CS3530 Hands-on Assignment for Nov 26th, 2020

Member 1: ABBURI VENKATA SAI MAHESH (CS18BTECH11001)
Member 2: JILLELA DEEPAK REDDY (CS18BTECH11016)

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 local copy of this question file, give the answer to the local copy, and submit in a form of a 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.

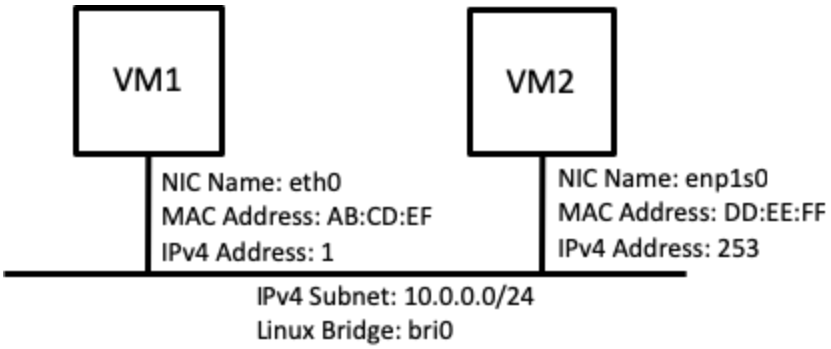


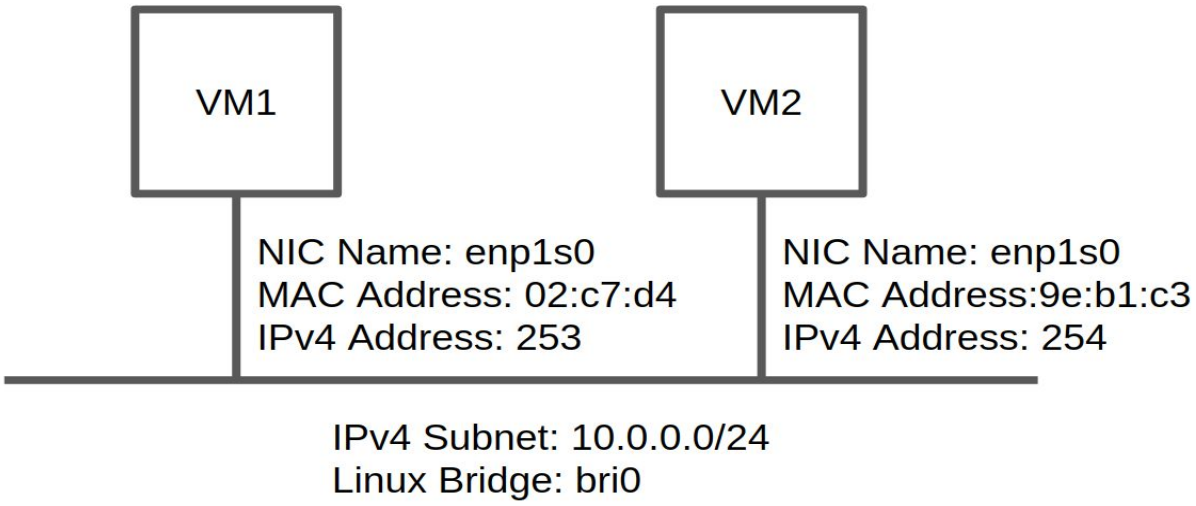
Figure 1. "Example" Network Configuration of 2 VMs connecting to the same Linux bridge and pinging with each other.

 # 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.



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.)

```
mahesh@serve1:~$ ip addr show
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 52:54:00:02:c7:d4 brd ff:ff:ff:ff:ff:ff
    inet 10.0.0.253/24 brd 10.0.0.255 scope global enp1s0
       valid_lft forever preferred_lft forever
    inet6 fe80::5054:ff:fe02:c7d4/64 scope link
       valid_lft forever preferred_lft forever
mahesh@serve1:~$
```

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.
(Paste the screen capture here.)

1. Average RTT = 0.667 msec

```
mahesh@serve1:~$ ping -c 10 10.0.0.254
PING 10.0.0.254 (10.0.0.254) 56(84) bytes of data.
64 bytes from 10.0.0.254: icmp_seq=1 ttl=64 time=0.502 ms
64 bytes from 10.0.0.254: icmp_seq=2 ttl=64 time=0.732 ms
64 bytes from 10.0.0.254: icmp_seq=3 ttl=64 time=0.717 ms
64 bytes from 10.0.0.254: icmp_seq=4 ttl=64 time=0.718 ms
64 bytes from 10.0.0.254: icmp_seq=5 ttl=64 time=0.649 ms
64 bytes from 10.0.0.254: icmp_seq=6 ttl=64 time=0.751 ms
64 bytes from 10.0.0.254: icmp_seq=7 ttl=64 time=0.606 ms
64 bytes from 10.0.0.254: icmp_seq=8 ttl=64 time=0.514 ms
64 bytes from 10.0.0.254: icmp_seq=9 ttl=64 time=0.770 ms
64 bytes from 10.0.0.254: icmp_seq=10 ttl=64 time=0.719 ms

--- 10.0.0.254 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9168ms
rtt min/avg/max/mdev = 0.502/0.667/0.770/0.091 ms
mahesh@serve1:~$ _
```

