RPi: Remote Interface

Lab 4

Learning outcomes:

1. Setting up static IP Address for RPi
2. Remote Interface
   - Install & Test VNC Server on RPi(if not installed)
   - Install VNC Viewer on your Laptop (if not installed)
   - Connect your RPi via VNC (Detach Monitor, K/b and Mouse)
3. Interfacing digital I/O peripherals using breadboard
4. Interfacing analogue sensors using breadboard

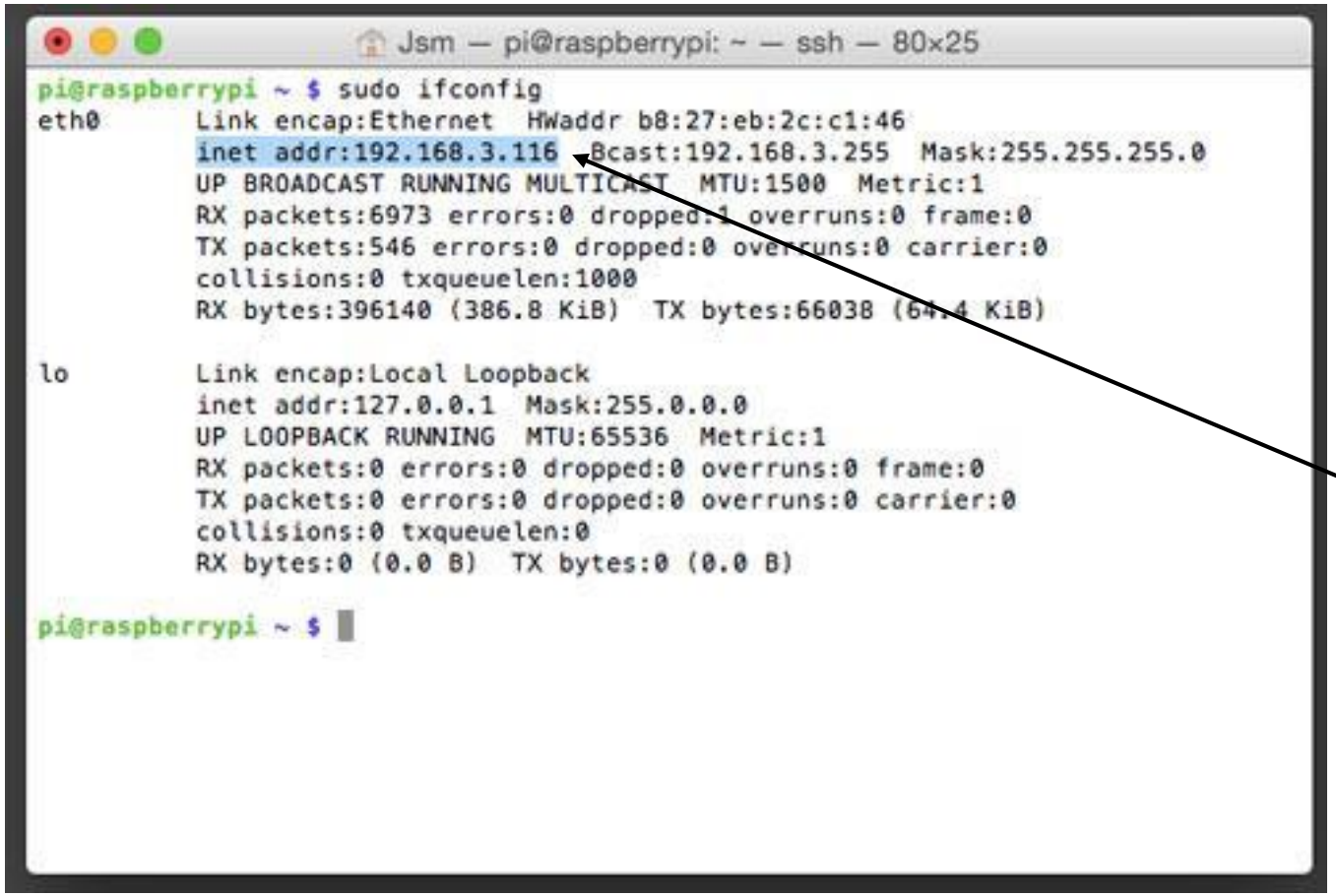
1. Setting static IP Address

- If you want to connect to RPi remotely, static address is useful as compared to dynamic address.
- There are many ways, the following is one of the methods.

