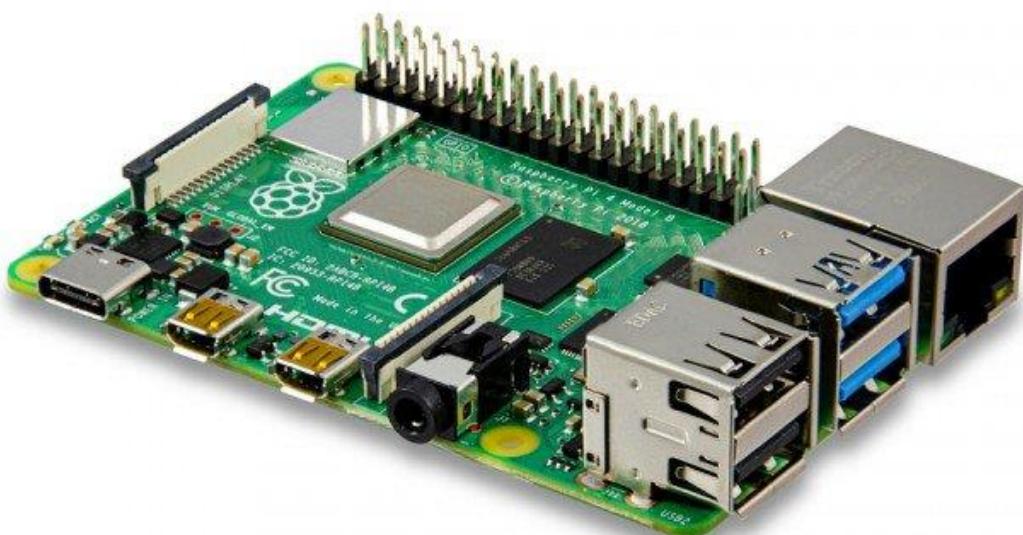


A

Step-by-Step

User Manual for Practice 1 & Practice 2



系級：資管三 A

學號：106403020

姓名：吳昭翰

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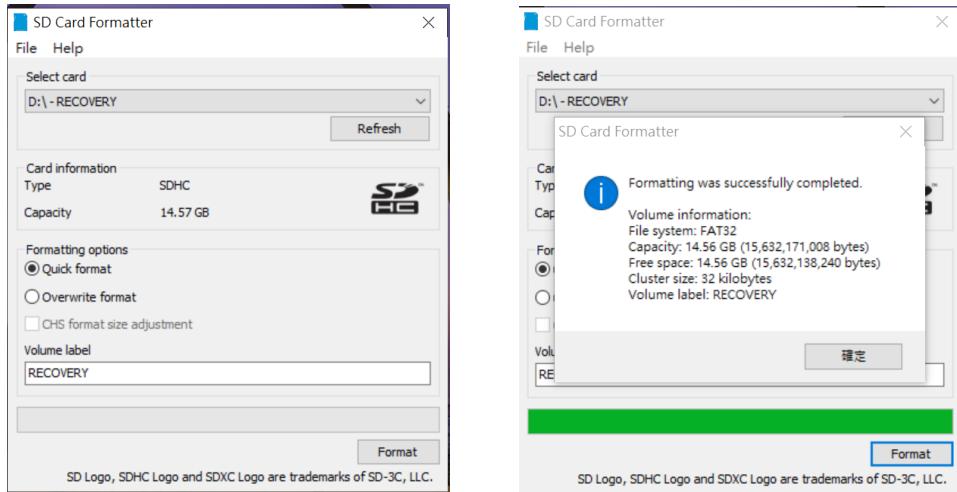
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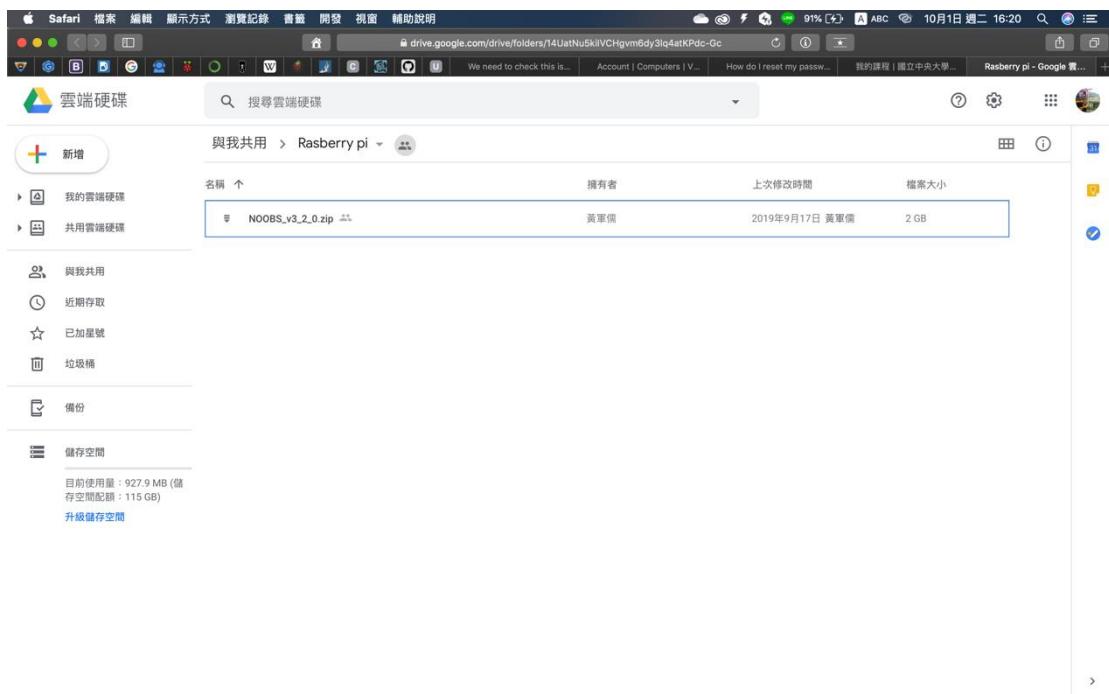
● FORMATTING THE SD CARD

1. First, download [SD card formatter](#), and insert your SD card reader into computer. Now start to format the SD card.



● INSTALLING OPERATING SYSTEM IMAGES

1. To install raspberry pi OS, we need to download [NOOBS](#) previously.

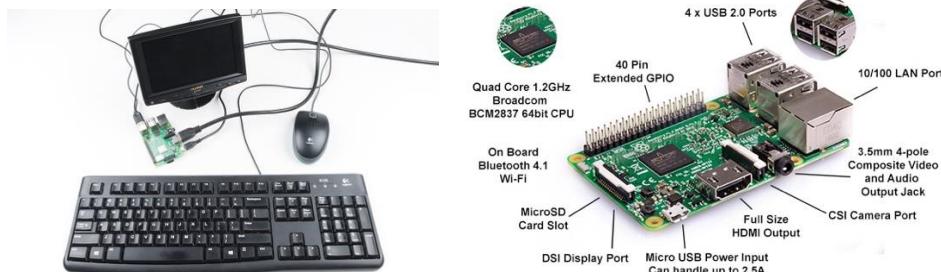


2. Then copy the NOOBS into your formatted raspberry pi. Now we complete the setting of the SD card!

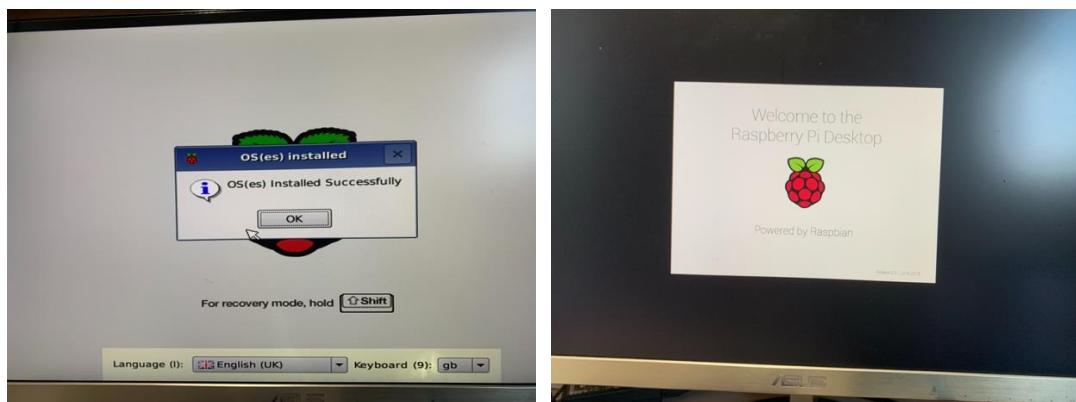
名稱	修改日期	類型	大小
defaults	2019/9/17 下午 01:44	檔案資料夾	
os	2019/9/17 下午 01:44	檔案資料夾	
overlays	2019/9/17 下午 01:44	檔案資料夾	
bcm2708-rpi-b.dtb	2019/6/10 下午 12:18	DTB 檔案	23 KB
bcm2708-rpi-b-plus.dtb	2019/6/10 下午 12:18	DTB 檔案	23 KB
bcm2708-rpi-cm.dtb	2019/6/10 下午 12:18	DTB 檔案	23 KB
bcm2708-rpi-zero.dtb	2019/6/10 下午 12:18	DTB 檔案	23 KB
bcm2708-rpi-zero-w.dtb	2019/6/10 下午 12:18	DTB 檔案	24 KB
bcm2709-rpi-2-b.dtb	2019/6/10 下午 12:18	DTB 檔案	24 KB
bcm2710-rpi-3-b.dtb	2019/6/10 下午 12:18	DTB 檔案	26 KB
bcm2710-rpi-3-b-plus.dtb	2019/6/10 下午 12:18	DTB 檔案	26 KB
bcm2710-rpi-cm3.dtb	2019/6/10 下午 12:18	DTB 檔案	25 KB
bcm2711-rpi-4-b.dtb	2019/6/10 下午 12:18	DTB 檔案	39 KB
bootcode.bin	2019/6/10 下午 12:18	BIN 檔案	52 KB
BUILD-DATA	2019/6/10 下午 12:18	檔案	1 KB
INSTRUCTIONS-README.txt	2019/6/10 下午 12:18	文字文件	3 KB
recover4.elf	2019/6/10 下午 12:18	ELF 檔案	743 KB
recovery.cmdline	2019/6/10 下午 12:18	CMDLINE 檔案	1 KB
recovery.elf	2019/6/10 下午 12:18	ELF 檔案	668 KB
recovery.img	2019/6/10 下午 12:18	光碟映像檔	2,949 KB
recovery.rfs	2019/6/10 下午 12:18	RFS 檔案	27,904 KB
RECOVERY_FILES_DO_NOT_EDIT	2019/6/10 下午 12:18	檔案	0 KB
recovery7.img	2019/6/10 下午 12:18	光碟映像檔	3,108 KB

● OPEN YOUR RASPBERRY PI WITH COMPUTER DEVICES FOR THE FIRST TIME AND SET VNC.

1. For the first time, you need to connect with keyboard/mouse/monitor to open raspberry pi.

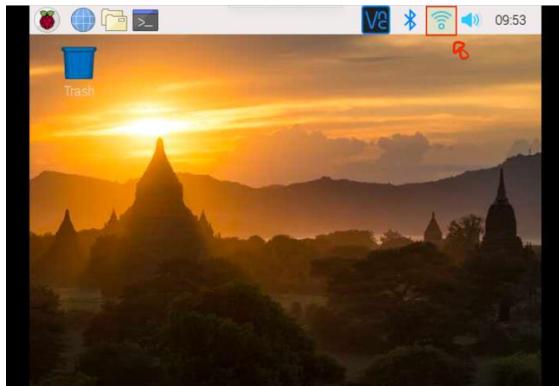


2. Then plug in the raspberry pi and start running Raspbian (raspberry pi OS)

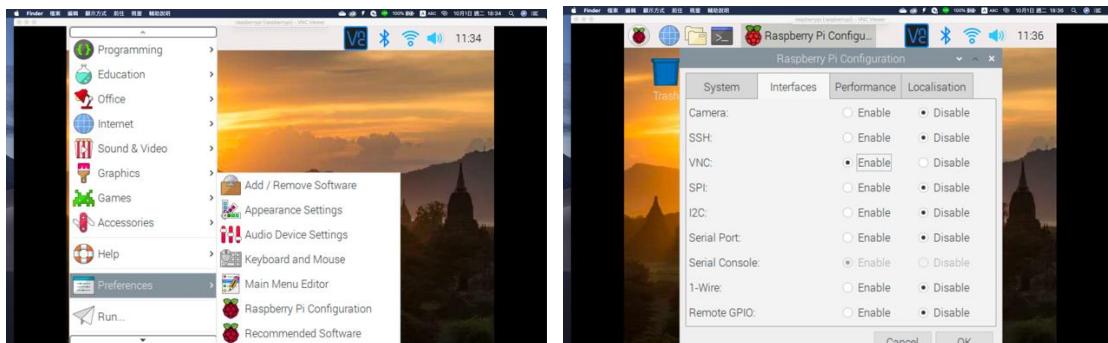




3. Connect to your wi-fi.



4. To get rid of the troubles of connecting computer devices, we need to use VNC which is a remote control service. Go to [Preferences]-> [Raspberry Pi Configuration] and enable the [VNC].



5. Then go back to your PC or Notebook and download [VNC viewer](#).

VNC® Connect consists of VNC® Viewer and VNC® Server

Download VNC® Viewer to the device you want to control from, below. Make sure you've [installed VNC® Server](#) on the computer you want to control.

