Name: Aquino, John Kennedy A.	**Date Performed: August 16, 2022**
Course/Section: CPE31S22	**Date Submitted: August 23, 2022**
Instructor: Jonathan V. Taylar	**Semester and SY: 1st Sem 2022 - 2023**

Activity 1: Configure Network using Virtual Machines

1. **Objectives:**

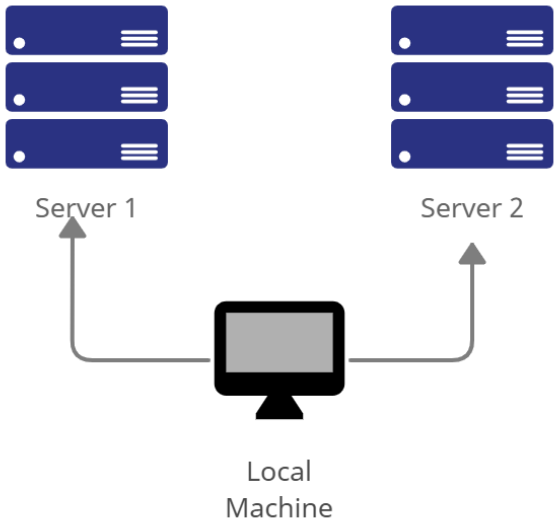
1.1. Create and configure Virtual Machines in Microsoft Azure or VirtualBox

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

2. **Discussion:**

Network Topology:

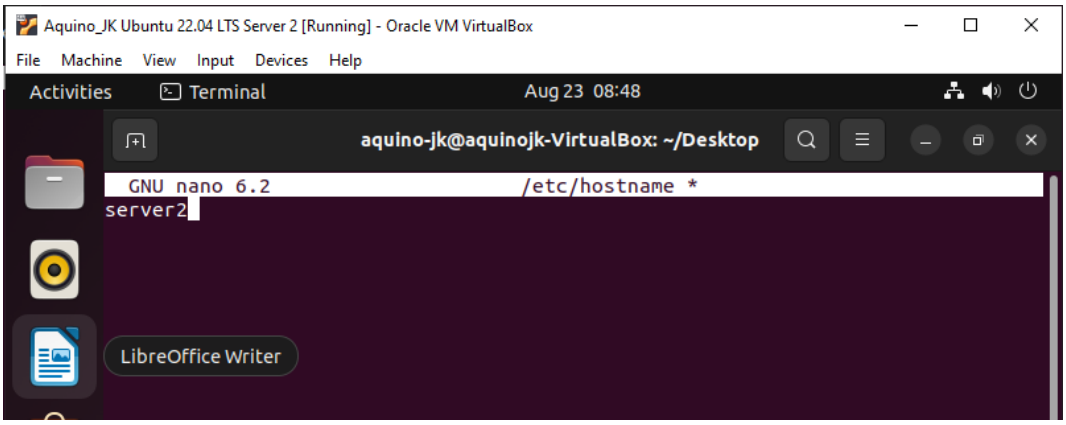
Assume that you have created the following network topology in Virtual Machines, *provide screenshots for each task*. (Note: *it is assumed that you have the prior knowledge of cloning and creating snapshots in a virtual machine*).



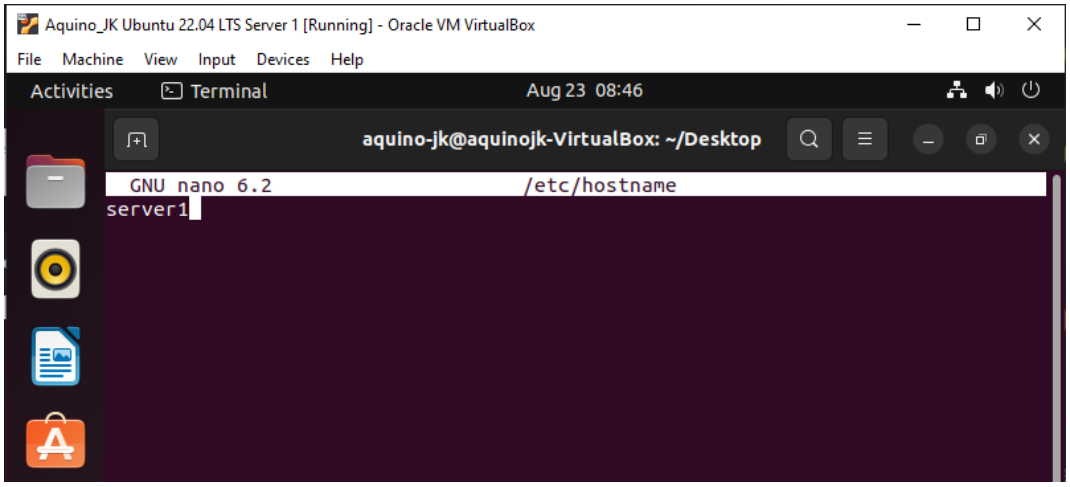
Task 1: Do the following on Server 1, Server 2, and Local Machine. In editing the file using nano command, press control + O to write out (save the file). Press enter when asked for the name of the file. Press control + X to end.

