

CSE434 Lab 1 Report

Group 82

Group Members:

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Exercise 1

Step 1

Running the command: `ifconfig -a`

The IP address is shown below (indicated in red).

```
root@hostD:~  
File Edit View Search Terminal Help  
bthakkaANDwyeo3@group82-hostD$ ifconfig -a  
lo        Link encap:Local Loopback  
  inet addr:127.0.0.1  Mask:255.0.0.0  
  inet6 addr: ::1/128 Scope:Host  
    UP LOOPBACK RUNNING  MTU:65536  Metric:1  
    RX packets:196 errors:0 dropped:0 overruns:0 frame:0  
    TX packets:196 errors:0 dropped:0 overruns:0 carrier:0  
    collisions:0 txqueuelen:0  
    RX bytes:15088 (14.7 KiB)  TX bytes:15088 (14.7 KiB)  
  
p2p1      Link encap:Ethernet  HWaddr 00:13:3B:21:78:1B  
  inet addr:10.0.1.14  Bcast:10.0.1.255  Mask:255.255.255.0  
  inet6 addr: fe80::213:3bff:fe21:781b/64 Scope:Link  
    UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
    RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
    TX packets:14 errors:0 dropped:0 overruns:0 carrier:0  
    collisions:0 txqueuelen:1000  
    RX bytes:0 (0.0 b)  TX bytes:1008 (1008.0 b)  
  
p2p2      Link encap:Ethernet  HWaddr 00:13:3B:21:78:1C  
  inet addr:10.0.1.24  Bcast:10.0.1.255  Mask:255.255.255.0  
    UP BROADCAST MULTICAST  MTU:1500  Metric:1  
    RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
    TX packets:0 errors:0 dropped:0 overruns:0 carrier:0  
    collisions:0 txqueuelen:1000  
    RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)  
  
p4p3      Link encap:Ethernet  HWaddr A4:1F:72:7C:3F:67  
    UP BROADCAST MULTICAST  MTU:1500  Metric:1  
    RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
    TX packets:0 errors:0 dropped:0 overruns:0 carrier:0  
    collisions:0 txqueuelen:1000  
    RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)  
bthakkaANDwyeo3@group82-hostD$
```

Step 2

Running the command: `ifconfig p2p1 10.0.1.16 netmask 255.255.255.0 broadcast 10.0.1.255`

Step 3

Running the command: `ifconfig -a`

The IP address has been changed from 10.0.1.14 to 10.0.1.16 (indicated in red).

```
root@hostD:~  
File Edit View Search Terminal Help  
bthakkaANDwyeo3@group82-hostD$ ifconfig p2p1 10.0.1.16 netmask 255.255.255.0  
bthakkaANDwyeo3@group82-hostD$ ifconfig -a  
lo        Link encap:Local Loopback  
  inet addr:127.0.0.1  Mask:255.0.0.0  
  inet6 addr: ::1/128 Scope:Host  
    UP LOOPBACK RUNNING  MTU:65536  Metric:1  
    RX packets:220 errors:0 dropped:0 overruns:0 frame:0  
    TX packets:220 errors:0 dropped:0 overruns:0 carrier:0  
    collisions:0 txqueuelen:0  
    RX bytes:16868 (16.4 KiB)  TX bytes:16868 (16.4 KiB)  
  
p2p1      Link encap:Ethernet  HWaddr 00:13:3B:21:78:1B  
  inet addr:10.0.1.16  Bcast:10.0.1.255  Mask:255.255.255.0  
  inet6 addr: fe80::213:3bff:fe21:781b/64 Scope:Link  
    UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
    RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
    TX packets:14 errors:0 dropped:0 overruns:0 carrier:0  
    collisions:0 txqueuelen:1000  
    RX bytes:0 (0.0 b)  TX bytes:1008 (1008.0 b)  
  
p2p2      Link encap:Ethernet  HWaddr 00:13:3B:21:78:1C  
  inet addr:10.0.1.24  Bcast:10.0.1.255  Mask:255.255.255.0  
    UP BROADCAST MULTICAST  MTU:1500  Metric:1  
    RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
    TX packets:0 errors:0 dropped:0 overruns:0 carrier:0  
    collisions:0 txqueuelen:1000  
    RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)  
  
p4p3      Link encap:Ethernet  HWaddr A4:1F:72:7C:3F:67  
    UP BROADCAST MULTICAST  MTU:1500  Metric:1  
    RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
    TX packets:0 errors:0 dropped:0 overruns:0 carrier:0  
    collisions:0 txqueuelen:1000  
    RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)  
bthakkaANDwyeo3@group82-hostD$
```

Exercise 2

Step 1

Commands used in the following computer to configure the IP address are shown below.

Computer A: `ifconfig 128.143.71.201 netmask 255.255.0.0`

Computer B: `ifconfig 128.143.71.21 netmask 255.255.255.0`

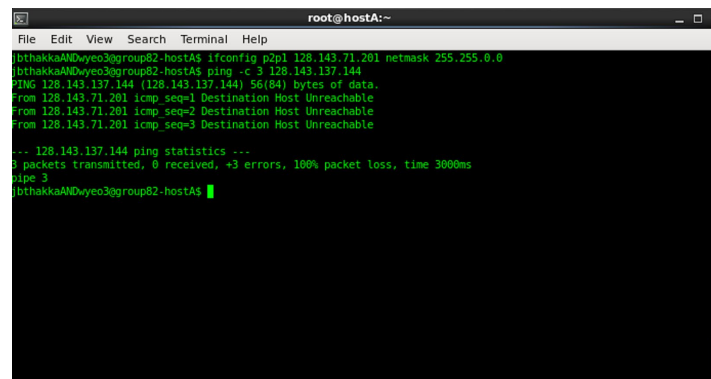
Computer C: `ifconfig 128.143.137.144 netmask 255.255.255.192`

Computer D: `ifconfig 128.143.137.32 netmask 255.255.255.192`

Step 2

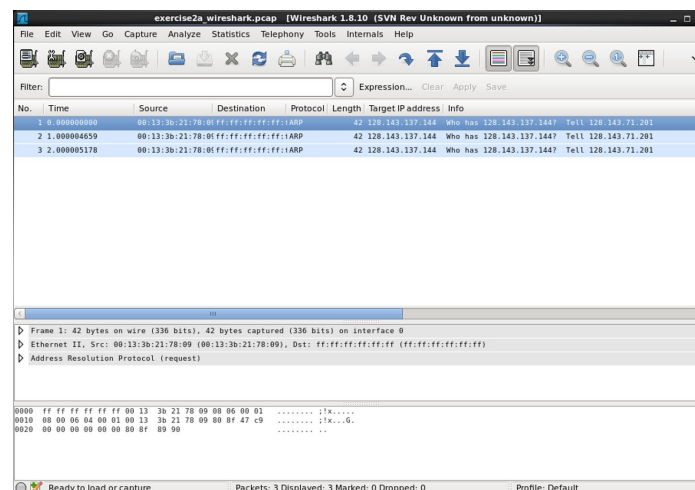
(a)

