

## Exercise1

1)

The screenshot shows the GENI Portal interface. At the top, there's a navigation bar with 'Home', 'Tools', 'Partners', 'Help', and the user 'ekargoug'. Below this, a status bar indicates the slice 'Eze-1' and project 'ASU-CSE434-Spring2...' with expiration dates of 6 days and 99 days respectively. There are buttons for 'Add Resources', 'Renew', 'Update SSH Keys', and 'Tools'. The main section is titled 'Manage Resources' and shows 'Resources on CENIC InstaGENI are ready.' with a 'View Rspec' button. Below this is a diagram showing a 'Client' and a 'Server' connected by a line. At the bottom, there's a row of buttons: 'Renew', 'Renew Date', 'Delete', 'SSH', 'Restart', 'Snapshot', 'Details', 'Add Resources', and 'Expand'.

2)

**Server:**

**Data: 10.10.1.2 (eth1)**

**Control: 172.17.3.25 (eth0)**

**Client:**

**Data: 10.10.1.1 (eth1)**

**Control: 172.17.3.24 (eth0)**

3)

The screenshot shows two terminal windows. The left window is titled 'ekargoug@client: ~' and shows the output of a ping command to 10.10.1.2 and 172.17.3.25. The right window is titled 'ekargoug@server: ~' and shows the output of the 'ifconfig' command for the 'eth1' and 'lo' interfaces. The 'eth1' interface is configured with IP 10.10.1.2, netmask 255.255.255.0, and broadcast 10.10.1.255. The 'lo' interface is configured with IP 127.0.0.1, netmask 255.0.0.0, and broadcast 127.0.0.1.

```
ekargoug@client: ~
rtt min/avg/max/mdev = 0.556/0.675/0.963/0.129 ms
ekargoug@client:~$ ping -c 5 10.10.1.2
PING 10.10.1.2 (10.10.1.2) 56(84) bytes of data:
 64 bytes from 10.10.1.2: icmp_seq=1 ttl=64 time=0.534 ms
 64 bytes from 10.10.1.2: icmp_seq=2 ttl=64 time=0.671 ms
 64 bytes from 10.10.1.2: icmp_seq=3 ttl=64 time=0.691 ms
 64 bytes from 10.10.1.2: icmp_seq=4 ttl=64 time=0.692 ms
 64 bytes from 10.10.1.2: icmp_seq=5 ttl=64 time=0.655 ms
--- 10.10.1.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 0.534/0.648/0.692/0.065 ms
ekargoug@client:~$ ping -c 5 172.17.3.25
PING 172.17.3.25 (172.17.3.25) 56(84) bytes of data:
 64 bytes from 172.17.3.25: icmp_seq=1 ttl=63 time=53.8 ms
 64 bytes from 172.17.3.25: icmp_seq=2 ttl=63 time=0.690 ms
 64 bytes from 172.17.3.25: icmp_seq=3 ttl=63 time=0.650 ms
 64 bytes from 172.17.3.25: icmp_seq=4 ttl=63 time=0.639 ms
 64 bytes from 172.17.3.25: icmp_seq=5 ttl=63 time=0.637 ms
--- 172.17.3.25 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 0.637/11.299/53.882/21.291 ms
ekargoug@client:~$
```

```
ekargoug@server: ~
RX packets 492 bytes 69238 (69.2 KB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 514 bytes 59740 (59.7 KB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.10.1.2 netmask 255.255.255.0 broadcast 10.10.1.255
    inet6 fe80::6e:bbff:fec7:917e prefixlen 64 scopeid 0x20<link>
    ether 02:6e:bb:c7:91:7e txqueuelen 1000 (Ethernet)
    RX packets 33 bytes 2929 (2.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 24 bytes 3297 (3.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

ekargoug@server:~$ ping
```

## Exercise2

	The subnet mask	The network address	The smallest IPv4 address	The broadcast address	The highest IPv4 address
<b>A</b>	255.255.255.192	10.10.172.128	10.10.172.130	10.10.172.191	10.10.172.190
<b>B</b>	255.255.255.128	10.10.172.0	10.10.172.2	10.10.172.127	10.10.172.126
<b>C</b>	255.255.255.224	10.10.172.192	10.10.172.194	10.10.172.223	10.10.172.222

