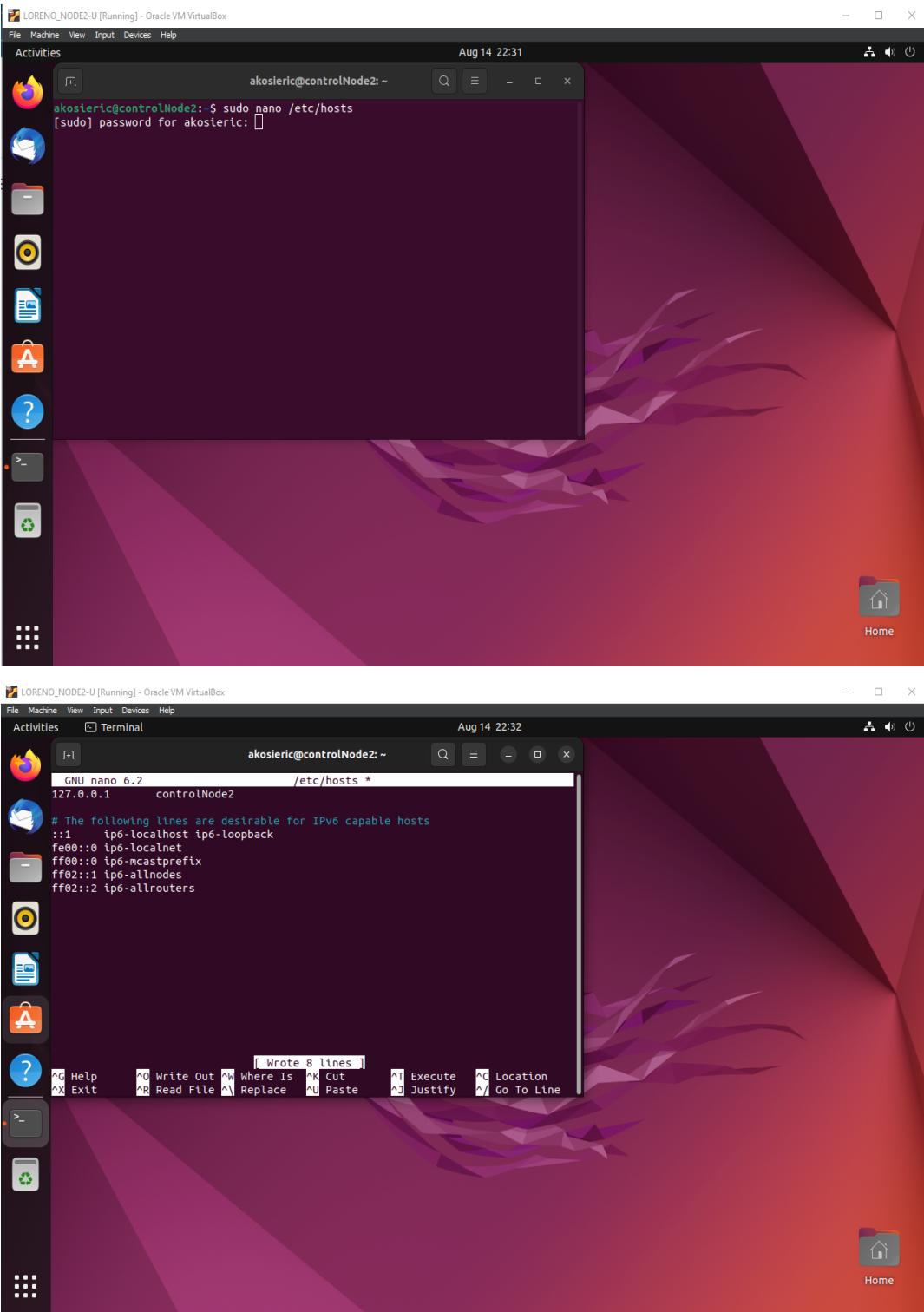
1.3 Use workstation for the Local Machine



2. Edit the hosts using the command `sudo nano /etc/hosts`. Edit the second line.
2.1 Type 127.0.0.1 server 1 for Server 1



2.2 Type 127.0.0.1 server 2 for Server 2



The image shows a dual-terminal session in an Oracle VM VirtualBox window. The desktop background is a purple and red abstract design. A vertical dock on the left contains icons for various applications: Dash, Home, Activities, Dash (again), Home (again), and a terminal icon.

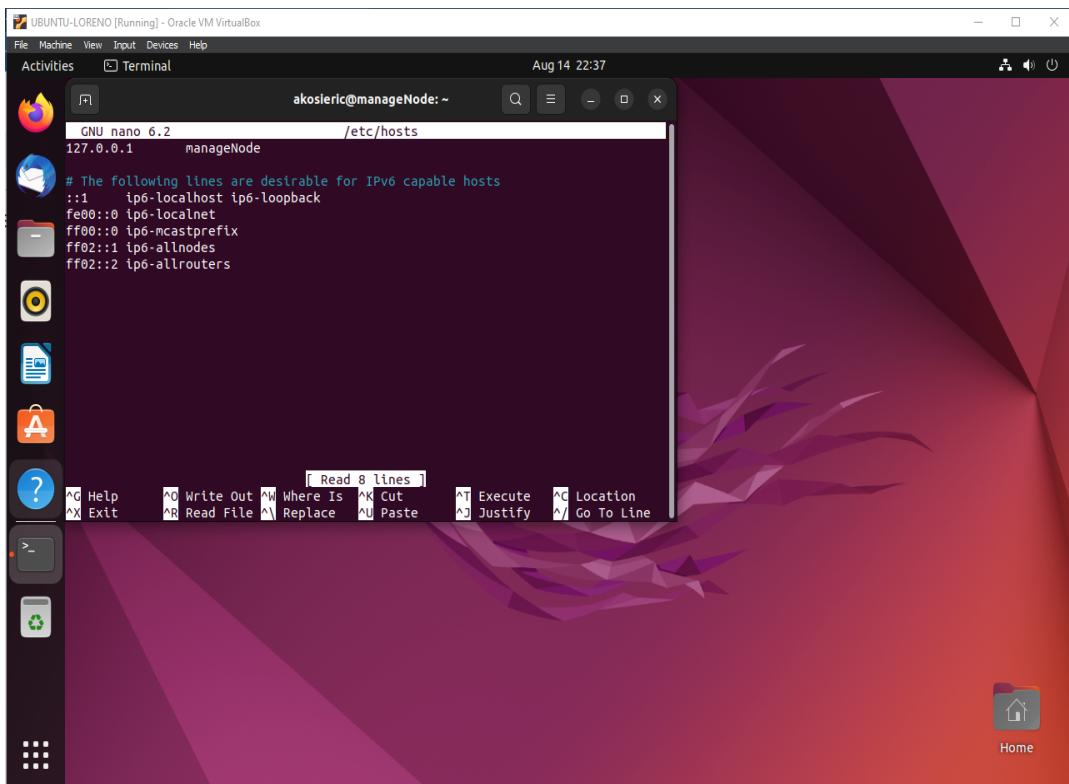
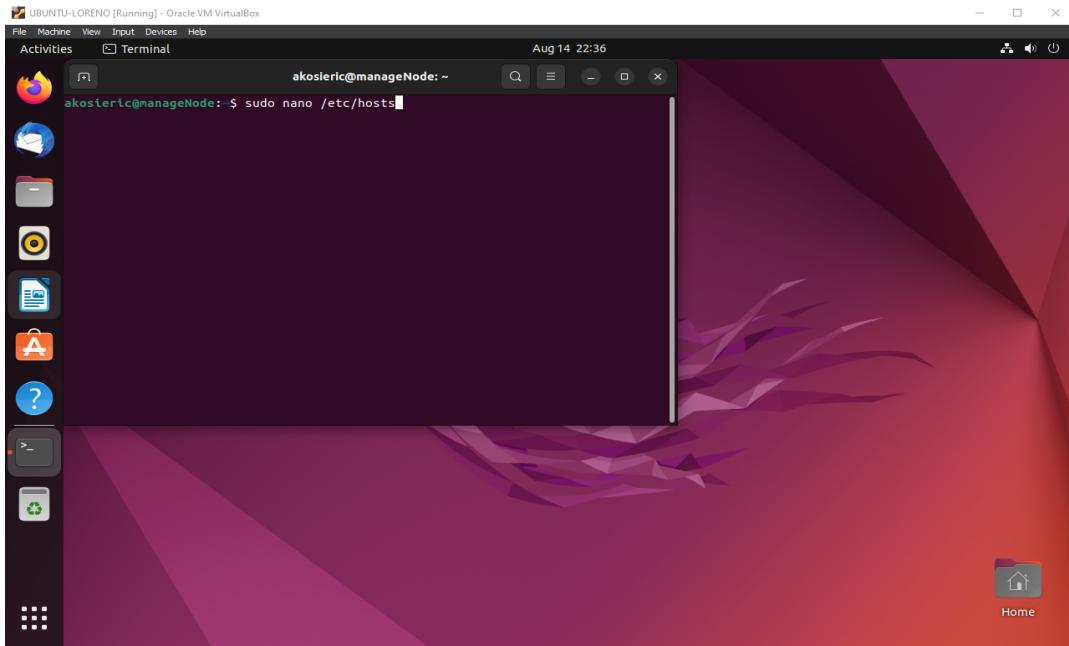
Terminal 1 (Top):

```
akosieric@controlNode2:~$ sudo nano /etc/hosts  
[sudo] password for akosieric:
```

Terminal 2 (Bottom):

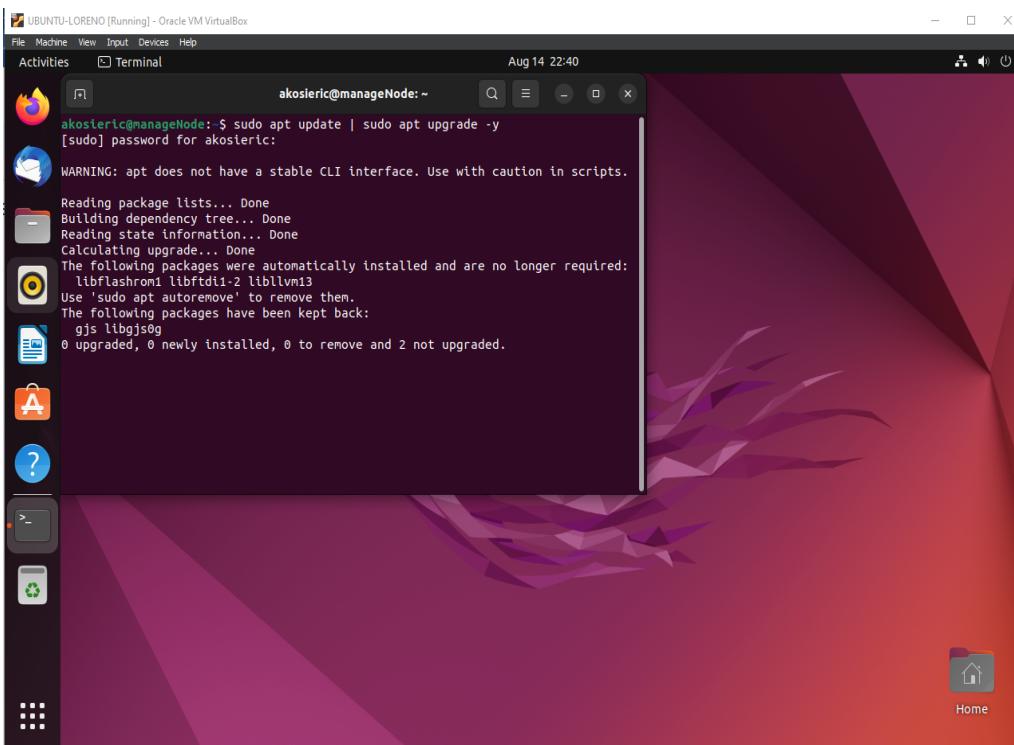
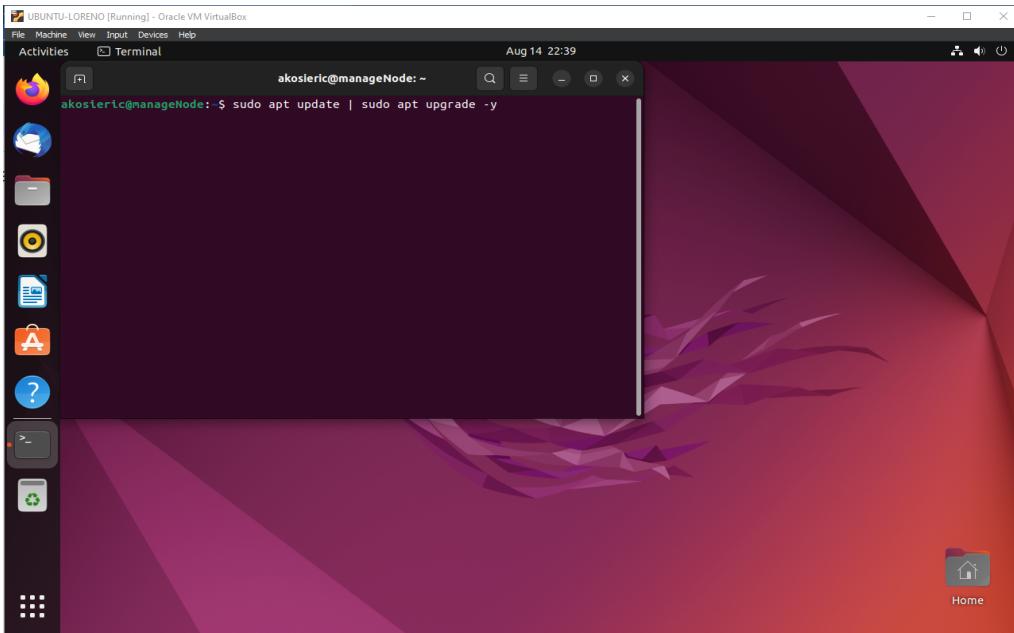
```
akosieric@controlNode2:~$ nano /etc/hosts  
127.0.0.1 controlNode2  
# The following lines are desirable for IPv6 capable hosts  
::1 ip6-localhost ip6-loopback  
fe00::0 ip6-localnet  
ff00::0 ip6-mcastprefix  
ff02::1 ip6-allnodes  
ff02::2 ip6-allrouters  
[ Wrote 8 lines ]  
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location  
^X Exit ^R Read File ^A Replace ^U Paste ^J Justify ^Y Go To Line
```

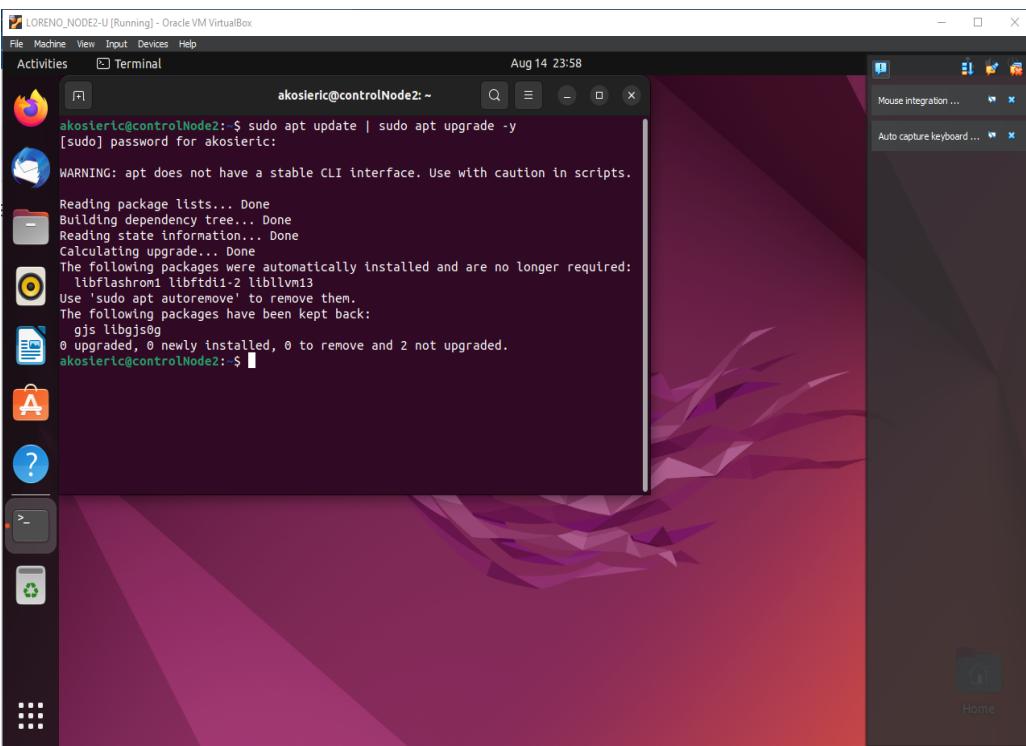
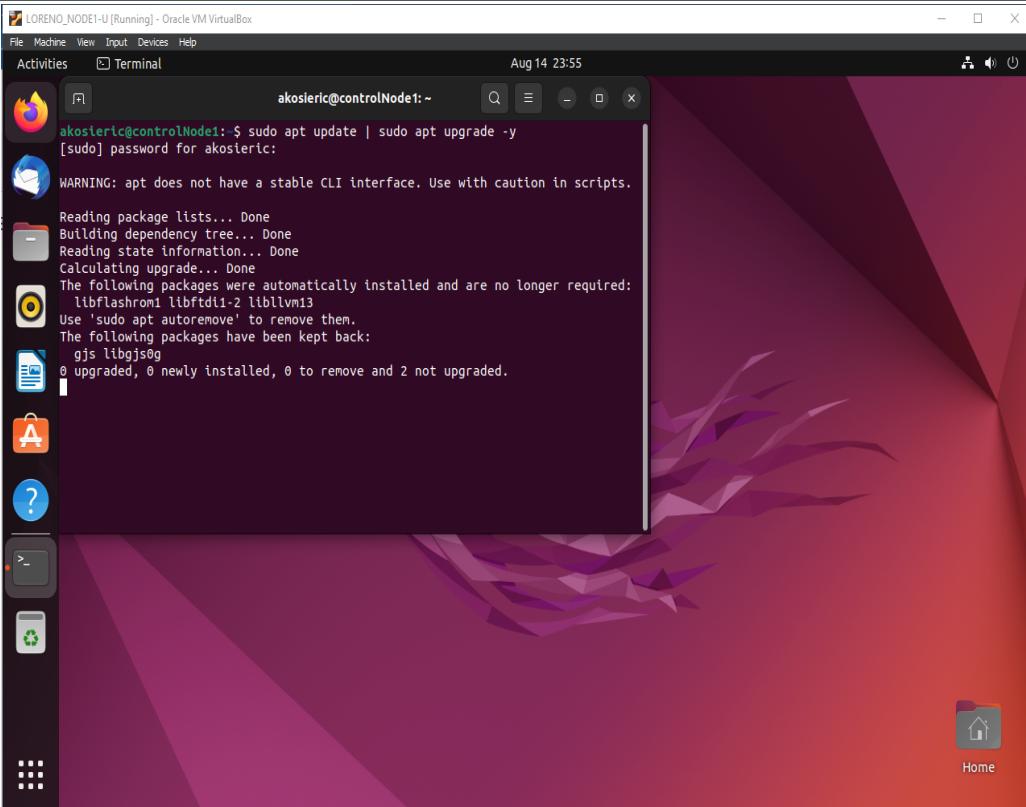
2.3 Type 127.0.0.1 workstation for the Local Machine