From terminal:



```
root@hostA:~  
File Edit View Search Terminal Help  
bthakka@NDWyeo3@group82-hostA$ ifconfig p2p1 128.143.71.201 netmask 255.255.0.0  
bthakka@NDWyeo3@group82-hostA$ ping -c 3 128.143.137.144  
PING 128.143.137.144 (128.143.137.144) 56(84) bytes of data:  
From 128.143.71.201 icmp_seq=1 Destination Host Unreachable  
From 128.143.71.201 icmp_seq=2 Destination Host Unreachable  
From 128.143.71.201 icmp_seq=3 Destination Host Unreachable  
... 128.143.137.144 ping statistics ...  
3 packets transmitted, 0 received, +3 errors, 100% packet loss, time 3000ms  
pipe 3  
bthakka@NDWyeo3@group82-hostA$
```

From Wireshark:



(b)

From Terminal:

```
root@hostA:~  
File Edit View Search Terminal Help  
jbtthakkaANDwyeo3@group82-hostA$ ping -c 3 128.143.71.21  
PING 128.143.71.21 (128.143.71.21) 56(84) bytes of data:  
64 bytes from 128.143.71.21: icmp_seq=1 ttl=64 time=0.275 ms  
64 bytes from 128.143.71.21: icmp_seq=2 ttl=64 time=0.221 ms  
64 bytes from 128.143.71.21: icmp_seq=3 ttl=64 time=0.234 ms  
... 128.143.71.21 ping statistics ...  
3 packets transmitted, 3 received, 0% packet loss, time 2000ms  
rtt min/avg/max/mdev = 0.221/0.243/0.275/0.026 ms  
jbtthakkaANDwyeo3@group82-hostA$
```

From Wireshark:

Capturing from p2p1 [Wireshark 1.8.10 (SVN Rev Unknown from unknown)]

Filter: Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Target IP address	Info
1	0.000000000	128.143.71.201	128.143.71.21	ICMP	98		Echo (ping) request id=0xe013, seq=1/256, ttl=64
2	0.000261864	128.143.71.21	128.143.71.201	ICMP	98		Echo (ping) reply id=0xe013, seq=1/256, ttl=64
3	0.000317792	128.143.71.201	128.143.71.21	ICMP	98		Echo (ping) request id=0xe013, seq=2/512, ttl=64
4	0.000320534	128.143.71.21	128.143.71.201	ICMP	98		Echo (ping) reply id=0xe013, seq=2/512, ttl=64
5	1.000713923	128.143.71.201	128.143.71.21	ICMP	98		Echo (ping) request id=0xe013, seq=3/768, ttl=64
6	1.000933488	128.143.71.21	128.143.71.201	ICMP	98		Echo (ping) reply id=0xe013, seq=3/768, ttl=64
7	4.000308570	00:13:3b:21:82:ef:00:13:3b:21:78:09	00:13:3b:21:82:ef:00:13:3b:21:78:09	ARP	60	128.143.71.201	Who has 128.143.71.201? Tell 128.143.71.21
8	4.000322169	00:13:3b:21:78:09:00:13:3b:21:82:ef	00:13:3b:21:82:ef:00:13:3b:21:78:09	ARP	42	128.143.71.21	128.143.71.201 is at 00:13:3b:21:78:09

Frame 1: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0

Ethernet II, Src: 00:13:3b:21:78:09 (00:13:3b:21:78:09), Dst: 00:13:3b:21:82:ef (00:13:3b:21:82:ef)

Internet Protocol Version 4, Src: 128.143.71.201 (128.143.71.201), Dst: 128.143.71.21 (128.143.71.21)

Internet Control Message Protocol

0000 00 13 3b 21 82 ef 00 13 3b 21 78 09 00 00 45 00 ...:..:ix...E:
0010 00 14 00 00 40 00 40 01 aa ac 00 8f 47 c9 00 8f ..T.-@-...G...
0020 47 15 00 00 05 de e0 13 00 01 c5 d8 17 63 00 00 G.....C...
0030 00 00 00 1e 00 00 00 00 00 00 10 11 12 13 14 15 ..R.....
0040 10 17 18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 24 25*#66
0050 26 27 28 29 2a 2b 2c 2d 2e 2f 30 31 32 33 34 35 6()*+.../012345
0060 36 37 67

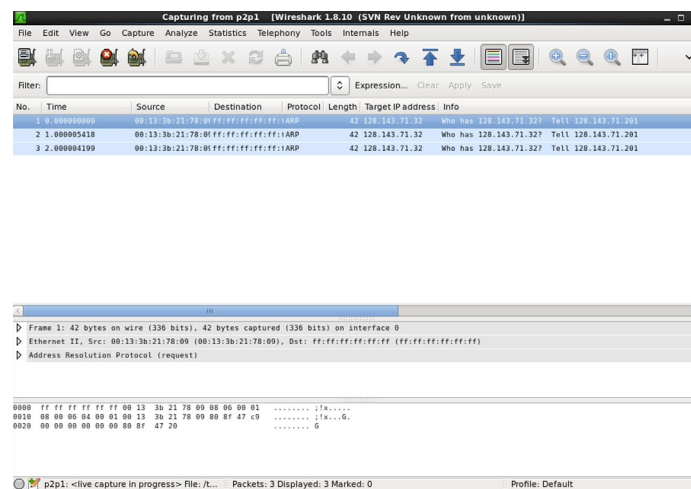
p2p1: <live capture in progress> File: /t... Packets: 8 Displayed: 8 Marked: 0 Profile: Default

(c)

From Terminal:

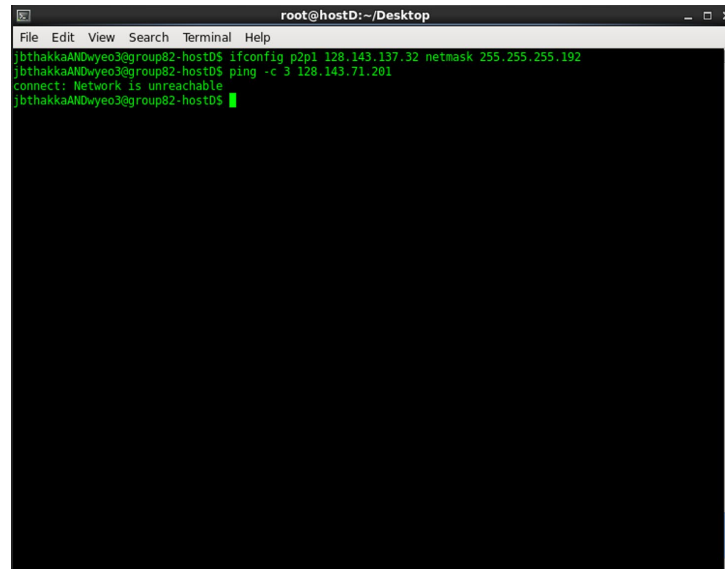
```
root@hostA:~  
File Edit View Search Terminal Help  
jbthakkaANDwyeo3@group82-hostA$ ping -c 3 128.143.71.32  
PING 128.143.71.32 (128.143.71.32) 56(84) bytes of data:  
From 128.143.71.201 icmp_seq=1 Destination Host Unreachable  
From 128.143.71.201 icmp_seq=2 Destination Host Unreachable  
From 128.143.71.201 icmp_seq=3 Destination Host Unreachable  
  
--- 128.143.71.32 ping statistics ---  
3 packets transmitted, 0 received, +3 errors, 100% packet loss, time 3000ms  
pipe 3  
jbthakkaANDwyeo3@group82-hostA$
```

From Wireshark:



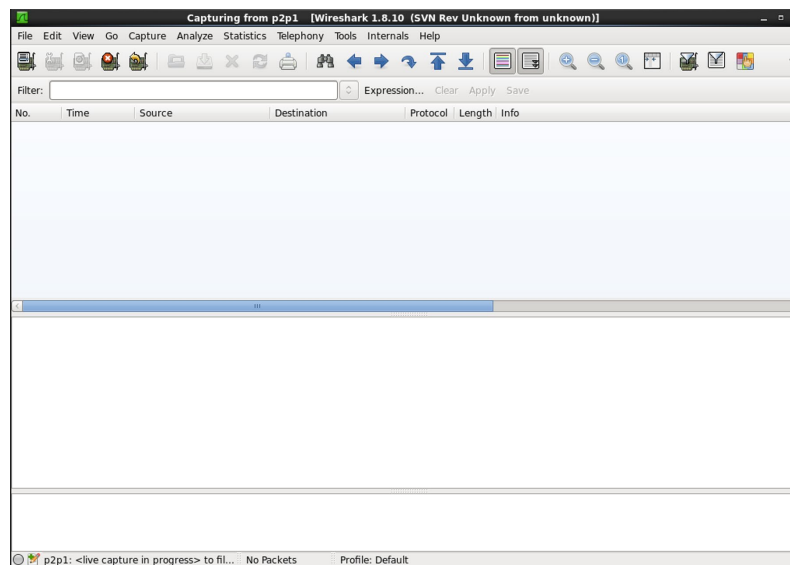
(d)

From Terminal:



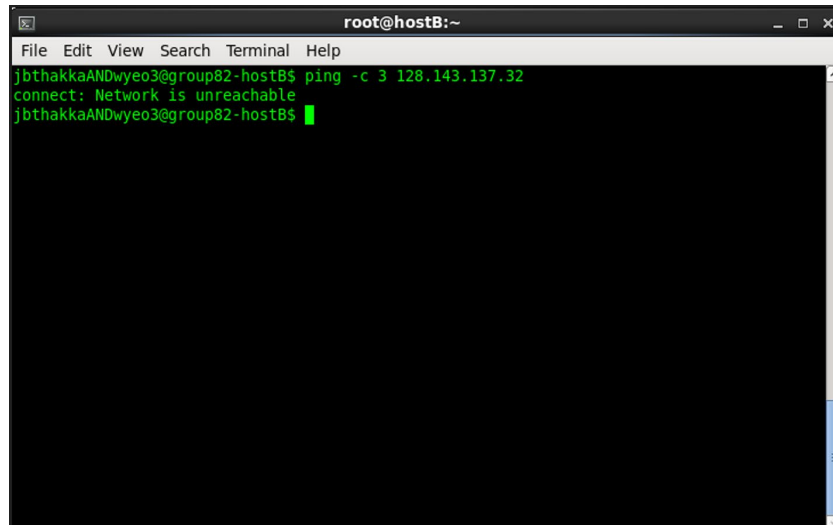
```
root@hostD: ~/Desktop
File Edit View Search Terminal Help
jbtthakkaANDwyeo3@group82-hostD$ ifconfig p2p1 128.143.137.32 netmask 255.255.255.192
jbtthakkaANDwyeo3@group82-hostD$ ping -c 3 128.143.71.201
connect: Network is unreachable
jbtthakkaANDwyeo3@group82-hostD$
```

From Wireshark:



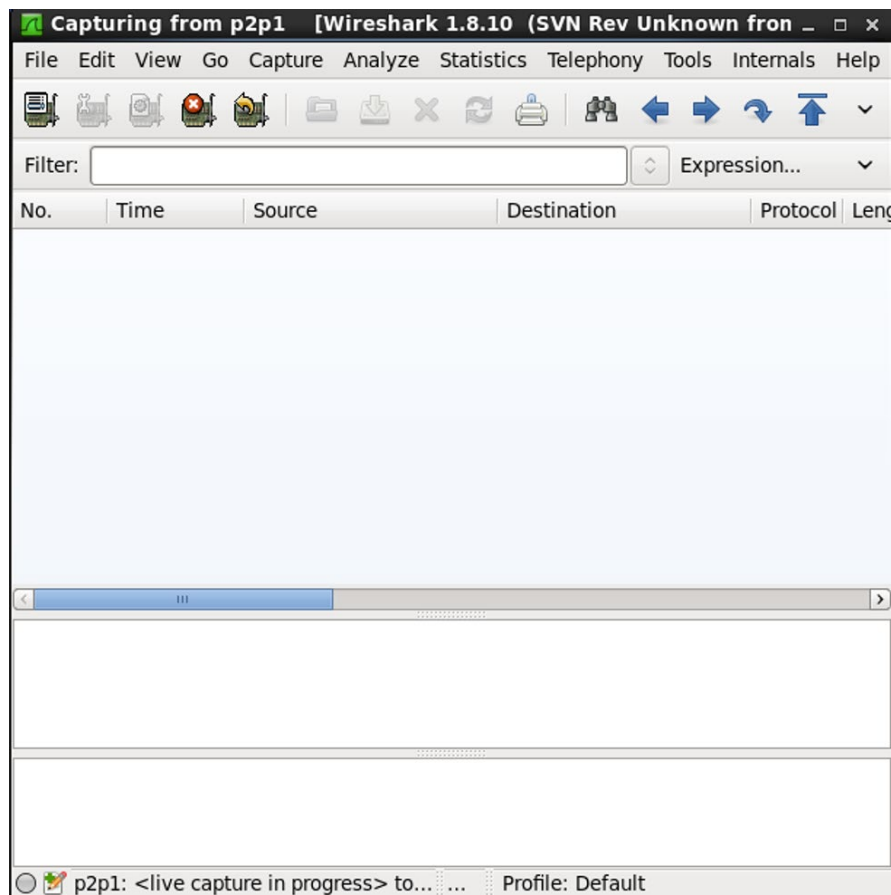
(e)

From Terminal:



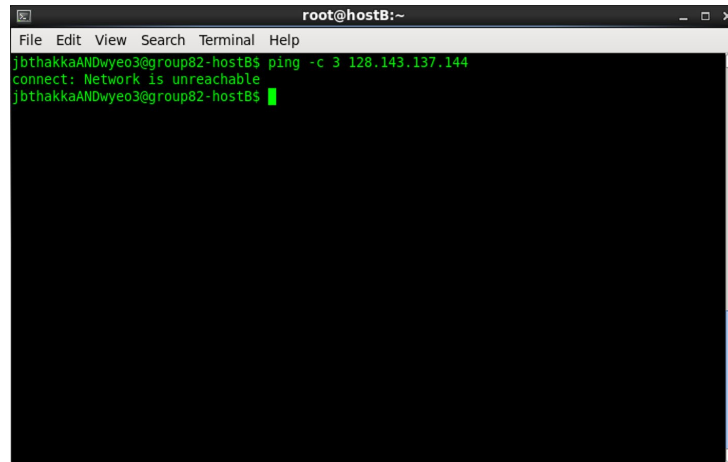
```
root@hostB:~  
File Edit View Search Terminal Help  
jbthakkaANDwyeo3@group82-hostB$ ping -c 3 128.143.137.32  
connect: Network is unreachable  
jbthakkaANDwyeo3@group82-hostB$
```

From Wireshark:



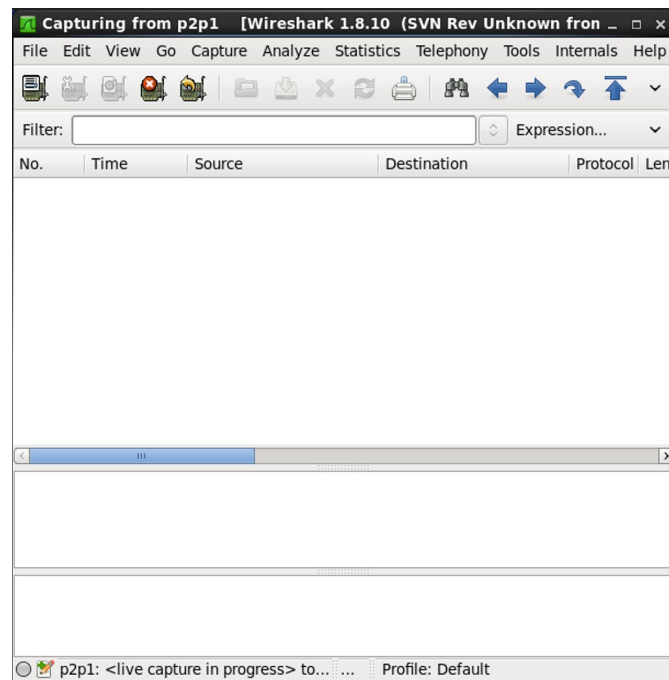
(f)

From Terminal:



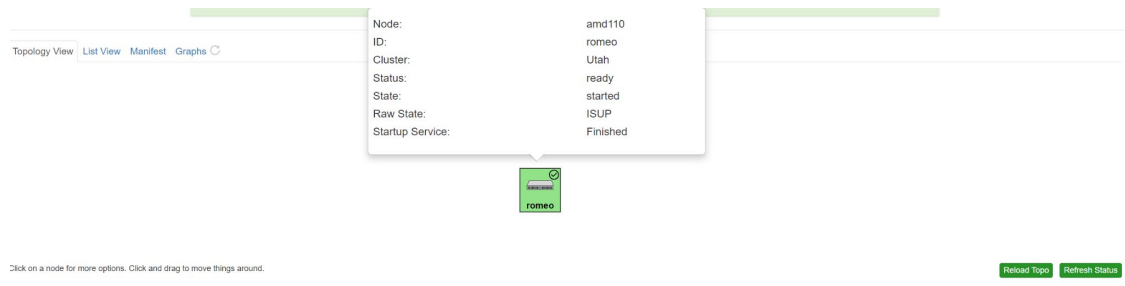
```
root@hostB:~  
File Edit View Search Terminal Help  
jbthakkaANDwyeo3@group82-hostB$ ping -c 3 128.143.137.144  
connect: Network is unreachable  
jbthakkaANDwyeo3@group82-hostB$
```

From Wireshark:

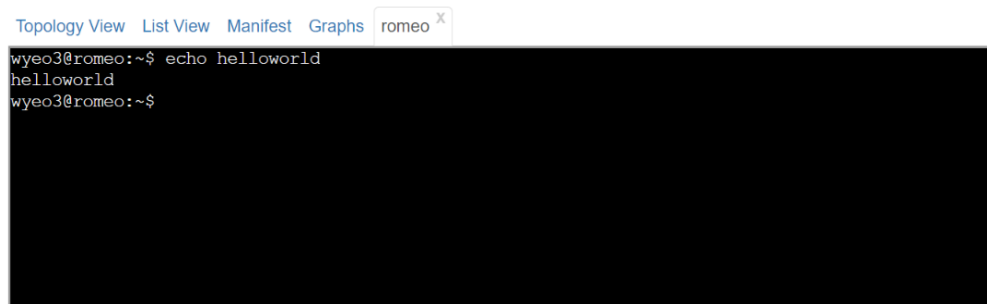


Exercise 3

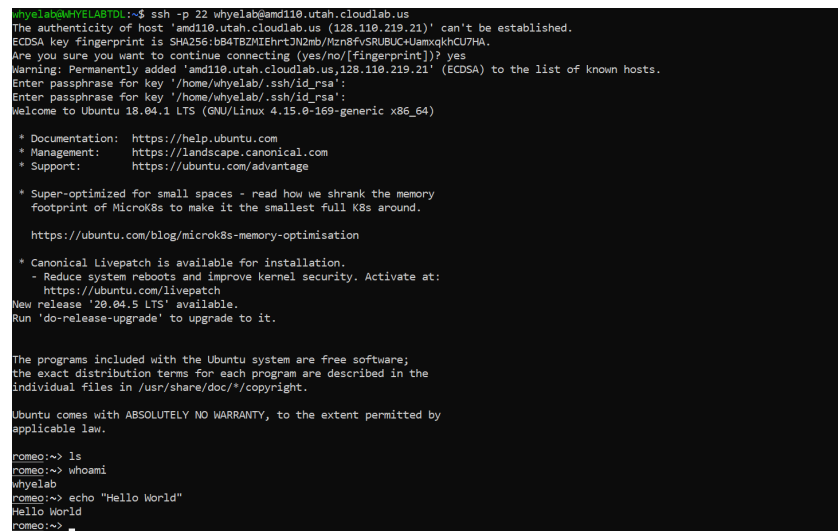
Step 1: Topology View



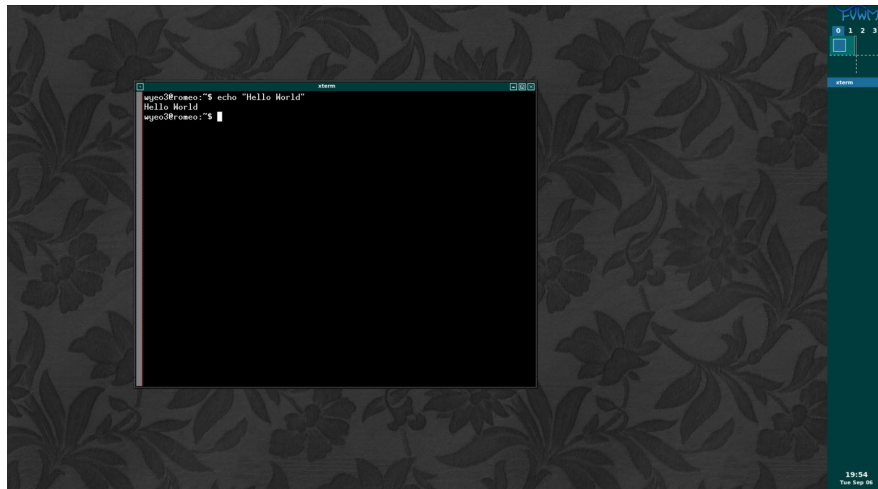
Step 2: Terminal Echo



Step 3: Connecting via Terminal and VNC View



Connection via Terminal



VNC view

Exercise 4

Hosts	Subnet Mask	Network Address	Smallest Host Address	Highest Host Address	Broadcast Address	Notes
LAN A: romeo and juliet	255.255.255.192	10.10.172.128	10.10.172.130	10.10.172.190	10.10.172.191	Should support at least 50 hosts
LAN B: othello and desdemo na	255.255.255.128	10.10.172.0	10.10.172.2	10.10.172.126	10.10.172.127	Should support at least 75 hosts
LAN C: hamlet and ophelia	255.255.255.224	10.10.172.192	10.10.10.194	10.10.172.222	10.10.172.223	Should support at least 20 hosts

