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3) Select **Change profile**, search for **cpre489-routing** and select
4) Click **Select Profile** and then **Next**.
5) Use your net-id for the name of the experiment and select an a
   typically worked with the fewest issues). Then select **Next** and
6) Wait for your resources to be ready. This may take several min

```
jschm333@nodeb:~$ 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
10.10.1.0       0.0.0.0         255.255.255.0    U     0      0        0 eth1
10.10.2.0       0.0.0.0         255.255.255.0    U     0      0        0 eth2
128.110.156.4   172.16.0.1      255.255.255.255  UGH   1024   0        0 eth0
172.16.0.1      0.0.0.0         255.255.255.255  UH    1024   0        0 eth0
jschm333@nodeb:~$
```

jschm333@nodea: ~

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the exact distribution terms for each program are described in the
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applicable law.

```
jschm333@nodea:~$ 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
10.10.1.0       0.0.0.0         255.255.255.0    U     0      0        0 eth1
10.10.3.0       0.0.0.0         255.255.255.0    U     0      0        0 eth2
128.110.156.4   172.16.0.1      255.255.255.255  UGH   1024   0        0 eth0
172.16.0.1      0.0.0.0         255.255.255.255  UH    1024   0        0 eth0
jschm333@nodea:~$
```

jschm333@nodec: ~

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

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

```
jschm333@nodec:~$ 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
10.10.1.0       10.10.3.2       255.255.255.254  UG    0      0        0 eth2
10.10.2.0       0.0.0.0         255.255.255.0    U     0      0        0 eth1
10.10.3.0       0.0.0.0         255.255.255.0    U     0      0        0 eth2
128.110.156.4   172.16.0.1      255.255.255.255  UGH   1024   0        0 eth0
172.16.0.0      0.0.0.0         255.240.0.0      U     1024   0        0 eth0
172.16.0.1      0.0.0.0         255.255.255.255  UH    1024   0        0 eth0
jschm333@nodec:~$
```

1

Part 1: route -n of all ssh terminals

```
jschm333@nodea:~$ ping 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=1.09 ms
64 bytes from 10.10.1.2: icmp_seq=2 ttl=64 time=0.280 ms
64 bytes from 10.10.1.2: icmp_seq=3 ttl=64 time=0.303 ms
64 bytes from 10.10.1.2: icmp_seq=4 ttl=64 time=0.301 ms
64 bytes from 10.10.1.2: icmp_seq=5 ttl=64 time=0.321 ms
^C
--- 10.10.1.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4054ms
rtt min/avg/max/mdev = 0.280/0.458/1.088/0.314 ms
jschm333@nodea:~$ ping 10.10.2.1
PING 10.10.2.1 (10.10.2.1) 56(84) bytes of data.
^C
--- 10.10.2.1 ping statistics ---
10 packets transmitted, 0 received, 100% packet loss, time 9215ms
```

```
jschm333@nodea:~$ ping 10.10.2.2
PING 10.10.2.2 (10.10.2.2) 56(84) bytes of data.
^C
--- 10.10.2.2 ping statistics ---
9 packets transmitted, 0 received, 100% packet loss, time 8182ms

jschm333@nodea:~$ ping 10.10.3.1
PING 10.10.3.1 (10.10.3.1) 56(84) bytes of data.
64 bytes from 10.10.3.1: icmp_seq=1 ttl=64 time=0.689 ms
64 bytes from 10.10.3.1: icmp_seq=2 ttl=64 time=0.306 ms
64 bytes from 10.10.3.1: icmp_seq=3 ttl=64 time=0.277 ms
64 bytes from 10.10.3.1: icmp_seq=4 ttl=64 time=0.340 ms
64 bytes from 10.10.3.1: icmp_seq=5 ttl=64 time=0.341 ms
^C
--- 10.10.3.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4078ms
rtt min/avg/max/mdev = 0.277/0.390/0.689/0.151 ms
ischm333@nodea:~$
```

Part 2: Each node has two connections. One to A and one to the other node. It makes sense that if node A is trying to ping a node that is connected to another node it does not work because there is not a direct connection. The ping that is receiving data back is the node that has a route in it's route table.

```
≡                          jschm333@nodea: ~                    _  □  ×

File  Edit  View  Search  Terminal  Help
64 bytes from 172.17.163.3: icmp_seq=4 ttl=64 time=0.333 ms
64 bytes from 172.17.163.3: icmp_seq=5 ttl=64 time=0.377 ms
^C
--- 172.17.163.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4095ms
rtt min/avg/max/mdev = 0.216/0.378/0.645/0.143 ms
jschm333@nodea:~$ traceroute 10.10.2.2
traceroute to 10.10.2.2 (10.10.2.2), 30 hops max, 60 byte packets
 1  128.110.216.1 (128.110.216.1)  0.367 ms  0.342 ms  0.321 ms
 2  128.110.103.241 (128.110.103.241)  0.299 ms  0.278 ms  0.257 ms
 3  140.197.246.176 (140.197.246.176)  1.195 ms  1.175 ms  1.177 ms
 4  ebc-pep-b-179-int.uen.net (140.197.252.85)  1.472 ms  1.524 ms  1.679 ms
 5  ddc-pep-b-129-int.uen.net (140.197.252.77)  1.167 ms  1.146 ms  1.225 ms
 6  140.197.253.103 (140.197.253.103)  1.064 ms  0.858 ms  0.835 ms
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
jschm333@nodea:~$
```