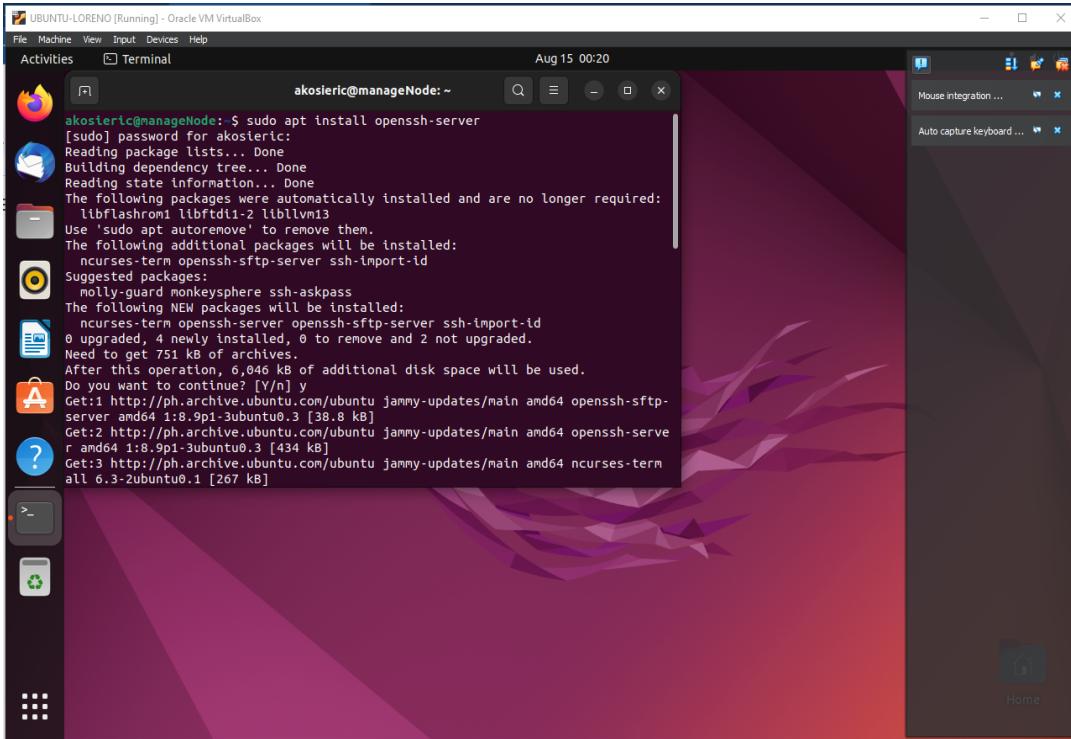
Task 2: Configure SSH on Server 1, Server 2, and Local Machine. Do the following:

1. Upgrade the packages by issuing the command `sudo apt update` and `sudo apt upgrade` respectively.





2. Install the SSH server using the command *sudo apt install openssh-server*.

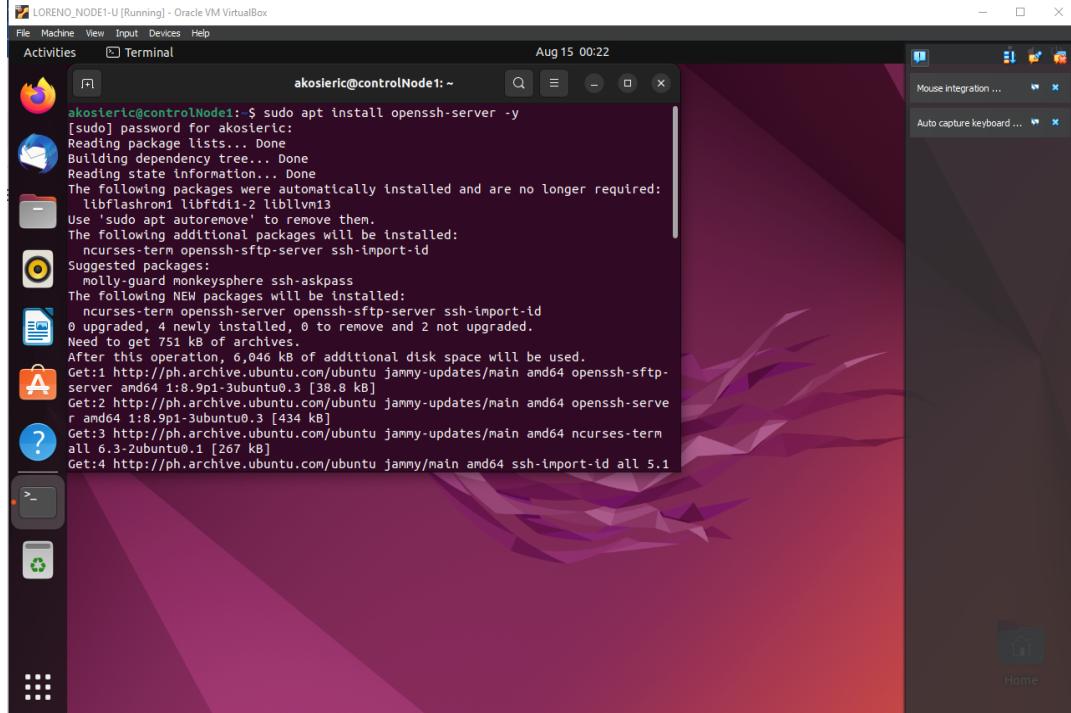


Ubuntu-LORENO [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Aug 15 00:20

```
akosieric@manageNode:~$ sudo apt install openssh-server
[sudo] password for akosieric:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libflashrom1 liblfd1-2 liblvm13
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 4 newly installed, 0 to remove and 2 not upgraded.
Need to get 751 kB of archives.
After this operation, 6,046 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-sftp-server amd64 1:8.9p1-3ubuntu0.3 [38.8 kB]
Get:2 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-server amd64 1:8.9p1-3ubuntu0.3 [434 kB]
Get:3 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ncurses-term all 6.3-2ubuntu0.1 [267 kB]
```

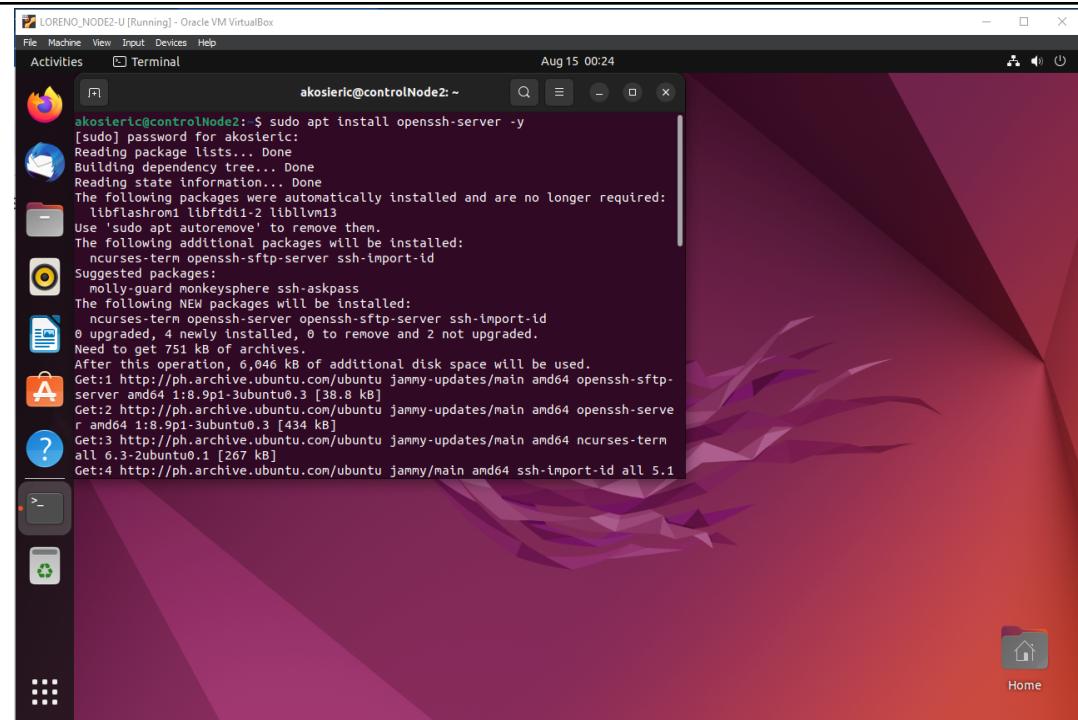


LORENO_NODE1-U [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Aug 15 00:22

```
akosieric@controlNode1:~$ sudo apt install openssh-server -y
[sudo] password for akosieric:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libflashrom1 liblfd1-2 liblvm13
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 4 newly installed, 0 to remove and 2 not upgraded.
Need to get 751 kB of archives.
After this operation, 6,046 kB of additional disk space will be used.
Get:1 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-sftp-server amd64 1:8.9p1-3ubuntu0.3 [38.8 kB]
Get:2 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-server amd64 1:8.9p1-3ubuntu0.3 [434 kB]
Get:3 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ncurses-term all 6.3-2ubuntu0.1 [267 kB]
Get:4 http://ph.archive.ubuntu.com/ubuntu jammy/main amd64 ssh-import-id all 5.1
```

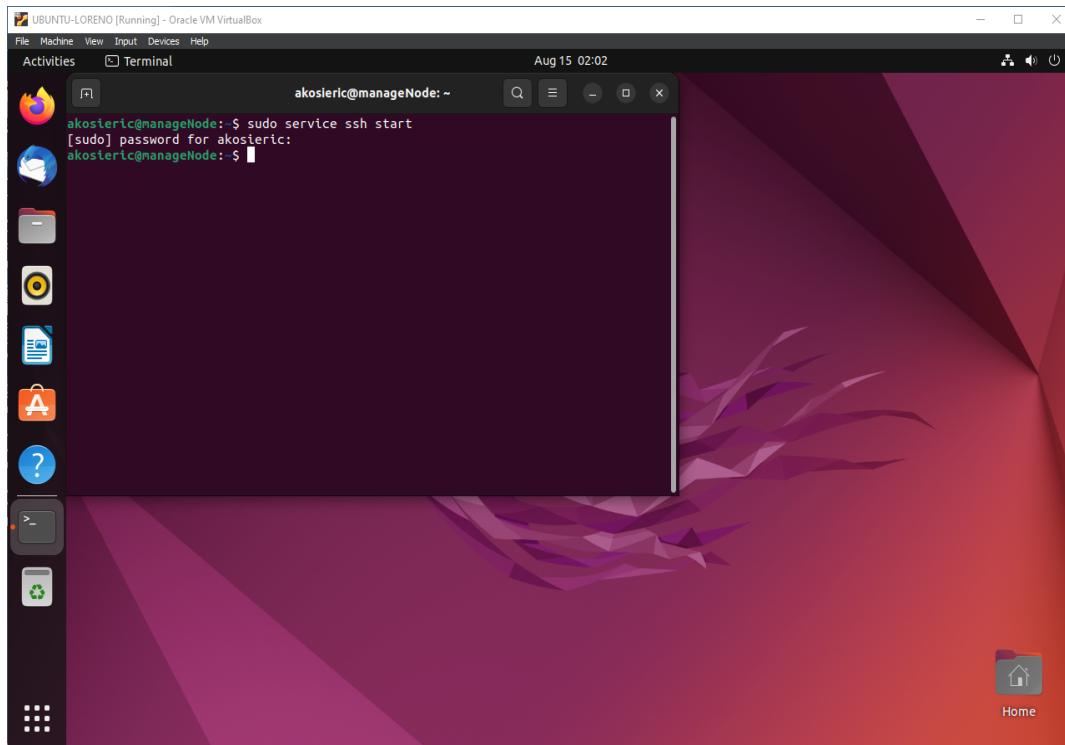


A screenshot of a Ubuntu desktop environment. A terminal window titled 'akosieric@controlNode2: ~' is open, showing the output of the command 'sudo apt install openssh-server -y'. The terminal shows the package manager reading lists, building dependency trees, and installing packages. It also lists suggested packages like 'molly-guard' and additional packages like 'ncurses-term' and 'ssh-import-id' that will be installed. The desktop background is a purple and red abstract design.

```
akosieric@controlNode2:~$ sudo apt install openssh-server -y
[sudo] password for akosieric:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libflashrom liblfdlib1-2 liblvm13
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 4 newly installed, 0 to remove and 2 not upgraded.
Need to get 751 kB of archives.
After this operation, 6,044 kB of additional disk space will be used.
Get:1 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-sftp-server amd64 1:8.9p1-3ubuntu0.3 [38.8 kB]
Get:2 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-server amd64 1:8.9p1-3ubuntu0.3 [434 kB]
Get:3 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ncurses-term all 6.3-2ubuntu0.1 [267 kB]
Get:4 http://ph.archive.ubuntu.com/ubuntu jammy/main amd64 ssh-import-id all 5.1
```

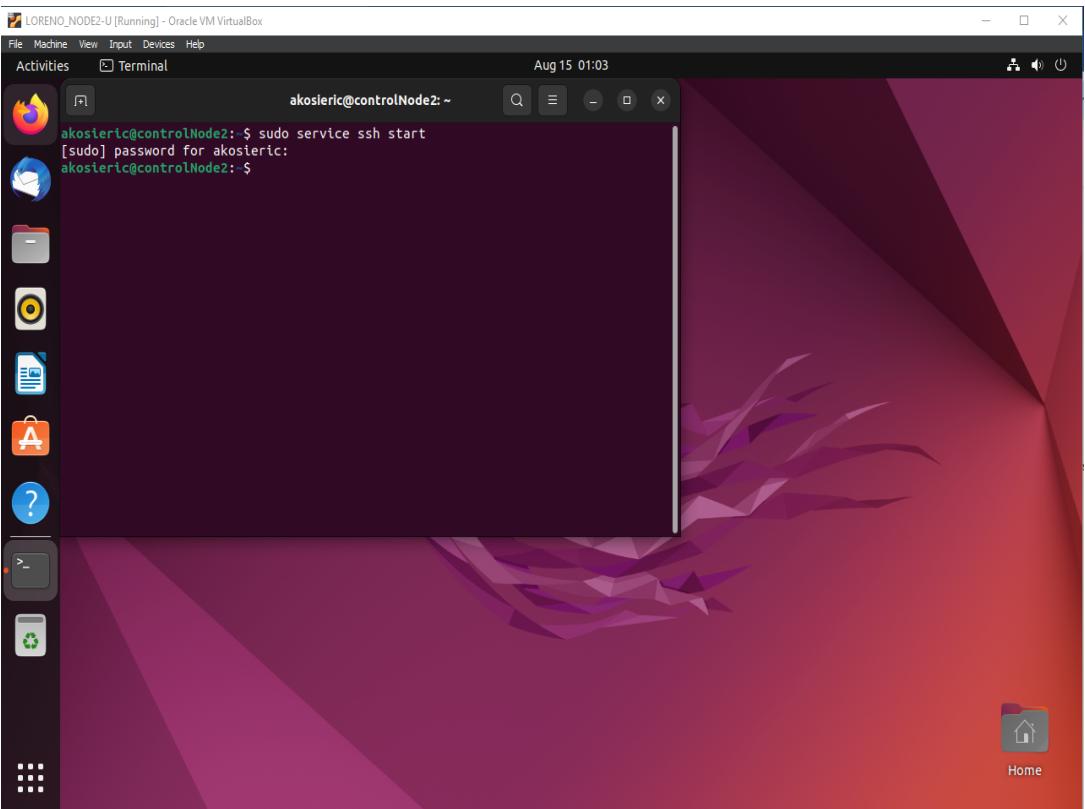
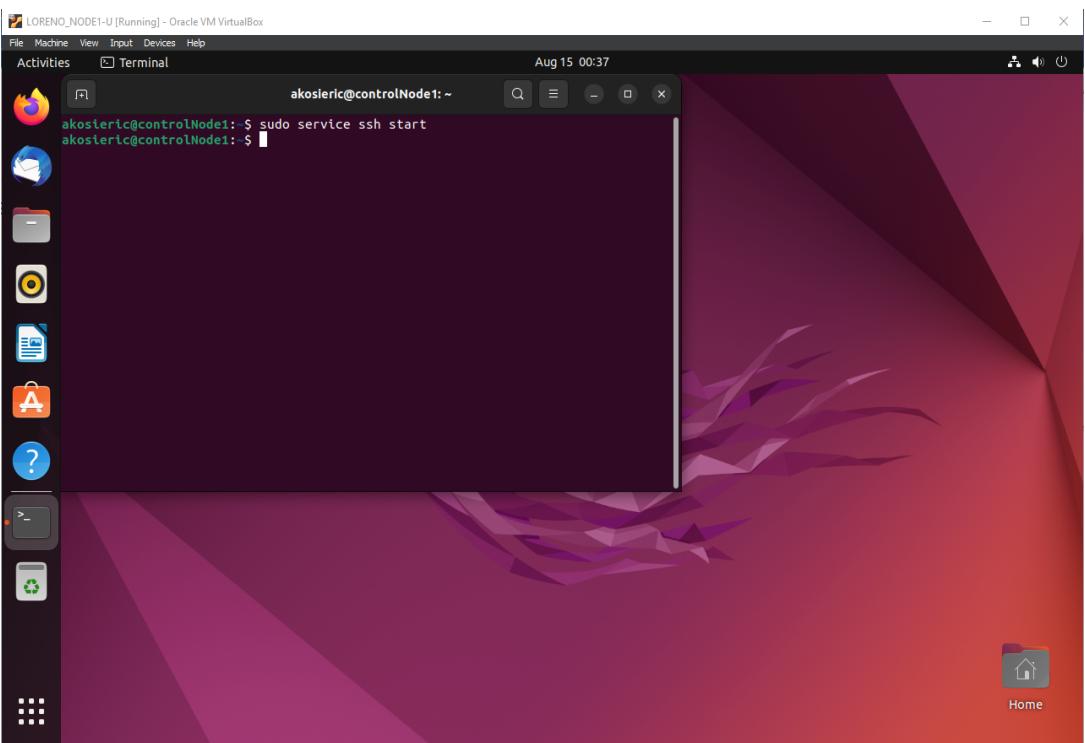
- Verify if the SSH service has started by issuing the following commands:

3.1 *sudo service ssh start*

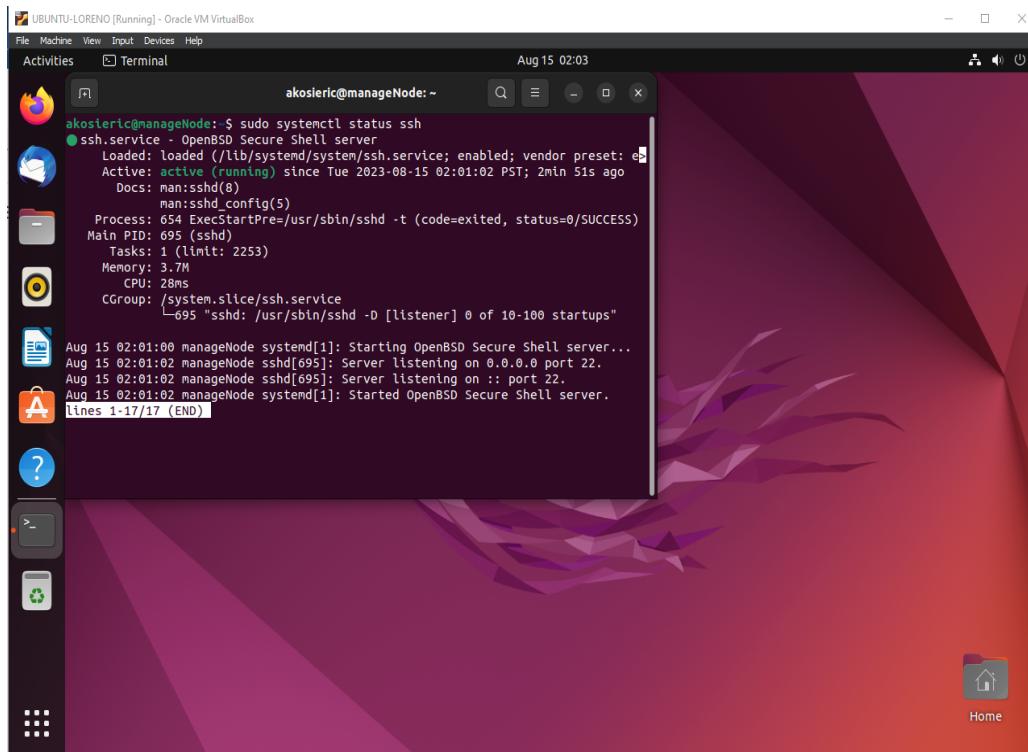


A screenshot of a Ubuntu desktop environment. A terminal window titled 'akosieric@manageNode: ~' is open, showing the output of the command 'sudo service ssh start'. The terminal shows the user entering their password and then the command being run successfully. The desktop background is a purple and red abstract design.

```
akosieric@manageNode:~$ sudo service ssh start
[sudo] password for akosieric:
akosieric@manageNode:~$
```

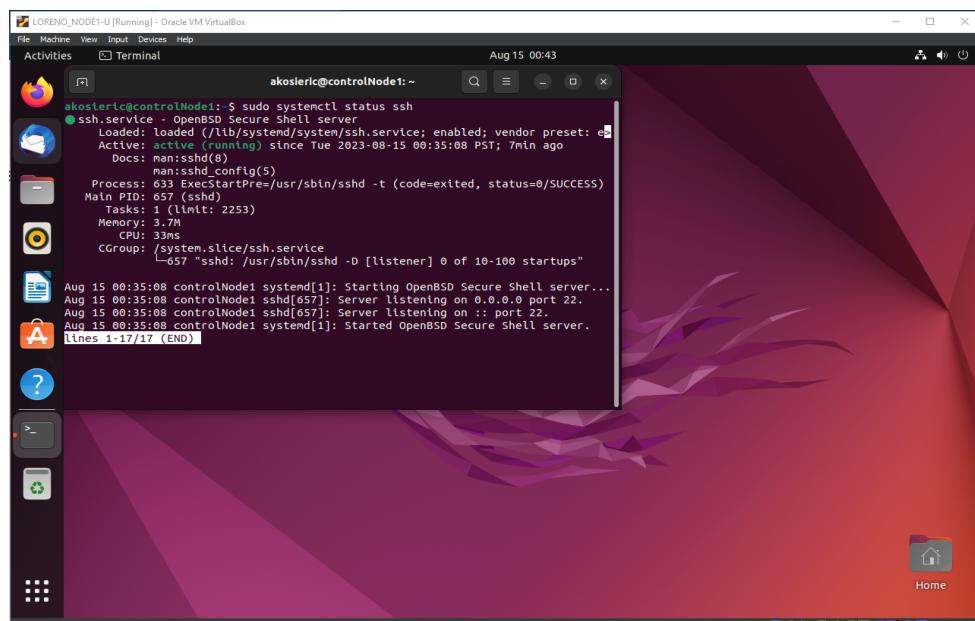


3.2 sudo systemctl status ssh



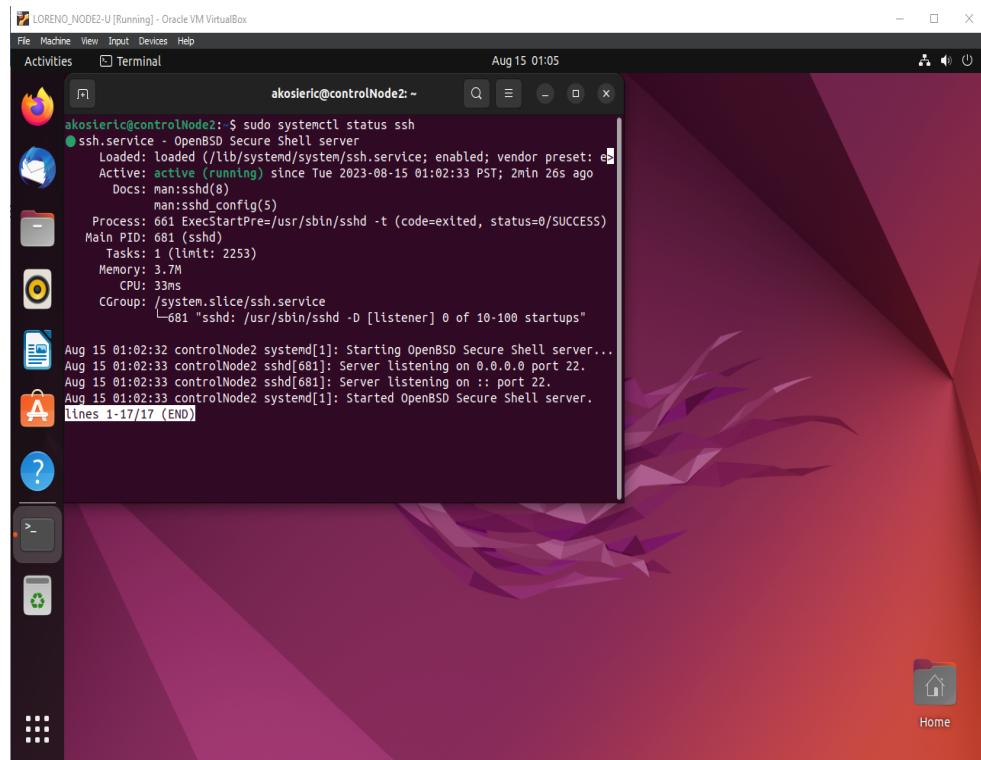
```
akosieric@manageNode:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2023-08-15 02:01:02 PST; 2min 5s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
     Process: 654 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
    Main PID: 695 (sshd)
      Tasks: 1 (limit: 2253)
     Memory: 3.7M
        CPU: 28ms
       CGroup: /system.slice/ssh.service
               └─695 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Aug 15 02:01:00 manageNode systemd[1]: Starting OpenBSD Secure Shell server...
Aug 15 02:01:02 manageNode sshd[695]: Server listening on 0.0.0.0 port 22.
Aug 15 02:01:02 manageNode sshd[695]: Server listening on :: port 22.
Aug 15 02:01:02 manageNode systemd[1]: Started OpenBSD Secure Shell server.
[lines 1-17/17 (END)]
```



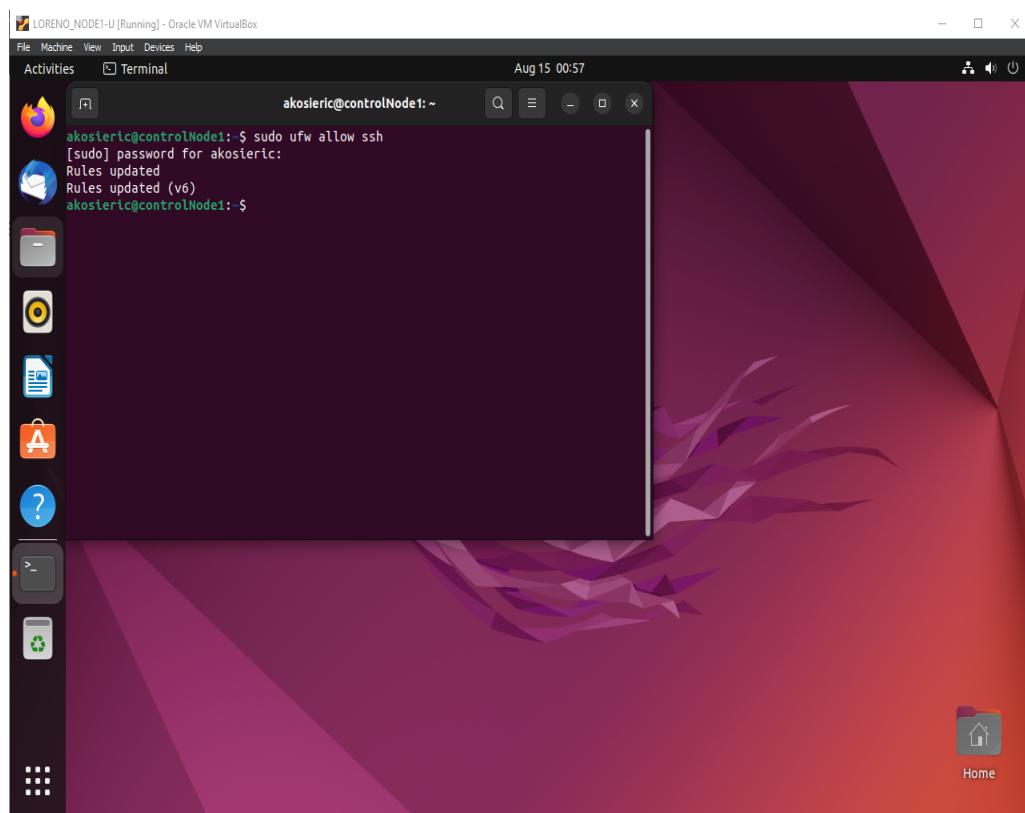
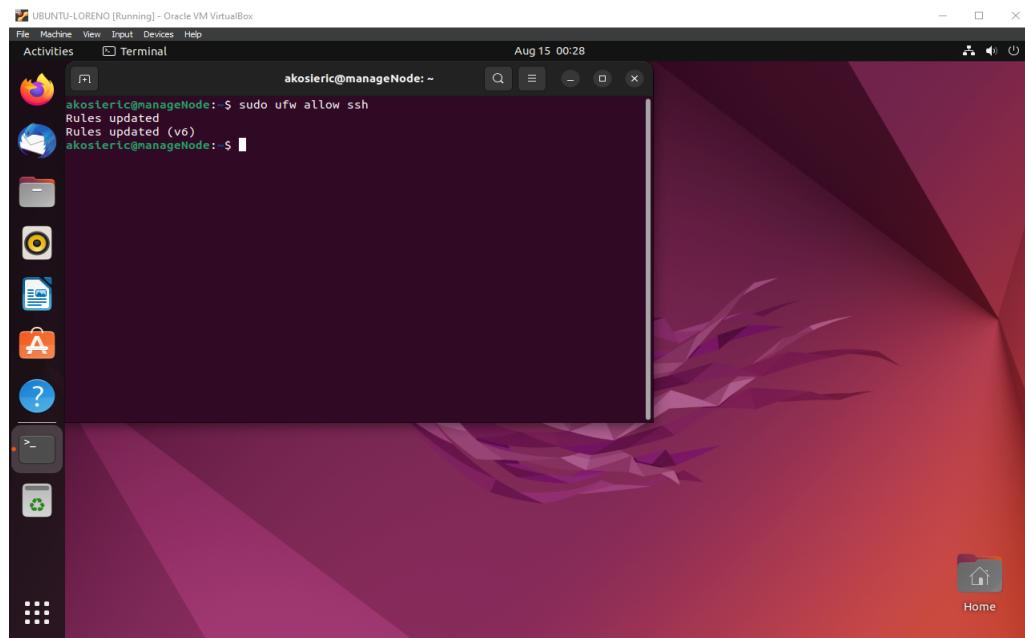
```
akosieric@controlNode1:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2023-08-15 00:35:08 PST; 7min ago
     Docs: man:sshd(8)
           man:sshd_config(5)
     Process: 633 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
    Main PID: 657 (sshd)
      Tasks: 1 (limit: 2253)
     Memory: 3.7M
        CPU: 33ms
       CGroup: /system.slice/ssh.service
               └─657 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

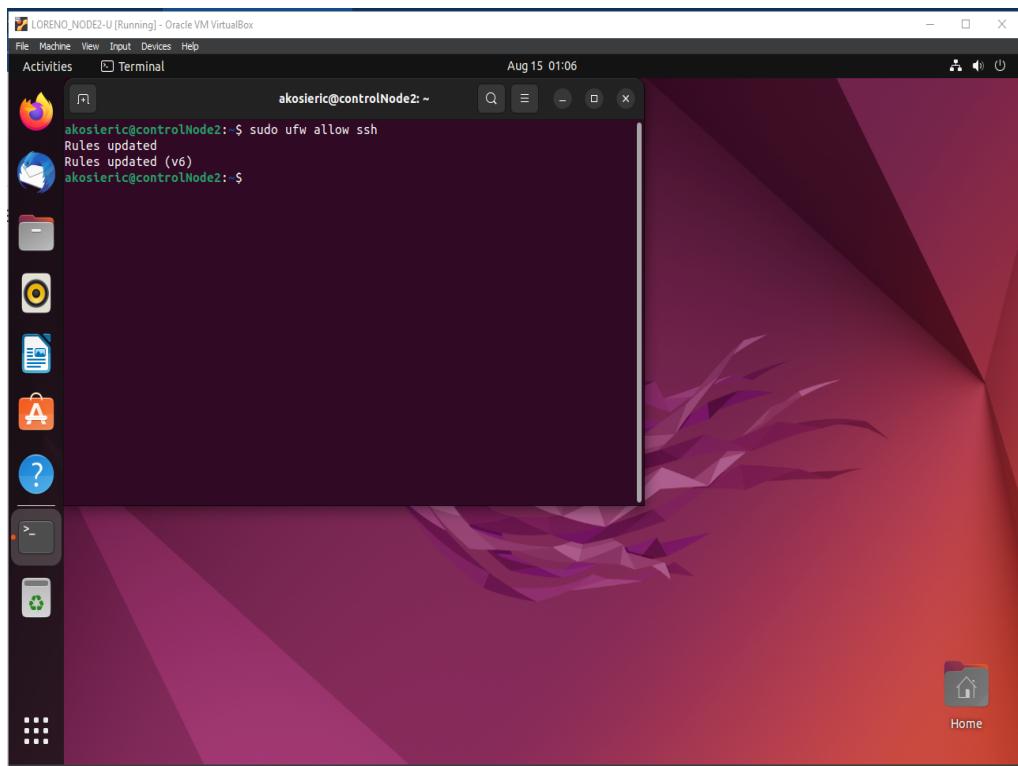
Aug 15 00:35:08 controlNode1 systemd[1]: Starting OpenBSD Secure Shell server...
Aug 15 00:35:08 controlNode1 sshd[657]: Server listening on 0.0.0.0 port 22.
Aug 15 00:35:08 controlNode1 sshd[657]: Server listening on :: port 22.
Aug 15 00:35:08 controlNode1 systemd[1]: Started OpenBSD Secure Shell server.
[lines 1-17/17 (END)]
```



