Name: Niemo, Christian Al C.	**Date Performed: Aug 5, 2023**
Course/Section: CPE 232 - CPE31S6	**Date Submitted:**
Instructor: Dr. Jonathan Taylar	**Semester and SY: 1st Sem, 2023-2024**

Activity 1: Configure Network using Virtual Machines

1. Objectives:

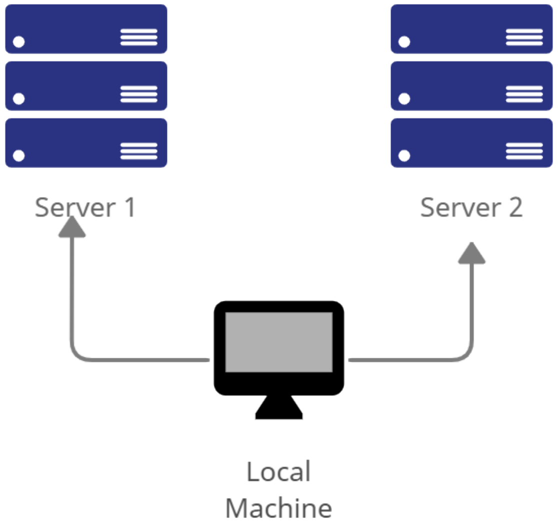
1.1. Create and configure Virtual Machines in Microsoft Azure or VirtualBox

1.2. Set-up a Virtual Network and Test Connectivity of VMs

2. Discussion:

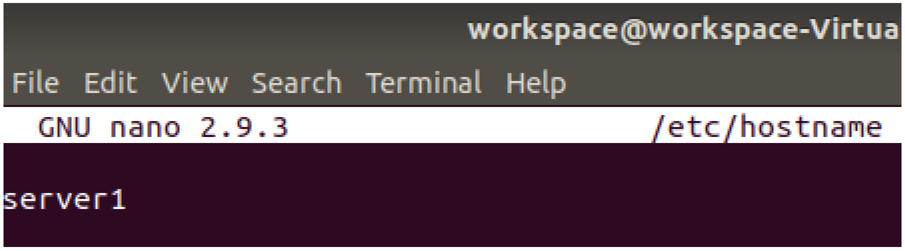
Network Topology:

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*).



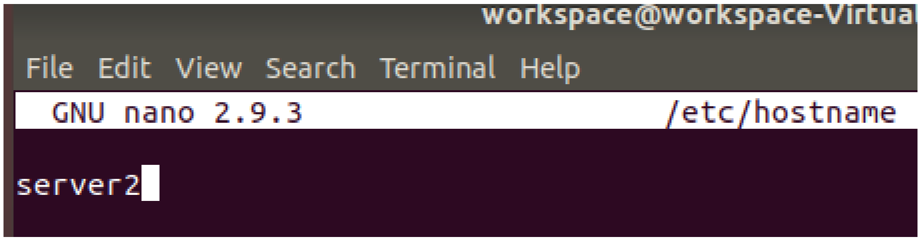
Task 1: Do the following on Server 1, Server 2, and Local Machine. In editing the file using nano command, press control + O to write out (save the file). Press enter when asked for the name of the file. Press control + X to end.

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


workspace@workspace-Virtua
File Edit View Search Terminal Help

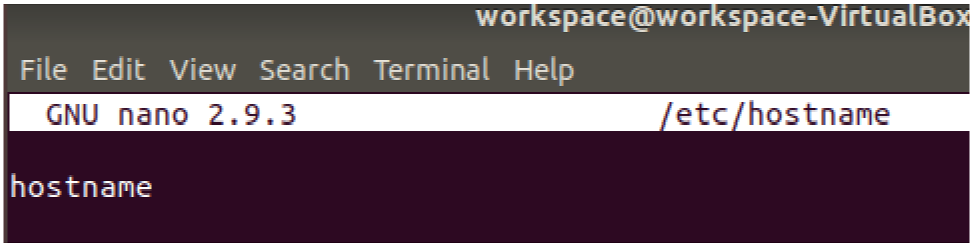
```
  GNU nano 2.9.3                    /etc/hostname

server1
```

1.2 Use server2 for Server 2


workspace@workspace-Virtua
File Edit View Search Terminal Help

```
  GNU nano 2.9.3                    /etc/hostname

server2
```

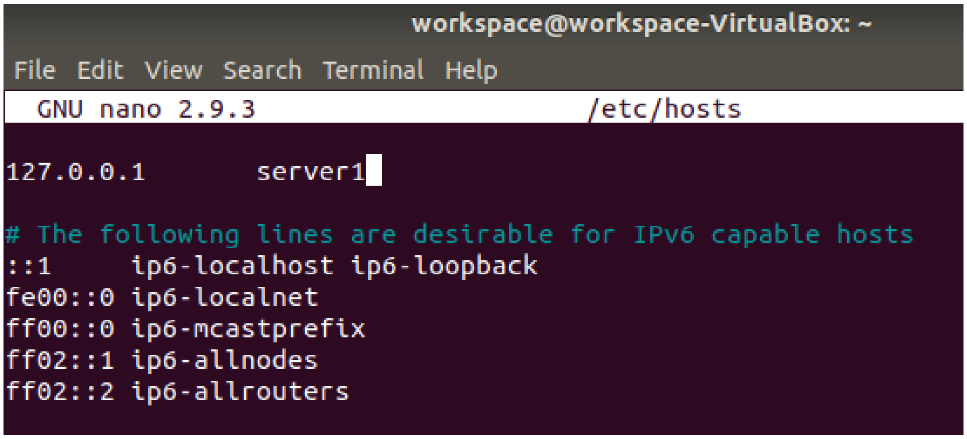
1.3 Use workstation for the Local Machine


workspace@workspace-VirtualBox
File Edit View Search Terminal Help

```
  GNU nano 2.9.3                    /etc/hostname

hostname
```

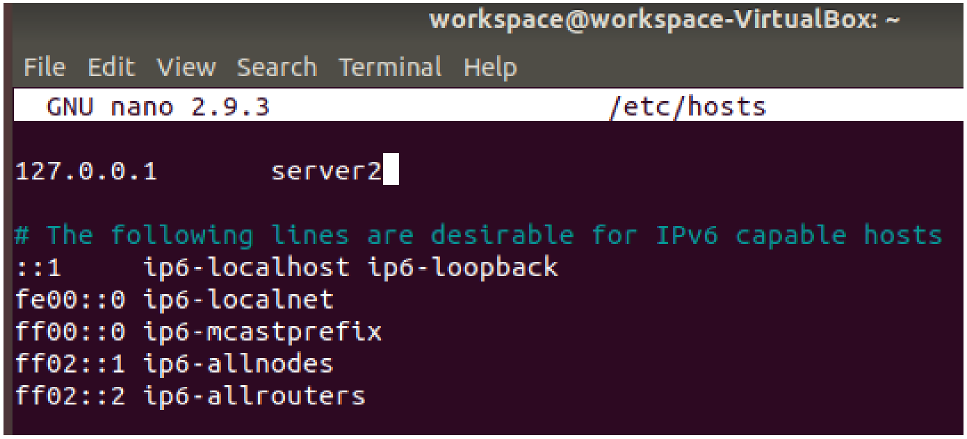
2. Edit the hosts using the command *sudo nano /etc/hosts*. Edit the second line.

2.1 Type 127.0.0.1 server 1 for Server 1


workspace@workspace-VirtualBox: ~
File Edit View Search Terminal Help

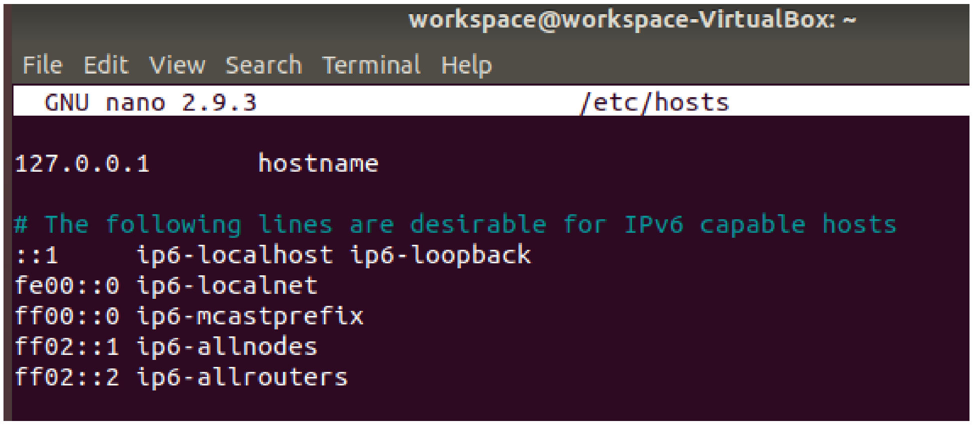
```
  GNU nano 2.9.3                         /etc/hosts

127.0.0.1       server1

# 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
```

