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<b>Course/Section: BSCpE</b>	<b>Date Submitted: 08/23/2023</b>
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### Activity 1: Configure Network using Virtual Machines

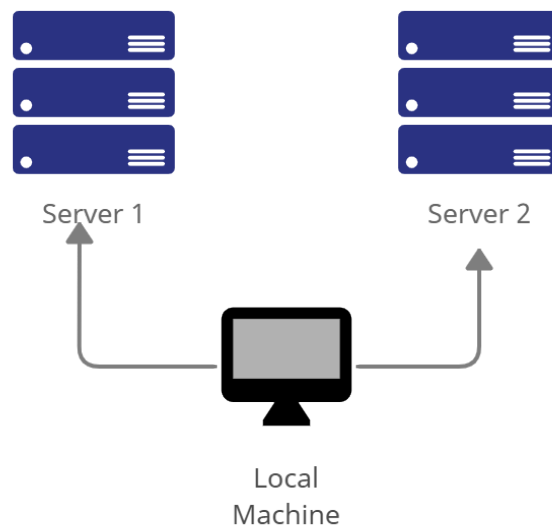
#### 1. Objectives:

- 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

```
gabrevilla@server1revilla:~$ cat /etc/hostname
server1_revilla
```

before

```
server1_revilla
qabrevilla@server1revilla:~$ sudo nano /etc/hostname
[sudo] password for qabrevilla: _
```

```
Last login: Tue Aug 22 14:27:08 UTC 2023 on tty1
qabrevilla@server1:~$ cat /etc/hostname
server1
qabrevilla@server1:~$ _
```

after

## 1.2 Use server2 for Server 2

```
qabrevilla@server2revilla:~$ cat /etc/hostname
server2_revilla
qabrevilla@server2revilla:~$
```

before

```
qabrevilla@server2revilla:~$ sudo nano /etc/hostname
```

```
Last login: Tue Aug 22 14:41:43 UTC 2023 on tty1
qabrevilla@server2:~$ cat /etc/hostname
server2
qabrevilla@server2:~$ _
```

after

## 1.3 Use workstation for the Local Machine

```
qabrevilla@qabrevilla-VirtualBox:~$ cat /etc/hostname
qabrevilla-VirtualBox
qabrevilla@qabrevilla-VirtualBox:~$
```

before

```
qabrevilla@qabrevilla-VirtualBox:~$ cat /etc/hostname
qabrevilla-VirtualBox
qabrevilla@qabrevilla-VirtualBox:~$ sudo nano /etc/hostname
[sudo] password for qabrevilla: 
```

```
qabrevilla@workstation:~$ cat /etc/hostname
workstation
qabrevilla@workstation:~$
```

after

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

```
Server1_Revilla [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
gabrevilla@server1:~$ sudo nano /etc/hosts
[sudo] password for gabrevilla:
```

```
Server1_Revilla [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 6.2 /etc/hosts *
127.0.0.1 localhost
127.0.1.1 server1_revilla

# 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
```

before

```
127.0.0.1 localhost
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
```

after

## 2.2 Type 127.0.0.1 server 2 for Server 2

```
Last login: Tue Aug 22 14:41:43 UTC 2023 on tty1
gabrevilla@server2:~$ cat /etc/hostname
server2
gabrevilla@server2:~$ sudo nano /etc/hosts
[sudo] password for gabrevilla: _
```

```
Server2_Revilla [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 6.2 /etc/hosts
127.0.0.1 localhost
127.0.1.1 server2_revilla

# 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
```