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

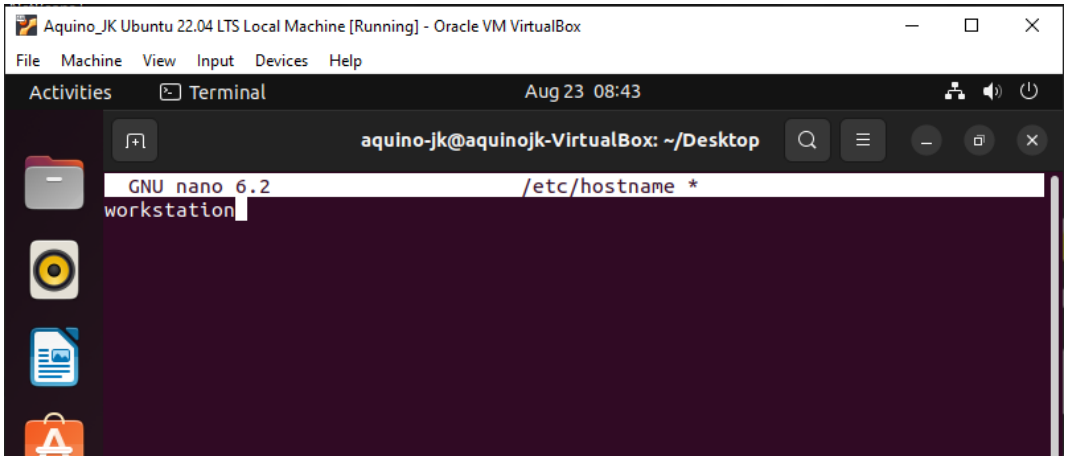
1.1 Use server1 for Server 1



1.2 Use server2 for Server 2

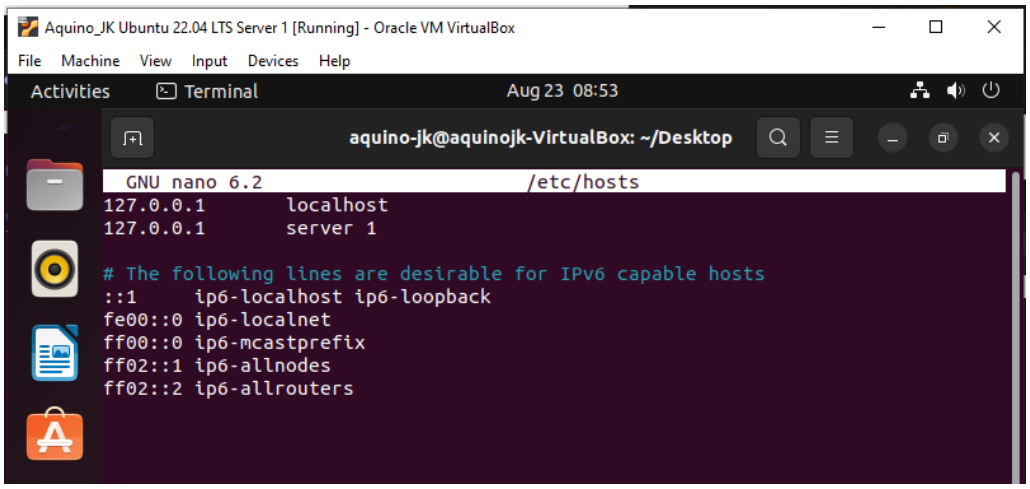


1.3 Use workstation for the Local Machine

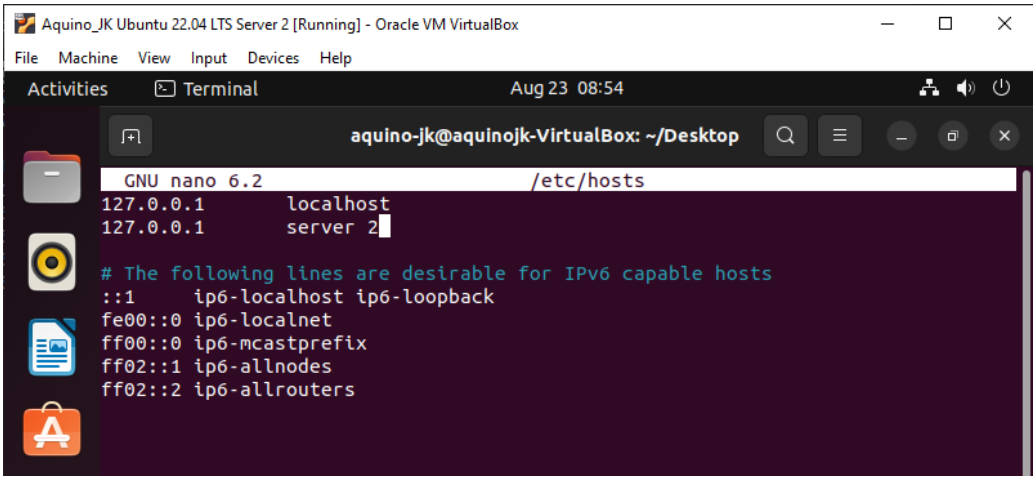


2. Edit the hosts using the command *sudo nano /etc/hosts*. Edit the second line.

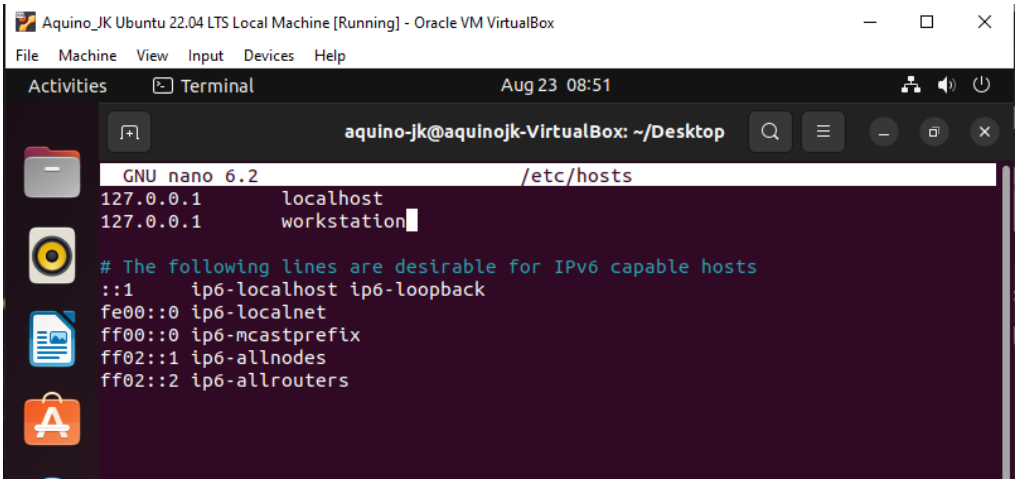
2.1 Type 127.0.0.1 server 1 for Server 1



2.2 Type 127.0.0.1 server 2 for Server 2

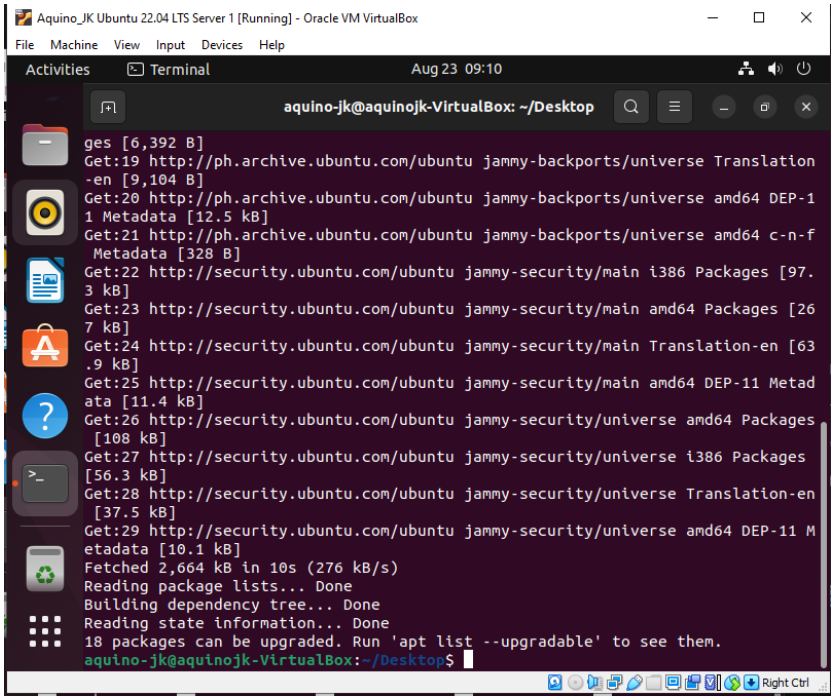


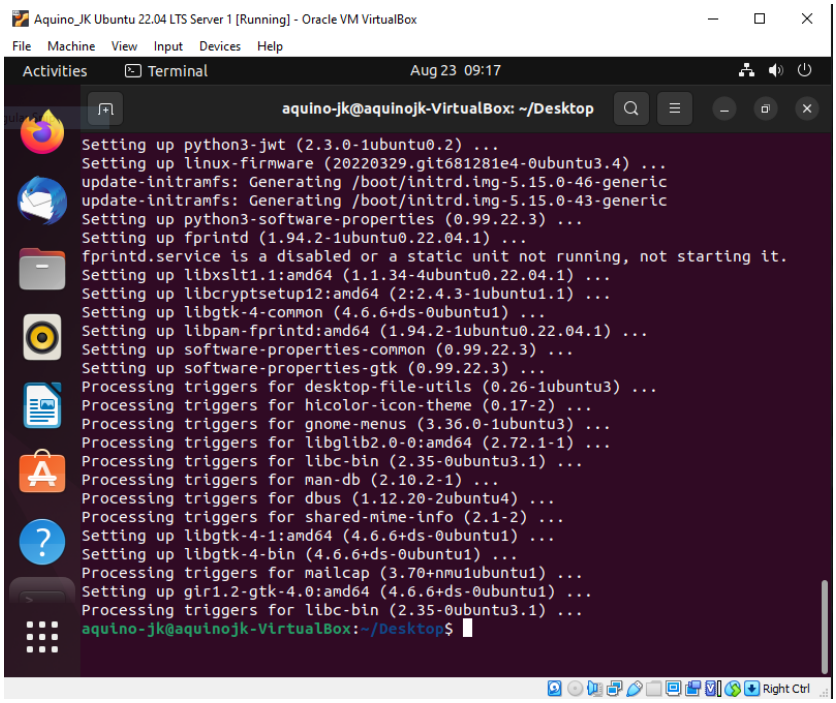
2.3 Type 127.0.0.1 workstation for the Local Machine

