Raspberry Pi Set-up Manual

Contents

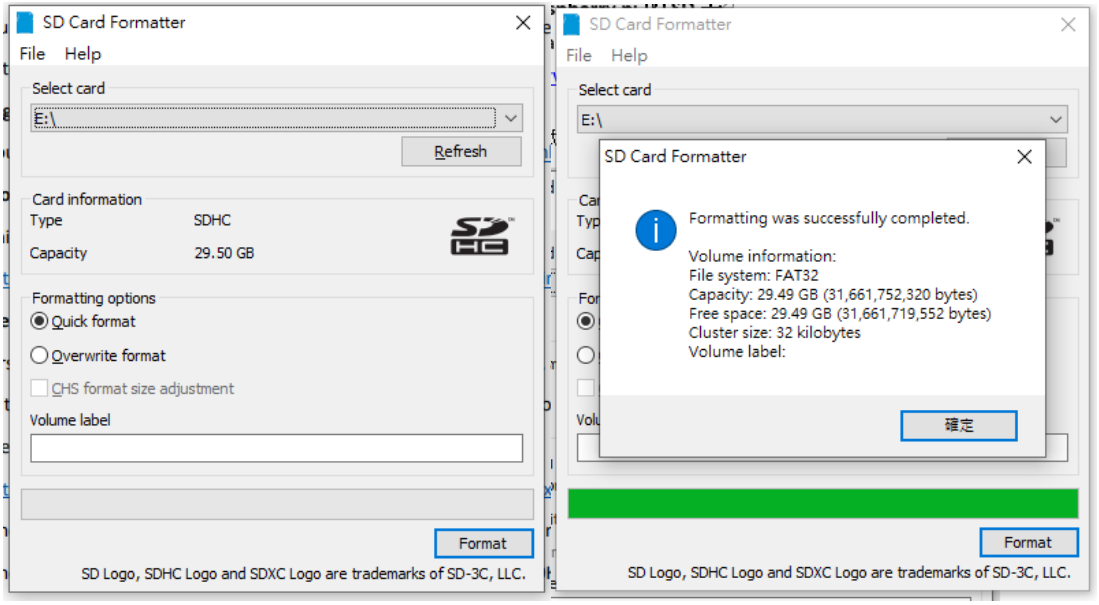
Raspberry Pi OS 安裝

1. **格式化 Raspberry Pi 的 SD 卡**

   SD card formatter

   https://www.sdcard.org/downloads/formatter/

   選取要格式化的 SD 卡，點 Format



2. **下載 image 檔**

   Follow instructions on the website

   https://www.raspberrypi.org/documentation/installation/installing-images/README.md

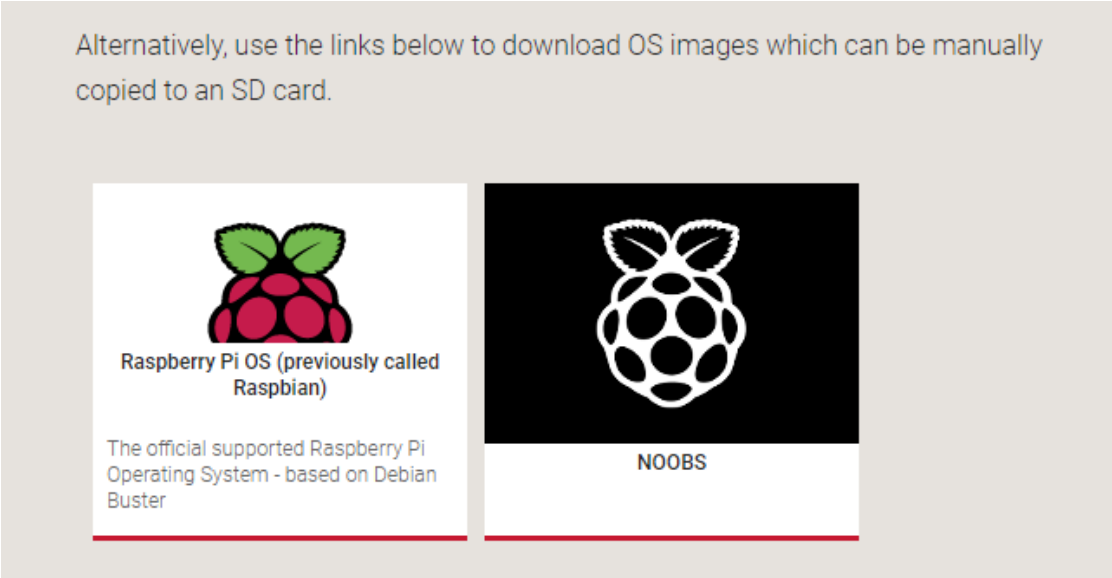
   找到 Using Raspberry Pi Image 的段落，點 Raspberry Pi Imager 的連結

Using Raspberry Pi Imager

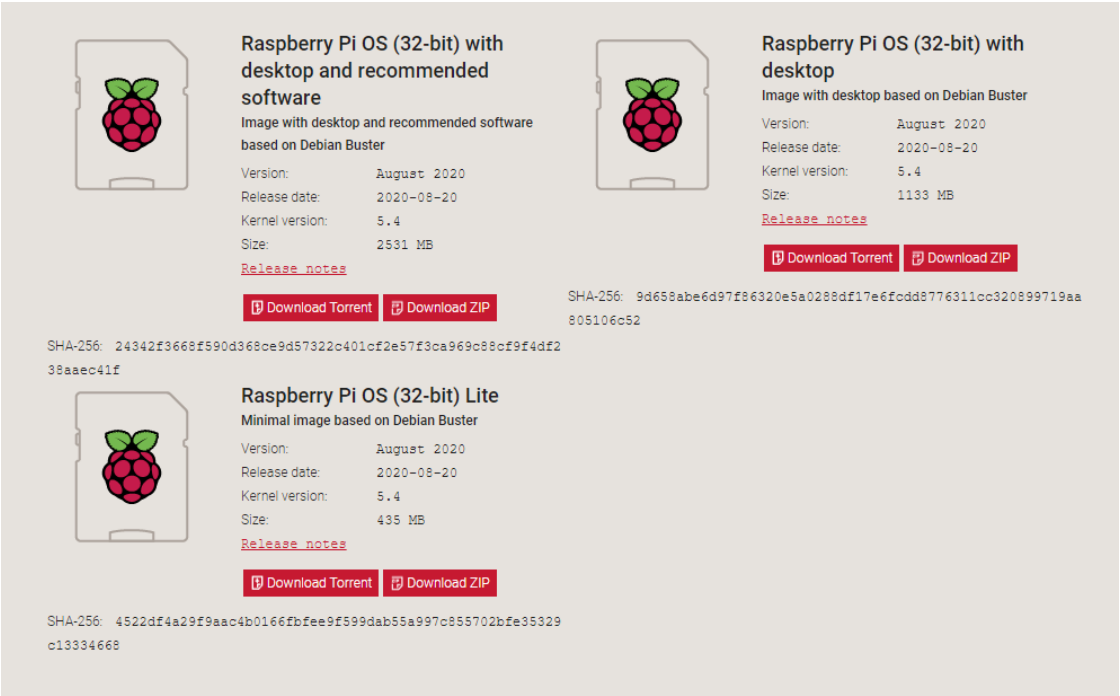
Raspberry Pi have developed a graphical SD card writing tool that works on Mac OS, Ubuntu 18.04 and Windows, and is the easiest option for most users as it will download the image and install it automatically to the SD card.

- Download the latest version of Raspberry Pi Imager and install it.
  - If you want to use Raspberry Pi Imager on the Raspberry Pi itself, you can install it from a terminal using `sudo apt install rpi-imager`.
- Connect an SD card reader with the SD card inside.
- Open Raspberry Pi Imager and choose the required OS from the list presented.
- Choose the SD card you wish to write your image to.
- Review your selections and click 'WRITE' to begin writing data to the SD card.

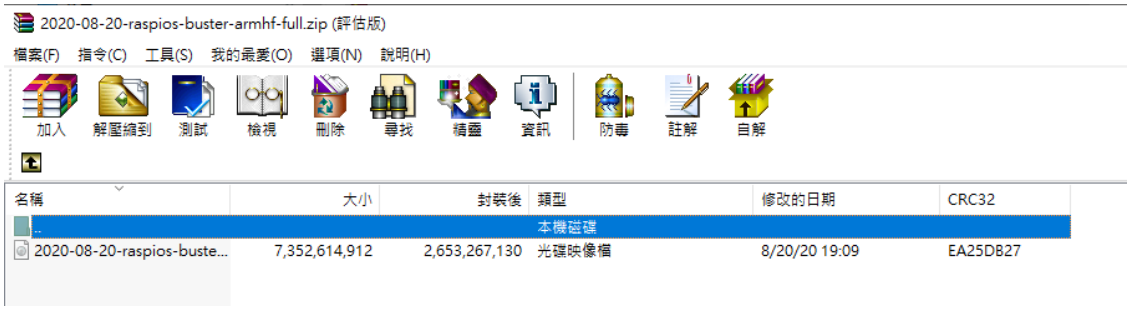
選擇 Raspberry Pi OS



選擇 Raspberry Pi OS with desktop and recommended software (下載 ZIP 檔後解壓縮)



下載後會得到要燒錄進去 SD 卡的 image 檔

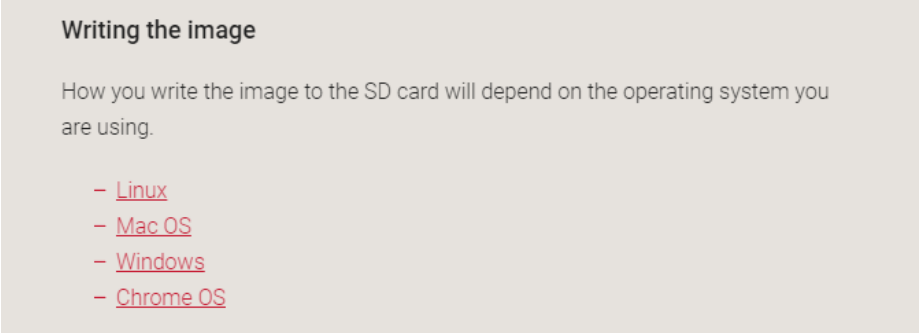


3. **燒錄 image 檔**

Follow instructions on the website

https://www.raspberrypi.org/documentation/installation/installing-images/README.md

找到 Writing the image 段落，選擇電腦的作業系統 (Windows)