## Exercise3

1)

```

ekargoug@node-4:~$ ping -c 5 10.10.172.190
PING 10.10.172.190 (10.10.172.190) 56(84) bytes of data:
64 bytes from 10.10.172.190: icmp_seq=1 ttl=64 time=1.18 ms
64 bytes from 10.10.172.190: icmp_seq=2 ttl=64 time=1.06 ms
64 bytes from 10.10.172.190: icmp_seq=3 ttl=64 time=1.09 ms
64 bytes from 10.10.172.190: icmp_seq=4 ttl=64 time=1.22 ms
64 bytes from 10.10.172.190: icmp_seq=5 ttl=64 time=0.993 ms
--- 10.10.172.190 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4007ms
rtt min/avg/max/mdev = 0.993/1.113/1.224/0.083 ms
ekargoug@node-4:~$

ekargoug@node-5:~$ Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
https://ubuntu.com/livepatch

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the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ekargoug@node-5:~$ sudo ifconfig eth1 10.10.172.190 netmask 255.255
.255.192
ekargoug@node-5:~$

ekargoug@node-6:~$ ping -c 5 10.10.172.126
PING 10.10.172.126 (10.10.172.126) 56(84) bytes of data:
64 bytes from 10.10.172.126: icmp_seq=1 ttl=64 time=1.31 ms
64 bytes from 10.10.172.126: icmp_seq=2 ttl=64 time=1.25 ms
64 bytes from 10.10.172.126: icmp_seq=3 ttl=64 time=0.948 ms
64 bytes from 10.10.172.126: icmp_seq=4 ttl=64 time=1.12 ms
64 bytes from 10.10.172.126: icmp_seq=5 ttl=64 time=1.04 ms
--- 10.10.172.126 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4007ms
rtt min/avg/max/mdev = 0.948/1.137/1.313/0.132 ms
ekargoug@node-6:~$

ekargoug@node-7:~$ Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
https://ubuntu.com/livepatch

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individual files in /usr/share/doc/*/copyright.

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applicable law.

ekargoug@node-7:~$ sudo ifconfig eth1 10.10.172.126 netmask 255.255.255.128
ekargoug@node-7:~$ sudo ifconfig eth1 10.10.172.126 netmask 255.255.255.128
ekargoug@node-7:~$

ekargoug@node-10:~$ ping -c 5 10.10.172.222
PING 10.10.172.222 (10.10.172.222) 56(84) bytes of data:
64 bytes from 10.10.172.222: icmp_seq=1 ttl=64 time=1.09 ms
64 bytes from 10.10.172.222: icmp_seq=2 ttl=64 time=0.815 ms
64 bytes from 10.10.172.222: icmp_seq=3 ttl=64 time=1.10 ms
64 bytes from 10.10.172.222: icmp_seq=4 ttl=64 time=1.02 ms
64 bytes from 10.10.172.222: icmp_seq=5 ttl=64 time=0.898 ms
--- 10.10.172.222 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4007ms
rtt min/avg/max/mdev = 0.815/0.987/1.104/0.120 ms
ekargoug@node-10:~$

ekargoug@node-11:~$ Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
https://ubuntu.com/livepatch

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ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224
ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224
ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.222 netmask 255.255.255.224
ekargoug@node-11:~$