Windows macOS Linux Raspberry Pi iOS Android Chrome Solaris HP-UX AIX

[Download VNC Viewer](#)

SHA-256: 918b0e5653265c6b272e538e3517d0ee0c6ec49e9dc2da1a04e4582b3b768fc9

[Looking for VNC® Server?](#)

6. Then [sign up](#) a new account.

RealVNC® uses cookies. For more information, please read our [privacy policy](#). [Got it](#)

Existing RealVNC customer? You may already have an account. Please enter the email address we sent your last license key to.

Sign up or sign in

Please enter your email

We'll sign you up if you're new. Please enter your **real email address**; you'll need to receive email to sign in on new devices.

Email address

We'll store your email securely, and never share it. You can manage communications in your account profile. [Privacy policy](#).

我不是機器人 reCAPTCHA 防止垃圾 - 請選

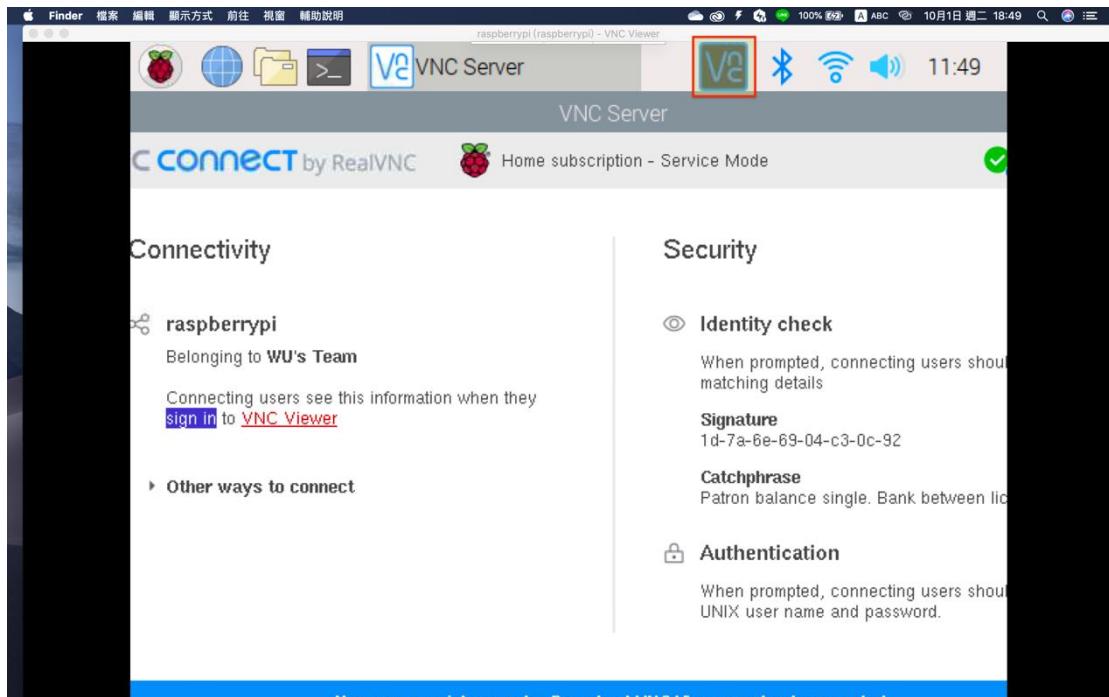
If you can't see our reCAPTCHA above, please [contact support](#).

[Next](#)

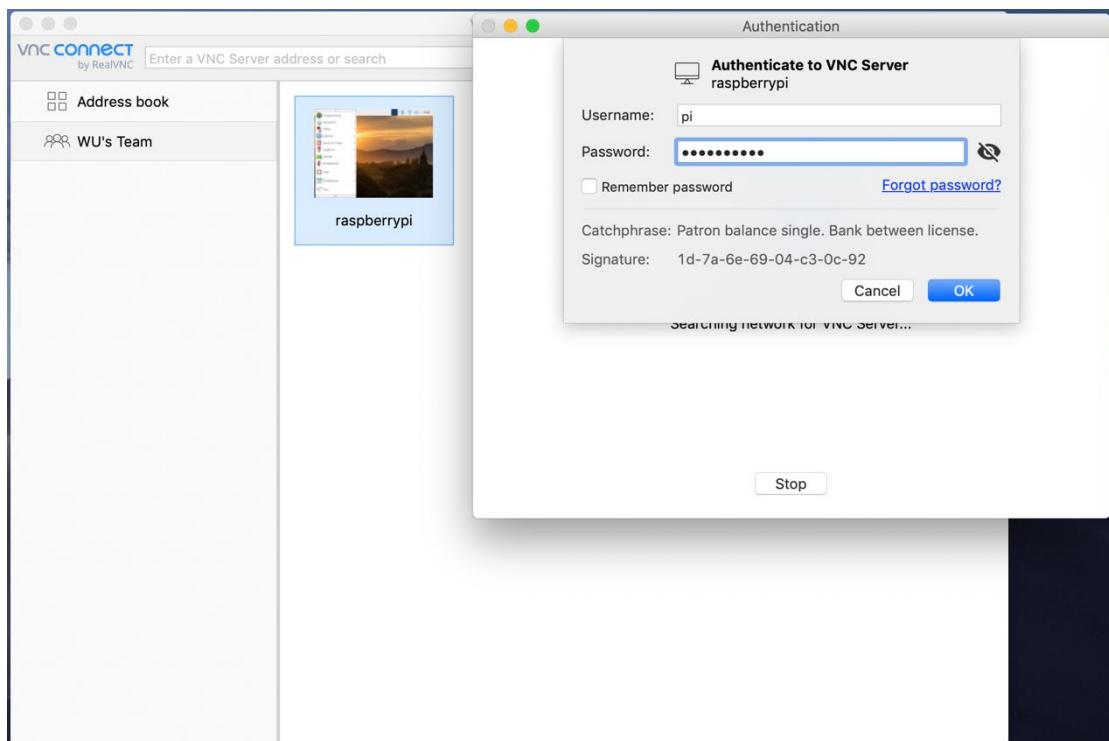
ACCOUNT BENEFITS

- Automatic discovery
- Address book sharing
- Backup and sync
- Remote sign out

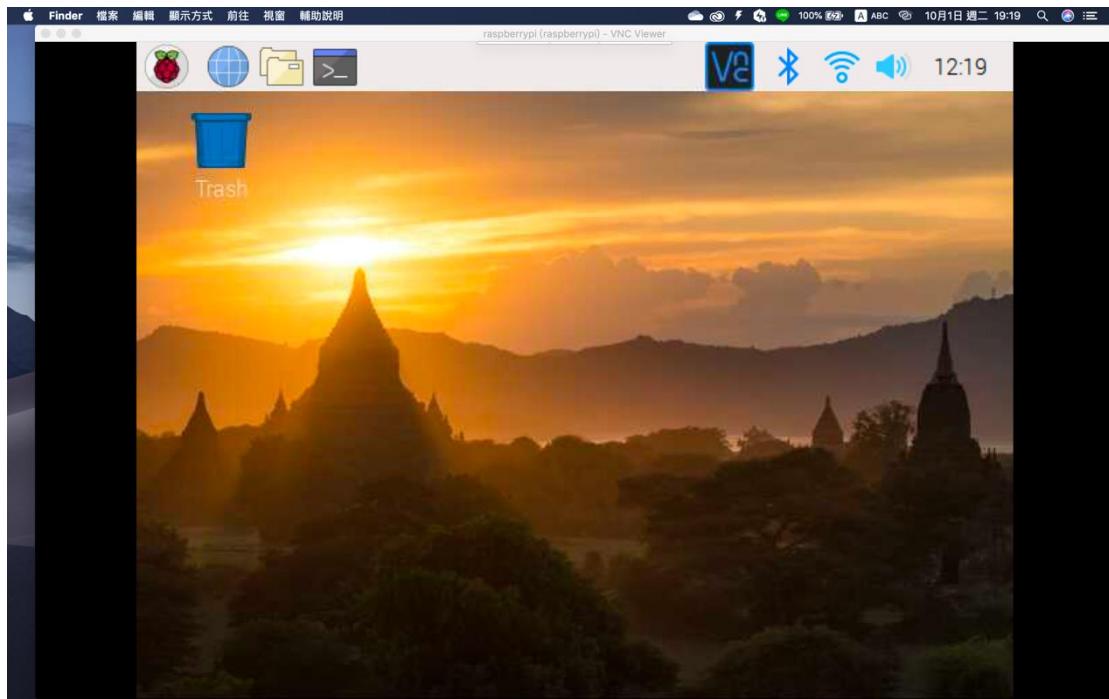
7. Come back to your raspberry pi. Click VNC icon and sign in to your account. The VNC Server will record your account to connect with the VNC Viewer on your PC or Notebook.



8. Shutdown your raspberry. Open the VNC Viewer on your PC or Notebook and boot your raspberry pi. Enter Username with [pi] (in default) and your account password.

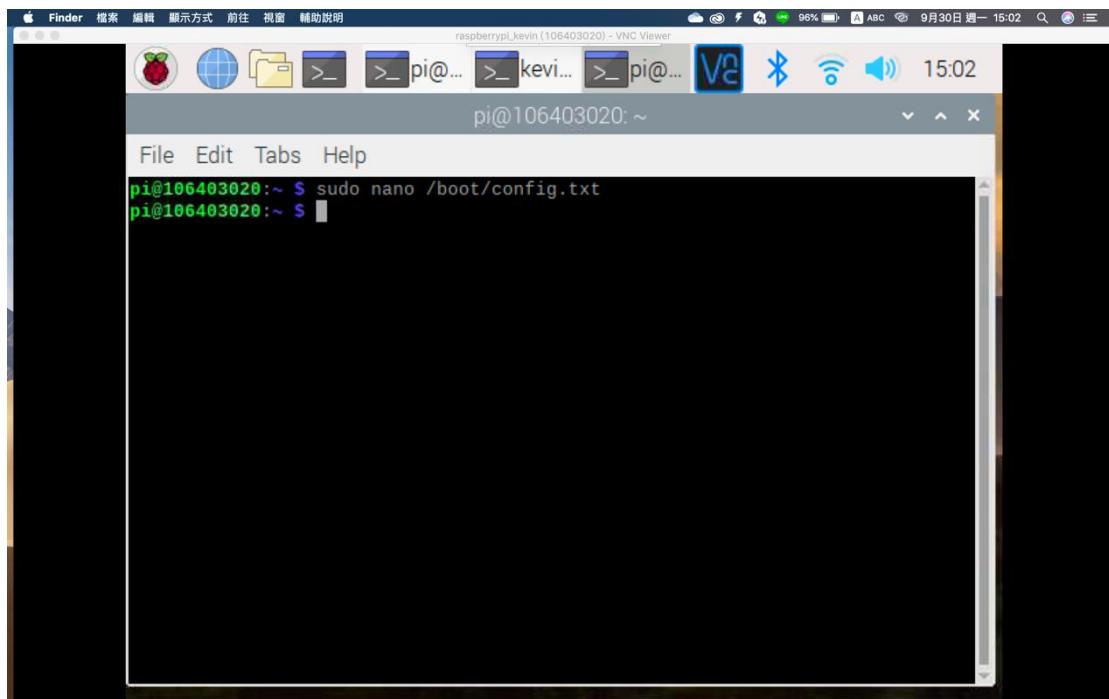


9. Now you can start to explore the world of raspberry pi!



● EDITING THE CONFIG.TXT FOR VIDEO OUTPUT

1. Enter `sudo nano /boot/config.txt` on Terminal.



[Can't edit config.txt](#)

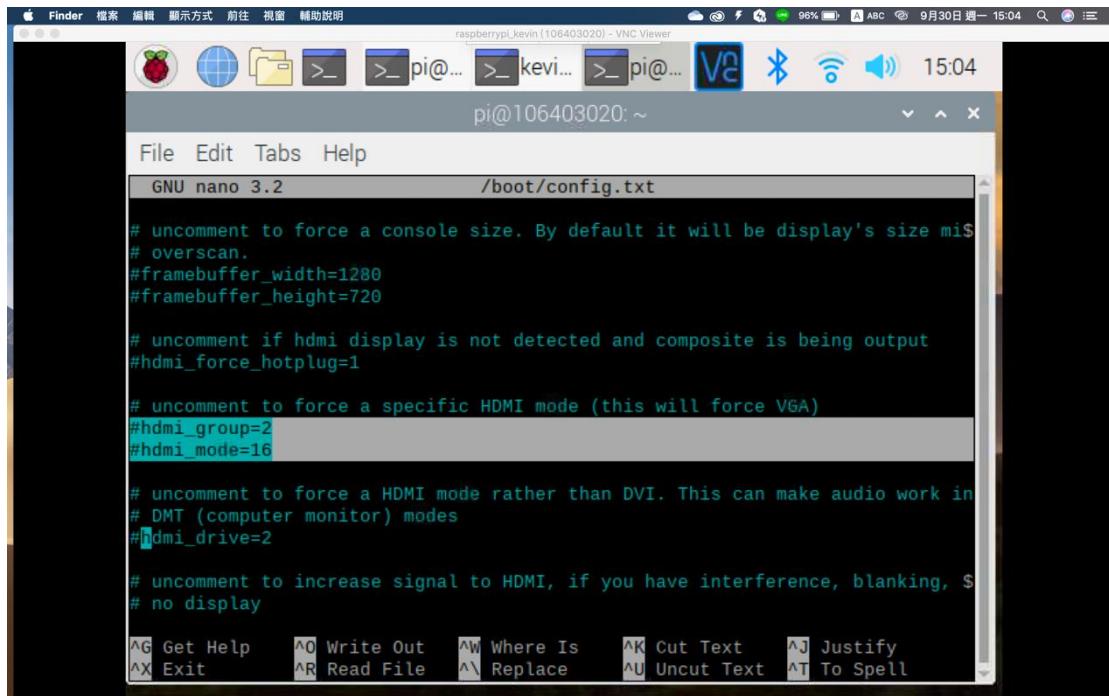
2. Editing the `#hdmi_group` / `#hdmi_mode` / `#hdmi_drive` to

