Computer Networks Lab Week 7

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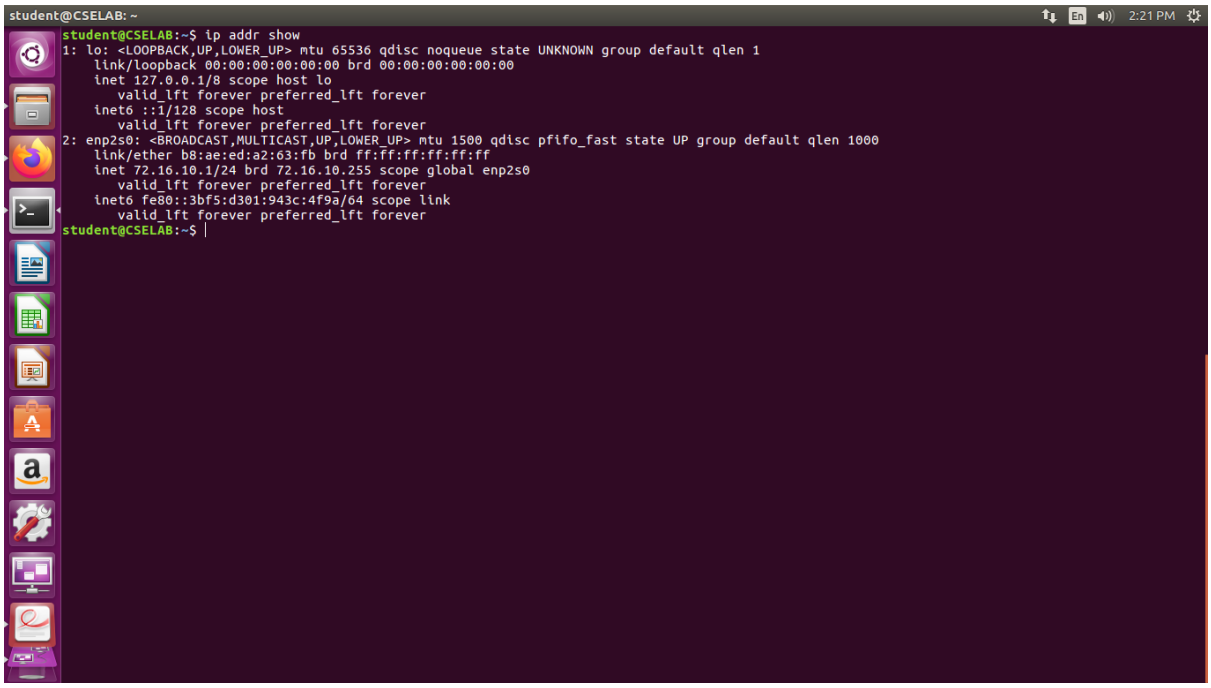
Task 1: Assign IP addresses to all computers A, B, C, D (Source host HA, Router R1, Router R2 and Destination Host HD)