1. Setting up static IP address(1):

Your RPi's dynamic IP address keep changing and hence you can set it to static.

Step 1: pi@raspberry~$ sudo ifconfig



IP address 192.168.3.116 (yours will likely be different!)

1. Setting up static IP address(2):

Step 2: Make notes of the following details

Current IP Address (inet addr)
Broadcast Range (Bcast)
Subnet Mask (Mask)

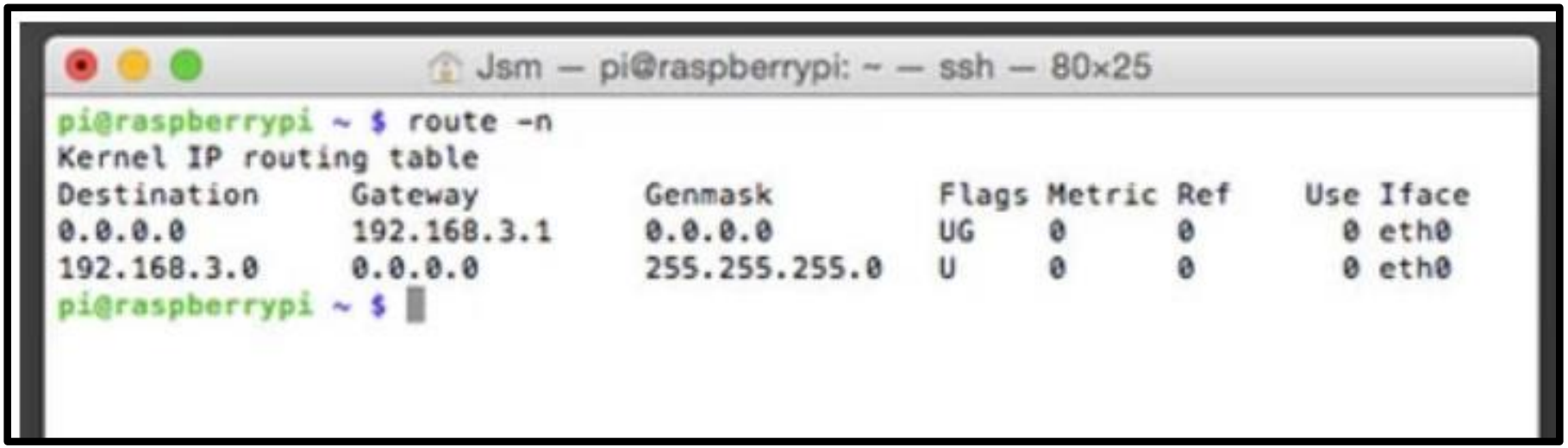
so, from our example, I would get the following information.

Current IP Address = 192.168.3.116
Broadcast Range = 192.168.3.255
Subnet Mask = 255.255.255.0

1. Setting up static IP address(3):

The below command will give information from your router.

Step 3: pi@raspberry~$ sudo route -n



Note down the following information given from this command:

- Gateway
- Destination

So from the example, I would get the following
Gateway = 192.168.3.1
Destination = 192.168.3.0

