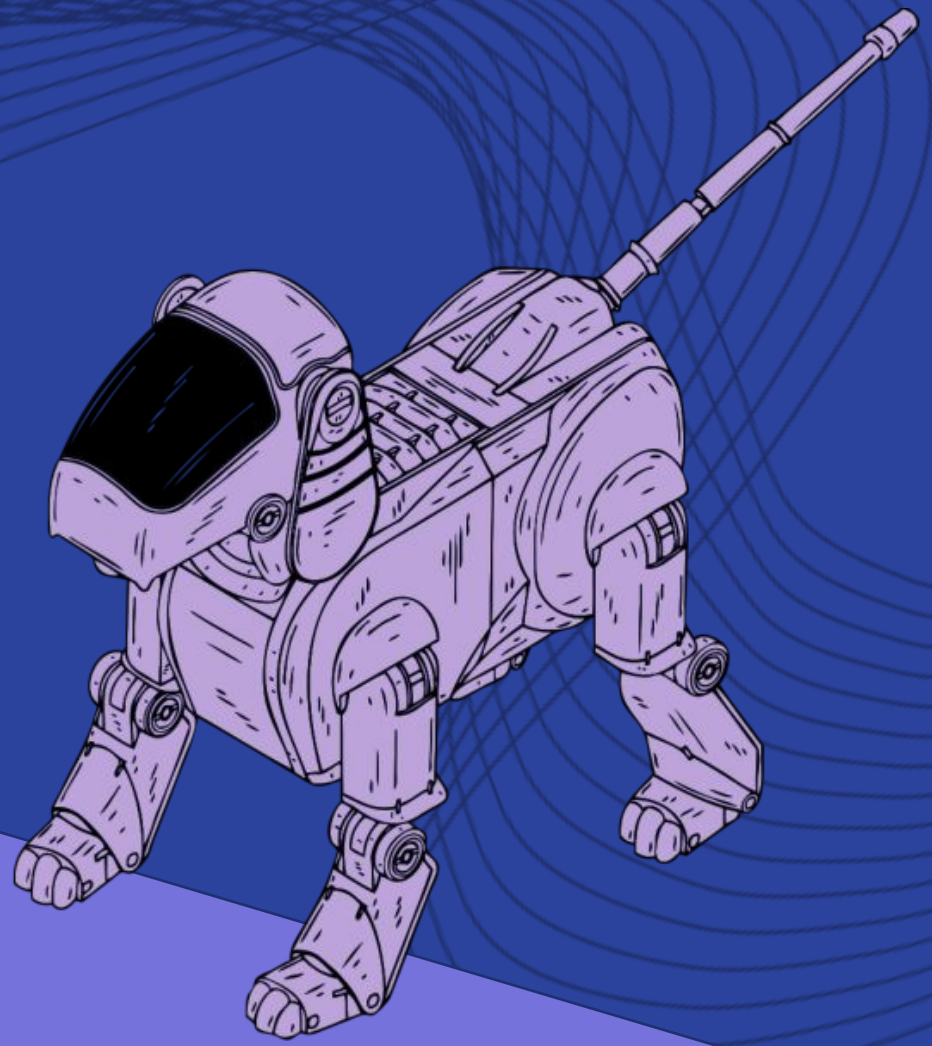
SCHOOL OF CODING

# Introduction to Raspberry Pi



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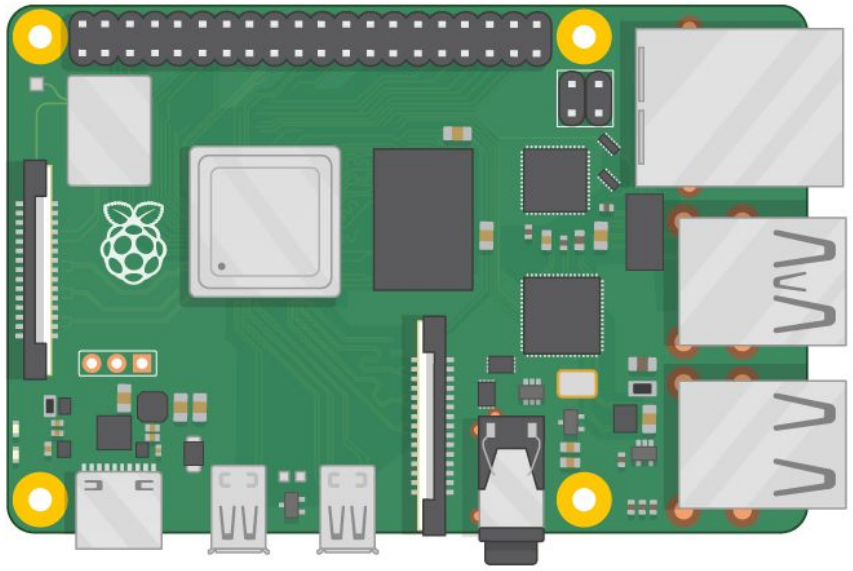
*Content created by Grace Bennett, Teri Dawkins and Natasha Parbhakar*

# Introduction

## The Raspberry Pi

- The Raspberry Pi is a low cost, **credit-card sized computer** that plugs into a computer monitor or TV, and uses a standard keyboard and mouse.

- It’s capable of doing everything you’d expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.



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# Task

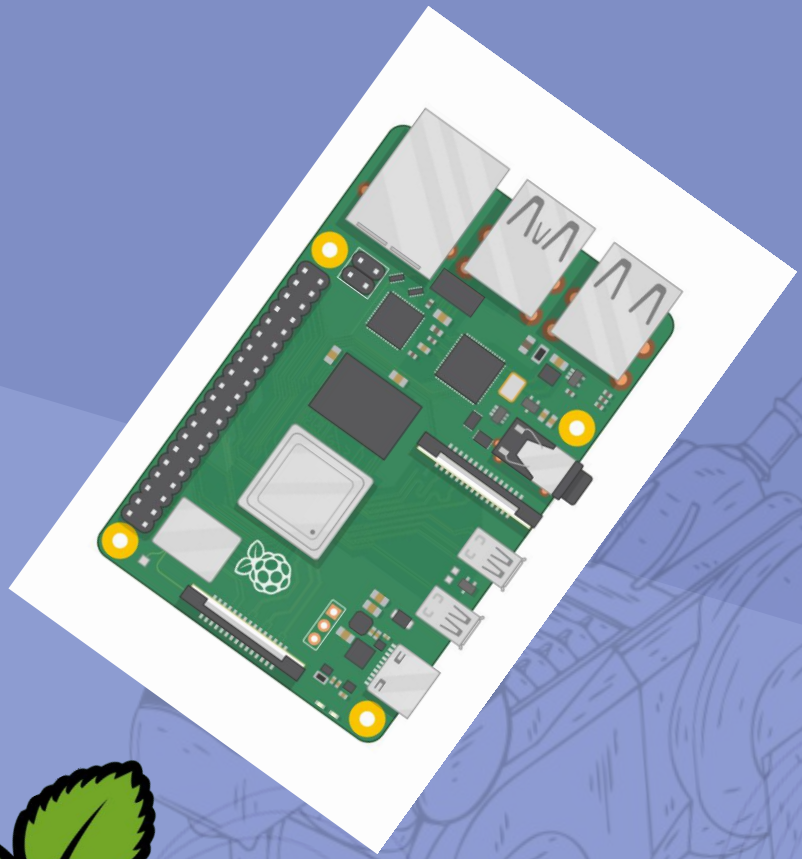
Introduction to Raspberry Pi

- Before we can make a start with any projects, you need to learn about the Raspberry Pi, how it works and how to get it working!

- *The task for today is to get your Raspberry Pi switched on and working!*

# Process

## Introduction to the Raspberry Pi



### Setting Up Your Raspberry Pi

- What you will need
- Understanding the Raspberry Pi
- Connecting the Raspberry Pi
- Setting up the Raspberry Pi

### Using Your Raspberry Pi

- A tour of the Raspberry Pi
- Exploring the settings

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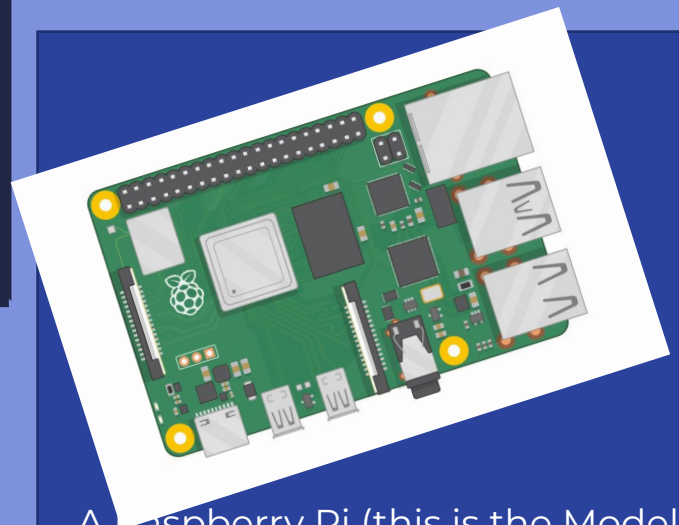
# Step 1

## What you will need!

A USB keyboard and mouse.



A Raspberry Pi (this is the Model 4 B).

A monitor and HDMI cable (check which HDMI you need for your model of Raspberry Pi).


An ethernet cable or WIFI (optional).


A micro SD card, preloaded with NOOBS or installed with the most recent version of Raspbian.

Find out more information about installing Raspbian here.

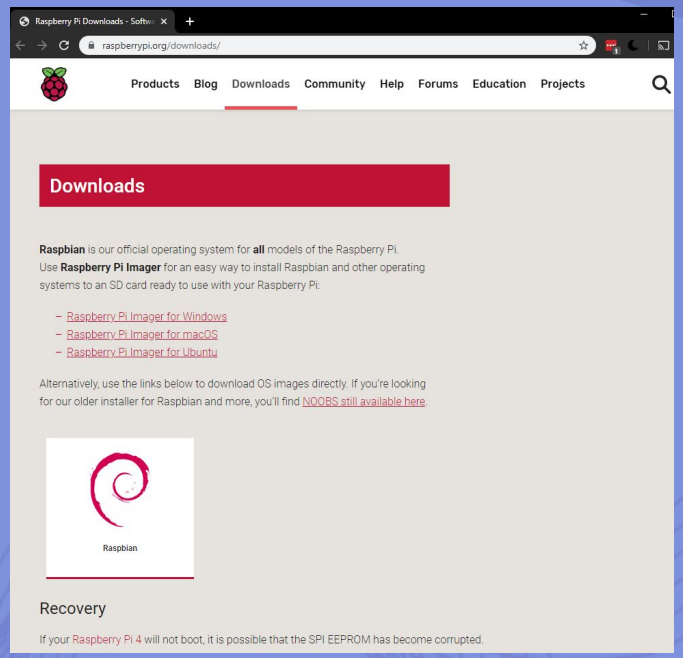
A micro USB power supply.

# Setting up your SD card

If you have an SD card that doesn't have the Raspbian operating system on it yet, or if you want to reset your Raspberry Pi, you can easily install Raspbian yourself. To do so, you need a computer that has an SD card port — most laptop and desktop computers have one.