```

2)

```
ekargoug@node-4:~$ ping -c 5 10.10.172.126
PING 10.10.172.126 (10.10.172.126) 56(84) bytes of data.
--- 10.10.172.126 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4098ms

ekargoug@node-4:~$ ping -c 5 10.10.172.222
PING 10.10.172.222 (10.10.172.222) 56(84) bytes of data.
--- 10.10.172.222 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4082ms

ekargoug@node-4:~$

ekargoug@node-5:~$
Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

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individual files in /usr/share/doc/*/copyright.

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applicable law.

ekargoug@node-5:~$ sudo ifconfig eth1 10.10.172.190 netmask 255.255.255.192
ekargoug@node-5:~$

ekargoug@node-6:~$

ekargoug@node-7:~$
Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

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the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

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applicable law.

ekargoug@node-7:~$ sudo ifconfig eth1 10.10.172.172 netmask 255.255.255.128
ekargoug@node-7:~$ sudo ifconfig eth1 10.10.172.126 netmask 255.255.255.128
ekargoug@node-7:~$

ekargoug@node-11:~$
Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

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ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224
ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224
ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.222 netmask 255.255.255.224
ekargoug@node-11:~$
```

```
ekargoug@node-4:~$ ping -c 5 10.10.172.126
PING 10.10.172.126 (10.10.172.126) 56(84) bytes of data.

--- 10.10.172.126 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4098ms

ekargoug@node-4:~$ ping -c 5 10.10.172.222
PING 10.10.172.222 (10.10.172.222) 56(84) bytes of data.

--- 10.10.172.222 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4082ms

ekargoug@node-4:~$

ekargoug@node-6:~$ ping -c 5 10.10.172.190
PING 10.10.172.190 (10.10.172.190) 56(84) bytes of data.

--- 10.10.172.190 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4074ms

ekargoug@node-6:~$ ping -c 5 10.10.172.222
PING 10.10.172.222 (10.10.172.222) 56(84) bytes of data.

--- 10.10.172.222 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4082ms

ekargoug@node-6:~$

ekargoug@node-10:~$

ekargoug@node-5:~$
Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

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applicable law.

ekargoug@node-5:~$ sudo ifconfig eth1 10.10.172.190 netmask 255.255.
255.192
ekargoug@node-5:~$

ekargoug@node-7:~$
Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

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applicable law.

ekargoug@node-7:~$ sudo ifconfig eth1 10.10.172.172 netmask 255.255.255.128
ekargoug@node-7:~$ sudo ifconfig eth1 10.10.172.126 netmask 255.255.255.128
ekargoug@node-7:~$

ekargoug@node-11:~$
Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

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ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224
ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224
ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.222 netmask 255.255.255.224
ekargoug@node-11:~$
```

```
ekargoug@node-4:~$ ping -c 5 10.10.172.126
PING 10.10.172.126 (10.10.172.126) 56(84) bytes of data.

--- 10.10.172.126 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4098ms

ekargoug@node-4:~$ ping -c 5 10.10.172.222
PING 10.10.172.222 (10.10.172.222) 56(84) bytes of data.

--- 10.10.172.222 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4082ms

ekargoug@node-4:~$

ekargoug@node-6:~$ ping -c 5 10.10.172.190
PING 10.10.172.190 (10.10.172.190) 56(84) bytes of data.

--- 10.10.172.190 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4074ms

ekargoug@node-6:~$ ping -c 5 10.10.172.222
PING 10.10.172.222 (10.10.172.222) 56(84) bytes of data.

--- 10.10.172.222 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4082ms

ekargoug@node-6:~$

ekargoug@node-10:~$ ping -c 5 10.10.172.190
PING 10.10.172.190 (10.10.172.190) 56(84) bytes of data.

--- 10.10.172.190 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4073ms

ekargoug@node-10:~$ ping -c 5 10.10.172.126
PING 10.10.172.126 (10.10.172.126) 56(84) bytes of data.

--- 10.10.172.126 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4080ms

ekargoug@node-10:~$

ekargoug@node-5:~$
Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

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applicable law.

ekargoug@node-5:~$ sudo ifconfig eth1 10.10.172.190 netmask 255.255.
255.192
ekargoug@node-5:~$

ekargoug@node-7:~$
Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

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applicable law.

ekargoug@node-7:~$ sudo ifconfig eth1 10.10.172.172 netmask 255.255.255.128
ekargoug@node-7:~$ sudo ifconfig eth1 10.10.172.126 netmask 255.255.255.128
ekargoug@node-7:~$

ekargoug@node-11:~$
Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

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applicable law.

ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224
ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.194 netmask 255.255.255.224
ekargoug@node-11:~$ sudo ifconfig eth1 10.10.172.222 netmask 255.255.255.224
ekargoug@node-11:~$
```

