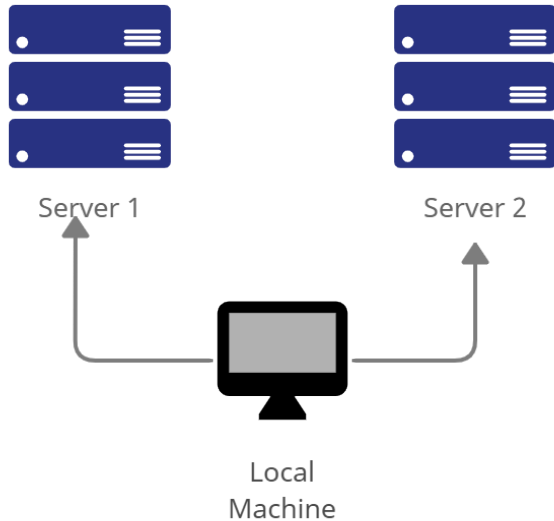


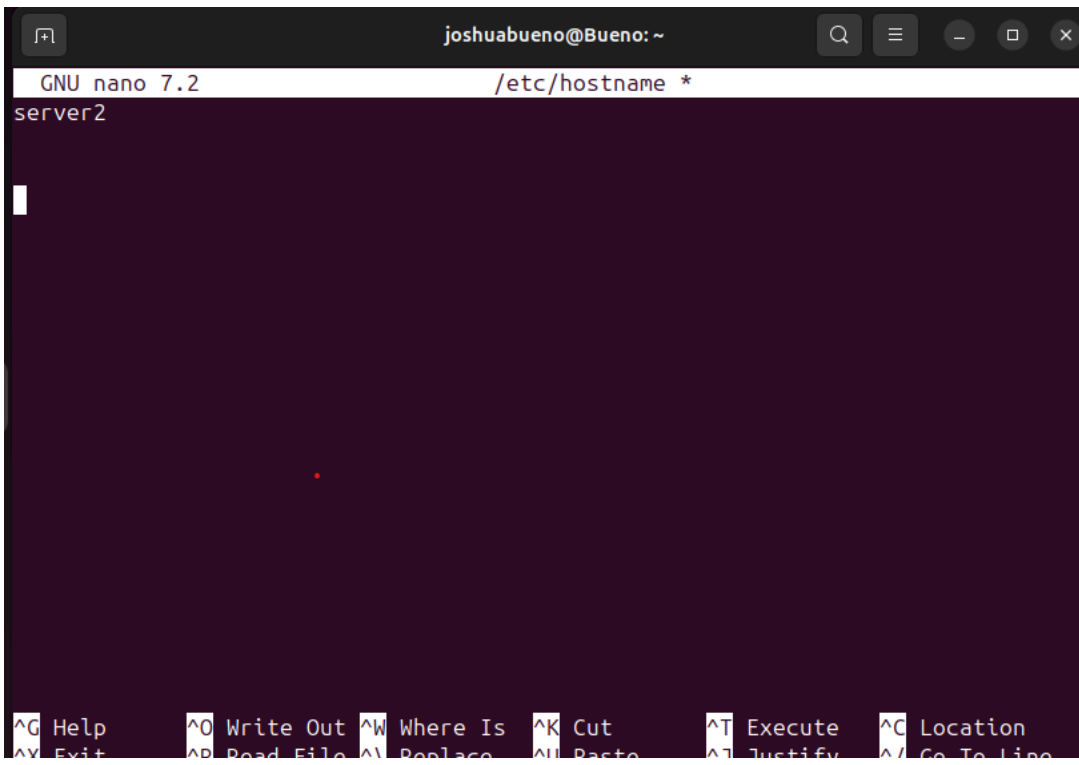
Name: Bueno, Joshua C.	Date Performed: 08/08/25
Course/Section: CPE31S2	Date Submitted: 08/08/25
Instructor: Engr. Robin Valenzuela	Semester and SY: 1st sem (2025-2026)
Activity 1: Configure Network using Virtual Machines	
1. Objectives: 1.1. Create and configure Virtual Machines in Microsoft Azure or 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, <i>provide screenshots for each task</i> . (Note: <i>it is assumed that you have the prior knowledge of cloning and creating snapshots in a virtual machine</i>).	
 <pre> graph TD LocalMachine[Local Machine] --> Server1[Server 1] LocalMachine --> Server2[Server 2] </pre> <p>The diagram illustrates a network topology. At the bottom center is a computer icon labeled "Local Machine". Two lines extend upwards from the "Local Machine" to two server racks. The left server rack is labeled "Server 1" and the right server rack is labeled "Server 2". Each server rack consists of three blue rectangular units, each with a small white circle and three horizontal white lines on its right side.</p>	
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 <i>sudo nano /etc/hostname</i>	