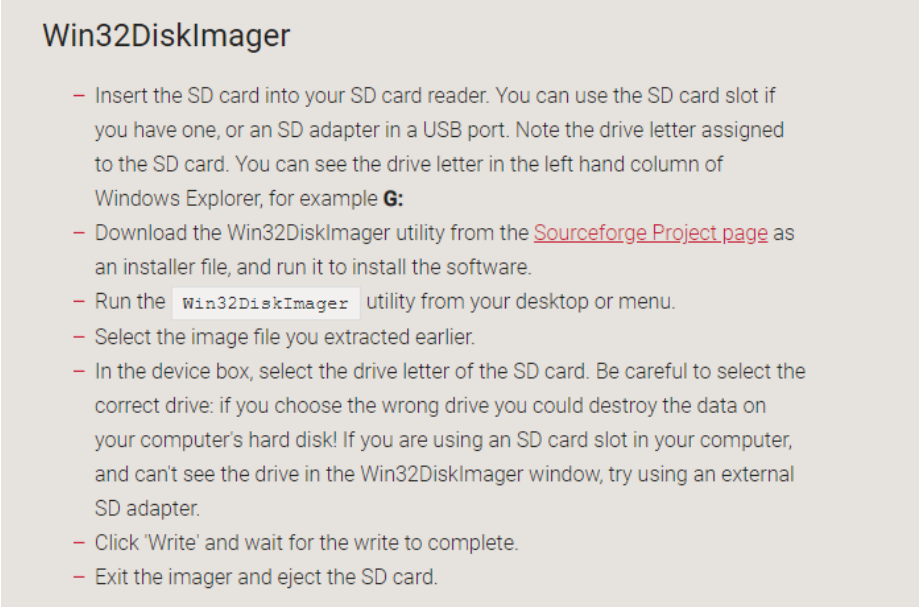


Writing the image

How you write the image to the SD card will depend on the operating system you are using.

- Linux
- Mac OS
- Windows
- Chrome OS

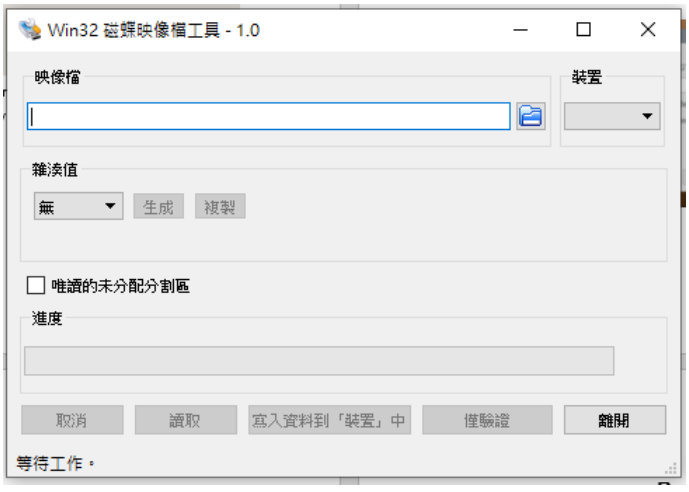
Raspberry Pi 官方提供三種不同的燒錄軟體，選其中一種按照網站上指示下載 (Win32DiskImager)



Win32DiskImager

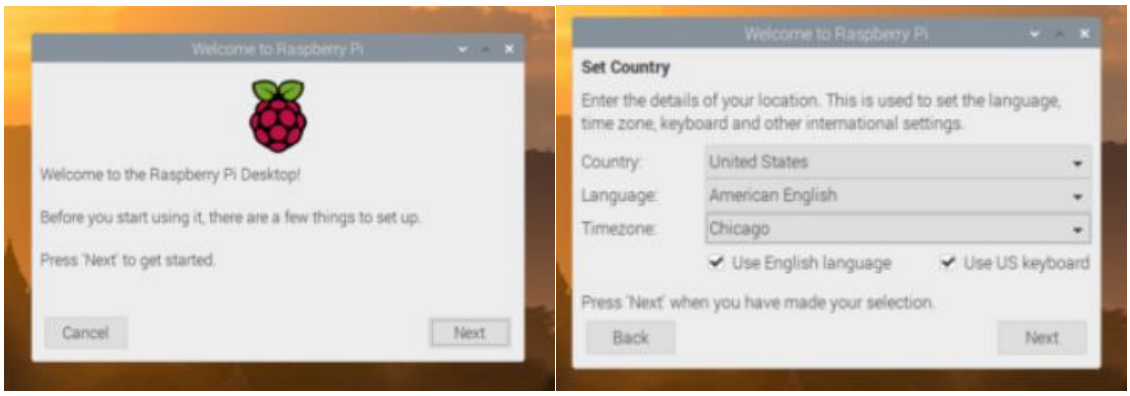
- Insert the SD card into your SD card reader. You can use the SD card slot if you have one, or an SD adapter in a USB port. Note the drive letter assigned to the SD card. You can see the drive letter in the left hand column of Windows Explorer, for example **G:**
- Download the Win32DiskImager utility from the Sourceforge Project page as an installer file, and run it to install the software.
- Run the `Win32DiskImager` utility from your desktop or menu.
- Select the image file you extracted earlier.
- In the device box, select the drive letter of the SD card. Be careful to select the correct drive: if you choose the wrong drive you could destroy the data on your computer's hard disk! If you are using an SD card slot in your computer, and can't see the drive in the Win32DiskImager window, try using an external SD adapter.
- Click 'Write' and wait for the write to complete.
- Exit the imager and eject the SD card.

開啟 Win32DiskImager，映像檔選擇要燒錄進 SD 卡的 image 檔，裝置選擇 SD 卡，點寫入資料，如果成功 SD 卡會出現一個一個資料夾，代表 Raspberry Pi OS 已經寫入記憶卡裡面



4. 設定 OS 環境

成功寫入 image 檔後，將 Raspberry Pi 連接 I/O 設備（螢幕、滑鼠、鍵盤）後接上電源，Raspberry Pi OS 會出現下面的訊息，選擇地區和語言（American English)