Step1: Assign the IP addresses to Ha

Sudo ip addr add 172.16.10.1/24 dev eth1

Ip addr show

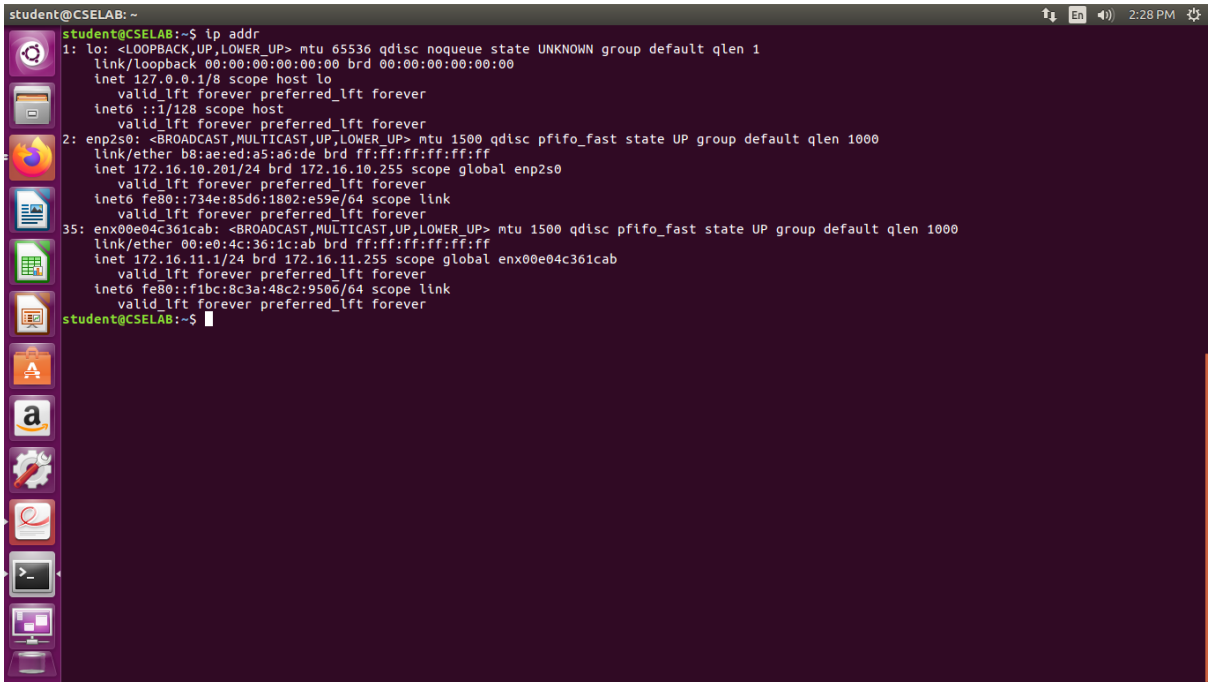


Step 2: Assign the IP address to R1

Sudo ip addr add 172.16.10.201/24 dev eth1

Sudo ip addr add 172.16.11.1/24 dev eth2

Ip addr show

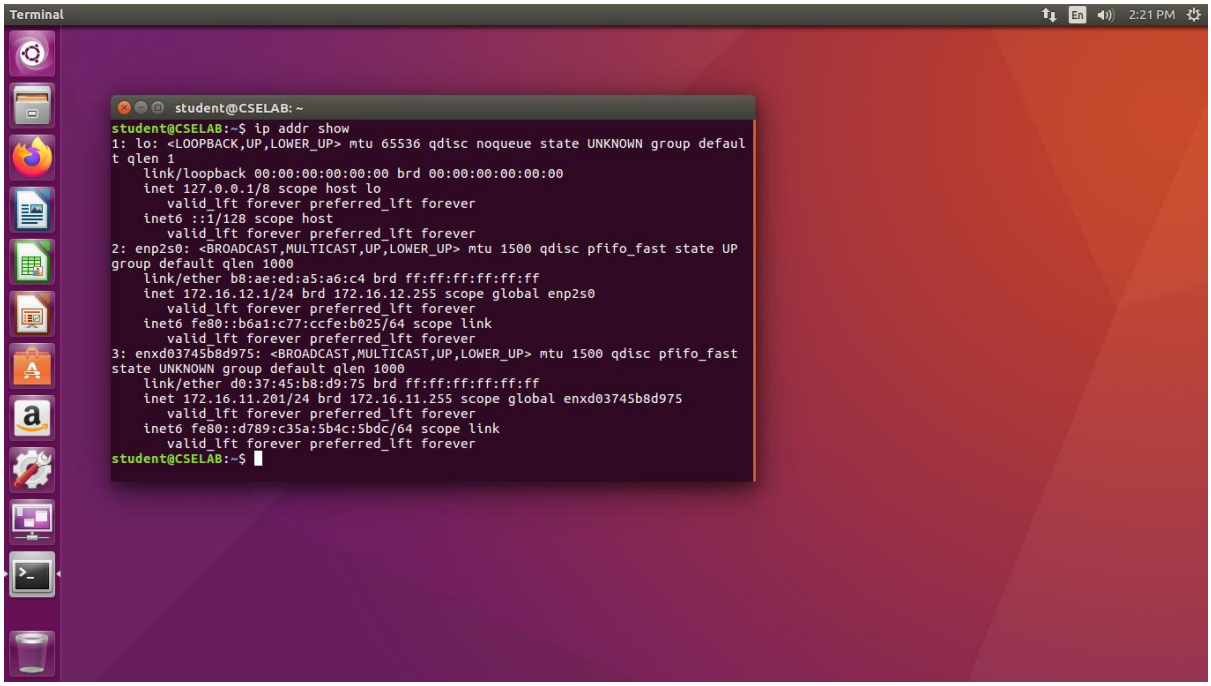


Step 3: Assign the IP address to R2

Sudo ip addr add 172.16.11.201/24 dev eth2

Sudo ip addr add 172.16.12.1/24 dev eth1

Ip addr show



Step 4: Assign the IP address to the Hd

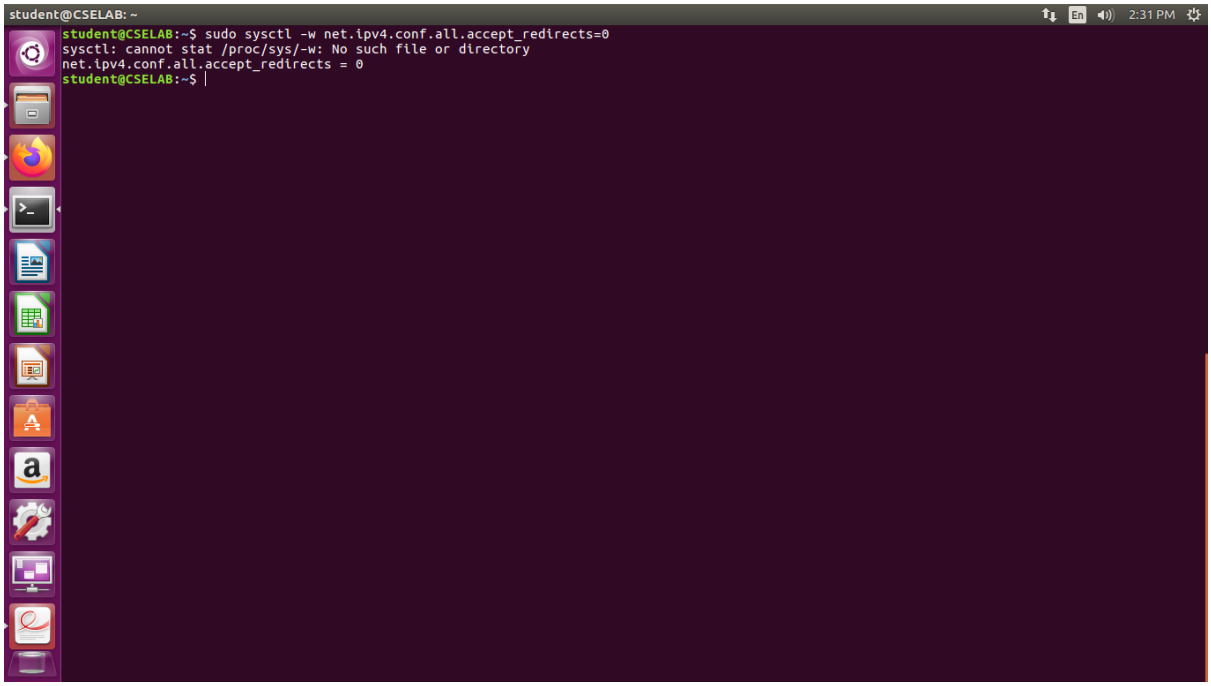
Sudo ip addr add 172.16.12.201/24 dev eth1

Ip addr show

```
student@CSELAB:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1
    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: enp2s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether b8:ae:ed:a5:a6:16 brd ff:ff:ff:ff:ff:ff
    inet 172.16.12.201/24 brd 172.16.12.255 scope global enp2s0
       valid_lft forever preferred_lft forever
    inet6 fe80::a880:400c:2c65:79c0/64 scope link
       valid_lft forever preferred_lft forever
```

Note 1: Disable accepting the ICMP redirect packets.

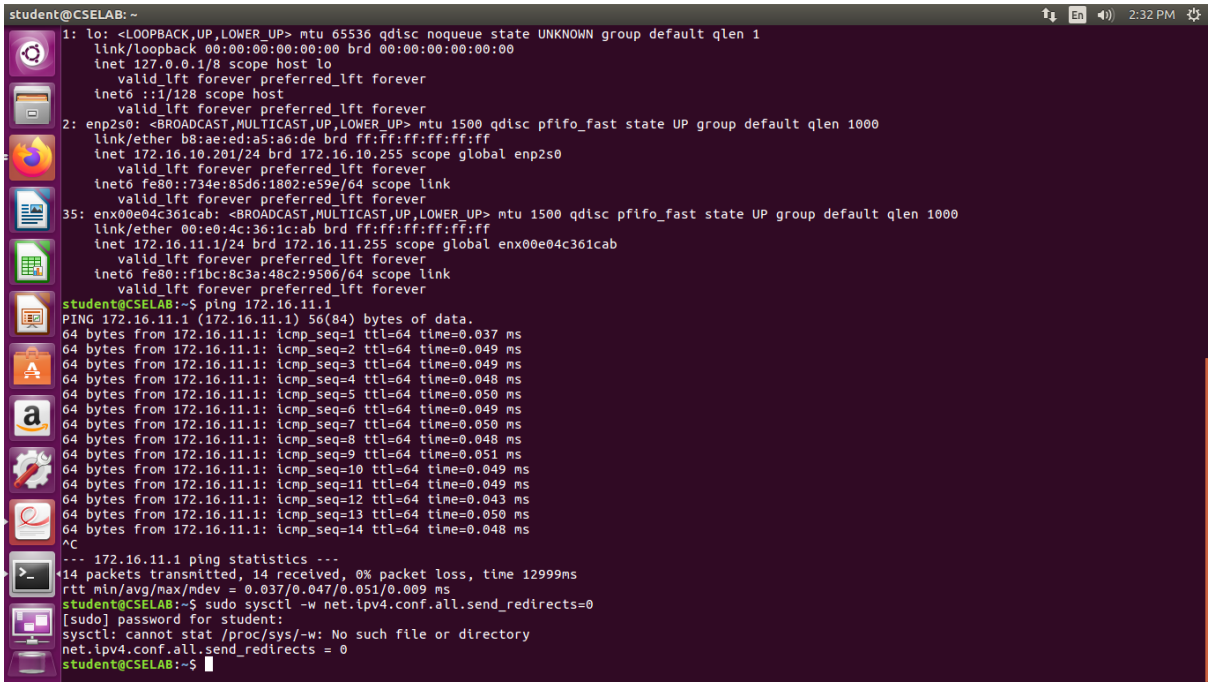
Sudo sysctl -w net.ipv4.conf.all.accept_redirects=0