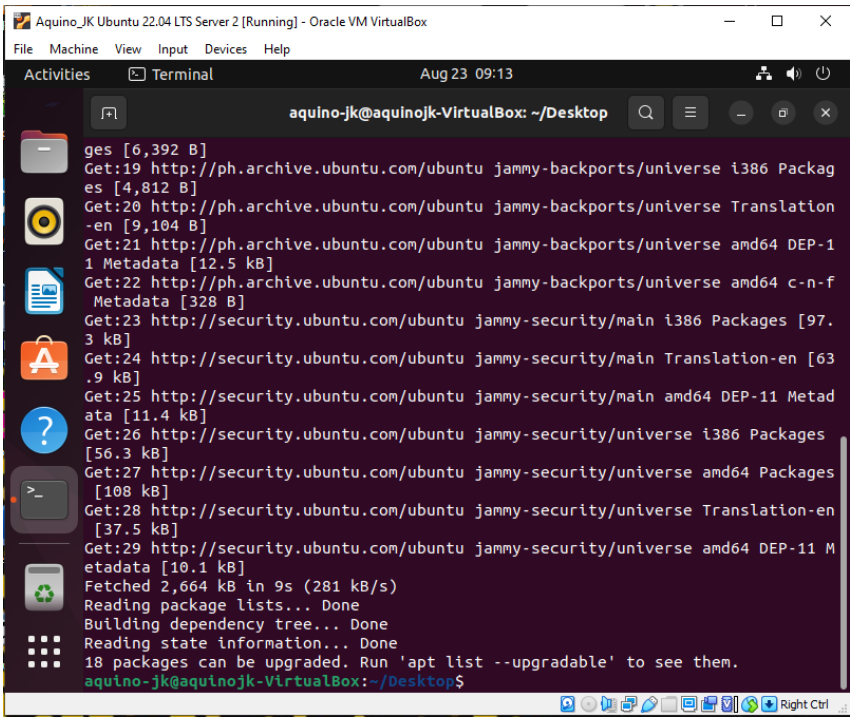


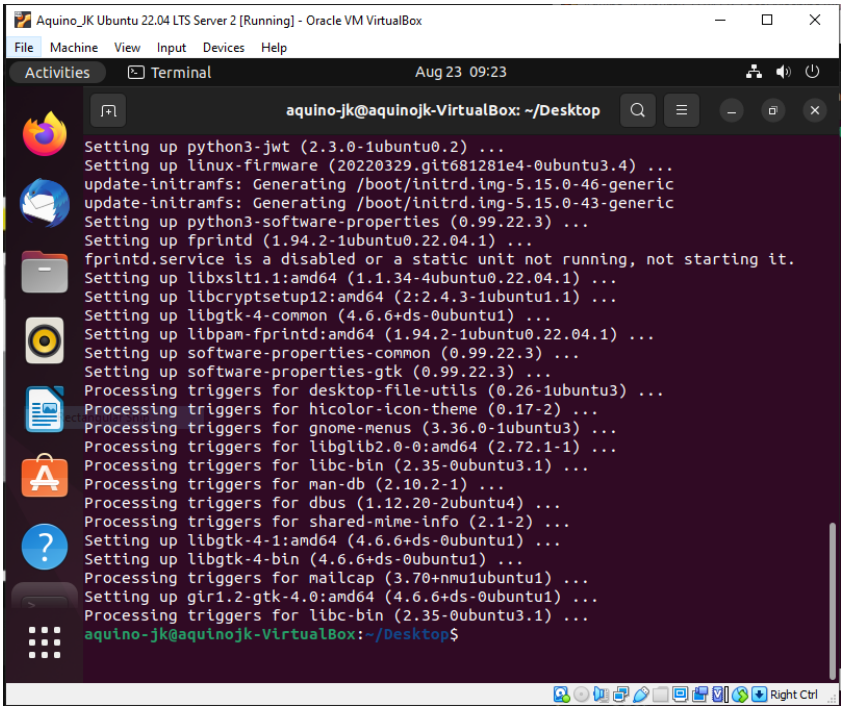
Task 2: Configure SSH on Server 1, Server 2, and Local Machine. Do the following:

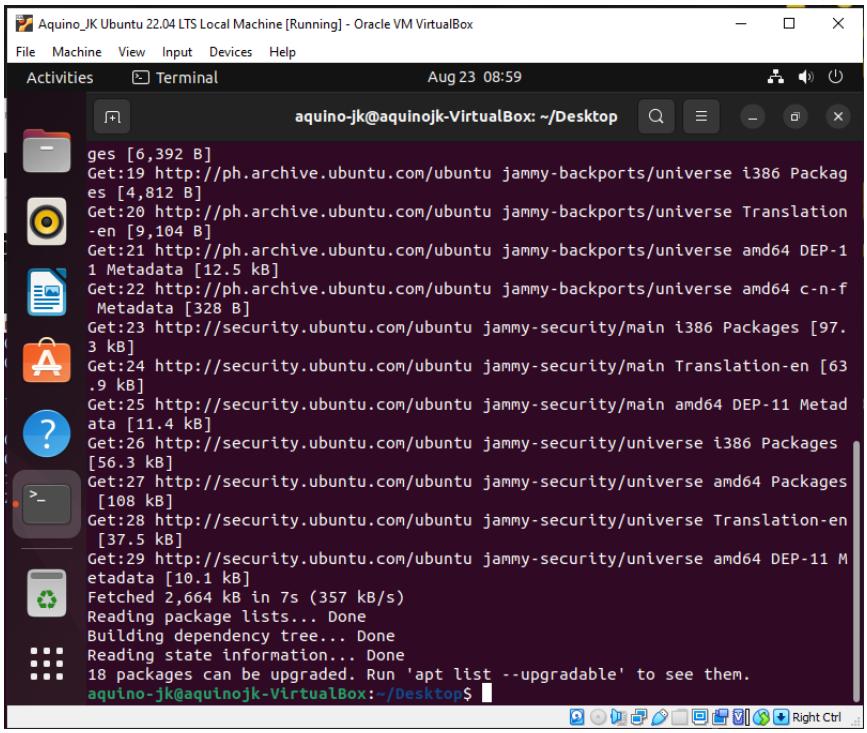
1. Upgrade the packages by issuing the command *sudo apt update* and *sudo apt upgrade* respectively.

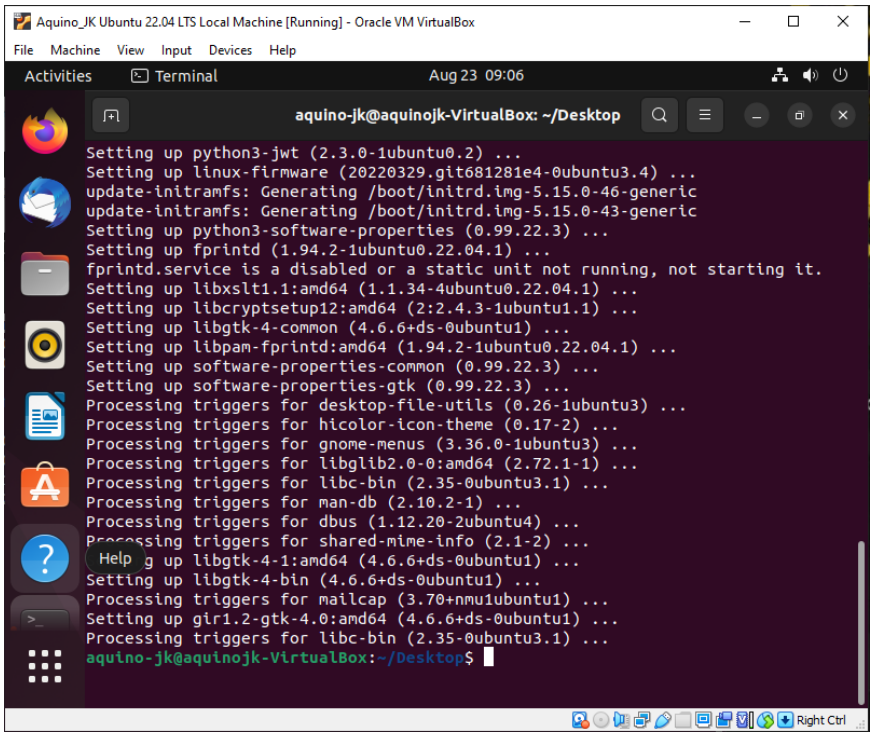




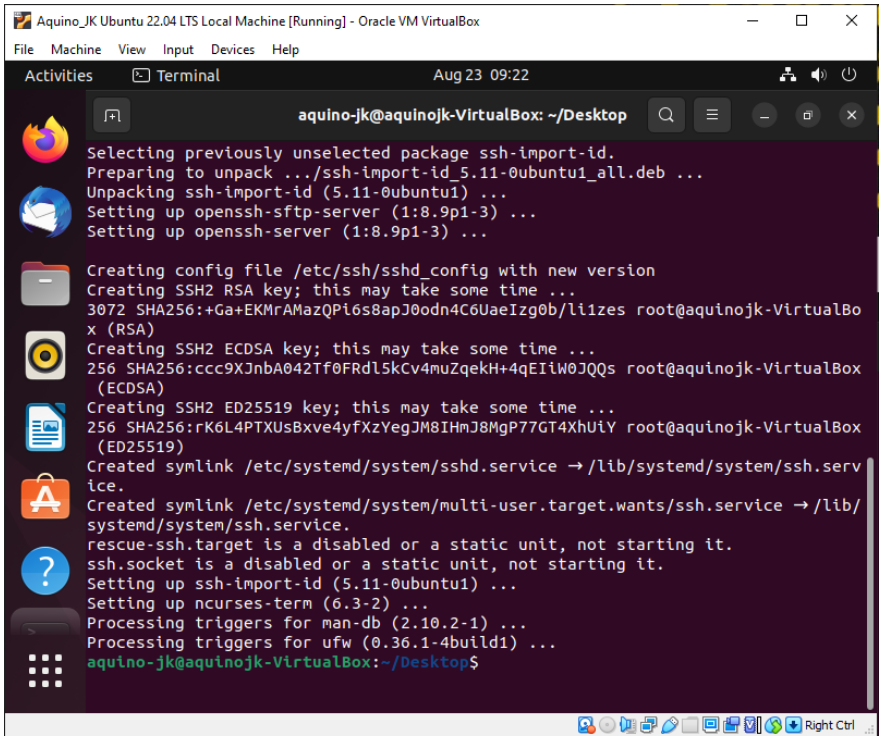

Aquino_JK Ubuntu 22.04 LTS Server 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 23 09:13
aquino-jk@aquinojk-VirtualBox: ~/Desktop
ges [6,392 B]
Get:19 http://ph.archive.ubuntu.com/ubuntu jammy-backports/universe i386 Packages [4,812 B]
Get:20 http://ph.archive.ubuntu.com/ubuntu jammy-backports/universe Translation-en [9,104 B]
Get:21 http://ph.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 DEP-11 Metadata [12.5 kB]
Get:22 http://ph.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 c-n-f Metadata [328 B]
Get:23 http://security.ubuntu.com/ubuntu jammy-security/main i386 Packages [97.3 kB]
Get:24 http://security.ubuntu.com/ubuntu jammy-security/main Translation-en [63.9 kB]
Get:25 http://security.ubuntu.com/ubuntu jammy-security/main amd64 DEP-11 Metadata [11.4 kB]
Get:26 http://security.ubuntu.com/ubuntu jammy-security/universe i386 Packages [56.3 kB]
Get:27 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [108 kB]
Get:28 http://security.ubuntu.com/ubuntu jammy-security/universe Translation-en [37.5 kB]
Get:29 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 DEP-11 Metadata [10.1 kB]
Fetched 2,664 kB in 9s (281 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
18 packages can be upgraded. Run 'apt list --upgradable' to see them.
aquino-jk@aquinojk-VirtualBox:~/Desktop$
Right Ctrl