before

```

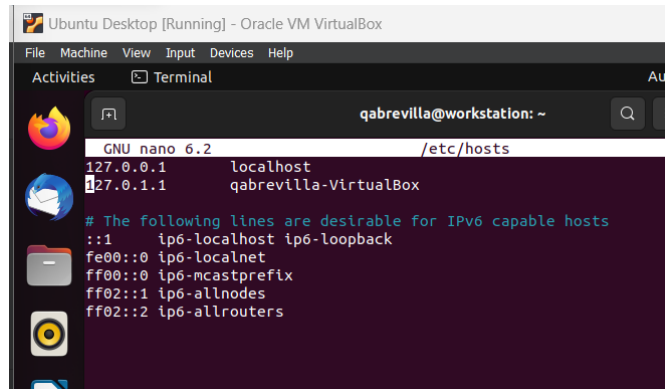
GNU nano 6.2 /etc/hosts
127.0.0.1 localhost
127.0.0.1 server2

# 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

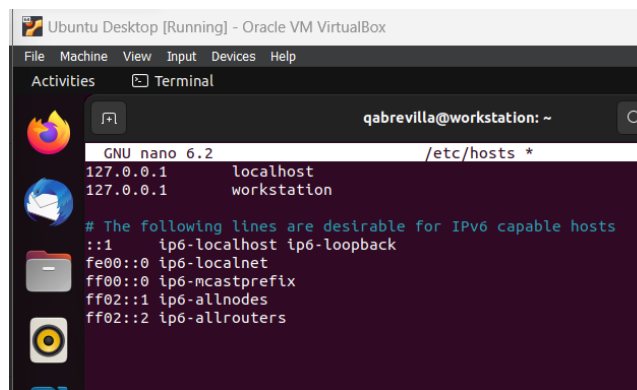
```

after

## 2.3 Type 127.0.0.1 workstation for the Local Machine



before



after

**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.

```

qabrevilla@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
Hit:4 http://ph.archive.ubuntu.com/ubuntu jammy-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
12 packages can be upgraded. Run 'apt list --upgradable' to see them.

```

```
qabrevilla@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
Hit:4 http://ph.archive.ubuntu.com/ubuntu jammy-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
12 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

```
qabrevilla@workstation:~$ 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
Hit:4 http://security.ubuntu.com/ubuntu jammy-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
77 packages can be upgraded. Run 'apt list --upgradable' to see them.
qabrevilla@workstation:~$
```

### sudo update

```
qabrevilla@server1:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  apt apt-utils cloud-init git git-man initramfs-tools initramfs
  libapt-pkg6.0 libldap-2.5-0 libldap-common sosreport
12 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 7,747 kB of archives.
After this operation, 838 kB disk space will be freed.
Do you want to continue? [Y/n] _
```

```
qabrevilla@server2:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  apt apt-utils cloud-init git git-man initramfs-tools initramfs
  libapt-pkg6.0 libldap-2.5-0 libldap-common sosreport
12 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 7,747 kB of archives.
After this operation, 838 kB disk space will be freed.
Do you want to continue? [Y/n]
```

```
qabrevilla@workstation:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
#
# You can verify the status of security fixes using:
# E.g., a recent Ruby vulnerability can be checked with:
#
```

### sudo upgrade

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

```
qabrevilla@server1:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
openssh-server is already the newest version (1:8.9p1-3ubuntu0.3).
openssh-server set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
qabrevilla@server1:~$
```

```
qabrevilla@server2:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
openssh-server is already the newest version (1:8.9p1-3ubuntu0.3).
openssh-server set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
qabrevilla@server2:~$ _
```

```
qabrevilla@workstation:~$ sudo apt install openssh-server
[sudo] password for qabrevilla:
```

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

#### 3.1 *sudo service ssh start*

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

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

```
qabrevilla@workstation:~$ sudo service ssh start
qabrevilla@workstation:~$
```

#### 3.2 *sudo systemctl status ssh*

```
qabrevilla@server1:~$ sudo systemctl status ssh
• ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2023-08-22 14:33:00 UTC; 48min ago
     Docs: man:sshd(8)
           man:sshd_config(5)
   Main PID: 699 (sshd)
     Tasks: 1 (limit: 5440)
    Memory: 4.4M
       CPU: 69ms
   CGroup: /system.slice/ssh.service
           └─699 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Aug 22 14:33:00 server1 systemd[1]: Starting OpenBSD Secure Shell server...
Aug 22 14:33:00 server1 sshd[699]: Server listening on 0.0.0.0 port 22.
Aug 22 14:33:00 server1 sshd[699]: Server listening on :: port 22.
Aug 22 14:33:00 server1 systemd[1]: Started OpenBSD Secure Shell server.
qabrevilla@server1:~$
```