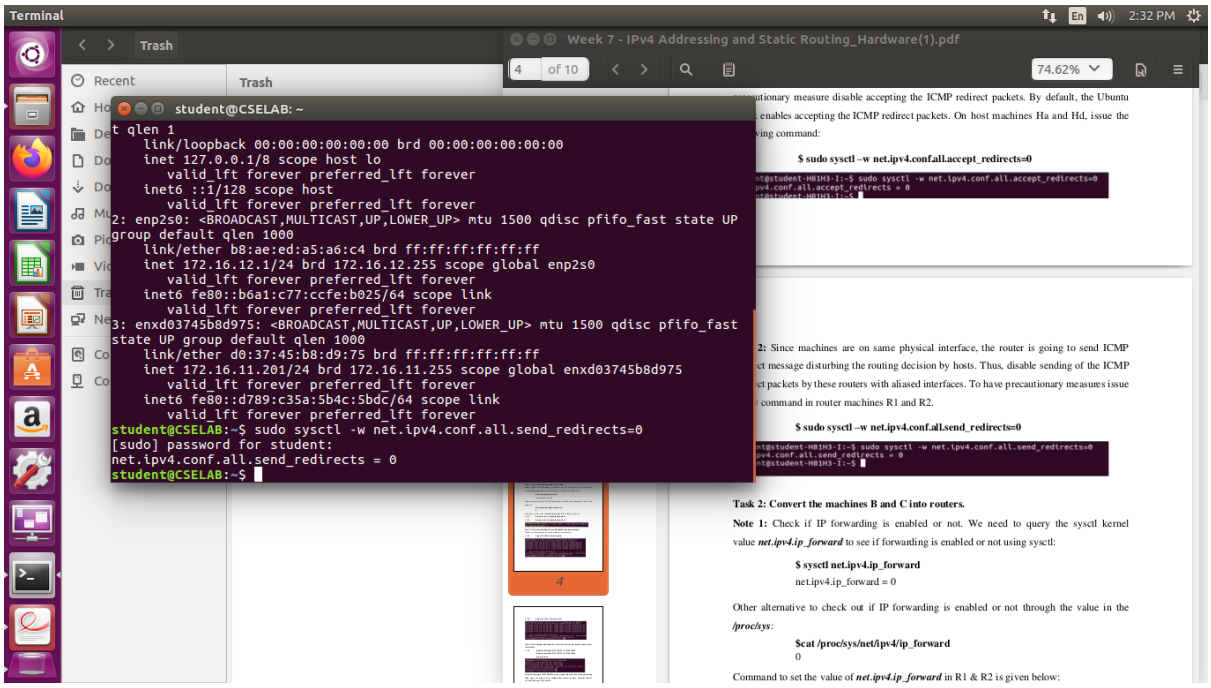



```
student@CSELAB:~$ sudo sysctl -w net.ipv4.conf.all.accept_redirects=0
[sudo] password for student:
net.ipv4.conf.all.accept_redirects = 0
```

Note 2: Disable sending of the ICMP redirect message.

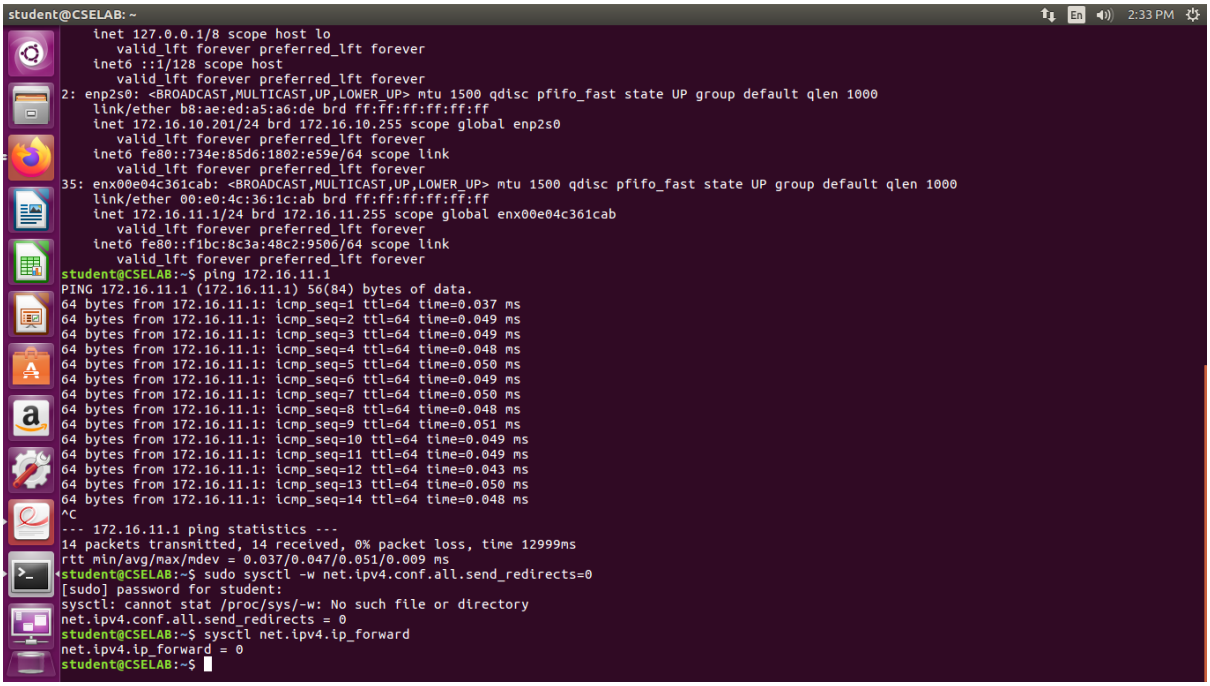
Sudo sysctl -w net.ipv4.conf.all.send_redirects=0



