

## **CS3530 Hands-on Assignment for Nov 26th, 2020**

Member 1: **PADIGAM PAVAN KALYAN(ms17btech11013)**

Member 2: **PULLEPU GUNA SEKHAR(ee17btech11032)**

**# Submission Deadline: 23:59 on Dec 4th (FRI), 2020)**

### **# General Information**

1. This assignment is a pair assignment. The same mark will be offered to the pair of students regardless of individual contributions.
2. The assignment is customized for Ubuntu + KVM environment. It is highly recommended for non-Ubuntu users to enable dual boot on your laptop computer and install Ubuntu. If you would like to work on another operating system and virtualization platform, you need to interpret the Ubuntu/KVM terminology to another environment's terminology.
3. Each pair can create a locally copy of this question file, give the answer to the local copy, and submit in a form of PDF file.
4. Only one submission is good enough as far as the student names and IDs are properly mentioned.
5. Do not send any private comment to separately mention the buddy.

## Prerequisite

This assignment assumes that the hand-on assignments 1 and 2 are completed. On your laptop computer, 2 (two) Ubuntu Servers should be already installed as VMs, say VM1 and VM2, using virt-manager, and can ping with each other as shown in Figure 1. Let us call this setup "your LAN". Note that the IP addresses given in the figure is just an example. Other IP addresses can be given to the VMs as far as they are consistent and working.

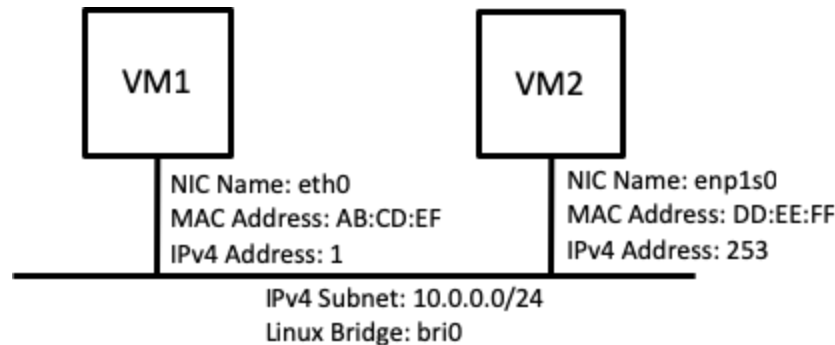


Figure 1. "Example" Network Configuration of 2 VMs connecting to the same Linux bridge and pinging with each other.

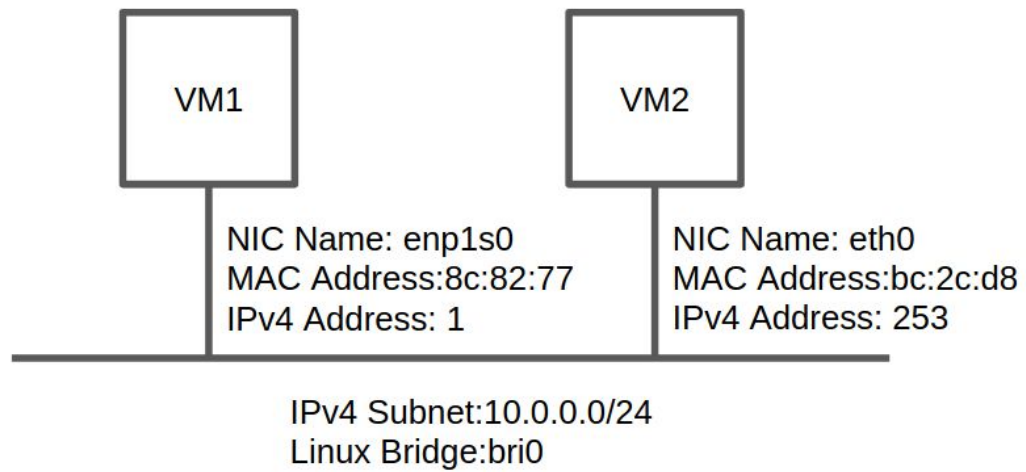
## # Part 1: Basic Networking

Question 1.

Paste the pictorial illustration of your LAN (Network Diagram) with sufficient information about NIC Name, MAC Address, IPv4 Address, IPv4 Subnet, Linux Bridge those are used to form the network. If needed, you may locally download and edit the template file to prepare the network diagram.

Answer to Question 1.

(Paste your pictorial illustration here.)