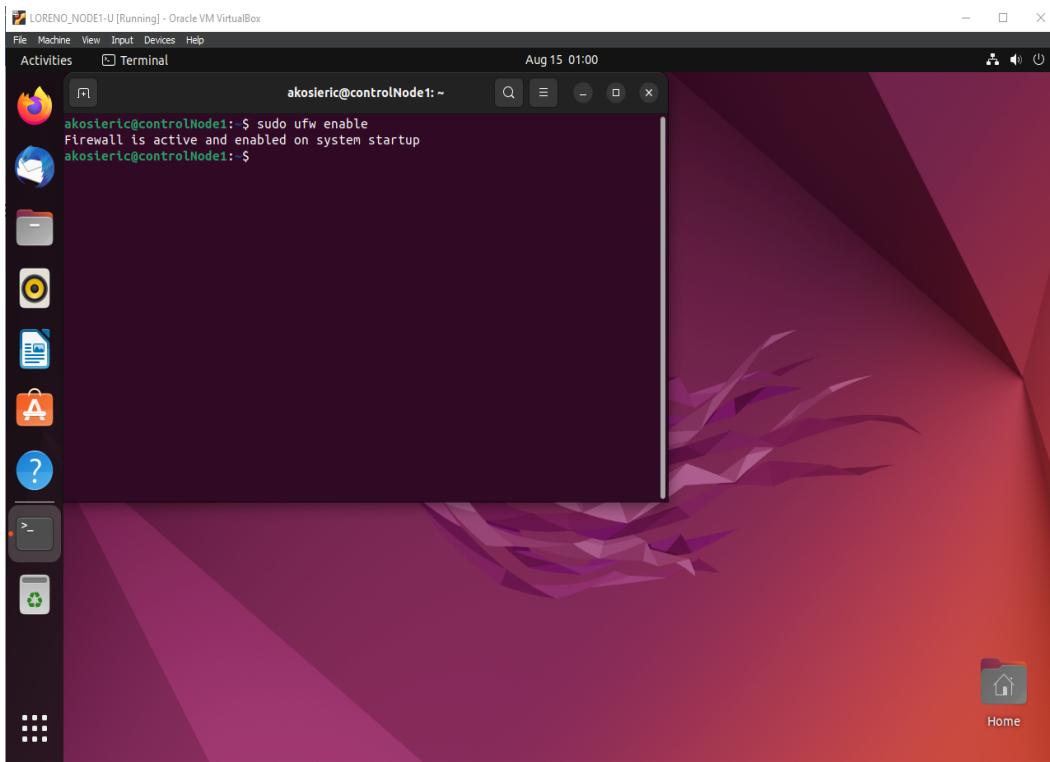
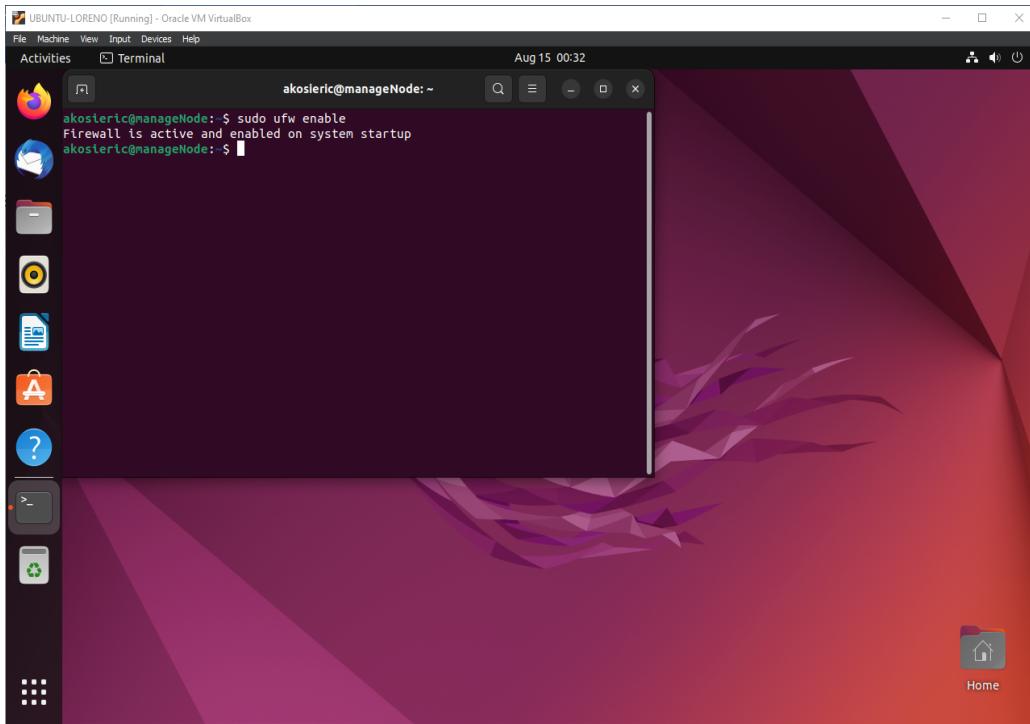
4. Configure the firewall to all port 22 by issuing the following commands:

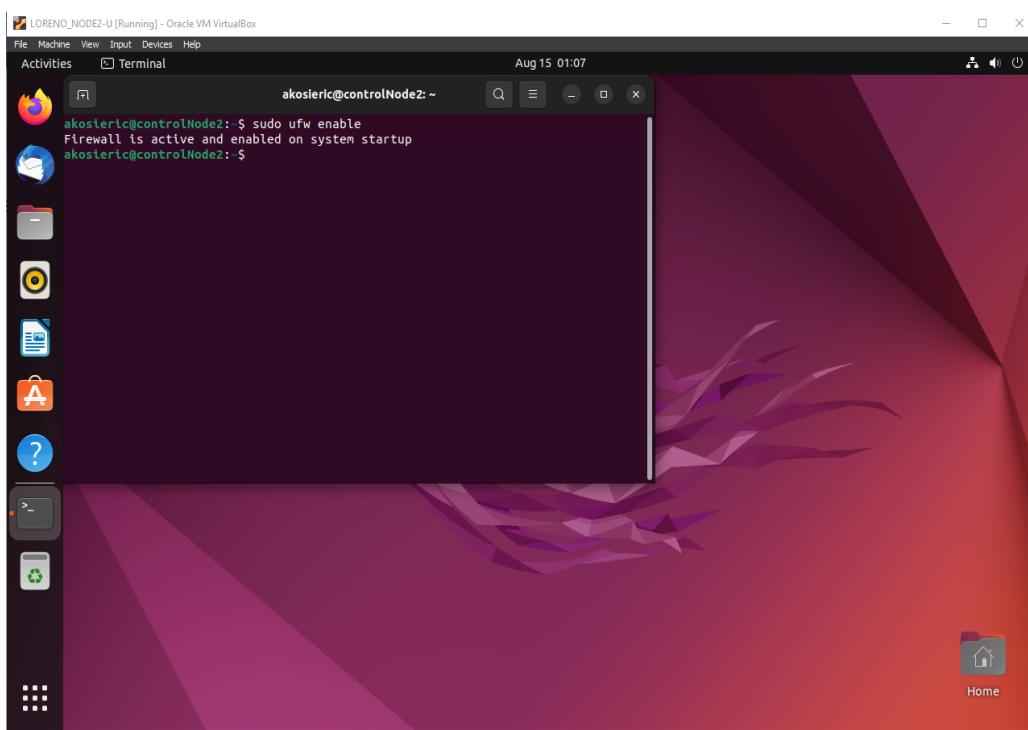
4.1 ***sudo ufw allow ssh***



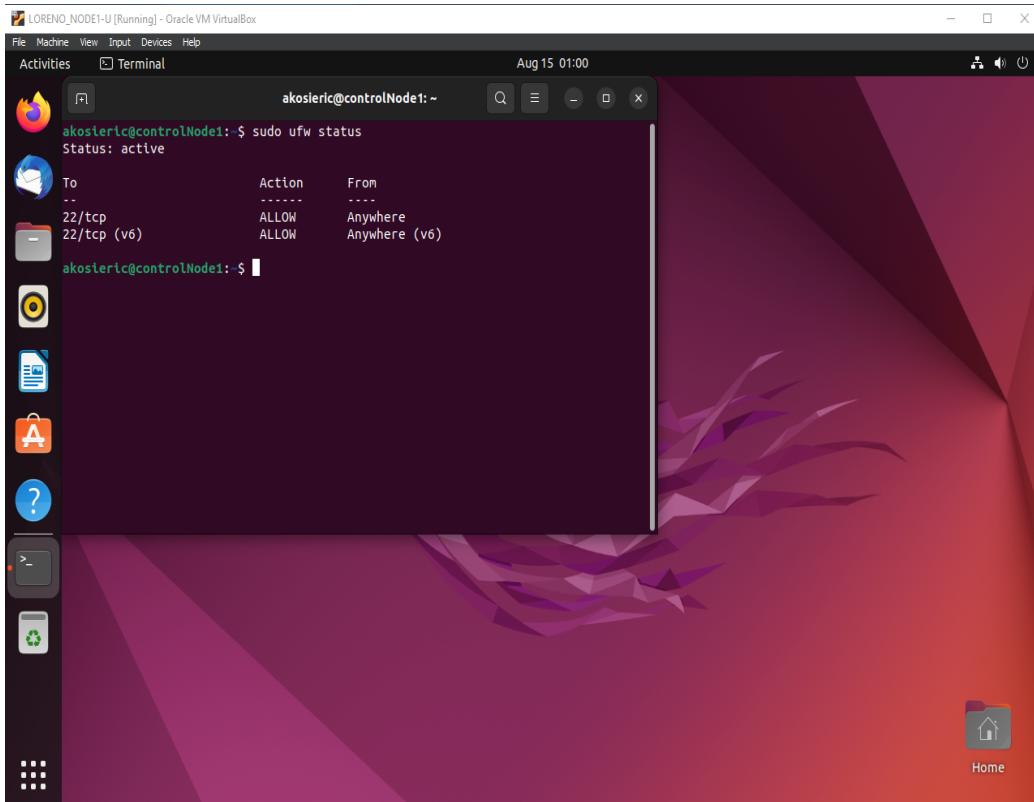
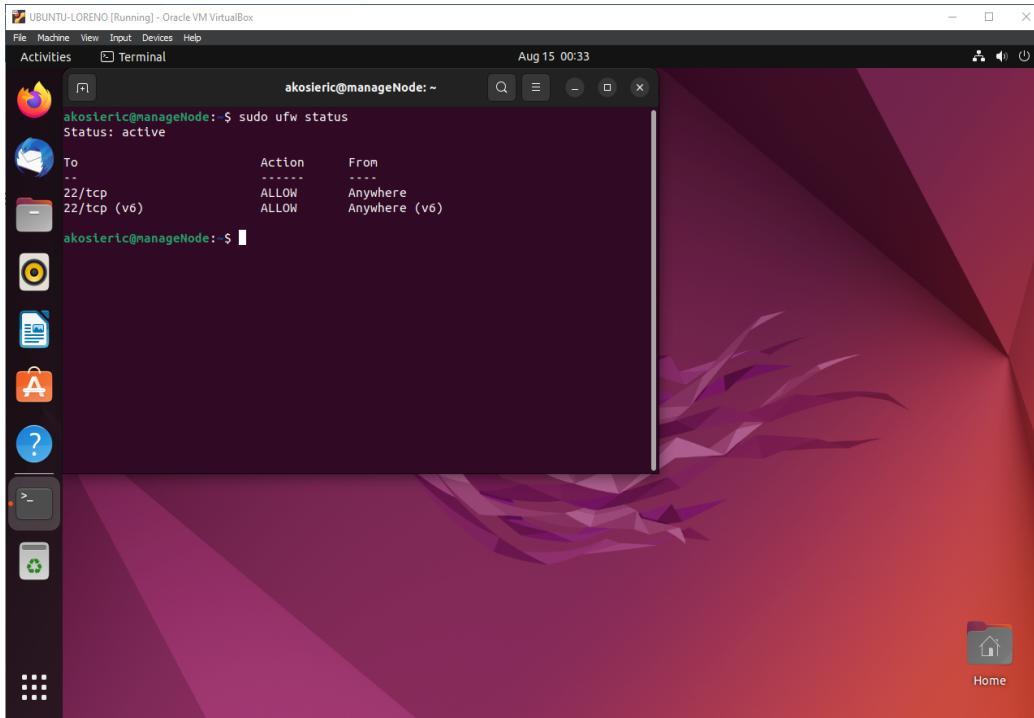


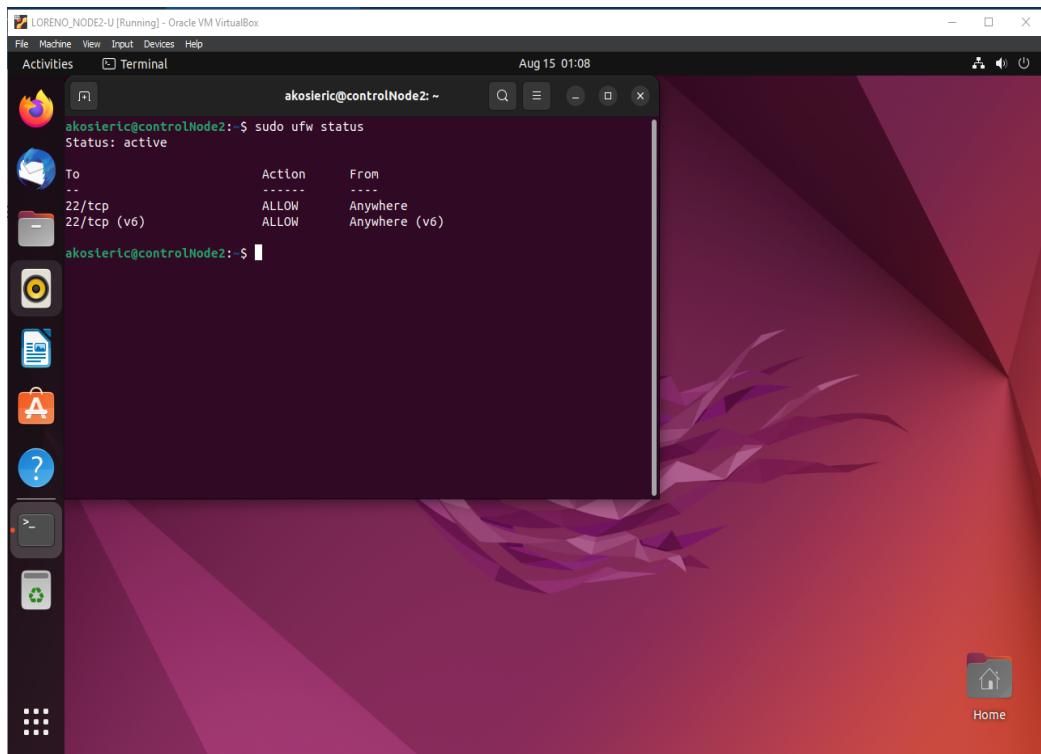
4.2 sudo ufw enable





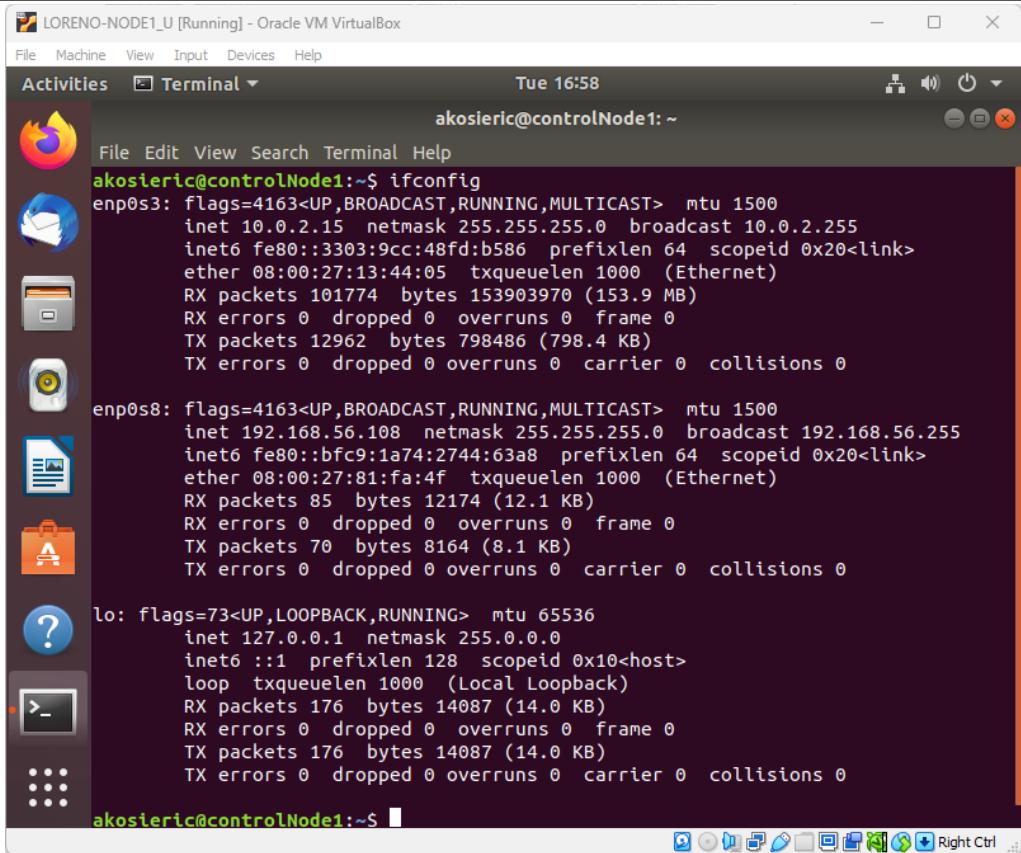
4.3 sudo ufw status





Task 3: Verify network settings on Server 1, Server 2, and Local Machine. On each device, do the following:

1. Record the ip address of Server 1, Server 2, and Local Machine. Issue the command ***ifconfig*** and check network settings. Note that the ip addresses of all the machines are in this network 192.168.56.XX.
1.1 Server 1 IP address: 192.168.56.108



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "LORENO-NODE1_U [Running] - Oracle VM VirtualBox". The terminal command "ifconfig" is run, displaying network interface statistics. The output shows three interfaces: enp0s3, enp0s8, and lo.

```
akosieric@controlNode1:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
              inet6 fe80::3303:9cc:48fd:b586  prefixlen 64  scopeid 0x20<link>
                ether 08:00:27:13:44:05  txqueuelen 1000  (Ethernet)
                  RX packets 101774  bytes 153903970 (153.9 MB)
                  RX errors 0  dropped 0  overruns 0  frame 0
                  TX packets 12962  bytes 798486 (798.4 KB)
                  TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.108  netmask 255.255.255.0  broadcast 192.168.56.255
              inet6 fe80::bfcc9:1a74:2744:63a8  prefixlen 64  scopeid 0x20<link>
                ether 08:00:27:81:fa:4f  txqueuelen 1000  (Ethernet)
                  RX packets 85  bytes 12174 (12.1 KB)
                  RX errors 0  dropped 0  overruns 0  frame 0
                  TX packets 70  bytes 8164 (8.1 KB)
                  TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
              inet6 ::1  prefixlen 128  scopeid 0x10<host>
                loop  txqueuelen 1000  (Local Loopback)
                  RX packets 176  bytes 14087 (14.0 KB)
                  RX errors 0  dropped 0  overruns 0  frame 0
                  TX packets 176  bytes 14087 (14.0 KB)
                  TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0
```

1.2 Server 2 IP address: 192.168.56.109

LORENO-NODE2_U [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Tue 16:59

akosieric@controlNode2: ~

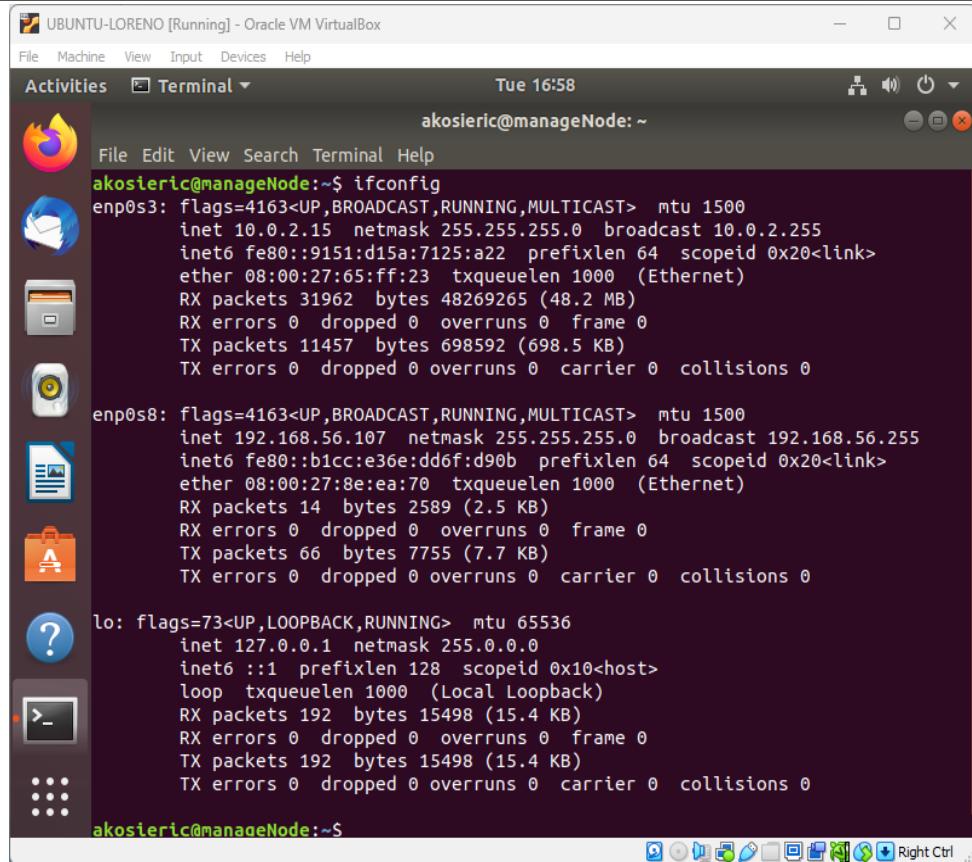
```
File Edit View Search Terminal Help
akosieric@controlNode2:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::9151:d15a:7125:a22  prefixlen 64  scopeid 0x20<link>
          ether 08:00:27:65:ff:23  txqueuelen 1000  (Ethernet)
            RX packets 20600  bytes 31001286 (31.0 MB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 3933  bytes 259649 (259.6 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.109  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::2142:a36e:327c:315c  prefixlen 64  scopeid 0x20<link>
          ether 08:00:27:70:40:11  txqueuelen 1000  (Ethernet)
            RX packets 76  bytes 10744 (10.7 KB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 71  bytes 8226 (8.2 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
          loop  txqueuelen 1000  (Local Loopback)
            RX packets 187  bytes 15151 (15.1 KB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 187  bytes 15151 (15.1 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

akosieric@controlNode2:~$
```

1.3 Server 3 IP address: 192.168.56.107



The screenshot shows a terminal window titled "UBUNTU-LORENO [Running] - Oracle VM VirtualBox". The terminal window displays the output of the "ifconfig" command. The output shows three network interfaces: enp0s3, enp0s8, and lo. The enp0s3 interface is connected to a bridge and has an IP address of 10.0.2.255. The enp0s8 interface is connected to the host and has an IP address of 192.168.56.107. The lo interface is a loopback interface with an IP address of 127.0.0.1.

```
akosieric@manageNode:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::9151:d15a:7125:a22  prefixlen 64  scopeid 0x20<link>
          ether 08:00:27:65:ff:23  txqueuelen 1000  (Ethernet)
            RX packets 31962  bytes 48269265 (48.2 MB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 11457  bytes 698592 (698.5 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

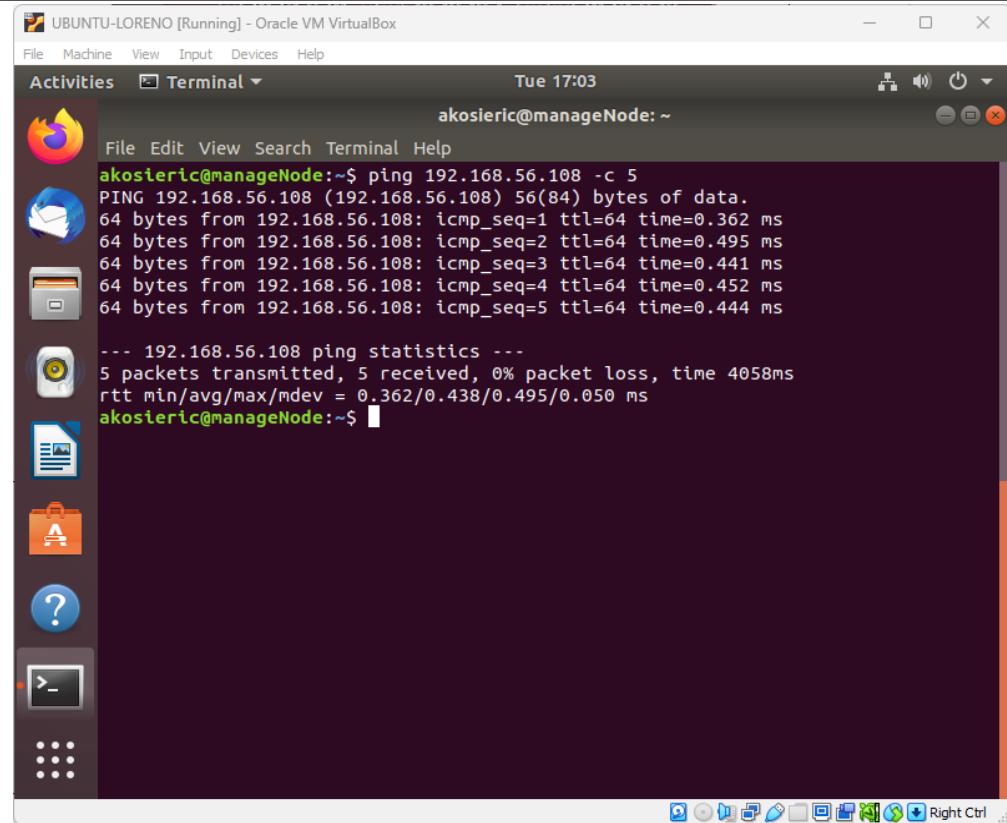
enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.107  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::b1cc:36e:dd6f:d90b  prefixlen 64  scopeid 0x20<link>
          ether 08:00:27:8e:ea:70  txqueuelen 1000  (Ethernet)
            RX packets 14  bytes 2589 (2.5 KB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 66  bytes 7755 (7.7 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
          loop  txqueuelen 1000  (Local Loopback)
            RX packets 192  bytes 15498 (15.4 KB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 192  bytes 15498 (15.4 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

akosieric@manageNode:~$
```

2. Make sure that they can ping each other.

2.1 Connectivity test for Local Machine 1 to Server 1: Successful Not Successful



UBUNTU-LORENO [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

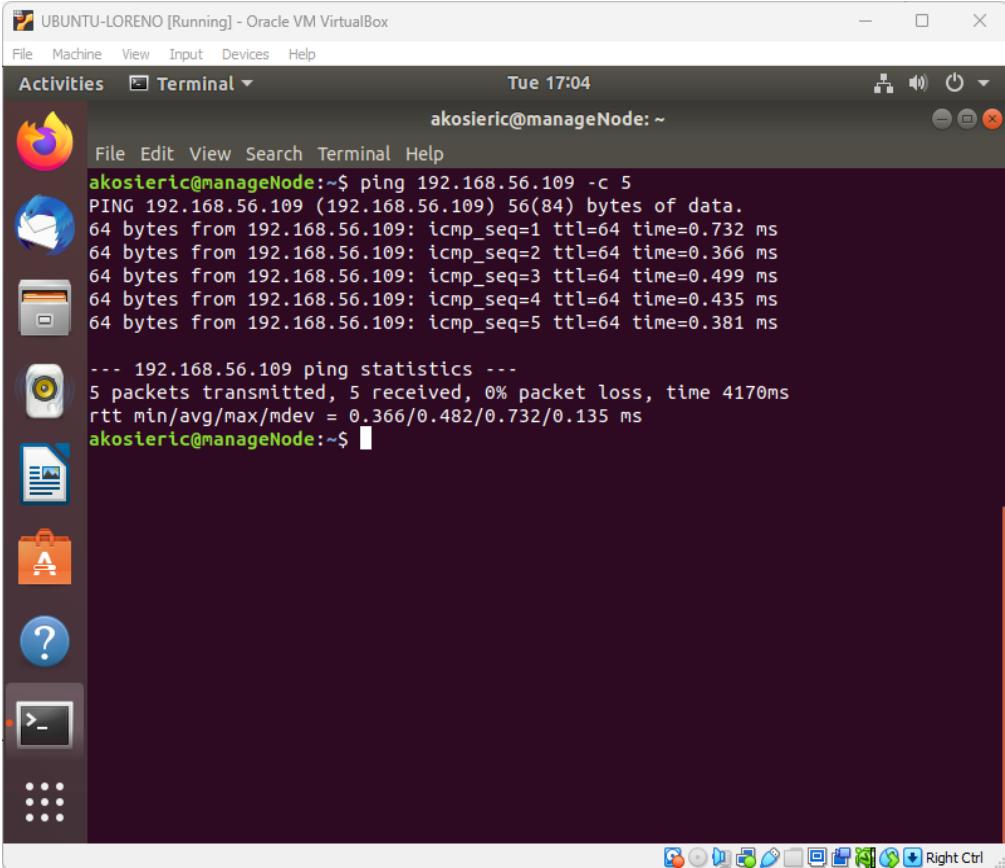
Activities Terminal Tue 17:03

akosieric@manageNode: ~

```
akosieric@manageNode:~$ ping 192.168.56.108 -c 5
PING 192.168.56.108 (192.168.56.108) 56(84) bytes of data.
64 bytes from 192.168.56.108: icmp_seq=1 ttl=64 time=0.362 ms
64 bytes from 192.168.56.108: icmp_seq=2 ttl=64 time=0.495 ms
64 bytes from 192.168.56.108: icmp_seq=3 ttl=64 time=0.441 ms
64 bytes from 192.168.56.108: icmp_seq=4 ttl=64 time=0.452 ms
64 bytes from 192.168.56.108: icmp_seq=5 ttl=64 time=0.444 ms

--- 192.168.56.108 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4058ms
rtt min/avg/max/mdev = 0.362/0.438/0.495/0.050 ms
akosieric@manageNode:~$
```

2.2 Connectivity test for Local Machine 1 to Server 2: Successful Not Successful



UBUNTU-LORENO [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

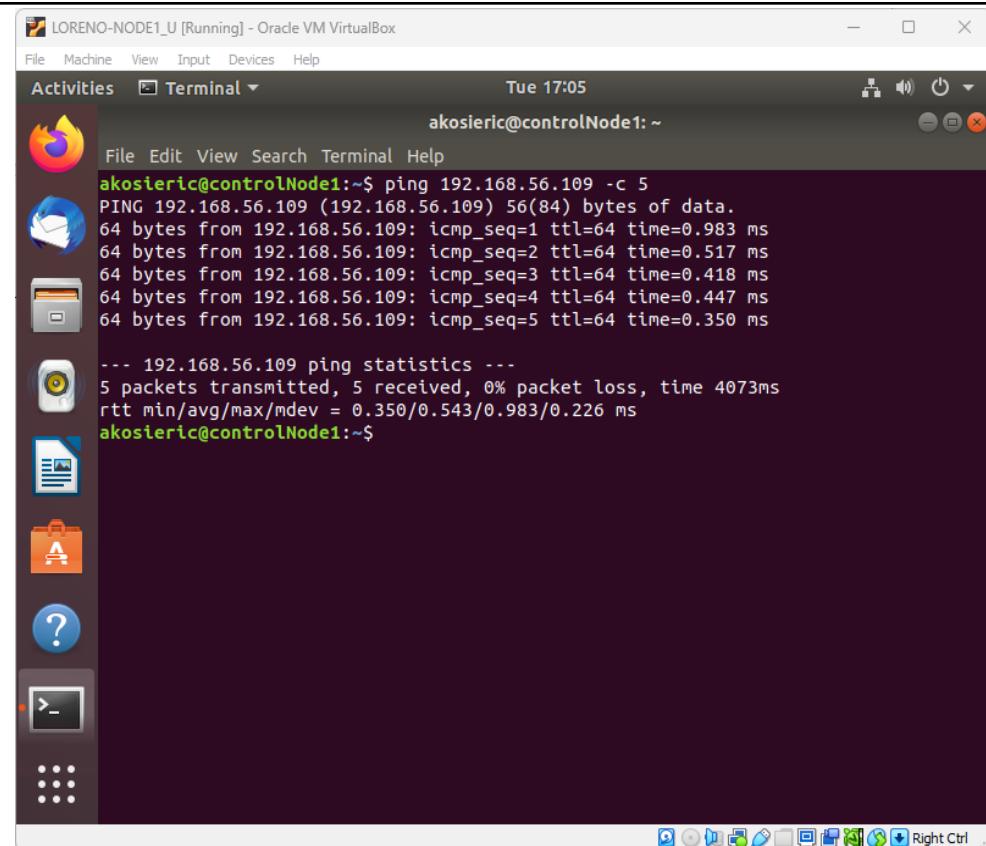
Activities Terminal Tue 17:04

akosieric@manageNode: ~

```
akosieric@manageNode:~$ ping 192.168.56.109 -c 5
PING 192.168.56.109 (192.168.56.109) 56(84) bytes of data.
64 bytes from 192.168.56.109: icmp_seq=1 ttl=64 time=0.732 ms
64 bytes from 192.168.56.109: icmp_seq=2 ttl=64 time=0.366 ms
64 bytes from 192.168.56.109: icmp_seq=3 ttl=64 time=0.499 ms
64 bytes from 192.168.56.109: icmp_seq=4 ttl=64 time=0.435 ms
64 bytes from 192.168.56.109: icmp_seq=5 ttl=64 time=0.381 ms

--- 192.168.56.109 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4170ms
rtt min/avg/max/mdev = 0.366/0.482/0.732/0.135 ms
akosieric@manageNode:~$
```