## Download and launch the Raspberry Pi Imager

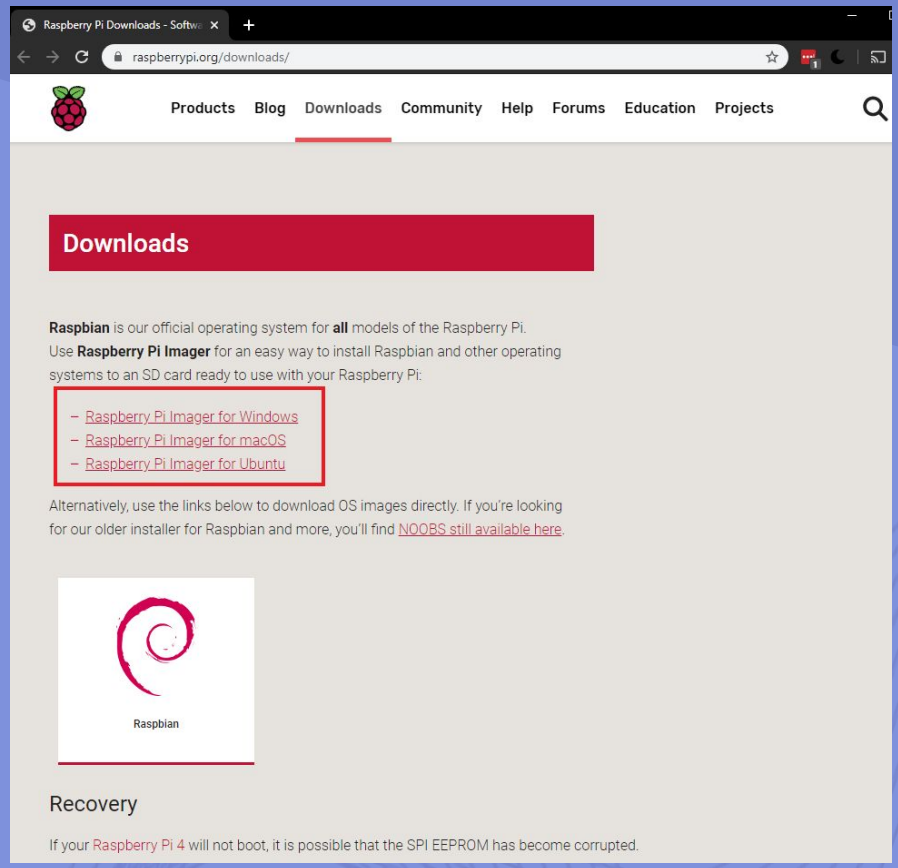
Visit the Raspberry Pi downloads page.



# Setting up your SD card

Download and launch the Raspberry Pi Imager

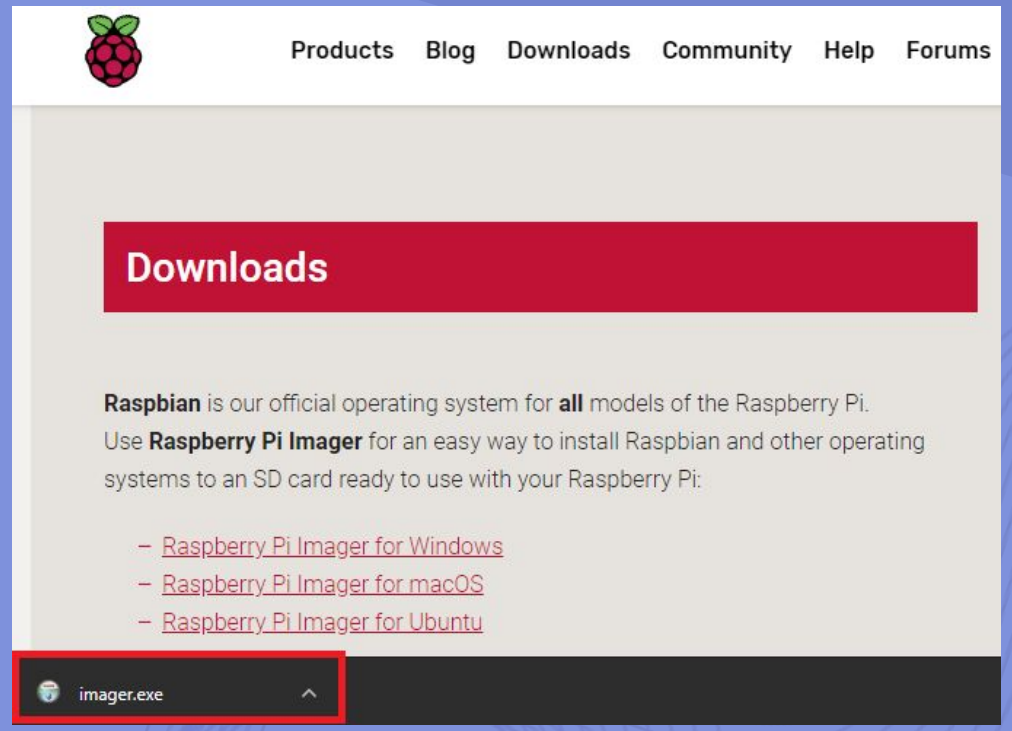
Click on the link for the Raspberry Pi Imager that matches your operating system.



# Setting up your SD card

Download and launch the Raspberry Pi Imager

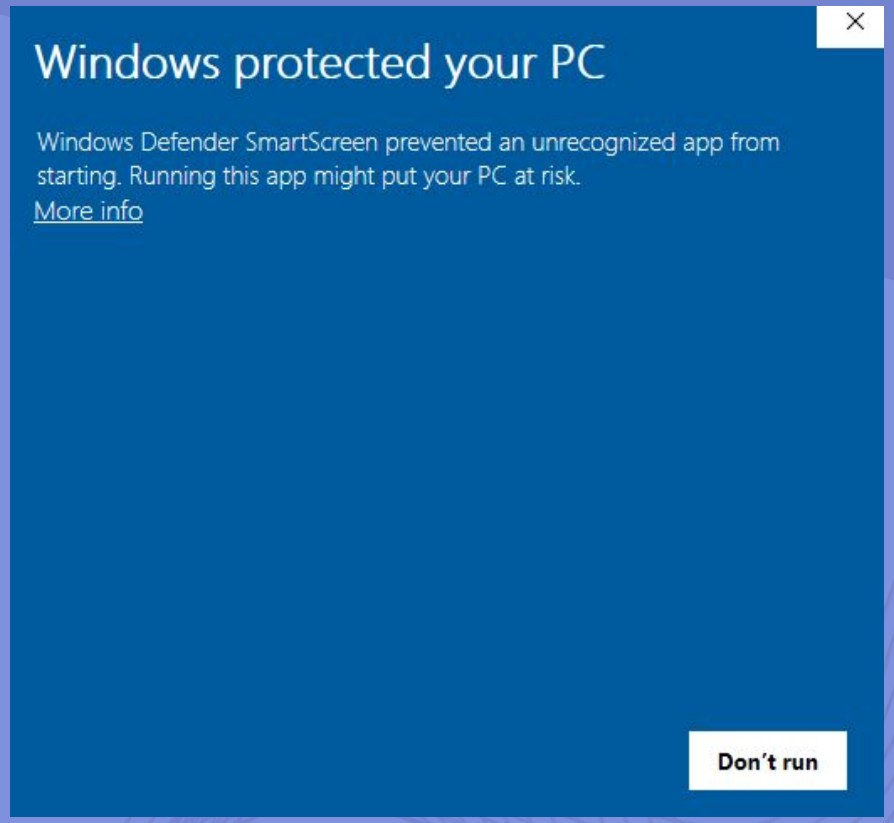
When the download finishes, click it to launch the installer.



# Using the Raspberry Pi Imager

Anything that's stored on the SD card will be overwritten during formatting. So if the SD card on which you want to install Raspbian currently has any files on it, e.g. from an older version of Raspbian, you may wish to back these files up first to not lose them permanently.

When you launch the installer, your operating system may try to block you from running it. For example, on Windows I get the following:



# Using the Raspberry Pi Imager

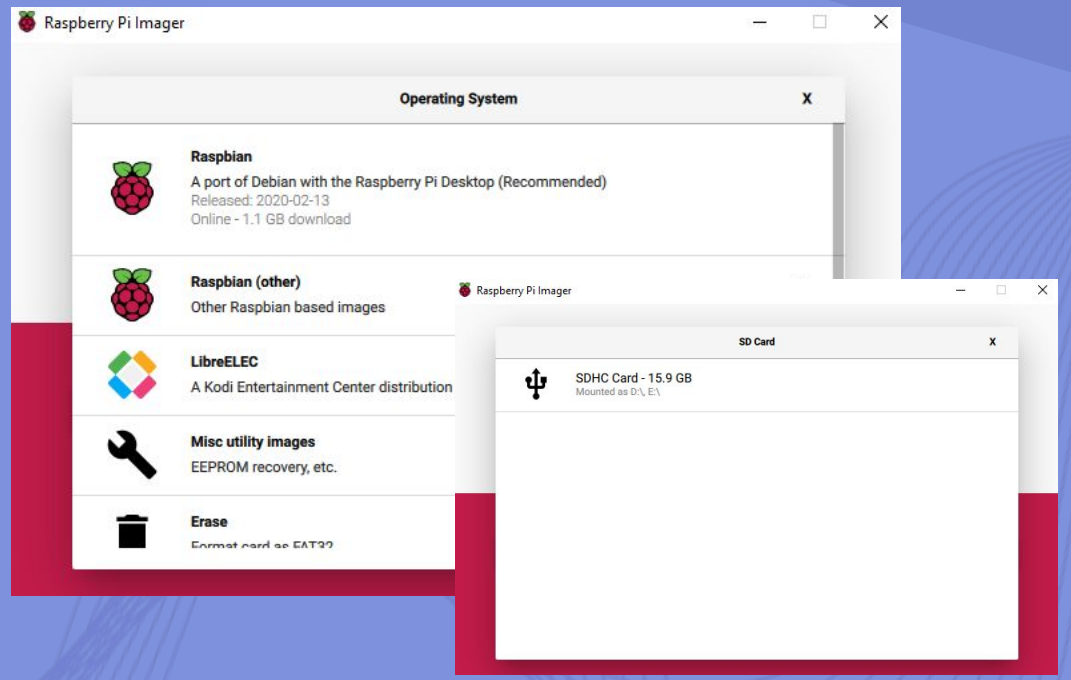
If you get this, click on More info and then Run anyway.

Follow the instructions to install and run the Raspberry Pi Imager.

Insert your SD card into the computer or laptop's SD card slot.

*(The OS we want to install is RASPBIAN)*

In the Raspberry Pi Imager, select the OS that you want to install and the SD card you would like to install it on.

