

# Raspberry Pi 3 for the First Time



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## Motivation

Rasberry Pi is a small computer on which you can install OS (i.e., Linux). In other words, it has no pre-installed OS. You'll need to install it by yourself if you want it to do something useful.

I think it's fun to do that but it was a bit tricky for the first time. So, my motivation in this article is to explain how to set up a Raspbian—a Debian based Linux distribution customized for Rasberry Pi in the following 4 simple steps:

1. What you need (hardware)
2. Make an OS installer on micro SD card using SDFormatter and NOOBS
3. Boot and install Raspbian (Debian Linux customized for Raspberry Pi)
4. Setup VNC for accessing Raspbian from your computer

# What you need (hardware)

I'm assuming you have a computer with Windows, Linux or Mac, and a SD card reader attached or built-in to your computer. Other than that, you'll at minimum need the following:

- Raspberry Pi 3
- Micro SD (with a full-size SD adapter)
- Monitor (or TV) with a HDMI cable
- Power Supply with a micro USB cable
- USB Keyboard and USB Mouse

Let's look at each component in details but focusing only on what we need to know.

## Raspberry Pi 3

As mentioned earlier, Raspberry Pi is a computer and it has the following interfaces:

- 1 Micro SD card slot (on the back side) for storage (OS, programs, etc)
- 1 HDMI port (for monitor)
- 1 Micro USB Power Supply Slot (for power)
- 4 USB ports (for keyboard, mouse, etc)



There are different packages of Raspberry Pi, some of which with extra stuff like a touch screen and expansion board. You can also buy a plastic protector so that you won't touch the eletrical components while connecting cables and avoid dusts accumulating on your Raspberry Pi.

So, you'll need to shop around to see what you want. You can buy it online from Amazon, eBay or go to physical shops to check out. I bought it from element14 online store that is a barebone Raspberry Pi 3.



The cup on the left is for size comparison (not part of Raspberry Pi 3 package in case you are wondering).

### Micro SD (with a full-size SD adapter)

This is where you install OS and all the softwares. 8 GB is the minimum size required. Mine is 64GB. But there is a catch when you format a SD card with more than 32GB (details on this later).



As mentioned earlier, you'll need a SD card reader connected or built-in to your computer. My Mac Book Pro from 2012 has a built-in SD card reader. But if your computer does not have one, you'll need an external SD card reader connected to your computer. Later, we'll format the SD card and install softwares on it.

### **Monitor (or TV) with a HDMI cable**

I don't have an external computer monitor at home so I used a TV which has HDMI slots. I have spare HDMI cables at home so I used one of them.



### **Power Supply with a micro USB cable**

At home, I have a box full of unwanted cables in that I found Micro USB cables.



I also had a power adapter with an USB interface. If not, I could plug the normal USB side into my Mac Book Pro or an external battery power bank for my mobile phone. As long as you can take power supply from there, it's ok.

Note: It should be a 5-volt 1 amp power supply. Usually, a power adapter has a seal with those details. Look for "output" section.

## USB Keyboard and USB Mouse

Any keyboard and mouse will do as long as they have a USB interface. I used a logitech's USB keyboard and mouse.



But don't hook up any cables yet. We need to make an OS installer on micro SD card to boot up your Raspberry Pi 3 with it.

## Make an OS installer on micro SD card

Raspberry Pi 3 uses a micro SD card for storage (OS, libraries and user programs). You need at least 8 GB storage on your micro SD card. If you do, place your micro SD card into the full sized SD card adapter and stick it into the SD card reader (built-in or attached to your computer).

Then, all you need is the following two steps to make a bootable OS installation disk.

- Format your micro SD card (FAT format)
- Download and copy the NOOBS files to your micro SD card