2.2 Type 127.0.0.1 server 2 for Server 2


workspace@workspace-VirtualBox: ~
File Edit View Search Terminal Help

```
  GNU nano 2.9.3                              /etc/hosts

127.0.0.1       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
```

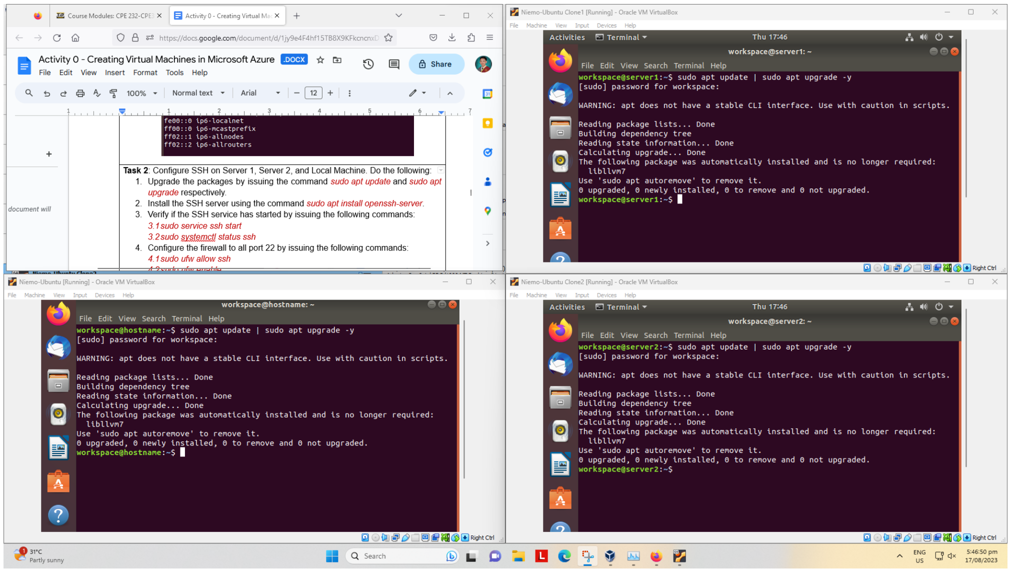
2.3 Type 127.0.0.1 workstation for the Local Machine


workspace@workspace-VirtualBox: ~
File Edit View Search Terminal Help

```
  GNU nano 2.9.3                              /etc/hosts

127.0.0.1       hostname

# 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
```

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.


Course Modules: CPE 232-CPE
Activity 0 - Creating Virtual Ma
https://docs.google.com/document/d/1jy9e4F4hf15TB8X9KFkcncnxD
Activity 0 - Creating Virtual Machines in Microsoft Azure
.DOCX
File Edit View Insert Format Tools Help
Share
100%
Normal text
Arial
12
document will

```
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
```

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*.
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
4. Configure the firewall to all port 22 by issuing the following commands:
   4.1 sudo ufw allow ssh
   4.2 sudo ufw enable

Niemo-Ubuntu Clone1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thu 17:46
workspace@server1: ~
File Edit View Search Terminal Help
Right Ctrl

```
workspace@server1:~$ sudo apt update | sudo apt upgrade -y
[sudo] password for workspace:

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following package was automatically installed and is no longer required:
  libllvm7
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
workspace@server1:~$
```

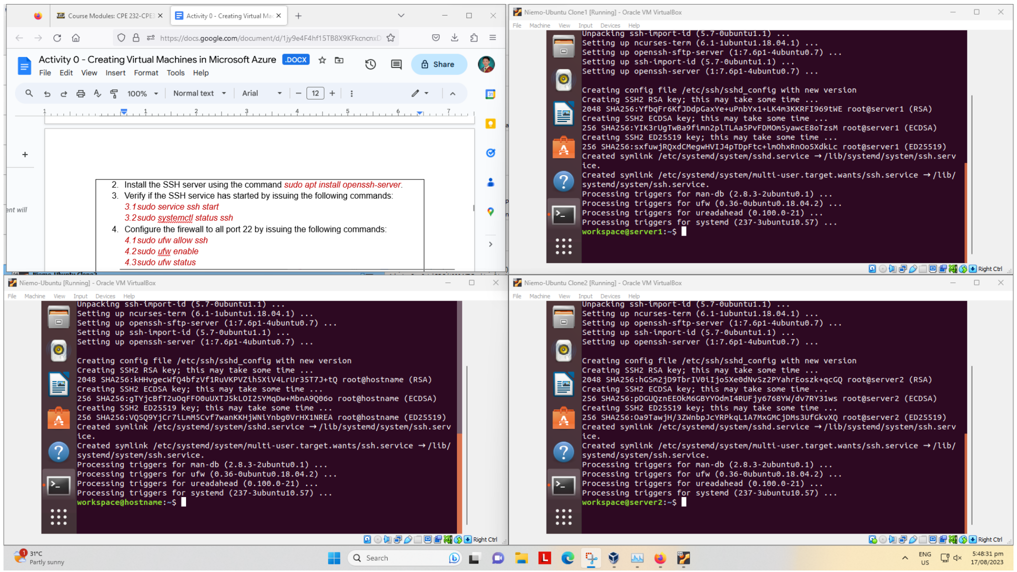
Niemo-Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
workspace@hostname: ~
File Edit View Search Terminal Help
Right Ctrl

```
workspace@hostname:~$ sudo apt update | sudo apt upgrade -y
[sudo] password for workspace:

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following package was automatically installed and is no longer required:
  libllvm7
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
workspace@hostname:~$
```

Niemo-Ubuntu Clone2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thu 17:46
workspace@server2: ~
File Edit View Search Terminal Help
Right Ctrl

```
workspace@server2:~$ sudo apt update | sudo apt upgrade -y
[sudo] password for workspace:

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following package was automatically installed and is no longer required:
  libllvm7
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
workspace@server2:~$
```

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


Activity 0 - Creating Virtual Machines in Microsoft Azure
Niemo-Ubuntu Clone1 [Running] - Oracle VM VirtualBox
Niemo-Ubuntu [Running] - Oracle VM VirtualBox
Niemo-Ubuntu Clone2 [Running] - Oracle VM VirtualBox
5:48:31 pm
17/08/2023