```

qabrevilla@server2:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2023-08-22 14:43:21 UTC; 39min ago
     Docs: man:sshd(8)
           man:sshd_config(5)
    Main PID: 705 (sshd)
      Tasks: 1 (limit: 5395)
     Memory: 4.4M
        CPU: 27ms
    CGroup: /system.slice/ssh.service
            └─705 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Aug 22 14:43:21 server2 systemd[1]: Starting OpenBSD Secure Shell server...
Aug 22 14:43:21 server2 sshd[705]: Server listening on 0.0.0.0 port 22.
Aug 22 14:43:21 server2 sshd[705]: Server listening on :: port 22.
Aug 22 14:43:21 server2 systemd[1]: Started OpenBSD Secure Shell server.
qabrevilla@server2:~$

```

```

qabrevilla@workstation:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor pre
   Active: active (running) since Tue 2023-08-22 23:30:12 PST; 35s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
    Main PID: 32244 (sshd)
      Tasks: 1 (limit: 7255)
     Memory: 1.7M
        CPU: 19ms
    CGroup: /system.slice/ssh.service
            └─32244 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 star

Aug 22 23:30:12 workstation systemd[1]: Starting OpenBSD Secure Shell ser
Aug 22 23:30:12 workstation sshd[32244]: Server listening on 0.0.0.0 port
Aug 22 23:30:12 workstation sshd[32244]: Server listening on :: port 22.
Aug 22 23:30:12 workstation systemd[1]: Started OpenBSD Secure Shell serv
lines 1-16/16 (END)

```

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

#### 4.1 *sudo ufw allow ssh*

```

qabrevilla@server1:~$ sudo ufw allow ssh
Rules updated
Rules updated (v6)
qabrevilla@server1:~$

```

```

qabrevilla@server2:~$ sudo ufw allow ssh
Rules updated
Rules updated (v6)

```

```

qabrevilla@workstation:~$ sudo ufw allow ssh
[sudo] password for qabrevilla:
Sorry, try again.
[sudo] password for qabrevilla:
Rules updated
Rules updated (v6)
qabrevilla@workstation:~$

```

#### 4.2 *sudo ufw enable*

```

qabrevilla@server1:~$ sudo ufw enable
Firewall is active and enabled on system startup
qabrevilla@server1:~$

```

```
qabrevilla@server2:~$ sudo ufw enable
Firewall is active and enabled on system startup
```

```
qabrevilla@workstation:~$ sudo ufw enable
Firewall is active and enabled on system startup
qabrevilla@workstation:~$
```

#### 4.3 *sudo ufw status*

```
qabrevilla@server1:~$ sudo ufw status
Status: active

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

qabrevilla@server1:~$
```

```
qabrevilla@server2:~$ sudo ufw status
Status: active

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

qabrevilla@server2:~$
```

```
qabrevilla@workstation:~$ sudo ufw status
Status: active

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

qabrevilla@workstation:~$
```



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

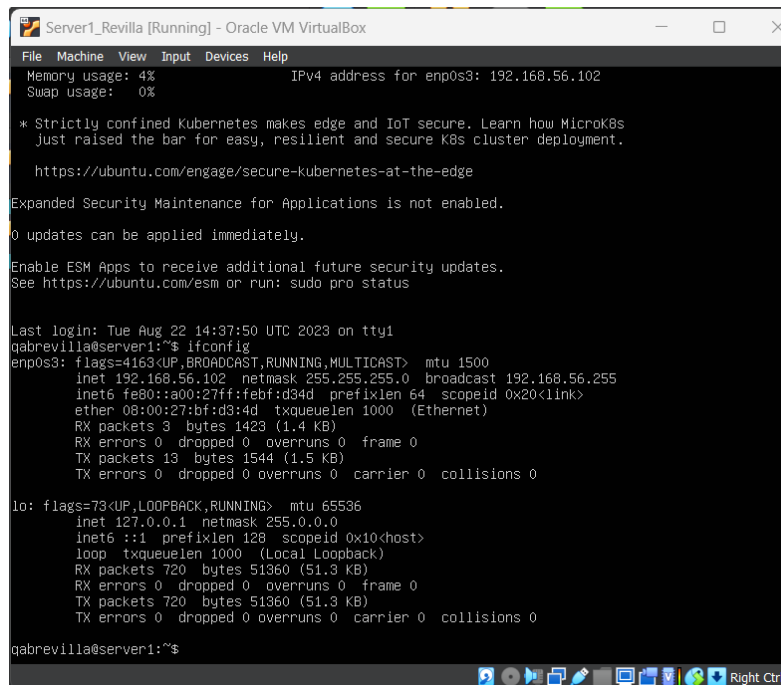
```
qabrevilla@server1:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::a00:27ff:febf:d34d prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:bf:d3:4d txqueuelen 1000 (Ethernet)
    RX packets 5790 bytes 8353995 (8.3 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 1768 bytes 115217 (115.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 128 bytes 11332 (11.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 128 bytes 11332 (11.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