### Format your micro SD card (FAT format)

- **SDFormatter (if your micro SD card is 32GB or less)**

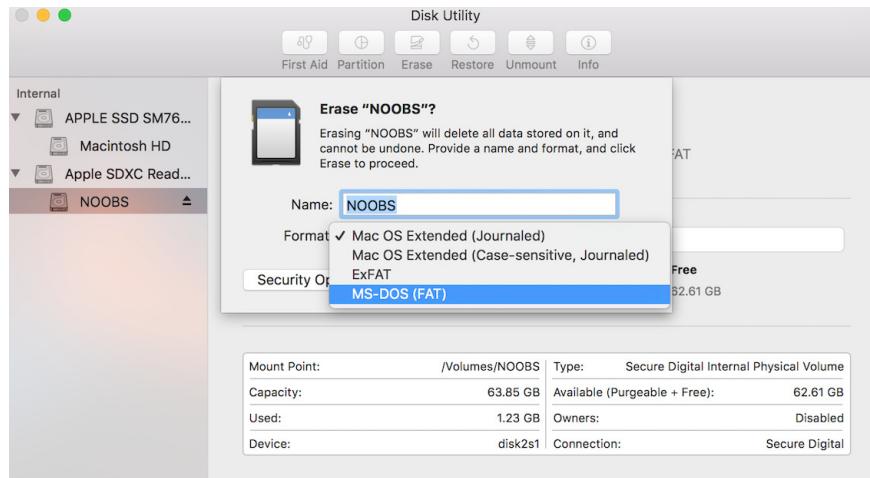
SDFormatter is a tool available from SD association. You can use it to format your micro SD card to FAT format if it's 32 GB or less.

*Otherwise, it will use exFAT format which **does not work** with Raspberry Pi (i.e., it will not boot up).*

More details are available here from Raspberry Pi website.

- **Other formatting tool (if your micro SD card is more than 32GB)**

As my micro SD card is 64GB, I used Disk Utility, one of the standard tools available on macOS to format it with FAT format.



I named my micro SD card as NOOBS. Yours may have a different name.

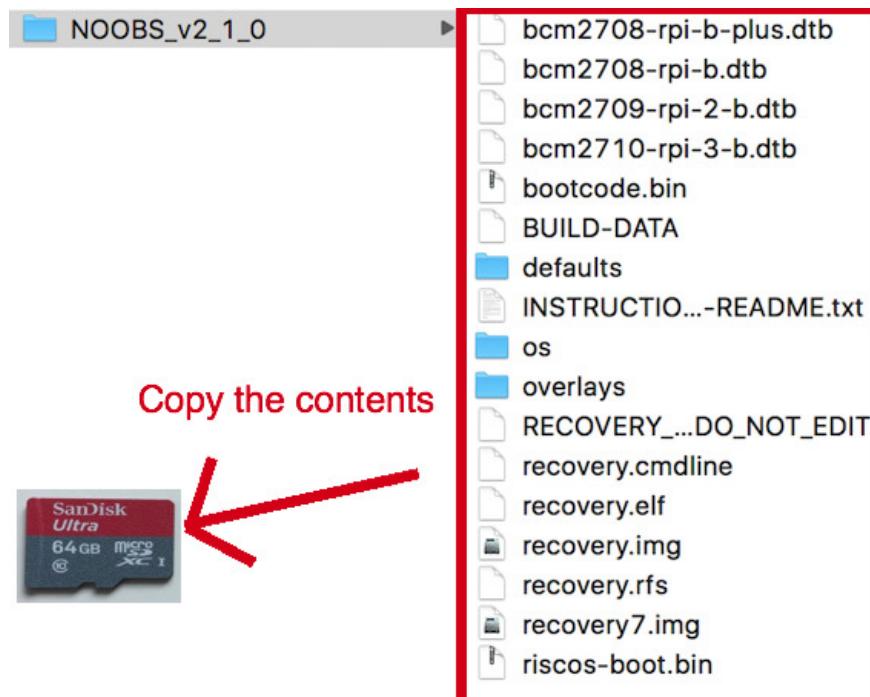
## Download and copy the NOOBS files to your micro SD card

- **Download NOOBS (New Out Of Box Software)**

NOOBS is available for download from here on the Raspberry Pi website. Download it and then extract it.

- **Copy the NOOBS files to your micro SD card**

All you need is to copy the contents of the extracted folder (not the folder itself) to your micro SD card.



Once again, you need to copy the contents of the folder (but not the folder itself) to your FAT formatted micro SD card.

Once the copy is done, safely remove the SD card from your computer (or from your SD card reader). Now, we are ready to boot Raspberry Pi 3.