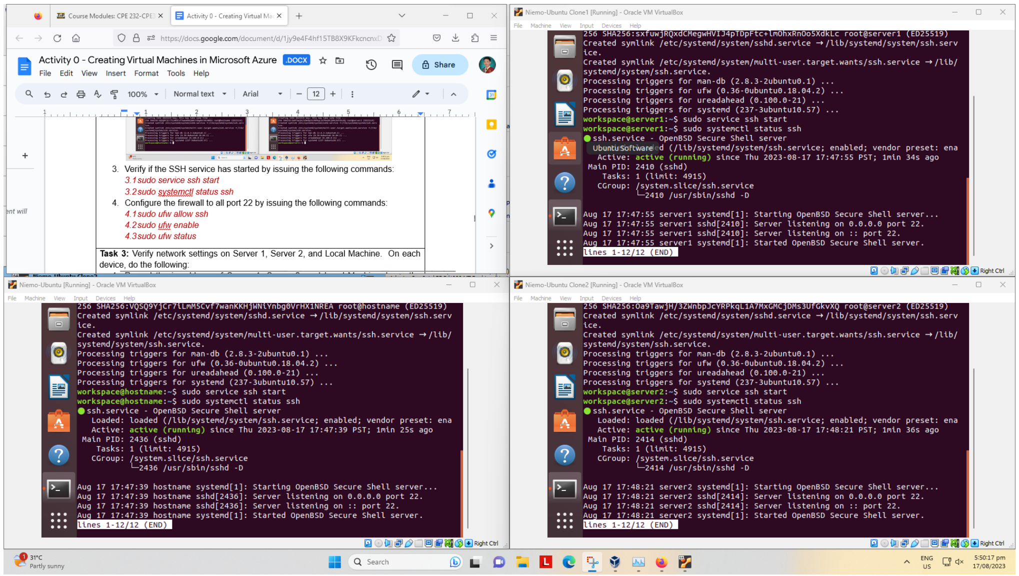
2. Install the SSH server using the command *sudo apt install openssh-server.*
3. Verify if the SSH service has started by issuing the following commands:
   3.1 sudo service ssh start
   3.2 sudo systemctl status ssh
4. Configure the firewall to all port 22 by issuing the following commands:
   4.1 sudo ufw allow ssh
   4.2 sudo ufw enable
   4.3 sudo ufw status

```
Unpacking ssh-import-id (5.7-0ubuntu1.1) ...
Setting up ncurses-term (6.1-1ubuntu1.18.04.1) ...
Setting up openssh-sftp-server (1:7.6p1-4ubuntu0.7) ...
Setting up ssh-import-id (5.7-0ubuntu1.1) ...
Setting up openssh-server (1:7.6p1-4ubuntu0.7) ...

Creating config file /etc/ssh/sshd_config with new version
Creating SSH2 RSA key; this may take some time ...
2048 SHA256:YfbqFr6KfJDdpGaxYe+uPnbYx1+LK4m3KKRFI969tWE root@server1 (RSA)
Creating SSH2 ECDSA key; this may take some time ...
256 SHA256:YIK3rUgTwBa9fimn2plTLAa5PvFDMOm5yawcE8oTzsM root@server1 (ECDSA)
Creating SSH2 ED25519 key; this may take some time ...
256 SHA256:sxfuwjRQxdCMegwHVIJ4pTDpFtc+lmOhxRnOo5XdkLc root@server1 (ED25519)
Created symlink /etc/systemd/system/sshd.service → /lib/systemd/system/ssh.serv
ice.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /lib/
systemd/system/ssh.service.
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ufw (0.36-0ubuntu0.18.04.2) ...
Processing triggers for ureadahead (0.100.0-21) ...
Processing triggers for systemd (237-3ubuntu10.57) ...
workspace@server1:~$
```

```
Unpacking ssh-import-id (5.7-0ubuntu1.1) ...
Setting up ncurses-term (6.1-1ubuntu1.18.04.1) ...
Setting up openssh-sftp-server (1:7.6p1-4ubuntu0.7) ...
Setting up ssh-import-id (5.7-0ubuntu1.1) ...
Setting up openssh-server (1:7.6p1-4ubuntu0.7) ...

Creating config file /etc/ssh/sshd_config with new version
Creating SSH2 RSA key; this may take some time ...
2048 SHA256:kHHvgecWfQ4bfzVf1RuVKPVZih5XiV4LrUr35T7J+tQ root@hostname (RSA)
Creating SSH2 ECDSA key; this may take some time ...
256 SHA256:gTYjcBfT2uOqFFO0uUXTJ5kLOI25YMqDw+MbnA9Q06o root@hostname (ECDSA)
Creating SSH2 ED25519 key; this may take some time ...
256 SHA256:VQSQ9YjCr7iLmM5Cvf7wanKKHjWNiYnbg0VrHX1NREA root@hostname (ED25519)
Created symlink /etc/systemd/system/sshd.service → /lib/systemd/system/ssh.serv
ice.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /lib/
systemd/system/ssh.service.
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ufw (0.36-0ubuntu0.18.04.2) ...
Processing triggers for ureadahead (0.100.0-21) ...
Processing triggers for systemd (237-3ubuntu10.57) ...
workspace@hostname:~$
```

```
Unpacking ssh-import-id (5.7-0ubuntu1.1) ...
Setting up ncurses-term (6.1-1ubuntu1.18.04.1) ...
Setting up openssh-sftp-server (1:7.6p1-4ubuntu0.7) ...
Setting up ssh-import-id (5.7-0ubuntu1.1) ...
Setting up openssh-server (1:7.6p1-4ubuntu0.7) ...

Creating config file /etc/ssh/sshd_config with new version
Creating SSH2 RSA key; this may take some time ...
2048 SHA256:hGSm2jD9TbrIV0iIjo5Xe0dNvSz2PYahrEoszk+qcGQ root@server2 (RSA)
Creating SSH2 ECDSA key; this may take some time ...
256 SHA256:pDGUQznEEOkM6GBYYOdmI4RUFjy6768YW/dv7RY31ws root@server2 (ECDSA)
Creating SSH2 ED25519 key; this may take some time ...
256 SHA256:Oa9TawjH/3ZWnbpJcYRPkqL1A7MxGMCjDMs3UfGkvXQ root@server2 (ED25519)
Created symlink /etc/systemd/system/sshd.service → /lib/systemd/system/ssh.serv
ice.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /lib/
systemd/system/ssh.service.
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ufw (0.36-0ubuntu0.18.04.2) ...
Processing triggers for ureadahead (0.100.0-21) ...
Processing triggers for systemd (237-3ubuntu10.57) ...
workspace@server2:~$
```

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


Activity 0 - Creating Virtual Machines in Microsoft Azure
Niemo-Ubuntu Clone1 [Running] - Oracle VM VirtualBox
Niemo-Ubuntu [Running] - Oracle VM VirtualBox
Niemo-Ubuntu Clone2 [Running] - Oracle VM VirtualBox
Ubuntu Software
5:50:17 pm
17/08/2023

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
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

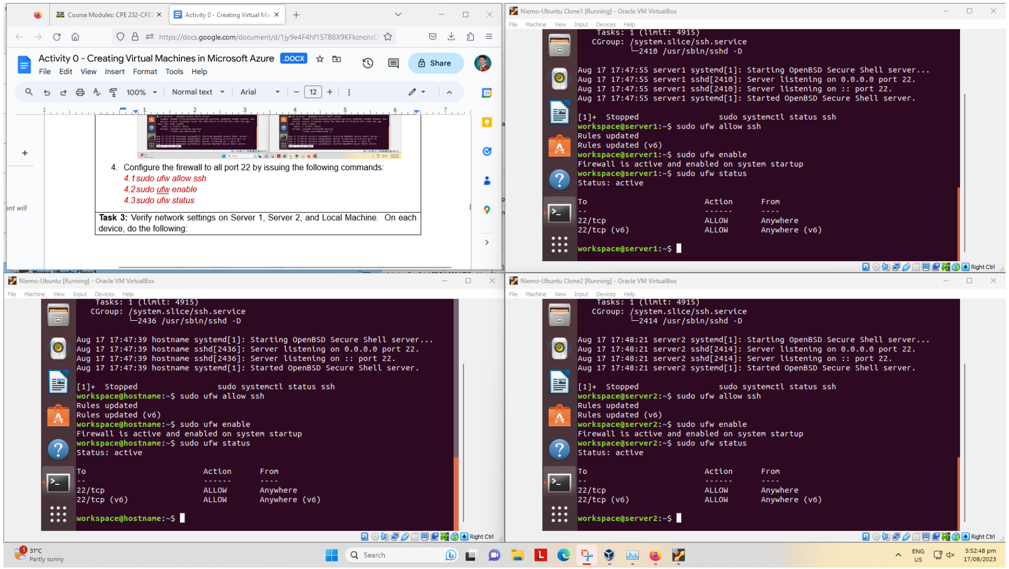
Task 3: Verify network settings on Server 1, Server 2, and Local Machine. On each device, do the following:

```
256 SHA256:sxfuwjRQxdCMegwHVIJ4pTDpFtc+lmOhxRnOo5XdkLc root@server1 (ED25519)
Created symlink /etc/systemd/system/sshd.service → /lib/systemd/system/ssh.serv
ice.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /lib/
systemd/system/ssh.service.
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ufw (0.36-0ubuntu0.18.04.2) ...
Processing triggers for ureadahead (0.100.0-21) ...
Processing triggers for systemd (237-3ubuntu10.57) ...
workspace@server1:~$ sudo service ssh start
workspace@server1:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
         ed (/lib/systemd/system/ssh.service; enabled; vendor preset: ena
   Active: active (running) since Thu 2023-08-17 17:47:55 PST; 1min 34s ago
 Main PID: 2410 (sshd)
    Tasks: 1 (limit: 4915)
   CGroup: /system.slice/ssh.service
           └─2410 /usr/sbin/sshd -D

Aug 17 17:47:55 server1 systemd[1]: Starting OpenBSD Secure Shell server...
Aug 17 17:47:55 server1 sshd[2410]: Server listening on 0.0.0.0 port 22.
Aug 17 17:47:55 server1 sshd[2410]: Server listening on :: port 22.
Aug 17 17:47:55 server1 systemd[1]: Started OpenBSD Secure Shell server.
lines 1-12/12 (END)
```

```
256 SHA256:VQSQ9YjCr7iLmM5Cvf7wanKKHjWNiYnbg0VrHX1NREA root@hostname (ED25519)
Created symlink /etc/systemd/system/sshd.service → /lib/systemd/system/ssh.serv
ice.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /lib/
systemd/system/ssh.service.
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ufw (0.36-0ubuntu0.18.04.2) ...
Processing triggers for ureadahead (0.100.0-21) ...
Processing triggers for systemd (237-3ubuntu10.57) ...
workspace@hostname:~$ sudo service ssh start
workspace@hostname:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: ena
   Active: active (running) since Thu 2023-08-17 17:47:39 PST; 1min 25s ago
 Main PID: 2436 (sshd)
    Tasks: 1 (limit: 4915)
   CGroup: /system.slice/ssh.service
           └─2436 /usr/sbin/sshd -D

Aug 17 17:47:39 hostname systemd[1]: Starting OpenBSD Secure Shell server...
Aug 17 17:47:39 hostname sshd[2436]: Server listening on 0.0.0.0 port 22.
Aug 17 17:47:39 hostname sshd[2436]: Server listening on :: port 22.
Aug 17 17:47:39 hostname systemd[1]: Started OpenBSD Secure Shell server.
lines 1-12/12 (END)
```

```
256 SHA256:Oa9TawjH/3ZWnbpJcYRPkqL1A7MxGMCjDMs3UfGkvXQ root@server2 (ED25519)
Created symlink /etc/systemd/system/sshd.service → /lib/systemd/system/ssh.serv
ice.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /lib/
systemd/system/ssh.service.
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ufw (0.36-0ubuntu0.18.04.2) ...
Processing triggers for ureadahead (0.100.0-21) ...
Processing triggers for systemd (237-3ubuntu10.57) ...
workspace@server2:~$ sudo service ssh start
workspace@server2:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: ena
   Active: active (running) since Thu 2023-08-17 17:48:21 PST; 1min 36s ago
 Main PID: 2414 (sshd)
    Tasks: 1 (limit: 4915)
   CGroup: /system.slice/ssh.service
           └─2414 /usr/sbin/sshd -D

Aug 17 17:48:21 server2 systemd[1]: Starting OpenBSD Secure Shell server...
Aug 17 17:48:21 server2 sshd[2414]: Server listening on 0.0.0.0 port 22.
Aug 17 17:48:21 server2 sshd[2414]: Server listening on :: port 22.
Aug 17 17:48:21 server2 systemd[1]: Started OpenBSD Secure Shell server.
lines 1-12/12 (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



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:

```
   Tasks: 1 (limit: 4915)
  CGroup: /system.slice/ssh.service
          └─2410 /usr/sbin/sshd -D

Aug 17 17:47:55 server1 systemd[1]: Starting OpenBSD Secure Shell server...
Aug 17 17:47:55 server1 sshd[2410]: Server listening on 0.0.0.0 port 22.
Aug 17 17:47:55 server1 sshd[2410]: Server listening on :: port 22.
Aug 17 17:47:55 server1 systemd[1]: Started OpenBSD Secure Shell server.

[1]+  Stopped                 sudo systemctl status ssh
workspace@server1:~$ sudo ufw allow ssh
Rules updated
Rules updated (v6)
workspace@server1:~$ sudo ufw enable
Firewall is active and enabled on system startup
workspace@server1:~$ sudo ufw status
Status: active

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

workspace@server1:~$
```

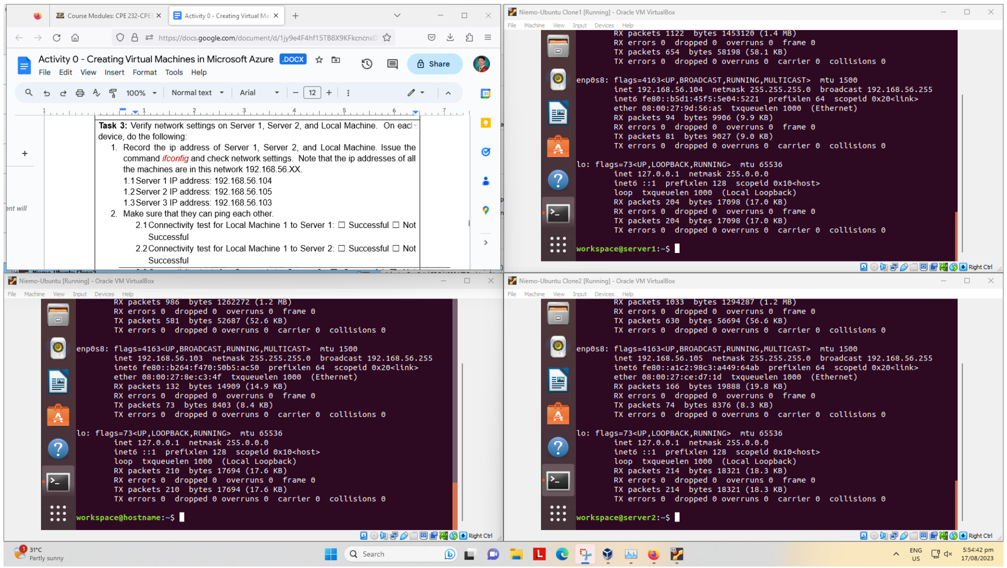
```
   Tasks: 1 (limit: 4915)
  CGroup: /system.slice/ssh.service
          └─2436 /usr/sbin/sshd -D

Aug 17 17:47:39 hostname systemd[1]: Starting OpenBSD Secure Shell server...
Aug 17 17:47:39 hostname sshd[2436]: Server listening on 0.0.0.0 port 22.
Aug 17 17:47:39 hostname sshd[2436]: Server listening on :: port 22.
Aug 17 17:47:39 hostname systemd[1]: Started OpenBSD Secure Shell server.

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

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

workspace@hostname:~$
```

```
   Tasks: 1 (limit: 4915)
  CGroup: /system.slice/ssh.service
          └─2414 /usr/sbin/sshd -D

Aug 17 17:48:21 server2 systemd[1]: Starting OpenBSD Secure Shell server...
Aug 17 17:48:21 server2 sshd[2414]: Server listening on 0.0.0.0 port 22.
Aug 17 17:48:21 server2 sshd[2414]: Server listening on :: port 22.
Aug 17 17:48:21 server2 systemd[1]: Started OpenBSD Secure Shell server.

[1]+  Stopped                 sudo systemctl status ssh
workspace@server2:~$ sudo ufw allow ssh
Rules updated
Rules updated (v6)
workspace@server2:~$ sudo ufw enable
Firewall is active and enabled on system startup
workspace@server2:~$ sudo ufw status
Status: active

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

workspace@server2:~$
```

Course Modules: CPE 232-CPE
Activity 0 - Creating Virtual Ma
https://docs.google.com/document/d/1jy9e4F4hf15TB8X9KFkcncnxD
Activity 0 - Creating Virtual Machines in Microsoft Azure
.DOCX
Share
File Edit View Insert Format Tools Help
100%
Normal text
Arial
12
Niemo-Ubuntu Clone1 [Running] - Oracle VM VirtualBox
Niemo-Ubuntu [Running] - Oracle VM VirtualBox
Niemo-Ubuntu Clone2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Right Ctrl
31°C
Partly sunny
Search
ENG
US
5:52:48 pm
17/08/2023

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: 192.168.56.104
   1.2 Server 2 IP address: 192.168.56.105
   1.3 Server 3 IP address: 192.168.56.103



Task 3: Verify network settings on Server 1, Server 2, and Local Machine. On eacl 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: 192.168.56.104
   1.2 Server 2 IP address: 192.168.56.105
   1.3 Server 3 IP address: 192.168.56.103
2. Make sure that they can ping each other.
   2.1 Connectivity test for Local Machine 1 to Server 1: ☐ Successful ☐ Not Successful
   2.2 Connectivity test for Local Machine 1 to Server 2: ☐ Successful ☐ Not Successful

```
        RX packets 1122  bytes 1453120 (1.4 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 654  bytes 58198 (58.1 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.104  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::b5d1:45f5:5e04:5221  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:9d:56:a5  txqueuelen 1000  (Ethernet)
        RX packets 94  bytes 9906 (9.9 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 81  bytes 9027 (9.0 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 204  bytes 17098 (17.0 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 204  bytes 17098 (17.0 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

workspace@server1:~$
```

```
        RX packets 986  bytes 1262272 (1.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 581  bytes 52687 (52.6 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.103  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::b264:f470:50b5:ac50  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:8e:c3:4f  txqueuelen 1000  (Ethernet)
        RX packets 132  bytes 14909 (14.9 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 73  bytes 8403 (8.4 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 210  bytes 17694 (17.6 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 210  bytes 17694 (17.6 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

