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Course/Section: CPE232-CPE31S23	**Date Submitted: August 24, 2022**
Instructor: Engr. Jonathan V. Taylar	**Semester and SY: 1st semester 2022-2023**

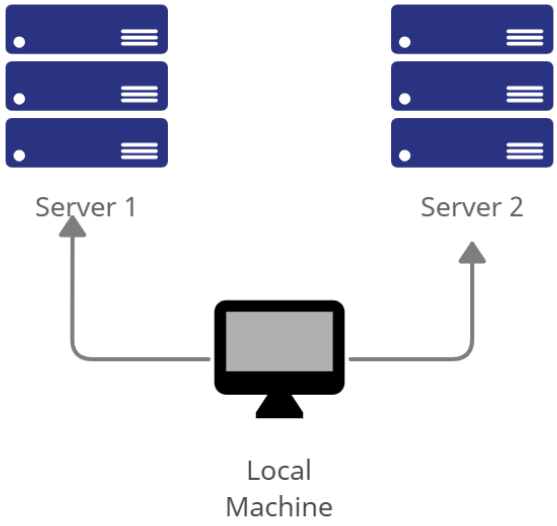
Activity 1: Configure Network using Virtual Machines

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:**

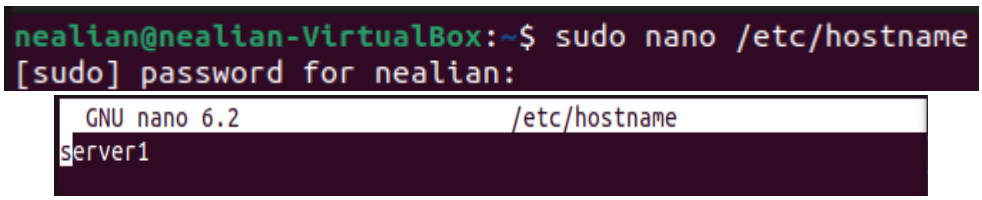
Network Topology:

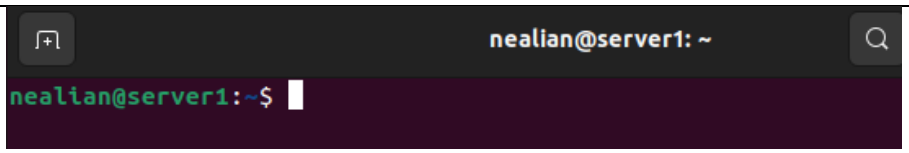
Assume that you have created the following network topology in Virtual Machines, *provide screenshots for each task*. (Note: *it is assumed that you have the prior knowledge of cloning and creating snapshots in a virtual machine*).



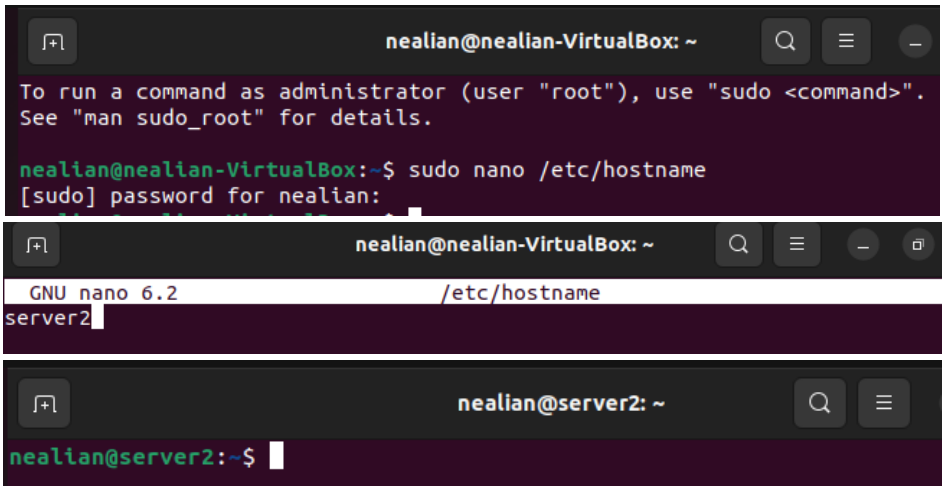
Task 1: Do the following on Server 1, Server 2, and Local Machine. In editing the file using nano command, press control + O to write out (save the file). Press enter when asked for the name of the file. Press control + X to end.