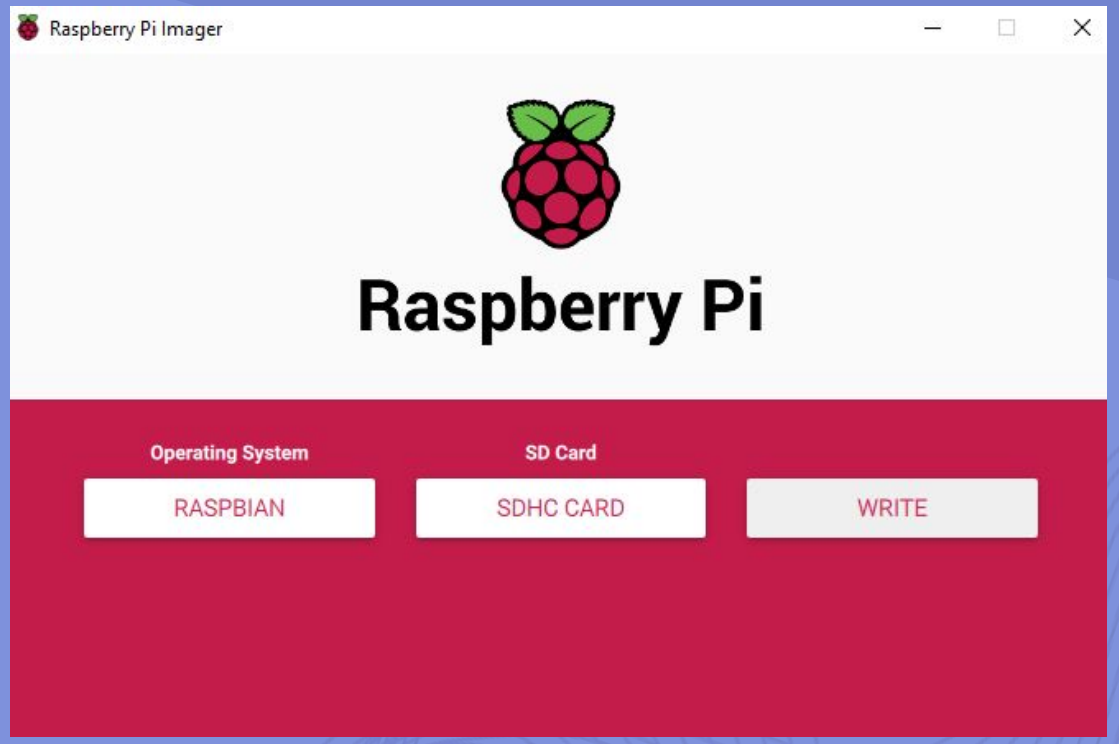


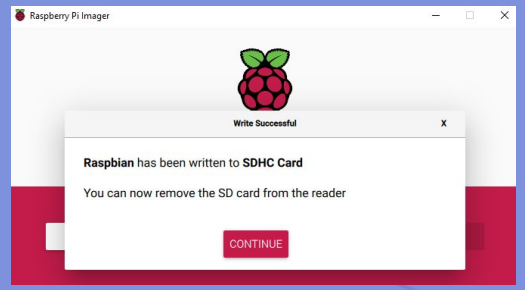
# Using the Raspberry Pi Imager

Then simply click the WRITE button.

Wait for the Raspberry Pi Imager to finish writing.

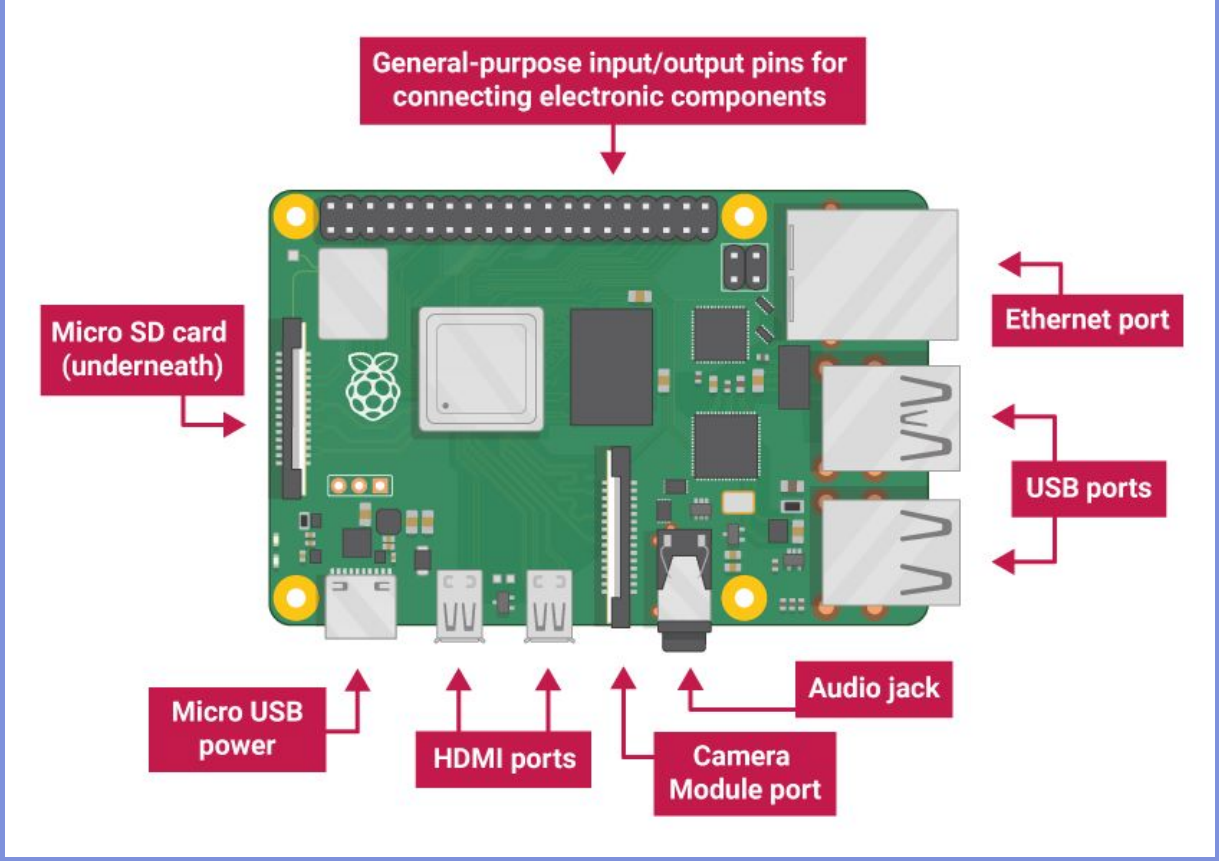
Once you get the following message, you can eject your SD card.



# Step 2

## Understanding the Raspberry Pi




- USB ports — these are used to connect a mouse and keyboard. You can also connect other components, such as a USB drive.
- SD card slot — you can slot the SD card in here. This is where the operating system software and your files are stored.
- Ethernet port — this is used to connect Raspberry Pi to a network with a cable. Raspberry Pi can also connect to a network via wireless LAN.
- Audio jack — you can connect headphones or speakers here.
- HDMI port — this is where you connect the monitor (or projector) that you are using to display the output from the Raspberry Pi. If your monitor has speakers, you can also use them to hear sound.
- Micro USB power connector — this is where you connect a power supply. You should always do this last after you have connected all your other components.
- GPIO ports — these allow you to connect electronic components such as LEDs and buttons to Raspberry Pi.

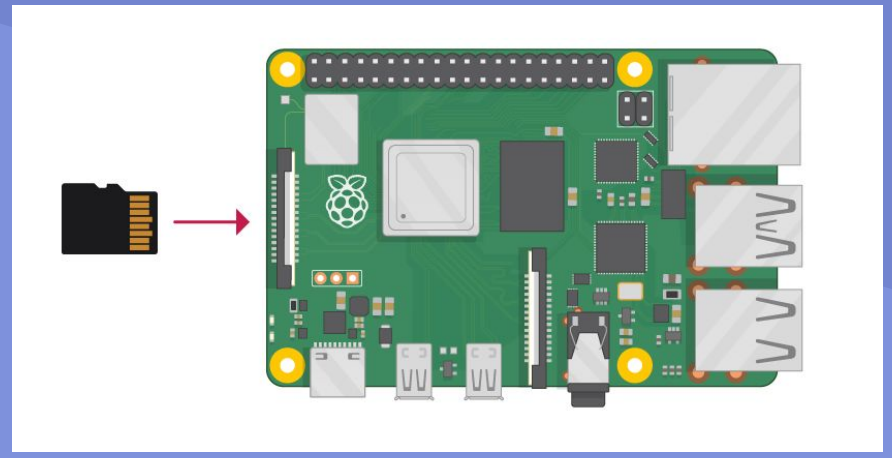
# Step 3

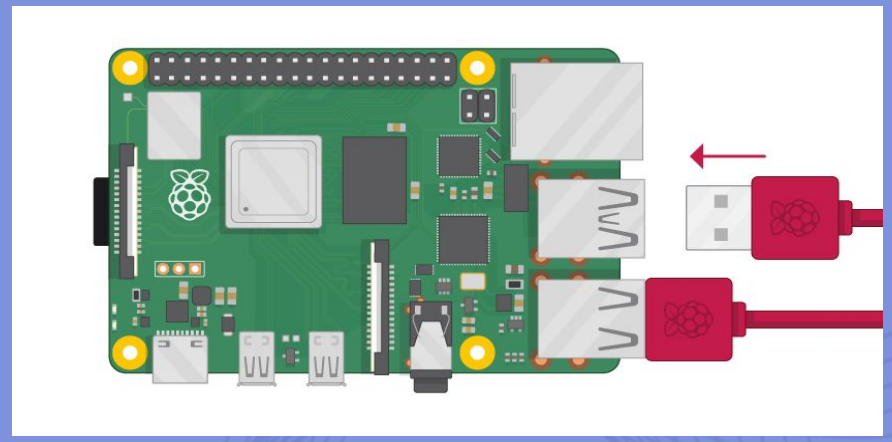
## Connecting the Raspberry Pi

Now get everything connected to your Raspberry Pi. It's important to do this in the right order, so that all your components are safe.

Insert the SD card you've set up with Raspbian into the microSD card slot on the underside of your Raspberry Pi.

Find the USB connector end of your mouse's cable, and connect the mouse to a USB port on Raspberry Pi (it doesn't matter which port you use). Do this for your keyboard as well.