2.3 Connectivity test for Server 1 to Server 2: Successful Not Successful



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "LORENO-NODE1_U [Running] - Oracle VM VirtualBox". The terminal window contains the following command and its output:

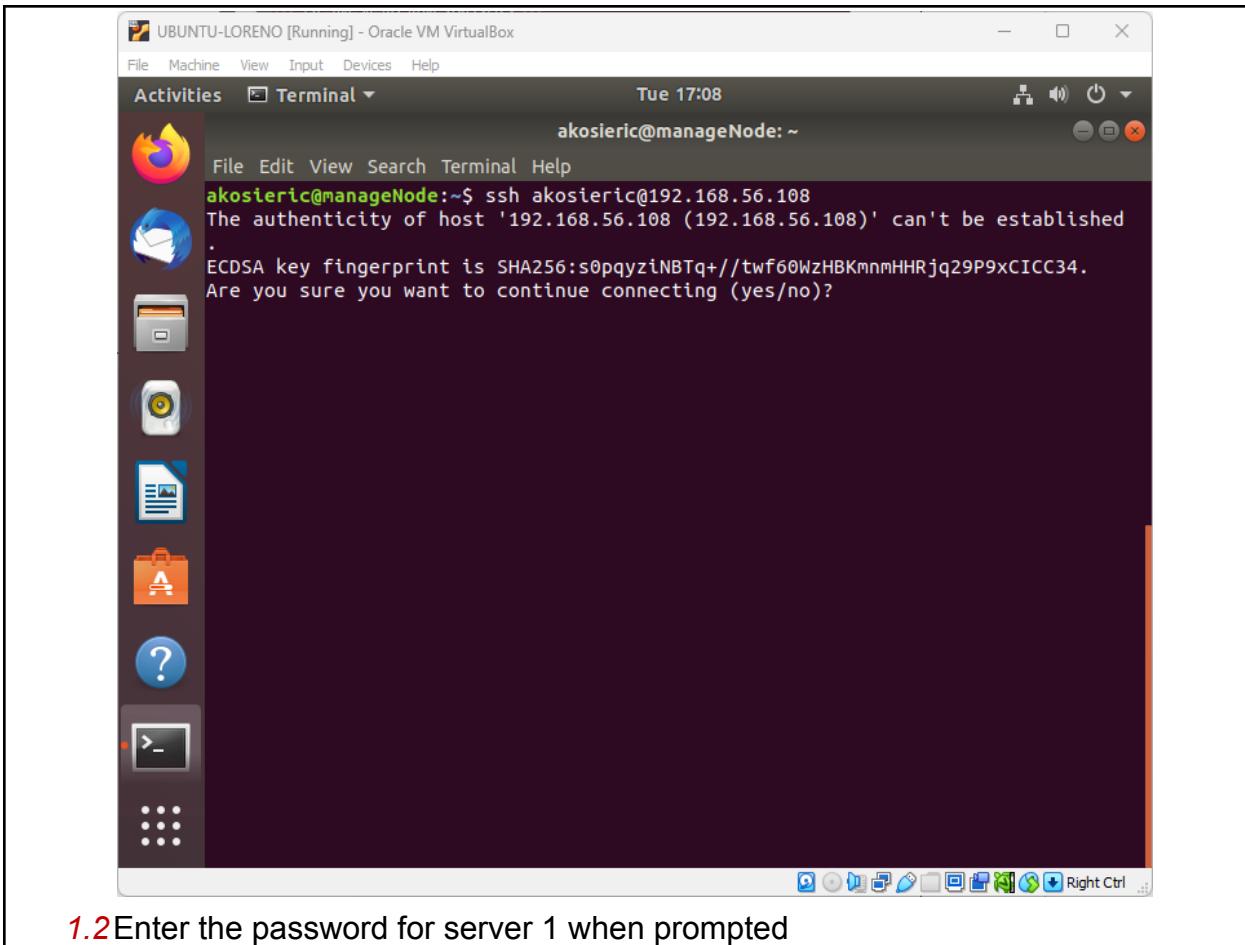
```
akosieric@controlNode1:~$ ping 192.168.56.109 -c 5
PING 192.168.56.109 (192.168.56.109) 56(84) bytes of data.
64 bytes from 192.168.56.109: icmp_seq=1 ttl=64 time=0.983 ms
64 bytes from 192.168.56.109: icmp_seq=2 ttl=64 time=0.517 ms
64 bytes from 192.168.56.109: icmp_seq=3 ttl=64 time=0.418 ms
64 bytes from 192.168.56.109: icmp_seq=4 ttl=64 time=0.447 ms
64 bytes from 192.168.56.109: icmp_seq=5 ttl=64 time=0.350 ms

--- 192.168.56.109 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4073ms
rtt min/avg/max/mdev = 0.350/0.543/0.983/0.226 ms
akosieric@controlNode1:~$
```

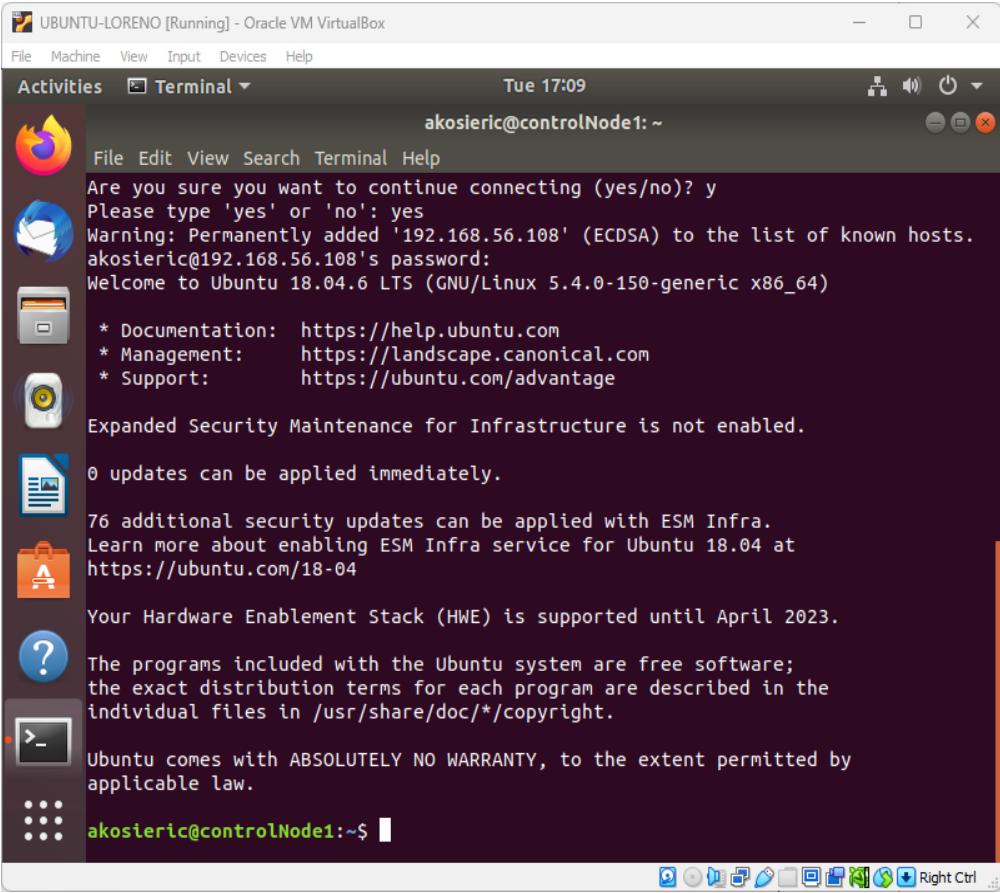
Task 4: Verify SSH connectivity on Server 1, Server 2, and Local Machine.

1. On the Local Machine, issue the following commands:

1.1 `ssh username@ip_address_server1` for example, `ssh jvtaylor@192.168.56.120`



1.2 Enter the password for server 1 when prompted



Ubuntu-LORENO [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Tue 17:09 akosieric@controlNode1: ~

File Edit View Search Terminal Help

Are you sure you want to continue connecting (yes/no)? y

Please type 'yes' or 'no': yes

Warning: Permanently added '192.168.56.108' (ECDSA) to the list of known hosts.

akosieric@192.168.56.108's password:

Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 5.4.0-150-generic x86_64)

* Documentation: <https://help.ubuntu.com>

* Management: <https://landscape.canonical.com>

* Support: <https://ubuntu.com/advantage>

Expanded Security Maintenance for Infrastructure is not enabled.

0 updates can be applied immediately.

76 additional security updates can be applied with ESM Infra.
Learn more about enabling ESM Infra service for Ubuntu 18.04 at
<https://ubuntu.com/18-04>

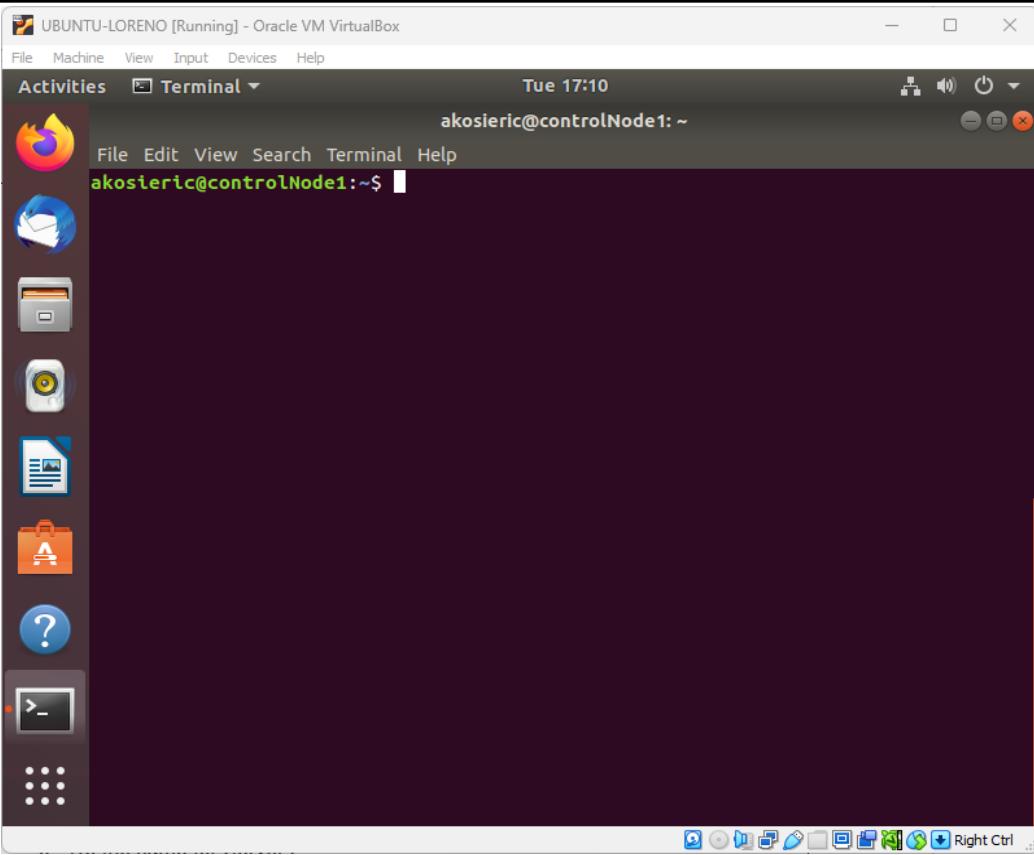
Your Hardware Enablement Stack (HWE) is supported until April 2023.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

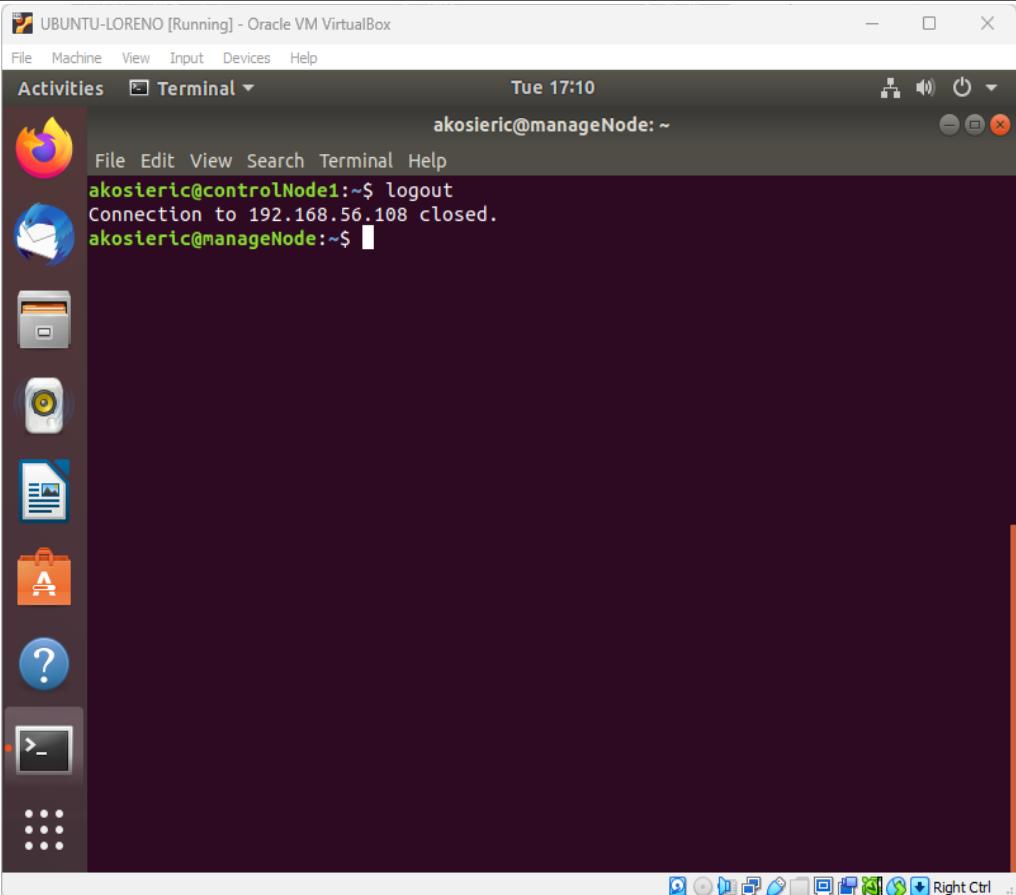
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

akosieric@controlNode1:~\$

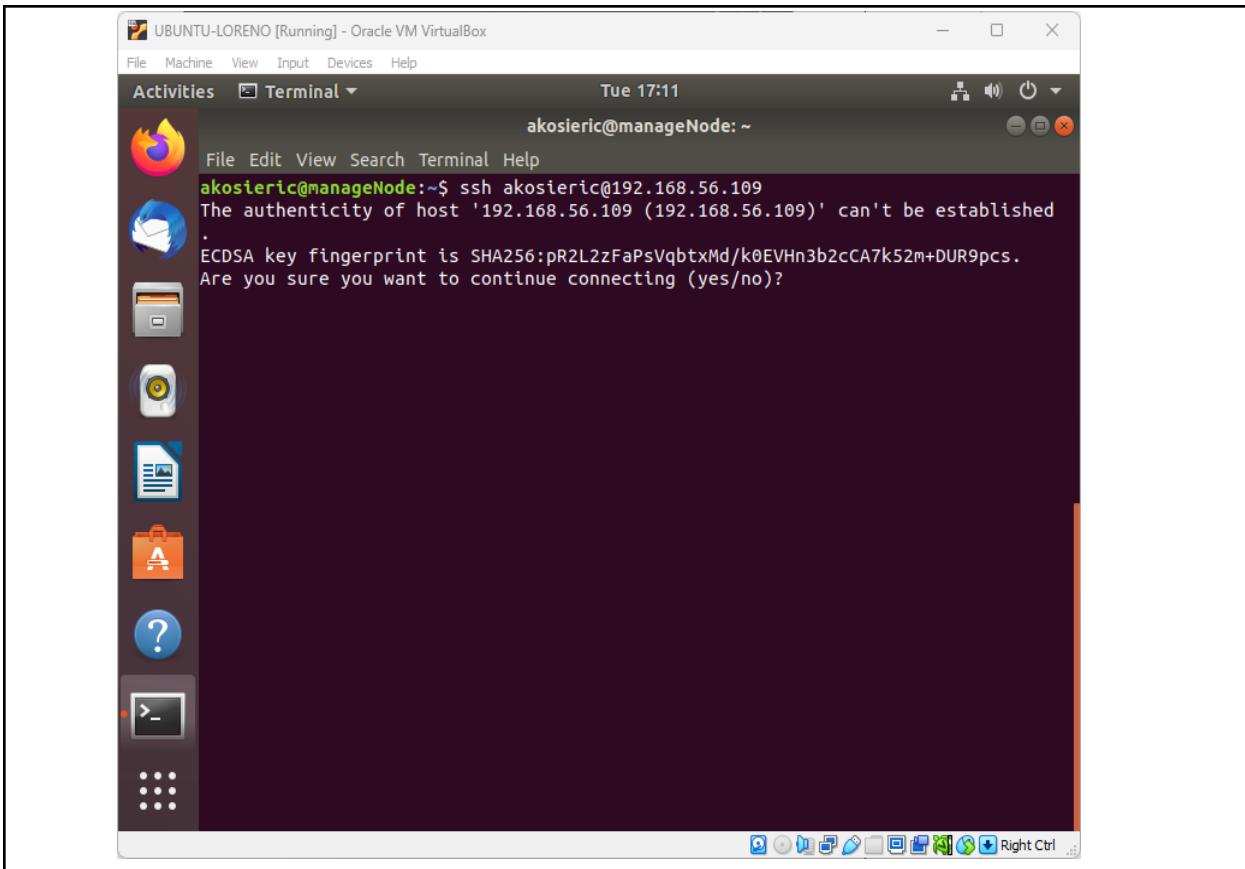
1.3 Verify that you are in server 1. The user should be in this format user@server1.
For example, *jvtaylor@server1*