1. Change the hostname using the command *sudo nano /etc/hostname*
   1.1 Use server1 for Server 1





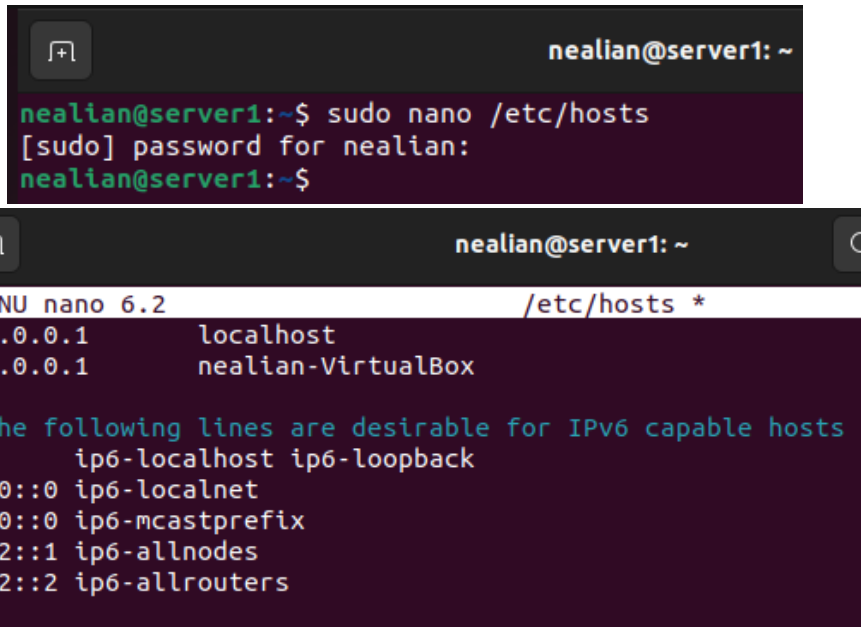
1.2 Use server2 for Server 2



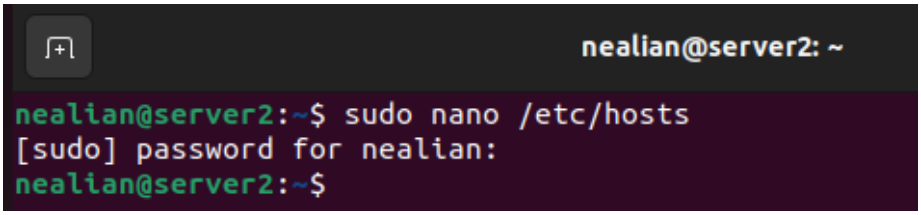
1.3 Use workstation for the Local Machine

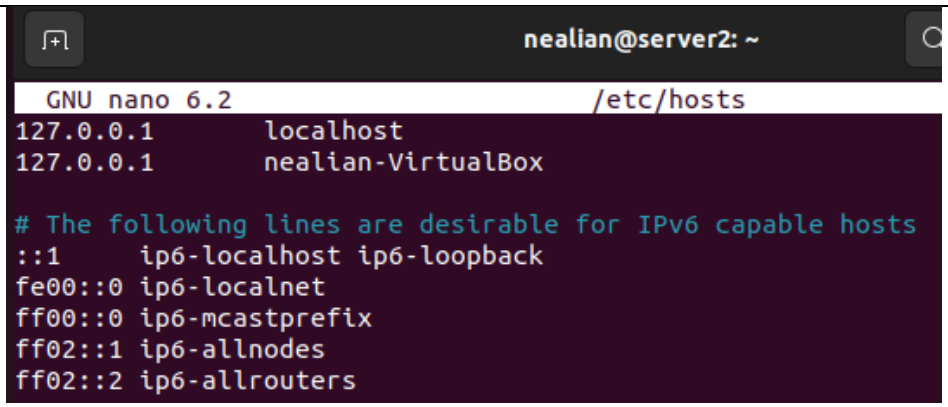
2. Edit the hosts using the command *sudo nano /etc/hosts*. Edit the second line.

2.1 Type 127.0.0.1 server 1 for Server 1



2.2 Type 127.0.0.1 server 2 for Server 2





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.

   Server 1:

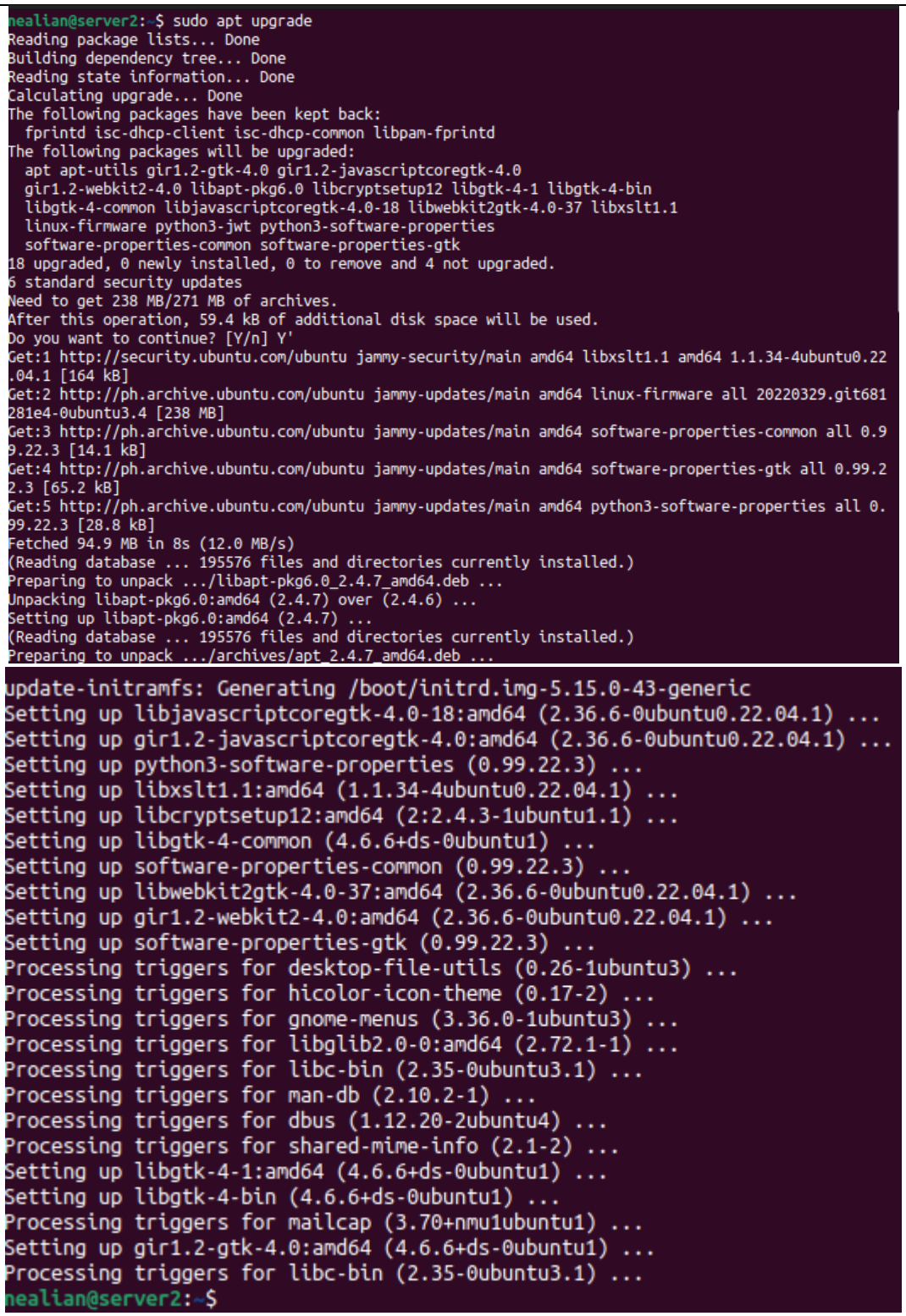
```
nealian@server1:~$ sudo apt update
Hit:1 http://ph.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://ph.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://ph.archive.ubuntu.com/ubuntu jammy-backports InRelease
Get:4 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:5 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [267
 kB]
Get:6 http://security.ubuntu.com/ubuntu jammy-security/main i386 Packages [97.3
 kB]
Get:7 http://security.ubuntu.com/ubuntu jammy-security/main Translation-en [63.
9 kB]
Fetched 539 kB in 3s (155 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
22 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

```
nealian@server1:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages have been kept back:
  fprintd isc-dhcp-client isc-dhcp-common libpam-fprintd
The following packages will be upgraded:
  apt apt-utils gir1.2-gtk-4.0 gir1.2-javascriptcoregtk-4.0
  gir1.2-webkit2-4.0 libapt-pkg6.0 libcryptsetup12 libgtk-4-1 libgtk-4-bin
  libgtk-4-common libjavascriptcoregtk-4.0-18 libwebkit2gtk-4.0-37 libxslt1.1
  linux-firmware python3-jwt python3-software-properties
  software-properties-common software-properties-gtk
18 upgraded, 0 newly installed, 0 to remove and 4 not upgraded.
6 standard security updates
Need to get 238 MB/271 MB of archives.
After this operation, 59.4 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://security.ubuntu.com/ubuntu jammy-security/main amd64 libxslt1.1 amd64 1.1.34-4ubuntu0.22
.04.1 [164 kB]
Get:2 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 linux-firmware all 20220329.git681
281e4-0ubuntu3.4 [238 MB]
Get:3 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 software-properties-common all 0.9
9.22.3 [14.1 kB]
Get:4 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 software-properties-gtk all 0.99.2
2.3 [65.2 kB]
Get:5 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3-software-properties all 0.
99.22.3 [28.8 kB]
Fetched 94.9 MB in 16s (5,950 kB/s)
(Reading database ... 195576 files and directories currently installed.)
Preparing to unpack .../libapt-pkg6.0_2.4.7_amd64.deb ...
Unpacking libapt-pkg6.0:amd64 (2.4.7) over (2.4.6) ...
Setting up libapt-pkg6.0:amd64 (2.4.7) ...
(Reading database ... 195576 files and directories currently installed.)
Preparing to unpack .../archives/apt_2.4.7_amd64.deb ...
```