Exercise 5

Commands

router-a: sudo ifconfig eth2 10.10.172.129 netmask 255.255.255.192 broadcast 10.10.172.191

romeo: sudo ifconfig eth1 10.10.172.130 netmask 255.255.255.192 broadcast 10.10.172.191

juliet: sudo ifconfig eth1 10.10.172.131 netmask 255.255.255.192 broadcast 10.10.172.191

router-b: sudo ifconfig eth2 10.10.172.1 netmask 255.255.255.128 broadcast 10.10.172.127

othello: sudo ifconfig eth1 10.10.172.2 netmask 255.255.255.128 broadcast 10.10.172.127

desdemona: sudo ifconfig eth1 10.10.172.3 netmask 255.255.255.128 broadcast 10.10.172.127

router-c: sudo ifconfig eth2 10.10.172.193 netmask 255.255.255.224 broadcast 10.10.172.223

ophelia: sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224 broadcast 10.10.172.223

hamlet: sudo ifconfig eth1 10.10.172.195 netmask 255.255.255.224 broadcast 10.10.172.223

Step 1 (LAN A between romeo & juliet):

```
jbthakka@desdemona: ~  
jbthakka@romeo:~$ sudo ifconfig eth2 10.10.172.129 netmask 255.255.255.192  
jbthakka@router-a:~$ ifconfig eth2  
eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 10.10.172.129 netmask 255.255.255.192 broadcast 10.10.172.191  
    inet6 fe80::86:2cff:fe2c:f696 prefixlen 64 scopeid 0x28<link>  
    ether 02:86:2c:2e:f6:96 txqueuelen 1000 (Ethernet)  
    RX packets 44 bytes 3514 (3.5 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 16 bytes 2133 (2.1 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
jbthakka@router-a:~$  
  
jbthakka@romeo:~$ sudo ifconfig eth1 10.10.172.130 netmask 255.255.255.192  
jbthakka@romeo:~$ ping -c 5 10.10.172.131  
PING 10.10.172.131 (10.10.172.131) 56(80) bytes of data:  
64 bytes from 10.10.172.131: icmp_seq=1 ttl=64 time=0.456 ms  
64 bytes from 10.10.172.131: icmp_seq=2 ttl=64 time=0.231 ms  
64 bytes from 10.10.172.131: icmp_seq=3 ttl=64 time=0.233 ms  
64 bytes from 10.10.172.131: icmp_seq=4 ttl=64 time=0.231 ms  
64 bytes from 10.10.172.131: icmp_seq=5 ttl=64 time=0.241 ms  
  
--- 10.10.172.131 ping statistics ---  
5 packets transmitted, 5 received, 0% packet loss, time 4094ms  
rtt min/avg/max/mdev = 0.231/0.278/0.456/0.090 ms  
jbthakka@romeo:~$ |  
  
jbthakka@juliet:~$ sudo ifconfig eth1 10.10.172.131 netmask 255.255.255.192  
jbthakka@juliet:~$ ping -c 5 10.10.172.130  
PING 10.10.172.130 (10.10.172.130) 56(80) bytes of data:  
64 bytes from 10.10.172.130: icmp_seq=1 ttl=64 time=0.238 ms  
64 bytes from 10.10.172.130: icmp_seq=2 ttl=64 time=0.213 ms  
64 bytes from 10.10.172.130: icmp_seq=3 ttl=64 time=0.205 ms  
64 bytes from 10.10.172.130: icmp_seq=4 ttl=64 time=0.176 ms  
64 bytes from 10.10.172.130: icmp_seq=5 ttl=64 time=0.200 ms  
  
--- 10.10.172.130 ping statistics ---  
5 packets transmitted, 5 received, 0% packet loss, time 4099ms  
rtt min/avg/max/mdev = 0.176/0.206/0.238/0.023 ms  
jbthakka@juliet:~$ |
```

Step 1 (LAN B between desdemona & othello):

```
jbthakka@router-b:~$ sudo ifconfig eth2 10.10.172.1 netmask 255.255.255.128
jbthakka@router-b:~$ ifconfig eth2
eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.10.172.1 netmask 255.255.255.128 broadcast 10.10.172.127
    inet6 fe80::da:99ff:feef:b12e prefixlen 64 scopeid 0x20<link>
    ether 02:da:99:ef:b1:2e txqueuelen 1000 (Ethernet)
    RX packets 39 bytes 3234 (3.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 16 bytes 2133 (2.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

jbthakka@router-b:~$

jbthakka@desdemona:~$ sudo ifconfig eth1 10.10.172.2 netmask 255.255.255.128
jbthakka@desdemona:~$ ping -c 5 10.10.172.3
PING 10.10.172.3 (10.10.172.3) 56(84) bytes of data:
 64 bytes from 10.10.172.3: icmp_seq=1 ttl=64 time=0.185 ms
 64 bytes from 10.10.172.3: icmp_seq=2 ttl=64 time=0.234 ms
 64 bytes from 10.10.172.3: icmp_seq=3 ttl=64 time=0.154 ms
 64 bytes from 10.10.172.3: icmp_seq=4 ttl=64 time=0.238 ms
 64 bytes from 10.10.172.3: icmp_seq=5 ttl=64 time=0.236 ms

--- 10.10.172.3 ping statistics ---
 5 packets transmitted, 5 received, 0% packet loss, time 4088ms
 rtt min/avg/max/mdev = 0.154/0.209/0.238/0.036 ms
jbthakka@desdemona:~$

jbthakka@othello:~$ sudo ifconfig eth1 10.10.172.3 netmask 255.255.255.128
jbthakka@othello:~$ ping -c 5 10.10.172.2
PING 10.10.172.2 (10.10.172.2) 56(84) bytes of data:
 64 bytes from 10.10.172.2: icmp_seq=1 ttl=64 time=0.263 ms
 64 bytes from 10.10.172.2: icmp_seq=2 ttl=64 time=0.232 ms
 64 bytes from 10.10.172.2: icmp_seq=3 ttl=64 time=0.234 ms
 64 bytes from 10.10.172.2: icmp_seq=4 ttl=64 time=0.233 ms
 64 bytes from 10.10.172.2: icmp_seq=5 ttl=64 time=0.173 ms

--- 10.10.172.2 ping statistics ---
 5 packets transmitted, 5 received, 0% packet loss, time 4102ms
 rtt min/avg/max/mdev = 0.173/0.227/0.263/0.029 ms
jbthakka@othello:~$
```