## Boot and install Raspbian

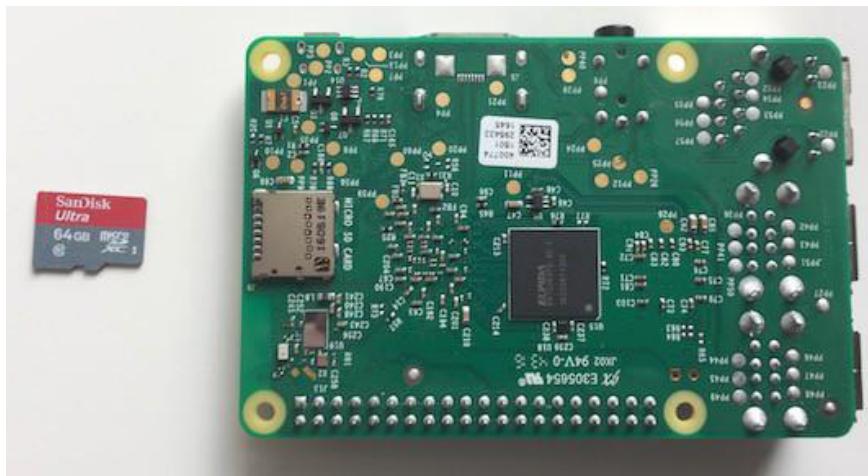
Raspbian = Raspberry Pi + Debian Linux. Basically, it's a customized linux for Raspberry Pi based on Debian Linux distribution.

### Boot Raspbian

Using the micro SD card, we are going to boot up your Raspberry Pi 3.

First of all, be careful not to touch any parts on Raspberry Pi 3. As mentioned earlier, you might want to put a plastic protector before you begin this phase.

Ready? Place your micro SD card (which has been formatted and has the NOOBS files copied on it) into Raspberry Pi 3's micro SD card slot.





There won't be any clicking sound or anything while attaching the micro SD card to Raspberry Pi 3. If it looks like the above image, it should be ok.

Now, connect all your cables:

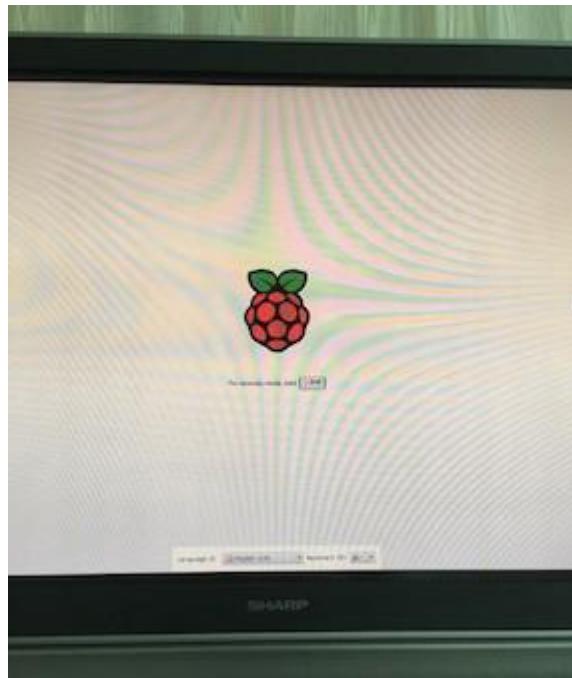
- HDMI cable
- USD Keyboard and mouse
- Micro USB Power Supply Slot (but read the below before you do).

You might have noticed that Raspberry Pi has no power-on button. It will start up booting as soon you connect it to a power supply via your micro USB power supply cable.

In my place, the power source on the wall has a power-on button. So, I leave it turned off before connecting the power cable to Raspberry Pi 3. Once connected, I made sure that Raspberry Pi is not touching any other metals or things that can carry electricity. After that, I turned the power on (on the wall, that is).

Note: you can also use a mobile power bank to supply electricity to Raspberry Pi or connect it to your computer's USB port.