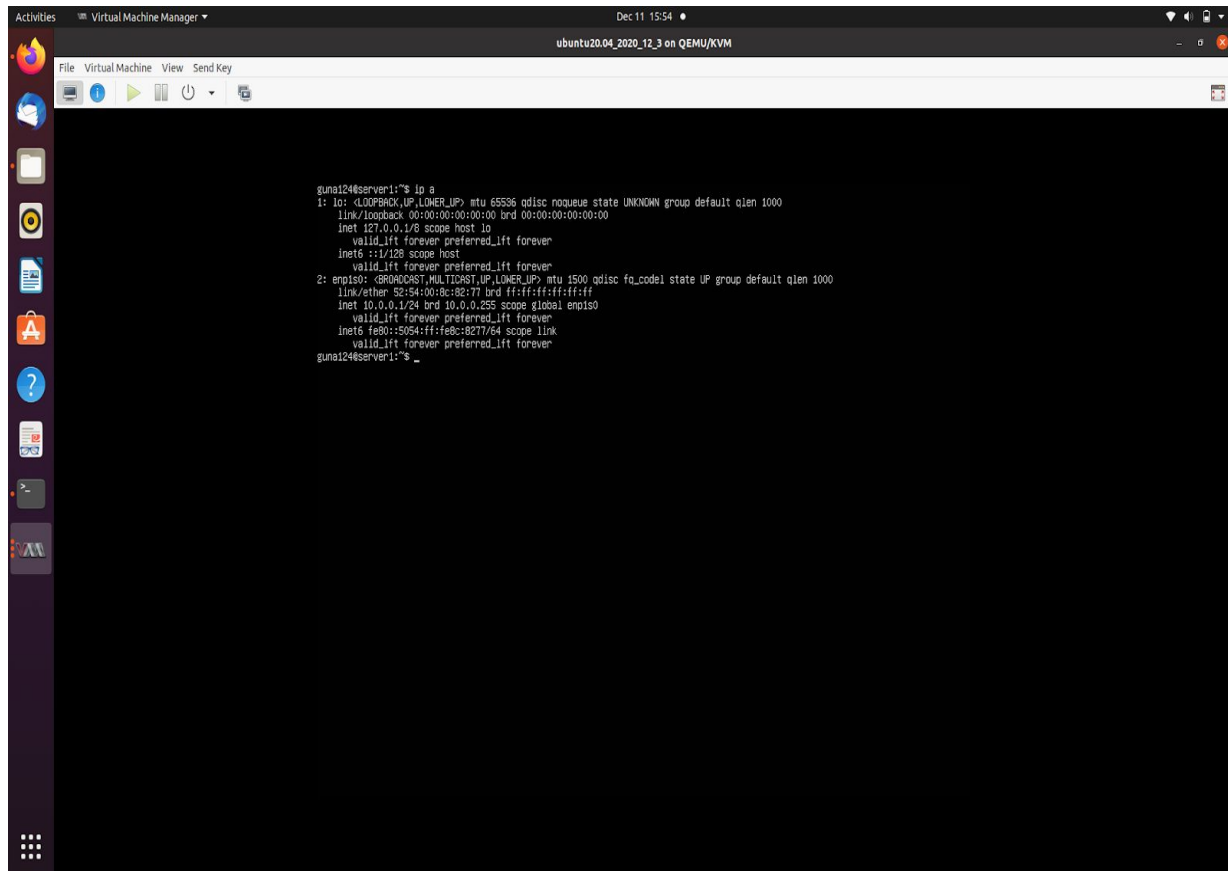


Question 2.

Paste the screen capture of the terminal of VM1 showing the IPv4 address which you configure.

Answer to Question 2.

(Paste the screen capture here.)



The screenshot shows a Virtual Machine Manager window titled "Virtual Machine Manager" with a sub-title "ubuntu20.04\_2020\_12\_3 on QEMU/KVM". The window displays a terminal window with the following output:

```
gna124@server1:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp1s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 52:54:00:8c:82:77 brd ff:ff:ff:ff:ff:ff
    inet 10.0.0.1/24 brd 10.0.0.255 scope global enp1s0
        valid_lft forever preferred_lft forever
    inet6 fe80::5054:ff:fe8c:8277/64 scope link
        valid_lft forever preferred_lft forever
gna124@server1:~$ _
```