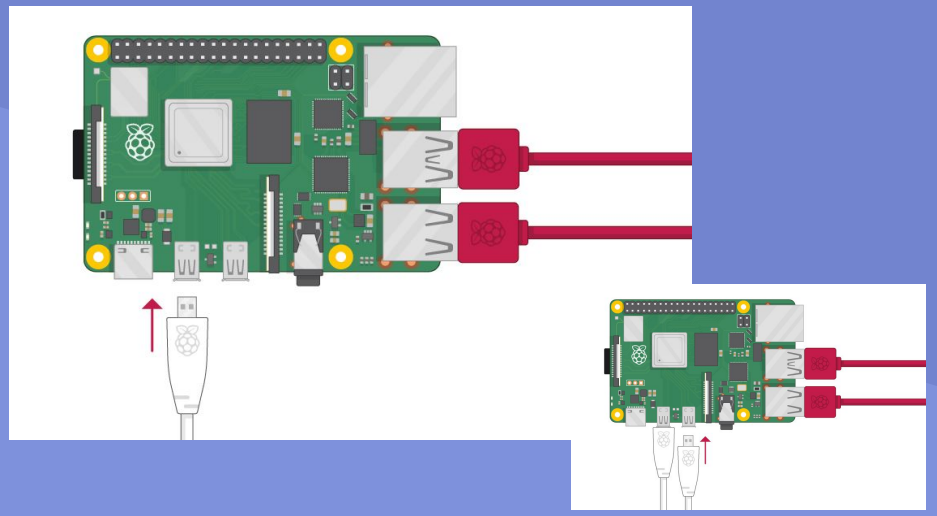


# Step 3

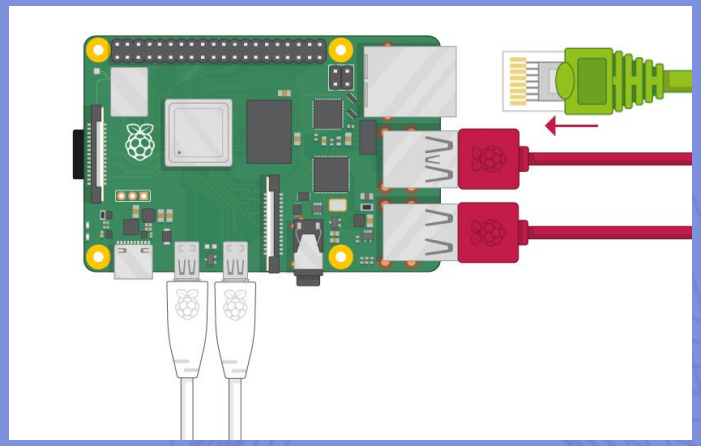
## Connecting the Raspberry Pi

Make sure your screen is plugged into a wall socket and switched on.
Use a cable to connect the screen to Raspberry Pi's HDMI port — use an adapter if necessary.

You can connect an optional second screen in the same way.



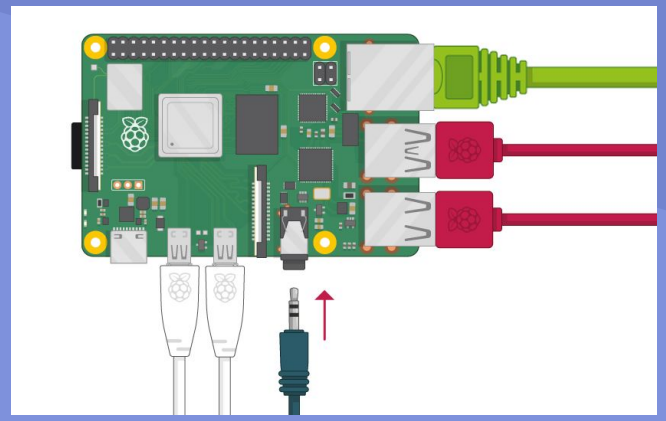
If you want to connect your Raspberry Pi to the internet via Ethernet, use an Ethernet cable to connect the Ethernet port on Raspberry Pi to an Ethernet socket on the wall or your internet router. You don't need to do this if you want to use wireless connectivity, or if you don't want to connect to the internet.



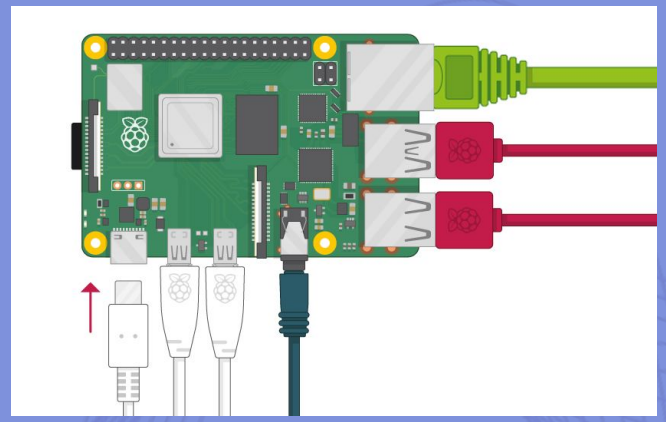
# Step 3

## Connecting the Raspberry Pi

If the screen you are using has speakers, the sound will play through those. Alternatively, connect headphones or speakers to the audio port if you prefer.



Your Raspberry Pi doesn't have a power switch: as soon as you connect it to a power outlet, it will turn on.
Plug the USB power supply into a socket and connect it to your Raspberry Pi's power port.



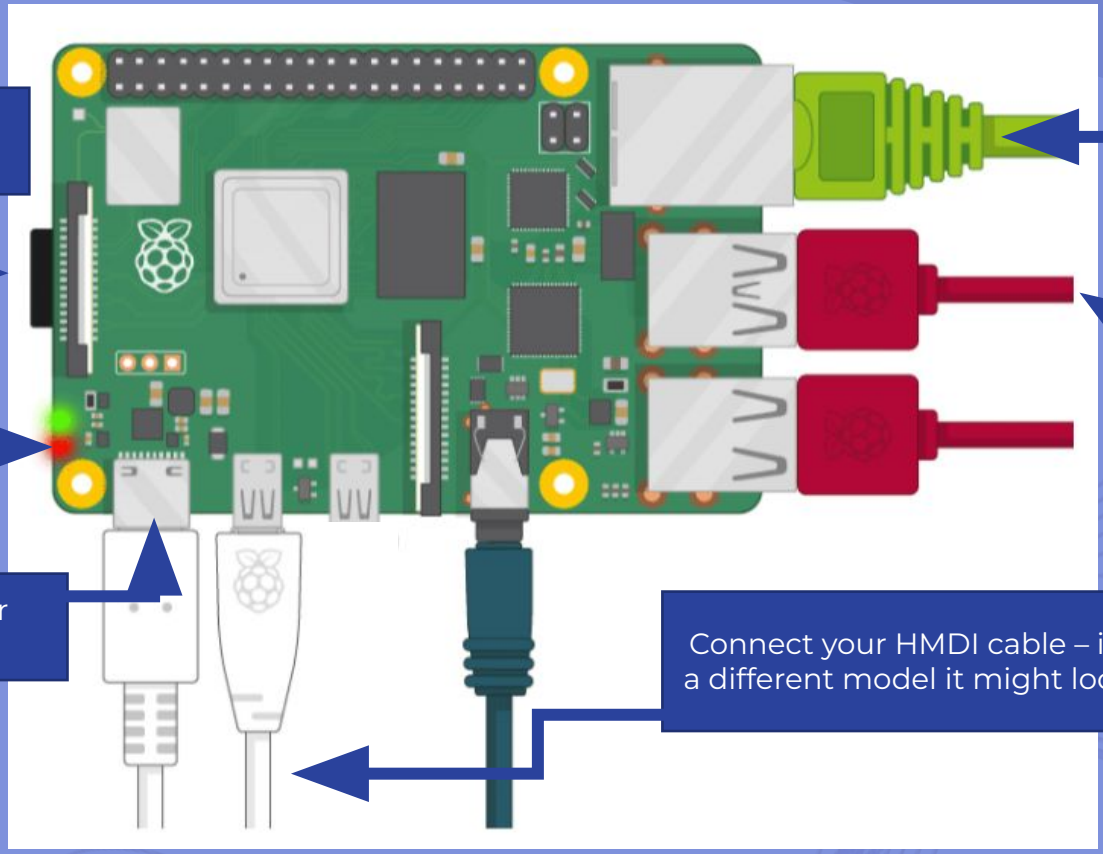
# Step 3

## Connecting the Raspberry Pi

Insert your SD card.

Red LED shows there's enough power, Green shows that the boot program on the SD card is working.

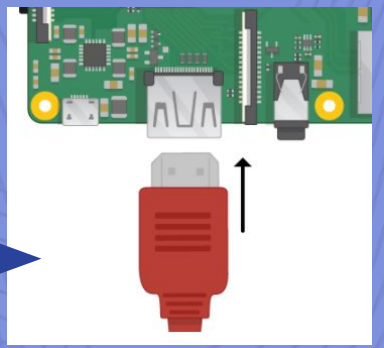
Connect the power supply.



The ethernet port is where you might connect your ethernet cable (used for wifi) – if you have a wifi dongle however, it will fit in one of the USB ports.

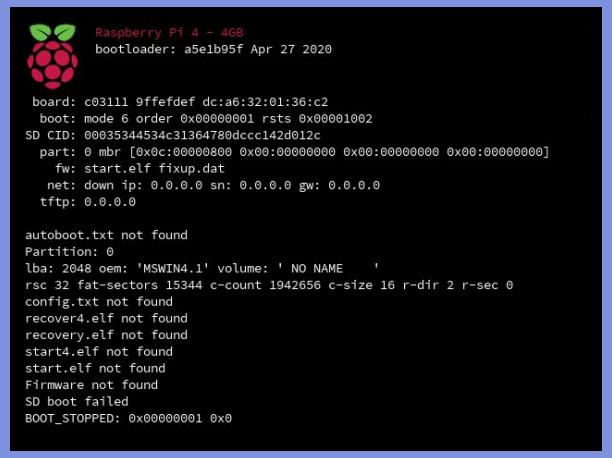
Connect the USB mouse and keyboard using the USB ports.

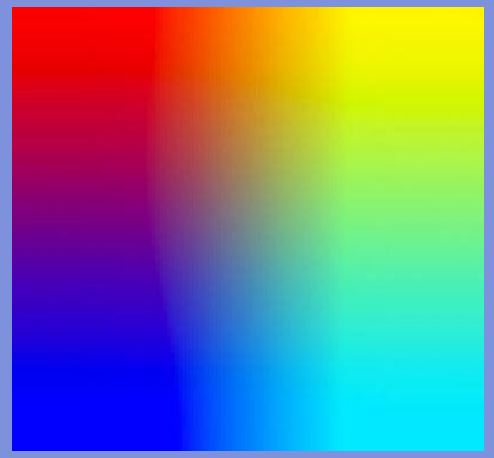
Connect your HMDI cable – if you have a different model it might look like this.



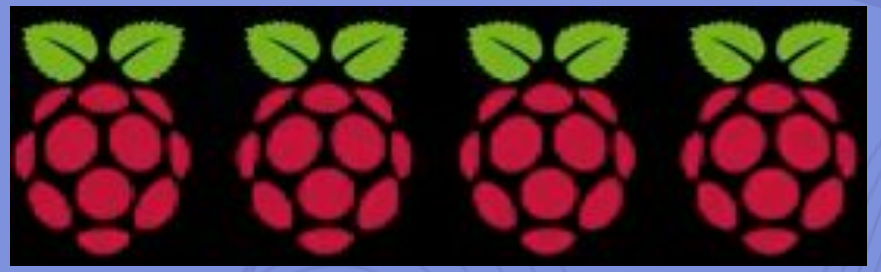
# Step 4

## Starting up the Raspberry Pi



You should see a red LED light up on the Raspberry Pi, which indicates that Raspberry Pi is connected to power. As it starts up (this is also called booting), you will see raspberries appear in the top left-hand corner of your screen.



If your Raspberry Pi boots to the command line, type in the command ‘startx’ to load up the graphical user interface.

# Step 4

## Setting up the Raspberry Pi


After a few seconds the Raspbian Desktop will appear.