1.1 Use server1 for Server 1



The screenshot shows a terminal window with the title bar "joshuabueno@Bueno: ~". The terminal is running the GNU nano 7.2 text editor, editing the file "/etc/hostname *". The current content of the file is "server1". The nano editor's status bar at the bottom displays various keyboard shortcuts: ^G Help, ^O Write Out, ^W Where Is, ^K Cut, ^T Execute, ^C Location, ^X Exit, ^R Read File, ^\ Replace, ^U Paste, ^J Justify, and ^_ Go To Line. A message "[Read 1 line]" is also visible in the status bar.

1.2 Use server2 for Server 2



The screenshot shows a terminal window with the title bar "joshuabueno@Bueno: ~". The terminal is running the GNU nano 7.2 text editor, editing the file "/etc/hostname *". The current content of the file is "server2". The nano editor's status bar at the bottom displays various keyboard shortcuts: ^G Help, ^O Write Out, ^W Where Is, ^K Cut, ^T Execute, ^C Location, ^X Exit, ^R Read File, ^\ Replace, ^U Paste, ^J Justify, and ^_ Go To Line.

1.3 Use workstation for the Local Machine



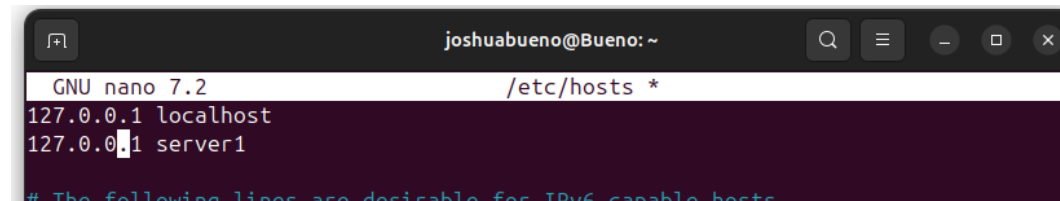
```
GNU nano 7.2 /etc/hostname
workstation
```

[Read 1 line]

^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line

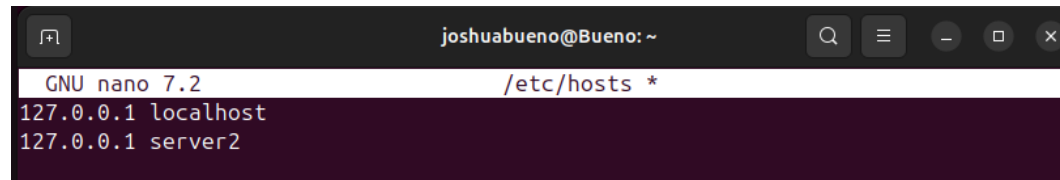
2. Edit the hosts using the command `sudo nano /etc/hosts`. Edit the second line.