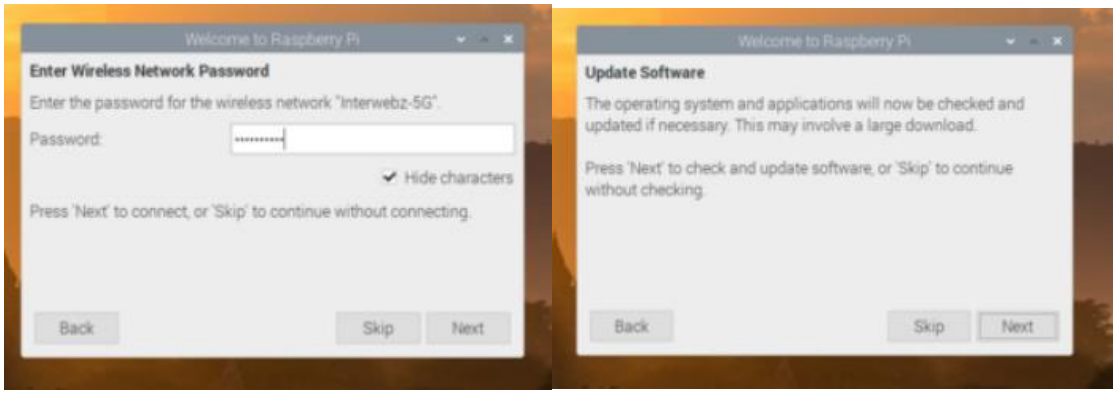


5. 設定密碼

這裡設定的密碼後續在連結遠端電腦的時候會用到！

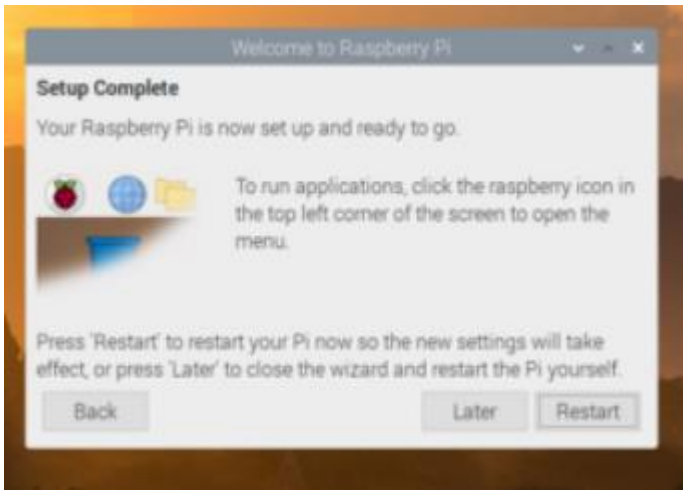
6. 設定 Wi-Fi

建議和遠端電腦紀錄相同 Wi-Fi，方便後續遠端連結，連上網路後先不要 Update Software



7. **重啟 Raspberry Pi**

完成後重新啟動，完成 OS 安裝

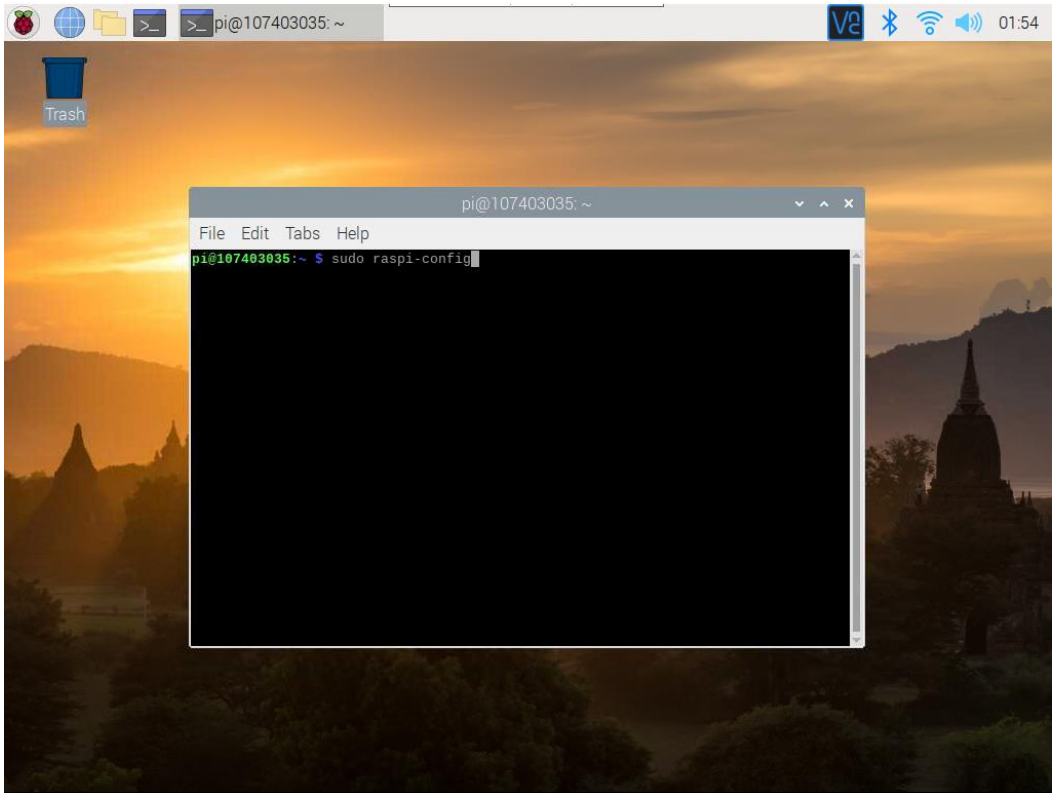


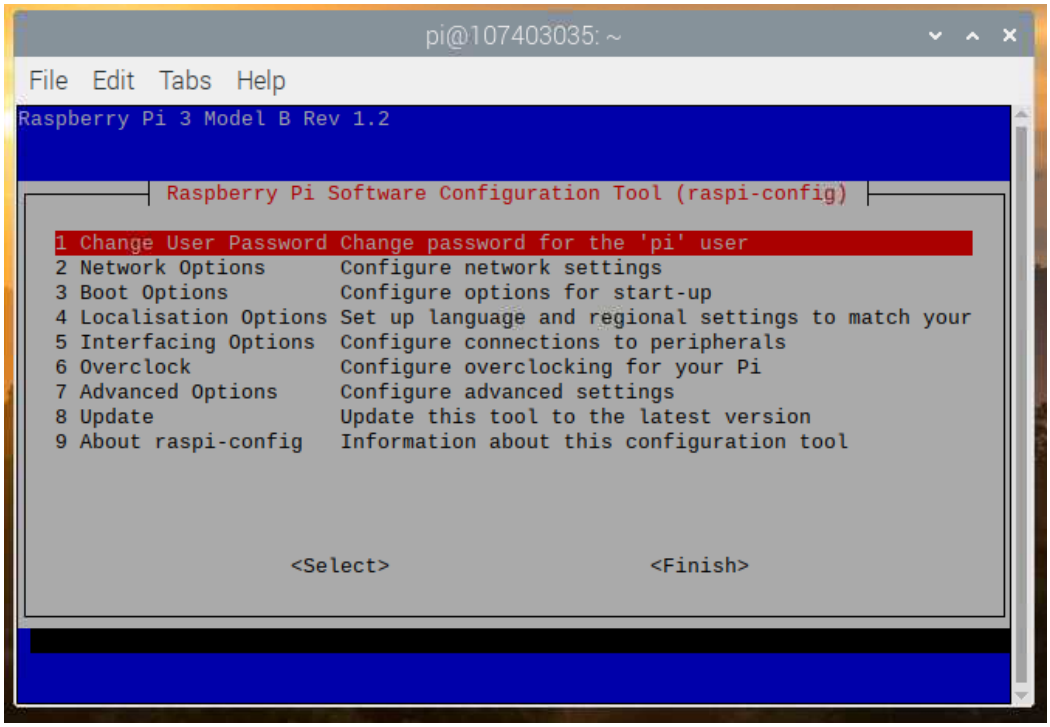
Raspberry Pi OS 設定

◆ **透過指令更改設定**

OS 設定的變更除了使用 GUI 介面變更之外，也可以透過指令修改

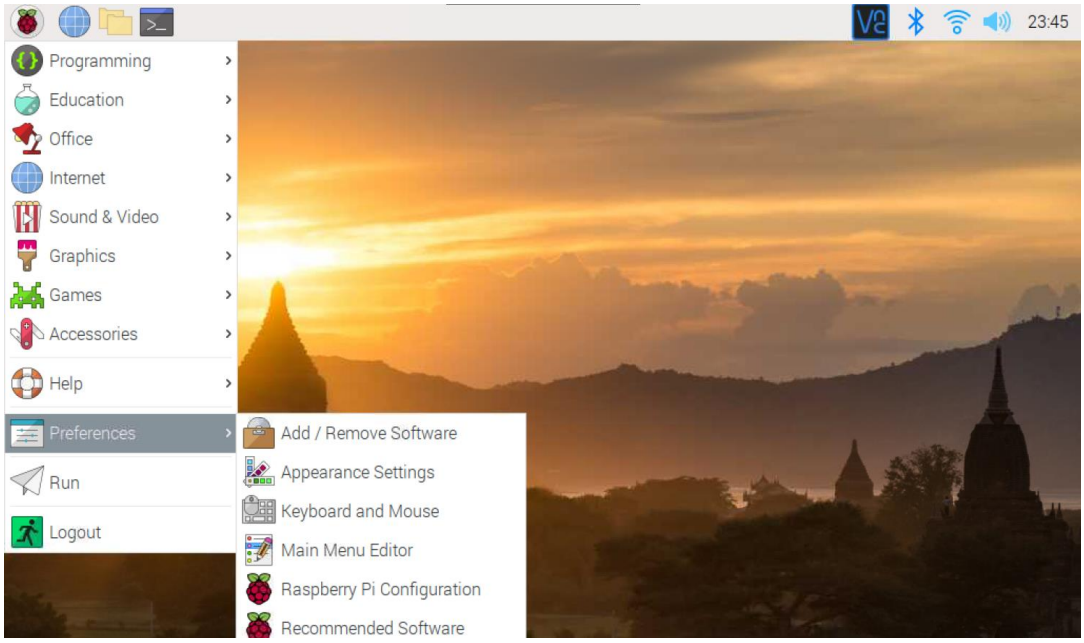
點左上角的 Terminal 輸入 `sudo raspi-config` 呼叫 Configuration Tool