1. Setting up static IP address(4):

Edit the file

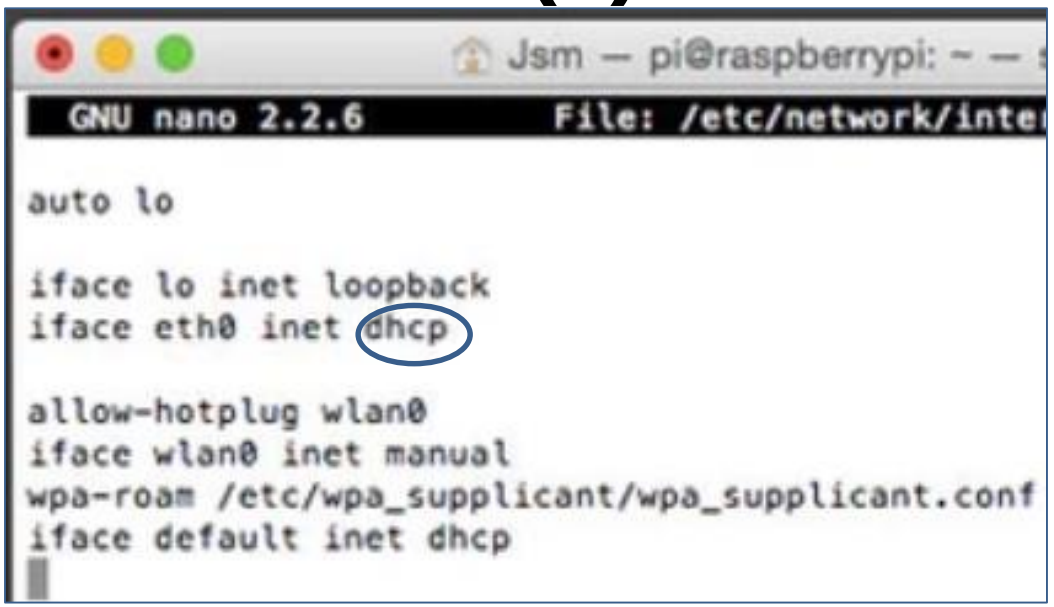
Step 4: pi@raspberry~$ sudo nano /etc/network/interfaces

This opens the below configuration file

1. Setting up static IP address(5):

Step 5a:

Firstly, replace “dhcp” with “**static**”.



Step 5b:

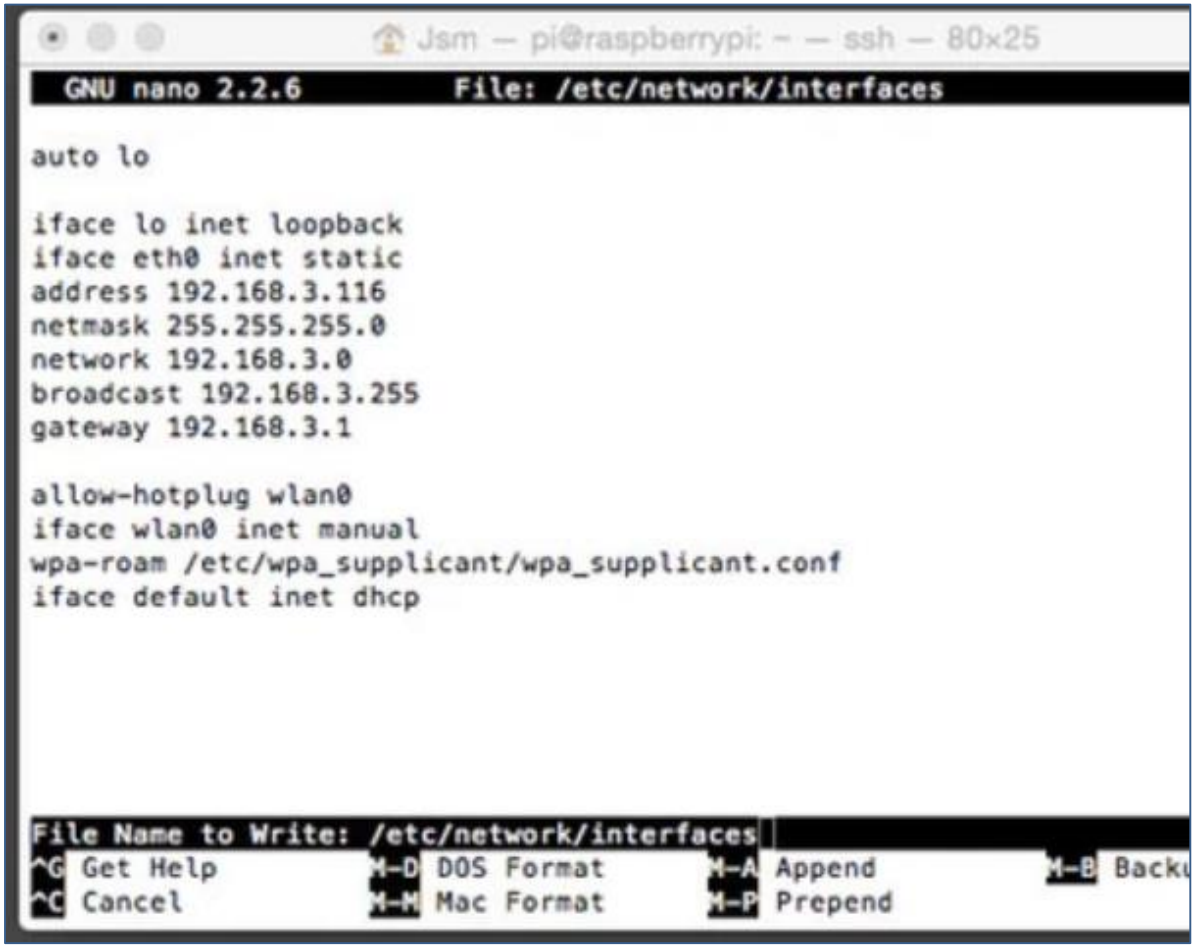
Add the following lines directly below the line you just altered:

address [your chosen IP address]
netmask [your netmask]
network [your destination]
broadcast [your broadcast range]
gateway [your gateway]

1. Setting up static IP address(6):

Step 6:

Press ctrl X to save the file



Step 7: Reboot

pi@raspberry~$ sudo reboot

Step 8:

pi@raspberry~$ sudo ifconfig

2. Remote Desktop Interface

1.1 Setting static IP address for RPi
2.1 Install & Test VNC Server in RPi(if not installed earlier)
2.2 Install VNC Viewer on your Laptop (if not installed earlier)
2.3 Connect your RPi via VNC (Detach Monitor, Keyboard and Mouse)

2. RPi Remote control over Internet:

- This is really useful if you want to run your RPi as a 'headless' machine without the need for its own monitor, mouse and keyboard - instead you can use PC or mobile phone to access and control your RPi.

- There are many methods to access remotely:

  a. **SSH (Secure SHell):** which provides access to the Pi's command line interface.
  b. **VNC (Virtual Network Computing):** which replicates the graphical desktop.

About SSH

SSH is a network protocol that lets you securely transfer data between your computer and your RPi.

Projects might require it so you can control your RPi from your computer's command line without hooking it up to a monitor or keyboard.
Enter **sudo raspi-config** in the terminal, then navigate to ssh, hit Enter and select Enable or disable ssh server.

Advanced options > SSH > Enable

Save and exit the configuration tool.

SSH now comes pre-installed in RPi operating system Raspbian. Type the following command to get IP address:

pi@raspberry~$ sudo ifconfig

2a Secure Shell(SSH):

- You can access the command line of a Raspberry Pi remotely from another computer on the same network using SSH.
- You only have access to the command line, not the full desktop environment.

Step 1: Find the IP address
pi@raspberry~$ sudo ifconfig

Step 2: Enable SSH using LX Terminal

1. Enter **pi@raspberry~$ sudo raspi-config** in a terminal window
2. Select **Interfacing Options**
3. Navigate to and select **SSH**
4. Choose **Yes**
5. Select **Ok**
6. Choose **Finish**

2a Secure Shell(SSH):

Step 2: Enable SSH (Alternate step)