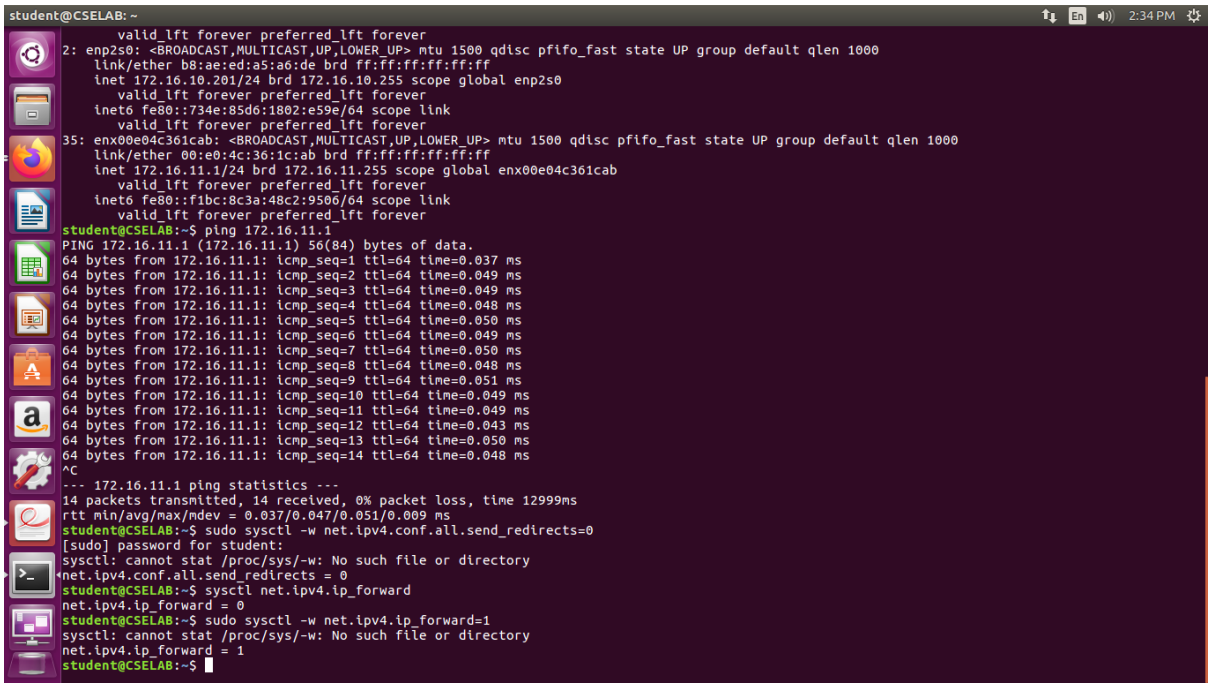


Task 2: Convert the machines B and C into routers

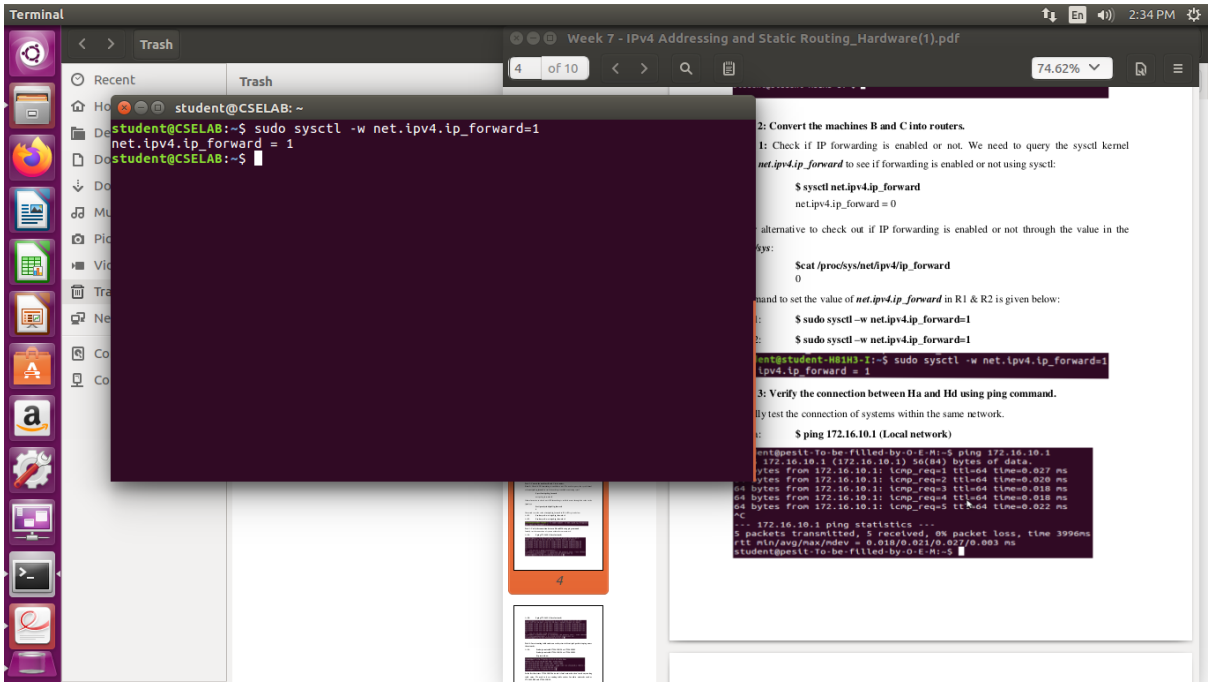
- Checking if IP forwarding is enables or not.



At R1: sudo sysctl -w net.ipv4.ip_forward=1

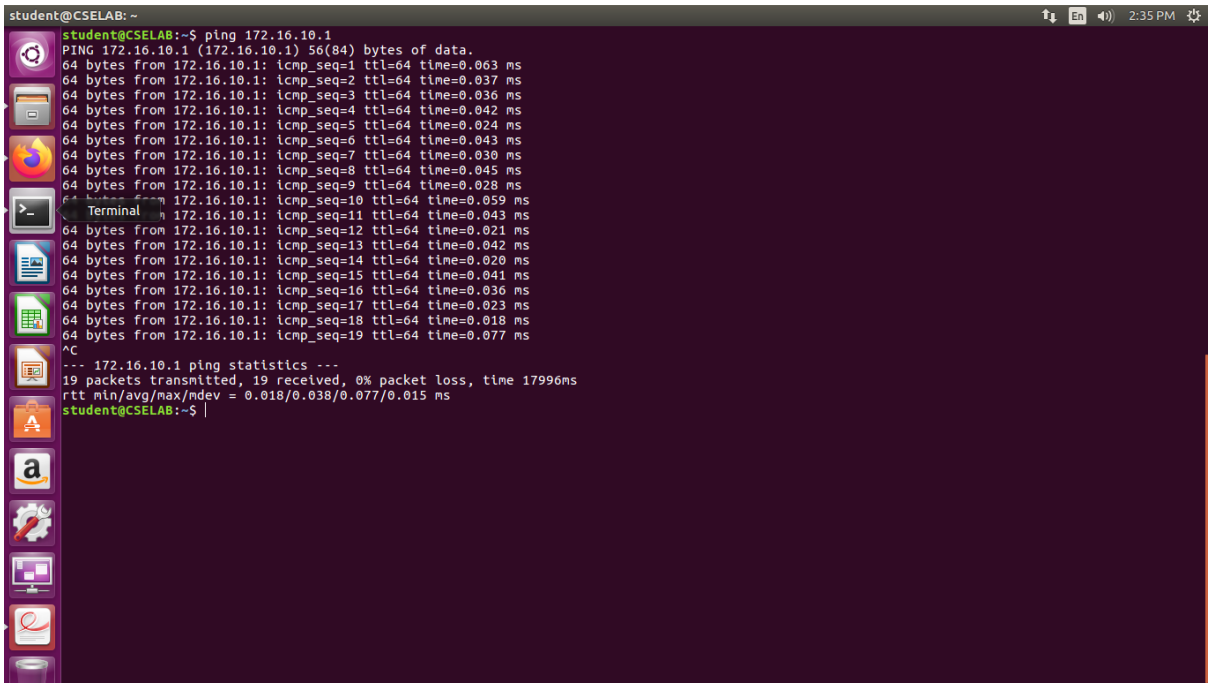


At R2: sudo sysctl -w net.ipv4.ip_forward=1



Task 3: Verify the connection between Ha and Hd using ping command

At Ha: ping 172.16.10.1(local network)



At Hd: ping 172.16.12.1(local network)

```
student@CSELAB:~$ ping 172.16.12.1
PING 172.16.12.1 (172.16.12.1) 56(84) bytes of data.
64 bytes from 172.16.12.1: icmp_seq=1 ttl=64 time=0.384 ms
64 bytes from 172.16.12.1: icmp_seq=2 ttl=64 time=0.240 ms
64 bytes from 172.16.12.1: icmp_seq=3 ttl=64 time=0.244 ms
64 bytes from 172.16.12.1: icmp_seq=4 ttl=64 time=0.248 ms
64 bytes from 172.16.12.1: icmp_seq=5 ttl=64 time=0.237 ms
64 bytes from 172.16.12.1: icmp_seq=6 ttl=64 time=0.201 ms
64 bytes from 172.16.12.1: icmp_seq=7 ttl=64 time=0.236 ms
64 bytes from 172.16.12.1: icmp_seq=8 ttl=64 time=0.237 ms
64 bytes from 172.16.12.1: icmp_seq=9 ttl=64 time=0.254 ms
64 bytes from 172.16.12.1: icmp_seq=10 ttl=64 time=0.269 ms
64 bytes from 172.16.12.1: icmp_seq=11 ttl=64 time=0.249 ms
^C
--- 172.16.12.1 ping statistics ---
11 packets transmitted, 11 received, 0% packet loss, time 9997ms
rtt min/avg/max/mdev = 0.201/0.254/0.384/0.046 ms
```

Task 4: insert routing table entries on each system to direct ipv4 packets to ping across the networks.