workspace@hostname:~$
```

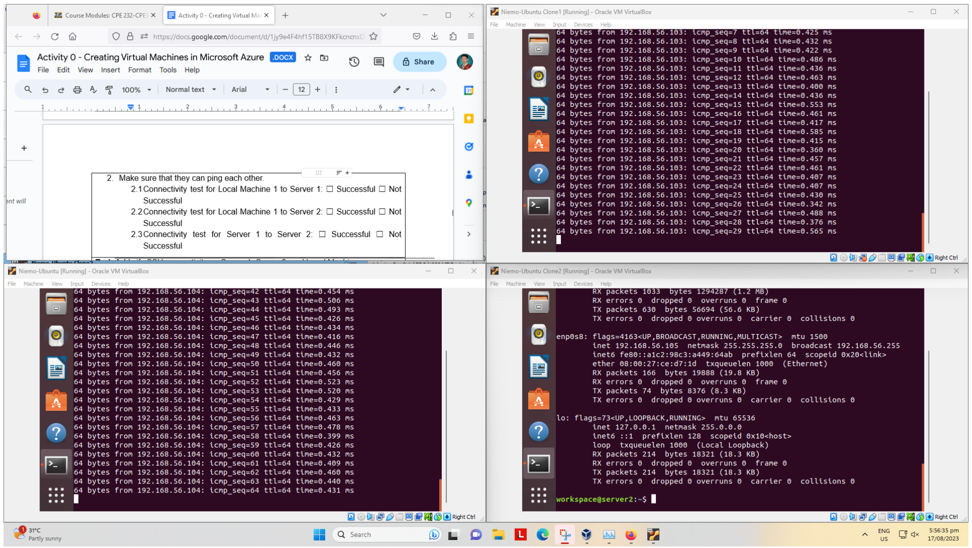
```
        RX packets 1033  bytes 1294287 (1.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 630  bytes 56694 (56.6 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.105  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::a1c2:98c3:a449:64ab  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:ce:d7:1d  txqueuelen 1000  (Ethernet)
        RX packets 166  bytes 19888 (19.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 74  bytes 8376 (8.3 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 214  bytes 18321 (18.3 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 214  bytes 18321 (18.3 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

workspace@server2:~$
```

Course Modules: CPE 232-CPE
Activity 0 - Creating Virtual Ma
https://docs.google.com/document/d/1jy9e4F4hf15TB8X9KFkcncnxD
Activity 0 - Creating Virtual Machines in Microsoft Azure
.DOCX
Share
File Edit View Insert Format Tools Help
100%
Normal text
Arial
12
Niemo-Ubuntu Clone1 [Running] - Oracle VM VirtualBox
Niemo-Ubuntu [Running] - Oracle VM VirtualBox
Niemo-Ubuntu Clone2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Right Ctrl
31°C
Partly sunny
Search
ENG
US
5:54:42 pm
17/08/2023

2. Make sure that they can ping each other.

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

- Successful



Activity 0 - Creating Virtual Machines in Microsoft Azure

2. Make sure that they can ping each other.
2.1 Connectivity test for Local Machine 1 to Server 1: ☐ Successful ☐ Not Successful
2.2 Connectivity test for Local Machine 1 to Server 2: ☐ Successful ☐ Not Successful
2.3 Connectivity test for Server 1 to Server 2: ☐ Successful ☐ Not Successful

Niemo-Ubuntu Clone1 [Running] - Oracle VM VirtualBox

```
64 bytes from 192.168.56.103: icmp_seq=7 ttl=64 time=0.425 ms
64 bytes from 192.168.56.103: icmp_seq=8 ttl=64 time=0.432 ms
64 bytes from 192.168.56.103: icmp_seq=9 ttl=64 time=0.422 ms
64 bytes from 192.168.56.103: icmp_seq=10 ttl=64 time=0.486 ms
64 bytes from 192.168.56.103: icmp_seq=11 ttl=64 time=0.436 ms
64 bytes from 192.168.56.103: icmp_seq=12 ttl=64 time=0.463 ms
64 bytes from 192.168.56.103: icmp_seq=13 ttl=64 time=0.400 ms
64 bytes from 192.168.56.103: icmp_seq=14 ttl=64 time=0.436 ms
64 bytes from 192.168.56.103: icmp_seq=15 ttl=64 time=0.553 ms
64 bytes from 192.168.56.103: icmp_seq=16 ttl=64 time=0.461 ms
64 bytes from 192.168.56.103: icmp_seq=17 ttl=64 time=0.417 ms
64 bytes from 192.168.56.103: icmp_seq=18 ttl=64 time=0.585 ms
64 bytes from 192.168.56.103: icmp_seq=19 ttl=64 time=0.415 ms
64 bytes from 192.168.56.103: icmp_seq=20 ttl=64 time=0.360 ms
64 bytes from 192.168.56.103: icmp_seq=21 ttl=64 time=0.457 ms
64 bytes from 192.168.56.103: icmp_seq=22 ttl=64 time=0.461 ms
64 bytes from 192.168.56.103: icmp_seq=23 ttl=64 time=0.407 ms
64 bytes from 192.168.56.103: icmp_seq=24 ttl=64 time=0.407 ms
64 bytes from 192.168.56.103: icmp_seq=25 ttl=64 time=0.430 ms
64 bytes from 192.168.56.103: icmp_seq=26 ttl=64 time=0.342 ms
64 bytes from 192.168.56.103: icmp_seq=27 ttl=64 time=0.488 ms
64 bytes from 192.168.56.103: icmp_seq=28 ttl=64 time=0.376 ms
64 bytes from 192.168.56.103: icmp_seq=29 ttl=64 time=0.565 ms
```

Niemo-Ubuntu [Running] - Oracle VM VirtualBox

```
64 bytes from 192.168.56.104: icmp_seq=42 ttl=64 time=0.454 ms
64 bytes from 192.168.56.104: icmp_seq=43 ttl=64 time=0.506 ms
64 bytes from 192.168.56.104: icmp_seq=44 ttl=64 time=0.493 ms
64 bytes from 192.168.56.104: icmp_seq=45 ttl=64 time=0.426 ms
64 bytes from 192.168.56.104: icmp_seq=46 ttl=64 time=0.434 ms
64 bytes from 192.168.56.104: icmp_seq=47 ttl=64 time=0.416 ms
64 bytes from 192.168.56.104: icmp_seq=48 ttl=64 time=0.446 ms
64 bytes from 192.168.56.104: icmp_seq=49 ttl=64 time=0.432 ms
64 bytes from 192.168.56.104: icmp_seq=50 ttl=64 time=0.460 ms
64 bytes from 192.168.56.104: icmp_seq=51 ttl=64 time=0.456 ms
64 bytes from 192.168.56.104: icmp_seq=52 ttl=64 time=0.523 ms
64 bytes from 192.168.56.104: icmp_seq=53 ttl=64 time=0.520 ms
64 bytes from 192.168.56.104: icmp_seq=54 ttl=64 time=0.429 ms
64 bytes from 192.168.56.104: icmp_seq=55 ttl=64 time=0.433 ms
64 bytes from 192.168.56.104: icmp_seq=56 ttl=64 time=0.463 ms
64 bytes from 192.168.56.104: icmp_seq=57 ttl=64 time=0.478 ms
64 bytes from 192.168.56.104: icmp_seq=58 ttl=64 time=0.399 ms
64 bytes from 192.168.56.104: icmp_seq=59 ttl=64 time=0.426 ms
64 bytes from 192.168.56.104: icmp_seq=60 ttl=64 time=0.432 ms
64 bytes from 192.168.56.104: icmp_seq=61 ttl=64 time=0.409 ms
64 bytes from 192.168.56.104: icmp_seq=62 ttl=64 time=0.460 ms
64 bytes from 192.168.56.104: icmp_seq=63 ttl=64 time=0.440 ms
64 bytes from 192.168.56.104: icmp_seq=64 ttl=64 time=0.431 ms
```

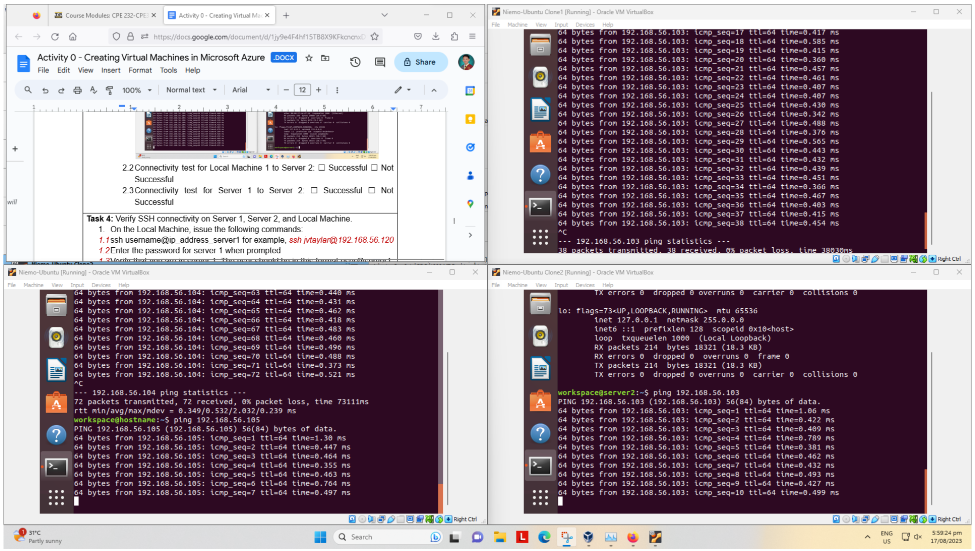
Niemo-Ubuntu Clone2 [Running] - Oracle VM VirtualBox

