

CS 485/ECE 440/CS 585 Lab 2 setup instructions

Separate from this, you'll receive a student number (3 through 75, Rudy from SSG---who is also a student in the class---is number 1, while the TA and I are sharing number 2). If your student number is 45, for example, you can use the following /24 to split into pieces and use for your connections:

```
192.168.45.0/24
```

And the IP addresses for the VMs for Stu 45-1, Stu 45-2, Stu 45-3, Stu 45-4, and Stu 45-5 are the five that you can use for your machines 1 through 5. Somebody (Rudy or I, probably) will send out the IP addresses, VPN connection instructions, and default username and password (you should change the password ASAP).

These instructions assume you can get onto each of your five machines, know how to use sudo, can edit files, etc. We'll go over these things in class, or ask the TA and/or I for help. I also strongly recommend that you use screen, and you should assume that you can be disconnected from your VMs at any time.

First, pick a password and five names for your five machines. I picked groucho, harpo, chico, zeppo, and gummo. SSH into each of your five machines and (using sudo) edit these two files to replace cs585server with the name of that machine:

```
/etc/hostname  
/etc/hosts
```

Then, change the password of the cs585user user, using:

```
passwd
```

If you know how to create new sudo users, feel free to, but in any case change the cs585user password to protect your machines from tomfoolery.

Next, for each VM, make sure the system is up-to-date and get some packages we'll need:

```
sudo apt-get update  
sudo apt-get dist-upgrade  
sudo apt-get install quagga tshark httpperf  
sudo apt-get autoremove
```

Then reboot the VM (you'll need to log back in after that):

```
sudo reboot
```

Next, turn on IP forwarding on the machines that will be forwarding packets by (using sudo) editing this file to look like the screencaps below for machines 2, 3, and 4 (on machines 1 and 5 leave this file alone):

```
/etc/sysctl.conf
```

Now, reboot all five machines

Next, (using sudo), edit this file on each of the five machines to add the correct networking information and routes, as in the screencaps below:

```
/etc/network/interfaces
```

Note that I'm student 2, so I took my /24 (192.168.2.0/24) and broke it up into sixteen /28's. You should do the same and try to mirror my IPs as closely as you can. E.g., if I use 192.168.2.49 and you're student 40, in the same part of your network use 191.168.40.49.

You can edit them all at once and then restart networking, or work iteratively and set up small parts of the network and test. In any case, make sure you don't have type-o's and always try to reconfigure the network without rebooting by using:

```
sudo /etc/init.d/networking restart
```

Never edit eth0. If you mess up your network, you may have to bribe Rudy to reset things or help you get back into a machine. So be very careful of type-o's.

My machines are connected like this (note that Rudy has already dragged all the virtual cables from machine to machine for you):

groucho ---- harpo ---- chico ---- zeppo ---- gummo

In the following 5 screencaps, I didn't delete anything at the top, just scrolled down, so for some of them you can't see the whole file but the part you don't see didn't change.

Here is the /etc/network interfaces file for all five machines:

groucho:

```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).
```

```
source /etc/network/interfaces.d/*
```

```
# The loopback network interface
```

```
auto lo
```

```
iface lo inet loopback
```

```
# The primary network interface
```

```
auto eth0
```

```
iface eth0 inet dhcp
```

```
# My connection to machine 2
```

```
auto eth1
```

```
iface eth1 inet static
```

```
address 192.168.2.2
```

```
netmask 255.255.255.240
```

```
up route add -net 192.168.2.16 netmask 255.255.255.240 gw 192.168.2.1
```

```
up route add -net 192.168.2.32 netmask 255.255.255.240 gw 192.168.2.1
```

```
up route add -net 192.168.2.48 netmask 255.255.255.240 gw 192.168.2.1
```

```
~
```

```
~
```

```
"/etc/network/interfaces" 21L, 621C
```

```
1,1
```

```
All
```

harpo:

```
Terminal - + x
source /etc/network/interfaces.d/*

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet dhcp

# My connection to machine 1
auto eth1
iface eth1 inet static
address 192.168.2.1
netmask 255.255.255.240

# My connection to machine 3
auto eth2
iface eth2 inet static
address 192.168.2.18
netmask 255.255.255.240
up route add -net 192.168.2.32 netmask 255.255.255.240 gw 192.168.2.17
up route add -net 192.168.2.48 netmask 255.255.255.240 gw 192.168.2.17
26,1 Bot
```

chico:

```
Terminal - + x
source /etc/network/interfaces.d/*

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet dhcp

# My connection to machine 2
auto eth1
iface eth1 inet static
address 192.168.2.17
netmask 255.255.255.240
up route add -net 192.168.2.0 netmask 255.255.255.240 gw 192.168.2.18

# My connection to machine 4
auto eth2
iface eth2 inet static
address 192.168.2.33
netmask 255.255.255.240
up route add -net 192.168.2.48 netmask 255.255.255.240 gw 192.168.2.34
26,1 Bot
```