At Ha:

sudo ip route add 172.16.12.0/24 via 172.16.10.201

Sudo ip route add 172.12.11.0/24 via 172.16.10.201

Ip route show

```
student@CSELAB:~$ sudo ip route add 172.16.12.0/24 via 172.16.10.201
student@CSELAB:~$ sudo ip route add 172.16.11.0/24 via 172.16.10.201
student@CSELAB:~$ ip route show
169.254.0.0/16 dev enp2s0  scope link  metric 1000
172.16.10.0/24 dev enp2s0  proto kernel  scope link  src 172.16.10.1  metric 100
172.16.11.0/24 via 172.16.10.201 dev enp2s0
172.16.12.0/24 via 172.16.10.201 dev enp2s0
student@CSELAB:~$
```

At R1:

Sudo ip route add 172.16.12.0/24 via 172.16.11.201

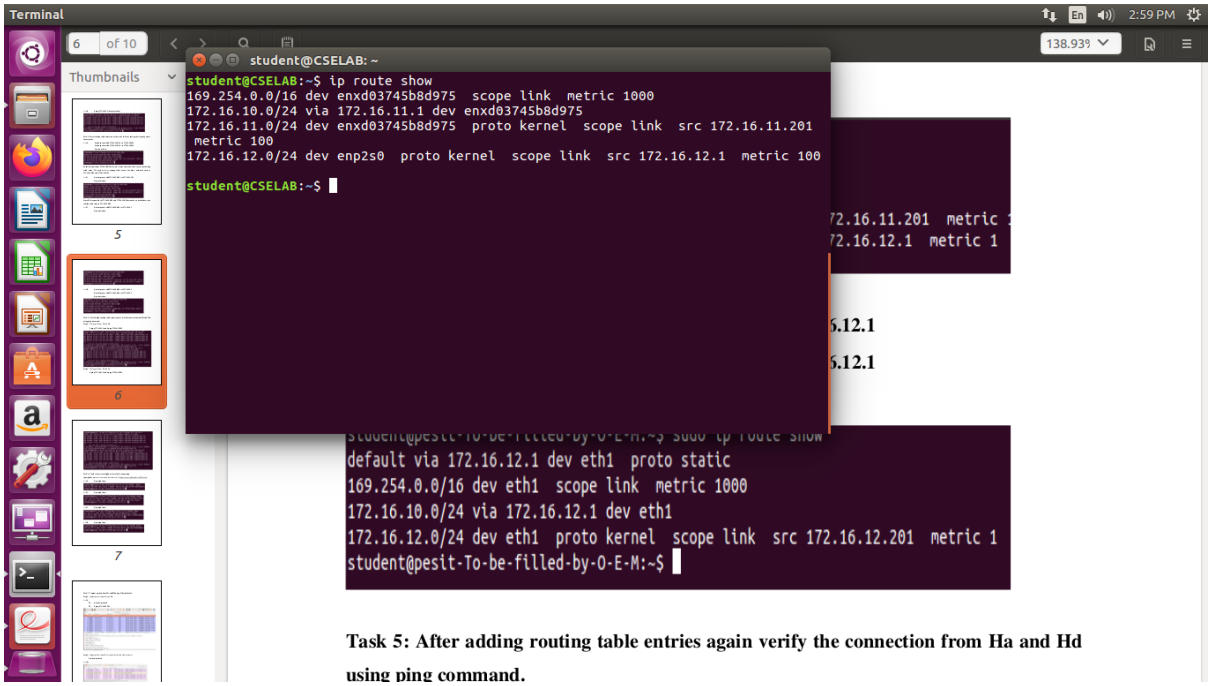
Ip route show

```
student@CSELAB:~$ sudo ip route add 172.16.12.0/24 via 172.16.11.201
student@CSELAB:~$ ip route show
169.254.0.0/16 dev enp2s0  scope link  metric 1000
172.16.10.0/24 dev enp2s0  proto kernel  scope link  src 172.16.10.201  metric 100
172.16.11.0/24 dev enx00e04c361cab  proto kernel  scope link  src 172.16.11.1  metric 100
172.16.12.0/24 via 172.16.11.201 dev enx00e04c361cab
```

At R2:

Sudo ip route add 172.16.10.0/24 via 172.16.11.1

Ip route show



Task 5: After adding routing table entries again verify the connection from Ha and Hd using ping command.

At Hd:

Sudo ip route add 172.16.10.0/24 via 172.16.12.1

Sudo ip route add 172.16.11.0/24 via 172.16.12.1

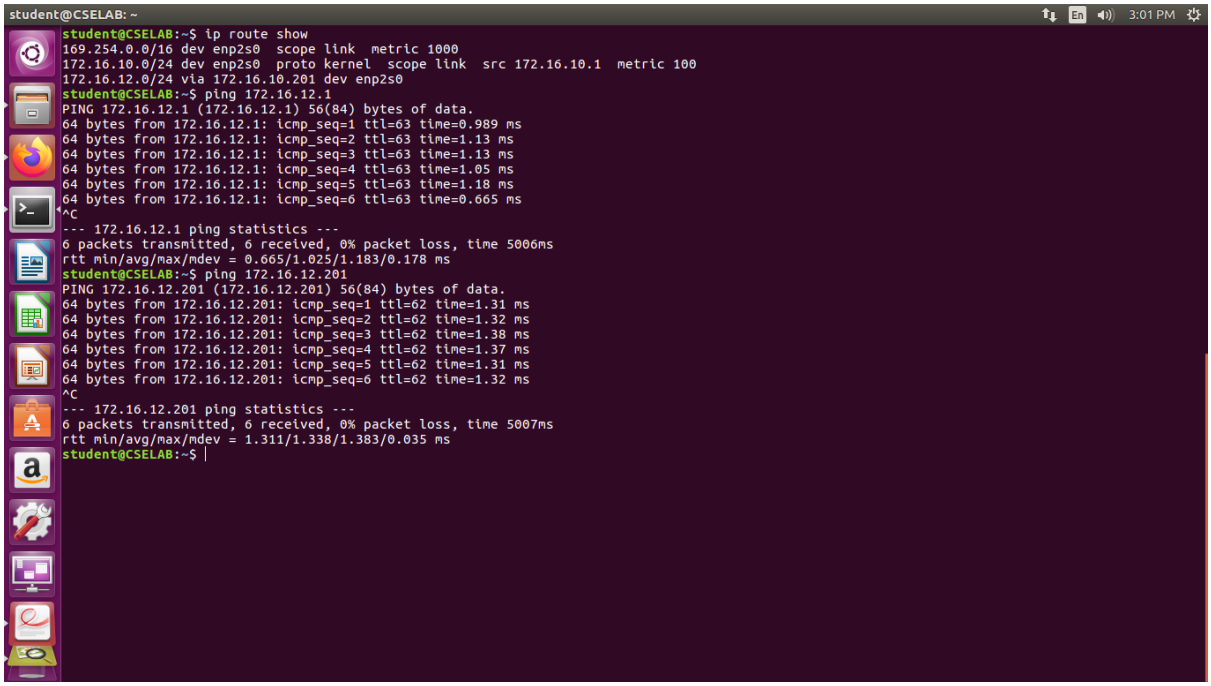
Ip route show

```
student@CSELAB:~$ ip route show
169.254.0.0/16 dev enp2s0  scope link  metric 1000
172.16.10.0/24 via 172.16.12.1 dev enp2s0
172.16.11.0/24 via 172.16.12.1 dev enp2s0
172.16.12.0/24 dev enp2s0  proto kernel  scope link  src 172.16.12.201  metric 100
```