2.1 Type 127.0.0.1 server 1 for Server 1



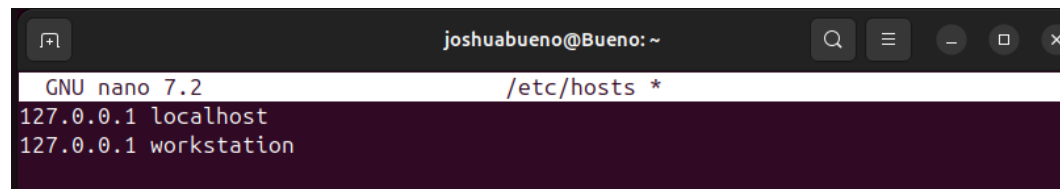
```
GNU nano 7.2 /etc/hosts *
127.0.0.1 localhost
127.0.0.1 server1
# The following lines are desirable for IPv6 capable hosts
```

2.2 Type 127.0.0.1 server 2 for Server 2



```
GNU nano 7.2 /etc/hosts *
127.0.0.1 localhost
127.0.0.1 server2
```

2.3 Type 127.0.0.1 workstation for the Local Machine



```
GNU nano 7.2 /etc/hosts *
127.0.0.1 localhost
127.0.0.1 workstation
```

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.

Workstation:

```
joshuabueno@Bueno:~$ sudo apt update
Hit:1 http://ph.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:3 http://ph.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://ph.archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
168 packages can be upgraded. Run 'apt list --upgradable' to see them.
joshuabueno@Bueno:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages were automatically installed and are no longer required:
  libgl1-amber-dri libglapi-mesa
Use 'sudo apt autoremove' to remove them.
The following packages have been kept back:
  libgl1-amber-dri
```

Server 1:

```
joshuabueno@server1:~$ sudo apt update
Hit:1 http://ph.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://ph.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:4 http://ph.archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
168 packages can be upgraded. Run 'apt list --upgradable' to see them.
joshuabueno@server1:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages were automatically installed and are no longer required:
  libgl1-amber-dri libglapi-mesa
Use 'sudo apt autoremove' to remove them.
The following packages have been kept back:
  libgl1-amber-dri
The following packages will be upgraded:
 alsa-ucm-conf apparmor apt apt-utils base-files bluez bluez-cups bluez-ob
```

Server 2:

```
joshuabueno@Bueno:~$ sudo apt update
Hit:1 http://ph.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://ph.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://ph.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
168 packages can be upgraded. Run 'apt list --upgradable' to see them.
joshuabueno@Bueno:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages were automatically installed and are no longer required:
  libgl1-amber-dri libglapi-mesa
```

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

Workstation:

```
joshuabueno@Bueno:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer requ
  libgl1-amber-dri libglapi-mesa
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 1 not upgraded.
Need to get 832 kB of archives.
After this operation, 6,743 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://ph.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh
server amd64 1:9.6p1-3ubuntu13.13 [37.1 kB]
```

Server 1:

```
joshuabueno@server1:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libgl1-amber-dri libglapi-mesa
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 1 not upgraded.
Need to get 832 kB of archives.
After this operation, 6,743 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://ph.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-sftp-
server amd64 1:9.6p1-3ubuntu13.13 [37.1 kB]
Get:2 http://ph.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-server
 amd64 1:9.6p1-3ubuntu13.13 [510 kB]
Get:3 http://ph.archive.ubuntu.com/ubuntu noble/main amd64 ncurses-term all 6.4+
```

Server 2:

```
joshuabueno@Bueno:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libgl1-amber-dri libglapi-mesa
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 1 not upgraded.
Need to get 832 kB of archives.
After this operation, 6,743 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://ph.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-:
server amd64 1:9.6p1-3ubuntu13.13 [37.1 kB]
```

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

- 3.1 *sudo service ssh start*

- 3.2 *sudo systemctl status ssh*

Workstation:

```
joshuabueno@Bueno:~$ sudo service ssh start
[sudo] password for joshuabueno:
joshuabueno@Bueno:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; disabled; preset: enabled)
   Active: active (running) since Fri 2025-08-08 09:40:02 UTC; 10s ago
 TriggeredBy: ● ssh.socket
    Docs: man:sshd(8)
          man:sshd_config(5)
   Process: 22904 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
   Main PID: 22906 (sshd)
     Tasks: 1 (limit: 3751)
    Memory: 1.2M (peak: 1.6M)
       CPU: 19ms
    CGroup: /system.slice/ssh.service
            └─22906 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Aug 08 09:40:02 Bueno systemd[1]: Starting ssh.service - OpenBSD Secure Shell server:
Aug 08 09:40:02 Bueno sshd[22906]: Server listening on 0.0.0.0 port 22.
Aug 08 09:40:02 Bueno sshd[22906]: Server listening on :: port 22.
Aug 08 09:40:02 Bueno systemd[1]: Started ssh.service - OpenBSD Secure Shell server:
lines 1-18/18 (END)
```