```
        RX packets 1033  bytes 1294287 (1.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 630  bytes 56694 (56.6 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.105  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::a1c2:98c3:a449:64ab  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:ce:d7:1d  txqueuelen 1000  (Ethernet)
        RX packets 166  bytes 19888 (19.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 74  bytes 8376 (8.3 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 214  bytes 18321 (18.3 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 214  bytes 18321 (18.3 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

workspace@server2:~$
```

5:56:35 pm 17/08/2023

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

- Successful



Activity 0 - Creating Virtual Machines in Microsoft Azure

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

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*
1.2 Enter the password for server 1 when prompted

Niemo-Ubuntu Clone1 [Running] - Oracle VM VirtualBox

```
64 bytes from 192.168.56.103: icmp_seq=17 ttl=64 time=0.417 ms
64 bytes from 192.168.56.103: icmp_seq=18 ttl=64 time=0.585 ms
64 bytes from 192.168.56.103: icmp_seq=19 ttl=64 time=0.415 ms
64 bytes from 192.168.56.103: icmp_seq=20 ttl=64 time=0.360 ms
64 bytes from 192.168.56.103: icmp_seq=21 ttl=64 time=0.457 ms
64 bytes from 192.168.56.103: icmp_seq=22 ttl=64 time=0.461 ms
64 bytes from 192.168.56.103: icmp_seq=23 ttl=64 time=0.407 ms
64 bytes from 192.168.56.103: icmp_seq=24 ttl=64 time=0.407 ms
64 bytes from 192.168.56.103: icmp_seq=25 ttl=64 time=0.430 ms
64 bytes from 192.168.56.103: icmp_seq=26 ttl=64 time=0.342 ms
64 bytes from 192.168.56.103: icmp_seq=27 ttl=64 time=0.488 ms
64 bytes from 192.168.56.103: icmp_seq=28 ttl=64 time=0.376 ms
64 bytes from 192.168.56.103: icmp_seq=29 ttl=64 time=0.565 ms
64 bytes from 192.168.56.103: icmp_seq=30 ttl=64 time=0.443 ms
64 bytes from 192.168.56.103: icmp_seq=31 ttl=64 time=0.432 ms
64 bytes from 192.168.56.103: icmp_seq=32 ttl=64 time=0.439 ms
64 bytes from 192.168.56.103: icmp_seq=33 ttl=64 time=0.451 ms
64 bytes from 192.168.56.103: icmp_seq=34 ttl=64 time=0.366 ms
64 bytes from 192.168.56.103: icmp_seq=35 ttl=64 time=0.467 ms
64 bytes from 192.168.56.103: icmp_seq=36 ttl=64 time=0.403 ms
64 bytes from 192.168.56.103: icmp_seq=37 ttl=64 time=0.415 ms
64 bytes from 192.168.56.103: icmp_seq=38 ttl=64 time=0.454 ms
^C
--- 192.168.56.103 ping statistics ---
38 packets transmitted, 38 received, 0% packet loss, time 38030ms
```

Niemo-Ubuntu [Running] - Oracle VM VirtualBox

```
64 bytes from 192.168.56.104: icmp_seq=63 ttl=64 time=0.440 ms
64 bytes from 192.168.56.104: icmp_seq=64 ttl=64 time=0.431 ms
64 bytes from 192.168.56.104: icmp_seq=65 ttl=64 time=0.462 ms
64 bytes from 192.168.56.104: icmp_seq=66 ttl=64 time=0.418 ms
64 bytes from 192.168.56.104: icmp_seq=67 ttl=64 time=0.483 ms
64 bytes from 192.168.56.104: icmp_seq=68 ttl=64 time=0.460 ms
64 bytes from 192.168.56.104: icmp_seq=69 ttl=64 time=0.496 ms
64 bytes from 192.168.56.104: icmp_seq=70 ttl=64 time=0.488 ms
64 bytes from 192.168.56.104: icmp_seq=71 ttl=64 time=0.373 ms
64 bytes from 192.168.56.104: icmp_seq=72 ttl=64 time=0.521 ms
^C
--- 192.168.56.104 ping statistics ---
72 packets transmitted, 72 received, 0% packet loss, time 73111ms
rtt min/avg/max/mdev = 0.349/0.532/2.032/0.239 ms
workspace@hostname:~$ ping 192.168.56.105
PING 192.168.56.105 (192.168.56.105) 56(84) bytes of data.
64 bytes from 192.168.56.105: icmp_seq=1 ttl=64 time=1.30 ms
64 bytes from 192.168.56.105: icmp_seq=2 ttl=64 time=0.447 ms
64 bytes from 192.168.56.105: icmp_seq=3 ttl=64 time=0.464 ms
64 bytes from 192.168.56.105: icmp_seq=4 ttl=64 time=0.355 ms
64 bytes from 192.168.56.105: icmp_seq=5 ttl=64 time=0.463 ms
64 bytes from 192.168.56.105: icmp_seq=6 ttl=64 time=0.764 ms
64 bytes from 192.168.56.105: icmp_seq=7 ttl=64 time=0.497 ms
```

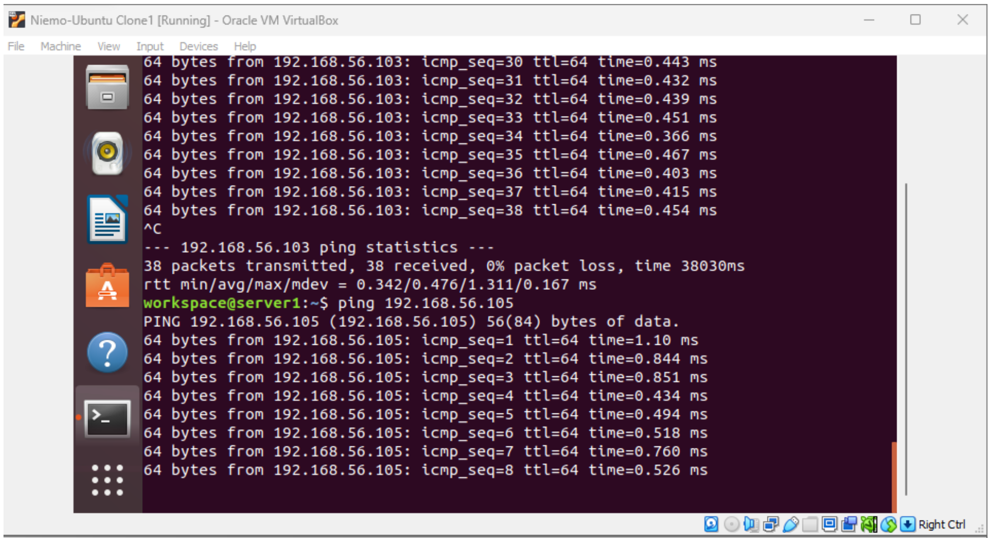
Niemo-Ubuntu Clone2 [Running] - Oracle VM VirtualBox

```
        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 214  bytes 18321 (18.3 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 214  bytes 18321 (18.3 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

workspace@server2:~$ ping 192.168.56.103
PING 192.168.56.103 (192.168.56.103) 56(84) bytes of data.
64 bytes from 192.168.56.103: icmp_seq=1 ttl=64 time=1.06 ms
64 bytes from 192.168.56.103: icmp_seq=2 ttl=64 time=0.422 ms
64 bytes from 192.168.56.103: icmp_seq=3 ttl=64 time=0.409 ms
64 bytes from 192.168.56.103: icmp_seq=4 ttl=64 time=0.789 ms
64 bytes from 192.168.56.103: icmp_seq=5 ttl=64 time=0.381 ms
64 bytes from 192.168.56.103: icmp_seq=6 ttl=64 time=0.462 ms
64 bytes from 192.168.56.103: icmp_seq=7 ttl=64 time=0.432 ms
64 bytes from 192.168.56.103: icmp_seq=8 ttl=64 time=0.493 ms
64 bytes from 192.168.56.103: icmp_seq=9 ttl=64 time=0.427 ms
64 bytes from 192.168.56.103: icmp_seq=10 ttl=64 time=0.499 ms
```

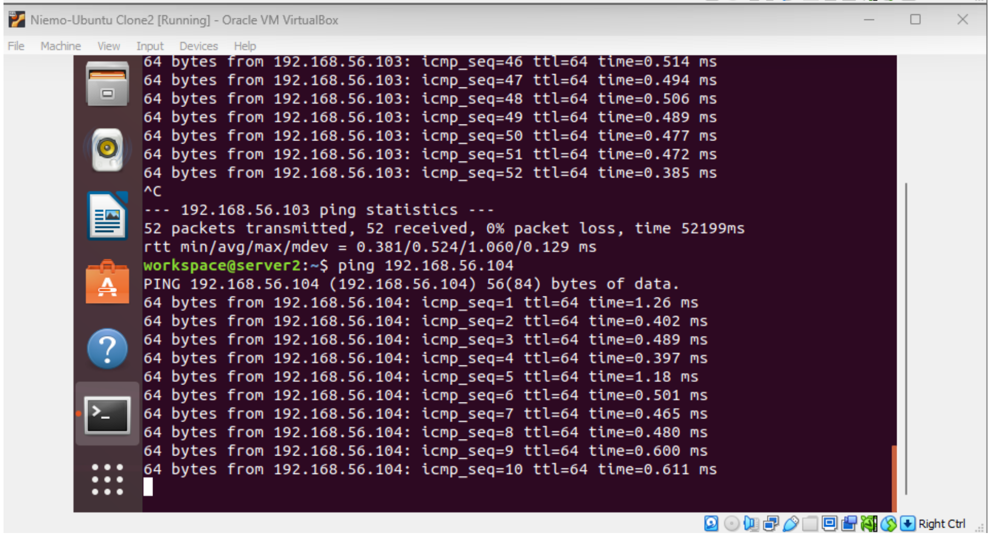
5:59:24 pm 17/08/2023

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

- Successful


Niemo-Ubuntu Clone1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Right Ctrl