qabrevilla@server1:~$ _
```

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



```
Server1_Revilla [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Memory usage: 4% IPv4 address for enp0s3: 192.168.56.102
Swap usage: 0%

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
  just raised the bar for easy, resilient and secure K8s cluster deployment.
  https://ubuntu.com/engage/secure-kubernetes-at-the-edge

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: Tue Aug 22 14:37:50 UTC 2023 on tty1
qabrevilla@server1:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.102 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:febf:d34d prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:bf:d3:4d txqueuelen 1000 (Ethernet)
    RX packets 3 bytes 1423 (1.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 13 bytes 1544 (1.5 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 720 bytes 51360 (51.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 720 bytes 51360 (51.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

qabrevilla@server1:~$
```

1.2 Server 2 IP address: 192.168.56.103

```
Server2_Revilla [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
System Information as of Wed Aug 23 05:47:10 AM UTC 2023
System load: 0.1484375 Processes: 119
Usage of /: 25.5% of 11.21GB Users logged in: 0
Memory usage: 4% IPv4 address for enp0s3: 192.168.56.103
Swap usage: 0%

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: Tue Aug 22 15:41:35 UTC 2023 on tty1
qabrevilla@server2:~$ ifconfig
enp0s3: 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::a00:27ff:fe1:635c prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:e1:63:5c txqueuelen 1000 (Ethernet)
    RX packets 3 bytes 1240 (1.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 12 bytes 1474 (1.4 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 400 bytes 28640 (28.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 400 bytes 28640 (28.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

qabrevilla@server2:~$
```

### 1.3 Server 3 IP address: 192.168.56.101

```
Ubuntu Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal
Aug 23 13:51
qabrevilla@workstation: ~
qabrevilla@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::db15:6f5:776:fa7c prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:32:65:e4 txqueuelen 1000 (Ethernet)
    RX packets 3907 bytes 5575989 (5.5 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 1887 bytes 124234 (124.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.101 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::f8be:e7ee:da99:92c9 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:4a:1a:9b txqueuelen 1000 (Ethernet)
    RX packets 23 bytes 14237 (14.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 62 bytes 8158 (8.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 321 bytes 27691 (27.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 321 bytes 27691 (27.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

qabrevilla@workstation:~$
```

## 2. Make sure that they can ping each other.

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

```
qabrevilla@workstation:~$ ping 192.168.56.102
PING 192.168.56.102 (192.168.56.102) 56(84) bytes of data.
64 bytes from 192.168.56.102: icmp_seq=1 ttl=64 time=0.953 ms
64 bytes from 192.168.56.102: icmp_seq=2 ttl=64 time=0.512 ms
64 bytes from 192.168.56.102: icmp_seq=3 ttl=64 time=0.569 ms
64 bytes from 192.168.56.102: icmp_seq=4 ttl=64 time=0.464 ms
```

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

```
gabrevilla@workstation:~$ 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=0.936 ms
64 bytes from 192.168.56.103: icmp_seq=2 ttl=64 time=0.613 ms
64 bytes from 192.168.56.103: icmp_seq=3 ttl=64 time=0.641 ms
64 bytes from 192.168.56.103: icmp_seq=4 ttl=64 time=0.557 ms
^C
```

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