Server 1:

```
joshuabueno@server1:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; disabled; preset: enabled)
   Active: active (running) since Fri 2025-08-08 09:55:51 UTC; 19s ago
 TriggeredBy: ● ssh.socket
    Docs: man:sshd(8)
          man:sshd_config(5)
   Process: 21529 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
   Main PID: 21530 (sshd)
     Tasks: 1 (limit: 3751)
    Memory: 1.2M (peak: 1.8M)
       CPU: 22ms
    CGroup: /system.slice/ssh.service
            └─21530 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Aug 08 09:55:51 server1 systemd[1]: Starting ssh.service - OpenBSD Secure Shell server:
Aug 08 09:55:51 server1 sshd[21530]: Server listening on 0.0.0.0 port 22.
Aug 08 09:55:51 server1 sshd[21530]: Server listening on :: port 22.
Aug 08 09:55:51 server1 systemd[1]: Started ssh.service - OpenBSD Secure Shell server:
lines 1-18/18 (END)
```

Server 2:

```
joshuabueno@Bueno:~$ sudo service ssh start
[sudo] password for joshuabueno:
joshuabueno@Bueno:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; disabled; preset: enabled)
   Active: active (running) since Fri 2025-08-08 09:40:58 UTC; 8s ago
     TriggeredBy: ● ssh.socket
       Docs: man:sshd(8)
             man:sshd_config(5)
    Process: 22988 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
   Main PID: 22989 (sshd)
      Tasks: 1 (limit: 3751)
     Memory: 1.2M (peak: 1.5M)
        CPU: 27ms
       CGroup: /system.slice/ssh.service
               └─22989 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Aug 08 09:40:58 Bueno systemd[1]: Starting ssh.service - OpenBSD Secure Shell server:
Aug 08 09:40:58 Bueno sshd[22989]: Server listening on 0.0.0.0 port 22.
Aug 08 09:40:58 Bueno sshd[22989]: Server listening on :: port 22.
Aug 08 09:40:58 Bueno systemd[1]: Started ssh.service - OpenBSD Secure Shell server:
lines 1-18/18 (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*

Workstation:

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

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

Server 1:

```
joshuabueno@server1:~$ sudo ufw allow ssh
Rules updated
Rules updated (v6)
joshuabueno@server1:~$ sudo ufw enable
Firewall is active and enabled on system startup
joshuabueno@server1:~$ sudo ufw status
Status: active

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

Server 2:

```
[1]+ Stopped sudo systemctl status ssh
joshuabueno@Bueno:~$ sudo ufw allow ssh
Rules updated
Rules updated (v6)
joshuabueno@Bueno:~$ sudo ufw enable
Firewall is active and enabled on system startup
joshuabueno@Bueno:~$ sudo ufw status
Status: active

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

joshuabueno@Bueno:~$
```

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: 192.168.56.111

```
joshuabueno@server1:~$ 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 fd00::a00:27ff:feff:52e9 prefixlen 64 scopeid 0x0<global>
    inet6 fe80::a00:27ff:feff:52e9 prefixlen 64 scopeid 0x20<link>
    inet6 fd00::6949:c48f:56ad:370f prefixlen 64 scopeid 0x0<global>
    ether 08:00:27:ff:52:e9 txqueuelen 1000 (Ethernet)
    RX packets 149921 bytes 146551574 (146.5 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 47235 bytes 2878747 (2.8 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.111 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::6e02:14eb:f33e:e7fc prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:0c:fb:63 txqueuelen 1000 (Ethernet)
    RX packets 55 bytes 11770 (11.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 71 bytes 9049 (9.0 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
```

