

Lab 8

CSCD 330 Computer Networks

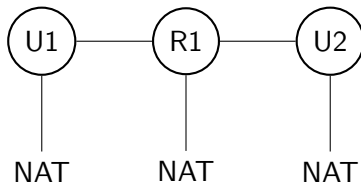
Fall (2024)



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

- **You 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!**