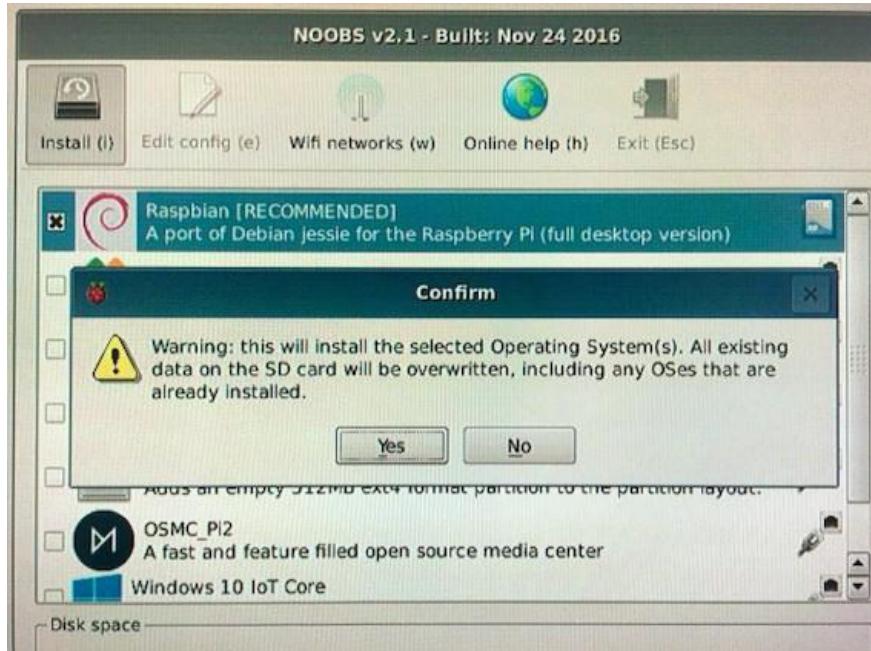
If all is good, you should start seeing the Raspberry Pi start up screen on your monitor (or TV).



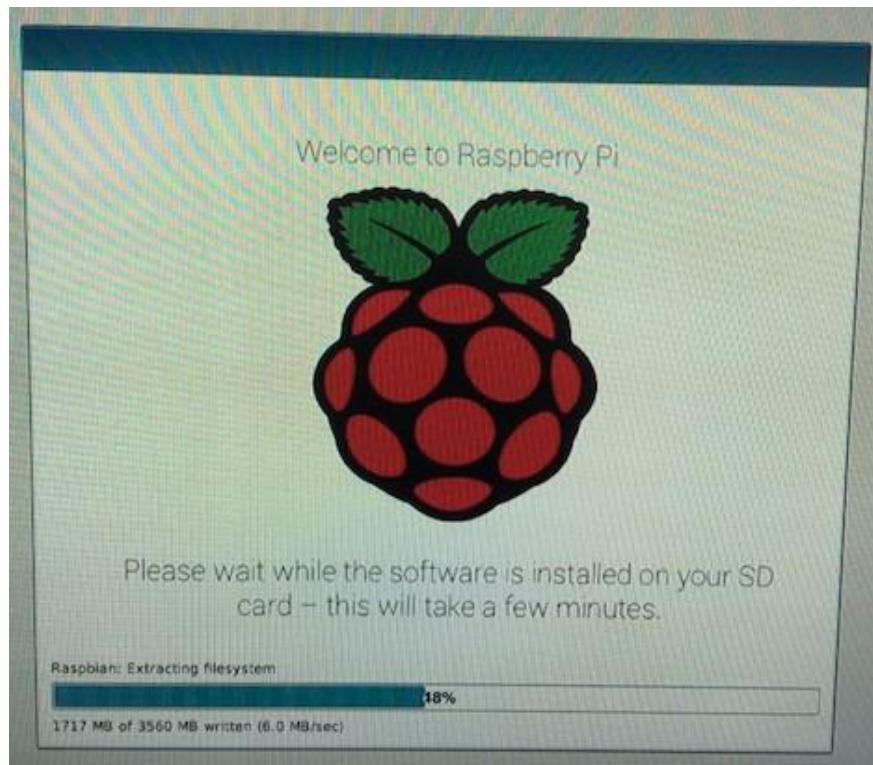
## Installing Raspbian

It asks you which software you want to install. You see only Raspbian by default which is fine for our purpose.

If you specify your wifi details in the Wifi networks section, you'll get more choices as shown below:



But we only need Raspbian for now. So, we continue with the default choice. The installation process will take a while.