```
gabrevilla@server1:~$ 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=0.921 ms
64 bytes from 192.168.56.103: icmp_seq=2 ttl=64 time=0.560 ms
64 bytes from 192.168.56.103: icmp_seq=3 ttl=64 time=0.637 ms
64 bytes from 192.168.56.103: icmp_seq=4 ttl=64 time=0.663 ms
^C
```

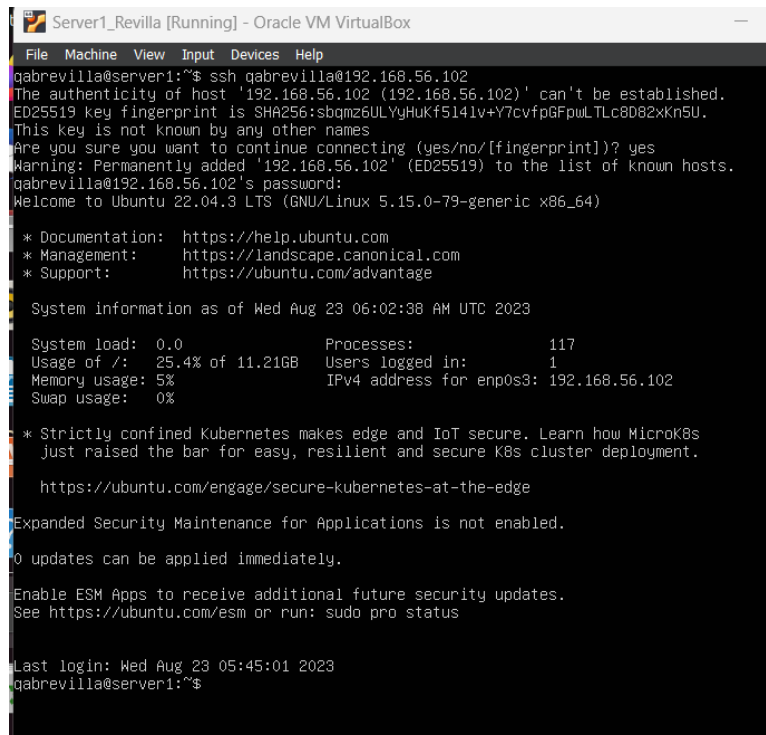
#### Task 4: Verify SSH connectivity on Server 1, Server 2, and Local Machine.

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`



```
Server1_Revilla [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
gabrevilla@server1:~$ ssh gabrevilla@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:sbqmz6ULVYhUKf514lv+Y7cvfp6FpwLTlc8D82xKn5U.
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.
gabrevilla@192.168.56.102's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-79-generic x86_64)

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

System information as of Wed Aug 23 06:02:38 AM UTC 2023

System load: 0.0          Processes: 117
Usage of /: 25.4% of 11.21GB Users logged in: 1
Memory usage: 5%          IPv4 address for enp0s3: 192.168.56.102
Swap usage: 0%

 * Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
   just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

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: Wed Aug 23 05:45:01 2023
gabrevilla@server1:~$
```

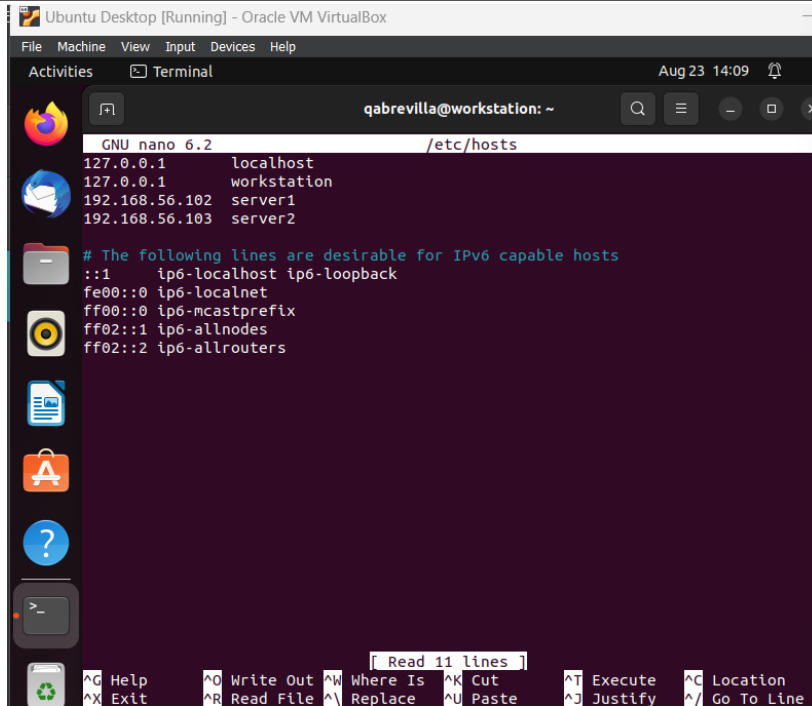
2. Logout of Server 1 by issuing the command `control + D`.

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

### 3. Do the same for Server 2.