1.2 Server 2 IP address: 192.168.56.113

```
joshuabueno@server2: ~
joshuabueno@server2:~$ 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::a00:27ff:fec8:81 prefixlen 64 scopeid 0x20<link>
    inet6 fd00::a00:27ff:fec8:81 prefixlen 64 scopeid 0x0<global>
    inet6 fd00::64cc:f9ea:5830:99e8 prefixlen 64 scopeid 0x0<global>
    ether 08:00:27:c8:00:81 txqueuelen 1000 (Ethernet)
    RX packets 79 bytes 11992 (11.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 173 bytes 22160 (22.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.113 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::5381:5d0b:bae7:5de6 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:18:3d:33 txqueuelen 1000 (Ethernet)
    RX packets 79 bytes 13116 (13.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 52 bytes 7185 (7.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

1.3 Server 3 IP address: 192.168.56.112

```
joshuabuena@workstation: ~  
joshuabuena@workstation:~$ 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::a00:27ff:feaf:738b prefixlen 64 scopeid 0x20<link>  
    inet6 fd00::1f6b:37df:6aee:451b prefixlen 64 scopeid 0x0<global>  
    inet6 fd00::a00:27ff:feaf:738b prefixlen 64 scopeid 0x0<global>  
    ether 08:00:27:af:73:8b txqueuelen 1000 (Ethernet)  
    RX packets 89  bytes 11596 (11.5 KB)  
    RX errors 0  dropped 0  overruns 0  frame 0  
    TX packets 184  bytes 21903 (21.9 KB)  
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0  
  
enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 192.168.56.112 netmask 255.255.255.0 broadcast 192.168.56.255  
    inet6 fe80::3ea7:54b8:588a:8493 prefixlen 64 scopeid 0x20<link>  
    ether 08:00:27:5c:e1:7c txqueuelen 1000 (Ethernet)  
    RX packets 89  bytes 14713 (14.7 KB)  
    RX errors 0  dropped 0  overruns 0  frame 0  
    TX packets 57  bytes 7617 (7.6 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
```

2. Make sure that they can ping each other.

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

```
joshuabuena@workstation:~$ ping 192.168.56.111  
PING 192.168.56.111 (192.168.56.111) 56(84) bytes of data:  
64 bytes from 192.168.56.111: icmp_seq=1 ttl=64 time=0.933 ms  
64 bytes from 192.168.56.111: icmp_seq=2 ttl=64 time=0.438 ms  
64 bytes from 192.168.56.111: icmp_seq=3 ttl=64 time=0.505 ms  
64 bytes from 192.168.56.111: icmp_seq=4 ttl=64 time=0.972 ms  
64 bytes from 192.168.56.111: icmp_seq=5 ttl=64 time=0.649 ms  
64 bytes from 192.168.56.111: icmp_seq=6 ttl=64 time=1.20 ms  
64 bytes from 192.168.56.111: icmp_seq=7 ttl=64 time=0.599 ms  
64 bytes from 192.168.56.111: icmp_seq=8 ttl=64 time=0.681 ms  
64 bytes from 192.168.56.111: icmp_seq=9 ttl=64 time=2.62 ms  
64 bytes from 192.168.56.111: icmp_seq=10 ttl=64 time=0.664 ms  
64 bytes from 192.168.56.111: icmp_seq=11 ttl=64 time=1.43 ms  
64 bytes from 192.168.56.111: icmp_seq=12 ttl=64 time=1.23 ms  
64 bytes from 192.168.56.111: icmp_seq=13 ttl=64 time=1.26 ms  
64 bytes from 192.168.56.111: icmp_seq=14 ttl=64 time=1.59 ms
```

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