```
64 bytes from 192.168.56.103: icmp_seq=30 ttl=64 time=0.443 ms
64 bytes from 192.168.56.103: icmp_seq=31 ttl=64 time=0.432 ms
64 bytes from 192.168.56.103: icmp_seq=32 ttl=64 time=0.439 ms
64 bytes from 192.168.56.103: icmp_seq=33 ttl=64 time=0.451 ms
64 bytes from 192.168.56.103: icmp_seq=34 ttl=64 time=0.366 ms
64 bytes from 192.168.56.103: icmp_seq=35 ttl=64 time=0.467 ms
64 bytes from 192.168.56.103: icmp_seq=36 ttl=64 time=0.403 ms
64 bytes from 192.168.56.103: icmp_seq=37 ttl=64 time=0.415 ms
64 bytes from 192.168.56.103: icmp_seq=38 ttl=64 time=0.454 ms
^C
--- 192.168.56.103 ping statistics ---
38 packets transmitted, 38 received, 0% packet loss, time 38030ms
rtt min/avg/max/mdev = 0.342/0.476/1.311/0.167 ms
workspace@server1:~$ ping 192.168.56.105
PING 192.168.56.105 (192.168.56.105) 56(84) bytes of data.
64 bytes from 192.168.56.105: icmp_seq=1 ttl=64 time=1.10 ms
64 bytes from 192.168.56.105: icmp_seq=2 ttl=64 time=0.844 ms
64 bytes from 192.168.56.105: icmp_seq=3 ttl=64 time=0.851 ms
64 bytes from 192.168.56.105: icmp_seq=4 ttl=64 time=0.434 ms
64 bytes from 192.168.56.105: icmp_seq=5 ttl=64 time=0.494 ms
64 bytes from 192.168.56.105: icmp_seq=6 ttl=64 time=0.518 ms
64 bytes from 192.168.56.105: icmp_seq=7 ttl=64 time=0.760 ms
64 bytes from 192.168.56.105: icmp_seq=8 ttl=64 time=0.526 ms
```


Niemo-Ubuntu Clone2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Right Ctrl

```
64 bytes from 192.168.56.103: icmp_seq=46 ttl=64 time=0.514 ms
64 bytes from 192.168.56.103: icmp_seq=47 ttl=64 time=0.494 ms
64 bytes from 192.168.56.103: icmp_seq=48 ttl=64 time=0.506 ms
64 bytes from 192.168.56.103: icmp_seq=49 ttl=64 time=0.489 ms
64 bytes from 192.168.56.103: icmp_seq=50 ttl=64 time=0.477 ms
64 bytes from 192.168.56.103: icmp_seq=51 ttl=64 time=0.472 ms
64 bytes from 192.168.56.103: icmp_seq=52 ttl=64 time=0.385 ms
^C
--- 192.168.56.103 ping statistics ---
52 packets transmitted, 52 received, 0% packet loss, time 52199ms
rtt min/avg/max/mdev = 0.381/0.524/1.060/0.129 ms
workspace@server2:~$ ping 192.168.56.104
PING 192.168.56.104 (192.168.56.104) 56(84) bytes of data.
64 bytes from 192.168.56.104: icmp_seq=1 ttl=64 time=1.26 ms
64 bytes from 192.168.56.104: icmp_seq=2 ttl=64 time=0.402 ms
64 bytes from 192.168.56.104: icmp_seq=3 ttl=64 time=0.489 ms
64 bytes from 192.168.56.104: icmp_seq=4 ttl=64 time=0.397 ms
64 bytes from 192.168.56.104: icmp_seq=5 ttl=64 time=1.18 ms
64 bytes from 192.168.56.104: icmp_seq=6 ttl=64 time=0.501 ms
64 bytes from 192.168.56.104: icmp_seq=7 ttl=64 time=0.465 ms
64 bytes from 192.168.56.104: icmp_seq=8 ttl=64 time=0.480 ms
64 bytes from 192.168.56.104: icmp_seq=9 ttl=64 time=0.600 ms
64 bytes from 192.168.56.104: icmp_seq=10 ttl=64 time=0.611 ms
```

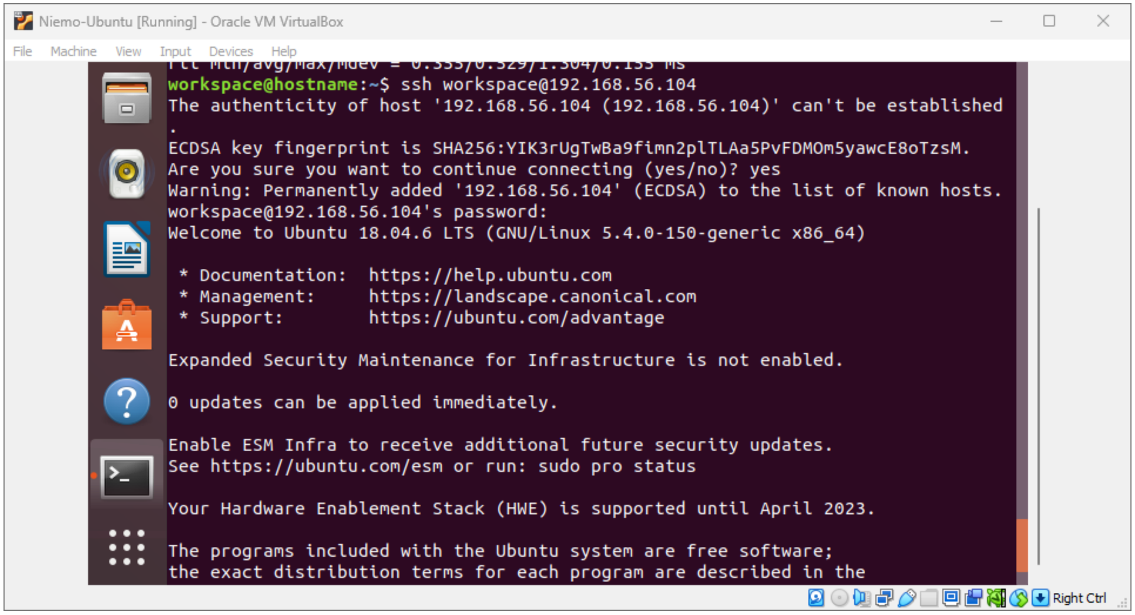
Task 4: Verify SSH connectivity on Server 1, Server 2, and Local Machine.

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

   1.1 ssh username@ip_address_server1 for example, *ssh jvtaylar@192.168.56.120*

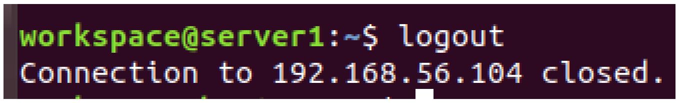
   1.2 Enter the password for server 1 when prompted

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


Niemo-Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Right Ctrl

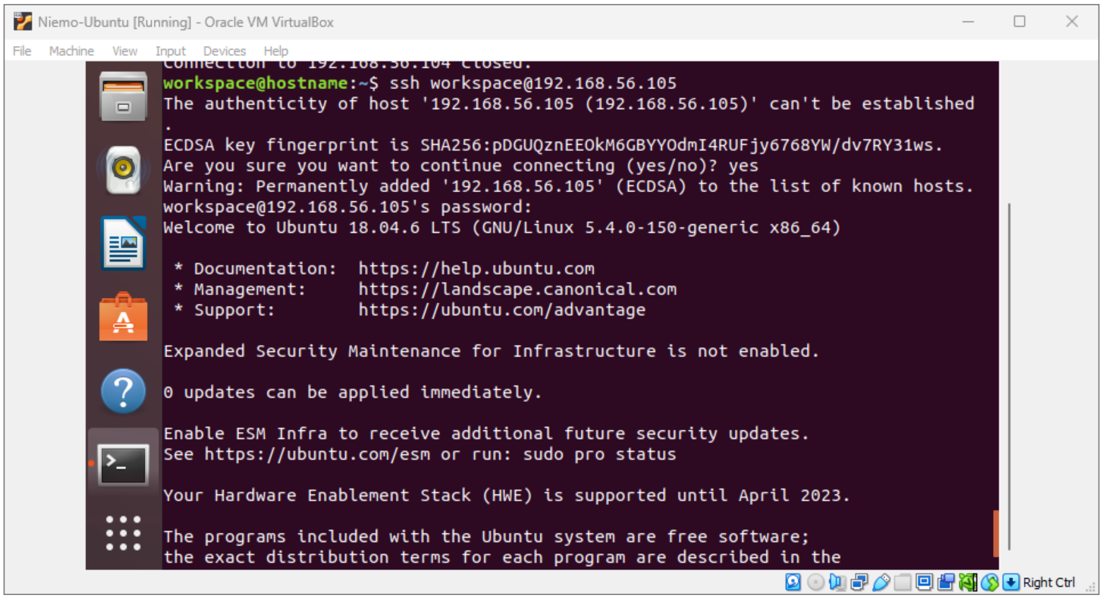
```
rtt min/avg/max/mdev = 0.333/0.329/1.304/0.135 ms
workspace@hostname:~$ ssh workspace@192.168.56.104
The authenticity of host '192.168.56.104 (192.168.56.104)' can't be established
.
ECDSA key fingerprint is SHA256:YIK3rUgTwBa9fimn2plTLAa5PvFDMOm5yawcE8oTzsM.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.56.104' (ECDSA) to the list of known hosts.
workspace@192.168.56.104'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.