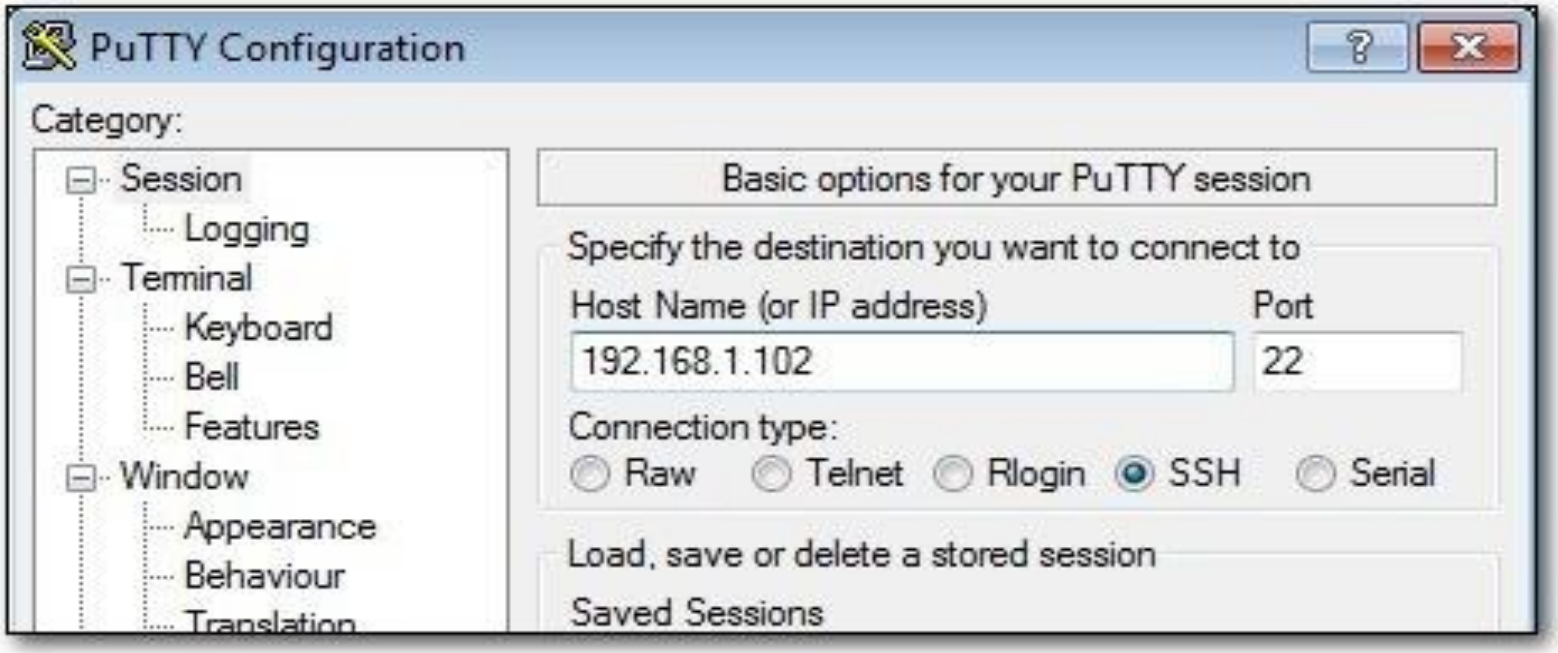
It can be enabled manually from the desktop:

1. Launch **Raspberry Pi Configuration** from the **Preferences** menu
2. Navigate to the **Interfaces** tab
3. Select **Enabled** next to **SSH**
4. Click **OK**

2a PuTTY: command line interface

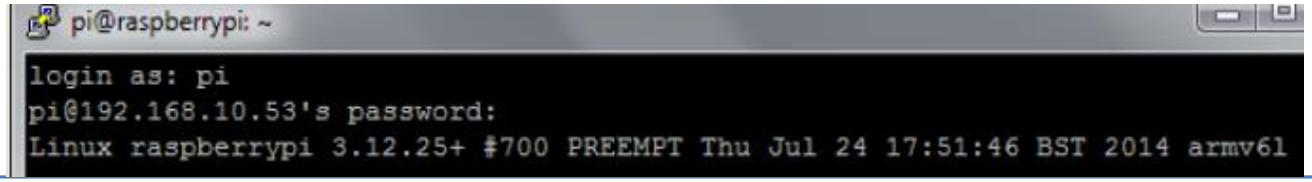
Step 3: Download and run PuTTY SSH client for Windows.