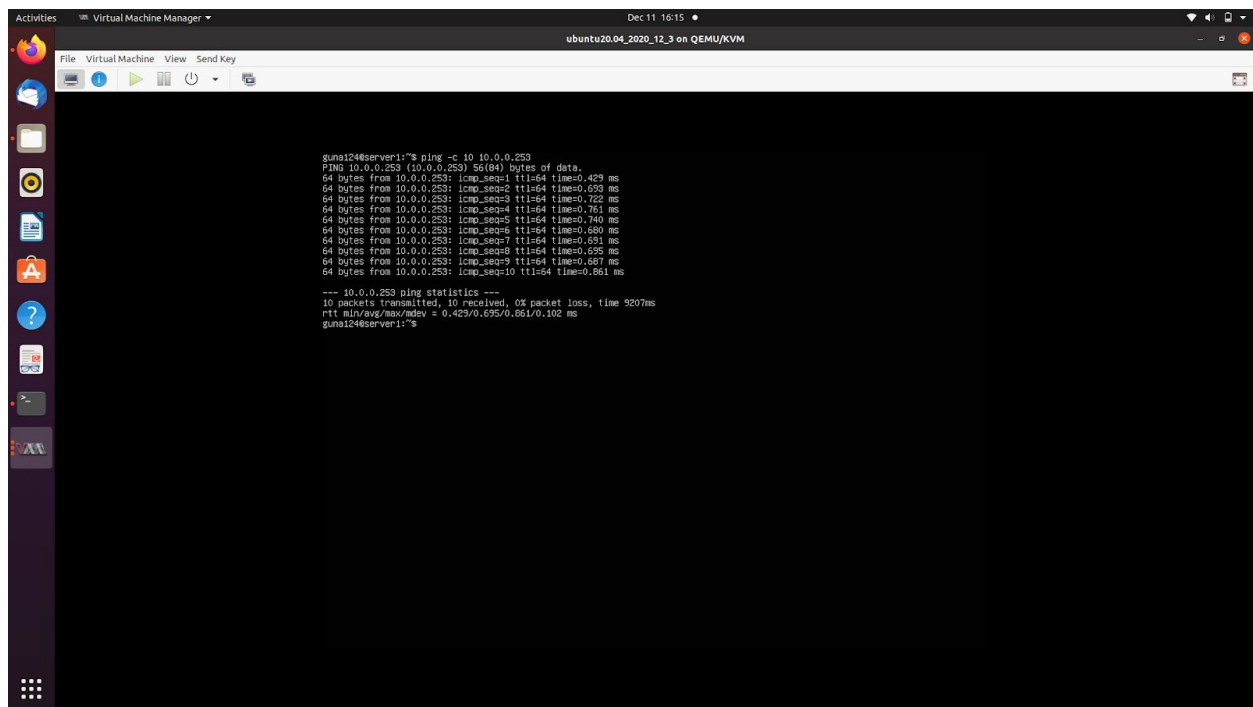
### Question 3.

Execute ping command from VM1 to VM2 with specifying the number of ICMP Echo Requests to be sent as 10 (ten). 1) Answer the average RTT in msec and 2) paste the screen capture of the terminal of VM1 including the command with appropriate options and the result including RTTs.

### Answer to Question 3.

1)Average RTT=0.695

2)



```
guni246server1:~$ ping -c 10 10.0.0.253
PING 10.0.0.253 (10.0.0.253) 56(84) bytes of data:
64 bytes from 10.0.0.253: icmp_seq=1 ttl=64 time=0.429 ms
64 bytes from 10.0.0.253: icmp_seq=2 ttl=64 time=0.593 ms
64 bytes from 10.0.0.253: icmp_seq=3 ttl=64 time=0.722 ms
64 bytes from 10.0.0.253: icmp_seq=4 ttl=64 time=0.761 ms
64 bytes from 10.0.0.253: icmp_seq=5 ttl=64 time=0.740 ms
64 bytes from 10.0.0.253: icmp_seq=6 ttl=64 time=0.680 ms
64 bytes from 10.0.0.253: icmp_seq=7 ttl=64 time=0.691 ms
64 bytes from 10.0.0.253: icmp_seq=8 ttl=64 time=0.695 ms
64 bytes from 10.0.0.253: icmp_seq=9 ttl=64 time=0.687 ms
64 bytes from 10.0.0.253: icmp_seq=10 ttl=64 time=0.861 ms

--- 10.0.0.253 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 5207ms
rtt min/avg/max/mdev = 0.429/0.695/0.861/0.102 ms
guni246server1:~$
```