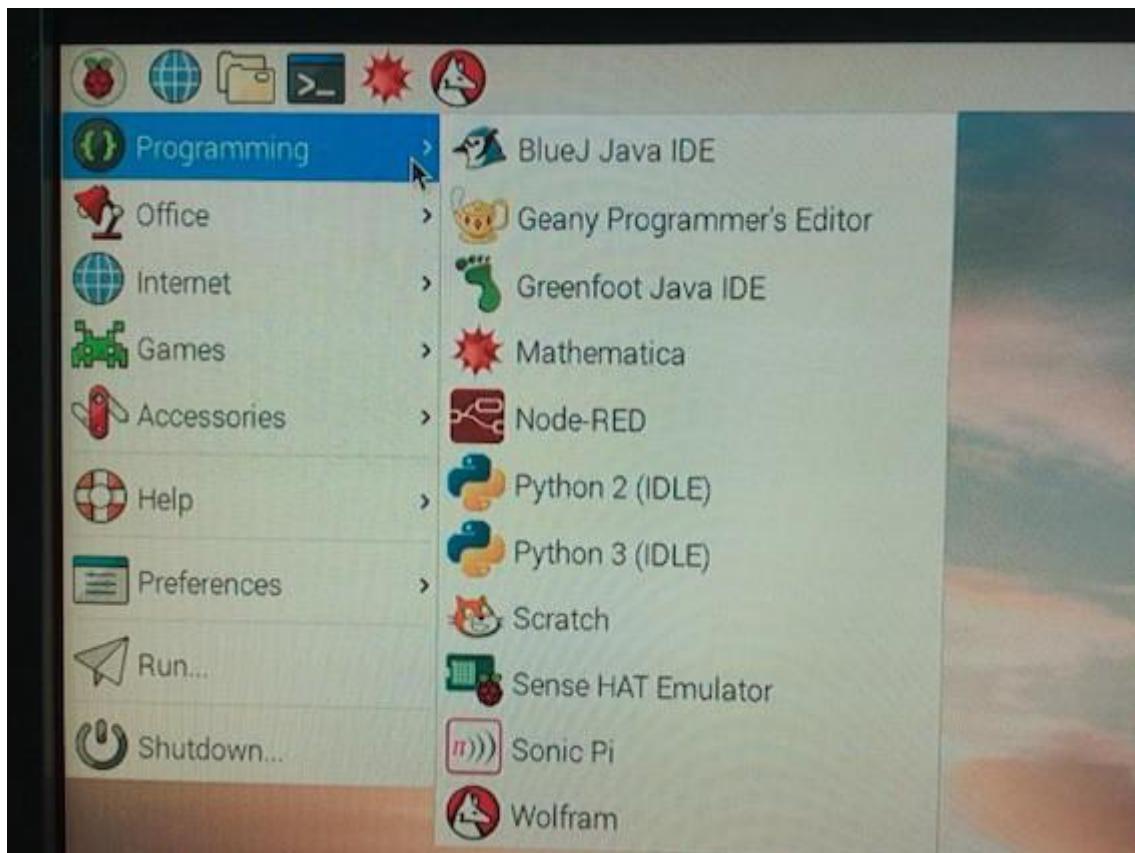
It shows you some of the feature highlights on Raspbian so you want to watch it at least once. Once it's done, you have Raspbian on your Raspberry Pi 3!



It's a fully functional linux with the nice desktop screen.

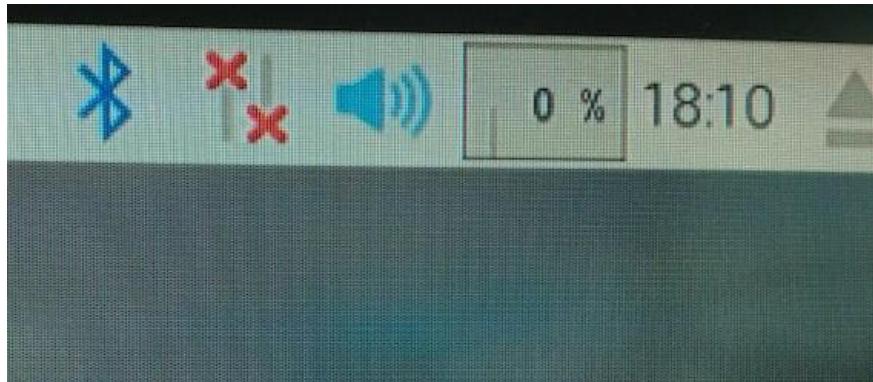


You should enjoy this moment of triumph and explore the menu items and tools. There are default python packages as well.



Wifi

You should set up Wifi connection by clicking the icon on the top right corner with two red X on the left side of the speaker volume icon.



Then, you can use the Chromium to browse the internet.

## **VNC for accessing Raspbian from your computer**

This is an optional set up. I find it useful to access Raspberry Pi from my main computer (Mac Book Pro).