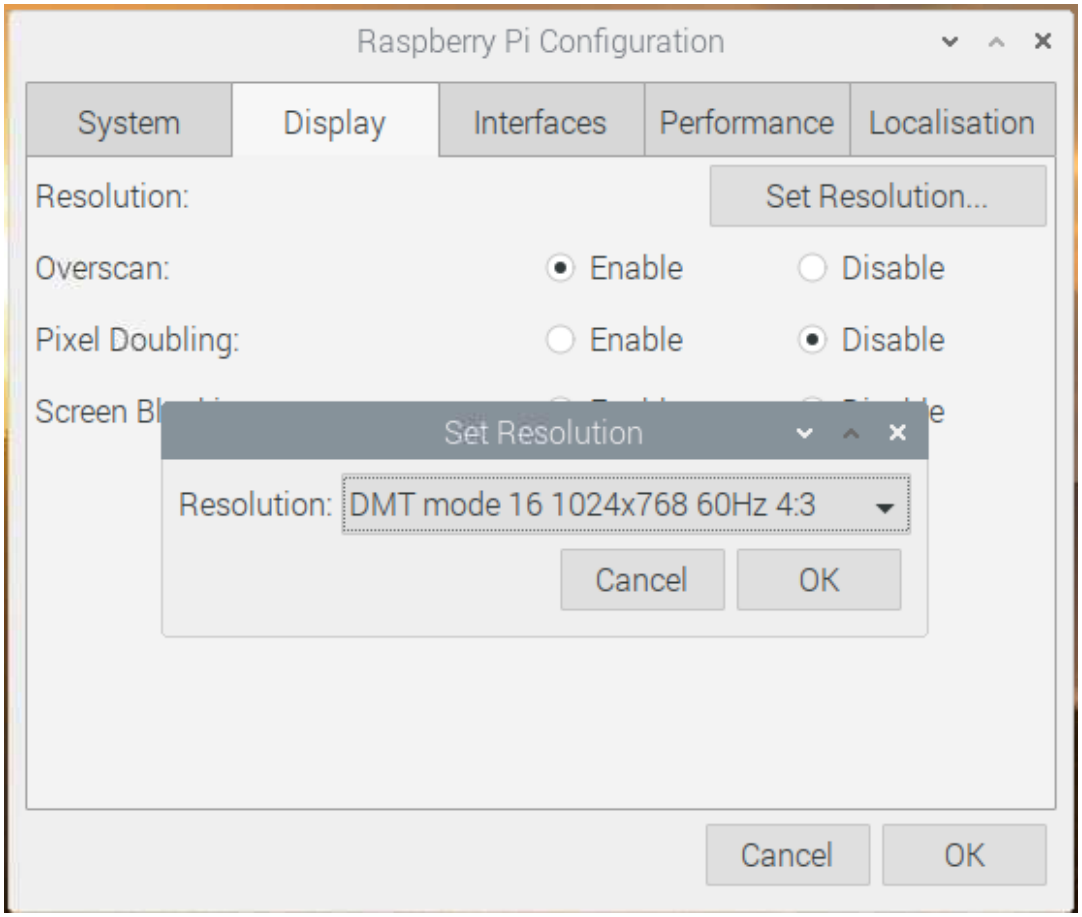


◆ **更改解析度**

Preference – Raspberry Pi Configuration

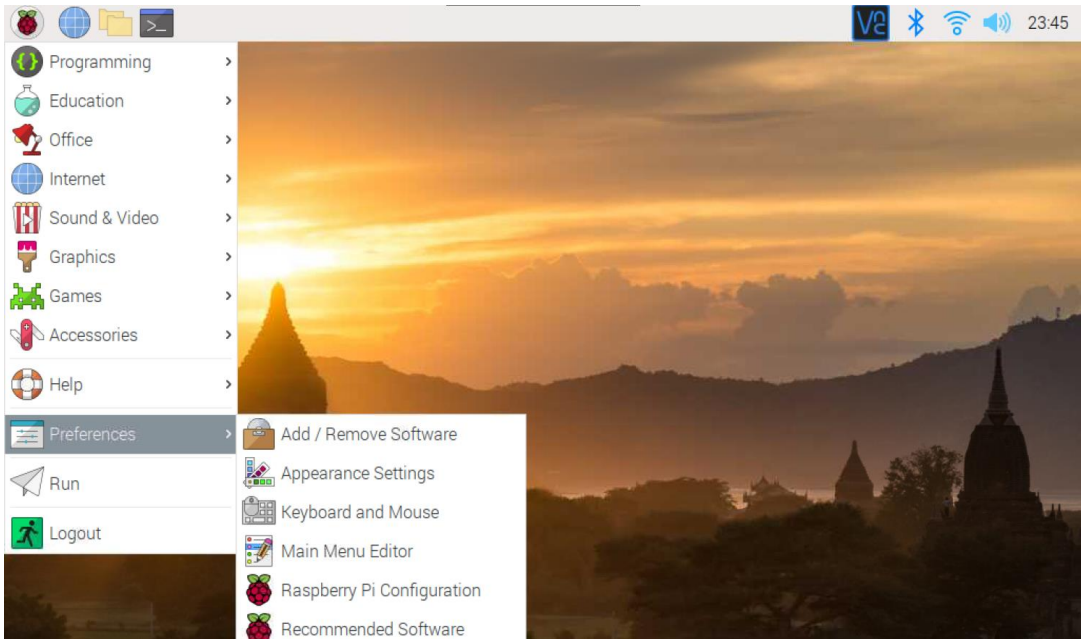


Display – Set Resolution/DMT mode 16 1024x768 60Hz 4:3

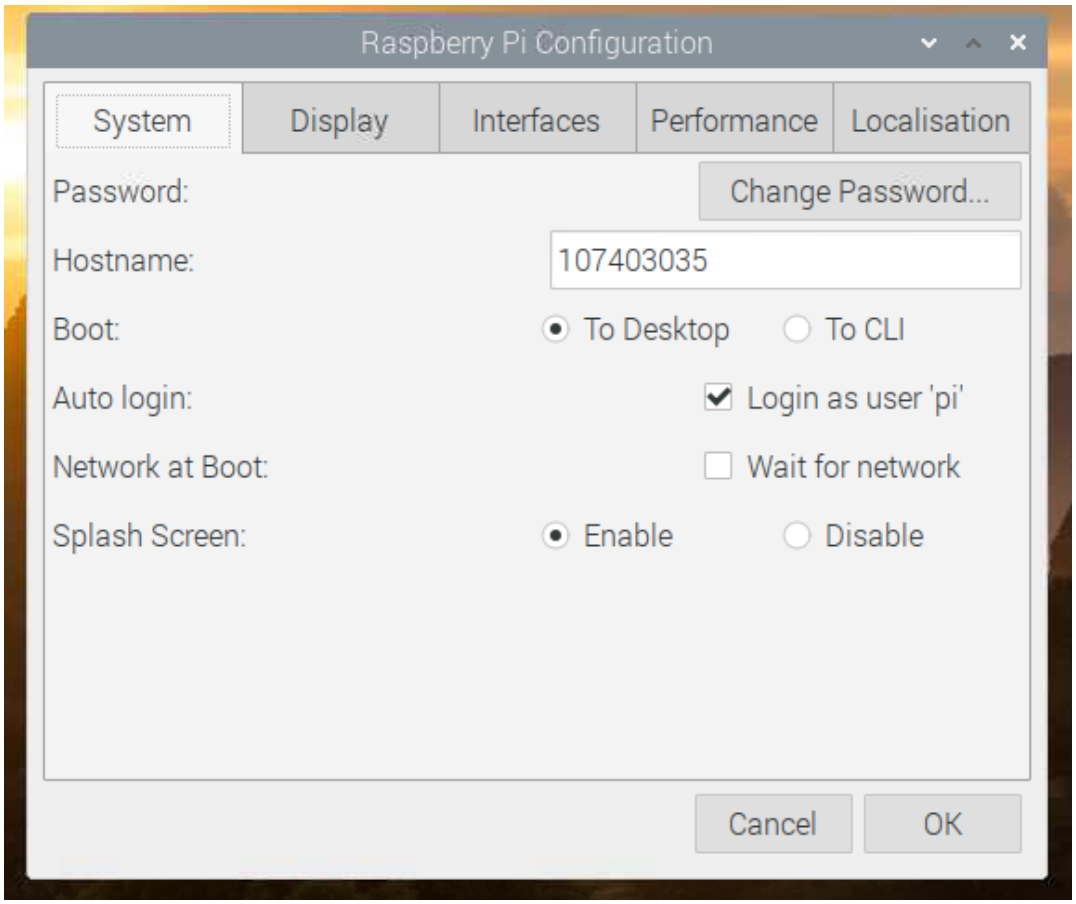


◆ **更改 Hostname**

Preference – Raspberry Pi Configuration

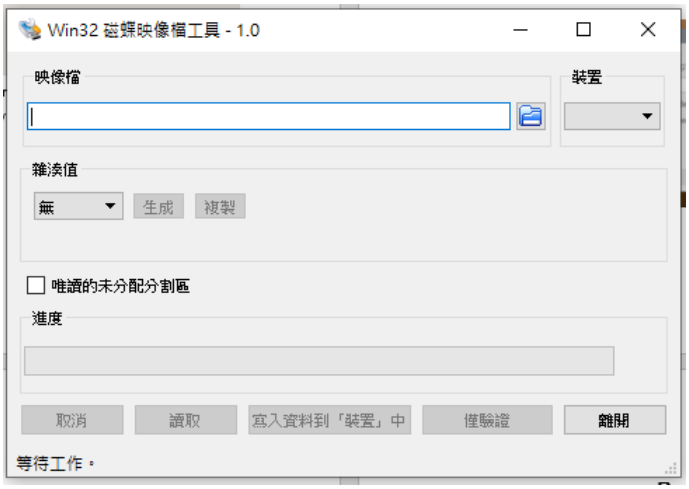


Hostname 改成學號



◆ **備份**

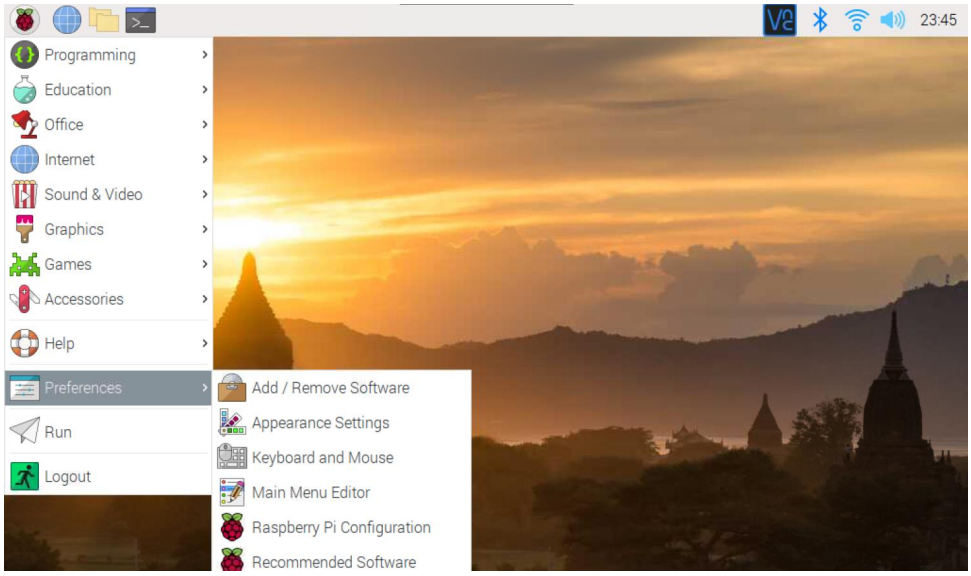
使用 Win32DiskImager，裝置選擇 SD 卡，映像檔選好路徑並且命名 (C:/raspberrypi.img)，點讀取，就可以完成備份



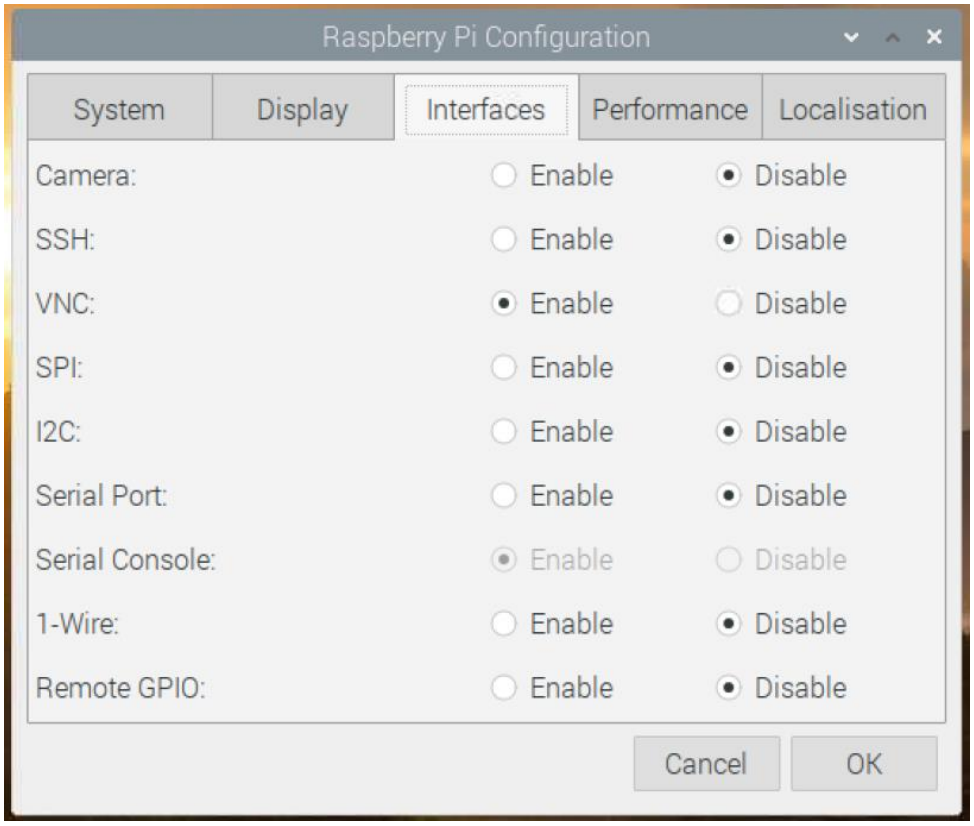
VNC 設定

1. 啟用 VNC

Preference – Raspberry Pi Configuration



Interfaces – VNC/Enable



重新開機以後右上角會出現 VNC Server 的 icon (在 bluetooth 左邊)