## Exercise 4

1)

```
ekargoug@node-4: ~  
ekargoug@node-4:~$ 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  
ekargoug@node-4:~$
```

```
ekargoug@node-5: ~  
ekargoug@node-5:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.129  
ekargoug@node-5:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.129  
ekargoug@node-5:~$ 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  
ekargoug@node-5:~$
```

```
ekargoug@node-6: ~  
ekargoug@node-6:~$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.172.1  
SIOCADDRT: File exists  
ekargoug@node-6:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.1  
SIOCADDRT: File exists  
ekargoug@node-6:~$ 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  
ekargoug@node-6:~$
```

```
ekargoug@node-7: ~  
ekargoug@node-7:~$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.172.1  
ekargoug@node-7:~$ sudo route add -net 10.10.172.192 netmask 255.255.255.224 gw 10.10.172.1  
ekargoug@node-7:~$ 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  
ekargoug@node-7:~$
```

```
ekargoug@node-10: ~  
ekargoug@node-10:~$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.172.193  
ekargoug@node-10:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128  
SIOCADDRT: No such device  
ekargoug@node-10:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.193  
ekargoug@node-10:~$ 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  
ekargoug@node-10:~$
```

```
ekargoug@node-11: ~  
ekargoug@node-11:~$ sudo route add -net 10.10.172.128 netmask 255.255.255.192 gw 10.10.172.193  
ekargoug@node-11:~$ sudo route add -net 10.10.172.0 netmask 255.255.255.128 gw 10.10.172.193  
ekargoug@node-11:~$ 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  
ekargoug@node-11:~$
```

```
ekargoug@router-c: ~  
ekargoug@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 eth2  
10.10.172.0      10.10.100.2     255.255.255.128 UG     0      0      0 eth2  
10.10.172.128    10.10.100.1     255.255.255.192 UG     0      0      0 eth2  
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  
ekargoug@router-c:~$
```

```
ekargoug@router-a: ~  
ekargoug@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 eth2  
10.10.172.0      10.10.100.2     255.255.255.128 UG     0      0      0 eth2  
10.10.172.128    0.0.0.0         255.255.255.192 U      0      0      0 eth1  
10.10.172.192    10.10.100.3     255.255.255.224 UG     0      0      0 eth2  
10.10.172.192    10.10.100.2     255.255.255.224 UG     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  
ekargoug@router-a:~$
```

```
ekargoug@router-b: ~  
ekargoug@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 eth2  
10.10.172.0      0.0.0.0         255.255.255.128 U      0      0      0 eth1  
10.10.172.128    10.10.100.1     255.255.255.192 UG     0      0      0 eth2  
10.10.172.192    10.10.100.3     255.255.255.224 UG     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  
ekargoug@router-b:~$
```

2)

ekargoug@node-11: ~

```
[-l preload] [-m mark] [-M pmtudisc_option]
[-N nodeinfo_option] [-p pattern] [-Q tclass] [-s packetsize]
[-S sndbuf] [-t ttl] [-T timestamp_option] [-w deadline]
[-W timeout] destination
ekargoug@node-11:~$ 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=2.49 ms
64 bytes from 10.10.172.130: icmp_seq=2 ttl=62 time=1.96 ms
64 bytes from 10.10.172.130: icmp_seq=3 ttl=62 time=2.20 ms
64 bytes from 10.10.172.130: icmp_seq=4 ttl=62 time=2.12 ms
64 bytes from 10.10.172.130: icmp_seq=5 ttl=62 time=2.26 ms

--- 10.10.172.130 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 1.961/2.209/2.493/0.182 ms
ekargoug@node-11:~$
```

ekargoug@node-5: ~

```
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
ekargoug@node-5:~$ 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=6.64 ms
64 bytes from 10.10.172.2: icmp_seq=2 ttl=62 time=3.20 ms
64 bytes from 10.10.172.2: icmp_seq=3 ttl=62 time=3.34 ms
64 bytes from 10.10.172.2: icmp_seq=4 ttl=62 time=2.87 ms
64 bytes from 10.10.172.2: icmp_seq=5 ttl=62 time=3.45 ms

--- 10.10.172.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4007ms
rtt min/avg/max/mdev = 2.879/3.905/6.645/1.385 ms
ekargoug@node-5:~$
```

ekargoug@node-10: ~

```
[-S sndbuf] [-t ttl] [-T timestamp_option] [-w deadline]
[-W timeout] destination
ekargoug@node-10:~$ 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=0.068 ms
64 bytes from 10.10.172.194: icmp_seq=2 ttl=64 time=0.069 ms
64 bytes from 10.10.172.194: icmp_seq=3 ttl=64 time=0.073 ms
64 bytes from 10.10.172.194: icmp_seq=4 ttl=64 time=0.086 ms
64 bytes from 10.10.172.194: icmp_seq=5 ttl=64 time=0.048 ms

--- 10.10.172.194 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4092ms
rtt min/avg/max/mdev = 0.048/0.068/0.086/0.016 ms
ekargoug@node-10:~$
```



3)

```
ekargoug@node-11: ~  
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      10.10.172.193  255.255.255.0   UG    0     0      0 eth1  
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  
ekargoug@node-11:~$ sudo route add -net 10.10.100.0 netmask 255.255.255.0 gw 10.10.172.193  
SIOCADDRT: File exists  
ekargoug@node-11:~$ traceroute 10.10.172.130  
traceroute to 10.10.172.130 (10.10.172.130), 30 hops max, 60 byte packets  
 1  10.10.172.193 (10.10.172.193)  0.666 ms  0.542 ms  0.431 ms  
 2  router-A-link-1 (10.10.100.1)  2.259 ms  2.169 ms  2.071 ms  
 3  10.10.172.130 (10.10.172.130)  2.714 ms  2.603 ms  2.479 ms  
ekargoug@node-11:~$
```