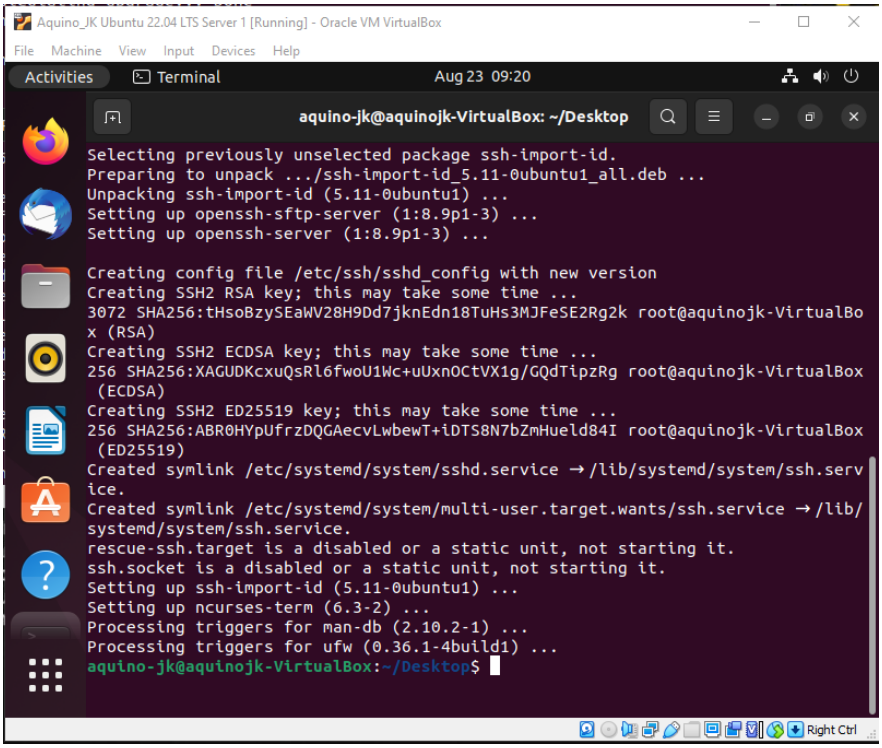

Aquino_JK Ubuntu 22.04 LTS Server 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 23 09:23
aquino-jk@aquinojk-VirtualBox: ~/Desktop
Setting up python3-jwt (2.3.0-1ubuntu0.2) ...
Setting up linux-firmware (20220329.git681281e4-0ubuntu3.4) ...
update-initramfs: Generating /boot/initrd.img-5.15.0-46-generic
update-initramfs: Generating /boot/initrd.img-5.15.0-43-generic
Setting up python3-software-properties (0.99.22.3) ...
Setting up fprintd (1.94.2-1ubuntu0.22.04.1) ...
fprintd.service is a disabled or a static unit not running, not starting it.
Setting up libxslt1.1:amd64 (1.1.34-4ubuntu0.22.04.1) ...
Setting up libcryptsetup12:amd64 (2:2.4.3-1ubuntu1.1) ...
Setting up libgtk-4-common (4.6.6+ds-0ubuntu1) ...
Setting up libpam-fprintd:amd64 (1.94.2-1ubuntu0.22.04.1) ...
Setting up software-properties-common (0.99.22.3) ...
Setting up software-properties-gtk (0.99.22.3) ...
Processing triggers for desktop-file-utils (0.26-1ubuntu3) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for libglib2.0-0:amd64 (2.72.1-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for dbus (1.12.20-2ubuntu4) ...
Processing triggers for shared-mime-info (2.1-2) ...
Setting up libgtk-4-1:amd64 (4.6.6+ds-0ubuntu1) ...
Setting up libgtk-4-bin (4.6.6+ds-0ubuntu1) ...
Processing triggers for mailcap (3.70+nmu1ubuntu1) ...
Setting up gir1.2-gtk-4.0:amd64 (4.6.6+ds-0ubuntu1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
aquino-jk@aquinojk-VirtualBox:~/Desktop$
Right Ctrl

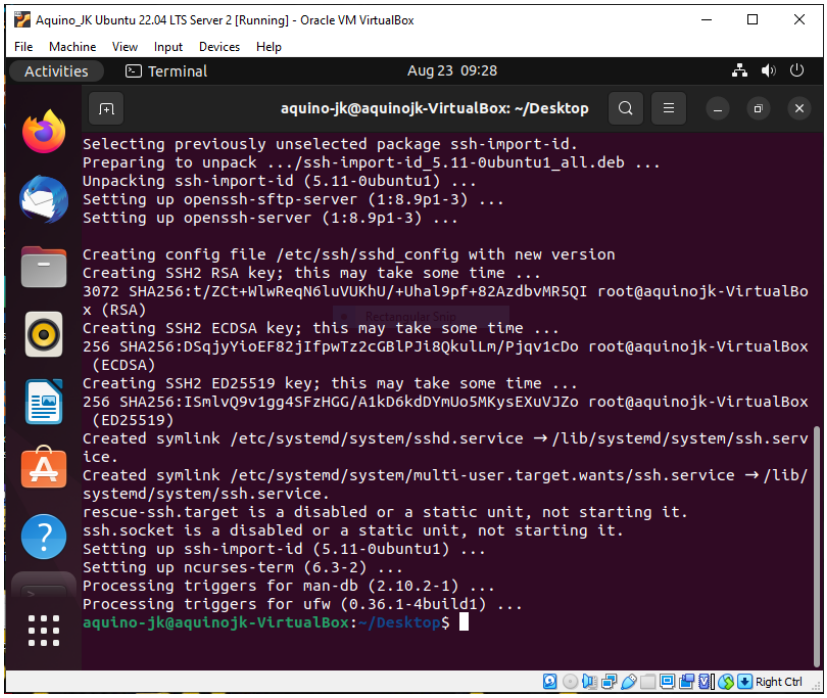

Aquino_JK Ubuntu 22.04 LTS Local Machine [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 23 08:59
aquino-jk@aquinojk-VirtualBox: ~/Desktop
ges [6,392 B]
Get:19 http://ph.archive.ubuntu.com/ubuntu jammy-backports/universe i386 Packages [4,812 B]
Get:20 http://ph.archive.ubuntu.com/ubuntu jammy-backports/universe Translation-en [9,104 B]
Get:21 http://ph.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 DEP-11 Metadata [12.5 kB]
Get:22 http://ph.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 c-n-f Metadata [328 B]
Get:23 http://security.ubuntu.com/ubuntu jammy-security/main i386 Packages [97.3 kB]
Get:24 http://security.ubuntu.com/ubuntu jammy-security/main Translation-en [63.9 kB]
Get:25 http://security.ubuntu.com/ubuntu jammy-security/main amd64 DEP-11 Metadata [11.4 kB]
Get:26 http://security.ubuntu.com/ubuntu jammy-security/universe i386 Packages [56.3 kB]
Get:27 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [108 kB]
Get:28 http://security.ubuntu.com/ubuntu jammy-security/universe Translation-en [37.5 kB]
Get:29 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 DEP-11 Metadata [10.1 kB]
Fetched 2,664 kB in 7s (357 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
18 packages can be upgraded. Run 'apt list --upgradable' to see them.
aquino-jk@aquinojk-VirtualBox:~/Desktop$
Right Ctrl


Aquino_JK Ubuntu 22.04 LTS Local Machine [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 23 09:06
aquino-jk@aquinojk-VirtualBox: ~/Desktop
Setting up python3-jwt (2.3.0-1ubuntu0.2) ...
Setting up linux-firmware (20220329.git681281e4-0ubuntu3.4) ...
update-initramfs: Generating /boot/initrd.img-5.15.0-46-generic
update-initramfs: Generating /boot/initrd.img-5.15.0-43-generic
Setting up python3-software-properties (0.99.22.3) ...
Setting up fprintd (1.94.2-1ubuntu0.22.04.1) ...
fprintd.service is a disabled or a static unit not running, not starting it.
Setting up libxslt1.1:amd64 (1.1.34-4ubuntu0.22.04.1) ...
Setting up libcryptsetup12:amd64 (2:2.4.3-1ubuntu1.1) ...
Setting up libgtk-4-common (4.6.6+ds-0ubuntu1) ...
Setting up libpam-fprintd:amd64 (1.94.2-1ubuntu0.22.04.1) ...
Setting up software-properties-common (0.99.22.3) ...
Setting up software-properties-gtk (0.99.22.3) ...
Processing triggers for desktop-file-utils (0.26-1ubuntu3) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for libglib2.0-0:amd64 (2.72.1-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for dbus (1.12.20-2ubuntu4) ...
Processing triggers for shared-mime-info (2.1-2) ...
Help
Setting up libgtk-4-1:amd64 (4.6.6+ds-0ubuntu1) ...
Setting up libgtk-4-bin (4.6.6+ds-0ubuntu1) ...
Processing triggers for mailcap (3.70+nmu1ubuntu1) ...
Setting up gir1.2-gtk-4.0:amd64 (4.6.6+ds-0ubuntu1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
aquino-jk@aquinojk-VirtualBox:~/Desktop$
Right Ctrl