Enter your IP address in the field & keep the default port at 22 (http://www.putty.org)



The default login for **raspbian** is **pi** with the password raspberry.

You should see RPi prompt.

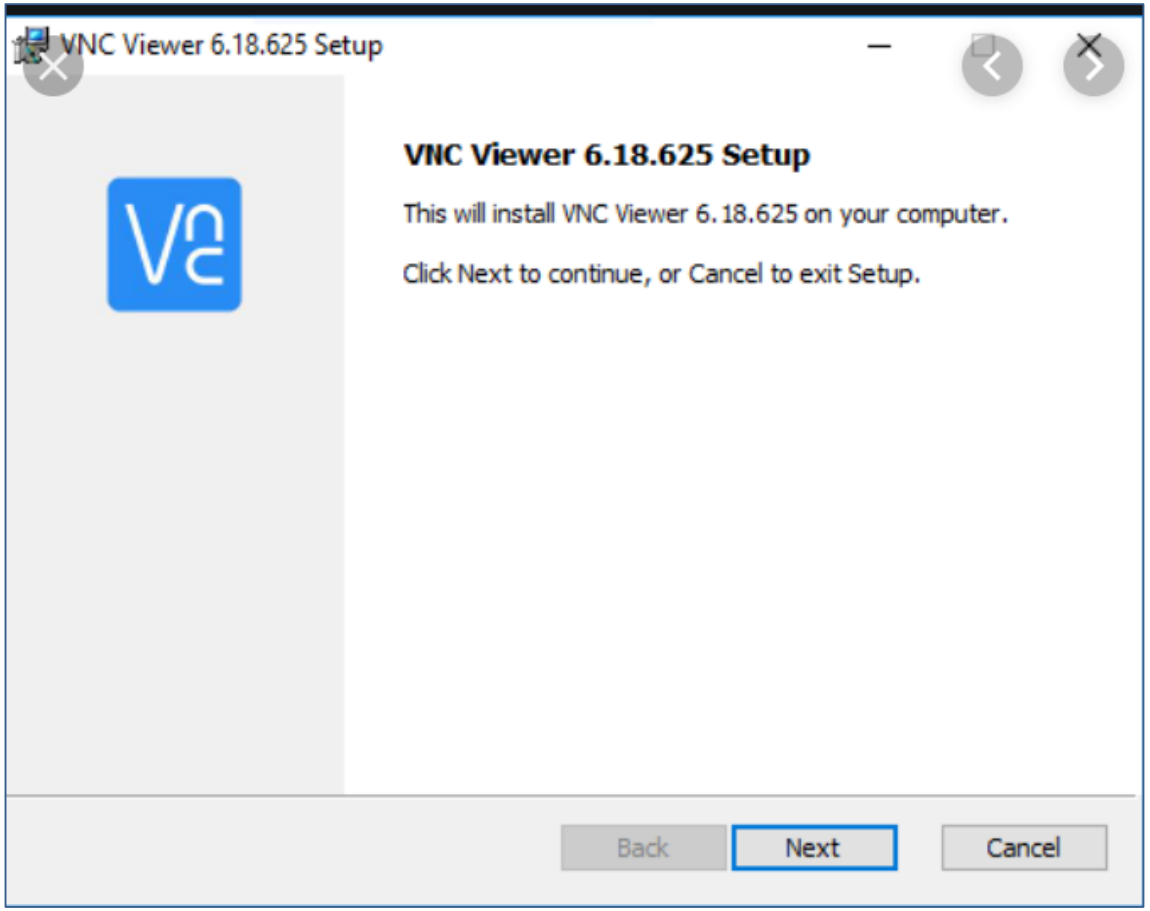


2b. VNC: desktop graphical interface(1)

VNC allows you to use the RPi desktop on another computer.