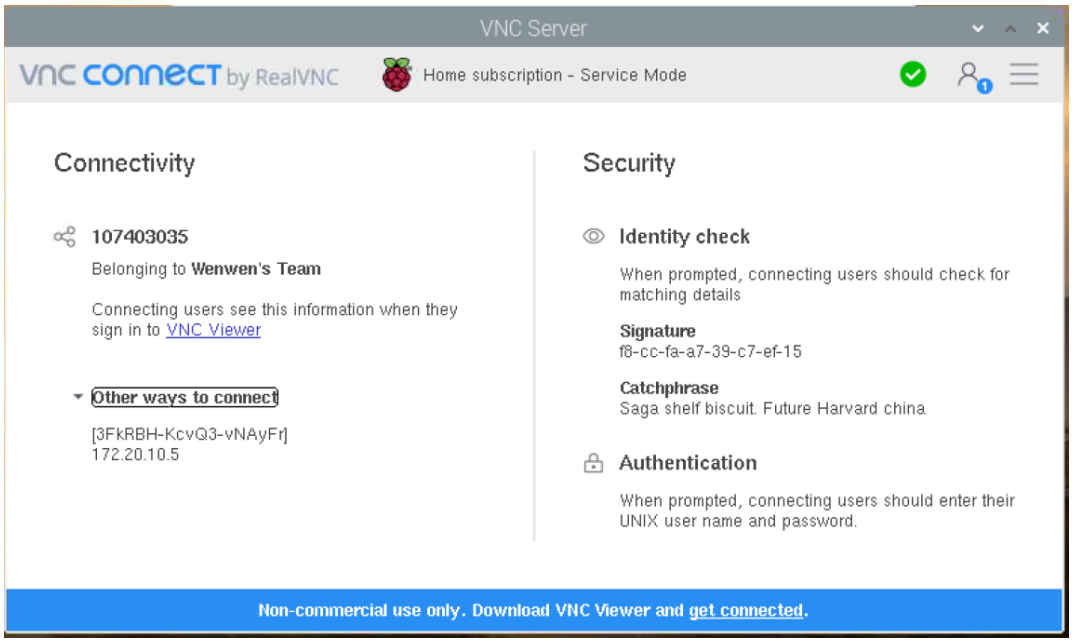
2. 設定 VNC Server

在 Raspberry Pi 上用的是 VNC Server

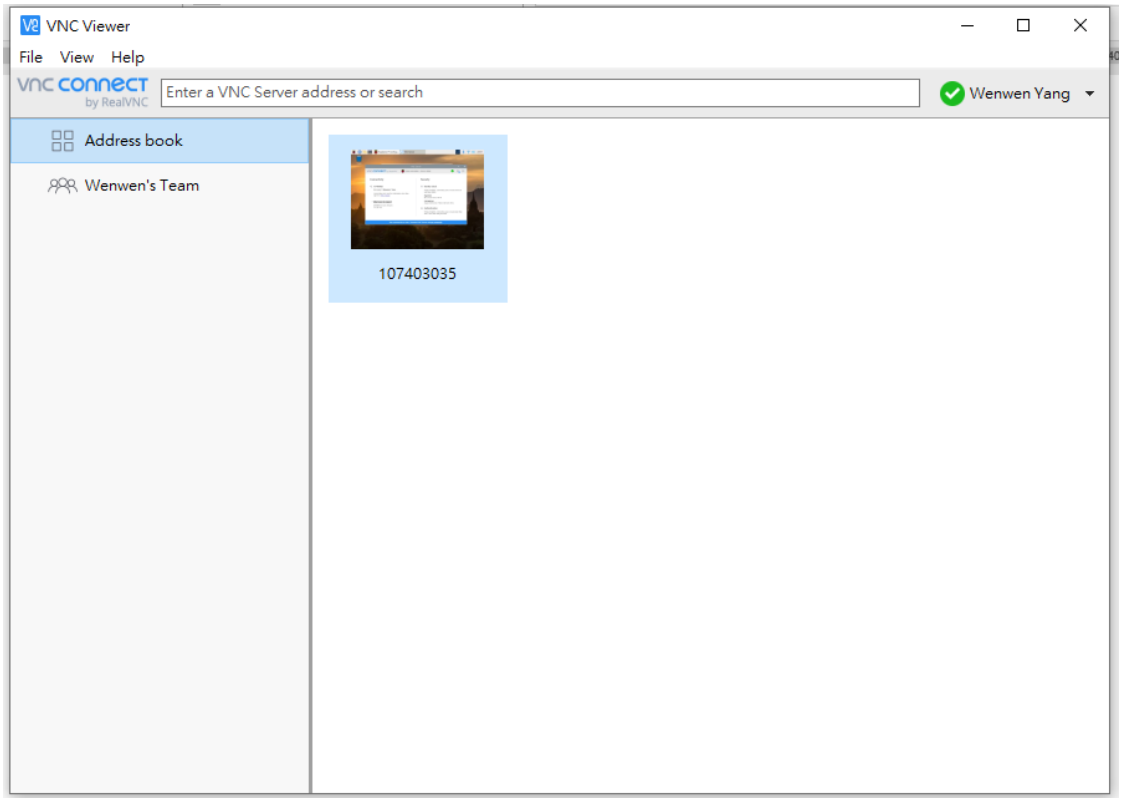
在遠端控制的電腦上用的是 VNC Viewer

下面的截圖是 VNC Server 已經設定完成後的畫面

剛開始 username 的地方會是一段數字組合 (172.20.10.5)，在連結相同 Wi-fi 的情況下，在 VNC Viewer 輸入數字串就可以連上，但是每次重新啟動 Raspberry Pi，數字會變動，所以在 VNC Server 和 Viewer 兩端都登入 VNC 帳號 (右上角人物形狀的 icon)，並在 VNC Server 端設定 username (107403035)，讓 Raspberry Pi 的遠端連結變成常駐型，以後只要 Raspberry Pi 一開啟，而且有連上網路，就可以直接使用 VNC 遠端控制

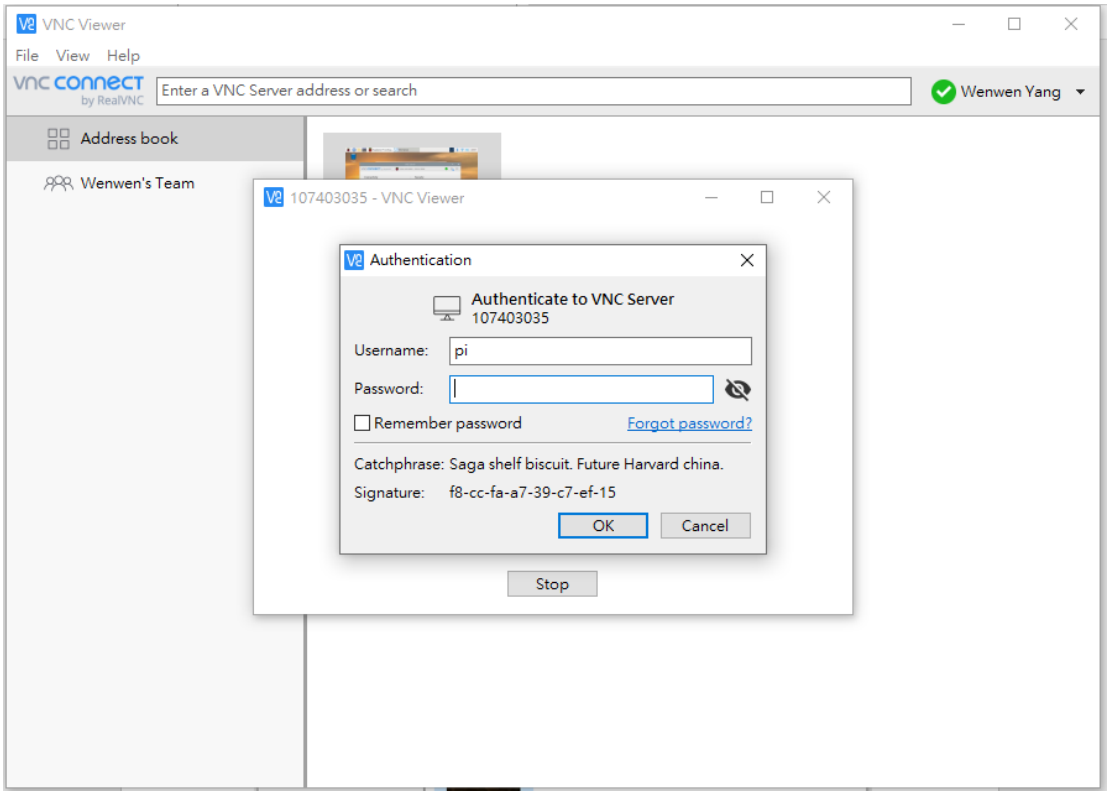


3. VNC Viewer 連結

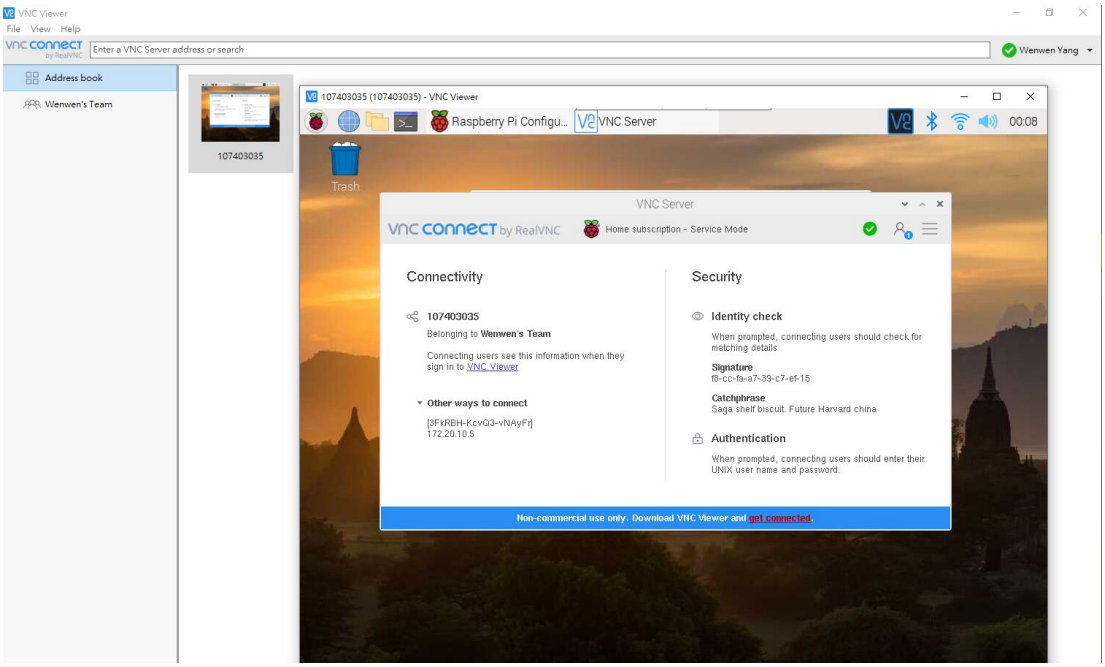


上面的截圖是 VNC Viewer 已經設定完成後的畫面

點選 Raspberry Pi (107403035)以後等待連結，會出現輸入密碼的訊息，username 預設是 pi，密碼則是前面在 Raspberry Pi 裡面設定的密碼