`#hdmi_group=2 (for DMT)`

```
#hdmi_mode=16 (for 1024x768 60Hz) or 85 (for 1280x720 60Hz)
#hdmi_drive=2 (for Normal HDMI mode) (sound will be sent if supported and
enabled)
```

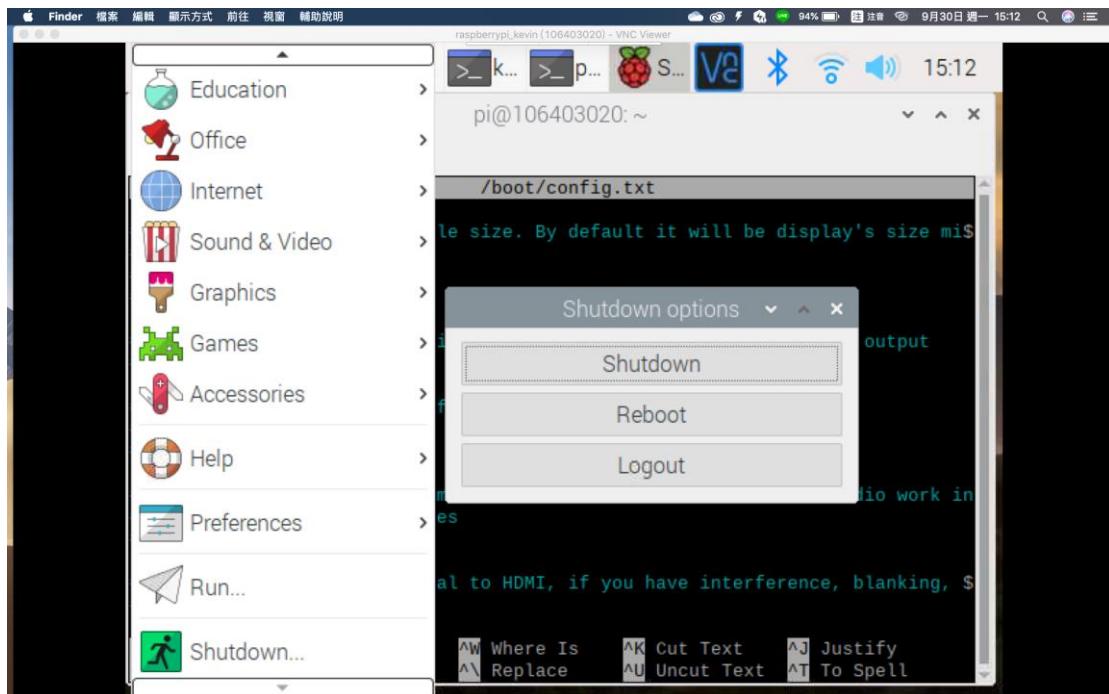
Video options in config.txt

3. Keying **^X** save and close the window.



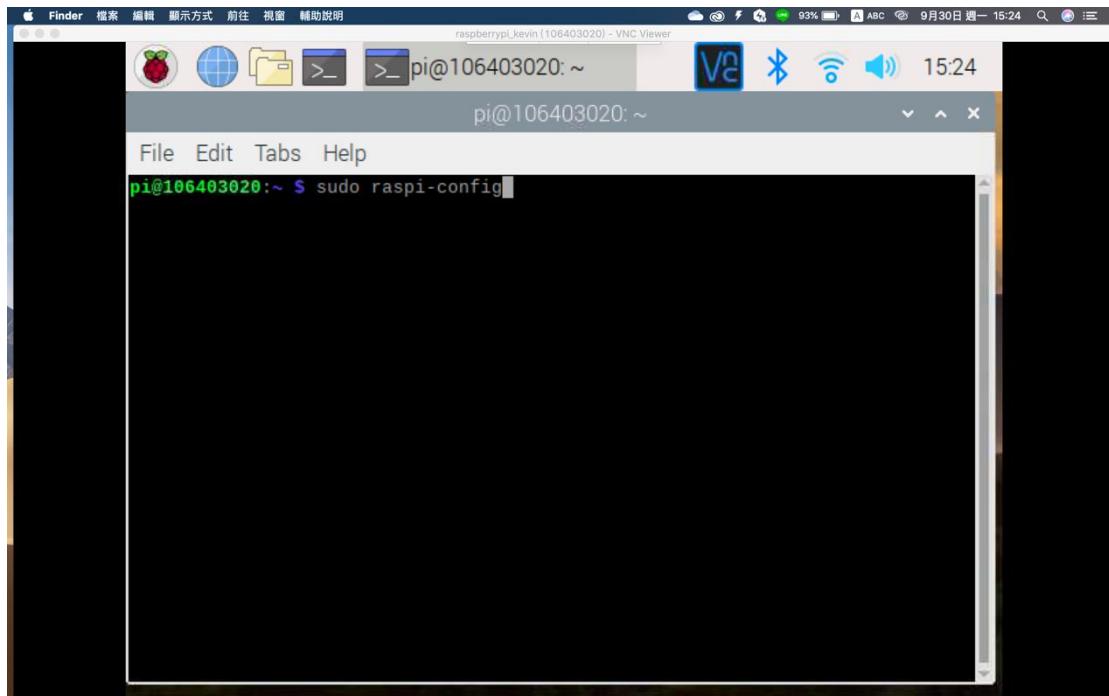
● BOOTING UP YOUR RASPBERRY PI FOR THE FIRST TIME

1. Then reboot your raspberry pi.

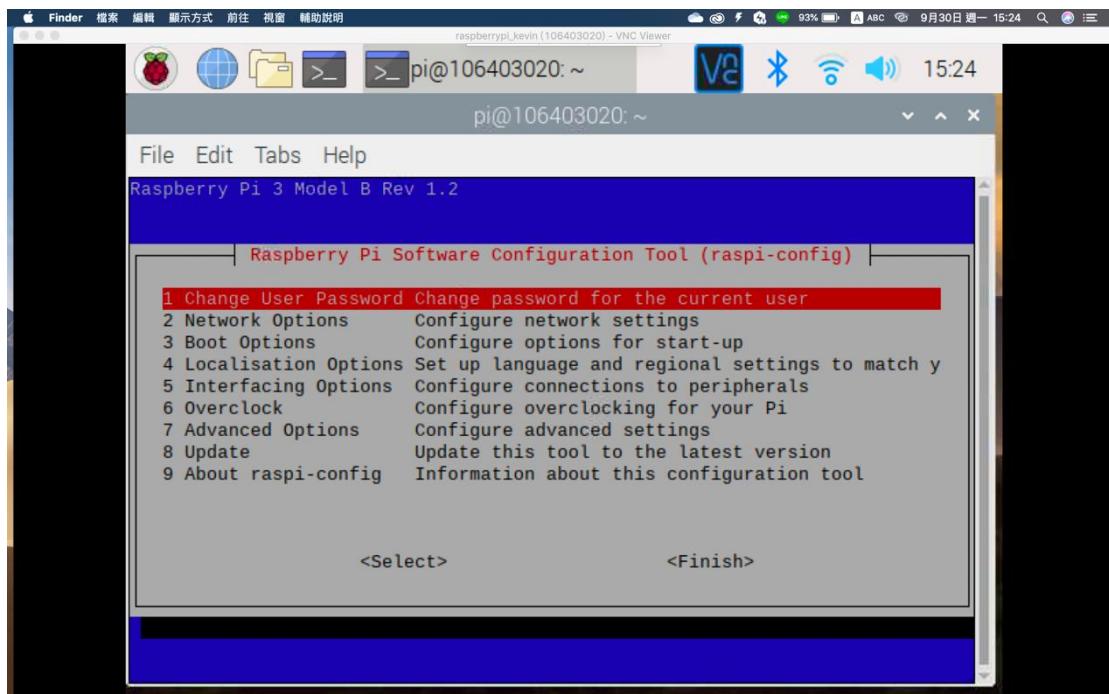


● LOGGING IN WITH THE DEFAULT USERNAME AND PASSWORD

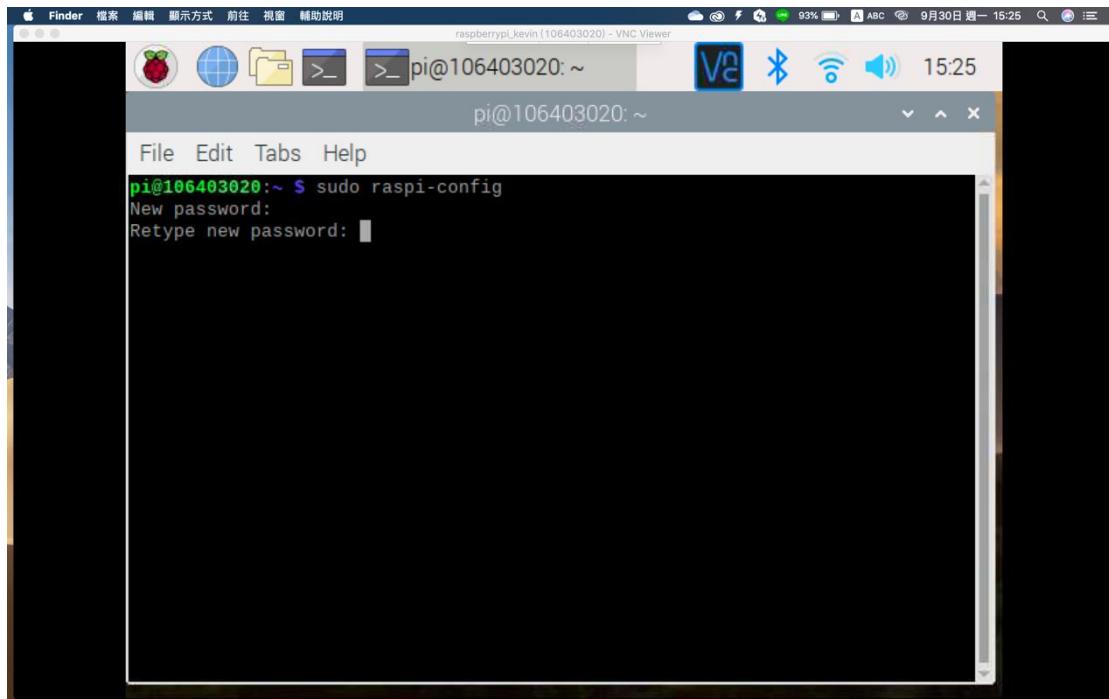
1. Enter `sudo raspi-config` on Terminal.