```
Server2_Revilla [Running] - Oracle VM VirtualBox  
File Machine View Input Devices Help  
gabrevilla@server2:~$ ssh gabrevilla@192.168.56.103  
The authenticity of host '192.168.56.103 (192.168.56.103)' can't be established.  
ED25519 key fingerprint is SHA256:4o20CuYwGxpswcP2kyC8rIycEx/c3JtpQn92uo43J+M.  
This key is not known by any other names  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '192.168.56.103' (ED25519) to the list of known hosts.  
gabrevilla@192.168.56.103's password:  
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-79-generic x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:       https://ubuntu.com/advantage  
  
System information as of Wed Aug 23 06:07:09 AM UTC 2023  
  
System load: 0.1943359375      Processes:            114  
Usage of /:  25.5% of 11.2GB    Users logged in:     1  
Memory usage: 5%              IPv4 address for enp0s3: 192.168.56.103  
Swap usage:  0%  
  
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: Wed Aug 23 05:47:11 2023  
gabrevilla@server2:~$  
logout  
Connection to 192.168.56.103 closed.  
gabrevilla@server2:~$ _
```

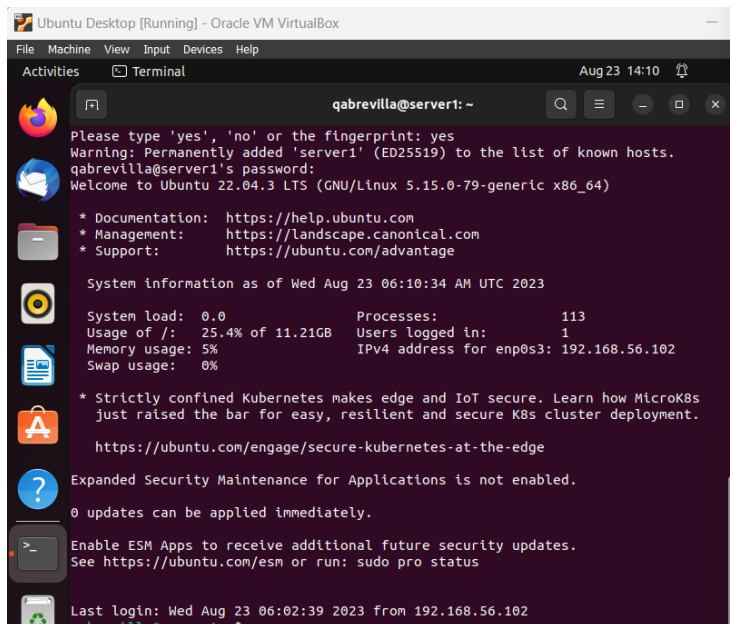
4. Edit the hosts of the Local Machine by issuing the command *sudo nano /etc/hosts*. Below all texts type the following:
  - 4.1 *IP\_address server 1* (provide the ip address of server 1 followed by the hostname)
  - 4.2 *IP\_address server 2* (provide the ip address of server 2 followed by the hostname)



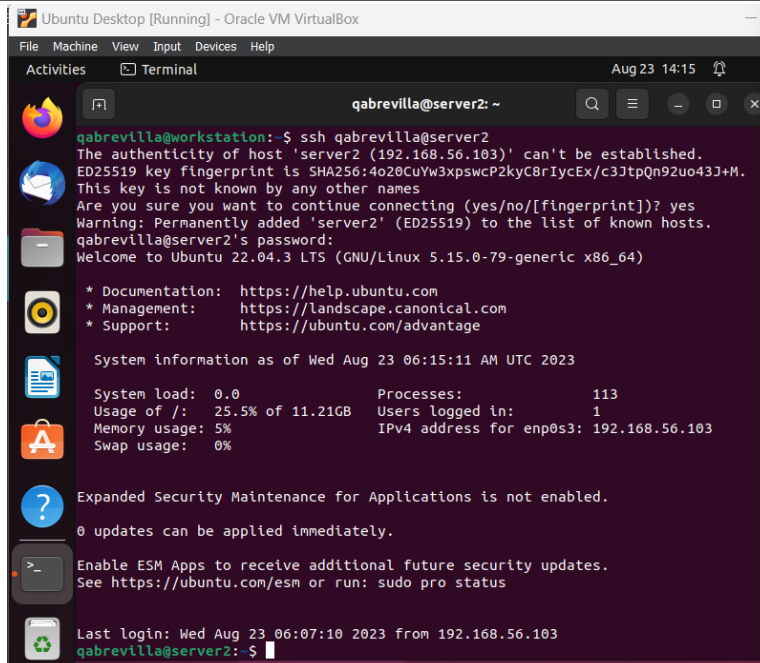
```
qabrevilla@workstation: ~  
GNU nano 6.2 /etc/hosts  
127.0.0.1 localhost  
127.0.0.1 workstation  
192.168.56.102 server1  
192.168.56.103 server2  
  
