

How to set up SSH and VNC on a raspberry pi

This guide is written for Mac.

The SSH option must be enabled in the Raspberry Pi's raspi-config prior to this guide. We did this together in class, so it should already be enabled on everyone's device.

This guide requires two computers. We will connect to raspi to your network via ethernet, then find the raspi on the network with a second computer, using a network scanning tool called arp-scan. In order to install arp-scan, we must first install Homebrew, a package manager that simplifies installing command line tools on Mac. Once we know the raspi's ip address, we can connect to it via SSH. We will then install a VNC server to connect the raspi as though it was connected your computer's monitor, keyboard, and mouse. TightVNC is a good open-source option.

1. Open up terminal on your Mac and install Homebrew by entering the following command

```
/usr/bin/ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install)"
```

Proceed with the installation and enter your user password when prompted. This will take a few minutes.

Now the Homebrew package manager is installed on your computer

2. Install arp-scan by entering the following command

```
brew install arp-scan
```

Now the network scanning tool arp-scan is installed on your computer

3. Connect the Raspberry Pi to your router directly with an ethernet cable, then connect the microUSB power cable to turn on the raspi. Wait a minute or two while your raspi boots up and establishes a network connection.

4. For this step you must know your router's IP address. This is usually something like 192.168.0.x or 192.168.1.x (where x is a number), and can be obtained by opening Network Preferences (Click on the wifi icon on your Mac, then Open Network Preferences at the bottom of the pop-up menu). You will see something like "Wi-Fi is connected to [Network Name] and has the IP address xxx.xxx.x.x (where the x's are numbers).

Write down or remember this number

Now in Terminal enter the command

```
ifconfig
```

This will display your computer's network interfaces. Several interfaces should show up, with names like en0, en1, eth0, etc...

Locate the interface that contains the ip address you wrote down a second ago. Write down or remember this interface name (Mine is en0. Yours probably is too).

5. Recall your IP Address. We are going to need the same string of numbers, but with the very last digit changed to a 0. (For example, my IP address was 192.168.0.8, so I now want the number 192.168.0.0)

In terminal, enter the command (anytime you enter sudo you will be prompted for your password)

```
sudo arp-scan --interface=en0 xxx.xxx.x.x/24
```

where xxx.xxx.x.x is the NEW IP address we changed with a 0 just a moment ago, and en0 should be replaced with your interface name that you found in step 4.

(note --interface=en0 has 2 -'s)

For example, I would enter arp-scan --interface=en0 192.168.0.0/24

This will display a list of IP addresses and hostnames on your local network. Find the IP Address associated with "Raspberry Pi Foundation" (This your raspberry pi's IP Address). For example, mine is 192.168.0.32

6. In Terminal, enter the command

```
ssh pi@xxx.xxx.x.x
```

where the x's are your raspberry pi's IP Address that you found in step 5. For example, I entered

```
ssh pi@192.168.0.32
```

Congratulations, you are now remotely connected to your raspi via SSH! Your terminal window is now your raspi's terminal window. You should now see something like

```
pi@hostname:~ $
```

Where hostname is your raspi's hostname that you set up in class.

7. Next we will install a VNC server on your raspi.

In Terminal, enter the commands (each of these will take a few minutes)

```
sudo apt-get update
```

```
sudo apt-get upgrade
```

```
sudo apt-get install tightvncserver
```

apt-get is the default package manager included with your NOOBS/Raspbian, similar to Homebrew that you installed on your mac at the beginning of this guide.

If anything gets stuck, hit ctrl+C to stop the process and try again. In my experience, installing applications with apt-get can sometimes get stuck in a loop while processing triggers. Wait a few minutes before stopping the process as it may just be taking a while.

8. Anytime you want to connect via VNC, you will need to SSH into your raspi and launch tightvncserver. The default VNC port is 5901. You can write a script that will launch tightvncserver on startup if you like, but it is quite resource-heavy, so I recommend only running it as needed and killing the process after you are done.

To launch tightvncserver, simply enter the command via SSH

```
tightvncserver
```

Connect to it with from your computer with your VNC client of choice. Mac comes with a hidden VNC that I like client called Screen Sharing, located in /System/Library/CoreServices/

You can find it by opening Finder, choosing Go in the top menu, choosing Go To Folder, and typing in the folder name /System/Library/CoreServices/

DO NOT move this program, but you can make a shortcut/alias and put that in your application folder if you like.

Open up Screen Sharing (or your favorite VNC client) and connect to

```
xxx.xxx.x.x:5901
```

where xxx.xxx.x.x is your Raspberry Pi's IP Address.

For example, I entered 192.168.0.32:5901

Now you are connected!

When you are done, I suggest killing the server by entering the command

```
vncserver -kill :1
```

Enjoy!