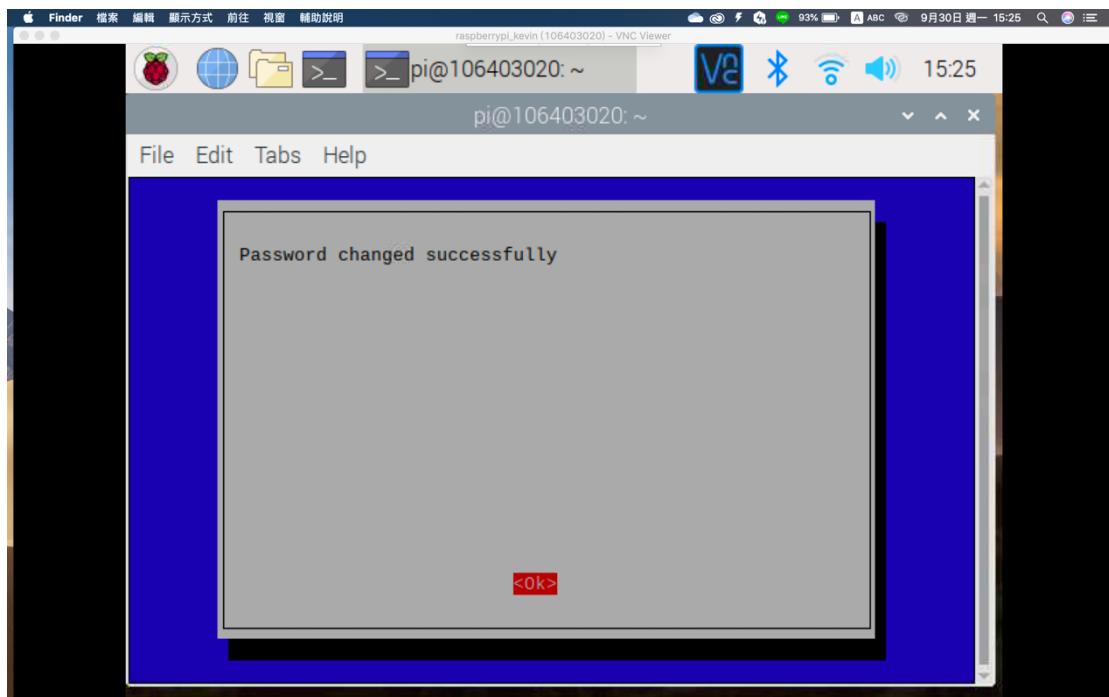
2. Click the first option



3. Enter your new password



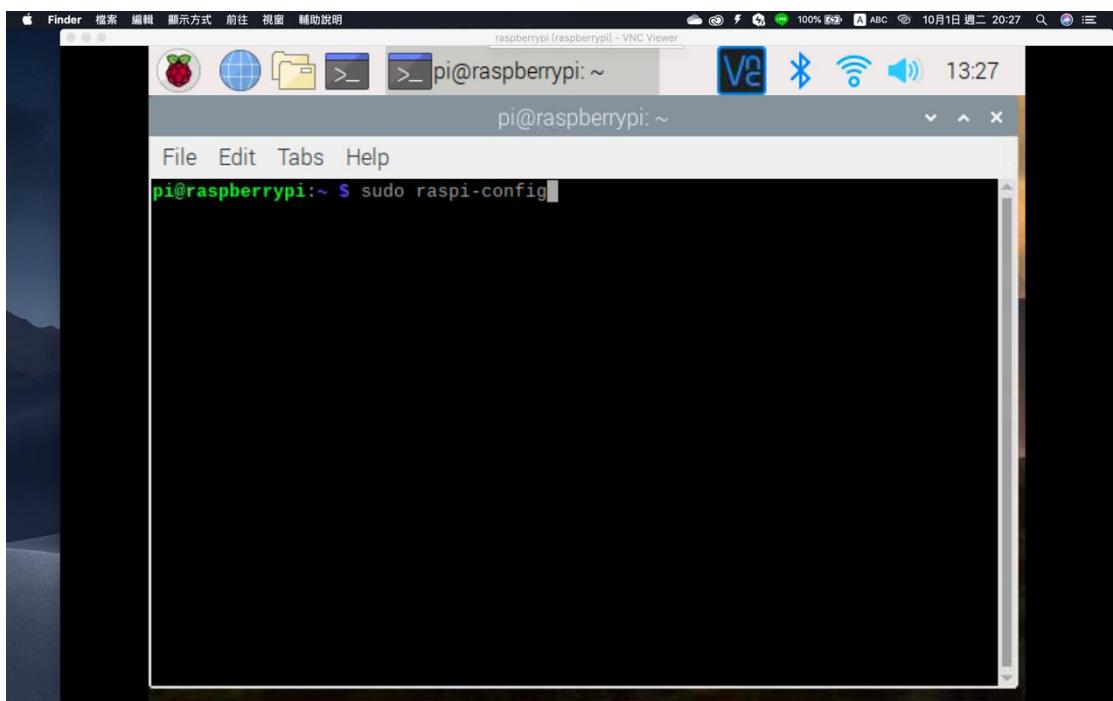
4. Successfully!



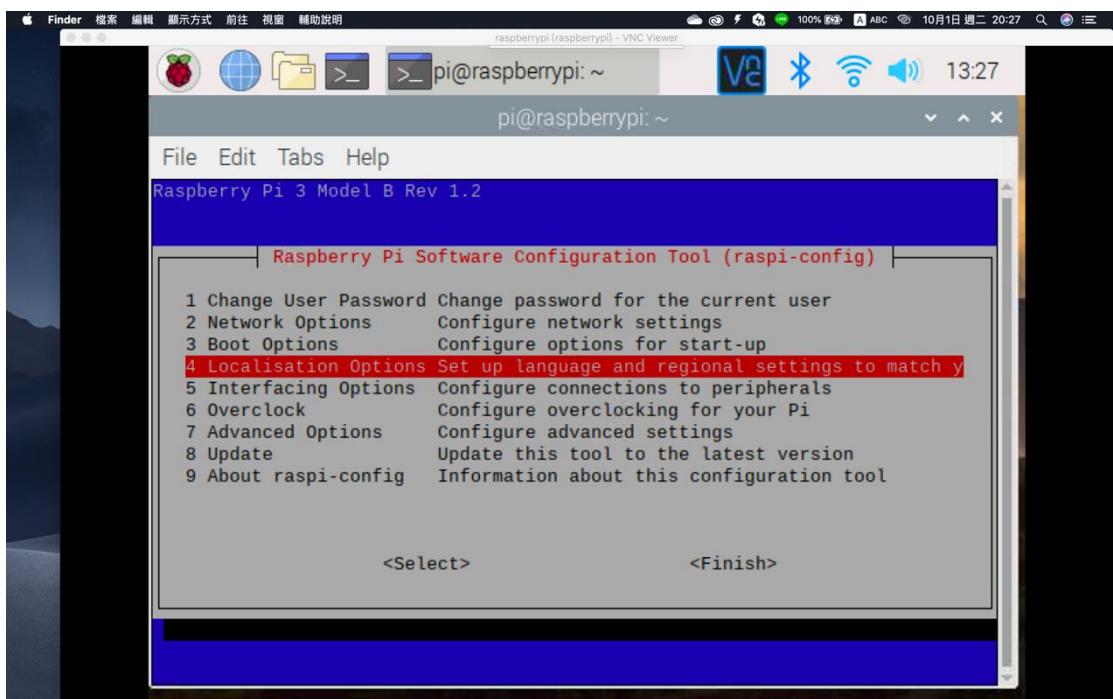
● CHANGE YOUR KEYBOARD LAYOUT AND THEN REBOOT

1. Enter `sudo raspi-config` on Terminal.

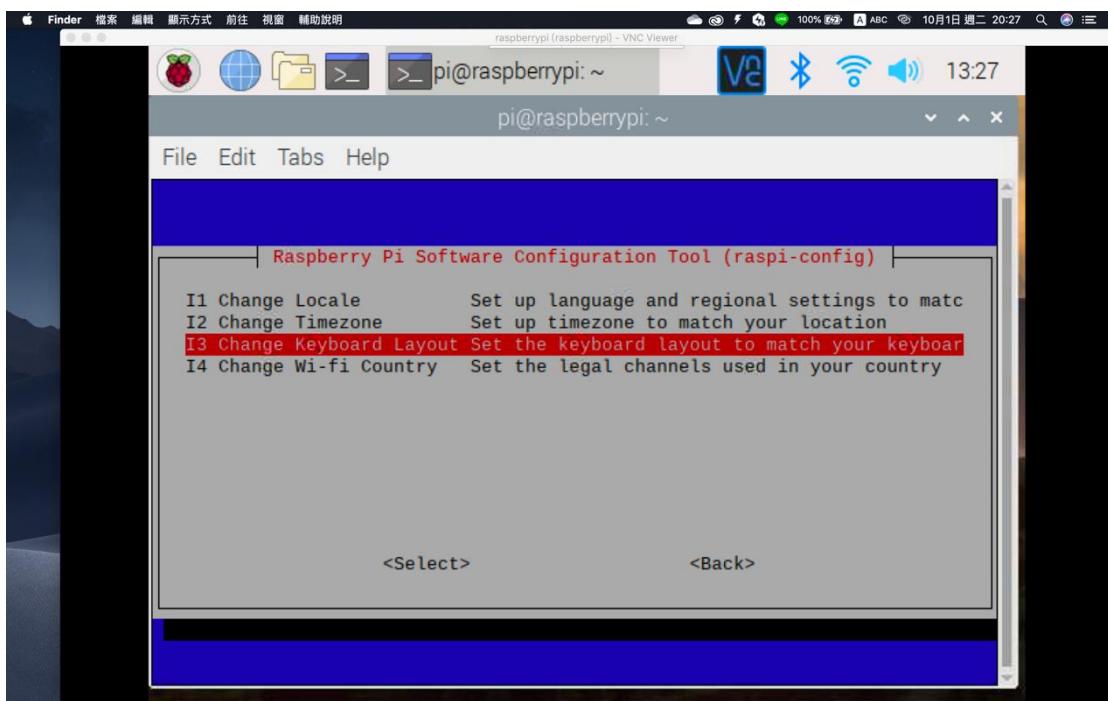
[Changing the Raspberry Pi Keyboard Layout](#)



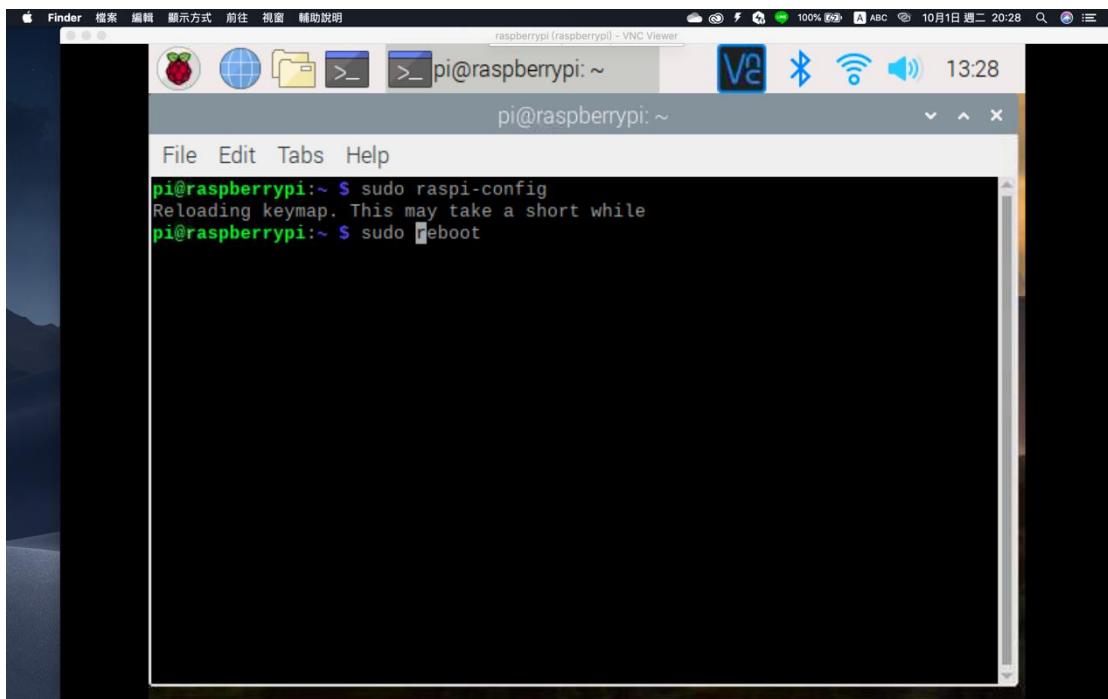
2. Choose [Localisation Options]



3. Choose [Change Keyboard Layout]



4. Now reboot your raspberry pi. sudo reboot



● CREATING NEW USER AND GIVE AN AUTHORIZATION FOR IT

1. Enter `sudo adduser kevinwu` and you'll be prompted for a password for the new user `kevinwu`
2. Then enter new password for this user
3. Press ENTER to use the default setting

```
pi@106403020:~ $ sudo adduser kevinwu
Adding user `kevinwu' ...
Adding new group `kevinwu' (1002) ...
Adding new user `kevinwu' (1002) with group `kevinwu' ...
Creating home directory `/home/kevinwu' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for kevinwu
Enter the new value, or press ENTER for the default
    Full Name []:
    Room Number []:
    Work Phone []:
    Home Phone []:
    Other []:
Is the information correct? [Y/n] Y
pi@106403020:~ $
```

4. Type `sudo visudo` on Terminal.
5. Find out the line `# User privilege specification` and add a new line `kevinwu`
`ALL=NOPASSWD: ALL` as the root like.
6. Save and exit. `^X`

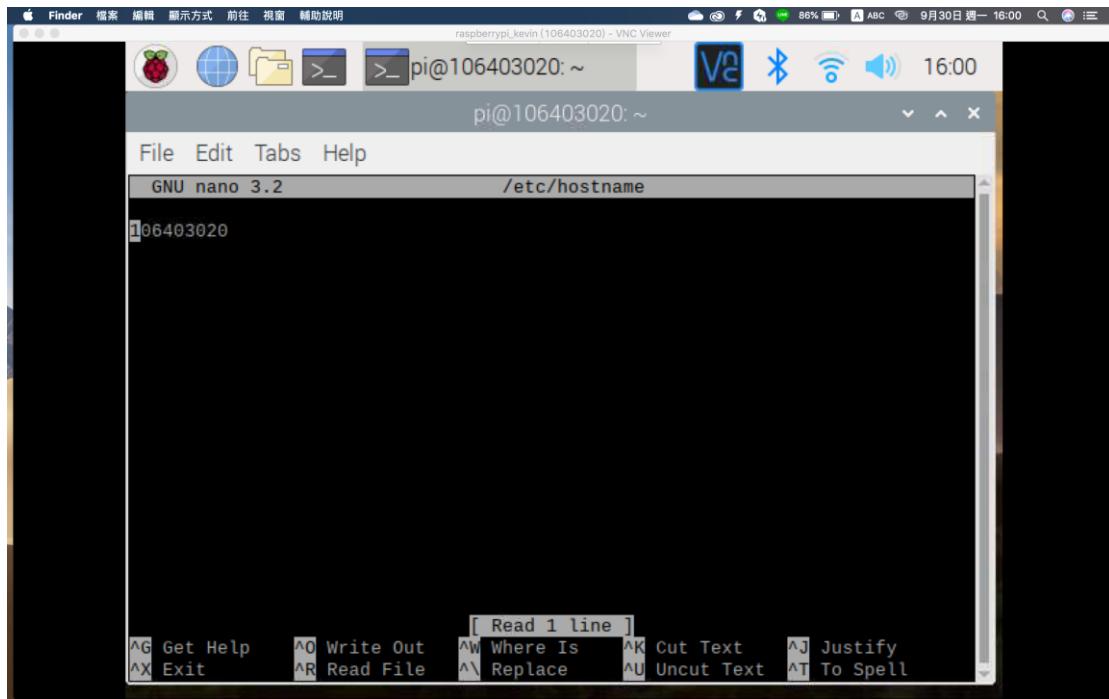
```
pi@106403020:~ $ cat /etc/sudoers.tmp
# User privilege specification
root    ALL=(ALL:ALL) ALL
kevin   ALL=NOPASSWD: ALL
kevinwu  ALL=NOPASSWD: ALL

# Allow members of group sudo to execute any command
%sudo   ALL=(ALL:ALL) ALL

# See sudoers(5) for more information on "#include" directives:
#include /etc/sudoers.d
```