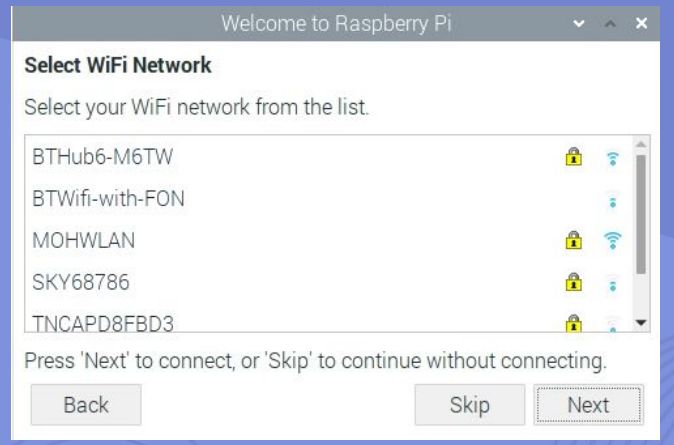
When you start your Raspberry Pi for the first time, the Welcome to Raspberry Pi application will pop up and guide you through the initial setup.

# Step 5

## Setting up the Raspberry Pi


Setup the country, language and timezone.


Change the password – make sure it's something secure!




If you have an ethernet cable or other method of Wi-Fi, connect it here.

# Where to find help

If you’re having problems with your Raspberry Pi, there are lots of places you can get help and advice:

- Check out the help section and the troubleshooting guide on the Raspberry Pi website.

- The Raspberry Pi forum, including the Beginners section, is a great place to ask questions and get support from the Raspberry Pi community.

# Step 6

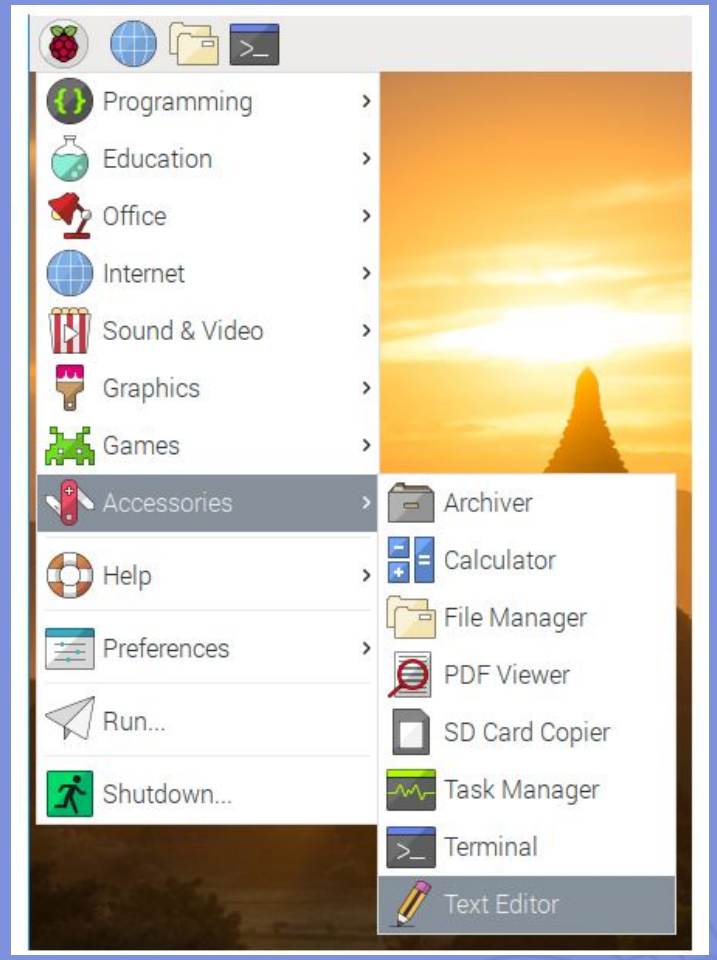
## Setting up the Raspberry Pi


Here you'll learn how to use the Raspberry Pi operating system Raspbian and some of its software, and how to adjust some key settings to your needs.

Your Raspberry Pi runs Raspbian, a version of an operating system called Linux.
After Raspbian starts up, you will see the Desktop appear.

# Step 6

## A tour of Raspberry Pi




From the Raspberry symbol in the top left corner, you can access the menu. Here are loads of applications that you can use on the Raspberry Pi.

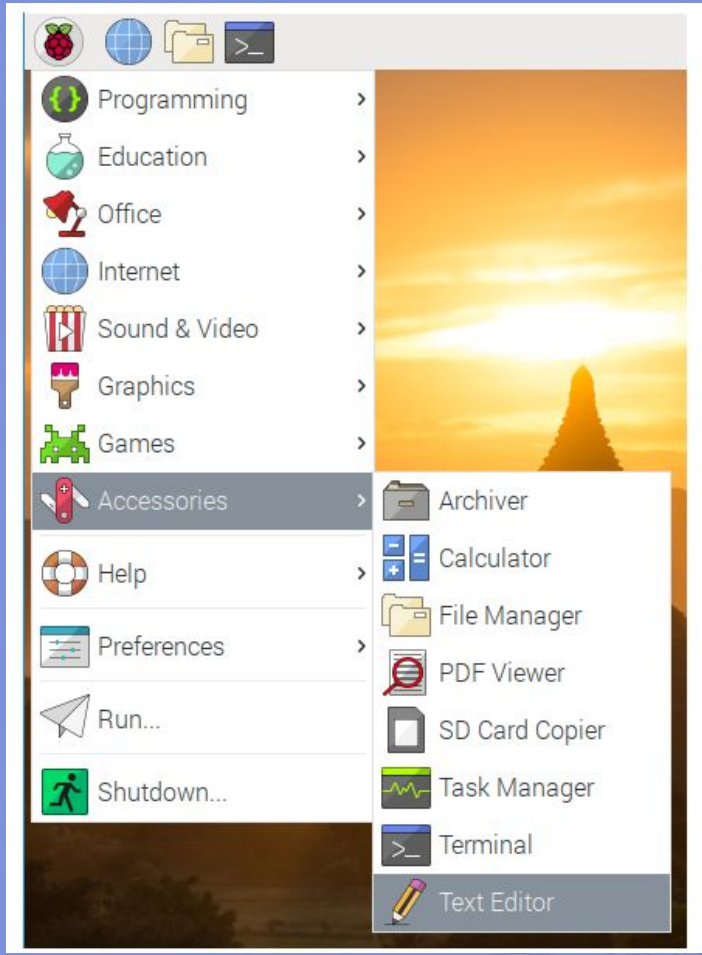
Explore the Raspberry Pi – can you find:

- Scratch?
- IDLE (or an equivalent Python IDE)?
- Minecraft?
- Python Games?

Keep experimenting and exploring the Raspberry Pi! It's important to feel confident in using a Raspberry Pi before you start making projects!

# Step 6

## A tour of Raspberry Pi

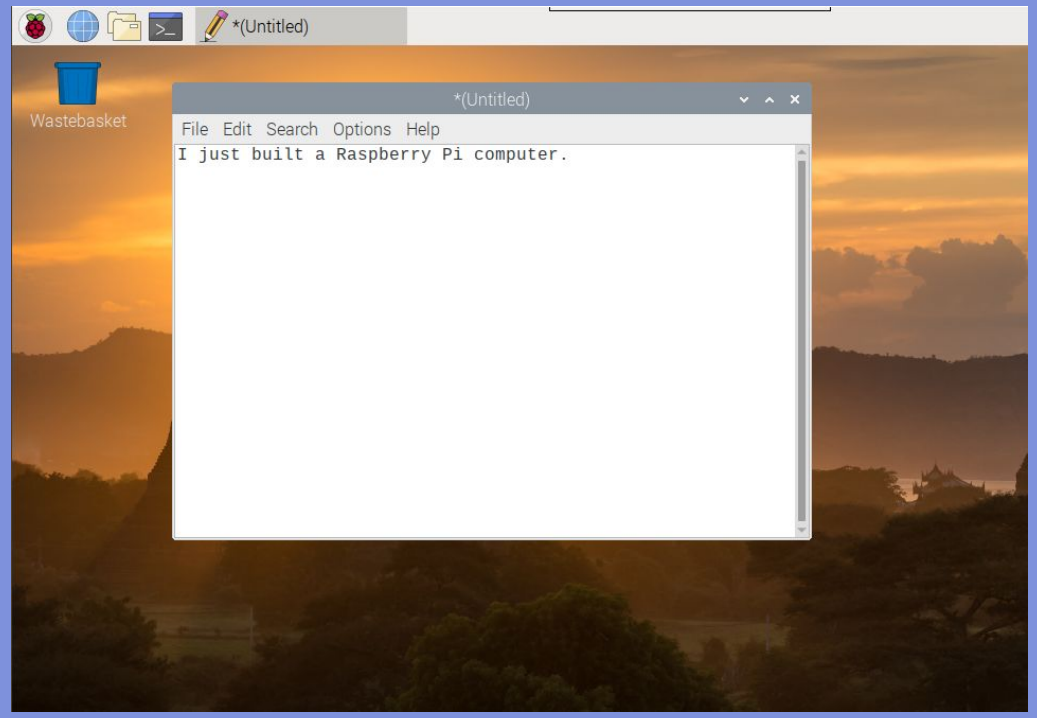



The Raspberry Pi icon in the top left-hand corner is where you access the menu.

- Click on it to find lots of applications, including Programming and Office applications.
- To open a text editor, click on Accessories and choose Text Editor.

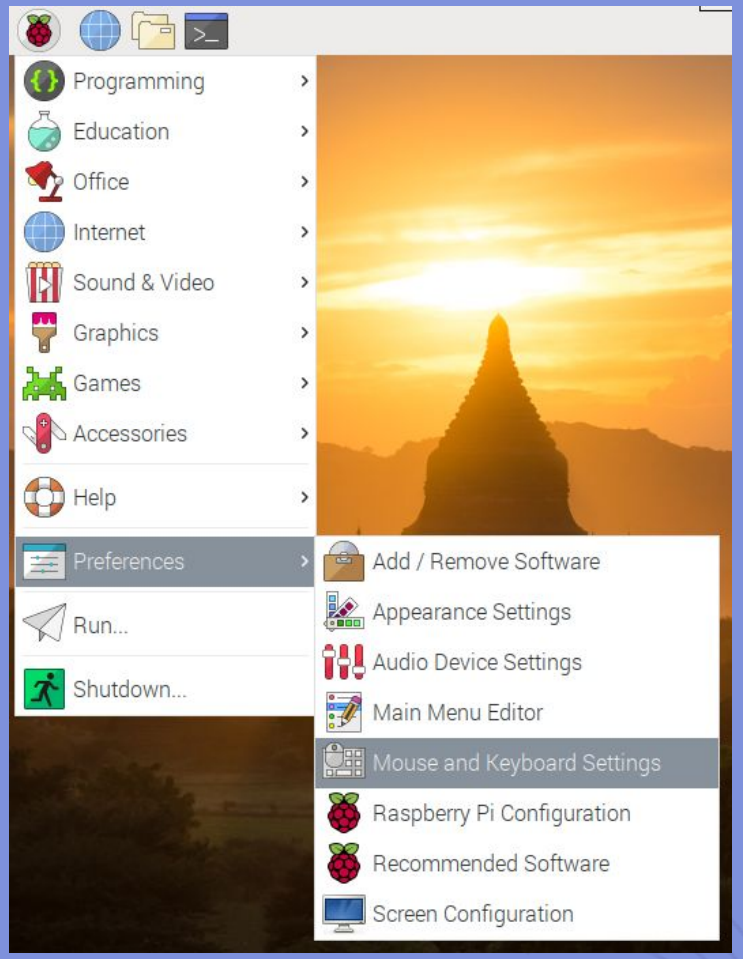
# Step 6

## A tour of Raspberry Pi

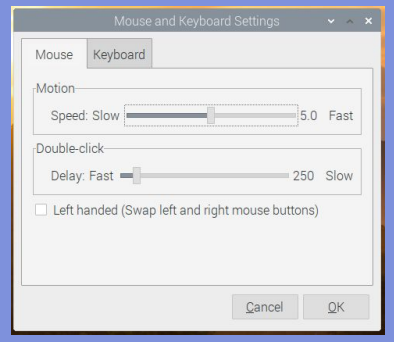



- Close the text editor by clicking the x in the top right-hand corner of the window.
- Explore some of the other applications in the menu, such as Python Games.