```
Preparing to unpack .../13-software-properties-common_0.99.22.3_all.deb ...
Unpacking software-properties-common (0.99.22.3) over (0.99.22.2) ...
Preparing to unpack .../14-software-properties-gtk_0.99.22.3_all.deb ...
Unpacking software-properties-gtk (0.99.22.3) over (0.99.22.2) ...
Preparing to unpack .../15-python3-software-properties_0.99.22.3_all.deb ...
Unpacking python3-software-properties (0.99.22.3) over (0.99.22.2) ...
Setting up apt-utils (2.4.7) ...
Setting up python3-jwt (2.3.0-1ubuntu0.2) ...
Setting up linux-firmware (20220329.git681281e4-0ubuntu3.4) ...
update-initramfs: Generating /boot/initrd.img-5.15.0-46-generic
update-initramfs: Generating /boot/initrd.img-5.15.0-43-generic
Setting up libjavascriptcoregtk-4.0-18:amd64 (2.36.6-0ubuntu0.22.04.1) ...
Setting up gir1.2-javascriptcoregtk-4.0:amd64 (2.36.6-0ubuntu0.22.04.1) ...
Setting up python3-software-properties (0.99.22.3) ...
Setting up libxslt1.1:amd64 (1.1.34-4ubuntu0.22.04.1) ...
Setting up libcryptsetup12:amd64 (2:2.4.3-1ubuntu1.1) ...
Setting up libgtk-4-common (4.6.6+ds-0ubuntu1) ...
Setting up software-properties-common (0.99.22.3) ...
Setting up libwebkit2gtk-4.0-37:amd64 (2.36.6-0ubuntu0.22.04.1) ...
Setting up gir1.2-webkit2-4.0:amd64 (2.36.6-0ubuntu0.22.04.1) ...
Setting up software-properties-gtk (0.99.22.3) ...
Processing triggers for desktop-file-utils (0.26-1ubuntu3) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for libglib2.0-0:amd64 (2.72.1-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for dbus (1.12.20-2ubuntu4) ...
Processing triggers for shared-mime-info (2.1-2) ...
Setting up libgtk-4-1:amd64 (4.6.6+ds-0ubuntu1) ...
Setting up libgtk-4-bin (4.6.6+ds-0ubuntu1) ...
Processing triggers for mailcap (3.70+nmu1ubuntu1) ...
Setting up gir1.2-gtk-4.0:amd64 (4.6.6+ds-0ubuntu1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
nealian@server1:~$
```

Server 2:

```
nealian@server2:~$ sudo apt update
Hit:1 http://ph.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://ph.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://ph.archive.ubuntu.com/ubuntu jammy-backports InRelease
Get:4 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:5 http://security.ubuntu.com/ubuntu jammy-security/main i386 Packages [97.3
 kB]
Get:6 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [267
 kB]
Get:7 http://security.ubuntu.com/ubuntu jammy-security/main Translation-en [63.
9 kB]
Fetched 539 kB in 3s (204 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
22 packages can be upgraded. Run 'apt list --upgradable' to see them.
```



```
nealian@server2:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages have been kept back:
  fprintd isc-dhcp-client isc-dhcp-common libpam-fprintd
The following packages will be upgraded:
  apt apt-utils gir1.2-gtk-4.0 gir1.2-javascriptcoregtk-4.0
  gir1.2-webkit2-4.0 libapt-pkg6.0 libcryptsetup12 libgtk-4-1 libgtk-4-bin
  libgtk-4-common libjavascriptcoregtk-4.0-18 libwebkit2gtk-4.0-37 libxslt1.1
  linux-firmware python3-jwt python3-software-properties
  software-properties-common software-properties-gtk
18 upgraded, 0 newly installed, 0 to remove and 4 not upgraded.
6 standard security updates
Need to get 238 MB/271 MB of archives.
After this operation, 59.4 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y'
Get:1 http://security.ubuntu.com/ubuntu jammy-security/main amd64 libxslt1.1 amd64 1.1.34-4ubuntu0.22
.04.1 [164 kB]
Get:2 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 linux-firmware all 20220329.git681
281e4-0ubuntu3.4 [238 MB]
Get:3 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 software-properties-common all 0.9
9.22.3 [14.1 kB]
Get:4 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 software-properties-gtk all 0.99.2
2.3 [65.2 kB]
Get:5 http://ph.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3-software-properties all 0.
99.22.3 [28.8 kB]
Fetched 94.9 MB in 8s (12.0 MB/s)
(Reading database ... 195576 files and directories currently installed.)
Preparing to unpack .../libapt-pkg6.0_2.4.7_amd64.deb ...
Unpacking libapt-pkg6.0:amd64 (2.4.7) over (2.4.6) ...
Setting up libapt-pkg6.0:amd64 (2.4.7) ...
(Reading database ... 195576 files and directories currently installed.)
Preparing to unpack .../archives/apt_2.4.7_amd64.deb ...
update-initramfs: Generating /boot/initrd.img-5.15.0-43-generic
Setting up libjavascriptcoregtk-4.0-18:amd64 (2.36.6-0ubuntu0.22.04.1) ...
Setting up gir1.2-javascriptcoregtk-4.0:amd64 (2.36.6-0ubuntu0.22.04.1) ...
Setting up python3-software-properties (0.99.22.3) ...
Setting up libxslt1.1:amd64 (1.1.34-4ubuntu0.22.04.1) ...
Setting up libcryptsetup12:amd64 (2:2.4.3-1ubuntu1.1) ...
Setting up libgtk-4-common (4.6.6+ds-0ubuntu1) ...
Setting up software-properties-common (0.99.22.3) ...
Setting up libwebkit2gtk-4.0-37:amd64 (2.36.6-0ubuntu0.22.04.1) ...
Setting up gir1.2-webkit2-4.0:amd64 (2.36.6-0ubuntu0.22.04.1) ...
Setting up software-properties-gtk (0.99.22.3) ...
Processing triggers for desktop-file-utils (0.26-1ubuntu3) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for libglib2.0-0:amd64 (2.72.1-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for dbus (1.12.20-2ubuntu4) ...
Processing triggers for shared-mime-info (2.1-2) ...
Setting up libgtk-4-1:amd64 (4.6.6+ds-0ubuntu1) ...
Setting up libgtk-4-bin (4.6.6+ds-0ubuntu1) ...
Processing triggers for mailcap (3.70+nmu1ubuntu1) ...
Setting up gir1.2-gtk-4.0:amd64 (4.6.6+ds-0ubuntu1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
nealian@server2:~$
```

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

   Server 1:

```
nealian@server1:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
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 4 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/main amd64 openssh-sftp-server amd64 1:8.9p1-3 [38.8
kB]
Get:2 http://ph.archive.ubuntu.com/ubuntu jammy/main amd64 openssh-server amd64 1:8.9p1-3 [434 kB]
Get:3 http://ph.archive.ubuntu.com/ubuntu jammy/main amd64 ncurses-term all 6.3-2 [267 kB]
Get:4 http://ph.archive.ubuntu.com/ubuntu jammy/main amd64 ssh-import-id all 5.11-0ubuntu1 [10.1 kB]
Fetched 751 kB in 1s (840 kB/s)
Preconfiguring packages ...
Selecting previously unselected package openssh-sftp-server.
(Reading database ... 195576 files and directories currently installed.)
Preparing to unpack .../openssh-sftp-server_1%3a8.9p1-3_amd64.deb ...
Unpacking openssh-sftp-server (1:8.9p1-3) ...
Selecting previously unselected package openssh-server.
Preparing to unpack .../openssh-server_1%3a8.9p1-3_amd64.deb ...
Unpacking openssh-server (1:8.9p1-3) ...
Selecting previously unselected package ncurses-term.
Preparing to unpack .../ncurses-term_6.3-2_all.deb ...
Unpacking ncurses-term (6.3-2) ...
Selecting previously unselected package ssh-import-id.
Preparing to unpack .../ssh-import-id_5.11-0ubuntu1_all.deb ...
Unpacking ssh-import-id (5.11-0ubuntu1) ...
Setting up openssh-sftp-server (1:8.9p1-3) ...
Creating config file /etc/ssh/sshd_config with new version
Creating SSH2 RSA key; this may take some time ...
3072 SHA256:bNbE0kRST4IIxIBsbgyRfDyn6O8L7Ep1H4RR1GNz99o root@server1 (RSA)
Creating SSH2 ECDSA key; this may take some time ...
256 SHA256:3IRTEVa5jAHyccnNLotyOex3gVNdHVu2jQ/420psE+Y root@server1 (ECDSA)
Creating SSH2 ED25519 key; this may take some time ...
256 SHA256:VlELNRsVXf6z3xL17lTuEmliCBY1UeG1nzq/z7pwm54 root@server1 (ED25519)
Created symlink /etc/systemd/system/sshd.service → /lib/systemd/system/ssh.service.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /lib/systemd/system/ssh.ser
vice.
rescue-ssh.target is a disabled or a static unit, not starting it.
ssh.socket is a disabled or a static unit, not starting it.
Setting up ssh-import-id (5.11-0ubuntu1) ...
Setting up ncurses-term (6.3-2) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for ufw (0.36.1-4build1) ...
nealian@server1:~$
```

Server 2:

```
nealian@server2:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
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 4 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/main amd64 openssh-sftp-server amd64 1:8.9p1-3 [38.8
kB]
Get:2 http://ph.archive.ubuntu.com/ubuntu jammy/main amd64 openssh-server amd64 1:8.9p1-3 [434 kB]
Get:3 http://ph.archive.ubuntu.com/ubuntu jammy/main amd64 ncurses-term all 6.3-2 [267 kB]
Get:4 http://ph.archive.ubuntu.com/ubuntu jammy/main amd64 ssh-import-id all 5.11-0ubuntu1 [10.1 kB]
Fetched 751 kB in 1s (1,122 kB/s)
Preconfiguring packages ...
Selecting previously unselected package openssh-sftp-server.
(Reading database ... 195576 files and directories currently installed.)
Preparing to unpack .../openssh-sftp-server_1%3a8.9p1-3_amd64.deb ...
Unpacking openssh-sftp-server (1:8.9p1-3) ...
Selecting previously unselected package openssh-server.
Preparing to unpack .../openssh-server_1%3a8.9p1-3_amd64.deb ...
Unpacking openssh-server (1:8.9p1-3) ...
Selecting previously unselected package ncurses-term.
Preparing to unpack .../ncurses-term_6.3-2_all.deb ...
Unpacking ncurses-term (6.3-2) ...
Selecting previously unselected package ssh-import-id.
Preparing to unpack .../ssh-import-id_5.11-0ubuntu1_all.deb ...
Unpacking ssh-import-id (5.11-0ubuntu1) ...
Setting up openssh-sftp-server (1:8.9p1-3) ...
```

```
Setting up openssh-sftp-server (1:8.9p1-3) ...
Setting up openssh-server (1:8.9p1-3) ...

