

# Lab 8

CSCD 330 Computer Networks

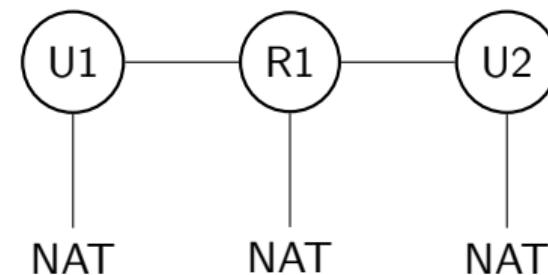
Fall (2024)



# Lab 8

# VM networking lab

Topology:



# Draw

- Don't assume you can remember everything.
- I recommend drawing this out.
  - A diagram will help you very much.
  - Especially if you need help debugging.
- You can draw something similar to the previous slide.
  - But you'll want to add more data.
- Use [draw.io](#) at the least.

## The best-laid schemes of mice and men

- Use consistent numbering schemes.
  - Make all “leaf node” IPs end with the same number.
  - Make all “router” IPs end with the same number.
- This will help you when things don’t work.
- They will be on different subnets so they should have different IP addresses.

# Specifics

- Each VM **must** have a unique IP address?
  - YES
  - Why?
- More specifically, each adapter on the VM must have a unique IP address!
- The routing VM R1 will have how many interfaces?
  - 3: NAT,HOST-ADAPTER-1,HOST-ADAPTER-2.
- How many will U1 have?
  - 2: NAT and HOST-ADAPTER-1.
- Netplan is the Ubuntu way of adding a static IP.
  - No need for a gateway or DNS (nameservers)?
  - We'll be manually adding the route.

## Example router netplan

```
network:  
  ethernets:  
    enp0s3:  
      dhcp4: true  
    enp0s8:  
      dhcp4: no  
      addresses:  
        - 192.168.56.3/24  
    enp0s9:  
      dhcp4: no  
      addresses:  
        - 192.168.57.3/24  
version 2
```

## Specifics continued

- How do you find out what IP block to use?
  - Look at the file->tools->network manager settings.
  - It should have the IP block for each adapter available.
- What happens if we don't set the route?
  - Packets won't go through R1.
  - If packets go to the right end location, but don't go through the router, it's wrong.
  - **Make sure your first hop is not 10.\* .**
- What IP address numbers can we use when selecting static IPs?
  - Anything in the block, but we need to avoid certain numbers.
    - Which numbers, and why?
    - Your host machine will claim the .1 in the block.
    - The highest and lowest are usually reserved.

# Routes?

- You can add non-persistent routes to test your setup.
  - `ip route add <DST NETWORK> via <ROUTER IP> dev <DEVICE>`
  - `<DST NETWORK>` will look like what?
- How to test if your route is there?
  - `ip route`

## Persistent routes

- You can make persistent routes with netplan.
- Simply add the routes field:

```
routes:  
  - to: 192.168.4.3/24  
    via: 192.168.4.2
```

- Routes are specific for each interface and should be indented as such.

# IP forwarding

- Your must enable IP forwarding on the router node.
  - If you don't **nothing will work**.
- There are persistent and non-persistent ways to set this.
- Non-persistent:
  - `sysctl -w net.ipv4.ip_forward=1`
- Persistent:
  - Must make a file in `/etc/sysctl.d`.
  - The file just needs one line:
    - `net.ipv4.ip_forward=1`
  - Call the file anything you want:
    - e.g., `10-ipv4-forward.conf`

## Editing netplan

- Netplan is a yaml file.
- Yaml is a for writing configuration files.
- Make sure you use spaces and indent correctly.
- You can test a netplan configuration with `netplan try`
  - Usually lets you know if there are syntax errors.

# Netplan

- If your configuration is bad it will likely take a long time to boot.
- How can you look at the effects of your netplan?
  - ip link
  - ip route
  - ip a

## Retrieving your file?

- Use scp from your R1 VM to the VM we've been using for labs.
- The gui VM (that we have done our other labs on) must use bridged network.
- You must install openssh-server on the gui VM.
- Once this is done you can ssh and scp.

# ssh

- Secure Shell.
  - This is the easy way to remotely access a computer.
  - `ssh <username>@<computer_name>`
    - e.g., `ssh tony@ewudesktop`
  - Can I use a host name for the `<computer_name>`?
    - **YES!**
  - Can I use an IP address?
    - **YES!**