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

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
```

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

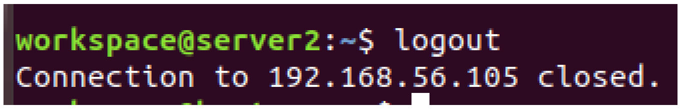


```
workspace@server1:~$ logout
Connection to 192.168.56.104 closed.
```

3. Do the same for Server 2.


Niemo-Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Right Ctrl

```
Connection to 192.168.56.104 closed.
workspace@hostname:~$ ssh workspace@192.168.56.105
The authenticity of host '192.168.56.105 (192.168.56.105)' can't be established
.
ECDSA key fingerprint is SHA256:pDGUQznEEOkM6GBYYOdmI4RUFjy6768YW/dv7RY31ws.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.56.105' (ECDSA) to the list of known hosts.
workspace@192.168.56.105'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.

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

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
```

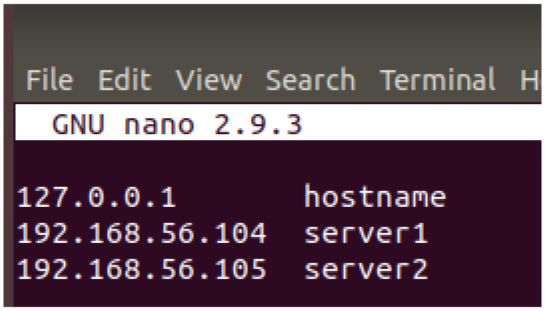


```
workspace@server2:~$ logout
Connection to 192.168.56.105 closed.
```

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)

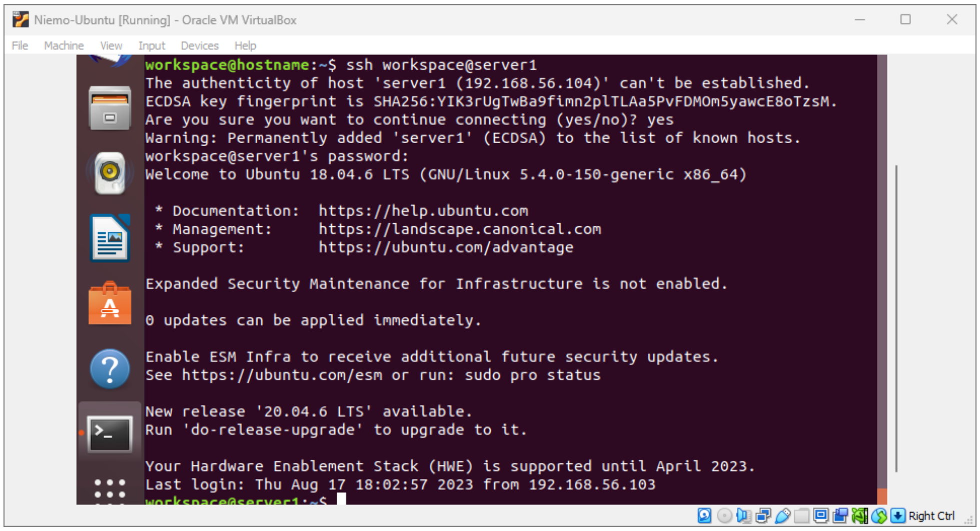


```
127.0.0.1       hostname
192.168.56.104  server1
192.168.56.105  server2
```

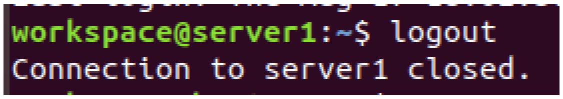
4.3 Save the file and exit.

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.

- Server 1

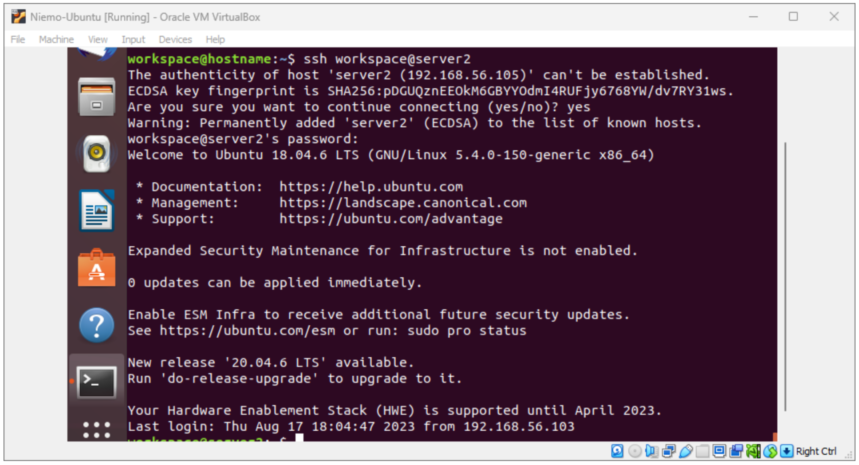

Niemo-Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Right Ctrl

```
workspace@hostname:~$ ssh workspace@server1
The authenticity of host 'server1 (192.168.56.104)' can't be established.
ECDSA key fingerprint is SHA256:YIK3rUgTwBa9fimn2plTLAa5PvFDMOm5yawcE8oTzsM.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'server1' (ECDSA) to the list of known hosts.
workspace@server1'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.

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

New release '20.04.6 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Your Hardware Enablement Stack (HWE) is supported until April 2023.
Last login: Thu Aug 17 18:02:57 2023 from 192.168.56.103
workspace@server1:~$
```

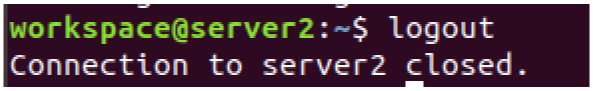


```
workspace@server1:~$ logout
Connection to server1 closed.
```

- Server 2


Niemo-Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Right Ctrl

```
workspace@hostname:~$ ssh workspace@server2
The authenticity of host 'server2 (192.168.56.105)' can't be established.
ECDSA key fingerprint is SHA256:pDGUQznEEOkM6GBYYOdmI4RUFjy6768YW/dv7RY31ws.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'server2' (ECDSA) to the list of known hosts.
workspace@server2'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.

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

New release '20.04.6 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Your Hardware Enablement Stack (HWE) is supported until April 2023.
Last login: Thu Aug 17 18:04:47 2023 from 192.168.56.103
```



```
workspace@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?
   - It can be used by adding the hostname and its IP address manually on the hosts file of the local machine and to do that, we need to change some firewall rule.

2. How secured is SSH?
   - It is secured because all SSH traffic is encrypted, so it is private.

Conclusion:

Virtualization provides a cost-effective solution for organizations that need to distribute system resources and manage large clusters of applications in an enterprise environment. By maximizing available machine capacity, virtualization eliminates costs associated with buying and maintaining underused servers, which can save organizations money