Task 5: After adding routing table entries again verify the connection from Ha and Hd using ping command

Step 1 : testing path from Ha and Hd

Ping 172.16.12.1 and ping 172.16.12.201



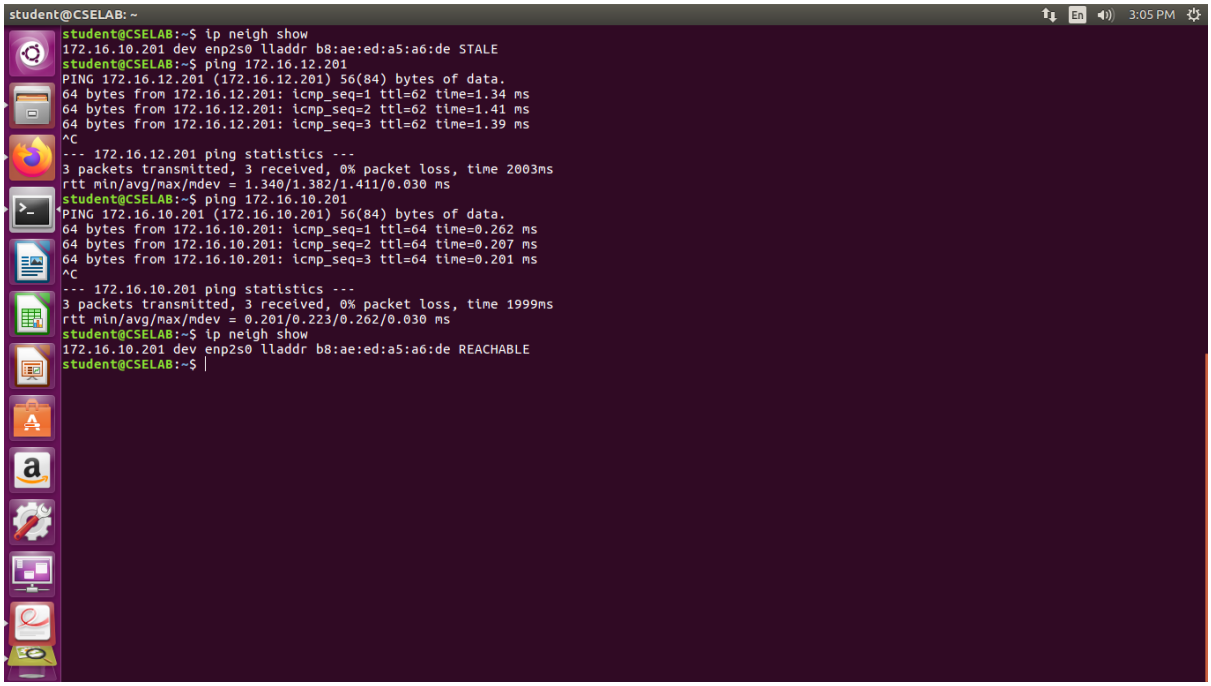
Step 2: Testing path from Hd and Ha

Ping 172.16.10.1 and ping 172.16.10.201

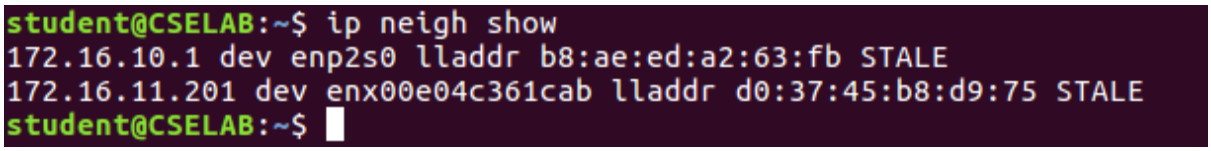
```
student@CSELAB:~$ ping 172.16.10.1
PING 172.16.10.1 (172.16.10.1) 56(84) bytes of data.
64 bytes from 172.16.10.1: icmp_seq=1 ttl=62 time=1.38 ms
64 bytes from 172.16.10.1: icmp_seq=2 ttl=62 time=1.40 ms
64 bytes from 172.16.10.1: icmp_seq=3 ttl=62 time=1.38 ms
64 bytes from 172.16.10.1: icmp_seq=4 ttl=62 time=1.31 ms
64 bytes from 172.16.10.1: icmp_seq=5 ttl=62 time=1.38 ms
64 bytes from 172.16.10.1: icmp_seq=6 ttl=62 time=1.40 ms
64 bytes from 172.16.10.1: icmp_seq=7 ttl=62 time=1.41 ms
^C
--- 172.16.10.1 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6009ms
rtt min/avg/max/mdev = 1.314/1.386/1.413/0.036 ms
student@CSELAB:~$ ping 172.16.10.201
PING 172.16.10.201 (172.16.10.201) 56(84) bytes of data.
64 bytes from 172.16.10.201: icmp_seq=1 ttl=63 time=1.15 ms
64 bytes from 172.16.10.201: icmp_seq=2 ttl=63 time=1.20 ms
64 bytes from 172.16.10.201: icmp_seq=3 ttl=63 time=1.18 ms
64 bytes from 172.16.10.201: icmp_seq=4 ttl=63 time=1.19 ms
64 bytes from 172.16.10.201: icmp_seq=5 ttl=63 time=1.10 ms
64 bytes from 172.16.10.201: icmp_seq=6 ttl=63 time=1.18 ms
64 bytes from 172.16.10.201: icmp_seq=7 ttl=63 time=1.12 ms
64 bytes from 172.16.10.201: icmp_seq=8 ttl=63 time=1.18 ms
^C
--- 172.16.10.201 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7009ms
rtt min/avg/max/mdev = 1.104/1.167/1.203/0.044 ms
```