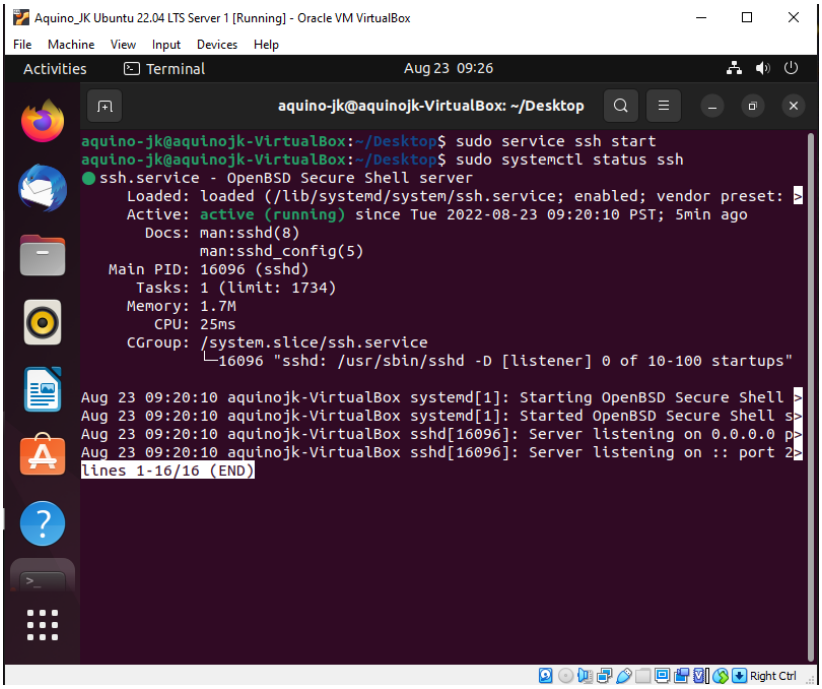
2. Install the SSH server using the command *sudo apt install openssh-server*.

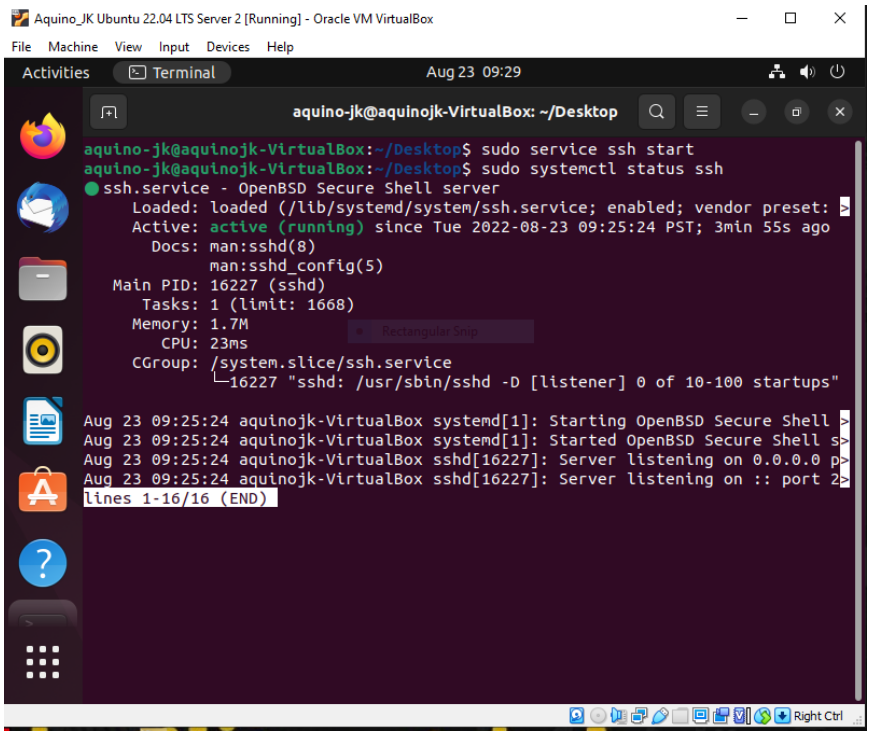


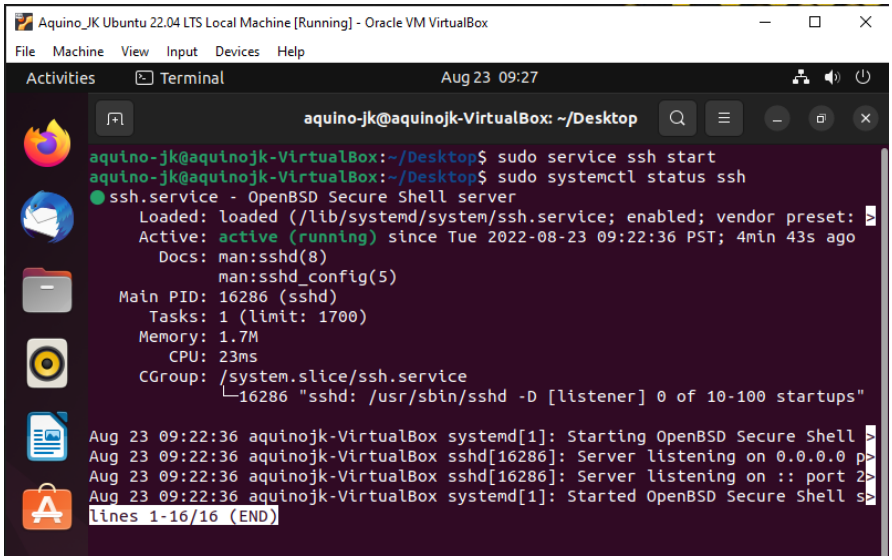




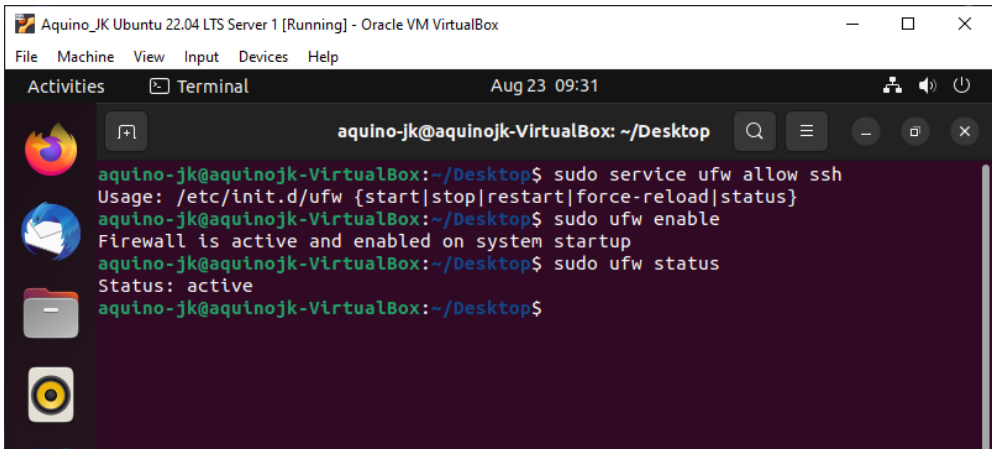
3. Verify if the SSH service has started by issuing the following commands:
   3.1 *sudo service ssh start*
   3.2 *sudo systemctl status ssh*