Step 1: Download and Install **VNC Viewer** on your laptop

- Search for Real VNC Viewer for Windows



2b. VNC: desktop graphical interface(2)

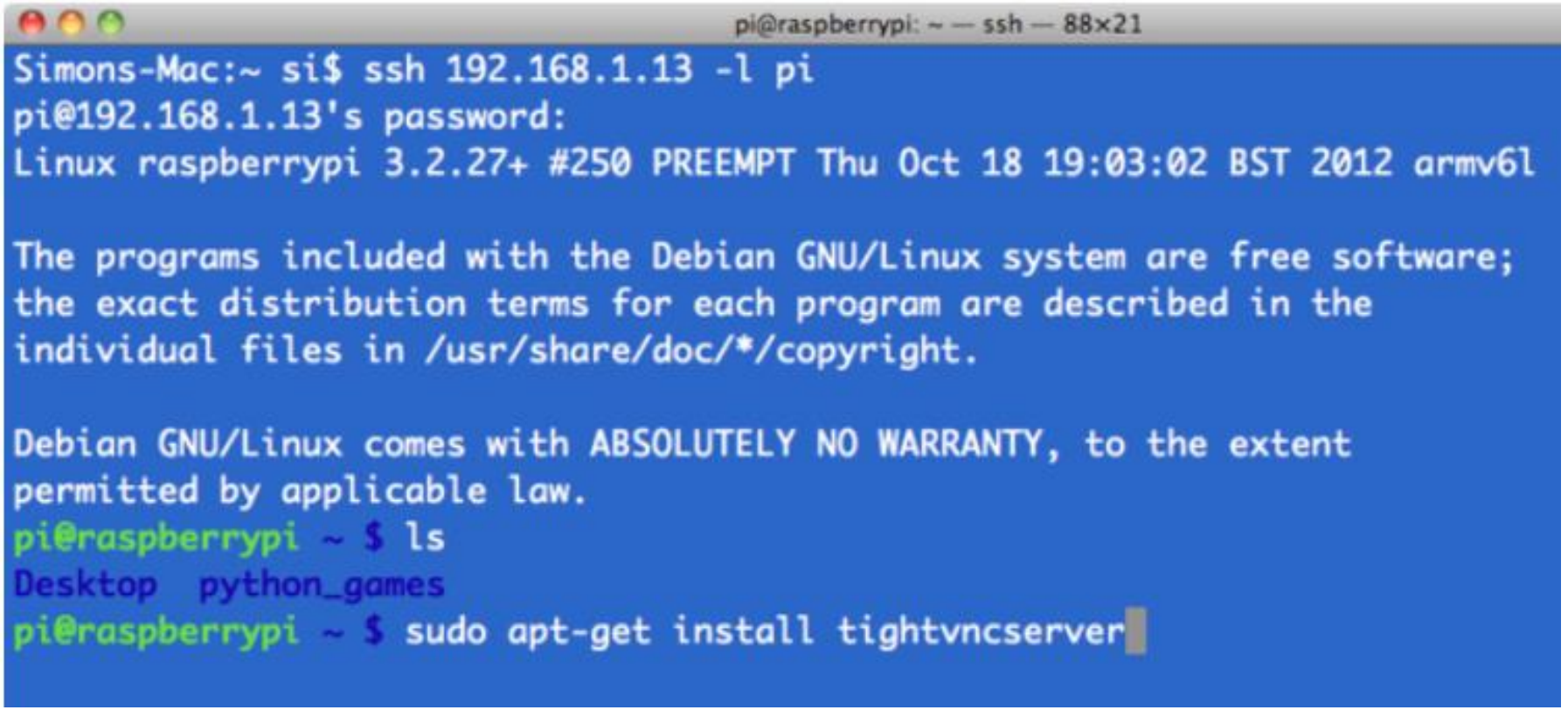
VNC allows you to use the RPi desktop on another computer.