Creating config file /etc/ssh/sshd_config with new version
Creating SSH2 RSA key; this may take some time ...
3072 SHA256:Br8sgtREGh7pAvrEZMhiT/E7bZOwYHFITVwC/huDbro root@server2 (RSA)
Creating SSH2 ECDSA key; this may take some time ...
256 SHA256:wLLkUBXTNY7jy57+/MP8akBn9DB5Mk4ZThn5uSh0JXI root@server2 (ECDSA)
Creating SSH2 ED25519 key; this may take some time ...
256 SHA256:2c3Yxh0ZB3mo6T3iOTzowpJsYBAA6Yj9ICzJ8ESVUkM root@server2 (ED25519)
Created symlink /etc/systemd/system/sshd.service → /lib/systemd/system/ssh.service.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /lib/systemd/system/ssh.ser
vice.
rescue-ssh.target is a disabled or a static unit, not starting it.
ssh.socket is a disabled or a static unit, not starting it.
Setting up ssh-import-id (5.11-0ubuntu1) ...
Setting up ncurses-term (6.3-2) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for ufw (0.36.1-4build1) ...
nealian@server2:~$
```

3. Verify if the SSH service has started by issuing the following commands:
   3.1 *sudo service ssh start*

   Server 1:

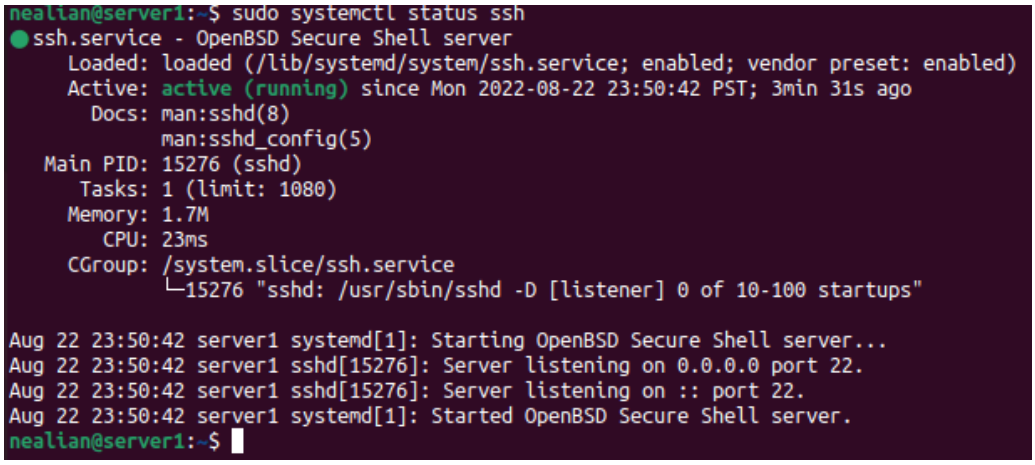
```
nealian@server1:~$ sudo service ssh start
```

   Server 2:

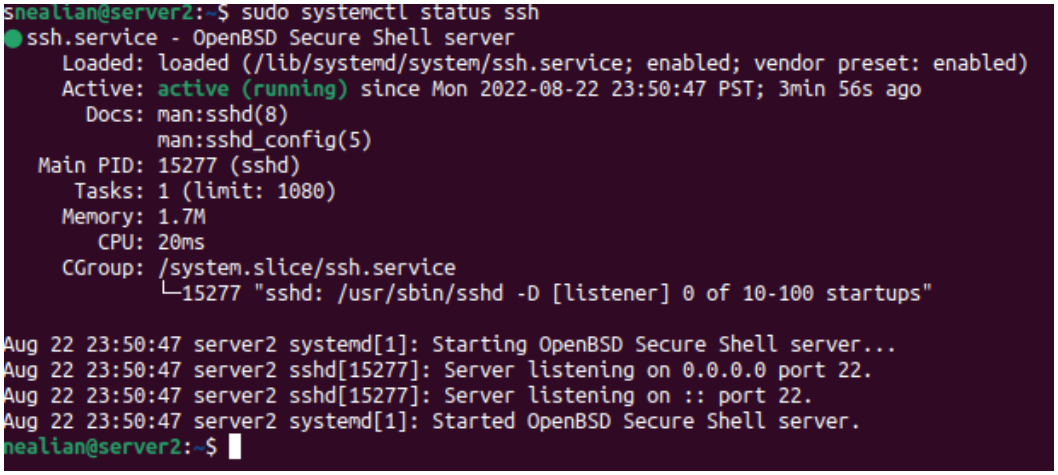
```
nealian@server2:~$ sudo service ssh start
```

   3.2 *sudo systemctl status ssh*

Server 1:

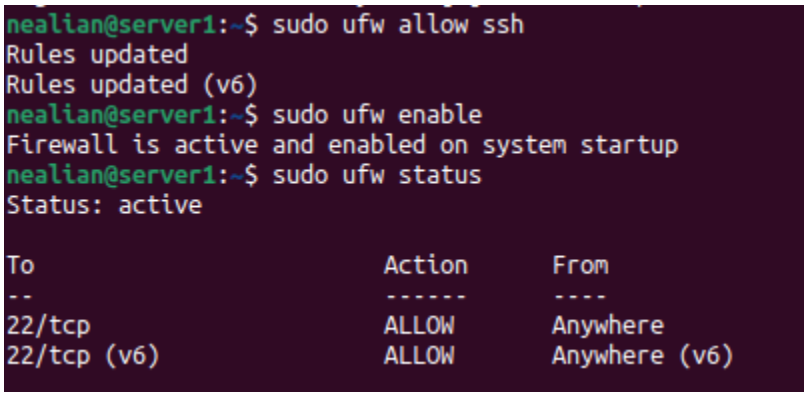


Server 2:



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*

Server 1:



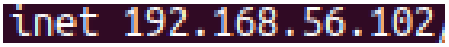
Server 2:

```
nealian@server2:~$ sudo ufw allow ssh
Rules updated
Rules updated (v6)
nealian@server2:~$ sudo ufw enable
Firewall is active and enabled on system startup
nealian@server2:~$ sudo ufw status
Status: active

To                         Action      From
--                         ------      ----
22/tcp                     ALLOW       Anywhere
22/tcp (v6)                ALLOW       Anywhere (v6)
```

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: 192.168.56.102

   1.2 Server 2 IP address: 192.168.56.101

   1.3 Server 3 IP address: 192.168.56.1

2. Make sure that they can ping each other.
   2.1 Connectivity test for Local Machine 1 to Server 1: ☐ Successful

```
nanqu@DESKTOP-1EOI7SG MINGW64 ~
$ ping 192.168.56.102

Pinging 192.168.56.102 with 32 bytes of data:
Reply from 192.168.56.102: bytes=32 time<1ms TTL=64
Reply from 192.168.56.102: bytes=32 time<1ms TTL=64
Reply from 192.168.56.102: bytes=32 time<1ms TTL=64
Reply from 192.168.56.102: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.56.102:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

   2.2 Connectivity test for Local Machine 1 to Server 2: ☐ Successful

```
nanqu@DESKTOP-1EOI7SG MINGW64 ~
$ ping 192.168.56.101

Pinging 192.168.56.101 with 32 bytes of data:
Reply from 192.168.56.101: bytes=32 time<1ms TTL=64
Reply from 192.168.56.101: bytes=32 time<1ms TTL=64
Reply from 192.168.56.101: bytes=32 time<1ms TTL=64
Reply from 192.168.56.101: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.56.101:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

2.3 Connectivity test for Server 1 to Server 2: ☐ Successful

```
nealian@server1:~$ ping 192.168.56.101
PING 192.168.56.101 (192.168.56.101) 56(84) bytes of data.
64 bytes from 192.168.56.101: icmp_seq=1 ttl=64 time=0.520 ms
64 bytes from 192.168.56.101: icmp_seq=2 ttl=64 time=0.612 ms
64 bytes from 192.168.56.101: icmp_seq=3 ttl=64 time=0.245 ms
64 bytes from 192.168.56.101: icmp_seq=4 ttl=64 time=0.535 ms
64 bytes from 192.168.56.101: icmp_seq=5 ttl=64 time=0.256 ms
64 bytes from 192.168.56.101: icmp_seq=6 ttl=64 time=0.349 ms
64 bytes from 192.168.56.101: icmp_seq=7 ttl=64 time=0.235 ms
64 bytes from 192.168.56.101: icmp_seq=8 ttl=64 time=0.373 ms
64 bytes from 192.168.56.101: icmp_seq=9 ttl=64 time=0.247 ms
64 bytes from 192.168.56.101: icmp_seq=10 ttl=64 time=0.402 ms
^C
--- 192.168.56.101 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9222ms
rtt min/avg/max/mdev = 0.235/0.377/0.612/0.130 ms
```

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 jvtaylar@192.168.56.120*

```
nanqu@DESKTOP-1EOI7SG MINGW64 ~
$ ssh nnanquil@192.168.56.102
The authenticity of host '192.168.56.102 (192.168.56.102)' can't be established.
ED25519 key fingerprint is SHA256:VlELNRsVXf6z3xL17lTuEmliCBY1UeG1nzq/z7pwm54.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.56.102' (ED25519) to the list of known hosts.
```

1.2 Enter the password for server 1 when prompted

```
nanqu@DESKTOP-1EOI7SG MINGW64 ~ (master)
$ ssh nealian@192.168.56.102
nealian@192.168.56.102's password:
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-46-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

0 updates can be applied immediately.


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.

nealian@server1:~$
```

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

```
nealian@server1:~$
```

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

```
nealian@server1:~$
logout
Connection to 192.168.56.102 closed.

nanqu@DESKTOP-1EOI7SG MINGW64 ~ (master)
$
```

3. Do the same for Server 2.

```
nanqu@DESKTOP-1EOI7SG MINGW64 ~ (master)
$ ssh nealian@192.168.56.101
The authenticity of host '192.168.56.101 (192.168.56.101)' can't be established.
ED25519 key fingerprint is SHA256:2c3YxhOZB3mo6T3iOTzowpJsYBAA6Yj9ICzJ8ESVUkM.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.56.101' (ED25519) to the list of known hosts.
nealian@192.168.56.101's password:
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-46-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

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individual files in /usr/share/doc/*/copyright.