Traceroute from A to IP 10.10.2.2 before setting up static routes. There is not route in the route table.

```
jschm333@nodea:~$ 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
10.10.1.0       0.0.0.0          255.255.255.0     U     0      0        0 eth1
10.10.2.0       10.10.3.1        255.255.255.0     UG    0      0        0 eth2
10.10.2.0       10.10.1.2        255.255.255.0     UG    0      0        0 eth1
10.10.3.0       0.0.0.0          255.255.255.0     U     0      0        0 eth2
128.110.156.4   172.16.0.1       255.255.255.255   UGH   1024   0        0 eth0
172.16.0.1      0.0.0.0          255.255.255.255   UH    1024   0        0 eth0
jschm333@nodea:~$
```

Routing table for Node A that has access to nodes not available in exercise 1

```
jschm333@nodea:~$ ping 10.10.2.2
PING 10.10.2.2 (10.10.2.2) 56(84) bytes of data.
64 bytes from 10.10.2.2: icmp_seq=1 ttl=64 time=0.864 ms
64 bytes from 10.10.2.2: icmp_seq=2 ttl=64 time=0.454 ms
64 bytes from 10.10.2.2: icmp_seq=3 ttl=64 time=0.273 ms
64 bytes from 10.10.2.2: icmp_seq=4 ttl=64 time=0.473 ms
^C
--- 10.10.2.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3071ms
rtt min/avg/max/mdev = 0.273/0.516/0.864/0.215 ms
jschm333@nodea:~$
```

Node A communicating with 10.10.2.2 which it couldn't before

```
jschm333@nodea:~$ traceroute 10.10.2.2
traceroute to 10.10.2.2 (10.10.2.2), 30 hops max, 60 byte packets
 1  nodeB-link-0 (10.10.1.2)  0.307 ms  0.283 ms  0.261 ms
 2  nodeC-link-1 (10.10.2.2)  0.411 ms  0.388 ms  0.366 ms
jschm333@nodea:~$
```

Traceroute between them

```
jschm333@nodea:~$ traceroute 10.10.2.1
traceroute to 10.10.2.1 (10.10.2.1), 30 hops max, 60 byte packets
 1  nodeC-link-2 (10.10.3.1)  0.365 ms  0.338 ms  0.323 ms
 2  nodeB-link-1 (10.10.2.1)  0.883 ms  0.859 ms  0.842 ms
jschm333@nodea:~$ ping 10.10.2.1
PING 10.10.2.1 (10.10.2.1) 56(84) bytes of data.
64 bytes from 10.10.2.1: icmp_seq=1 ttl=63 time=0.747 ms
64 bytes from 10.10.2.1: icmp_seq=2 ttl=63 time=0.592 ms
64 bytes from 10.10.2.1: icmp_seq=3 ttl=63 time=0.573 ms
64 bytes from 10.10.2.1: icmp_seq=4 ttl=63 time=0.578 ms
^C
--- 10.10.2.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3071ms
rtt min/avg/max/mdev = 0.573/0.622/0.747/0.072 ms
```

Node A communicating with 10.10.2.1

```
jschm333@nodec:~$ ping 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=0.770 ms
64 bytes from 10.10.1.2: icmp_seq=2 ttl=64 time=0.360 ms
64 bytes from 10.10.1.2: icmp_seq=3 ttl=64 time=0.484 ms
^C
--- 10.10.1.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2042ms
rtt min/avg/max/mdev = 0.360/0.538/0.770/0.171 ms
jschm333@nodec:~$ traceroute 10.10.1.2
traceroute to 10.10.1.2 (10.10.1.2), 30 hops max, 60 byte packets
 1  nodeA-link-2 (10.10.3.2)  0.591 ms  0.564 ms  0.548 ms
 2  nodeB-link-0 (10.10.1.2)  0.745 ms  0.724 ms  0.708 ms
jschm333@nodec:~$
```