Step 2: Install **VNC Sever** on your RPi

pi@raspberry~$ sudo apt install realvnc-vnc-server

Or

pi@raspberry~$ sudo apt-get install tightvncserver



2b. VNC: desktop graphical interface(3)

Running vnc server

Step 3: pi@raspberry~$ vncserver

```
swd) in auto mode
Setting up x11-xserver-utils (7.7~3) ...
Setting up xfonts-encodings (1:1.0.4-1) ...
Setting up xfonts-utils (1:7.7~1) ...
Setting up xfonts-base (1:1.0.3) ...
Processing triggers for menu ...
pi@raspberrypi ~ $ vncserver :1

You will require a password to access your desktops.

Password:
Warning: password truncated to the length of 8.
Verify:
Would you like to enter a view-only password (y/n)? n

New 'X' desktop is raspberrypi:1

Creating default startup script /home/pi/.vnc/xstartup
Starting applications specified in /home/pi/.vnc/xstartup
Log file is /home/pi/.vnc/raspberrypi:1.log
```

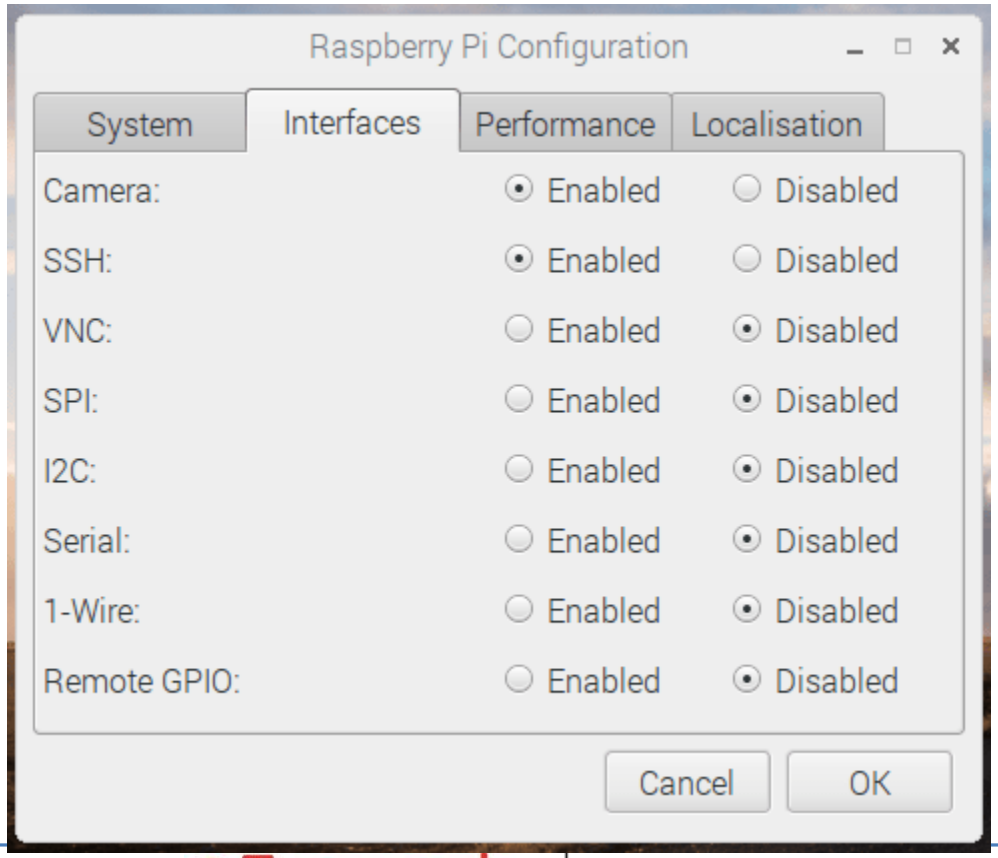
The VNC server is now running and so we can attempt to connect to it.

2b. VNC: desktop graphical interface(4)

Step 4:

Enabling VNC Server graphically

- On RPi, boot into the graphical desktop.
- Select **Menu > Preferences > Raspberry Pi Configuration > Interfaces**.
- Ensure **VNC** is **Enabled**.



2b. VNC: desktop graphical interface(5)

Step 4:

Enabling VNC Server at the command line

- You can enable VNC Server at the command line using raspi-config:
  pi@raspberry~$ sudo raspi-config

Now, enable VNC Server by doing the following:

- Navigate to **Interfacing Options**.
- Scroll down and select **VNC > Yes**.

2b. VNC: Connecting RPi to VNC Viewer(6)

Step 5:

Launch VNC Viewer on computer and enter Rpi's IP address.