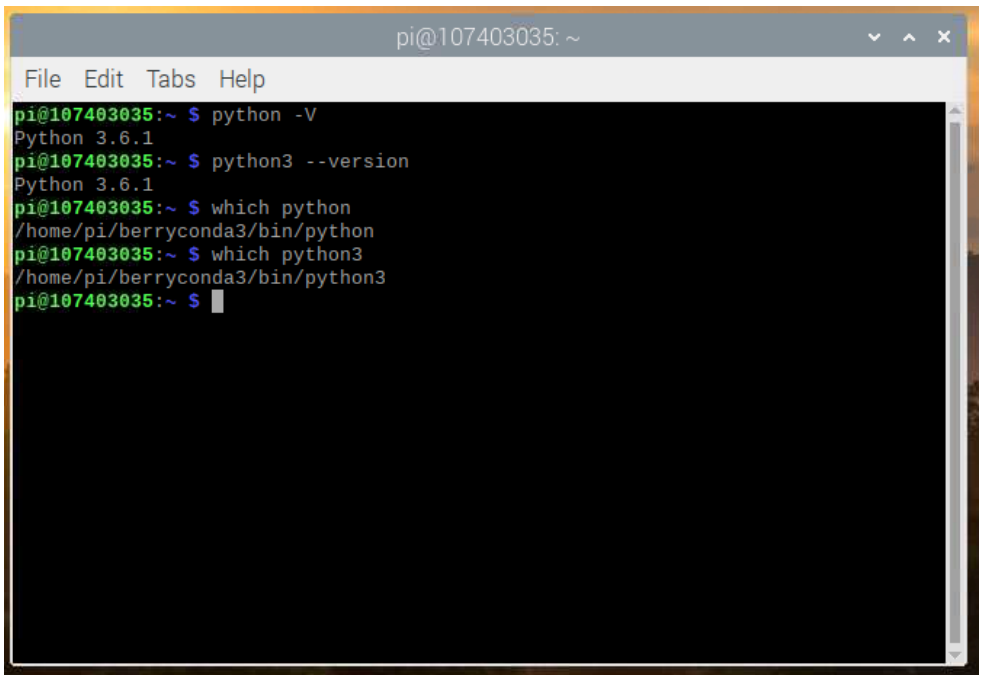
連結成功就可以從遠端控制 Raspberry Pi



Conda 和其他 Software 安裝

1. **確認 Python 版本和安裝路徑**

   在 Terminal 輸入以下指令可以確認 Python 的版本以及安裝路徑



2. **下載 BerryConda**

   Follow instructions on the website

   https://github.com/jjhelmus/berryconda

   找到對應的 installers (Berryconda3-2.0.0-Linux-armv7l.sh) 下載到 Raspberry Pi 上

Quick start

Berryconda is designed to work with raspbian jessie. Other Linux versions and distributions may or may not work. When using non-raspbian based distributions, bzip2 should be installed.

To install Berryconda, download the installer appropiate for your Raspberry Pi model. For Raspberry Pi 2 or 3 use the armv7l installers. For Raspberry Pi 1 or Zero use the armv6l installer.

Berryconda comes in two 'flavors', Berryconda2 and Berryconda3. The difference between these are the version of Python installed; Berryconda2 installs Python 2.7, and Berryconda3 installs Python 3.6. Choose the version you want installed.

armv7l installers (Raspberry Pi 2 or 3)

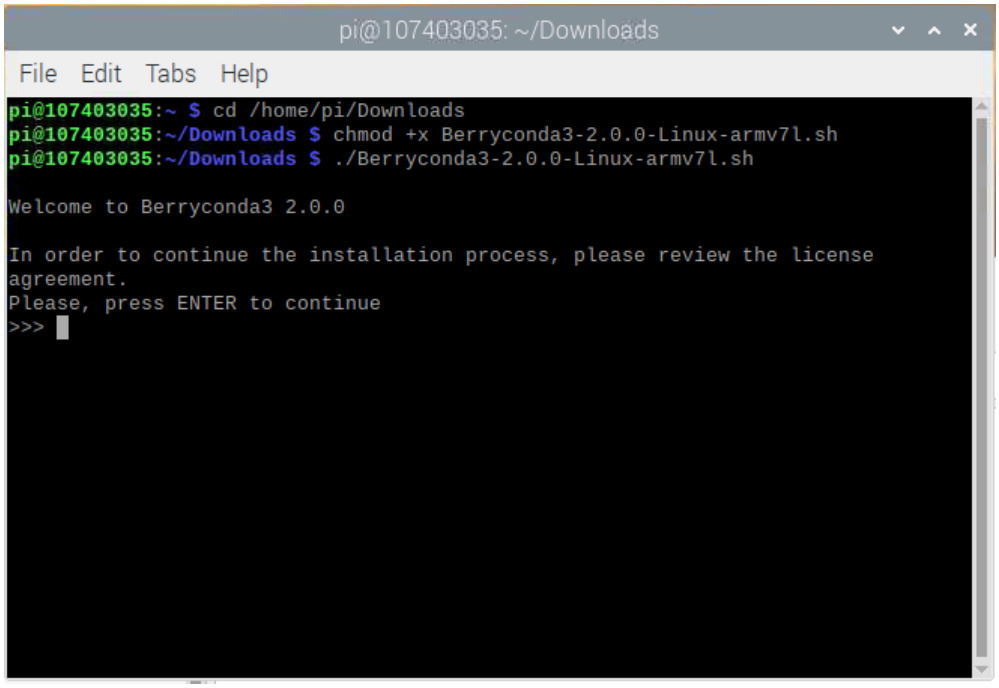
- Berryconda3-2.0.0-Linux-armv7l.sh
- Berryconda2-2.0.0-Linux-armv7l.sh

armv6l installers (Raspberry Pi 1 or Zero)

- Berryconda3-2.0.0-Linux-armv6l.sh
- Berryconda2-2.0.0-Linux-armv6l.sh

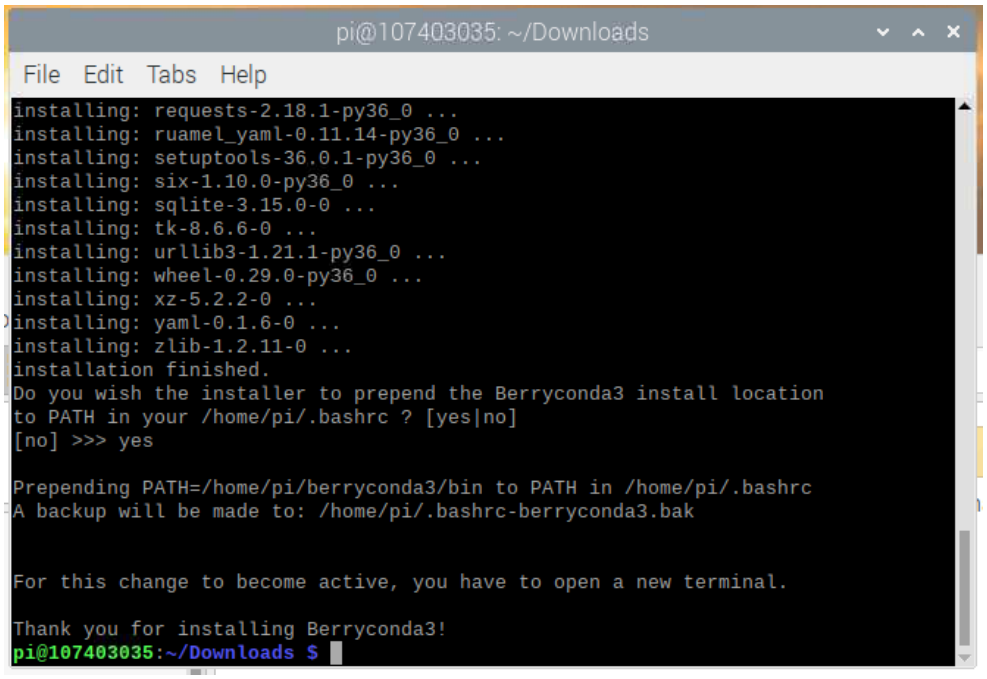
開啟 Terminal 到 installer 下載路徑（/home/pi/Downloads）輸入指令

```
chmod +x Berryconda3-2.0.0-Linux-armv7l.sh
./Berryconda3-2.0.0-Linux-arm7l.sh
```