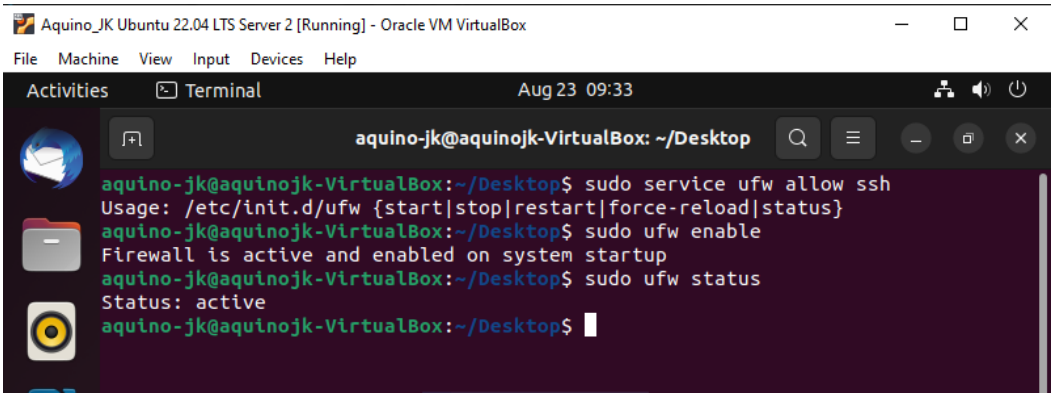


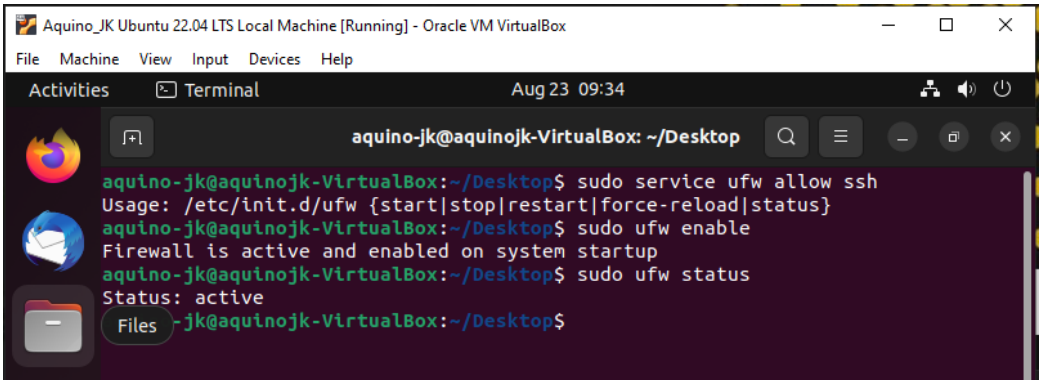

Aquino_JK Ubuntu 22.04 LTS Server 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 23 09:29
aquino-jk@aquinojk-VirtualBox: ~/Desktop
aquino-jk@aquinojk-VirtualBox:~/Desktop$ sudo service ssh start
aquino-jk@aquinojk-VirtualBox:~/Desktop$ sudo systemctl status ssh
ssh.service - OpenBSD Secure Shell server
Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset:
Active: active (running) since Tue 2022-08-23 09:25:24 PST; 3min 55s ago
Docs: man:sshd(8)
man:sshd_config(5)
Main PID: 16227 (sshd)
Tasks: 1 (limit: 1668)
Memory: 1.7M
CPU: 23ms
CGroup: /system.slice/ssh.service
└16227 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"
Aug 23 09:25:24 aquinojk-VirtualBox systemd[1]: Starting OpenBSD Secure Shell
Aug 23 09:25:24 aquinojk-VirtualBox systemd[1]: Started OpenBSD Secure Shell s
Aug 23 09:25:24 aquinojk-VirtualBox sshd[16227]: Server listening on 0.0.0.0 p
Aug 23 09:25:24 aquinojk-VirtualBox sshd[16227]: Server listening on :: port 2
lines 1-16/16 (END)
Right Ctrl


Aquino_JK Ubuntu 22.04 LTS Local Machine [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 23 09:27
aquino-jk@aquinojk-VirtualBox: ~/Desktop
aquino-jk@aquinojk-VirtualBox:~/Desktop$ sudo service ssh start
aquino-jk@aquinojk-VirtualBox:~/Desktop$ sudo systemctl status ssh
ssh.service - OpenBSD Secure Shell server
Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset:
Active: active (running) since Tue 2022-08-23 09:22:36 PST; 4min 43s ago
Docs: man:sshd(8)
man:sshd_config(5)
Main PID: 16286 (sshd)
Tasks: 1 (limit: 1700)
Memory: 1.7M
CPU: 23ms
CGroup: /system.slice/ssh.service
└16286 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"
Aug 23 09:22:36 aquinojk-VirtualBox systemd[1]: Starting OpenBSD Secure Shell
Aug 23 09:22:36 aquinojk-VirtualBox sshd[16286]: Server listening on 0.0.0.0 p
Aug 23 09:22:36 aquinojk-VirtualBox sshd[16286]: Server listening on :: port 2
Aug 23 09:22:36 aquinojk-VirtualBox systemd[1]: Started OpenBSD Secure Shell s
lines 1-16/16 (END)

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



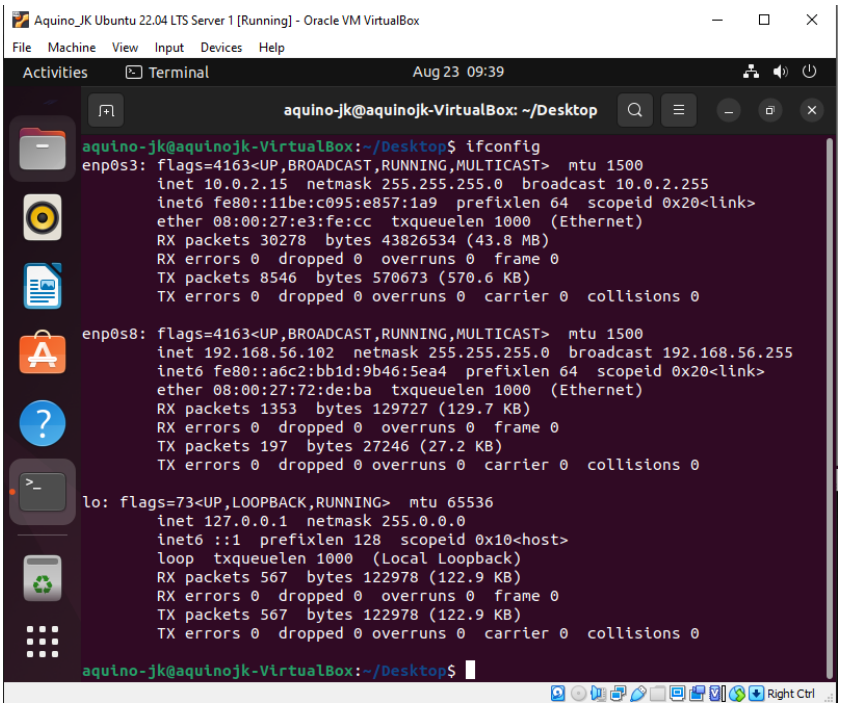




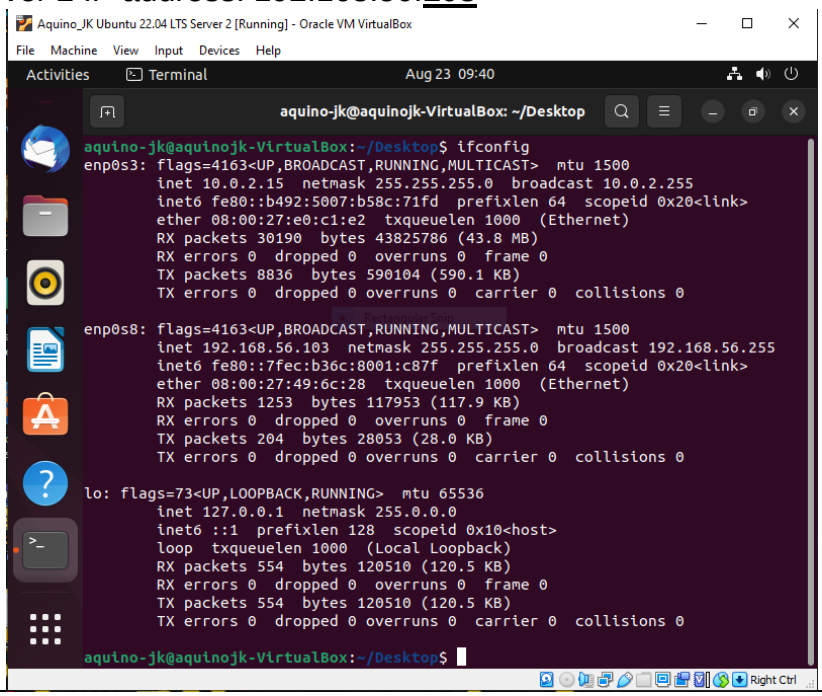
Task 3: Verify network settings on Server 1, Server 2, and Local Machine. On each device, do the following:

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

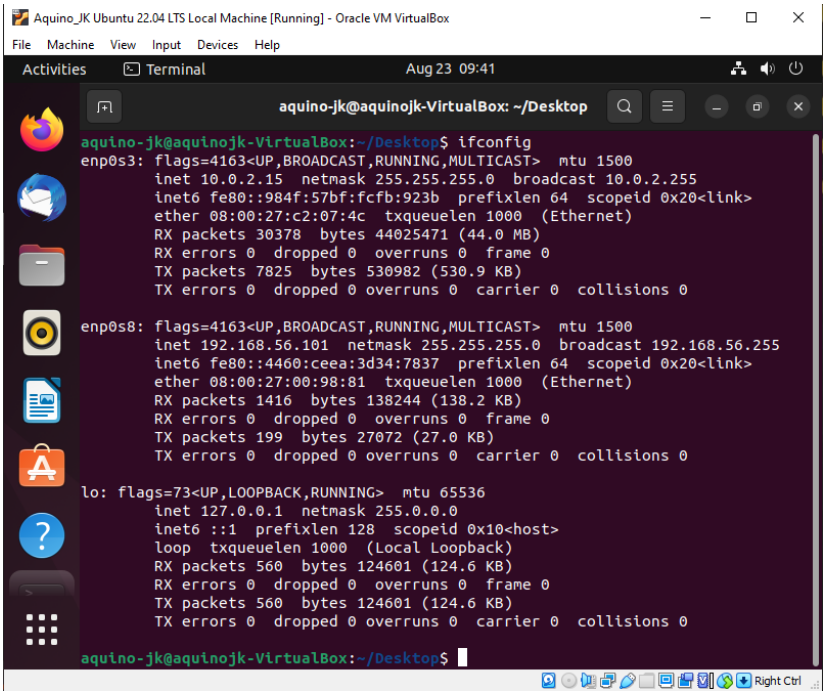
1.1 Server 1 IP address: 192.168.56.**102**