Step 1 (LAN C between ophelia & hamlet):

```
jbthakka@router-c:~$ sudo ifconfig eth2 10.10.172.193 netmask 255.255.255.224
jbthakka@router-c:~$ ifconfig eth2
eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.10.172.193 netmask 255.255.255.224 broadcast 10.10.172.223
    inet6 fe80::be:9eff:fela:b953 prefixlen 64 scopeid 0x20<link>
    ether 02:be:9e:1a:b9:53 txqueuelen 1000 (Ethernet)
    RX packets 58 bytes 4721 (4.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 14 bytes 1788 (1.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

jbthakka@router-c:~$

jbthakka@ophelia:~$ sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224
jbthakka@ophelia:~$ ping -c 5 10.10.172.195
PING 10.10.172.195 (10.10.172.195) 56(84) bytes of data:
 64 bytes from 10.10.172.195: icmp_seq=1 ttl=64 time=0.469 ms
 64 bytes from 10.10.172.195: icmp_seq=2 ttl=64 time=0.226 ms
 64 bytes from 10.10.172.195: icmp_seq=3 ttl=64 time=0.233 ms
 64 bytes from 10.10.172.195: icmp_seq=4 ttl=64 time=0.237 ms
 64 bytes from 10.10.172.195: icmp_seq=5 ttl=64 time=0.227 ms

--- 10.10.172.195 ping statistics ---
 5 packets transmitted, 5 received, 0% packet loss, time 4097ms
 rtt min/avg/max/mdev = 0.226/0.278/0.469/0.096 ms
jbthakka@ophelia:~$

jbthakka@hamlet:~$ sudo ifconfig eth1 10.10.172.195 netmask 255.255.255.224
jbthakka@hamlet:~$ ping -c 5 10.10.172.194
PING 10.10.172.194 (10.10.172.194) 56(84) bytes of data:
 64 bytes from 10.10.172.194: icmp_seq=1 ttl=64 time=0.233 ms
 64 bytes from 10.10.172.194: icmp_seq=2 ttl=64 time=0.225 ms
 64 bytes from 10.10.172.194: icmp_seq=3 ttl=64 time=0.197 ms
 64 bytes from 10.10.172.194: icmp_seq=4 ttl=64 time=0.157 ms
 64 bytes from 10.10.172.194: icmp_seq=5 ttl=64 time=0.226 ms

--- 10.10.172.194 ping statistics ---
 5 packets transmitted, 5 received, 0% packet loss, time 4098ms
 rtt min/avg/max/mdev = 0.157/0.207/0.233/0.032 ms
jbthakka@hamlet:~$
```

Step 2 Ping from LAN A (romeo) To LAN B (desdemona):

```

jbtthakka@desdemona: ~
jbtthakka@romeo: ~
jbtthakka@hamlet: ~
jbtthakka@router-a:~$ sudo ifconfig eth2 10.10.172.129 netmask 255.255.255.192
jbtthakka@router-a:~$ ifconfig eth2
eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.10.172.129 netmask 255.255.255.192 broadcast 10.10.172.191
    inet6 fe80::86:2cff:fe2c:f696 prefixlen 64 scopeid 0x20<link>
    ether 02:86:2c:2c:f6:96 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 16 bytes 2133 (2.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

jbtthakka@router-a:~$

jbtthakka@romeo:~$ ping -c 5 10.10.172.2
PING 10.10.172.2 (10.10.172.2) 56(84) bytes of data:
--- 10.10.172.2 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4073ms

jbtthakka@romeo:~$ |

jbtthakka@juliet:~$
```

Step 2 Ping from LAN B (desdemona) To LAN C (othello):

```

jbtthakka@desdemona: ~
jbtthakka@romeo: ~
jbtthakka@hamlet: ~
jbtthakka@router-b:~$ sudo ifconfig eth2 10.10.172.1 netmask 255.255.255.128
jbtthakka@router-b:~$ ifconfig eth2
eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.10.172.1 netmask 255.255.255.128 broadcast 10.10.172.127
    inet6 fe80::da:99ff:feef:b12e prefixlen 64 scopeid 0x20<link>
    ether 02:da:99:ef:b1:2e txqueuelen 1000 (Ethernet)
    RX packets 39 bytes 3234 (3.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 16 bytes 2133 (2.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

jbtthakka@router-b:~$

jbtthakka@desdemona:~$ ping -c 5 10.10.172.194
PING 10.10.172.194 (10.10.172.194) 56(84) bytes of data:
--- 10.10.172.194 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4094ms

jbtthakka@desdemona:~$ |

jbtthakka@othello:~$
```

Step 2 Ping from LAN C (othello) To LAN A (romeo):

```
jbthakka@desdemona: ~  
jbthakka@router-b:~$ sudo ifconfig eth2 10.10.172.1 netmask 255.255.255.128  
jbthakka@router-b:~$ ifconfig eth2  
eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 10.10.172.1 netmask 255.255.255.128 broadcast 10.10.172.127  
    inet6 fe80::da:99ff:feef:b12e prefixlen 64 scopeid 0<20<link>  
    ether 02:da:99:ef:b1:2e txqueuelen 1000 (Ethernet)  
    RX packets 39 bytes 3234 (3.2 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 16 bytes 2133 (2.1 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
jbthakka@router-b:~$  
  
jbthakka@desdemona:~$ ping -c 5 10.10.172.194  
PING 10.10.172.194 (10.10.172.194) 56(84) bytes of data:  
  
--- 10.10.172.194 ping statistics ---  
5 packets transmitted, 0 received, 100% packet loss, time 4094ms  
jbthakka@desdemona:~$ |  
  
jbthakka@othello:~$
```

Exercise 6

Router-A Configuration

(Router A-B): sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.100.2

(Router A-C): sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.100.3

Host Romeo Configuration

(romeo - LAN B): sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.129

(romeo - LAN C): sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw
10.10.172.129

Host Juliet Configuration

(juliet - LAN B): sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.129

(juliet - LAN C): sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.129

Router-B Configuration

(Router B-A): sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.100.1

(Router B-C): sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.100.3

Host othello Configuration

(desdemona - LAN A): sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw
10.10.172.1

(desdemona - LAN C): sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw
10.10.172.1

Host desdemona Configuration

(desdemona - LAN A): sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw
10.10.172.1

(desdemona - LAN C): sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw
10.10.172.1

Router-C Configuration

(Router C-A): sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.100.1

(Router C-B): sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.100.2

Host ophelia Configuration

(ophelia - LAN A): sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.172.193

(ophelia - LAN B): sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.193

Host hamlet Configuration

(ophelia - LAN A): sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.172.193

(ophelia - LAN B): sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.193

Step 1 LAN A Routing Table:

<pre>jthakka@router-a:~\$ sudo route add -net 10.10.172.0 netmask 255.255.128 gw 10.10.100.2 jthakka@router-a:~\$ sudo route add -net 10.10.172.192 netmask 255.255.224 gw 10.10.100.3 jthakka@router-a:~\$ route -n Kernel IP routing table Destination Gateway Genmask Flags Metric Ref Use Iface 0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0 10.10.100.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1 10.10.172.0 10.10.100.2 255.255.255.128 UG 0 0 0 eth1 10.10.172.128 0.0.0.0 255.255.255.192 U 0 0 0 eth2 10.10.172.192 10.10.100.3 255.255.255.224 UG 0 0 0 eth1 172.16.0.0 0.0.0.0 255.248.0.0 U 0 0 0 eth0 172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0 jthakka@router-a:~\$</pre>	<pre>jthakka@roses:~\$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.129 jthakka@roses:~\$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.129 jthakka@roses:~\$ route -n Kernel IP routing table Destination Gateway Genmask Flags Metric Ref Use Iface 0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0 10.10.172.0 10.10.172.129 255.255.255.128 UG 0 0 0 eth1 10.10.172.128 0.0.0.0 255.255.255.192 U 0 0 0 eth1 10.10.172.192 10.10.172.129 255.255.255.224 UG 0 0 0 eth1 172.16.0.0 0.0.0.0 255.248.0.0 U 0 0 0 eth0 172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0 jthakka@roses:~\$</pre>
<pre>jthakka@juliet:~\$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.129 jthakka@juliet:~\$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.129 jthakka@juliet:~\$ route -n Kernel IP routing table Destination Gateway Genmask Flags Metric Ref Use Iface 0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0 10.10.172.0 10.10.172.129 255.255.255.128 UG 0 0 0 eth1 10.10.172.128 0.0.0.0 255.255.255.192 U 0 0 0 eth1 10.10.172.192 10.10.172.129 255.255.255.224 UG 0 0 0 eth1 172.16.0.0 0.0.0.0 255.248.0.0 U 0 0 0 eth0 172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0 jthakka@juliet:~\$</pre>	