zeppo:

```
Terminal - + x
# The loopback network interface
auto lo
iface lo inet loopback

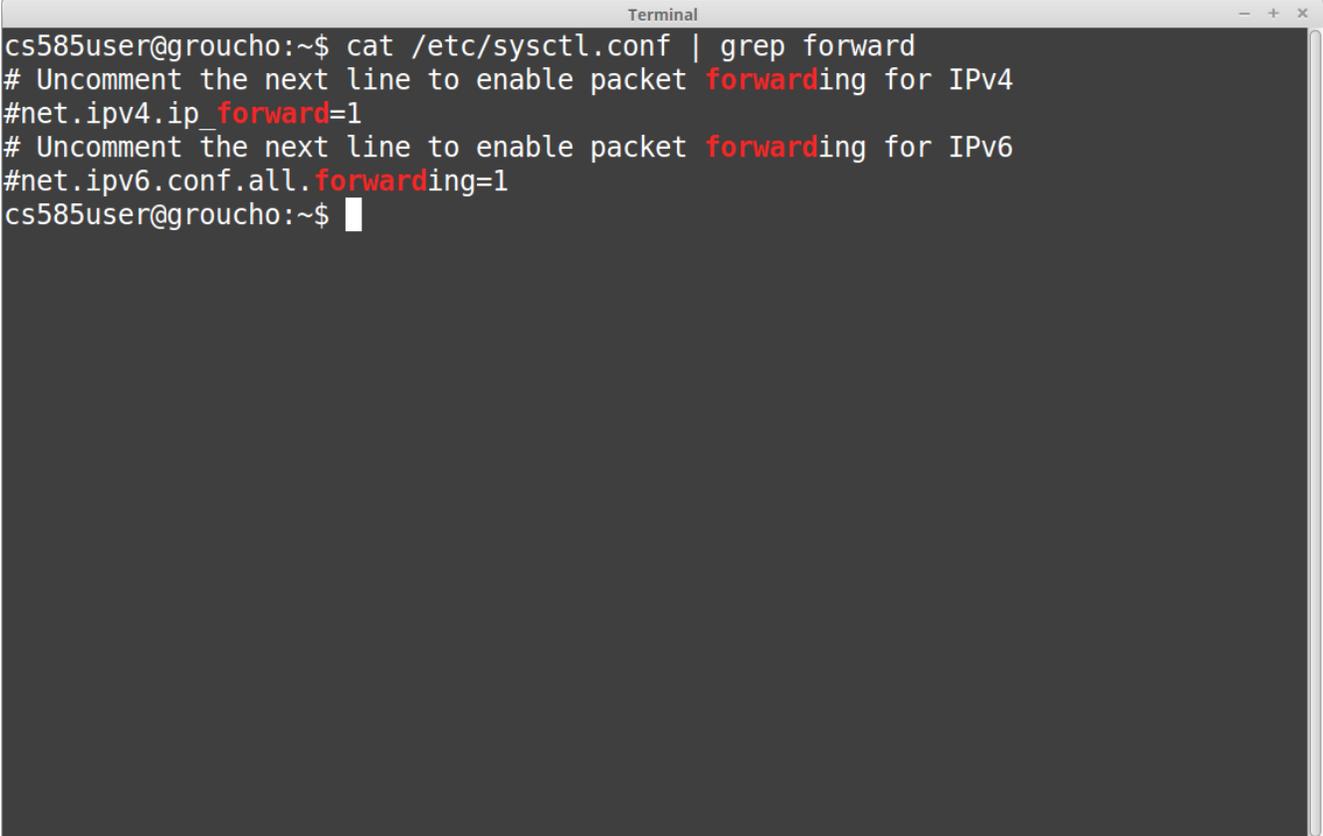
# The primary network interface
auto eth0
iface eth0 inet dhcp

# My connection to Machine 3
auto eth1
iface eth1 inet static
address 192.168.2.34
netmask 255.255.255.240
up route add -net 192.168.2.0 netmask 255.255.255.240 gw 192.168.2.33
up route add -net 192.168.2.16 netmask 255.255.255.240 gw 192.168.2.33

# My connection to Machine 5
auto eth2
iface eth2 inet static
address 192.168.2.49
netmask 255.255.255.240
█

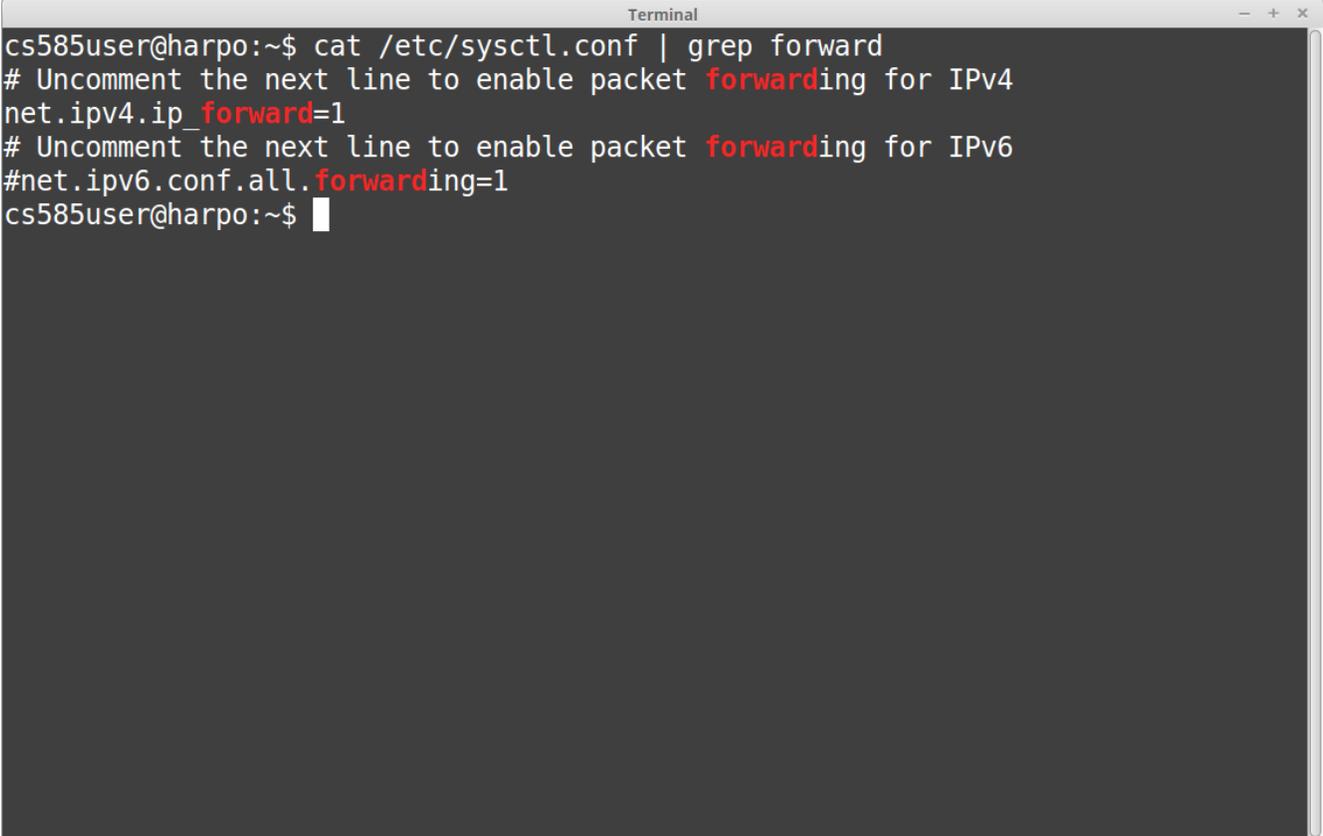
27,0-1 Bot
```