● SETTING THE HOSTNAME TO BE YOUR STUDENT NUMBER

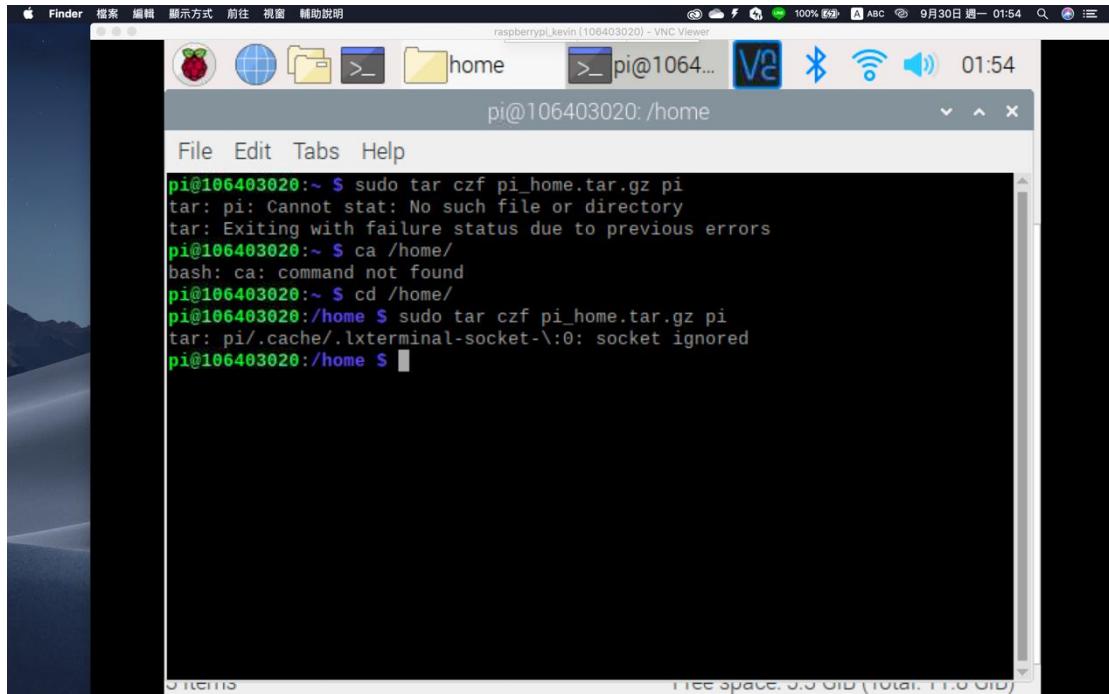
1. Enter `sudo nano /etc/hostname` on Terminal.
2. Change the only default name to your student number.
3. Save and exit. `^X`



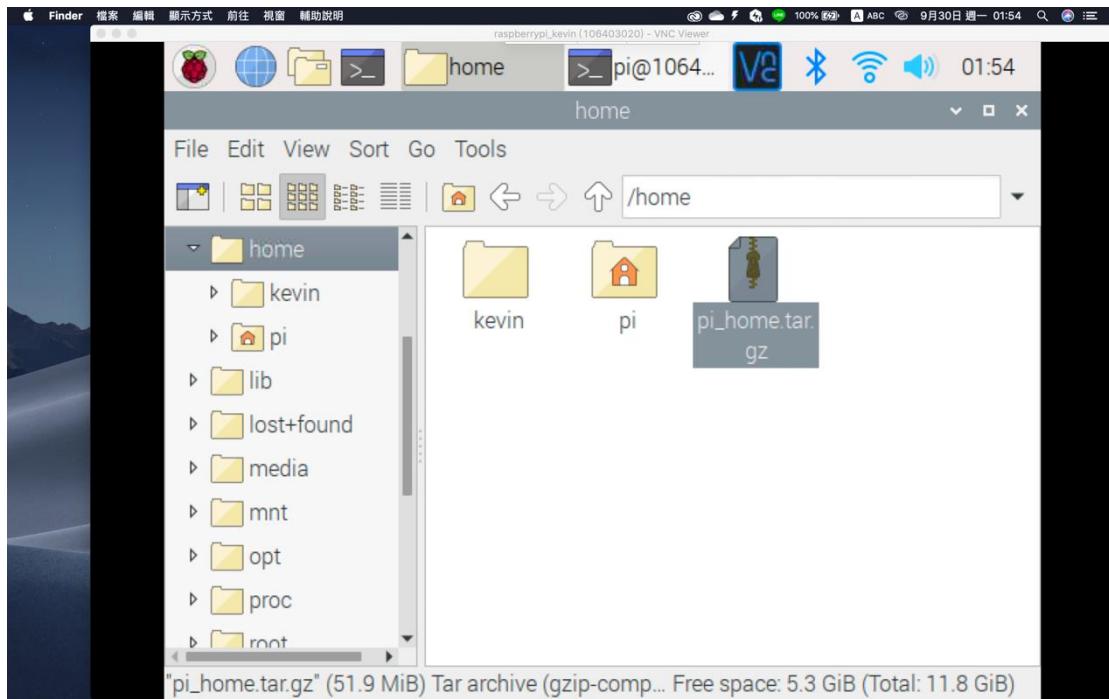
4. Reboot the raspberry pi and the new hostname appear.

● BACKING UP YOUR RASPBIAN OS

1. Enter `sudo tar czf pi_home.tar.gz pi` on Terminal.



2. Then it will create a backup file in /home.



3. Save this file into your USB.

● INSTALLING CONDA

1. First change to your own user `su [username]`

2. Enter `wget`

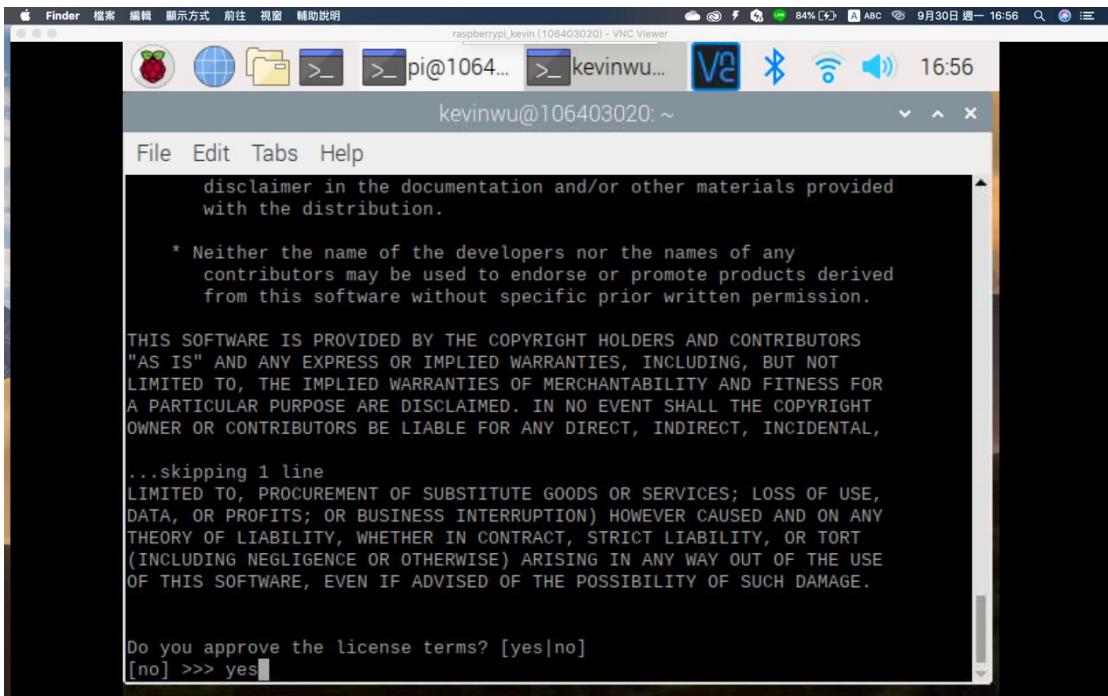
```
https://github.com/jjhelmus/berryconda/releases/download/v2.0.0/Berryco
nda3-2.0.0-Linux-armv7l.sh bash Berryconda3-2.0.0-Linux-armv7l.sh
```

on Terminal. (It will take a few minutes.)

```
kevinwu@106403020:~$ wget https://github.com/jjhelmus/berryconda/releases/do
wnload/v2.0.0/Berryconda3-2.0.0-Linux-armv7l.sh bash Berryconda3-2.0.0-Linux-
armv7l.sh
--2019-09-30 16:41:53-- https://github.com/jjhelmus/berryconda/releases/down
load/v2.0.0/Berryconda3-2.0.0-Linux-armv7l.sh
Resolving github.com (github.com)... 140.82.114.3
Connecting to github.com (github.com)|140.82.114.3|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://github-production-release-asset-2e65be.s3.amazonaws.com/758
86189/ced18f0c-5fd0-11e7-8a11-282642a50db5?X-Amz-Algorithm=AWS4-HMAC-SHA256&X
-Amz-Credential=AKIAIWNYAX4CSVEH53A%2F20190930%2Fus-east-1%2Fs3%2Faws4_quee
st&X-Amz-Date=20190930T084155Z&X-Amz-Expires=300&X-Amz-Signature=a553fb3d4d9
af75cd4598f760400da8f551667a5d6060cdfa11e4e110fe0b9c&X-Amz-SignedHeaders=host
&actor_id=0&response-content-disposition=attachment%3Bfilename%3DBerrycond
a3-2.0.0-Linux-armv7l.sh&response-content-type=application%2Foctet-stream [fo
llowing]
--2019-09-30 16:41:55-- https://github-production-release-asset-2e65be.s3.am
azonaws.com/75886189/ced18f0c-5fd0-11e7-8a11-282642a50db5?X-Amz-Algorithm=AWS
4-HMAC-SHA256&X-Amz-Credential=AKIAIWNYAX4CSVEH53A%2F20190930%2Fus-east-1%2F
s3%2Faws4_request&X-Amz-Date=20190930T084155Z&X-Amz-Expires=300&X-Amz-Signatu
re=a553fb3d4d9af75cd4598f760400da8f551667a5d6060cdfa11e4e110fe0b9c&X-Amz-Sig
nedHeaders=host&actor_id=0&response-content-disposition=attachment%3Bfilename%3DBerrycond
a3-2.0.0-Linux-armv7l.sh&response-content-type=application%2F
```

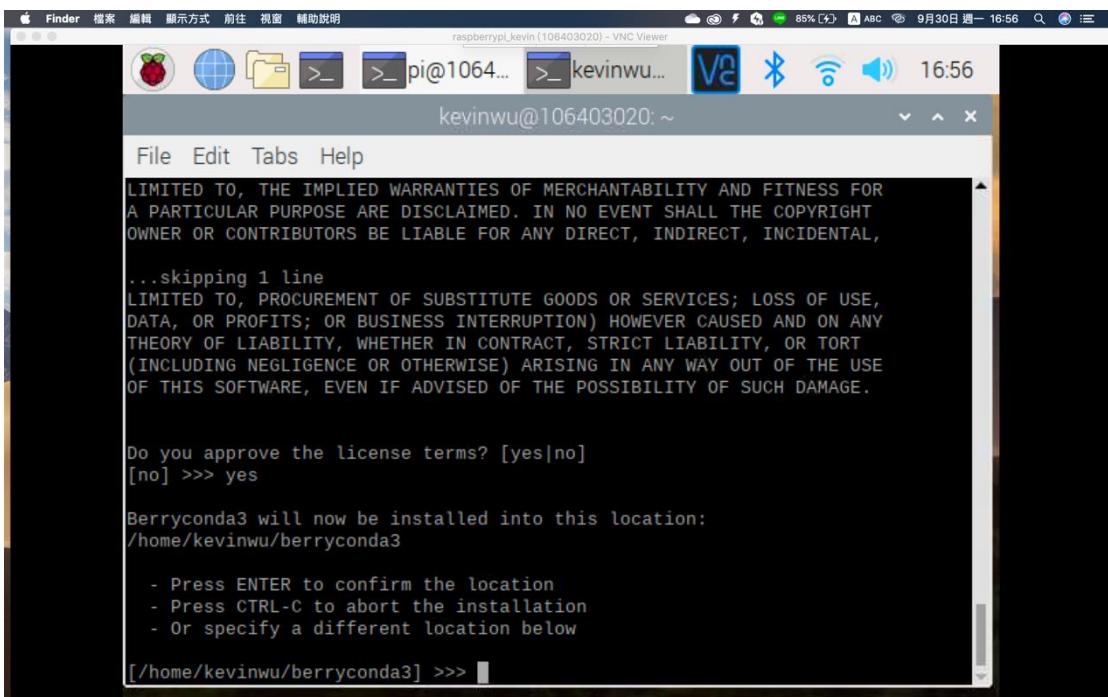
3. Then enter `bash Berryconda3-2.0.0-Linux-armv7l.sh` It will ask you some

questions like if you approve the license. Enter yes.