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.)

```
mahesh@serve1:~$ iperf -c 10.0.0.254 -i1 -t20
------------------------------------------------------------
Client connecting to 10.0.0.254, TCP port 5001
TCP window size:  442 KByte (default)
------------------------------------------------------------
[  3] local 10.0.0.253 port 59460 connected with 10.0.0.254 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0- 1.0 sec  2.07 GBytes  17.8 Gbits/sec
[  3]  1.0- 2.0 sec  2.06 GBytes  17.7 Gbits/sec
[  3]  2.0- 3.0 sec  2.12 GBytes  18.2 Gbits/sec
[  3]  3.0- 4.0 sec  1.89 GBytes  16.3 Gbits/sec
[  3]  4.0- 5.0 sec  1.72 GBytes  14.8 Gbits/sec
[  3]  5.0- 6.0 sec  1.83 GBytes  15.8 Gbits/sec
[  3]  6.0- 7.0 sec  1.84 GBytes  15.8 Gbits/sec
[  3]  7.0- 8.0 sec  2.24 GBytes  19.2 Gbits/sec
[  3]  8.0- 9.0 sec  2.19 GBytes  18.8 Gbits/sec
[  3]  9.0-10.0 sec  2.12 GBytes  18.2 Gbits/sec
[  3] 10.0-11.0 sec  2.18 GBytes  18.8 Gbits/sec
[  3] 11.0-12.0 sec  2.21 GBytes  19.0 Gbits/sec
[  3] 12.0-13.0 sec  1.89 GBytes  16.2 Gbits/sec
[  3] 13.0-14.0 sec  2.08 GBytes  17.9 Gbits/sec
[  3] 14.0-15.0 sec  1.93 GBytes  16.6 Gbits/sec
[  3] 15.0-16.0 sec  2.33 GBytes  20.0 Gbits/sec
[  3] 16.0-17.0 sec  2.20 GBytes  18.9 Gbits/sec
[  3] 17.0-18.0 sec  1.88 GBytes  16.1 Gbits/sec
[  3] 18.0-19.0 sec  1.81 GBytes  15.6 Gbits/sec
[  3] 19.0-20.0 sec  1.90 GBytes  16.3 Gbits/sec
[  3]  0.0-20.0 sec  40.5 GBytes  17.4 Gbits/sec
mahesh@serve1:~$
```

 # 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.

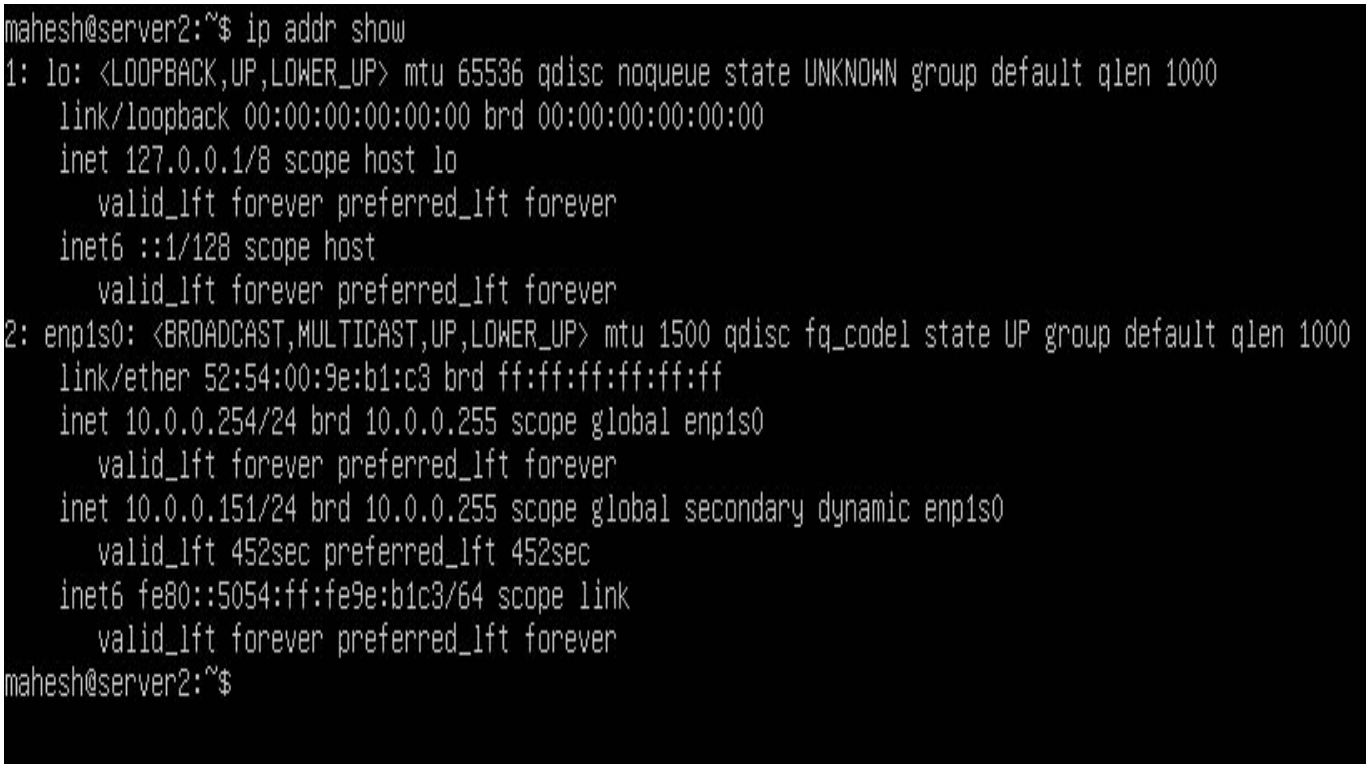
Parameters	Value
Domain Name corresponding to your LAN. "cs3530" must not be included. Bring something else.	example.com
IPv4 Address of DNS Server	10.0.0.253
Hostname of DNS Server	ns.example.com

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 VM2 is using static IPv4 address (10.0.0.254) and DHCP Client address(10.0.0.151) at the same time and these multiple address are shown in the above figure.

Done!!