依照指示進行安裝（幾乎都是按 ENTER 或是輸入 yes，除非需要更改安裝路徑）

完成後會出現以下提示



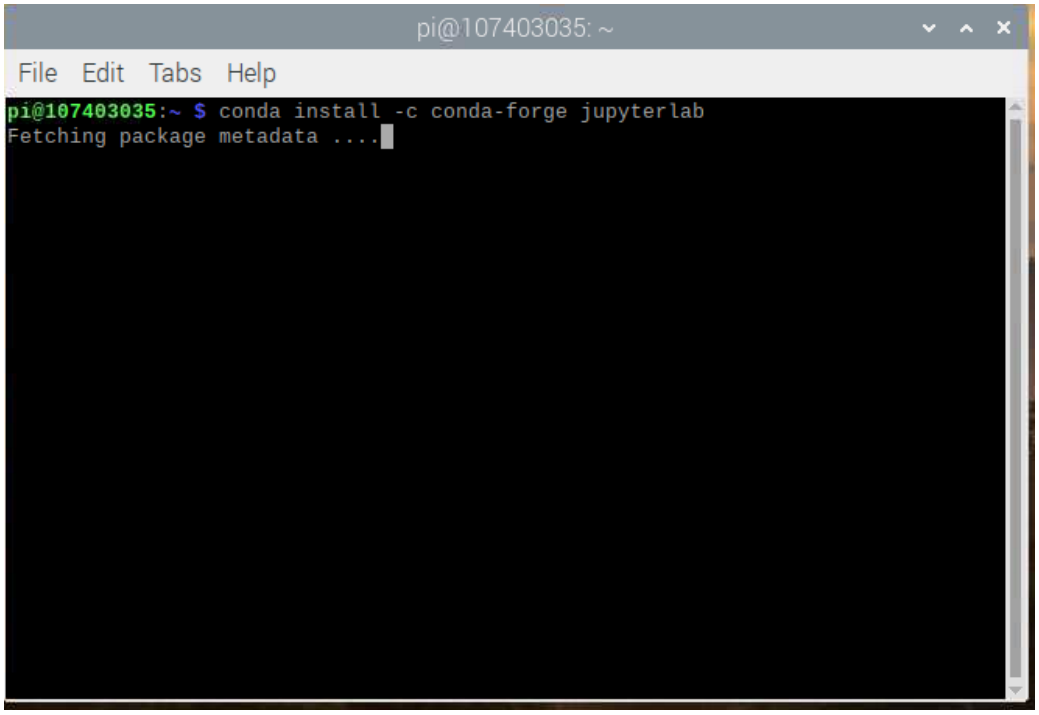
3. 使用 Conda 安裝 Jupyter Notebook

Follow instructions on the website

https://jupyter.org/install

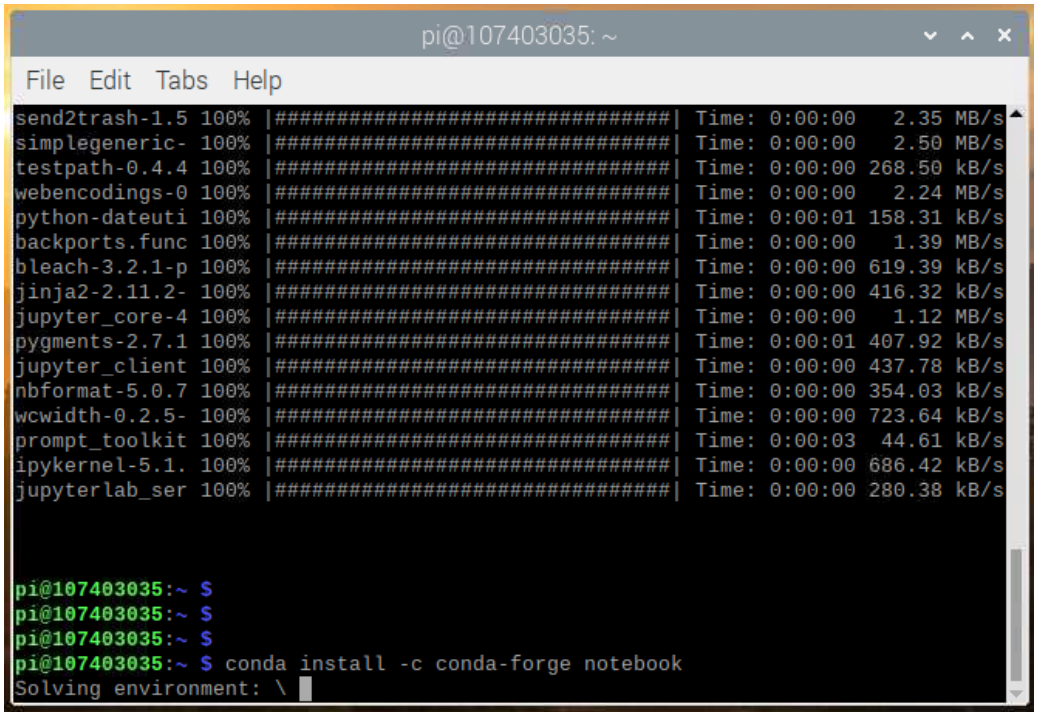
JupyterLab

在 Terminal 輸入 `conda install -c conda-forge jupyterlab`



Jupyter Notebook

在 Terminal 輸入 `conda install -c conda-forge notebook`



4. **用 Conda 下載虛擬環境套件 (Conda+pip)**

開啟 Terminal 輸入指令下載

Conda:

```
pi@107403035:~ $ conda install numpy
pi@107403035:~ $ conda install scipy
pi@107403035:~ $ conda install matplotlib
pi@107403035:~ $ conda install pandas
pi@107403035:~ $ conda install scikit-learn
```

pip:

```
pi@107403035:~ $ pip install rpi.gpio
```

使用 pip 下載 gpio 時，系統可能會要求 upgrade

```
pi@107403035:~ $ pip install --upgrade pip
```

5. **安裝 IPython kernel (Conda)**

Follow instructions on the website

https://ipython.readthedocs.io/en/stable/install/kernel_install.html

在 Terminal 中輸入指令 `python2 -m pip --version` 確認版本，符合需求 (8 以上) 就可以輸入 `conda create -n ipykernel_py2 python=2 ipykernel` 建立虛擬環境，建立成功後以 `source activate ipykernel_py2` 和 `python -m ipykernel install --user` 來完成下載

```
pi@107403035:~ $ conda create -n ipykernel_py2 python=2 ipykernel
```

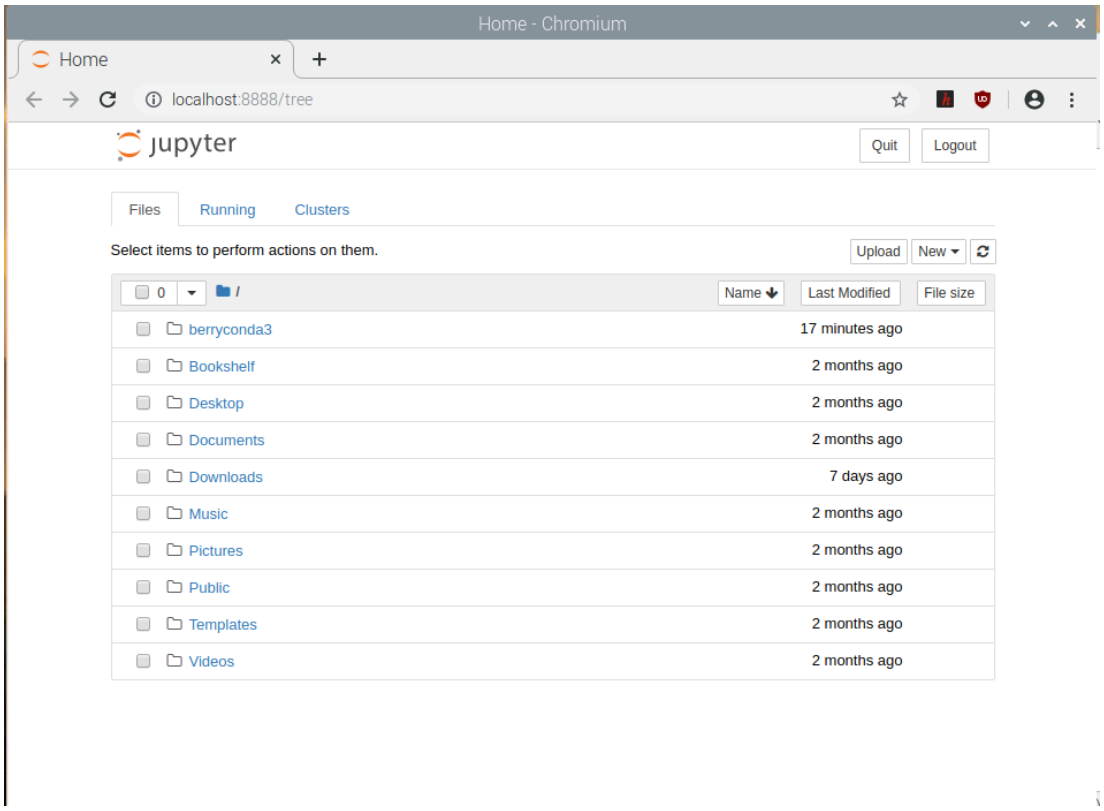
```
pi@107403035:~ $ source activate ipykernel_py2
(ipykernel_py2) pi@107403035:~ $ python -m ipykernel install --user
```

執行 Jupyter Notebook

參考資料 https://medium.com/python4u/jupyter-notebook%E5%AE%8C%E6%95%B4%E4%BB%8B%E7%B4%B9%E5%8F%8A%E5%AE%89%E8%A3%9D%E8%AA%AA%E6%98%8E-b8fcadba15f