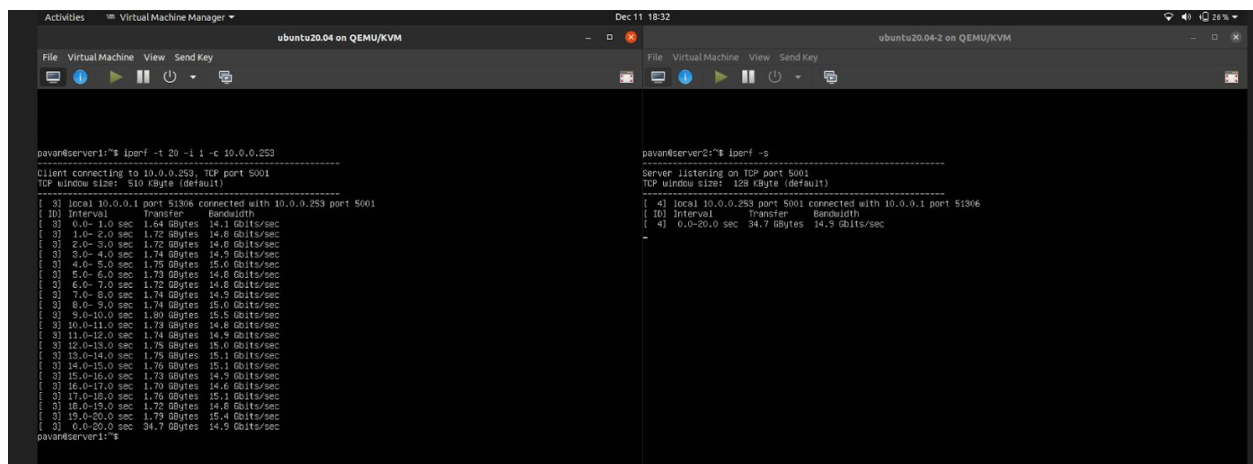
(Paste the screen capture here.)

Question 4.

Run iperf using VM2 as the iperf server (receiver of the traffic) and VM1 as the iperf client (sender of the traffic). Specify the appropriate options (-t 20 -i 1) so that the benchmark lasts for 20 seconds showing the throughput every second. Paste the screen capture of the iperf result on VM1.

Answer to Question 4.

(Paste the screen capture here.)



```
pavan@server1:~$ iperf -t 20 -i 1 -c 10.0.0.253
Client connecting to 10.0.0.253, TCP port 5001
TCP window size: 510 KByte (default)
[ 0] local 10.0.0.1 port 51306 connected with 10.0.0.253 port 5001
[ ID] Interval      Transfer      Bandwidth
[ 0] 0.0-1.0 sec    1.64 Gbytes   14.1 Gbits/sec
[ 1] 1.0-2.0 sec    1.72 Gbytes   14.8 Gbits/sec
[ 2] 2.0-3.0 sec    1.72 Gbytes   14.8 Gbits/sec
[ 3] 3.0-4.0 sec    1.74 Gbytes   14.9 Gbits/sec
[ 4] 4.0-5.0 sec    1.75 Gbytes   15.0 Gbits/sec
[ 5] 5.0-6.0 sec    1.73 Gbytes   14.8 Gbits/sec
[ 6] 6.0-7.0 sec    1.72 Gbytes   14.8 Gbits/sec
[ 7] 7.0-8.0 sec    1.74 Gbytes   14.9 Gbits/sec
[ 8] 8.0-9.0 sec    1.74 Gbytes   15.0 Gbits/sec
[ 9] 9.0-10.0 sec   1.90 Gbytes   15.5 Gbits/sec
[10] 10.0-11.0 sec   1.73 Gbytes   14.8 Gbits/sec
[11] 11.0-12.0 sec   1.74 Gbytes   14.9 Gbits/sec
[12] 12.0-13.0 sec   1.75 Gbytes   15.0 Gbits/sec
[13] 13.0-14.0 sec   1.75 Gbytes   15.1 Gbits/sec
[14] 14.0-15.0 sec   1.76 Gbytes   15.1 Gbits/sec
[15] 15.0-16.0 sec   1.73 Gbytes   14.9 Gbits/sec
[16] 16.0-17.0 sec   1.70 Gbytes   14.6 Gbits/sec
[17] 17.0-18.0 sec   1.76 Gbytes   15.1 Gbits/sec
[18] 18.0-19.0 sec   1.72 Gbytes   14.8 Gbits/sec
[19] 19.0-20.0 sec   1.79 Gbytes   15.4 Gbits/sec
[ 0] 0.0-20.0 sec   34.7 Gbytes   14.9 Gbits/sec
pavan@server1:~$
```

```
pavan@server2:~$ iperf -s
Server listening on TCP port 5001
TCP window size: 128 KByte (default)
[ 4] local 10.0.0.253 port 5001 connected with 10.0.0.1 port 51306
[ ID] Interval      Transfer      Bandwidth
[ 0] 0.0-20.0 sec   34.7 Gbytes   14.9 Gbits/sec
pavan@server2:~$
```