groucho and gummo (*i.e.*, machines 1 and 5, note that you should choose your own names) should look like this, since their `/etc/sysctl.conf` did not get edited:



```
Terminal
cs585user@groucho:~$ cat /etc/sysctl.conf | grep forward
# Uncomment the next line to enable packet forwarding for IPv4
#net.ipv4.ip_forward=1
# Uncomment the next line to enable packet forwarding for IPv6
#net.ipv6.conf.all.forwarding=1
cs585user@groucho:~$
```

harpo, chico, and zeppo (*i.e.*, machines 2, 3, and 4, note that you should choose your own names) should look like this, since their `/etc/sysctl.conf` *did* get edited:



```
Terminal
cs585user@harpo:~$ cat /etc/sysctl.conf | grep forward
# Uncomment the next line to enable packet forwarding for IPv4
net.ipv4.ip_forward=1
# Uncomment the next line to enable packet forwarding for IPv6
#net.ipv6.conf.all.forwarding=1
cs585user@harpo:~$
```

In case you're having trouble getting the hostname right:

```
Terminal - + x
cs585user@chico:~$ cat /etc/hostname
chico
cs585user@chico:~$ head -n 10 /etc/hosts
127.0.0.1    localhost
127.0.1.1    chico

# The following lines are desirable for IPv6 capable hosts
::1        localhost ip6-localhost ip6-loopback
ff02::1    ip6-allnodes
ff02::2    ip6-allrouters
cs585user@chico:~$
```