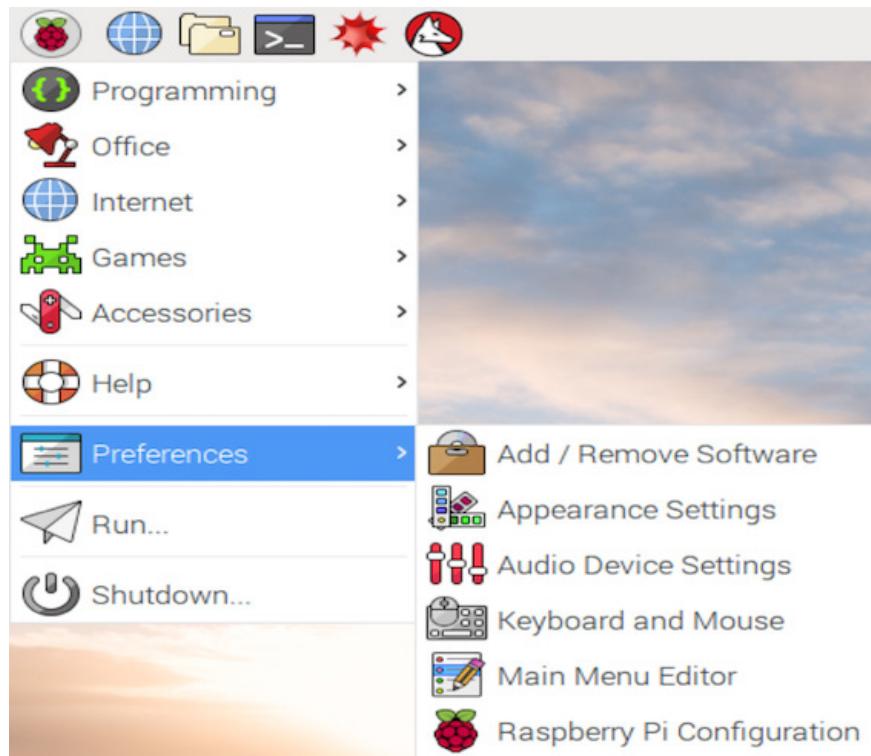
To set this up, you run a VNC server on Raspbian and a VNC client on your computer.

### **Run a VNC server on Raspbian**

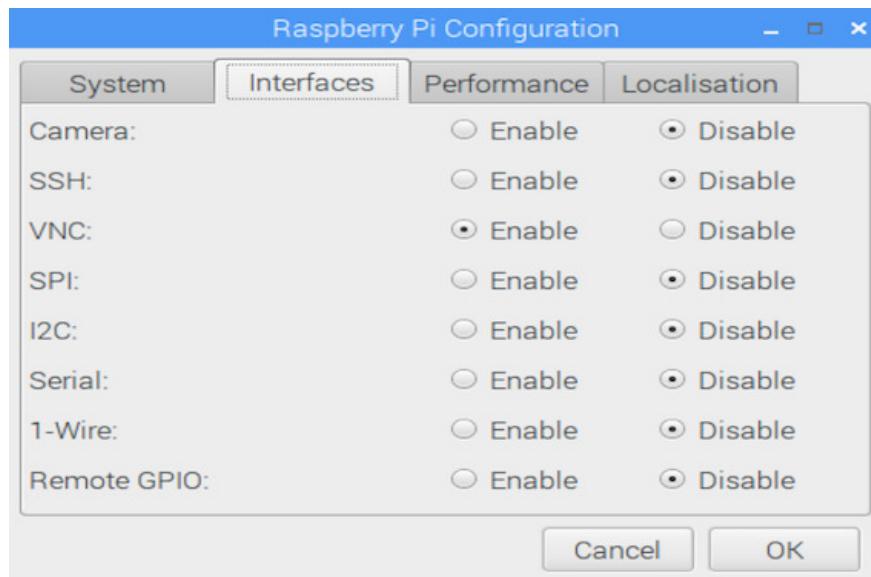
First of all, make sure Raspbian is connected to a Wifi network which is also used by your computer. Then, follow the below steps.

Raspbian has a VNC server built-in. All you need to do is:

- Go to Preferences > Raspberry Pi Configuration



Enable VNC and press OK.