A screenshot of a VNC viewer window titled "raspberrypi_kevin (106403020) - VNC Viewer". The window shows a terminal session with the command "pi@1064...: ~" and the user "kevinwu". The terminal displays the Berryconda3 license agreement, which includes a disclaimer about the software's purpose and liability, followed by a copyright notice, and a section about skipping lines. At the bottom, it asks "Do you approve the license terms? [yes|no]" and the user has typed "[no] >> yes".

4. Do you want to install it into the default path? Press Enter.



A screenshot of a VNC viewer window titled "raspberrypi_kevin (106403020) - VNC Viewer". The window shows a terminal session with the command "pi@1064...: ~" and the user "kevinwu". The terminal displays the Berryconda3 license agreement again, followed by a message asking if the user wants to install it into the default path. It then asks for confirmation with "Berryconda3 will now be installed into this location: /home/kevinwu/berryconda3" and provides instructions: "- Press ENTER to confirm the location", "- Press CTRL-C to abort the installation", and "- Or specify a different location below". The user has typed "[/home/kevinwu/berryconda3] >>".

A screenshot of a VNC session titled "raspberrypi_kevin (106403020) - VNC Viewer". The terminal window shows the following output:

```
installing: setuptools-36.0.1-py36_0 ...
installing: six-1.10.0-py36_0 ...
installing: sqlite-3.15.0-0 ...
installing: tk-8.6.6-0 ...
installing: urllib3-1.21.1-py36_0 ...
installing: wheel-0.29.0-py36_0 ...
installing: xz-5.2.2-0 ...
installing: yaml-0.1.6-0 ...
installing: zlib-1.2.11-0 ...
installation finished.
Do you wish the installer to prepend the Berryconda3 install location
to PATH in your /home/kevinwu/.bashrc ? [yes|no]
[no] >>> yes

Prepending PATH=/home/kevinwu/berryconda3/bin to PATH in /home/kevinwu/.bashrc
A backup will be made to: /home/kevinwu/.bashrc-berryconda3.bak

For this change to become active, you have to open a new terminal.

Thank you for installing Berryconda3!
kevinwu@106403020:~ $
```

5. When it finished, you can update your conda by typing `conda update conda`

A screenshot of a VNC session titled "raspberrypi_kevin (106403020) - VNC Viewer". The terminal window shows the following output:

```
Prepending PATH=/home/kevinwu/berryconda3/bin to PATH in /home/kevinwu/.bashrc
A backup will be made to: /home/kevinwu/.bashrc-berryconda3.bak

For this change to become active, you have to open a new terminal.

Thank you for installing Berryconda3!
kevinwu@106403020:~ $ source ~/.bashrc
kevinwu@106403020:~ $ conda --version
conda 4.3.22
kevinwu@106403020:~ $ conda update conda
Fetching package metadata .....
Solving package specifications: .

Package plan for installation in environment /home/kevinwu/berryconda3:

The following packages will be UPDATED:

    conda: 4.3.22-py36_0 --> 4.5.11-py36_0
    pycosat: 0.6.1-py36_0 --> 0.6.3-py36hdff2a78_1

Proceed ([y]/n)? y
```

6. And check your conda if it already up to date. Typing `conda --version`
[RASPBERRY PI 树莓派通过 BERRYCONDA 安装 CONDA PYTHON 发行版](#)

● INSTALLING JUPYTER NOTEBOOK

1. First, change to your own user `su [username]`
2. Then typing `conda install -c rpi jupyter`. It will start to install jupyter using conda. (Note that using -c to divide into different channel.)

3. Typing conda list to check if there is a [notebook] on your conda.

4. If not, enter conda install notebook to install it.

```
kevin@106403020:~/home/pi$ conda list
simplegeneric          0.8.1           py_1
six                   1.10.0          py36_0
sqlite                3.15.0           0
terminado              0.8.1           py36_1
testpath               0.3.1           py36_1
tk                     8.6.6             0
tornado                5.1            py36hdf2a78_1
traitlets              4.3.2           py36_0
urllib3                1.21.1          py36_0
wcwidth                0.1.7           py_1
webencodings           0.5.1           py_1
wheel                  0.29.0          py36_0
widgetsnbextension     3.4.1           py36_0
xz                     5.2.2             0
yaml                   0.1.6             0
zeromq                 4.2.5           h4f752ac_5
zlib                   1.2.11            0
kevin@106403020:~/home/pi$ conda install notebook
Solving environment: done

# All requested packages already installed.

kevin@106403020:~/home/pi$
```

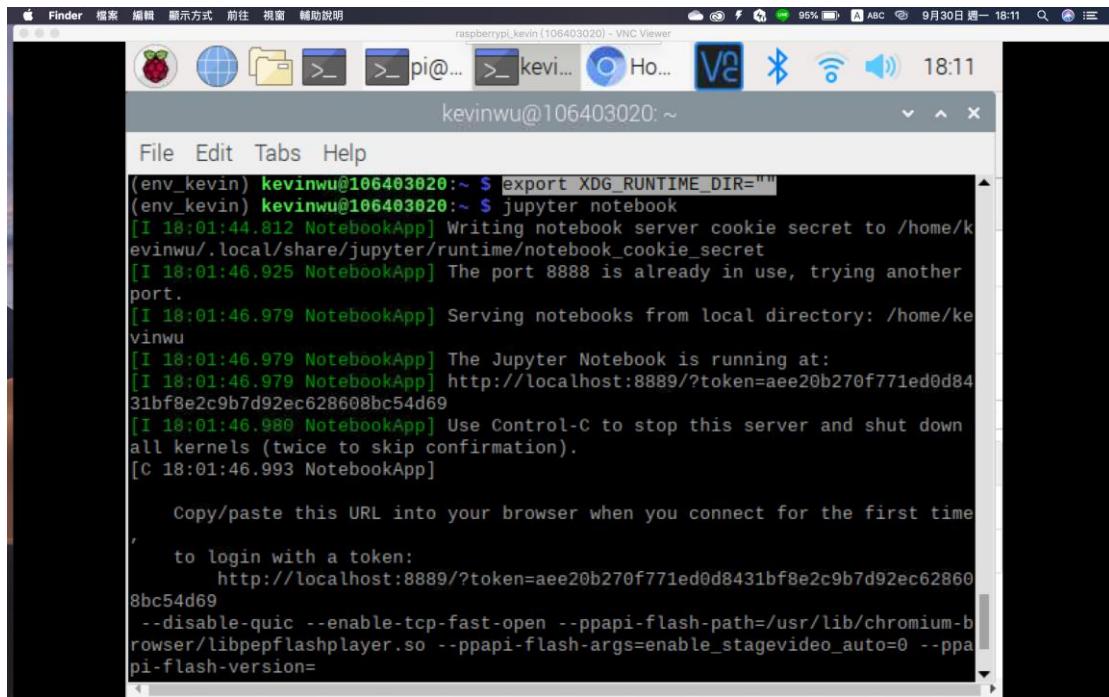
5. When you open jupyter notebook, it maybe has an error.

```
(env_kevin) kevinwu@106403020:~$ jupyter notebook
Traceback (most recent call last):
  File "/home/kevinwu/berryconda3/lib/python3.6/site-packages/traitlets/traitlets.py", line 528, in get
    value = obj._trait_values[self.name]
KeyError: 'runtime_dir'

During handling of the above exception, another exception occurred:

Traceback (most recent call last):
  File "/home/kevinwu/berryconda3/bin/jupyter-notebook", line 11, in <module>
    sys.exit(main())
  File "/home/kevinwu/berryconda3/lib/python3.6/site-packages/jupyter_core/application.py", line 266, in launch_instance
    return super(JupyterApp, cls).launch_instance(argv=argv, **kwargs)
  File "/home/kevinwu/berryconda3/lib/python3.6/site-packages/traitlets/config/application.py", line 657, in launch_instance
    app.initialize(argv)
  File "<decorator-gen-7>", line 2, in initialize
  File "/home/kevinwu/berryconda3/lib/python3.6/site-packages/traitlets/config/application.py", line 87, in catch_config_error
    return method(app, *args, **kwargs)
  File "/home/kevinwu/berryconda3/lib/python3.6/site-packages/notebook/notebo
```

6. It is owing to the environment variable [\$_XDG_RUNTIME_DIR]. Typing
export XDG_RUNTIME_DIR="" to eliminate the problem. And try again. It works!

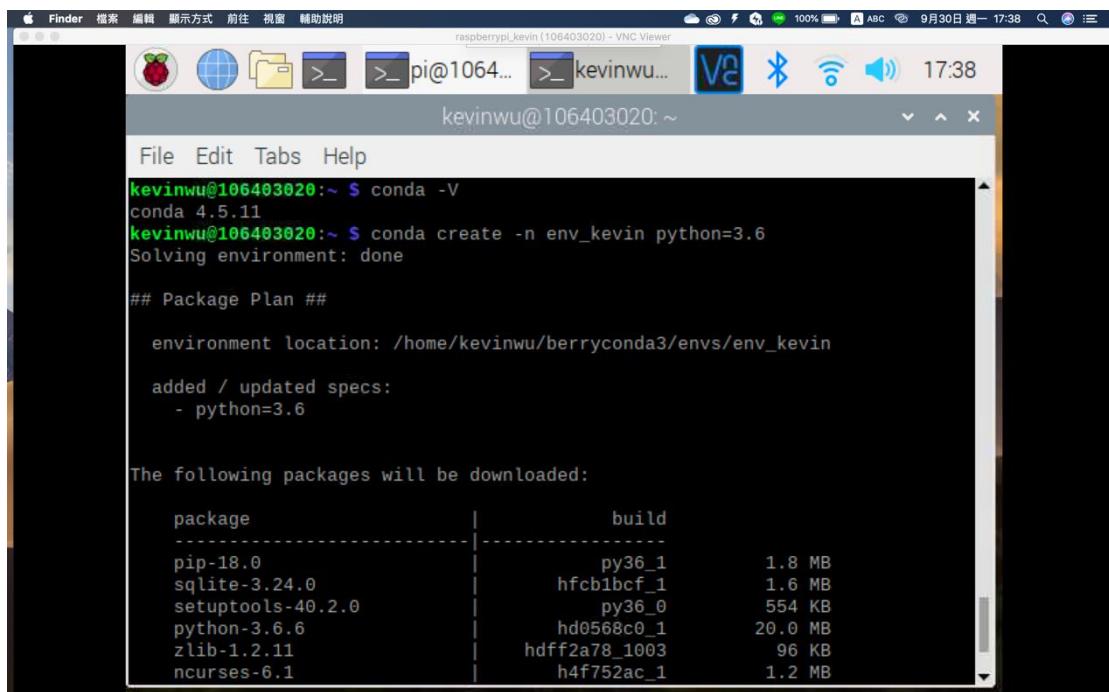


A screenshot of a VNC session on a Mac OS X desktop. The terminal window shows the command `jupyter notebook` being run. The output indicates that the Jupyter Notebook is running at `http://localhost:8889/?token=aee20b270f771ed0d8431bf8e2c9b7d92ec628608bc54d69`. The terminal window has a dark background with white text.

```
(env_kevin) kevinwu@106403020:~ $ export XDG_RUNTIME_DIR=""  
(env_kevin) kevinwu@106403020:~ $ jupyter notebook  
[I 18:01:44.812 NotebookApp] Writing notebook server cookie secret to /home/kevinwu/.local/share/jupyter/runtime/notebook_cookie_secret  
[I 18:01:46.925 NotebookApp] The port 8888 is already in use, trying another port.  
[I 18:01:46.979 NotebookApp] Serving notebooks from local directory: /home/kevinwu  
[I 18:01:46.979 NotebookApp] The Jupyter Notebook is running at:  
[I 18:01:46.979 NotebookApp] http://localhost:8889/?token=aee20b270f771ed0d8431bf8e2c9b7d92ec628608bc54d69  
[I 18:01:46.980 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).  
[C 18:01:46.993 NotebookApp]  
  
Copy/paste this URL into your browser when you connect for the first time  
' to login with a token:  
http://localhost:8889/?token=aee20b270f771ed0d8431bf8e2c9b7d92ec628608bc54d69  
--disable-quic --enable-tcp-fast-open --ppapi-flash-path=/usr/lib/chromium-browser/libpepflashplayer.so --ppapi-flash-args=enable_stagevideo_auto=0 --ppapi-flash-version=
```

● CREATE A VIRTUAL ENVIRONMENT USING CONDA

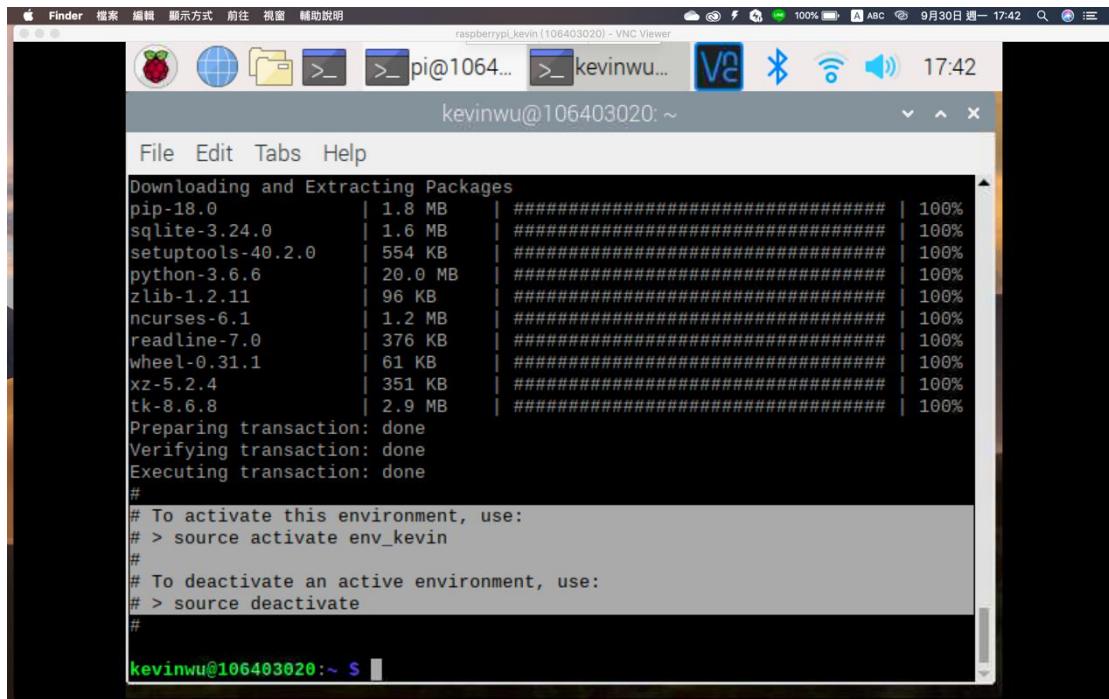
1. Typing `conda create -n [yourenvname] python=3.6` to create a virtual environment with python 3.6.