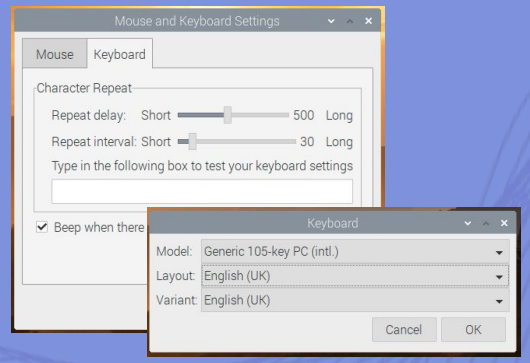
# Keyboard and Mouse Settings




- To set up your mouse and keyboard, select Preferences and then Mouse and Keyboard Settings from the menu.




- You can change the mouse speed and double-click time here, and swap the buttons if you are left-handed.




- You can adjust the key repeat delay and interval values here.
- To change the keyboard layout, click on Keyboard Layout and select your layout from the list of countries.

# Connecting to the Internet


- Before we can set up wifi, make sure that your ethernet cable is plugged into your router, or that you have a wifi dongle plugged into one of the USB ports

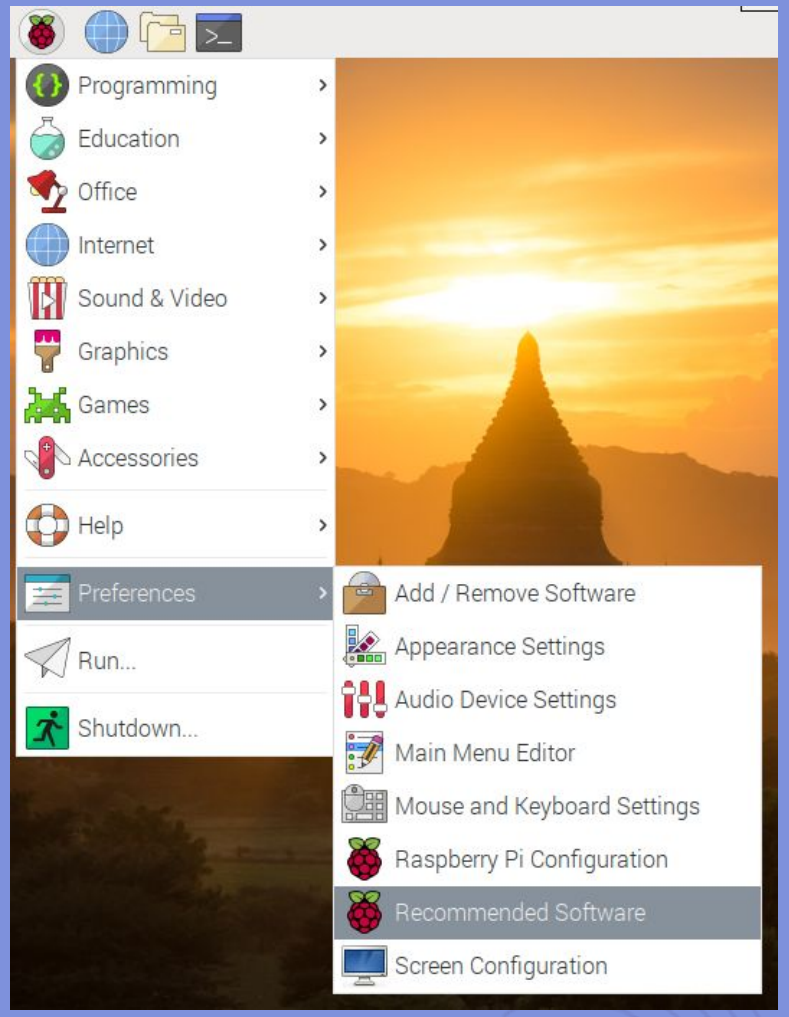

Click on the wireless network icon in the top right-hand corner of the screen, and select your network from the drop-down menu


Type in the password for your wireless network, then click OK.

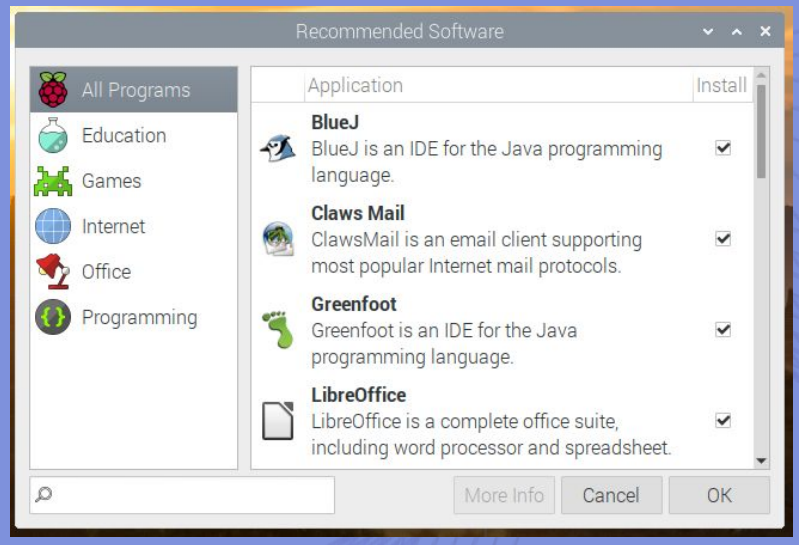
Once your Pi is connected to the internet, you will see a wireless LAN symbol instead of the red crosses.

Test your connection by clicking on the web browser icon and searching the web for Raspberry Pi.

# Installing Software

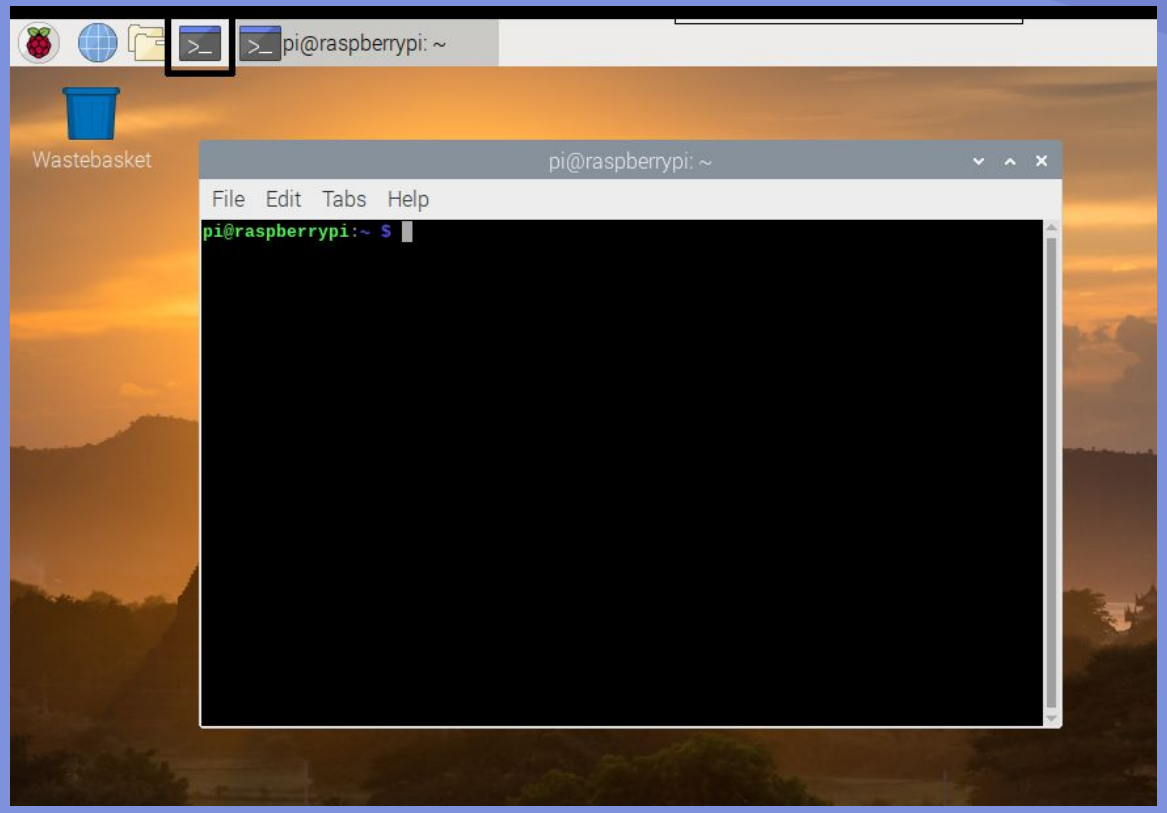



- There are many, many software programmes and applications you can download and install on the Raspberry Pi.
- Note: your Pi has to be connected to the internet before you can install the software.
- In the menu, click Preferences and then Recommended Software.