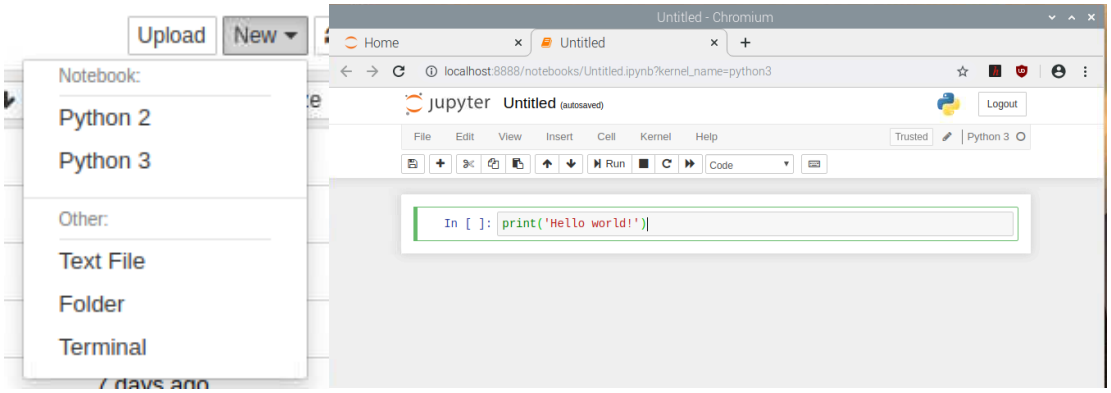
1. 開啟 Jupyter notebook

在 Terminal 輸入 `jupyter notebook` 後，Raspberry Pi OS 會出現這樣的畫面



2. 建立新 notebook

右上角的 New 下拉可以建立新的 notebook



導入模組前要確認是用 conda 還是 pip 安裝

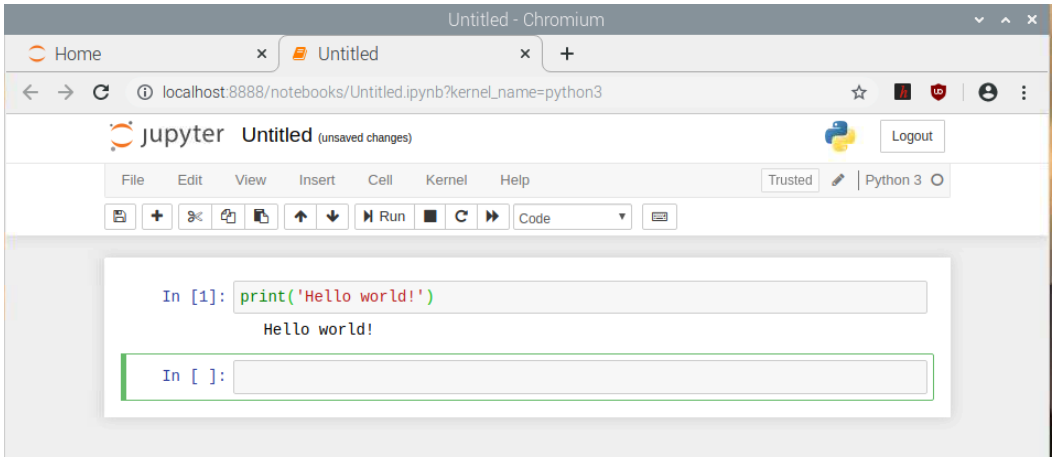
```
In [2]: import numpy
```

如果該模組不是用 conda (Jupyter Notebook 用 conda 裝)，會出現 Error

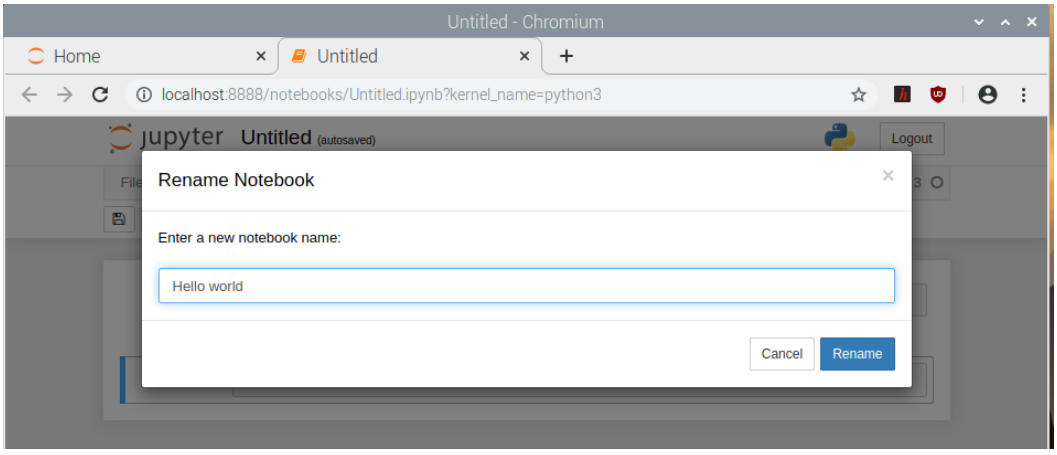
```
In [3]: import rpi.gpio
---------------------------------------------------------------------------
ModuleNotFoundError                       Traceback (most recent call
last)
<ipython-input-3-cb8729443155> in <module>()
----> 1 import rpi.gpio

ModuleNotFoundError: No module named 'rpi'
```

3. **執行 notebook**

點 Run 的按鈕，或是 Shift+ENTER



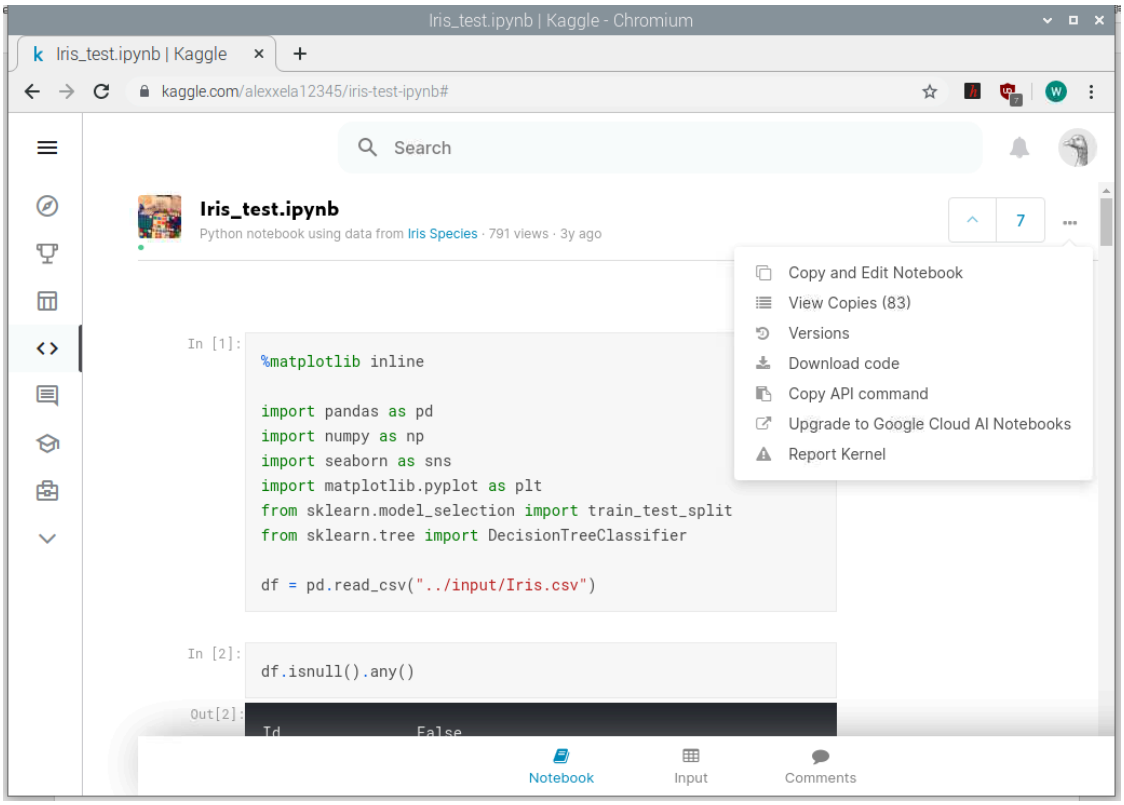
點檔名 (Untitled) 可以直接修改



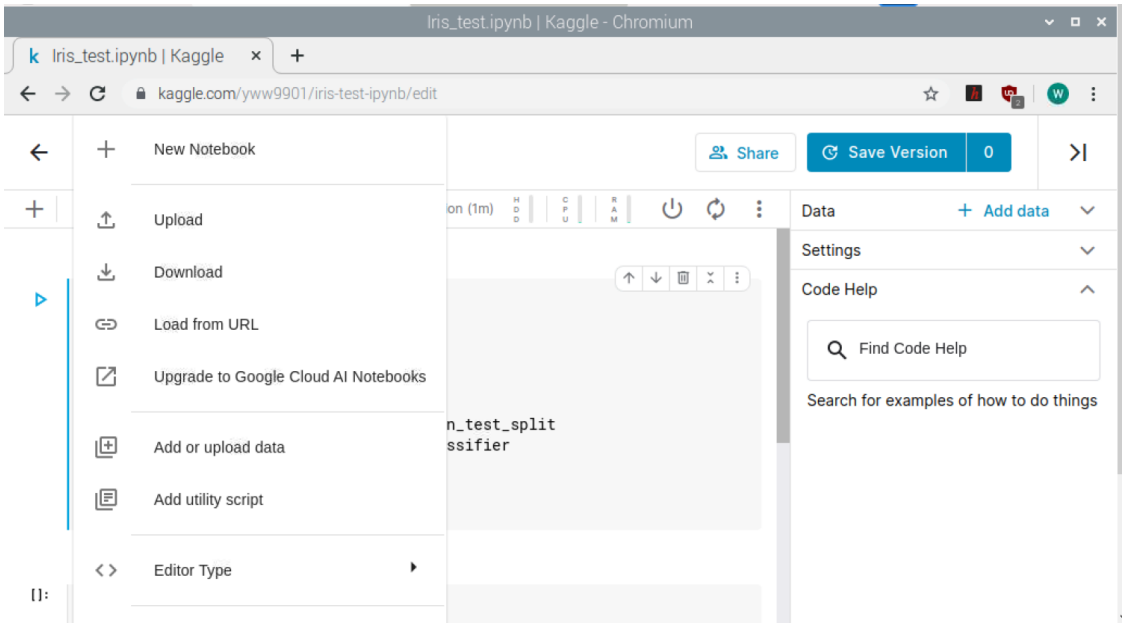
Kaggle 操作

1. 在 Kaggle 上 fork notebook

點 Copy & Edit 按鈕進入編輯頁面 (Kaggle Kernel)



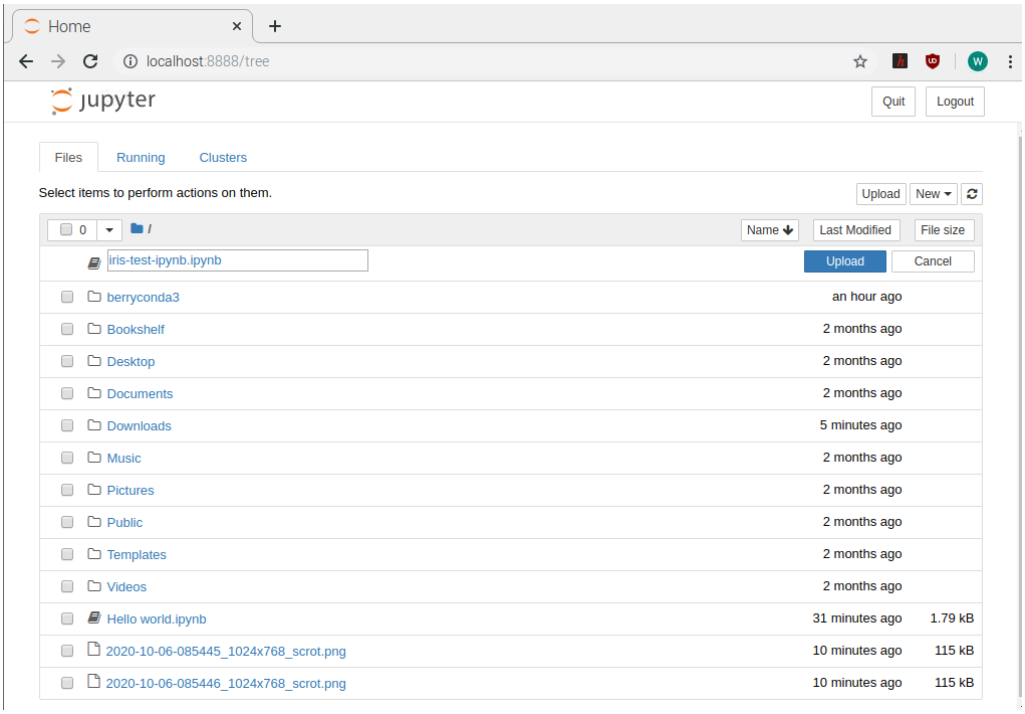
編輯頁面中左上角的 File 點擊後可以找到 Download (預設放入 Downloads 資料夾)



下載完成後會產生一個 ipynb 檔

2. 上傳到 Jupyter Notebook

一樣在 Terminal 輸入 jupyter notebook 開啟頁面，點右上的 Upload 上傳 ipynb 檔



3. 在 Jupyter 虛擬環境中執行

點擊檔名可以進入編輯頁面，上方列表中的 Kernel 裡可以找到 Change Kernel 的選項，可以變換 Python 版本，如果要執行，點 Run 或是 Kernel — Run All