# The following lines are desirable for IPv6 capable hosts  
::1 ip6-localhost ip6-loopback  
fe00::0 ip6-localnet  
ff00::0 ip6-mcastprefix  
ff02::1 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.



```
qabrevilla@server1: ~  
Please type 'yes', 'no' or the fingerprint: yes  
Warning: Permanently added 'server1' (ED25519) to the list of known hosts.  
qabrevilla@server1's password:  
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-79-generic x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/advantage  
  
System information as of Wed Aug 23 06:10:34 AM UTC 2023  
  
System load:  0.0      Processes:      113  
Usage of /:   25.4% of 11.21GB  Users logged in:  1  
Memory usage: 5%      IPv4 address for enp0s3: 192.168.56.102  
Swap usage:   0%  
  
* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s  
just raised the bar for easy, resilient and secure K8s cluster deployment.  
  
https://ubuntu.com/engage/secure-kubernetes-at-the-edge  
  
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: Wed Aug 23 06:02:39 2023 from 192.168.56.102  
qabrevilla@server1: ~
```



```
qabrevilla@server2: ~
qabrevilla@workstation:~$ ssh qabrevilla@server2
The authenticity of host 'server2 (192.168.56.103)' can't be established.
ED25519 key fingerprint is SHA256:4o20CuYw3xpswcP2kyC8rIycEx/c3JtpQn92uo43J+M.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'server2' (ED25519) to the list of known hosts.
qabrevilla@server2's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-79-generic x86_64)

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

System information as of Wed Aug 23 06:15:11 AM UTC 2023

System load:  0.0               Processes:    113
Usage of /:   25.5% of 11.21GB   Users logged in: 1
Memory usage: 5%               IPv4 address for enp0s3: 192.168.56.103
Swap usage:  0%

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: Wed Aug 23 06:07:10 2023 from 192.168.56.103
qabrevilla@server2:~$
```

## Reflections:

Answer the following:

1. How are we able to use the hostname instead of IP address in SSH commands?  
In this activity, we're able to use hostname in SSH commands by simply editing the `/etc/hosts` in the local machine. There, we can set the Ip addresses of the servers and provide the corresponding hostnames. After the configuration, we can now use the SSH commands using hostnames (ex. `ssh qabrevilla@server1`).

2. How secured is SSH?

Secure Socket Shell (SSH) is a network communication protocol that enables the network between two devices. It also comes with a strong encryption method using password authentication for safe remote access and communication. In the activity, I understand the methods of accessing and managing servers and computers and how it will be a good skill for computer engineers.

## Conclusion:

From this activity, We were able to experience connecting ubuntu desktop and servers in a virtual machine. We used ssh commands to configure the connection between the devices. I also learned how important ip addresses play an important role in

connecting computers. We change `/etc/hosts` and `/etc/hostname` to configure the name and ip addresses of the devices for it to connect the system.