Step 1 LAN B Routing Table:

<pre>jthakka@router-b:~\$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.100.1 jthakka@router-b:~\$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.100.3 jthakka@router-b:~\$ route -n Kernel IP routing table Destination Gateway Genmask Flags Metric Ref Use Iface 0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0 10.10.100.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1 10.10.172.0 0.0.0.0 255.255.255.192 UG 0 0 0 eth2 10.10.172.128 10.10.100.1 255.255.255.192 UG 0 0 0 eth1 10.10.172.192 10.10.100.3 255.255.255.224 UG 0 0 0 eth1 172.16.0.0 0.0.0.0 255.248.0.0 U 0 0 0 eth0 172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0 jthakka@router-b:~\$</pre>	<pre>jthakka@bethello:~\$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.172.1 jthakka@bethello:~\$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.1 jthakka@bethello:~\$ route -n Kernel IP routing table Destination Gateway Genmask Flags Metric Ref Use Iface 0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0 10.10.172.0 10.10.172.1 255.255.255.128 UG 0 0 0 eth1 10.10.172.128 10.10.172.1 255.255.255.192 UG 0 0 0 eth1 10.10.172.192 10.10.172.1 255.255.255.224 UG 0 0 0 eth1 172.16.0.0 0.0.0.0 255.248.0.0 U 0 0 0 eth0 172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0 jthakka@bethello:~\$</pre>
<pre>jthakka@desdemona:~\$ route -n Kernel IP routing table Destination Gateway Genmask Flags Metric Ref Use Iface 0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0 10.10.172.0 0.0.0.0 255.255.255.128 U 0 0 0 eth1 10.10.172.128 10.10.172.1 255.255.255.192 UG 0 0 0 eth1 10.10.172.192 10.10.172.1 255.255.255.224 UG 0 0 0 eth1 172.16.0.0 0.0.0.0 255.248.0.0 U 0 0 0 eth0 172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0 jthakka@desdemona:~\$</pre>	

Step 1 LAN C Routing Table:

<pre>jthakka@router-c:~\$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.100.1 jthakka@router-c:~\$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.100.2 jthakka@router-c:~\$ route -n Kernel IP routing table Destination Gateway Genmask Flags Metric Ref Use Iface 0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0 10.10.100.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1 10.10.172.0 10.10.100.2 255.255.255.128 UG 0 0 0 eth1 10.10.172.128 10.10.100.1 255.255.255.192 UG 0 0 0 eth1 10.10.172.192 0.0.0.0 255.255.255.224 U 0 0 0 eth2 172.16.0.0 0.0.0.0 255.248.0.0 U 0 0 0 eth0 172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0 jthakka@router-c:~\$</pre>	<pre>jthakka@ophelia:~\$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.172.193 jthakka@ophelia:~\$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.193 jthakka@ophelia:~\$ route -n Kernel IP routing table Destination Gateway Genmask Flags Metric Ref Use Iface 0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0 10.10.172.0 10.10.172.193 255.255.255.128 UG 0 0 0 eth1 10.10.172.128 10.10.172.193 255.255.255.192 UG 0 0 0 eth1 10.10.172.192 0.0.0.0 255.255.255.224 U 0 0 0 eth1 172.16.0.0 0.0.0.0 255.248.0.0 U 0 0 0 eth0 172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0 jthakka@ophelia:~\$</pre>
<pre>jthakka@philet:~\$ route -n Kernel IP routing table Destination Gateway Genmask Flags Metric Ref Use Iface 0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0 10.10.172.0 10.10.172.193 255.255.255.128 UG 0 0 0 eth1 10.10.172.128 10.10.172.193 255.255.255.192 UG 0 0 0 eth1 10.10.172.192 0.0.0.0 255.255.255.224 U 0 0 0 eth1 172.16.0.0 0.0.0.0 255.248.0.0 U 0 0 0 eth0 172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0 jthakka@philet:~\$</pre>	

Step 2 LAN A (Ping from Host from LAN A to Host on LAN B):

```
jbtthakka@juli:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.100.2
jbtthakka@router-a:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.100.3
jbtthakka@router-a:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.100.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
10.10.172.0 10.10.100.2 255.255.255.128 UG 0 0 0 eth1
10.10.172.128 0.0.0.0 255.255.255.192 U 0 0 0 eth2
10.10.172.192 10.10.100.3 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jbtthakka@router-a:~$

jbtthakka@romeo:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.129
jbtthakka@romeo:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.129
jbtthakka@romeo:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.172.0 10.10.172.129 255.255.255.128 UG 0 0 0 eth1
10.10.172.128 0.0.0.0 255.255.255.192 U 0 0 0 eth1
10.10.172.192 10.10.172.129 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jbtthakka@romeo:~$

jbtthakka@juli:~$ ping -c 5 10.10.172.2
PING 10.10.172.2 (10.10.172.2) 56(84) bytes of data:
64 bytes from 10.10.172.2: icmp_seq=1 ttl=62 time=0.952 ms
64 bytes from 10.10.172.2: icmp_seq=2 ttl=62 time=0.620 ms
64 bytes from 10.10.172.2: icmp_seq=3 ttl=62 time=0.645 ms
64 bytes from 10.10.172.2: icmp_seq=4 ttl=62 time=0.616 ms
64 bytes from 10.10.172.2: icmp_seq=5 ttl=62 time=0.589 ms
--- 10.10.172.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4075ms
rtt min/avg/max/mdev = 0.589/0.676/0.952/0.140 ms
jbtthakka@juli:~$
```

Step 2 LAN B (Ping from Host from LAN B to Host on LAN C):

```
jbtthakka@romeo:~$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.100.1
jbtthakka@router-b:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.100.3
jbtthakka@router-b:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.100.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
10.10.172.0 0.0.0.0 255.255.255.128 U 0 0 0 eth2
10.10.172.128 10.10.100.1 255.255.255.192 UG 0 0 0 eth1
10.10.172.192 10.10.100.3 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jbtthakka@router-b:~$

jbtthakka@desdemona:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.172.0 0.0.0.0 255.255.255.128 U 0 0 0 eth1
10.10.172.128 10.10.172.1 255.255.255.192 UG 0 0 0 eth1
10.10.172.192 10.10.172.1 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jbtthakka@desdemona:~$

jbtthakka@othello:~$ ping -c 5 10.10.172.194
PING 10.10.172.194 (10.10.172.194) 56(84) bytes of data:
64 bytes from 10.10.172.194: icmp_seq=1 ttl=62 time=0.620 ms
64 bytes from 10.10.172.194: icmp_seq=2 ttl=62 time=0.476 ms
64 bytes from 10.10.172.194: icmp_seq=3 ttl=62 time=0.451 ms
64 bytes from 10.10.172.194: icmp_seq=4 ttl=62 time=0.568 ms
64 bytes from 10.10.172.194: icmp_seq=5 ttl=62 time=0.472 ms
--- 10.10.172.194 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4077ms
rtt min/avg/max/mdev = 0.451/0.515/0.620/0.070 ms
jbtthakka@othello:~$
```