A screenshot of a VNC session on a Mac OS X desktop. The terminal window shows the command `conda create -n env_kevin python=3.6` being run. The output shows the environment location is `/home/kevinwu/berryconda3/envs/env_kevin`, and it lists the packages being downloaded, including pip, sqlite, setuptools, python, zlib, and ncurses. The terminal window has a dark background with white text.

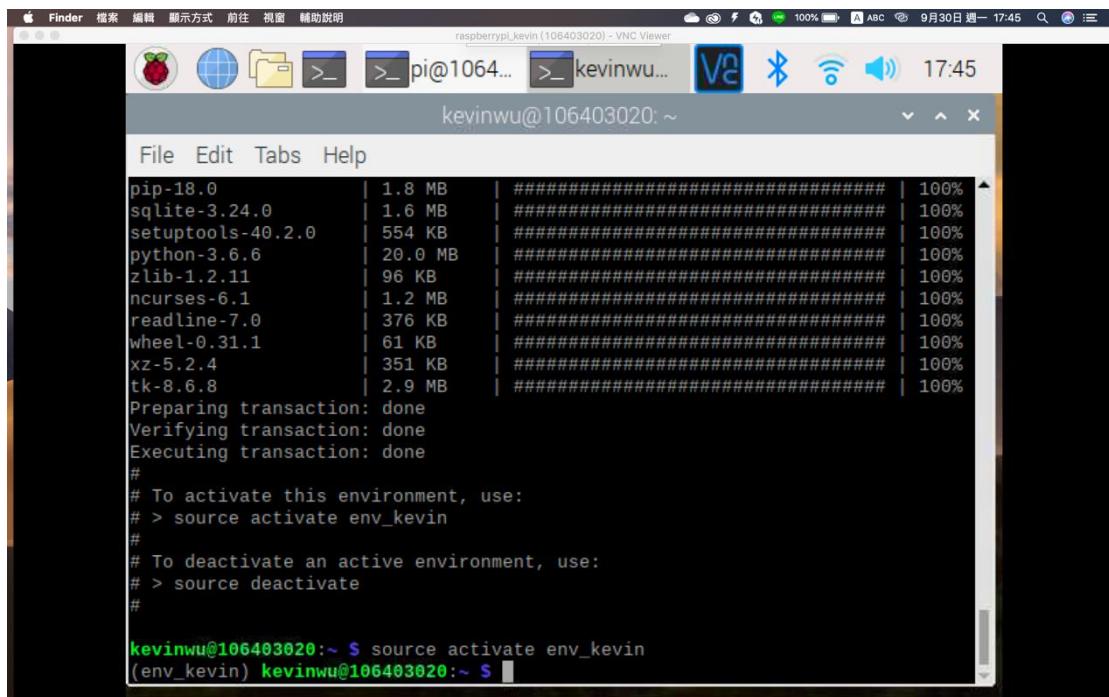
```
kevinwu@106403020:~ $ conda -V  
conda 4.5.11  
kevinwu@106403020:~ $ conda create -n env_kevin python=3.6  
Solving environment: done  
  
## Package Plan ##  
  
environment location: /home/kevinwu/berryconda3/envs/env_kevin  
  
added / updated specs:  
- python=3.6  
  
The following packages will be downloaded:  
  
  package          |      build  
  -----|-----  
  pip-18.0          |      py36_1      1.8 MB  
  sqlite-3.24.0     |      hfcbbcf_1    1.6 MB  
  setuptools-40.2.0 |      py36_0      554 KB  
  python-3.6.6      |      hd0568c0_1    20.0 MB  
  zlib-1.2.11        |      hdf2a78_1003   96 KB  
  ncurses-6.1         |      h4f752ac_1    1.2 MB
```

2. When it done, it will tell you if you want to activate this environment. Typing `source activate [yourenvname]`



```
Downloading and Extracting Packages
pip-18.0           | 1.8 MB  | #####| 100%
sqlite-3.24.0      | 1.6 MB  | #####| 100%
setuptools-40.2.0   | 554 KB  | #####| 100%
python-3.6.6        | 20.0 MB | #####| 100%
zlib-1.2.11         | 96 KB   | #####| 100%
ncurses-6.1          | 1.2 MB  | #####| 100%
readline-7.0         | 376 KB  | #####| 100%
wheel-0.31.1         | 61 KB   | #####| 100%
xz-5.2.4            | 351 KB  | #####| 100%
tk-8.6.8             | 2.9 MB  | #####| 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use:
# > source activate env_kevin
#
# To deactivate an active environment, use:
# > source deactivate
#
kevinwu@106403020:~ $
```

3. Then it appears! (env_kevin)



```
kevinwu@106403020:~ $ source activate env_kevin
(env_kevin) kevinwu@106403020:~ $
```

● INSTALL ADDITIONAL PYTHON PACKAGES TO A VIRTUAL ENVIRONMENT

1. We need to install six packages (numpy/scipy/ matplotlib/ pandas/ scikit-learn/ rpi.gpio) Typing `conda install -n [yourenvname] [package]` to install these packet.

```
added / updated specs:
- scikit-learn

The following packages will be downloaded:
  package           |      build
  scikit-learn-0.19.2 |py36_bla...91e181_201      11.7 MB

The following NEW packages will be INSTALLED:
  scikit-learn: 0.19.2-py36_bla...91e181_201 [blas_openblas]

Proceed ([y]/n)? y

Downloading and Extracting Packages
scikit-learn-0.19.2 | 11.7 MB | ##### | 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
(environ_kevin) kevinwu@106403020:~ $
```

2. Enter `pip install rpi.gpio` to install rpi.gpio packet.

```
tornado:          5.1-py36hdff2a78_1
traitlets:         4.3.2-py36_0
wcwidth:          0.1.7-py_1
zeromq:           4.2.5-h4f752ac_5

Proceed ([y]/n)? y

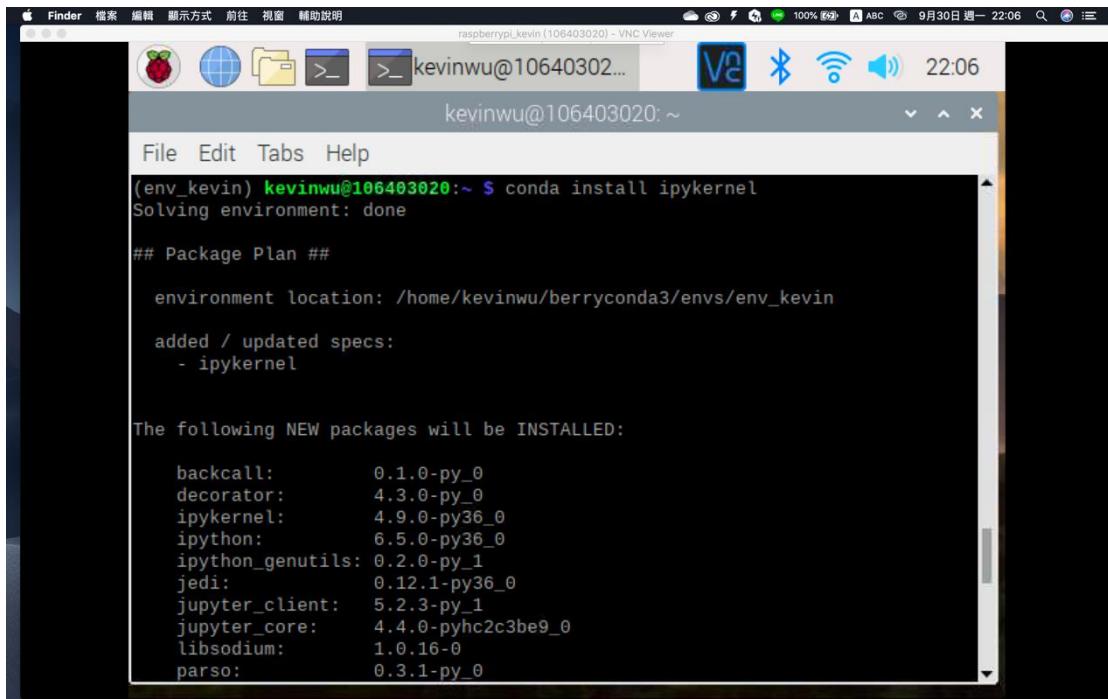
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
(environ_kevin) kevinwu@106403020:~ $ pip install rpi.gpio
Looking in indexes: https://pypi.org/simple, https://www.piwheels.org/simple
Collecting rpi.gpio
  Downloading https://files.pythonhosted.org/packages/cb/88/d3817eb11fc77a8d9a63abeab8fe303266b1e3b85e2952238f0da43fed4e/RPi.GPIO-0.7.0.tar.gz
Building wheels for collected packages: rpi.gpio
  Running setup.py bdist_wheel for rpi.gpio ... done
  Stored in directory: /home/kevinwu/.cache/pip/wheels/ec/11/7f/aa6fe56010104b49197ebbd697418affe12e05d42213f3e0ca
Successfully built rpi.gpio
Installing collected packages: rpi.gpio
Successfully installed rpi.gpio-0.7.0
(environ_kevin) kevinwu@106403020:~ $
```

[Create virtual environments for python with conda](#)

● MAKE THE KERNEL IN VIRTUAL ENVIRONMENT AVAILABLE IN JUPYTER NOTEBOOK

3. Enter `conda install ipykernel` to make the kernel.

(Note that you should activate virtual environment previously.)



```
(env_kevin) kevinwu@106403020:~ $ conda install ipykernel
Solving environment: done

## Package Plan ##

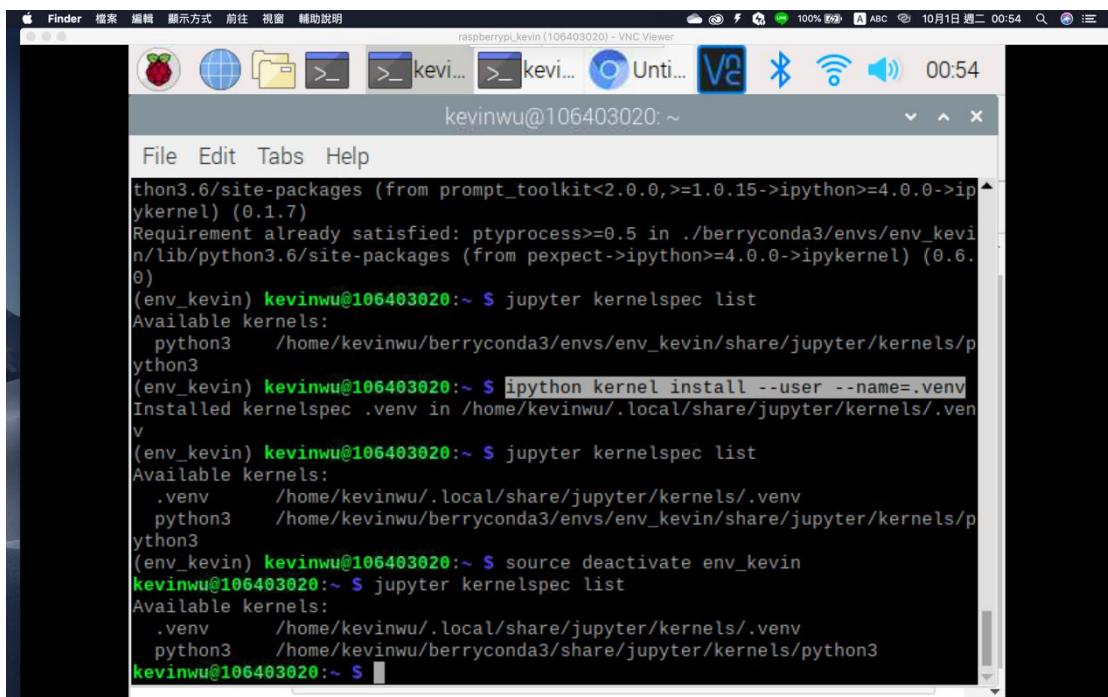
environment location: /home/kevinwu/berryconda3/envs/env_kevin

added / updated specs:
- ipykernel

The following NEW packages will be INSTALLED:

backcall:          0.1.0-py_0
decorator:         4.3.0-py_0
ipykernel:         4.9.0-py36_0
ipython:           6.5.0-py36_0
ipython_genutils:  0.2.0-py_1
jedi:              0.12.1-py36_0
jupyter_client:   5.2.3-py_1
jupyter_core:     4.4.0-pyhc2c3be9_0
libsodium:         1.0.16-0
parso:             0.3.1-py_0
```

