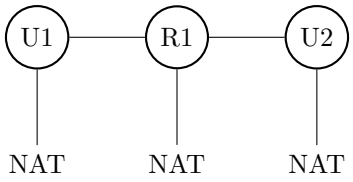
CSCD 330 – Computer Networks

Lab 8, VM networking

Overview:

Today we will create 3 virtual machines and network them together. They'll have the following topology:



Specifics:

1. Create a base VM with Ubuntu Server from here.
   - Use 1GB of RAM, 1 core, and a 10GB hard drive.
     - During installation, you may want to use more RAM and cores. Do not increase the amount of disk space.
   - Install an `ssh` server, but leave all other defaults.
   - If you don't want to worry about forgetting your credentials you can use the same username and password as the previous VM.
     - username: class-vm
     - password: CSCD330
2. Clone the base VM 3 times.
   - To clone, right click on the VM to clone and select clone from the drop down menu.
   - When cloning, select `Generate new MAC addresses for all network adapters`.
   - ***Do not*** use the base image, only work with clones!
3. Network the machines together.
   - You'll have 3 machines `U1`,`U2`, and `R1`. Where `U1` and `U2` are Ubuntu end nodes and `R1` is a router through which we'll make `U1` and `U2` communicate.
   - Create two interfaces (vboxnet0, and vboxnet1)
     - **If you are using a lab machine, we have done this step for you.**
     - Go to `File->Tools->Network Manager`:
   - In the settings of each VM, add a host only adapter.
     - The router will have both, whereas each endpoint will have 1.
   - Configure each VM to have a static IP in the network.
     - The router will have 2 and each endpoint will have 1.
     - Keep the NAT interface, we still want the machines to be able to reach the Internet.
   - All traffic from `U1`, and `U2`, must pass through `R1`. For example, add a specific route so that all traffic from `U1 -> U2` goes through `R1`.
4. Make all your configurations persistent across reboots.
   - This will require editing your `netplan` file with the route information. Additionally, you'll need to make IP forwarding persistent.

5. Make sure all traffic to/from the set (S) `U1`, and `U2` goes through `R1`.
    - Test with a `traceroute` from `U1` to `U2`.

Static IPs:

To create a static IP you'll need to configure the file in `/etc/netplan`. You'll have to add in the static IP information for all 3 machines, being sure to leave the NATed interface alone. You can apply your configuration with:

```
sudo netplan try
```

The static IP you select will be determined by the `vboxnet#` interface and what IPs are available on that interface. You'll only be adding 4 lines to the file.

DO NOTs:

- Do not rely on your your classmates.
    - This is **NOT** a group assignment.
    - If you need a reminder of the rules, please read the syllabus.

Turn in file:

Use the naming convention `lab8_turnin_MYNAME.tar.gz`. Where the contents are your pcap, netplan configurations (label them clearly so we know which configuration belongs to each VM) and PDF file. This is the file you will turn in.

What to turn in:

Turn in a tarball with the following:

1. A pcap file of `U1` `traceroute`ing `U2` through `R1`. `R1` should be the machine where `tcpdump` is executed.
2. A PDF document stating:
    - Each MAC address traversed in the above `traceroute` and how you know.
    - How to make ipforwarding persistent on `R1`.
3. The netplan file for each VM (`R1`, `U1`, and `U2`).