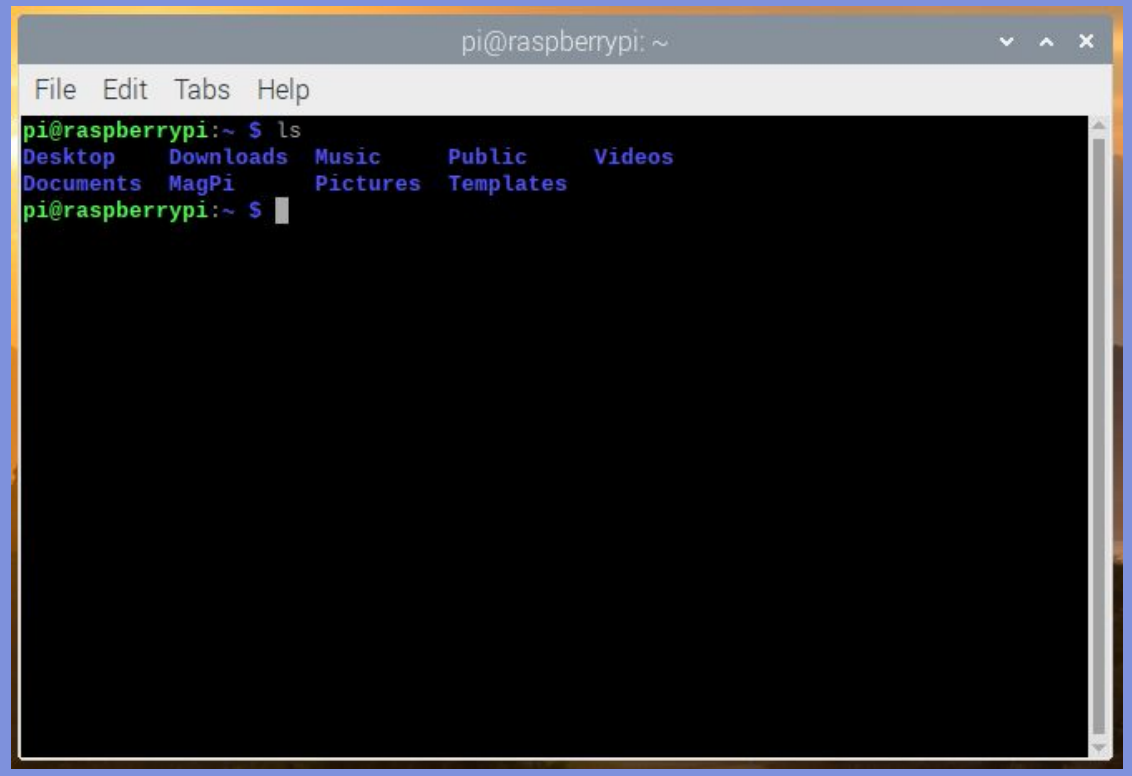

- To install a piece of software, click to mark the check box to its right.
- Then click OK to install the selected software.

# Using the Terminal




- The terminal is a really useful application: it allows you to navigate file directories and control your Pi using typed commands instead of clicking on menu options. It's often in many tutorials and project guides, including the ones on our website.
- To open a terminal window, click on the Terminal icon at the top of the screen, or select Accessories and then Terminal in the menu.

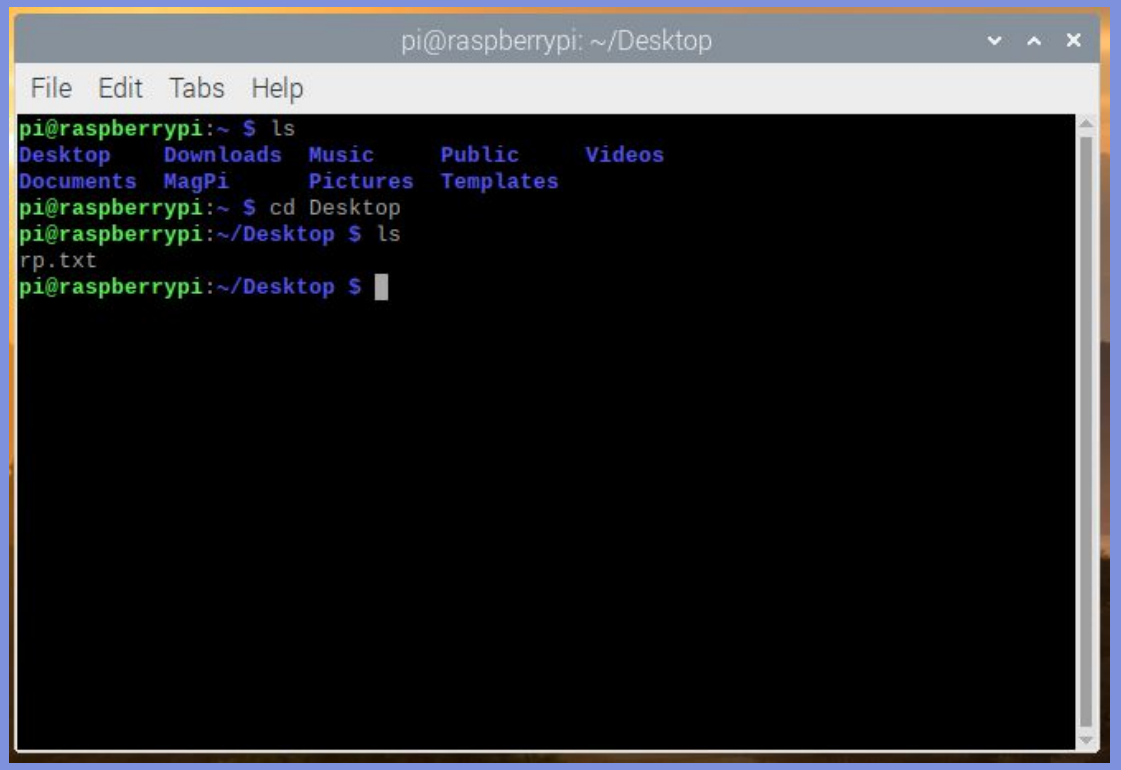
# Using the Terminal




- You can type commands into the terminal window and run them by pressing Enter on your keyboard.
- In the terminal window, type: `ls`
- Then press Enter on the keyboard.

- The command ls lists all the files and subdirectories in the current file directory. By default, the file directory that the terminal accesses when you open it is the one called pi.

# Using the Terminal

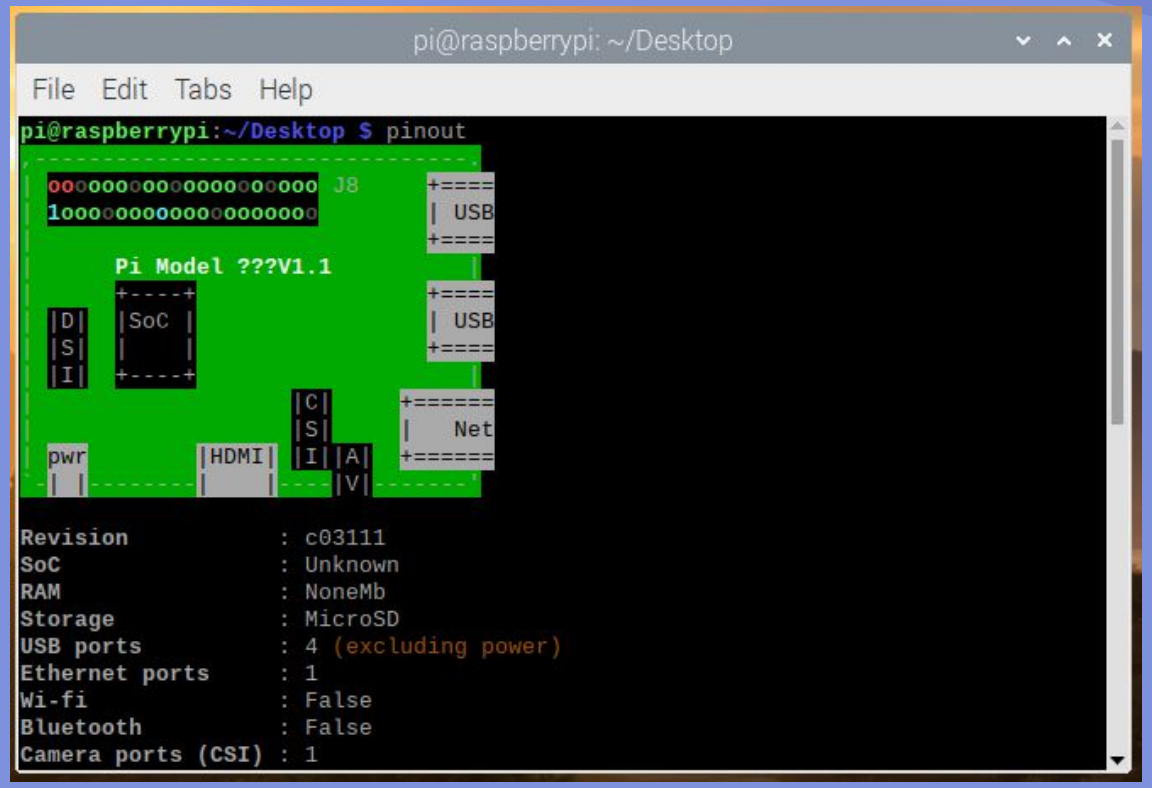



- Now type in this command to change the directory to the Desktop.

```
cd Desktop
```

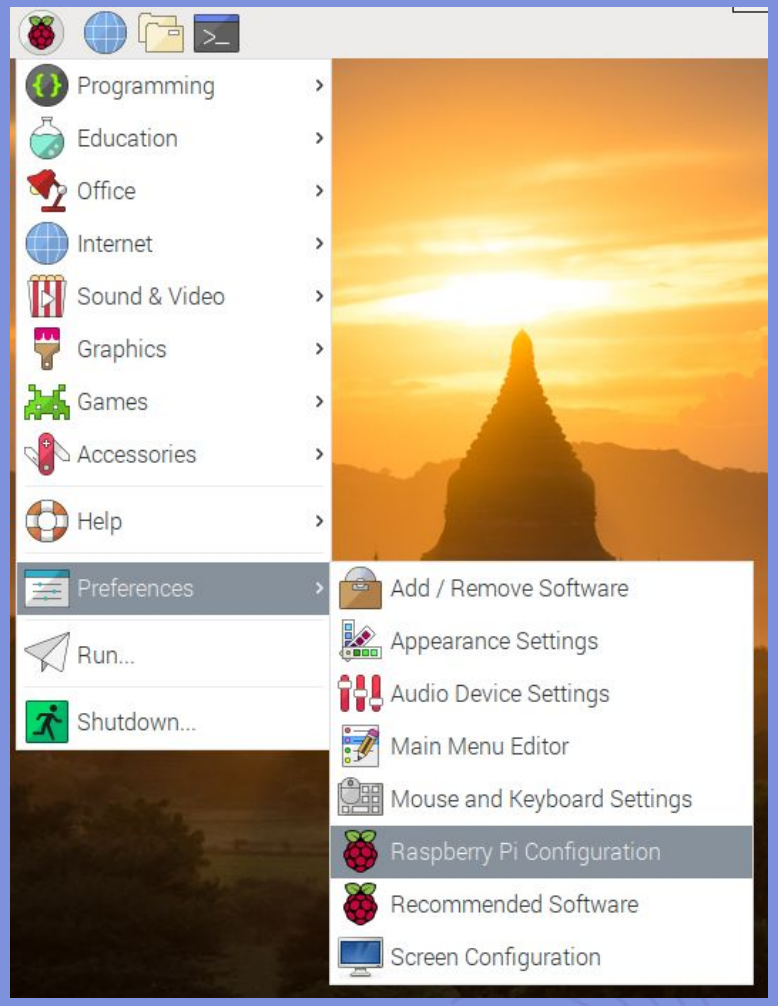
- You have to press the Enter key after every command.
- Use the command `ls` to list the files in the Desktop directory.