## # Part 2: DNS and DHCP

In this part, you configure a DNS server and a DHCP server on VM1, and answer the following questions. The DNS server must be configured as a Primary and Authoritative DNS server for your LAN. Specifically, you can refer to "Installation", "Primary Server", and "Testing" in Ubuntu Server Reference [1] to perform the bare minimum configuration. DHCP server configuration can also be found as part of the same reference [2].

[1] <https://ubuntu.com/server/docs/service-domain-name-service-dns>

[2] <https://ubuntu.com/server/docs/network-dhcp>

Question 5.

Fill the table to plan your domain.

Answer to Question 5.

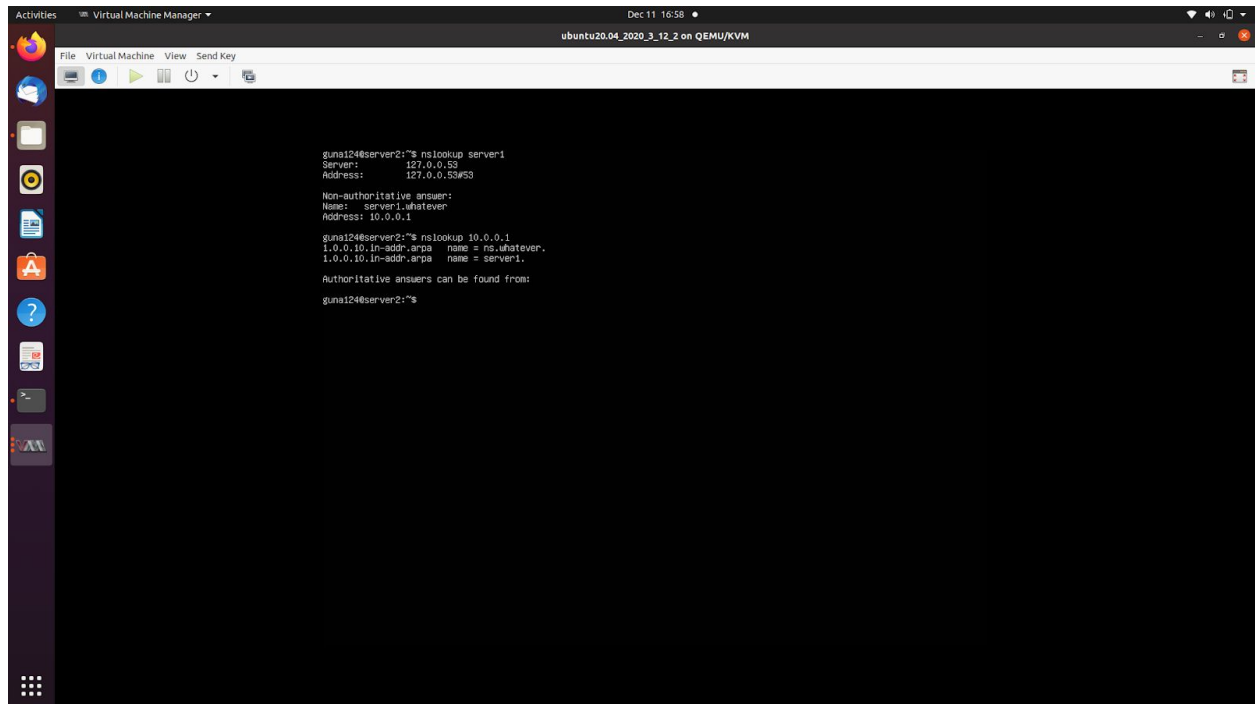
Parameters	Value
Domain Name corresponding to your LAN. "cs3530" must not be included. Bring something else.	whatever
IPv4 Address of DNS Server	10.0.0.1
Hostname of DNS Server	server1

Question 6.

