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Lab 9

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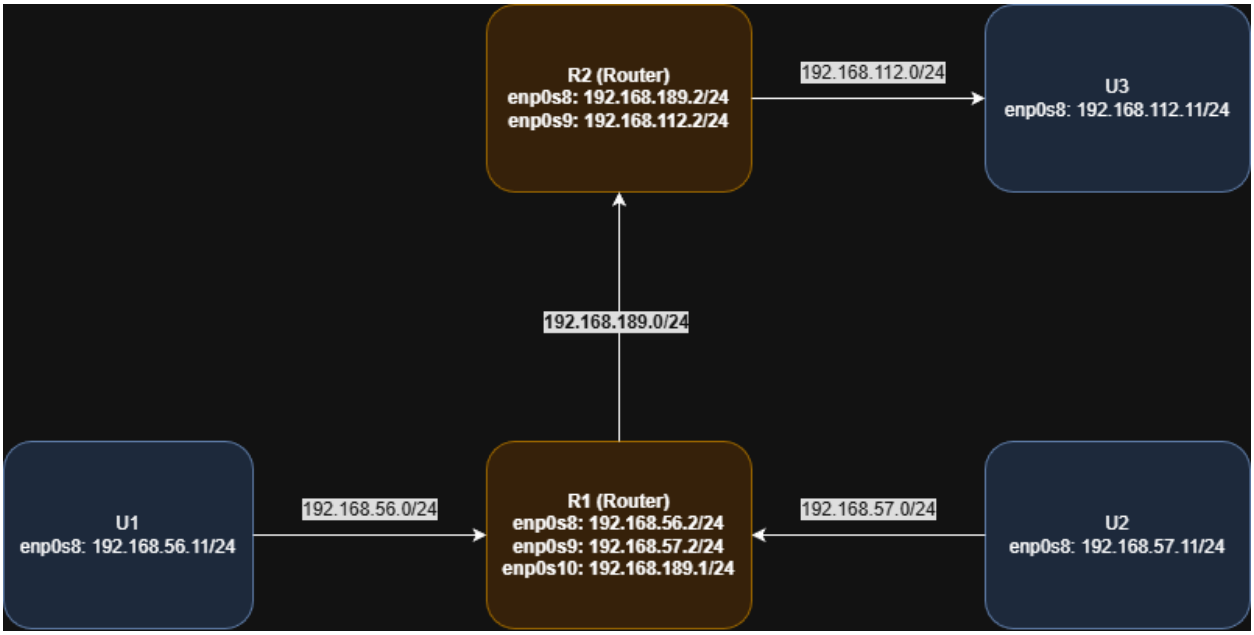
Network Topology Diagram:



Traceroute From U1 to U3:

```
traceroute to 192.168.112.11 (192.168.112.11), 30 hops max, 60 byte packets
 1  _gateway (192.168.56.2)  0.501 ms  0.477 ms  0.645 ms
 2  192.168.189.2 (192.168.189.2)  1.385 ms  1.387 ms  1.404 ms
 3  192.168.112.11 (192.168.112.11)  1.923 ms  1.916 ms  1.910 ms
class-vm@class-base:~$
```

Traceroute From U1 to U2

```
traceroute to 192.168.57.11 (192.168.57.11), 30 hops max, 60 byte packets
 1  _gateway (192.168.56.2)  0.516 ms  0.481 ms  0.475 ms
 2  192.168.57.11 (192.168.57.11)  1.186 ms  1.181 ms  1.369 ms
class-vm@class-base:~$
```

MAC Traversal From U1 to U3:

Hop	Network	Source MAC	Destination MAC	Devices
1	192.168.56.0/24	08:00:27:d2:7f:f4	08:00:27:44:99:e9	U1 → R1
2	192.168.189.0/24	08:00:27:d8:af:a9	08:00:27:20:11:59	R1 → R2
3	192.168.112.0/24	08:00:27:1c:97:7c	08:00:27:a4:96:b5	R2 → U3

- PCAP was captured on R1 for path from U1 toU3

To determine the correct MAC addresses:

1. I used ip -br link on each host to identify the MAC address of every interface.
2. I then matched each interface to its subnet based on the topology.
3. Since routers forward frames only to the next hop on the same LAN, each hop uses:
    - **Source MAC = the router's outgoing interface MAC**
    - **Destination MAC = the next hop router or host's interface MAC**

This gives the following complete path:

- U1 sends the packet to R1 → uses U1 MAC → R1 MAC
- R1 forwards to R2 → uses R1 MAC → R2 MAC
- R2 forwards to U3 → uses R2 MAC → U3 MAC

U1:

```
class-vm@class-base:~$ ip -br link
lo               UNKNOWN        00:00:00:00:00:00 <LOOPBACK,UP,LOWER_UP>
enp0s3           UP             08:00:27:d2:7f:f4 <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s8           UP             08:00:27:fe:23:7b <BROADCAST,MULTICAST,UP,LOWER_UP>
class-vm@class-base:~$ _
```

U2:

```
class-vm@class-base:~$ ip -br link
lo               UNKNOWN        00:00:00:00:00:00 <LOOPBACK,UP,LOWER_UP>
enp0s3           UP             08:00:27:92:d3:f2 <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s8           UP             08:00:27:a8:88:3b <BROADCAST,MULTICAST,UP,LOWER_UP>
class-vm@class-base:~$ _
```

U3:

```
class-vm@class-base:~$ ip -br link
lo               UNKNOWN        00:00:00:00:00:00 <LOOPBACK,UP,LOWER_UP>
enp0s3           UP             08:00:27:c7:2a:87 <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s8           UP             08:00:27:a4:96:b5 <BROADCAST,MULTICAST,UP,LOWER_UP>
class-vm@class-base:~$ _
```

R1:

```
class-vm@class-base:~$ ip -br link
lo               UNKNOWN        00:00:00:00:00:00 <LOOPBACK,UP,LOWER_UP>
enp0s3           UP             08:00:27:80:45:19 <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s8           UP             08:00:27:44:99:e9 <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s9           UP             08:00:27:b5:35:45 <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s10          UP             08:00:27:d8:af:a9 <BROADCAST,MULTICAST,UP,LOWER_UP>
class-vm@class-base:~$
```

R2:

```
class-vm@class-base:~$ ip -br link
lo               UNKNOWN        00:00:00:00:00:00 <LOOPBACK,UP,LOWER_UP>
enp0s3           UP             08:00:27:a8:85:d5 <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s8           UP             08:00:27:20:1b:59 <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s9           UP             08:00:27:1c:97:7c <BROADCAST,MULTICAST,UP,LOWER_UP>
class-vm@class-base:~$
```