# Using the Terminal



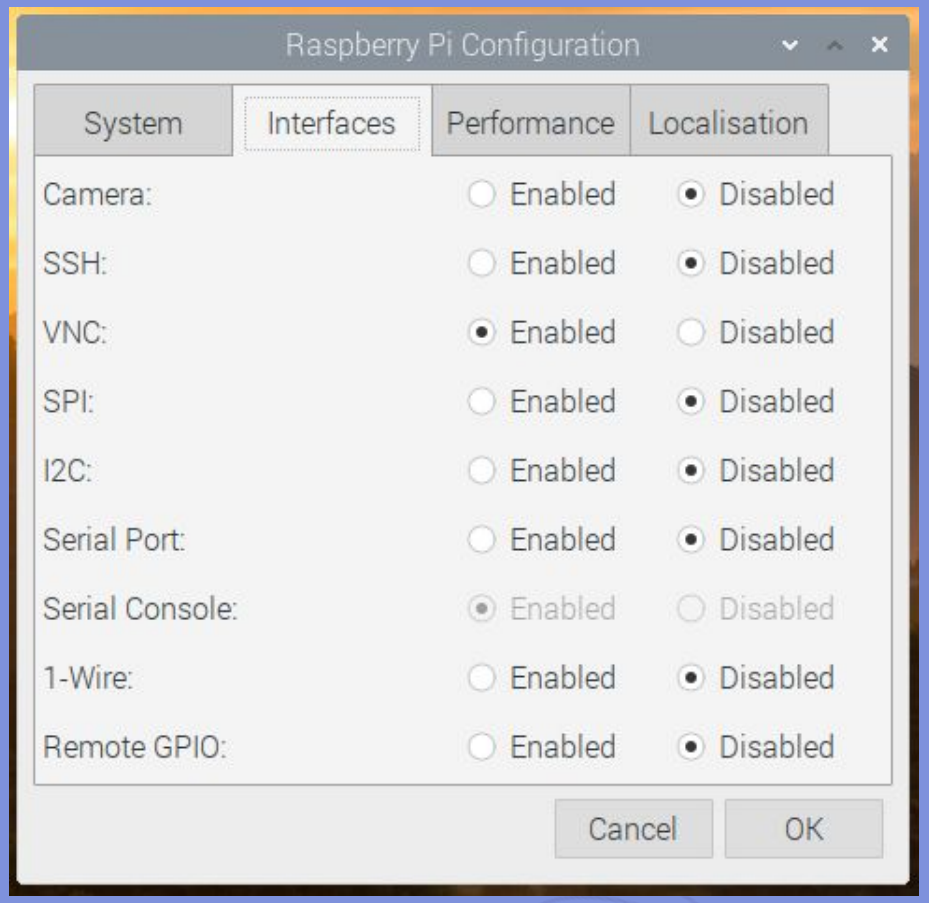

- The terminal can do a lot more than list files — it's a very powerful way of interacting with your Raspberry Pi!
- As just one small example, try the command `pinout`:
- This will show you a labelled diagram of the GPIO pins, and some other information about your Pi.

# Configuring your Pi




You can control most of your Raspberry Pi's settings, such as the password, through the Raspberry Pi Configuration application found in Preferences on the menu.

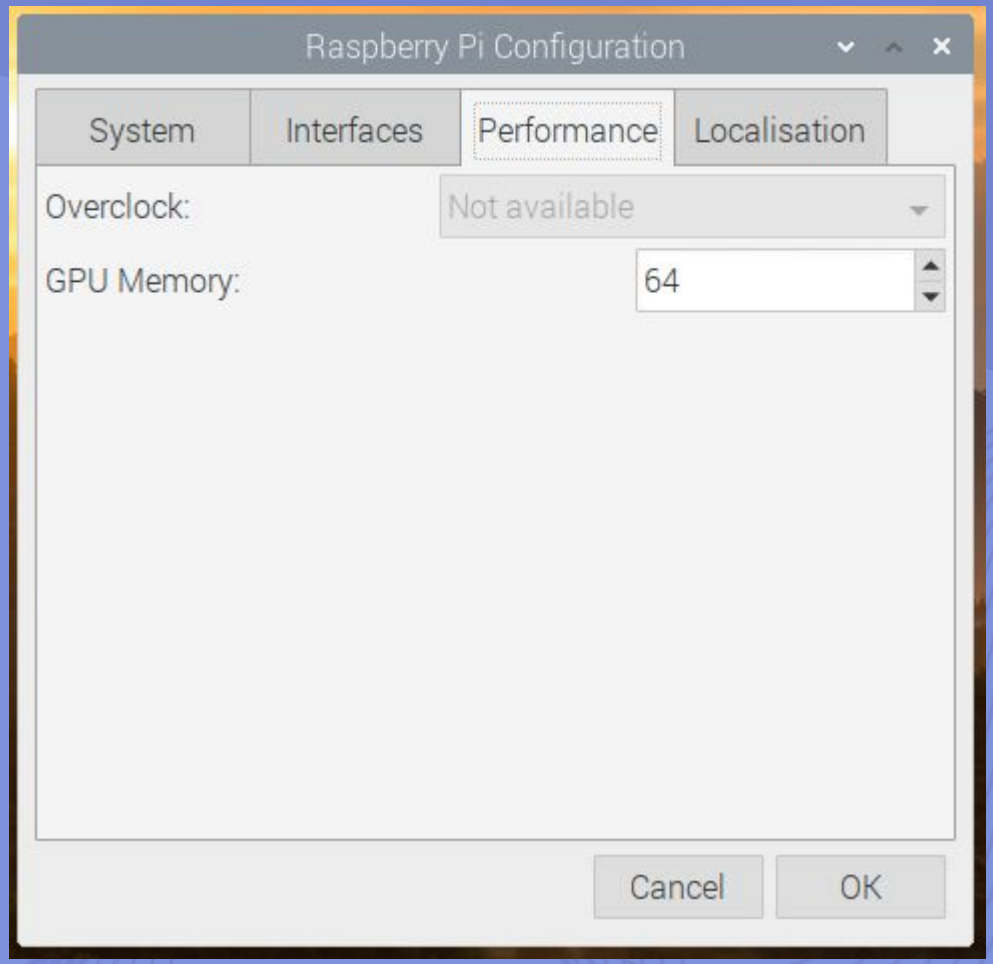
# Interfaces




- You can link devices and components to the Raspberry Pi using a lot of different types of connections. The Interfaces tab is where you turn these different connections on or off, so that the Pi recognizes that you've linked something to it via a particular type of connection.
  - Camera — enable the Raspberry Pi Camera Module.
  - SSH — allow remote access to your Raspberry Pi from another computer using SSH.
  - VNC — allow remote access to the Raspberry Pi Desktop from another computer using VNC.
  - SPI — enable the SPI GPIO pins.
  - I2C — enable the I2C GPIO pins.
  - Serial — enable the Serial (Rx, Tx) GPIO pins.
  - 1-Wire — enable the 1-Wire GPIO pin.
  - Remote GPIO — allow access your Raspberry Pi's GPIO pins from another computer.

# Performance

- If you need to do so for a particular project you want to work on, you can change the performance settings of your Pi in this tab.
    - Warning: changing your Pi's performance settings may result in it behaving erratically or not working.
    - Overclock — change the CPU speed and voltage to increase performance.
    - GPU Memory — change the allocation of memory given to the GPU.



# Localisation

- This tab allows you to change your Raspberry Pi settings to be specific to a country or location.
  - Locale — set the language, country, and character set used by your Raspberry Pi.
  - Timezone — set the time zone.
  - Keyboard — change your keyboard layout.
  - WiFi Country — set the WiFi country code.

# Where to find help

If you’re having problems with your Raspberry Pi, there are lots of places you can get help and advice:

- Check out the help section and the troubleshooting guide on the Raspberry Pi website.

- The Raspberry Pi forum, including the Beginners section, is a great place to ask questions and get support from the Raspberry Pi community.

# Conclusion

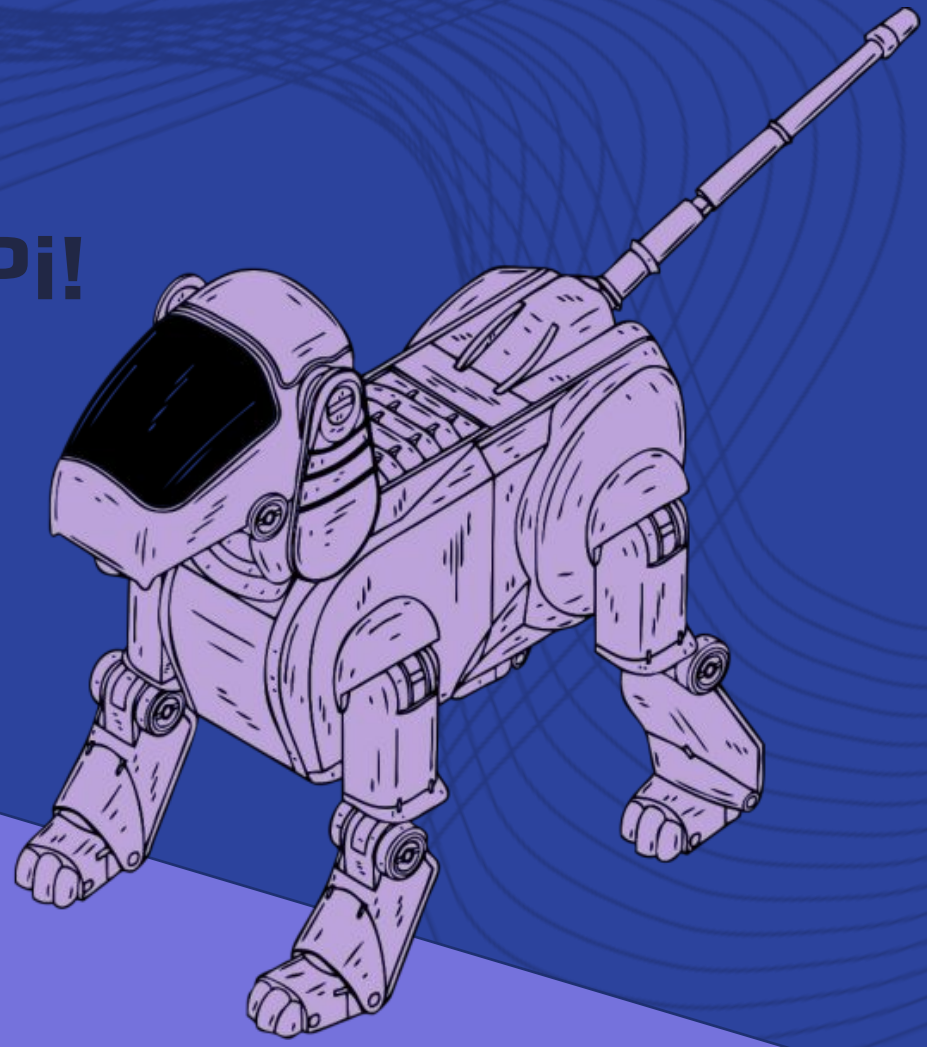
## Learning outcomes

- *Keep experimenting and exploring the Raspberry Pi! It's important to feel confident in using a Raspberry Pi before you start making projects!*

- ✔ What you will need
- ✔ Understanding the Raspberry Pi
- ✔ Connecting the Raspberry Pi
- ✔ Setting up the Raspberry Pi
- ✔ A tour of the Raspberry Pi
  - ✔ Using the terminal
  - ✔ Configuring the Pi
  - ✔ Installing software

# Congratulations!

## You have set up your Raspberry Pi!



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4 YOUTH