Run dig or nslookup command on VM2 and confirm that 1) the IPv4 address of VM1 is successfully resolved by its hostname, and 2) the hostname of VM1 is successfully resolved by its IPv4 address. Give the answer by pasting the screen capture of dig or nslookup commands executed on VM2.

Answer to Question 6.

((Paste the screen capture here.))

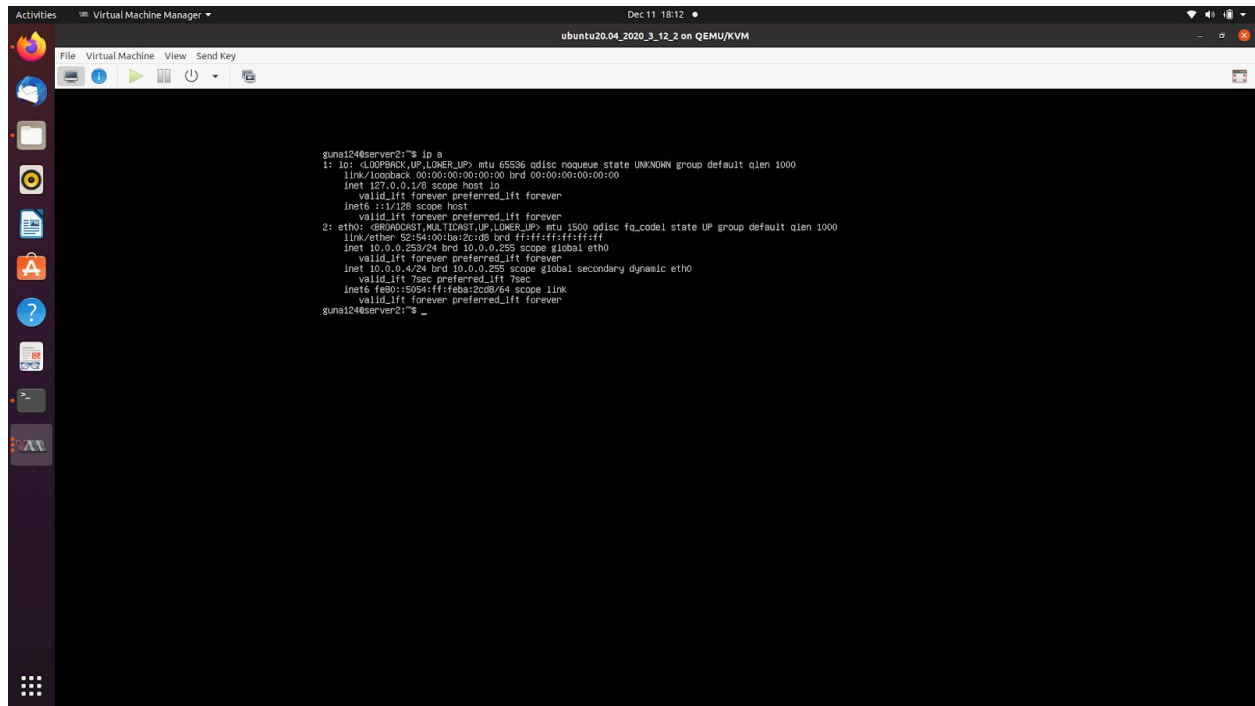


#### Question 7.

Configure DHCP server on VM1 so that VM2 in your LAN can configure IPv4 address, Subnet Mask and DNS server using DHCP. In this question, Default Gateway can be left without being mentioned because the router does not exist in your LAN. If VM2 uses static IPv4 address and DHCP Client at the same time, you may observe a NIC may have multiple IPv4 addresses.

#### Answer to Question 7.

((Paste the screen capture here.))



The screenshot shows a Virtual Machine Manager window titled "Virtual Machine Manager" with a sub-header "Dec 11 18:12". The main window displays a terminal window titled "ubuntu20.04\_2020\_3\_12\_2 on QEMU/KVM". The terminal output shows the following commands and their results:

```
guni246server2:"$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
        inet6 ::1/128 scope host
            valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 52:54:00:1a:3c:de brd ff:ff:ff:ff:ff:ff
        inet 10.0.0.253/24 brd 10.0.0.255 scope global eth0
            valid_lft forever preferred_lft forever
        inet 10.0.0.4/24 brd 10.0.0.255 scope global secondary dynamic eth0
            valid_lft 7sec preferred_lft 7sec
        inet6 fe80::5094:fff:feba:2cde/64 scope link
            valid_lft forever preferred_lft forever
guni246server2:"$ _
```

Done!!