Task 6: check each system neighbour to verify the connection

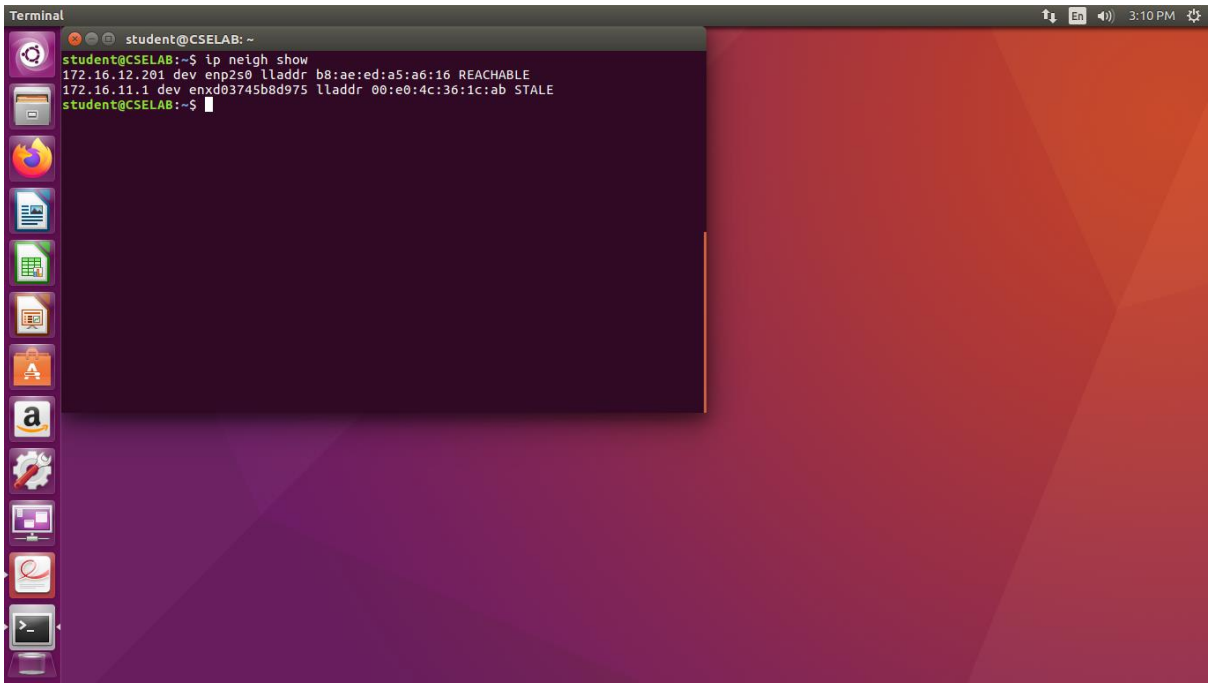
At Ha: ip neigh show



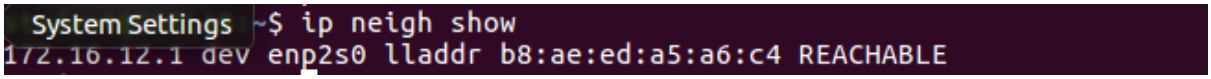
At R1: ip neigh show



At R2: ip neigh show



At Hd: ip neigh show



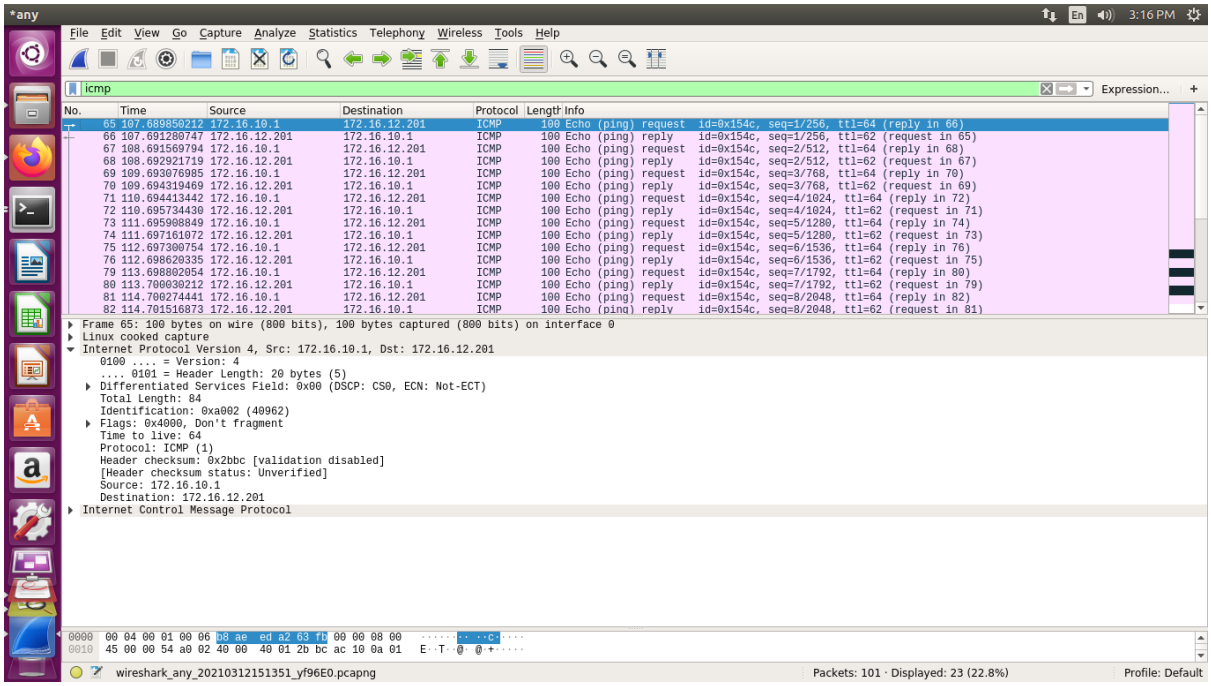
Task 7: Capture the packets from Ha and Hd using wireshark tool

Step1: capture packets from Ha and Hd

At Ha:

T1: sudo wireshark

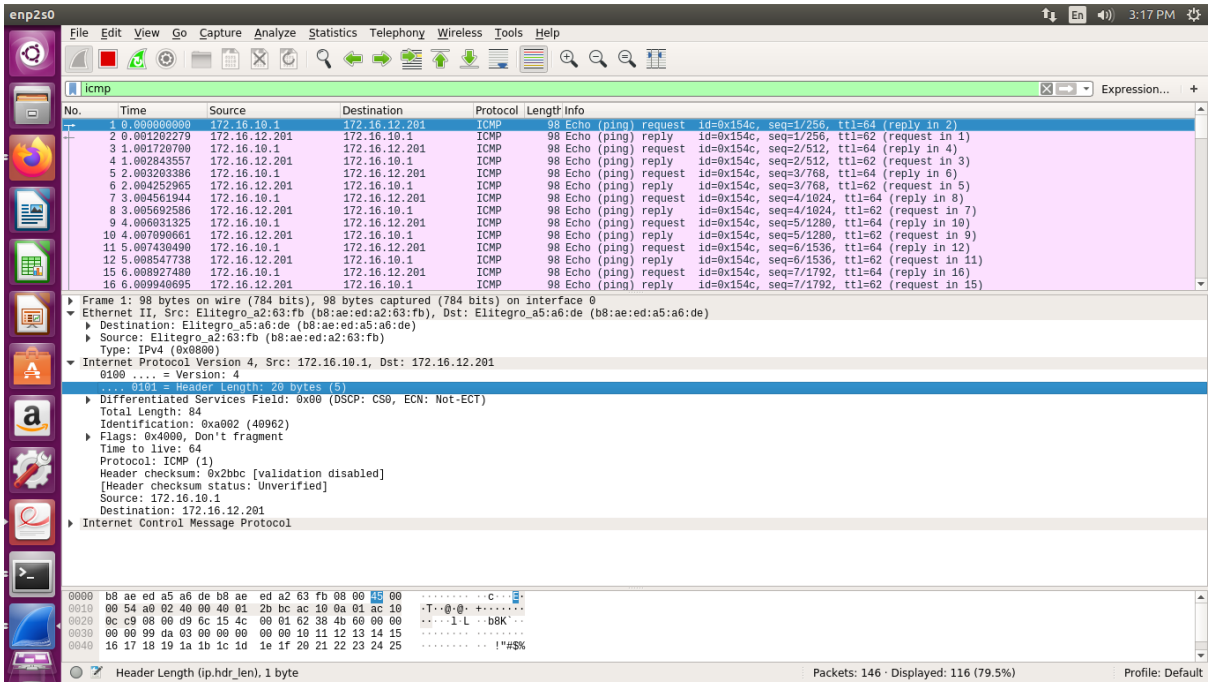
T2: ping 172.16.12.201



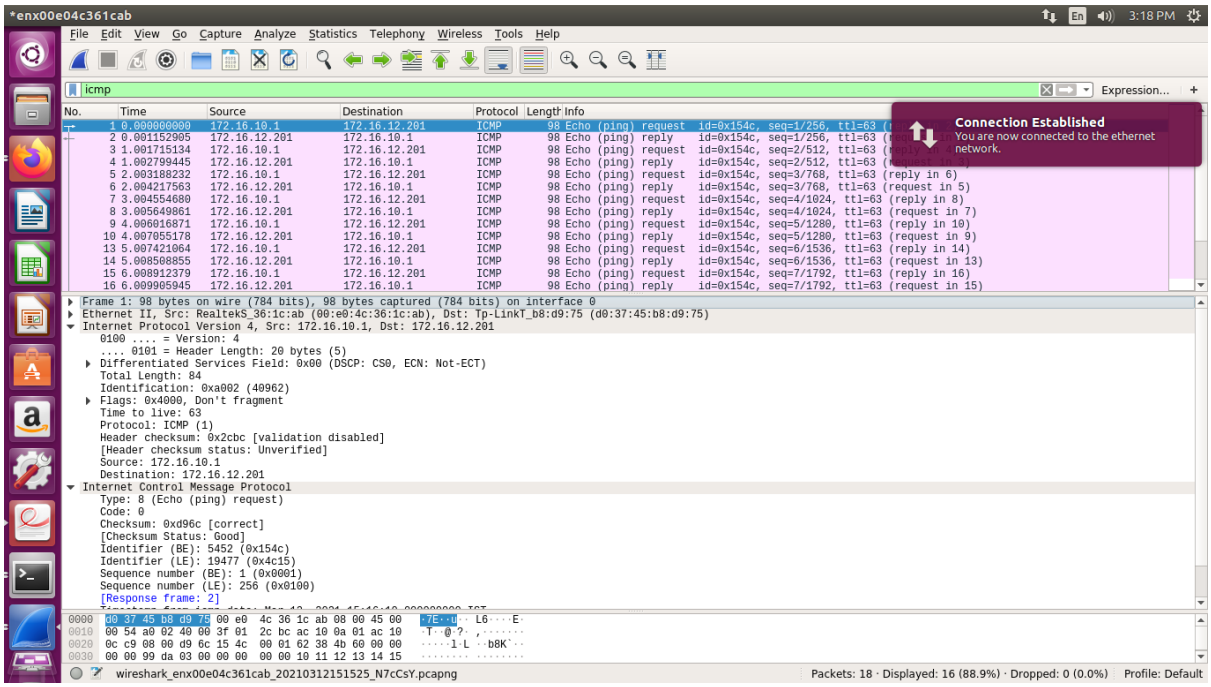
Step 2: Capture packets from R1 using both eth1 and eth2 interfaces.

Sudo wireshark

At eth1:



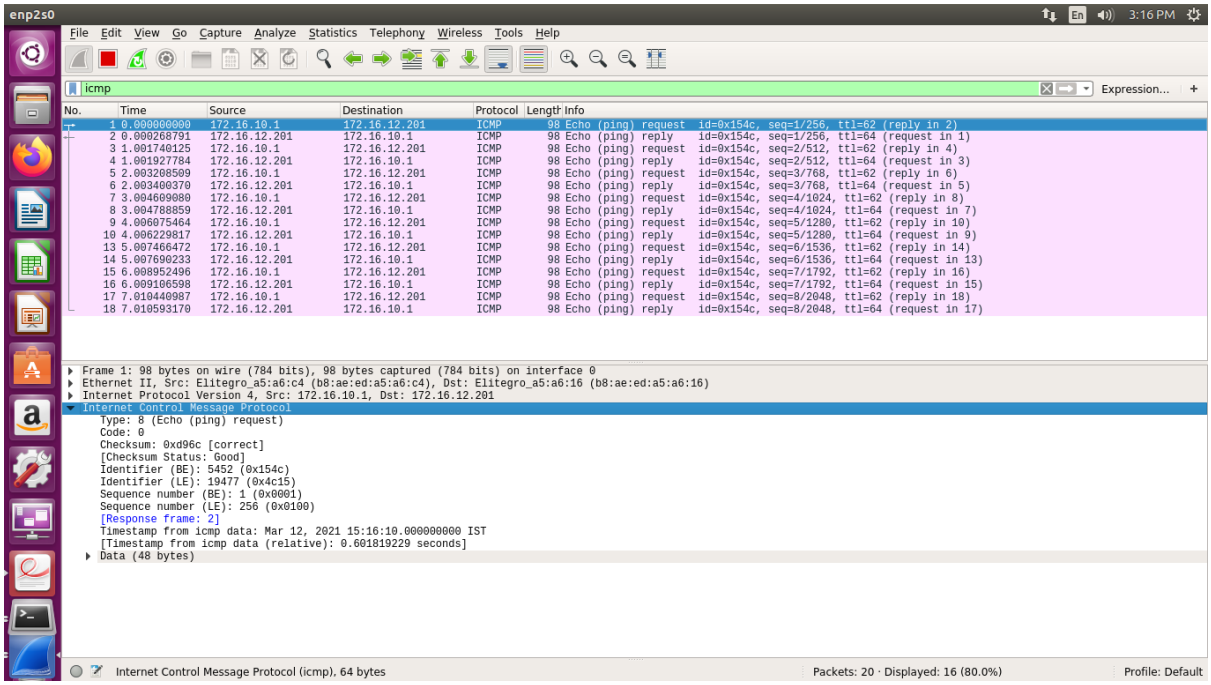
At eth2:



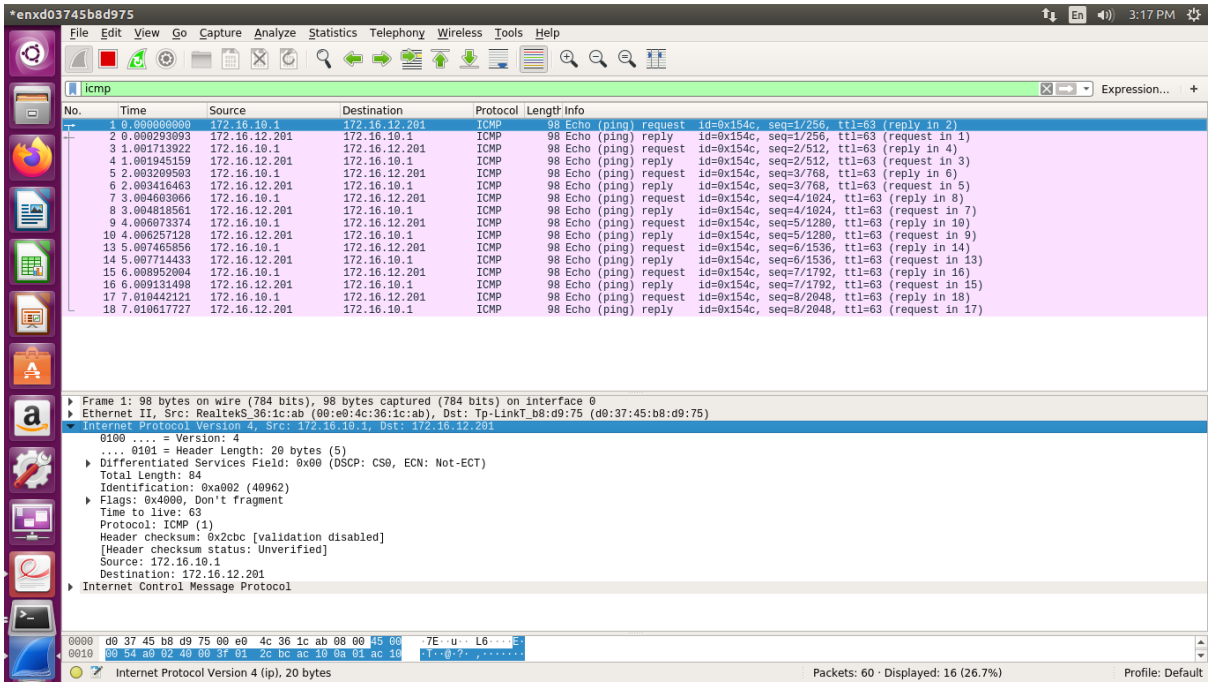
Step 3: Capture packets from R2 using both eth1 and eth2 interfaces.

Sudo wireshark

At eth1:



At eth2:



Step 4: Capture packets from Hd and Ha

At Hd:

T1: sudo wirehark