```
joshuabueno@workstation:~$ ping 192.168.56.113
PING 192.168.56.113 (192.168.56.113) 56(84) bytes of data.
64 bytes from 192.168.56.113: icmp_seq=1 ttl=64 time=0.863 ms
64 bytes from 192.168.56.113: icmp_seq=2 ttl=64 time=0.688 ms
64 bytes from 192.168.56.113: icmp_seq=3 ttl=64 time=1.23 ms
64 bytes from 192.168.56.113: icmp_seq=4 ttl=64 time=0.888 ms
64 bytes from 192.168.56.113: icmp_seq=5 ttl=64 time=0.959 ms
64 bytes from 192.168.56.113: icmp_seq=6 ttl=64 time=0.554 ms
64 bytes from 192.168.56.113: icmp_seq=7 ttl=64 time=2.95 ms
64 bytes from 192.168.56.113: icmp_seq=8 ttl=64 time=0.581 ms
64 bytes from 192.168.56.113: icmp_seq=9 ttl=64 time=0.750 ms
64 bytes from 192.168.56.113: icmp_seq=10 ttl=64 time=0.339 ms
64 bytes from 192.168.56.113: icmp_seq=11 ttl=64 time=0.380 ms
64 bytes from 192.168.56.113: icmp_seq=12 ttl=64 time=0.538 ms
64 bytes from 192.168.56.113: icmp_seq=13 ttl=64 time=0.521 ms
64 bytes from 192.168.56.113: icmp_seq=14 ttl=64 time=1.17 ms
64 bytes from 192.168.56.113: icmp_seq=15 ttl=64 time=0.515 ms
64 bytes from 192.168.56.113: icmp_seq=16 ttl=64 time=0.858 ms
64 bytes from 192.168.56.113: icmp_seq=17 ttl=64 time=1.32 ms
64 bytes from 192.168.56.113: icmp_seq=18 ttl=64 time=0.982 ms
```

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

```
joshuabueno@server1:~$ ping 192.168.56.113
PING 192.168.56.113 (192.168.56.113) 56(84) bytes of data.
64 bytes from 192.168.56.113: icmp_seq=1 ttl=64 time=3.18 ms
64 bytes from 192.168.56.113: icmp_seq=2 ttl=64 time=0.487 ms
64 bytes from 192.168.56.113: icmp_seq=3 ttl=64 time=0.479 ms
64 bytes from 192.168.56.113: icmp_seq=4 ttl=64 time=0.798 ms
64 bytes from 192.168.56.113: icmp_seq=5 ttl=64 time=0.430 ms
64 bytes from 192.168.56.113: icmp_seq=6 ttl=64 time=0.330 ms
64 bytes from 192.168.56.113: icmp_seq=7 ttl=64 time=0.322 ms
64 bytes from 192.168.56.113: icmp_seq=8 ttl=64 time=0.954 ms
64 bytes from 192.168.56.113: icmp_seq=9 ttl=64 time=0.434 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 jvtaylor@192.168.56.120`

1.2 Enter the password for server 1 when prompted

1.3 Verify that you are in server 1. The user should be in this format `user@server1`.

For example, `jvtaylor@server1`

```
joshuabueno@workstation:~$ ssh joshuabueno@192.168.56.111
joshuabueno@192.168.56.111's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-27-generic x86_64)

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

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

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.

joshuabueno@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)

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

```
GNU nano 7.2 /etc/hosts
127.0.0.1 localhost
127.0.0.1 workstation
192.168.56.111 server1
192.168.56.113 server2

# 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
```

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

Server 1:

```
joshuabueno@workstation:~$ ssh joshuabueno@server1
joshuabueno@server1's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-27-generic x86_64)

 * Documentation:  https://help.ubuntu.com
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Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Fri Aug  8 10:19:41 2025 from 192.168.56.112
joshuabueno@server1:~$
```

Server 2:

```
joshuabueno@workstation:~$ ssh joshuabueno@server2
joshuabueno@server2's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-27-generic x86_64)

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

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Fri Aug  8 10:21:03 2025 from 192.168.56.112
joshuabueno@server2:~$
```

Reflections:

Answer the following:

1. How are we able to use the hostname instead of IP address in SSH commands?
-We can use hostnames in SSH because the system resolves them to IP addresses using DNS (Domain Name System) or local methods like the `/etc/hosts` file. Once the hostname is resolved, SSH uses the IP address to establish a secure connection.
2. How secured is SSH?
-SSH is highly secure due to strong encryption, key-based authentication, and integrity checks that protect data during transmission. However, it can be vulnerable if misconfigured, such as using weak passwords or outdated software.