1.2 Server 2 IP address: 192.168.56.**<u>103</u>**

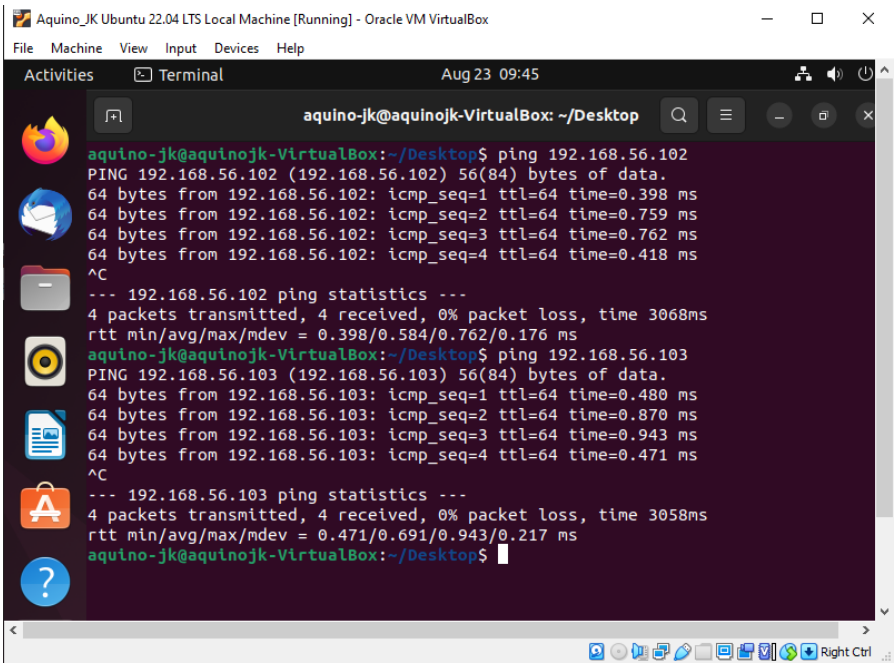


1.3 Server 3 IP address: 192.168.56.**101**

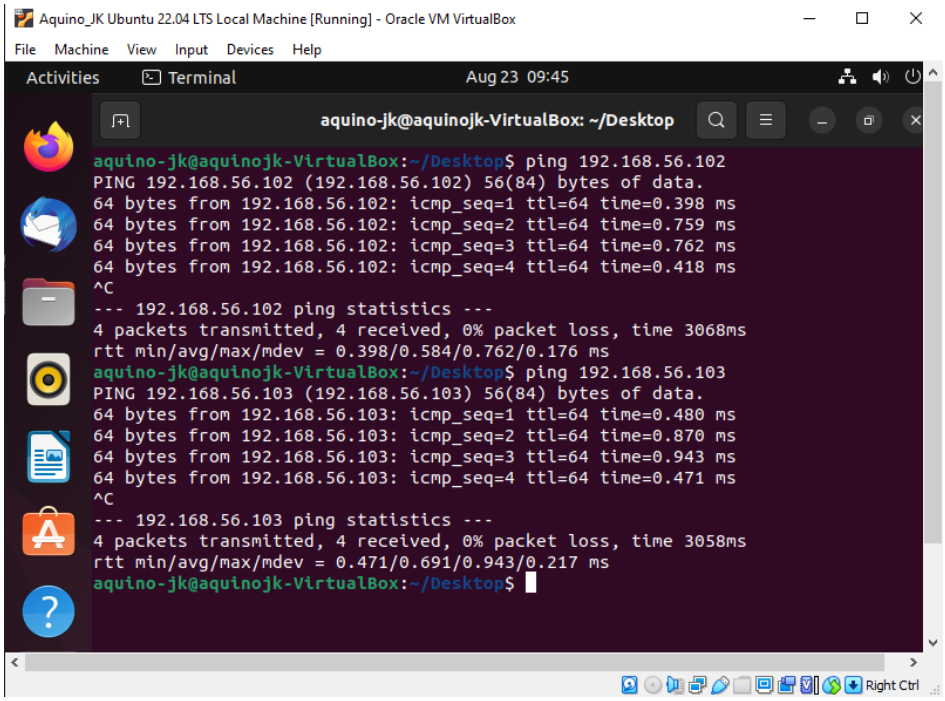


2. Make sure that they can ping each other.

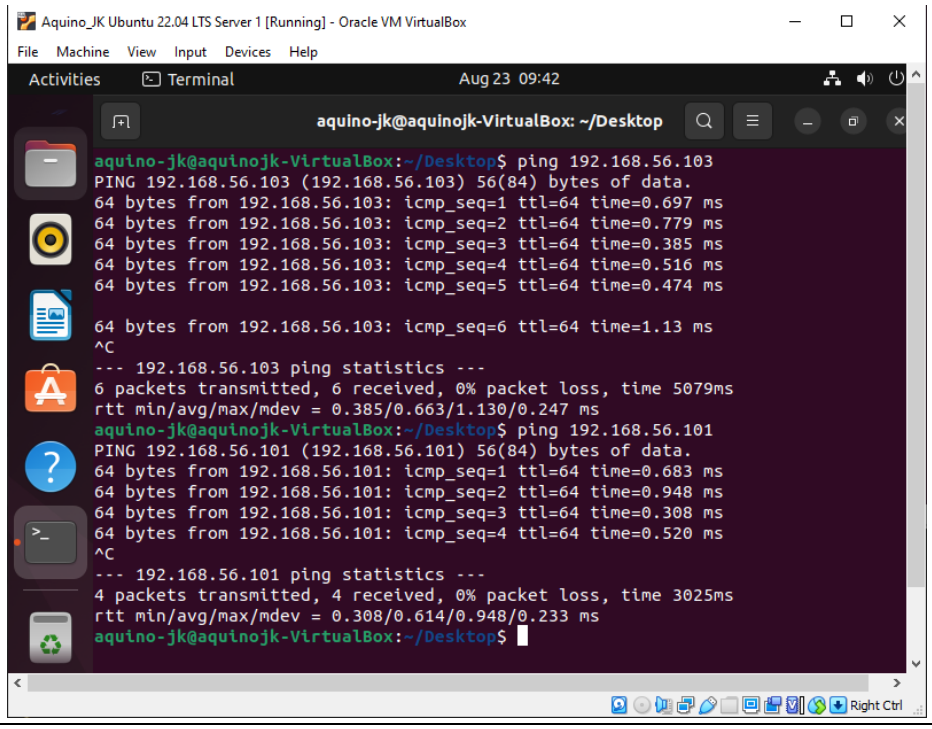
2.1 Connectivity test for Local Machine 1 to Server 1: ☐ Successful ☐ Not Successful



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



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

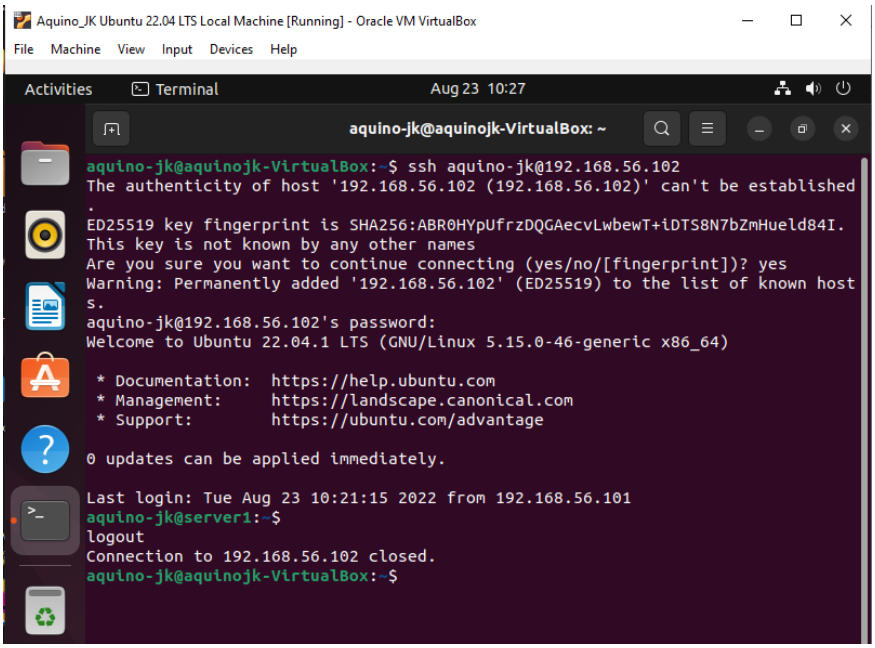
1. On the Local Machine, issue the following commands:

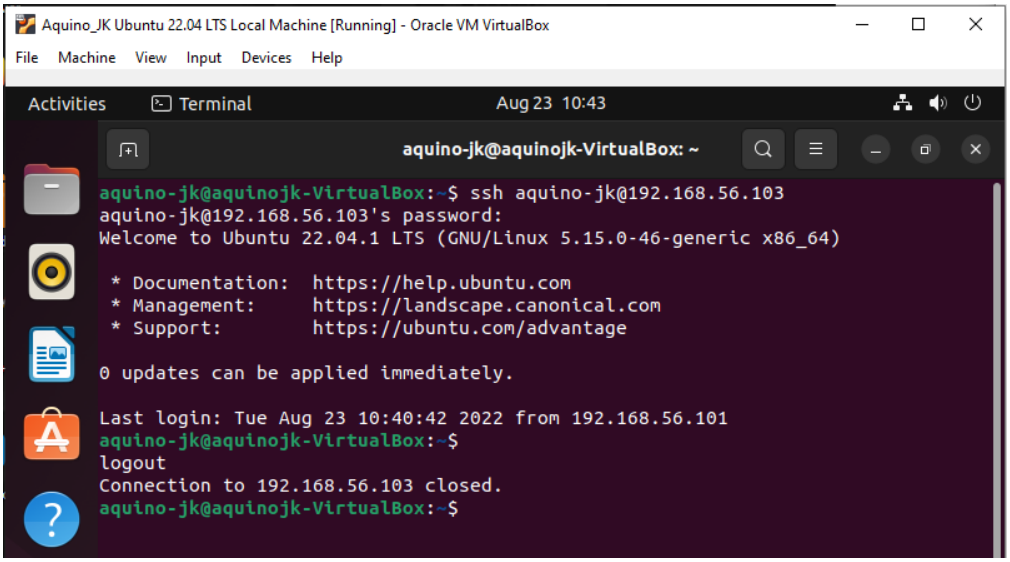
1.1 ssh username@ip_address_server1 for example, *ssh jvtaylar@192.168.56.120*

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*

2. Logout of Server 1 by issuing the command *control + D.*
3. Do the same for Server 2.



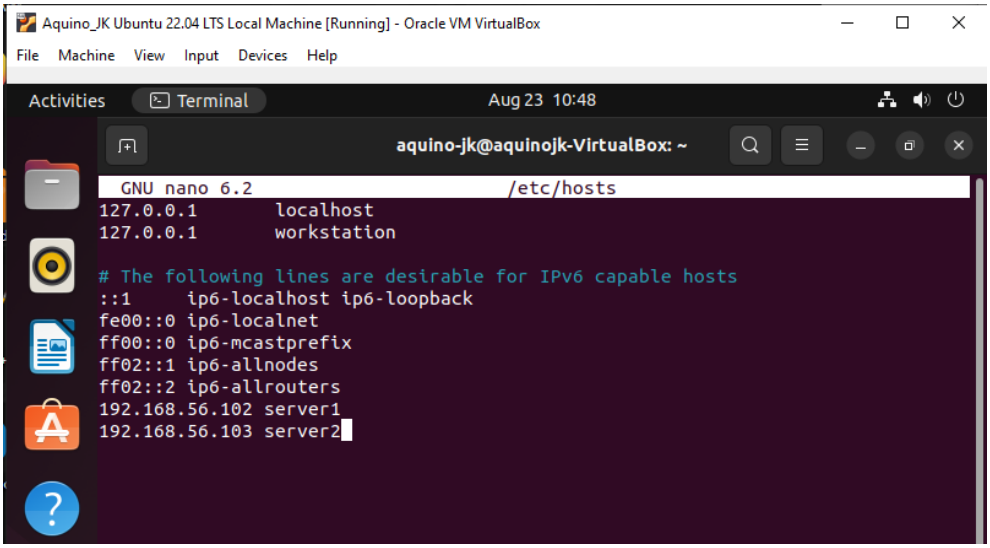


4. Edit the hosts of the Local Machine by issuing the command *sudo nano /etc/hosts.* Below all texts type the following:

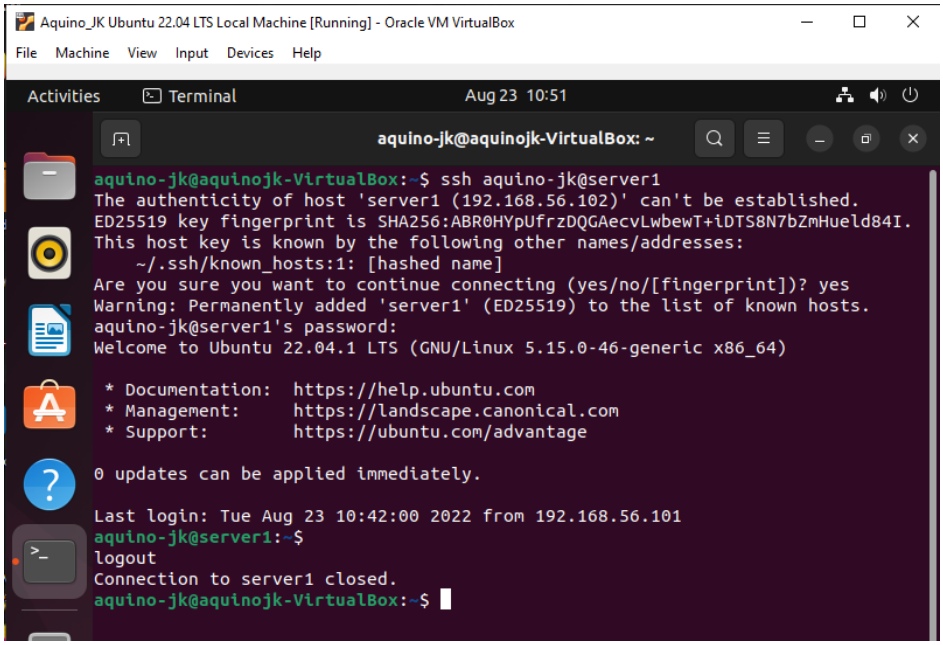
4.1 IP_address server 1 (provide the ip address of server 1 followed by the hostname)

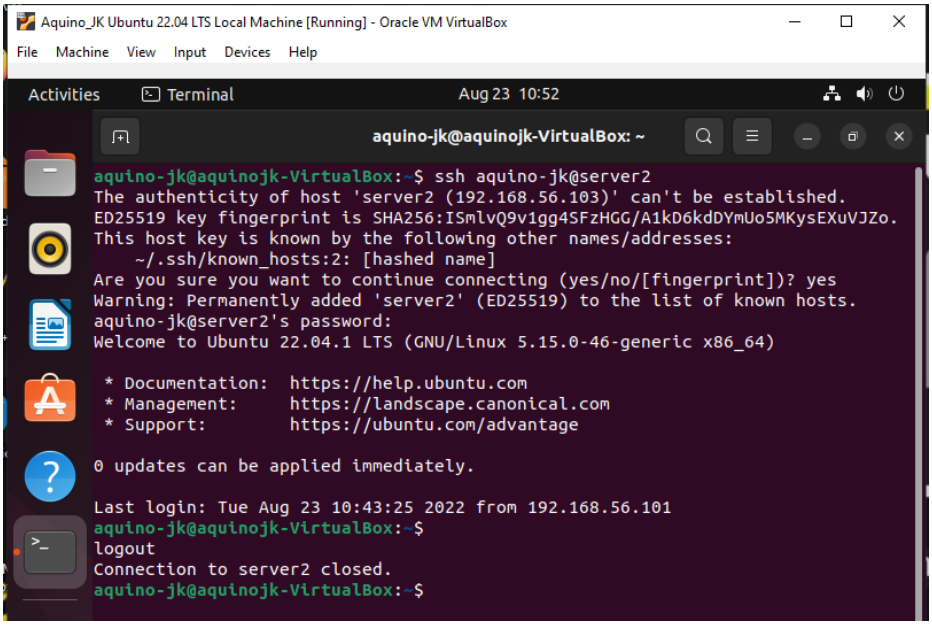
4.2 IP_address server 2 (provide the ip address of server 2 followed by the hostname)

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.





Reflections:

Answer the following:

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

    - We are able to use the hostname instead of the IP address in SSH commands because I have edited the hosts of the local machine's host using the commands sudo nano /etc/host and in the lower part of the script, I have added the IP Addresses of the servers and put the hostnames beside it, after saving the changes in the script, we can now use the hostname of the servers instead of using the IP addresses of the servers.

2. How secured is SSH?

    - Secure Shell (SSH) is a secure type of shell which actually safer than just using the password which is not secure, SSH uses strong encryption algorithms which makes it more secure to ensure the integrity of the data transmitted.