Step 2 LAN C (Ping from Host from LAN C to Host on LAN A):

```
jbtthakka@router-c:~$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.100.1
jbtthakka@router-c:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.100.2
jbtthakka@router-c:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.100.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
10.10.172.0 10.10.100.2 255.255.255.128 UG 0 0 0 eth1
10.10.172.128 10.10.100.1 255.255.255.192 UG 0 0 0 eth1
10.10.172.192 0.0.0.0 255.255.255.224 U 0 0 0 eth2
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jbtthakka@router-c:~$

jbtthakka@ophelia:~$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.172.193
jbtthakka@ophelia:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.193
jbtthakka@ophelia:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.172.0 10.10.172.193 255.255.255.128 UG 0 0 0 eth1
10.10.172.128 10.10.172.193 255.255.255.192 UG 0 0 0 eth1
10.10.172.192 0.0.0.0 255.255.255.224 U 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jbtthakka@ophelia:~$

jbtthakka@hamlet:~$ ping -c 5 10.10.172.130
PING 10.10.172.130 (10.10.172.130) 56(84) bytes of data:
64 bytes from 10.10.172.130: icmp_seq=1 ttl=62 time=0.589 ms
64 bytes from 10.10.172.130: icmp_seq=2 ttl=62 time=0.441 ms
64 bytes from 10.10.172.130: icmp_seq=3 ttl=62 time=0.402 ms
64 bytes from 10.10.172.130: icmp_seq=4 ttl=62 time=0.538 ms
64 bytes from 10.10.172.130: icmp_seq=5 ttl=62 time=0.491 ms
--- 10.10.172.130 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4101ms
rtt min/avg/max/mdev = 0.401/0.500/0.589/0.058 ms
jbtthakka@hamlet:~$
```

Step 3 LAN A:

```
jthakka@juli:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.100.2
jthakka@router-a:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.100.3
jthakka@router-a:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.100.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
10.10.172.0 10.10.100.2 255.255.255.128 UG 0 0 0 eth1
10.10.172.128 0.0.0.0 255.255.255.192 U 0 0 0 eth2
10.10.172.192 10.10.100.3 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jthakka@router-a:~$

jthakka@romeo:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.129
jthakka@romeo:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.129
jthakka@romeo:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.172.0 10.10.172.129 255.255.255.128 UG 0 0 0 eth1
10.10.172.128 0.0.0.0 255.255.255.192 U 0 0 0 eth1
10.10.172.192 10.10.172.129 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jthakka@romeo:~$

jthakka@juli:~$ traceroute 10.10.172.2
traceroute to 10.10.172.2 (10.10.172.2), 30 hops max, 60 byte packets
 1 10.10.172.129 (10.10.172.129) 0.337 ms 0.352 ms 1.492 ms
 2 router-b-link-1 (10.10.100.2) 1.432 ms 1.369 ms 1.278 ms
 3 10.10.172.2 (10.10.172.2) 1.220 ms 1.157 ms 1.092 ms
jthakka@juli:~$ traceroute 10.10.172.194
traceroute to 10.10.172.194 (10.10.172.194), 30 hops max, 60 byte packets
 1 10.10.172.129 (10.10.172.129) 0.336 ms 0.258 ms 0.368 ms
 2 router-c-link-1 (10.10.100.3) 0.710 ms 0.657 ms 0.792 ms
 3 10.10.172.194 (10.10.172.194) 1.237 ms 1.158 ms 1.102 ms
jthakka@juli:~$
```

Step 3 LAN B:

```
jthakka@juli:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.100.2
jthakka@router-a:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.100.3
jthakka@router-a:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.100.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
10.10.172.0 10.10.100.2 255.255.255.128 UG 0 0 0 eth1
10.10.172.128 0.0.0.0 255.255.255.192 U 0 0 0 eth2
10.10.172.192 10.10.100.3 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jthakka@router-a:~$

jthakka@romeo:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.129
jthakka@romeo:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.129
jthakka@romeo:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.172.0 10.10.172.129 255.255.255.128 UG 0 0 0 eth1
10.10.172.128 0.0.0.0 255.255.255.192 U 0 0 0 eth1
10.10.172.192 10.10.172.129 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jthakka@romeo:~$

jthakka@juli:~$ traceroute 10.10.172.2
traceroute to 10.10.172.2 (10.10.172.2), 30 hops max, 60 byte packets
 1 10.10.172.129 (10.10.172.129) 0.337 ms 0.282 ms 1.492 ms
 2 router-b-link-1 (10.10.100.2) 1.432 ms 1.369 ms 1.278 ms
 3 10.10.172.2 (10.10.172.2) 1.220 ms 1.157 ms 1.092 ms
jthakka@juli:~$ traceroute 10.10.172.194
traceroute to 10.10.172.194 (10.10.172.194), 30 hops max, 60 byte packets
 1 10.10.172.129 (10.10.172.129) 0.336 ms 0.258 ms 0.368 ms
 2 router-c-link-1 (10.10.100.3) 0.710 ms 0.657 ms 0.792 ms
 3 10.10.172.194 (10.10.172.194) 1.237 ms 1.158 ms 1.102 ms
jthakka@juli:~$
```

Step 3 LAN C:

```
jthakka@router-b:~$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.100.1
jthakka@router-b:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.100.3
jthakka@router-b:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.100.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
10.10.172.0 0.0.0.0 255.255.255.128 U 0 0 0 eth2
10.10.172.128 10.10.100.1 255.255.255.192 UG 0 0 0 eth1
10.10.172.192 10.10.100.3 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jthakka@router-b:~$

jthakka@desdemona:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 172.16.0.1 0.0.0.0 UG 1024 0 0 eth0
10.10.172.0 0.0.0.0 255.255.255.128 U 0 0 0 eth1
10.10.172.128 10.10.172.1 255.255.255.192 UG 0 0 0 eth1
10.10.172.192 10.10.172.1 255.255.255.224 UG 0 0 0 eth1
172.16.0.0 0.0.0.0 255.240.0.0 U 0 0 0 eth0
172.16.0.1 0.0.0.0 255.255.255.255 UH 1024 0 0 eth0
jthakka@desdemona:~$

jthakka@othello:~$ traceroute 10.10.172.130
traceroute to 10.10.172.130 (10.10.172.130), 30 hops max, 60 byte packets
 1 10.10.172.1 (10.10.172.1) 0.315 ms 0.236 ms 0.204 ms
 2 router-a-link-1 (10.10.100.1) 0.506 ms 0.821 ms 0.750 ms
 3 10.10.172.130 (10.10.172.130) 1.294 ms 1.214 ms 1.237 ms
jthakka@othello:~$ traceroute 10.10.172.194
traceroute to 10.10.172.194 (10.10.172.194), 30 hops max, 60 byte packets
 1 10.10.172.1 (10.10.172.1) 0.276 ms 0.245 ms 0.264 ms
 2 router-c-link-1 (10.10.100.3) 0.843 ms 0.759 ms 0.883 ms
 3 10.10.172.194 (10.10.172.194) 1.301 ms 1.261 ms 1.206 ms
jthakka@othello:~$
```