Last connection that was not working fixed

```
≡                           jschm333@nodeb: ~                    _  ▢  ✕

File  Edit  View  Search  Terminal  Help
64 bytes from 10.10.1.2: icmp_seq=1 ttl=64 time=0.012 ms
64 bytes from 10.10.1.2: icmp_seq=2 ttl=64 time=0.018 ms
^C
--- 10.10.1.2 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1030ms
rtt min/avg/max/mdev = 0.012/0.015/0.018/0.003 ms
jschm333@nodeb:~$ ping 10.10.2.1
PING 10.10.2.1 (10.10.2.1) 56(84) bytes of data.
64 bytes from 10.10.2.1: icmp_seq=1 ttl=64 time=0.009 ms
64 bytes from 10.10.2.1: icmp_seq=2 ttl=64 time=0.019 ms
^C
--- 10.10.2.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1006ms
rtt min/avg/max/mdev = 0.009/0.014/0.019/0.005 ms
jschm333@nodeb:~$ 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
10.10.1.0       0.0.0.0         255.255.255.0   U     0      0        0 eth1
10.10.2.0       0.0.0.0         255.255.255.0   U     0      0        0 eth2
10.10.3.0       10.10.2.2       255.255.255.0   UG    0      0        0 eth2
128.110.156.4   172.16.0.1      255.255.255.255 UGH   1024   0        0 eth0
172.16.0.1      0.0.0.0         255.255.255.255 UH    1024   0        0 eth0
jschm333@nodeb:~$ ▯
```

```
≡                           jschm333@nodec: ~                    _  ▢  ✕

File  Edit  View  Search  Terminal  Help
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=0.770 ms
64 bytes from 10.10.1.2: icmp_seq=2 ttl=64 time=0.360 ms
64 bytes from 10.10.1.2: icmp_seq=3 ttl=64 time=0.484 ms
^C
--- 10.10.1.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2042ms
rtt min/avg/max/mdev = 0.360/0.538/0.770/0.171 ms
jschm333@nodec:~$ traceroute 10.10.1.2
traceroute to 10.10.1.2 (10.10.1.2), 30 hops max, 60 byte packets
 1  nodeA-link-2 (10.10.3.2)  0.591 ms  0.564 ms  0.548 ms
 2  nodeB-link-0 (10.10.1.2)  0.745 ms  0.724 ms  0.708 ms
jschm333@nodec:~$ 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
10.10.1.0       10.10.3.2       255.255.255.254 UG    0      0        0 eth2
10.10.1.0       10.10.3.2       255.255.255.0   UG    0      0        0 eth2
10.10.2.0       0.0.0.0         255.255.255.0   U     0      0        0 eth1
10.10.3.0       0.0.0.0         255.255.255.0   U     0      0        0 eth2
128.110.156.4   172.16.0.1      255.255.255.255 UGH   1024   0        0 eth0
172.16.0.0      0.0.0.0         255.240.0.0     U     1024   0        0 eth0
172.16.0.1      0.0.0.0         255.255.255.255 UH    1024   0        0 eth0
jschm333@nodec:~$ ▯
```

Routing tables for nodes B and C

```
172.10.0.1        0.0.0.0       255.255.255.255 on     1024  0      0 eth
jschm333@nodeb:~$ traceroute 10.10.1.1
traceroute to 10.10.1.1 (10.10.1.1), 30 hops max, 60 byte packets
 1  nodeA-link-0 (10.10.1.1)  0.238 ms  0.216 ms  0.197 ms
jschm333@nodeb:~$ traceroute 10.10.3.2
traceroute to 10.10.3.2 (10.10.3.2), 30 hops max, 60 byte packets
 1  nodeC-link-1 (10.10.2.2)  0.498 ms  0.472 ms  0.457 ms
 2  nodeA-link-2 (10.10.3.2)  0.791 ms  0.771 ms  0.754 ms
jschm333@nodeb:~$ traceroute 10.10.3.1
traceroute to 10.10.3.1 (10.10.3.1), 30 hops max, 60 byte packets
 1  nodeC-link-2 (10.10.3.1)  0.515 ms  0.494 ms  0.477 ms
jschm333@nodeb:~$ traceroute 10.10.2.2
traceroute to 10.10.2.2 (10.10.2.2), 30 hops max, 60 byte packets
 1  nodeC-link-1 (10.10.2.2)  0.458 ms  0.436 ms  0.417 ms
jschm333@nodeb:~$
```

Traceroute from B node

Experiments ▾   Storage ▾   News!

Current Usage: 0 Node Hours, Prev Week: 2.65, Prev Month: 2.65 (30 day rank: 1579 of 1681 users)

Experiments Profiles Project Profiles Datasets Reservations Membership Usage Account

You do not have any active experiments. Click here to create one.

Cleaned up work

Summary:
In this lab I learned more about networking and specifically subnetting. We had to deal with
some of our routers not being able to ping other ips. We had to set up static routes in order to
allow them to communicate. I learned more about routing tables. I learned more about network
masks. I was able to get more practice using traceroute to see the different jumps packets take
to reach a location. I got more practice using ping to check for communication between two
devices. Overall, this lab helped me learn a lot more about networking and different tools to
evaluate networks.