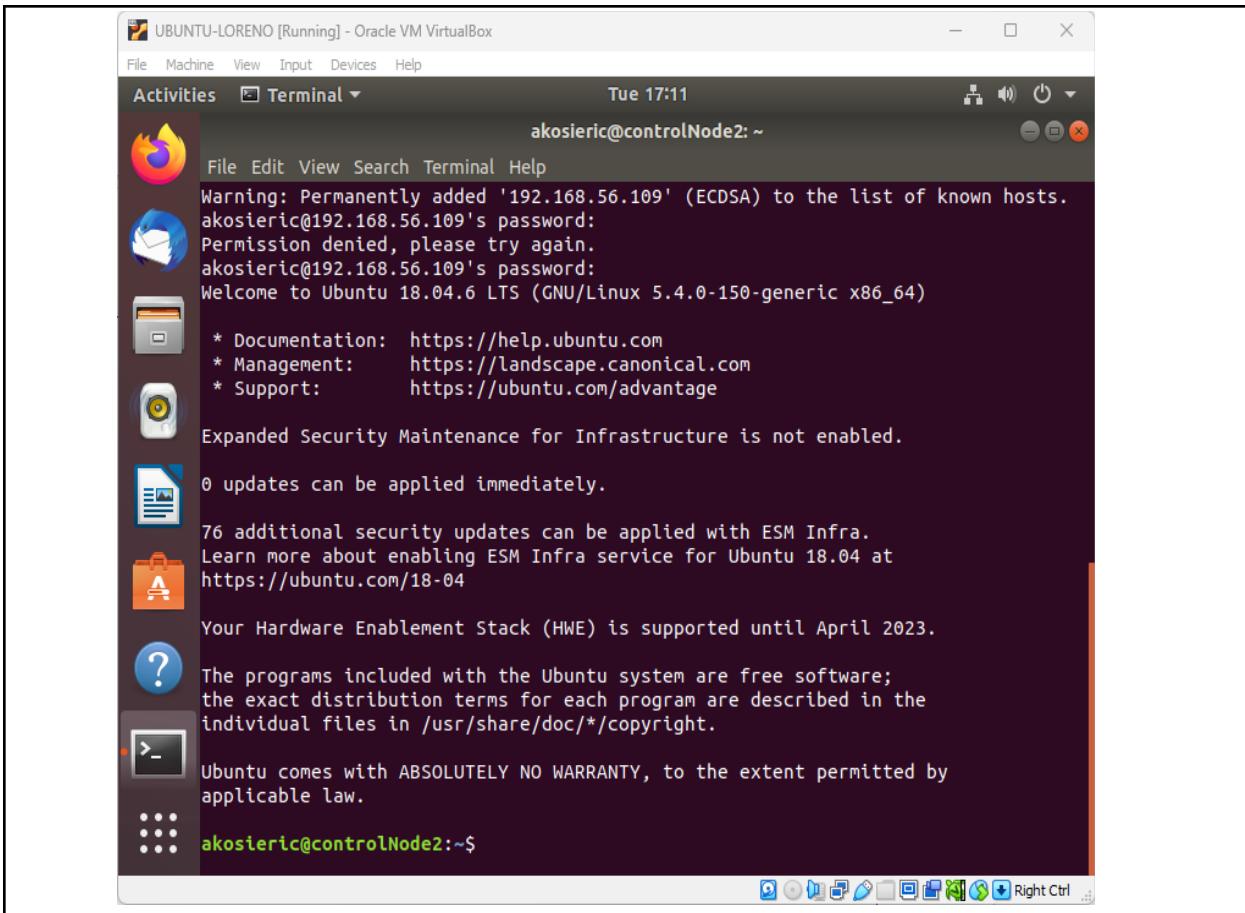


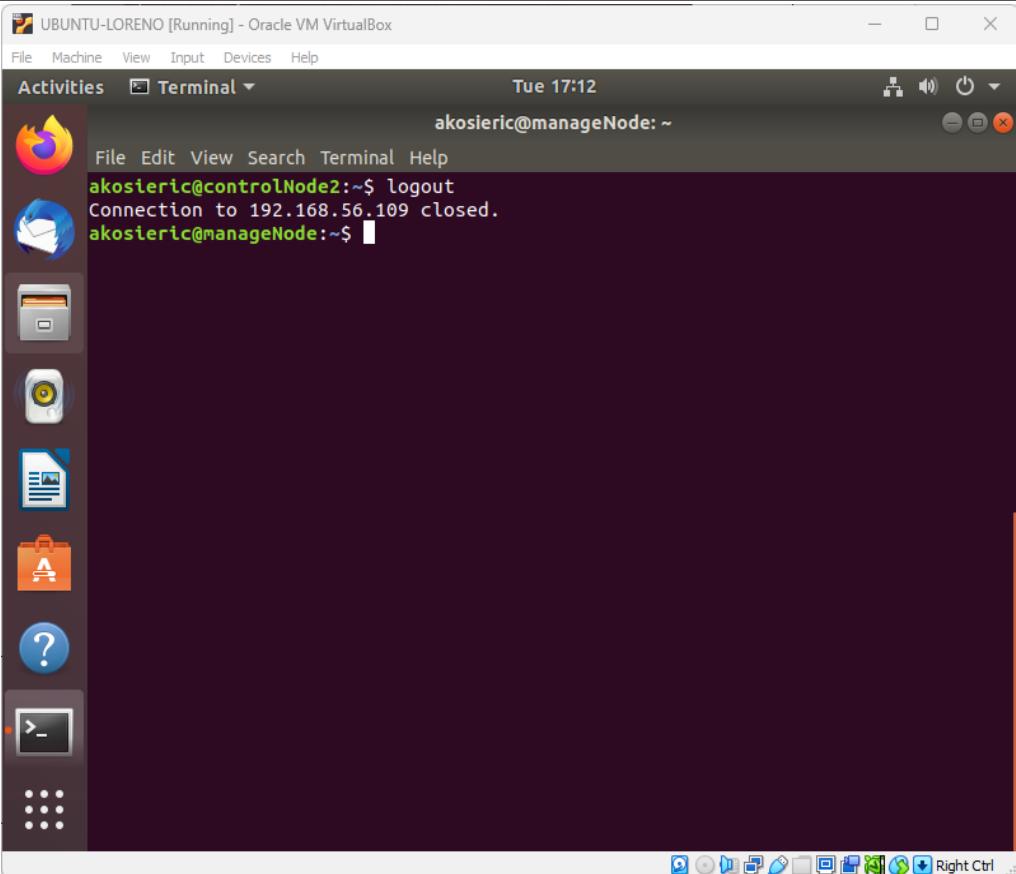
2. Logout of Server 1 by issuing the command ***control + D***.



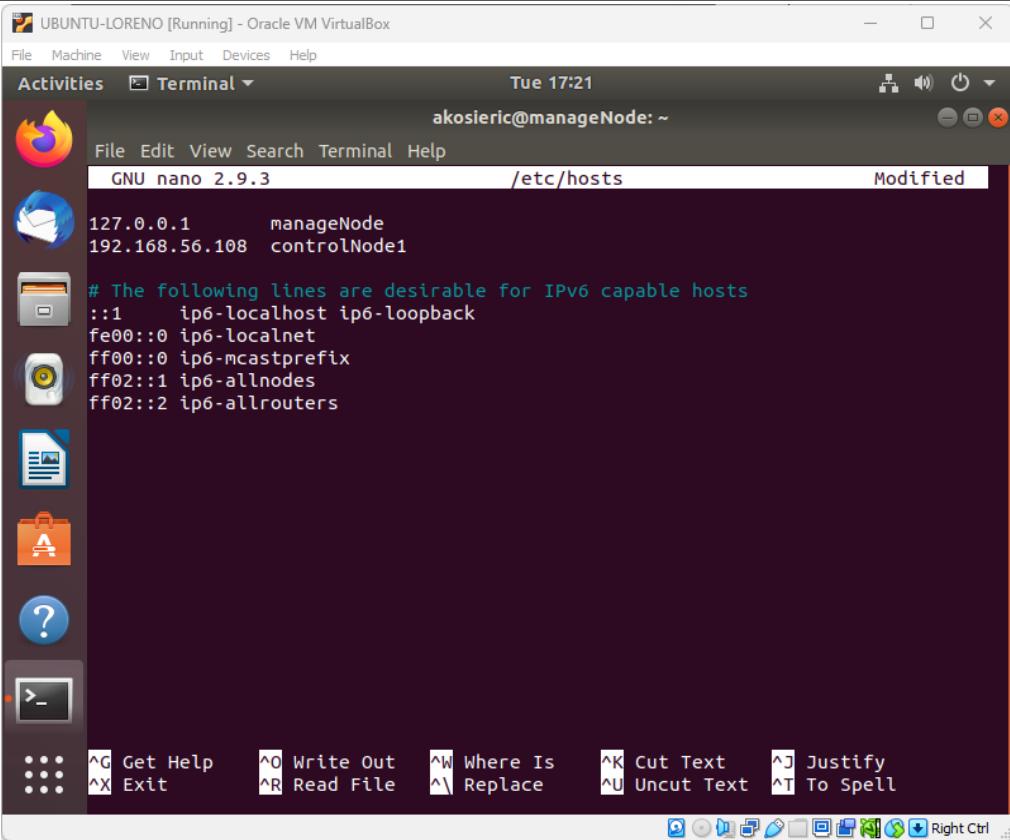
3. Do the same for Server 2.







4. Edit the hosts of the Local Machine by issuing the command ***sudo nano /etc/hosts***. Below all texts type the following:
4.1 **IP_address server 1** (provide the ip address of server 1 followed by the hostname)



```
127.0.0.1      manageNode
192.168.56.108 controlNode1

# The following lines are desirable for IPv6 capable hosts
::1      ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
```

4.2 IP_address server 2 (provide the ip address of server 2 followed by the hostname)

The screenshot shows a terminal window titled "Activities Terminal" running on an Ubuntu system. The window title bar includes "UBUNTU-LORENO [Running] - Oracle VM VirtualBox", "File Machine View Input Devices Help", "Tue 17:21", and a power icon. The terminal window has a dark background and displays the contents of the "/etc/hosts" file:

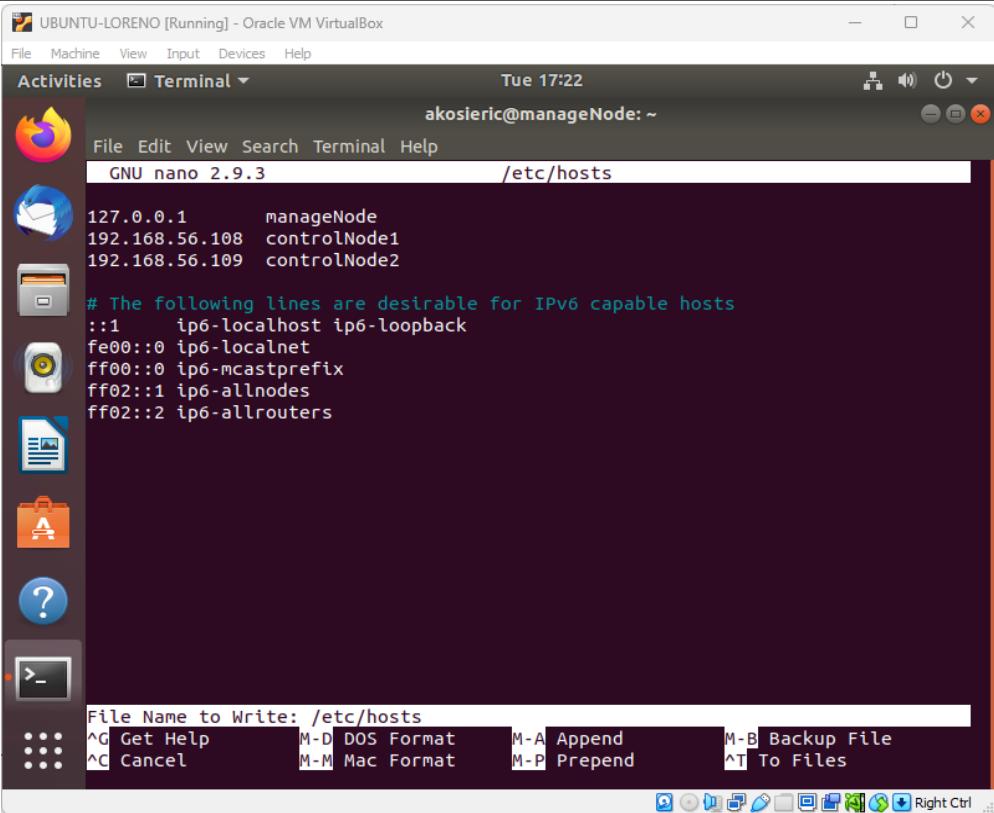
```
127.0.0.1      manageNode
192.168.56.108 controlNode1
192.168.56.109 controlNode2

# The following lines are desirable for IPv6 capable hosts
::1      ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
```

The terminal window also shows the nano editor's status bar at the bottom, which includes the message "[Read 10 lines]". Below the status bar, there are several keyboard shortcut keys:

- ^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

4.3 Save the file and exit.

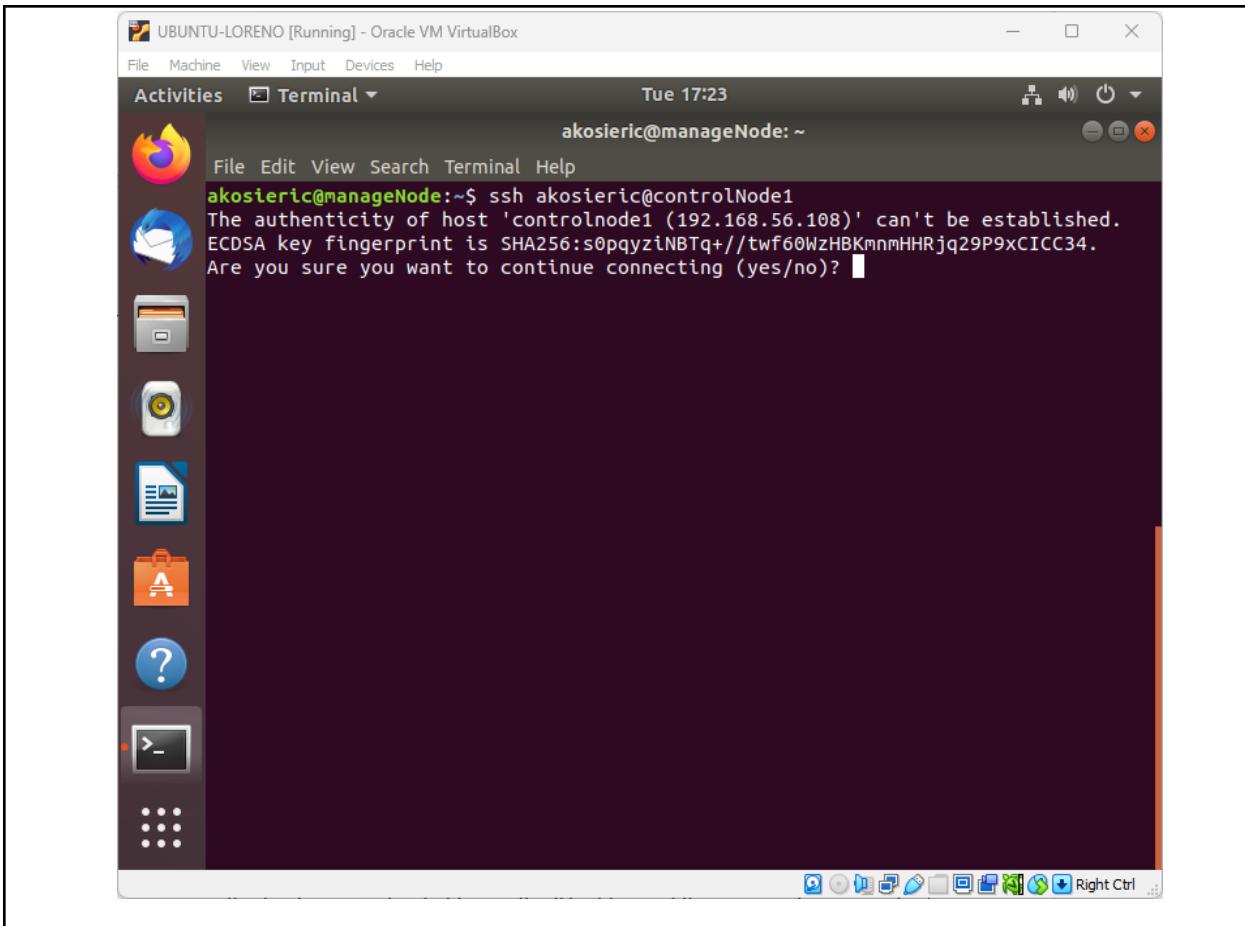


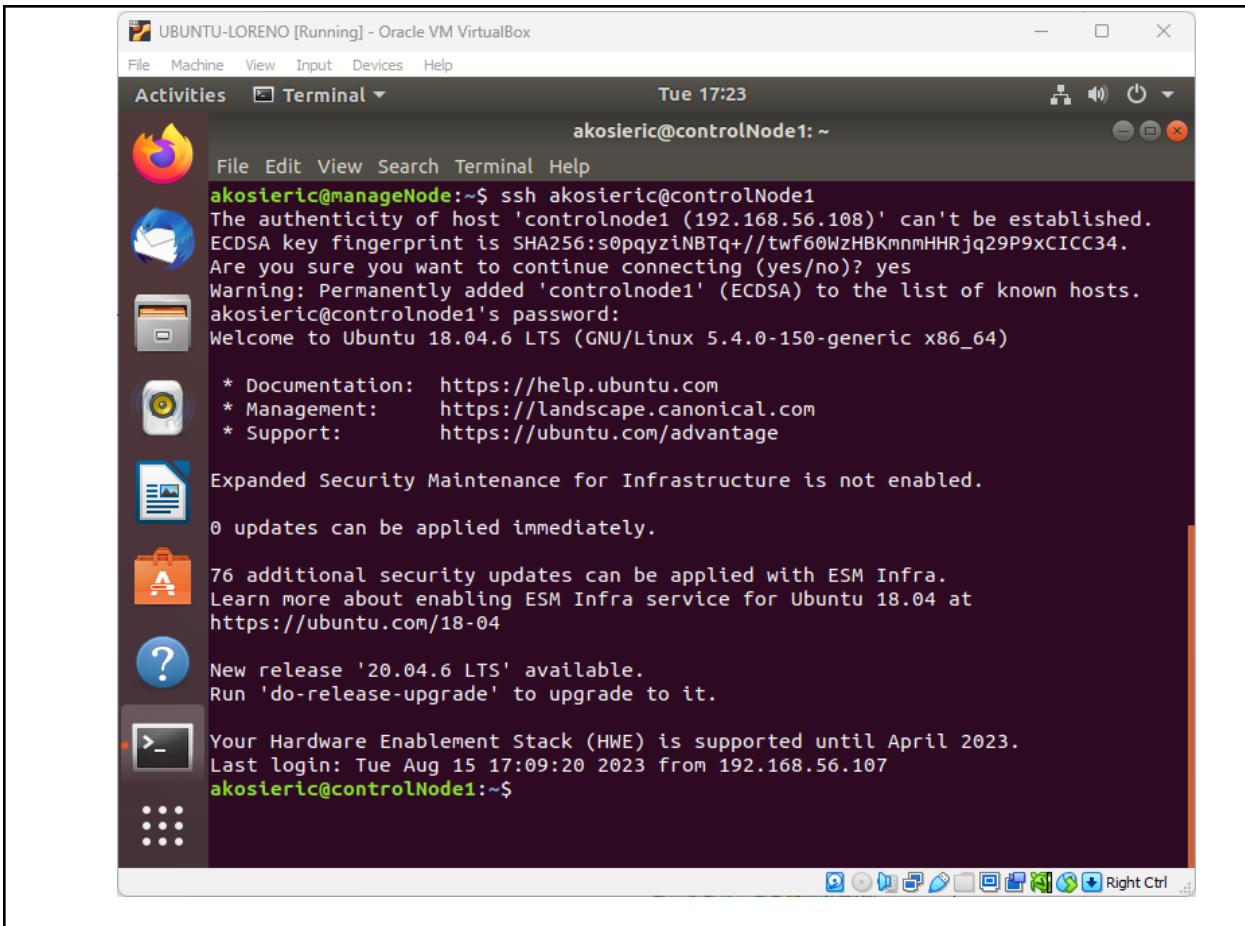
```
127.0.0.1      manageNode
192.168.56.108 controlNode1
192.168.56.109 controlNode2

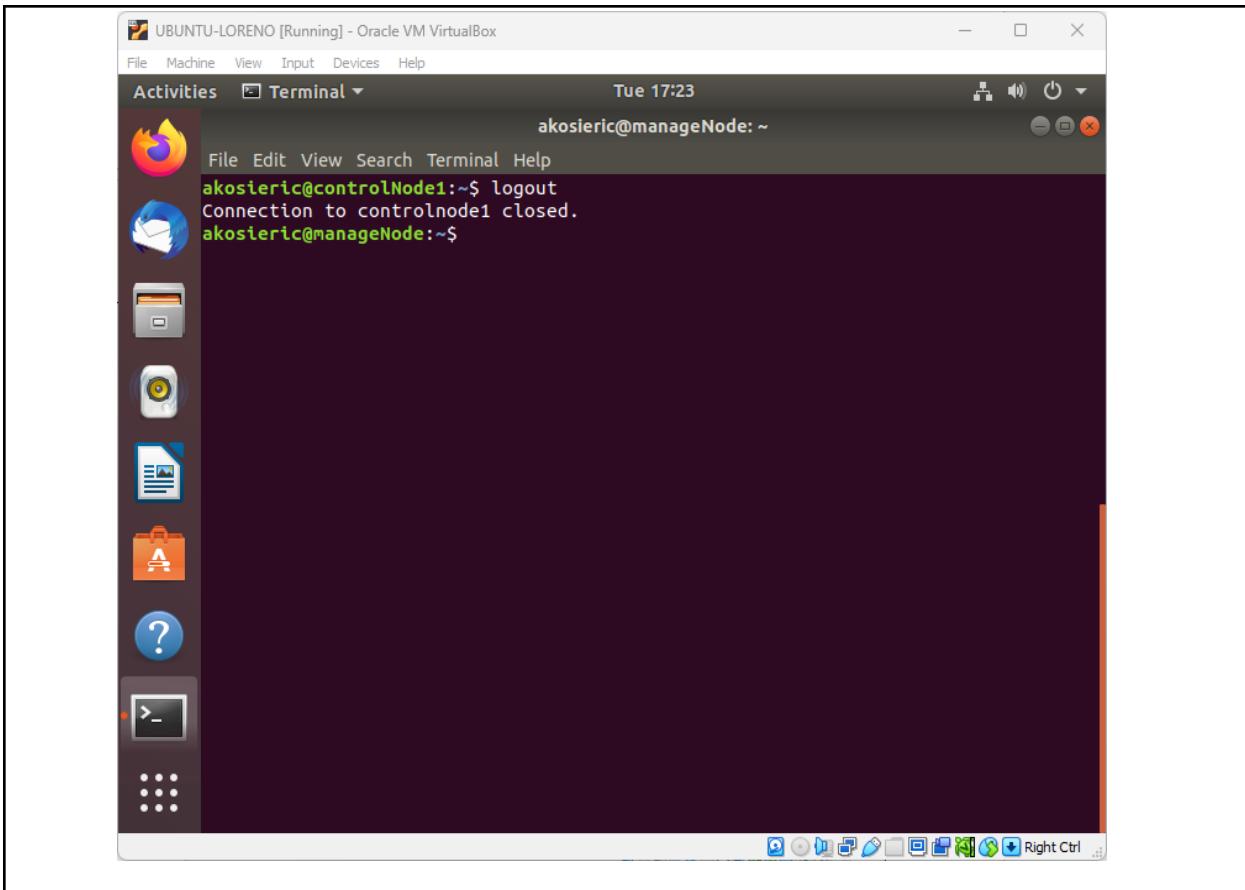
# The following lines are desirable for IPv6 capable hosts
::1      ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
```

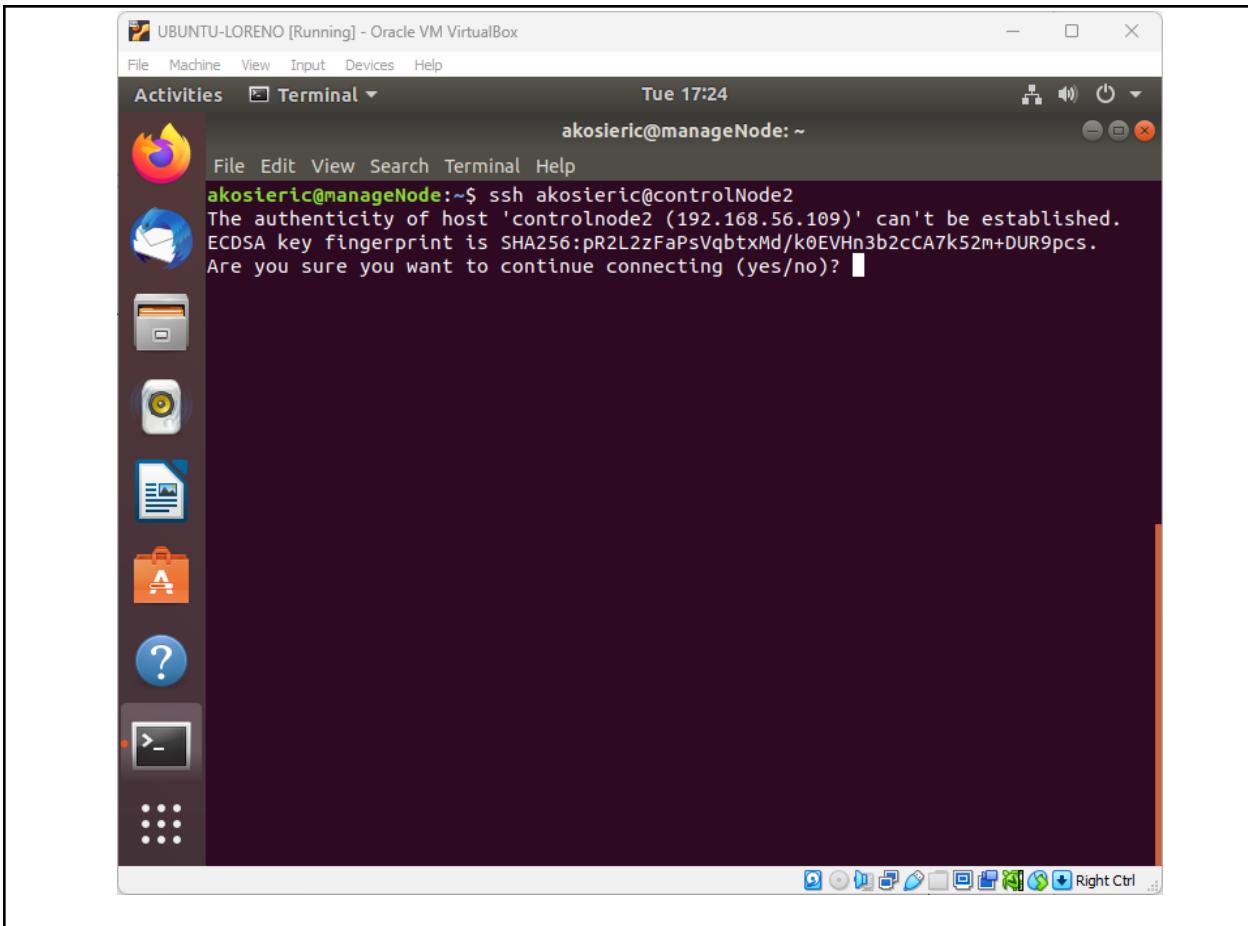
File Name to Write: /etc/hosts
^G Get Help M-D DOS Format M-A Append M-B Backup File
^C Cancel M-M Mac Format M-P Prepend ^T To Files

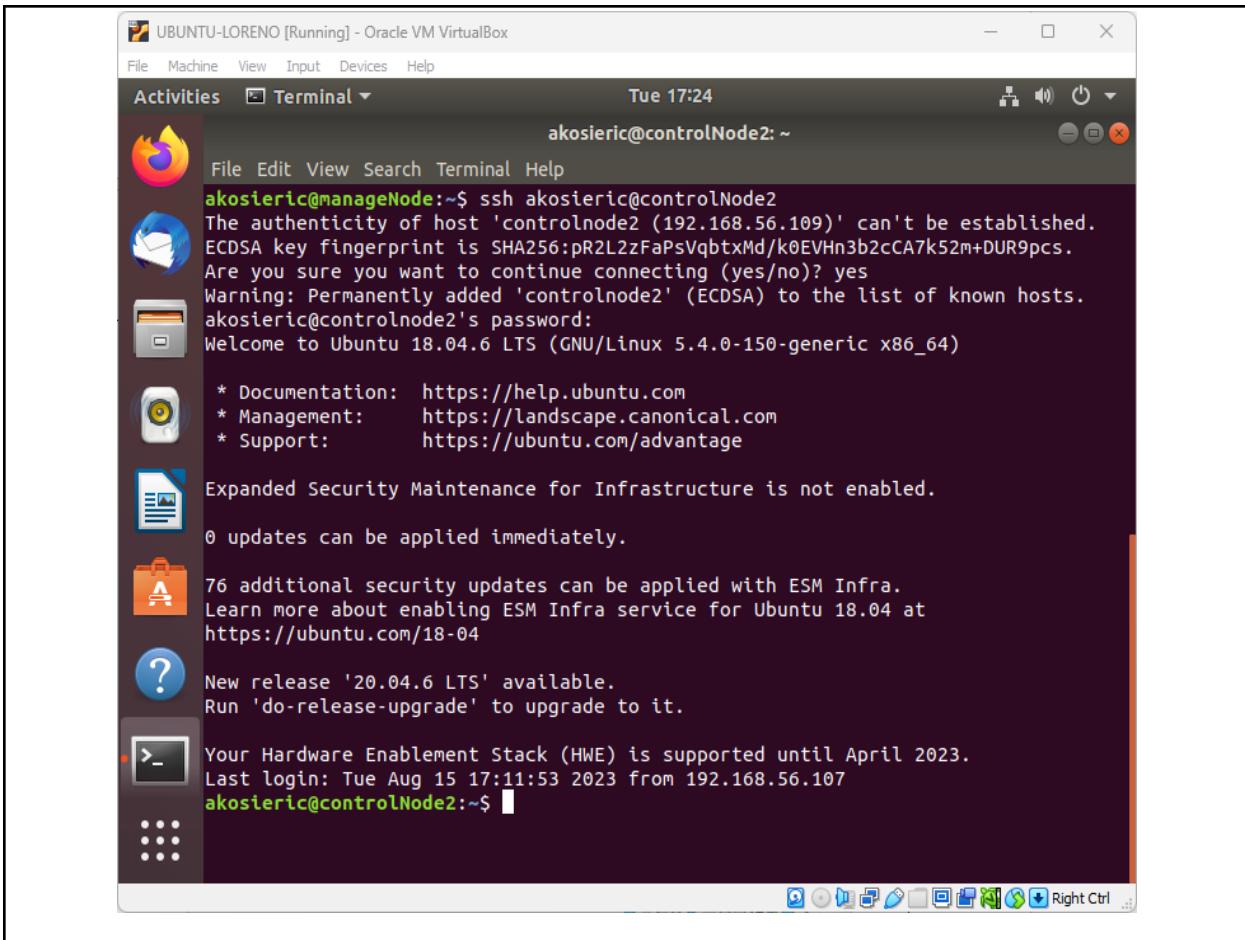
5. On the local machine, verify that you can do the SSH command but this time, use the hostname instead of typing the IP address of the servers. For example, try to do **ssh jvtaylor@server1**. Enter the password when prompted. Verify that you have entered Server 1. Do the same for Server 2.

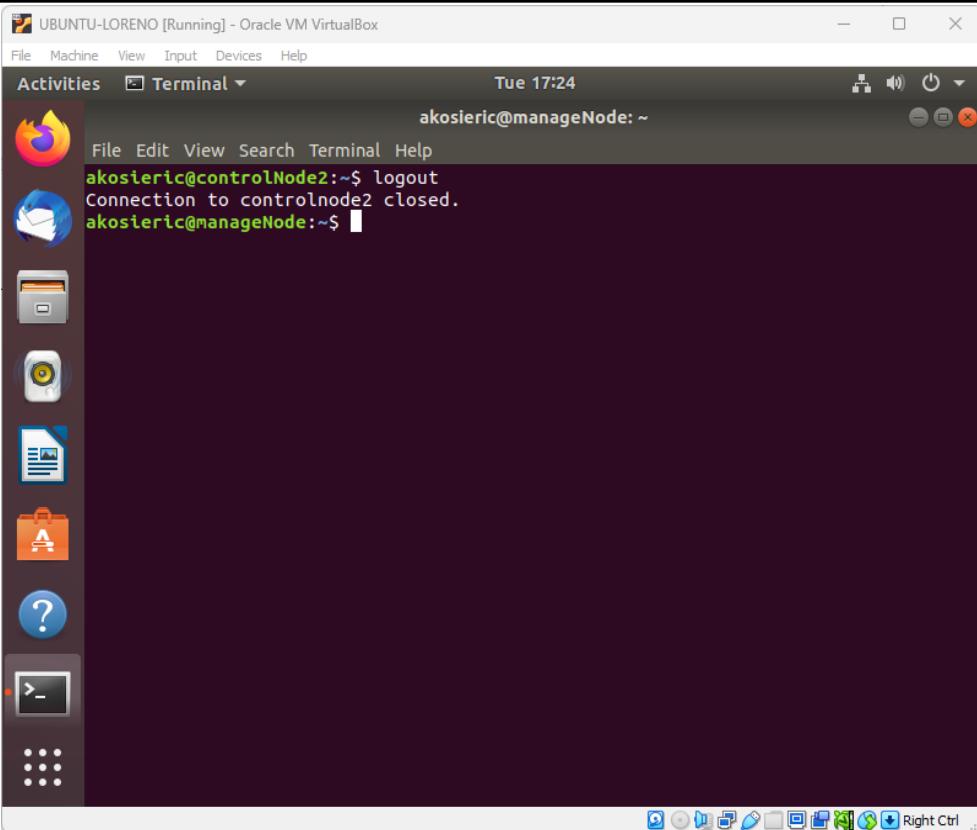












Reflections:

Answer the following:

1. How are we able to use the hostname instead of IP address in SSH commands?
 - ***We can use the hostname instead of an IP address in SSH commands by relying on DNS resolution, which translates the hostname into its corresponding IP address, enabling seamless network communication.***
2. How secured is SSH?
 - ***SSH is highly secure due to its encryption and authentication mechanisms, ensuring encrypted communication and secure access to remote systems over potentially insecure networks.***