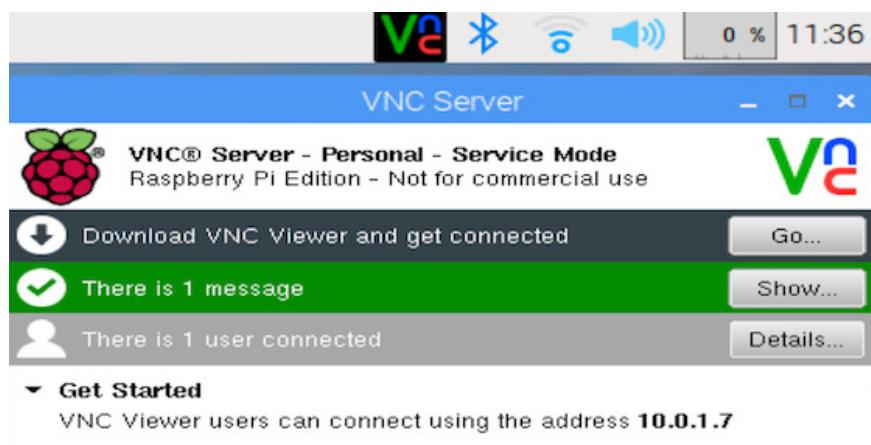


If you prefer using the terminal, you can issue the following command:

```
> sudo raspi-config
```

Then, choose 7 Advanced Options, then enable P3 VNC.

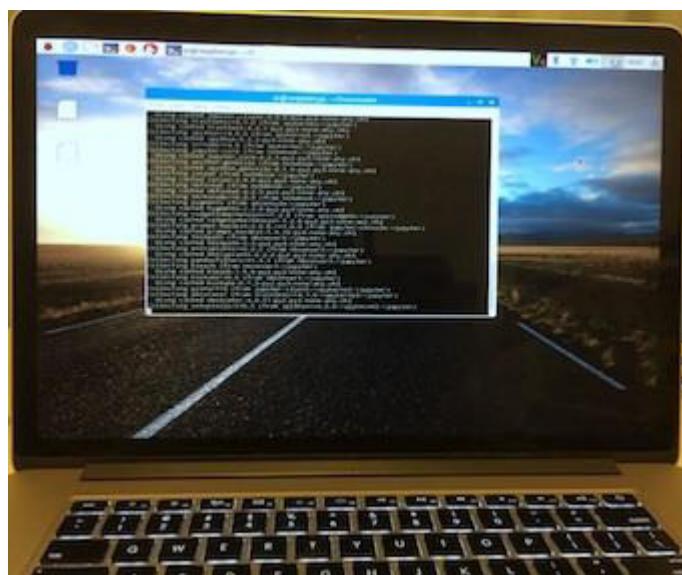
Once VNC is enabled, click the VNC icon and find out the address of the VNC server. In my case, it's 10.0.1.7 which I need for my VNC client to connect to the server.



## Run a VNC client on your computer

I'm using the Real VNC client. You can download it from here. Follow the instruction to install it on your computer (in my case Mac Book Pro).

Start up your Real VNC client and enter the server IP address (in my case, it's 10.0.1.7) and press enter. You will be asked to confirm the identity of VNC server. Once you acknowledge that, your computer should connect to the remote Raspberry Pi.



Look carefully. It's not macOS but Raspbian is showing on my Mac Book Pro screen in full screen mode. You may want to change the resolution used by Raspbian (on the server side).

Run the following command to enter the config screen.

```
> raspi-config
```

Choose **7 Advance Options > 5 Resolution** to choose the resolution you like. This requires a reboot.

You can also adjust screen size of the VNC client's in the setting panel which appears when you hover your mouse pointer over the top middle part of the VNC client screen.

On a separate note, I'm taking the power supply from my Mac Book Pro. So, with VNC set up, I need neither a separate monitor, a HDMI cable, a keyboard nor a mouse to use Raspbian.



## Conclusion

If you have followed the steps until here, you should have a fully working linux running on your Raspberry Pi.

Now, you stand in front of infinite possibilities. I'll leave you here until we come across again.

## References

- **Raspberry Pi 3 B:**  
<https://www.raspberrypi.org/products/raspberry-pi-3-model-b/>
- **SD Card Formatter:** <https://www.sdcard.org/downloads/>
- **Formatting an SDXC card:**  
[https://www.raspberrypi.org/documentation/installation/sdxc\\_formatting.md](https://www.raspberrypi.org/documentation/installation/sdxc_formatting.md)
- **Introduction to NOOBS:**  
<https://www.raspberrypi.org/blog/introducing-noobs/>
- **Raspbian Quick Start Guide:**  
<https://www.raspberrypi.org/learning/software-guide/quickstart/>
- **Real VNC client:** <https://www.realvnc.com/download/vnc/>