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

nealian@server2:~$
logout
Connection to 192.168.56.101 closed.

nanqu@DESKTOP-1EOI7SG MINGW64 ~ (master)
$
```
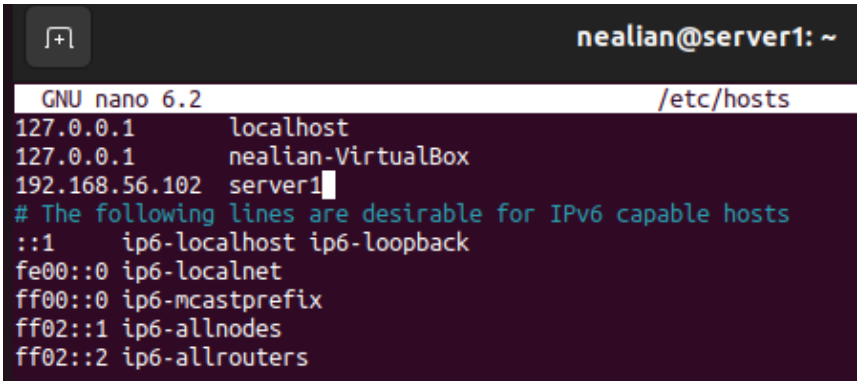
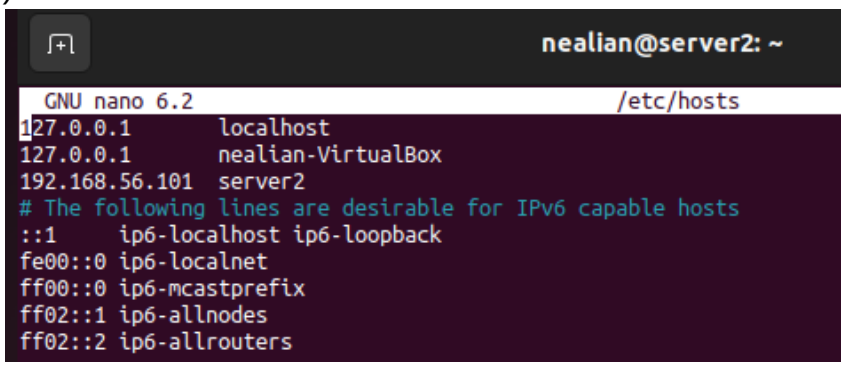

4. Edit the hosts of the Local Machine by issuing the command *sudo nano /etc/hosts.* Below all texts type the following:

4.1 IP_address server 1 (provide the ip address of server 1 followed by the hostname)

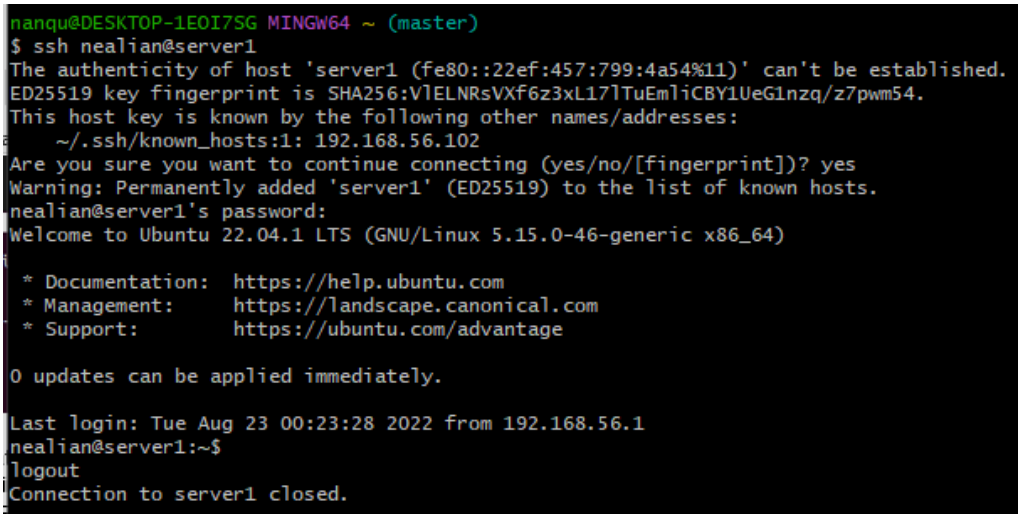


4.2 IP_address server 2 (provide the ip address of server 2 followed by the hostname)



4.3 Save the file and exit.

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 jvtaylar@server1*. Enter the password when prompted. Verify that you have entered Server 1. Do the same for Server 2.



```
nanqu@DESKTOP-1EOI7SG MINGW64 ~ (master)
$ ssh nealian@server2
The authenticity of host 'server2 (fe80::dbc1:d5b8:45b6:591%11)' can't be established.
ED25519 key fingerprint is SHA256:2c3YxhOZB3mo6T3iOTzowpJsYBAA6Yj9ICzJ8ESVUkM.
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:4: 192.168.56.101
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'server2' (ED25519) to the list of known hosts.
nealian@server2's password:
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-46-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

0 updates can be applied immediately.

Last login: Tue Aug 23 00:30:13 2022 from 192.168.56.1
nealian@server2:~$
logout
Connection to server2 closed.
```

Reflections:

Answer the following:

1. **How are we able to use the hostname instead of IP address in SSH commands?**

We are able to use the hostname instead of IP address in SSH commands because we added lines to the file of etc/hosts which is the IP address on the left side following the server's name of the server under the command "sudo nano /etc/hosts". This command translates hostnames to IP addresses.

2. **How secured is SSH?**

   Secure Shell is secured because it gives information security with technical techniques and equipment to manage the clients of the SSH. Also, we can say that the SSH is secured since it has a strong encryption algorithms which provides secure communication between SSH client and server.