4. Then install a jupyter kernel `ipython kernel install --user --name=[your_env_name]`



```
thon3.6/site-packages (from prompt_toolkit<2.0.0,>=1.0.15->ipython>=4.0.0->ipykernel) (0.1.7)
Requirement already satisfied: ptyprocess>=0.5 in ./berryconda3/envs/env_kevin/lib/python3.6/site-packages (from pexpect->ipython>=4.0.0->ipykernel) (0.6.0)
(env_kevin) kevinwu@106403020:~ $ jupyter kernelspec list
Available kernels:
  python3    /home/kevinwu/berryconda3/envs/env_kevin/share/jupyter/kernels/python3
(env_kevin) kevinwu@106403020:~ $ ipython kernel install --user --name=.venv
Installed kernelspec .venv in /home/kevinwu/.local/share/jupyter/kernels/.venv
(env_kevin) kevinwu@106403020:~ $ jupyter kernelspec list
Available kernels:
  .venv      /home/kevinwu/.local/share/jupyter/kernels/.venv
  python3   /home/kevinwu/berryconda3/envs/env_kevin/share/jupyter/kernels/python3
(env_kevin) kevinwu@106403020:~ $ source deactivate env_kevin
kevinwu@106403020:~ $ jupyter kernelspec list
Available kernels:
```

5. Check if there is a new kernel on your jupyter. `jupyter kernelspec list`

```

ipykernel (0.1.7)
Requirement already satisfied: ptyprocess>=0.5 in ./berryconda3/envs/env_kevin/lib/python3.6/site-packages (from pexpect->ipython>=4.0.0->ipykernel) (0.6.0)
(env_kevin) kevinwu@106403020:~ $ jupyter kernelspec list
Available kernels:
  python3    /home/kevinwu/berryconda3/envs/env_kevin/share/jupyter/kernels/python3
(env_kevin) kevinwu@106403020:~ $ ipython kernel install --user --name=.venv
Installed kernelspec .venv in /home/kevinwu/.local/share/jupyter/kernels/.venv
(env_kevin) kevinwu@106403020:~ $ jupyter kernelspec list
Available kernels:
  .venv      /home/kevinwu/.local/share/jupyter/kernels/.venv
  python3    /home/kevinwu/berryconda3/envs/env_kevin/share/jupyter/kernels/python3
(env_kevin) kevinwu@106403020:~ $ source deactivate env_kevin
kevinwu@106403020:~ $ jupyter kernelspec list
Available kernels:
  .venv      /home/kevinwu/.local/share/jupyter/kernels/.venv
  python3    /home/kevinwu/berryconda3/share/jupyter/kernels/python3
kevinwu@106403020:~ $ #
kevinwu@106403020:~ $ 

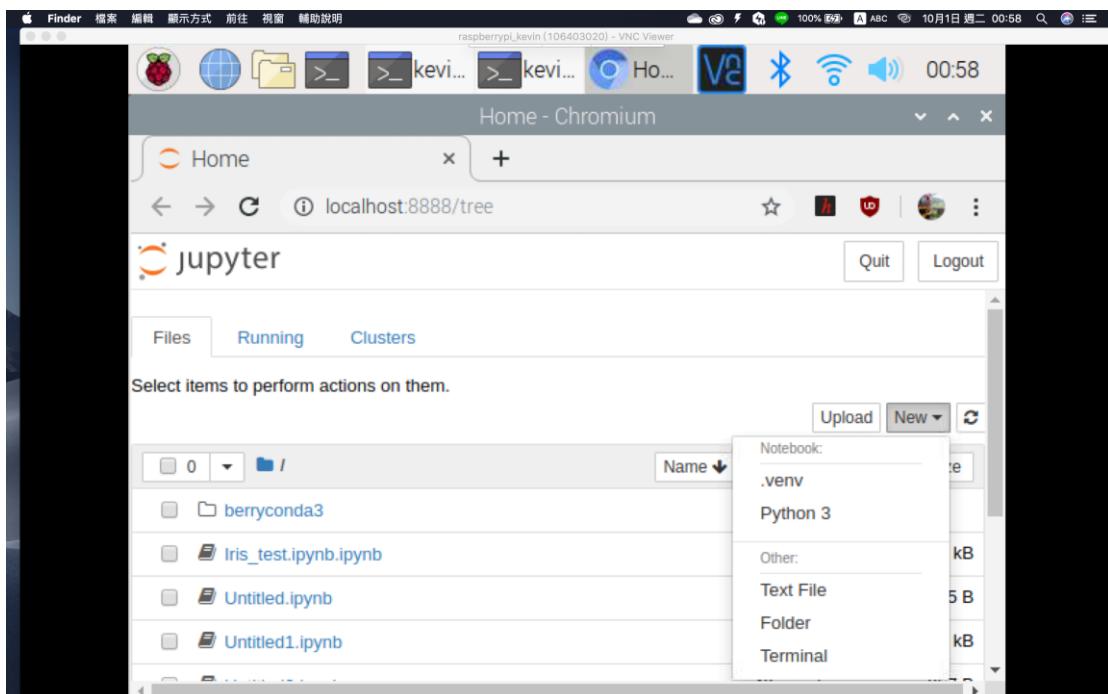
```

Jupyter Notebook in a virtual environment (virtualenv)

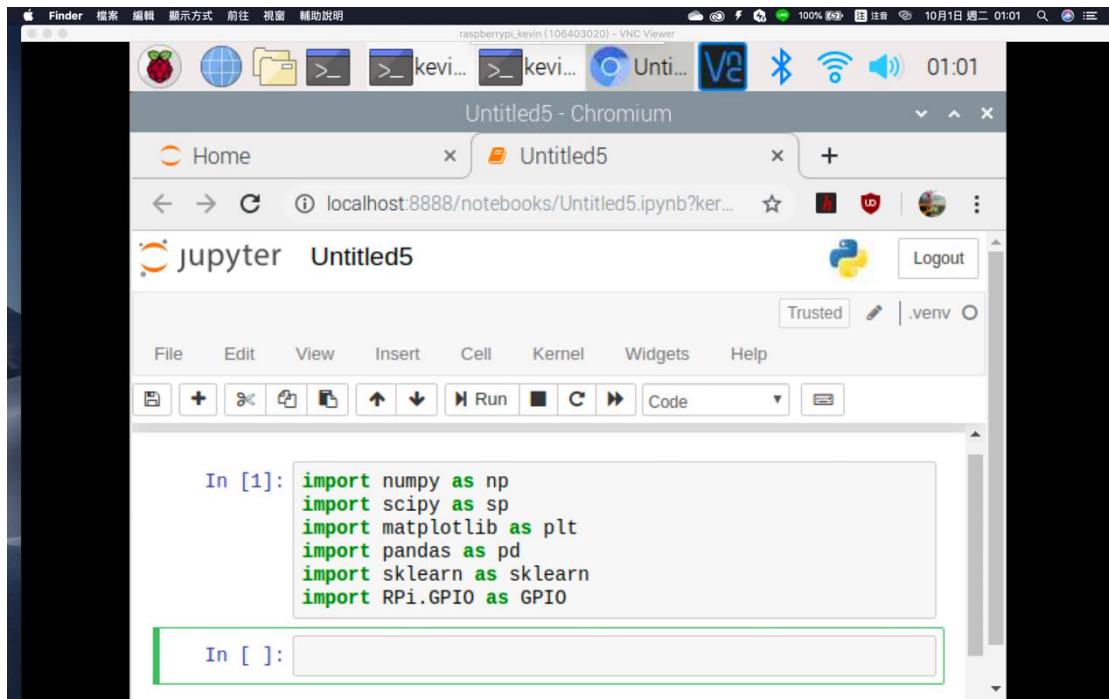
打造 Jupyter Notebook 資料科學環境

- **RUN A JUPYTER NOTEBOOK WITH THE ABOVE INSTALLED PACKAGES**

6. Create a new notebook. After opening jupyter notebook, press [New]->[.venv] to add a new notebook.



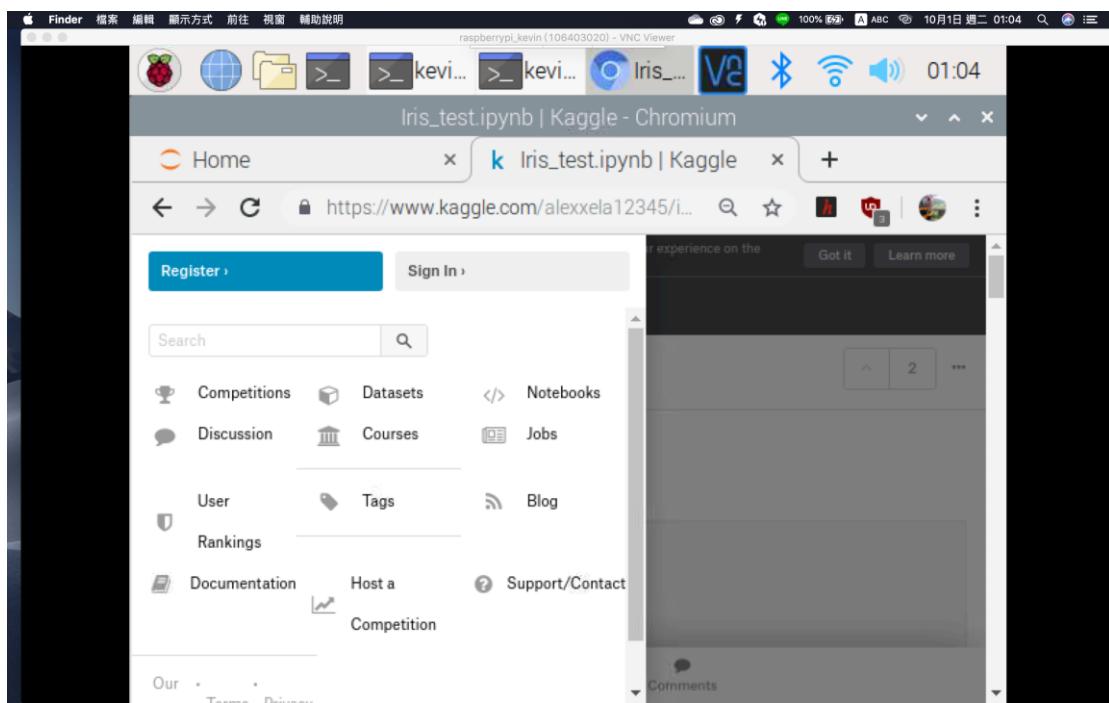
7. Then import the packages installed previously and run it!



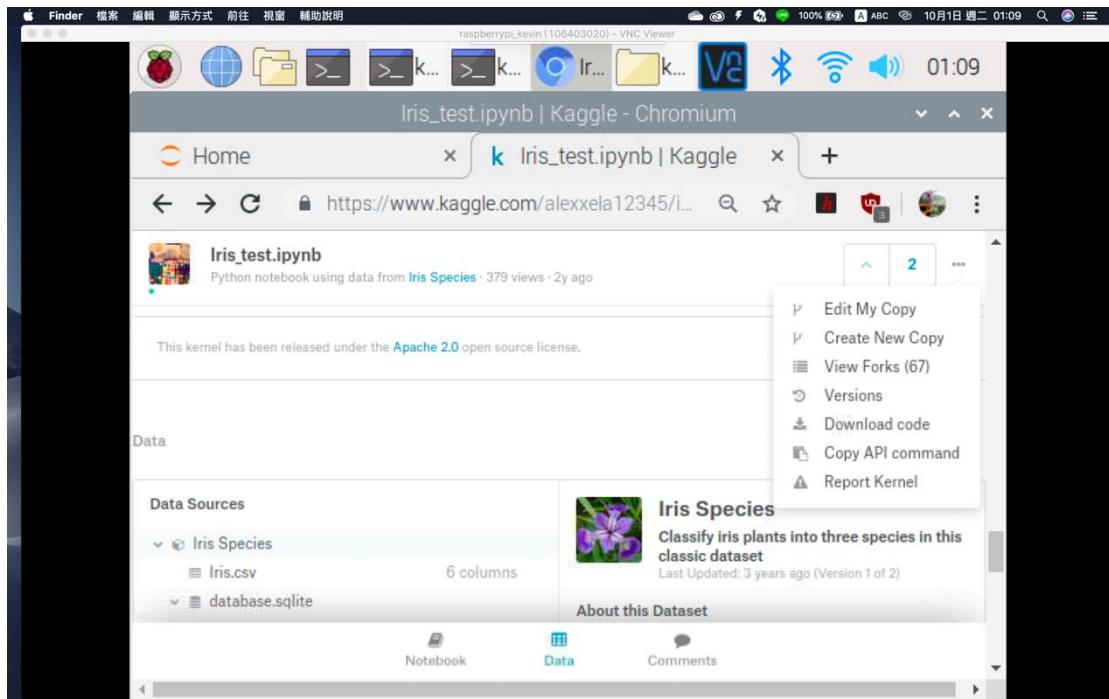
● FORK A JUPYTER NOTE FROM KAGGLE AND RUN IT ON YOUR RPI

1. First, go to Kaggle to register a new account.

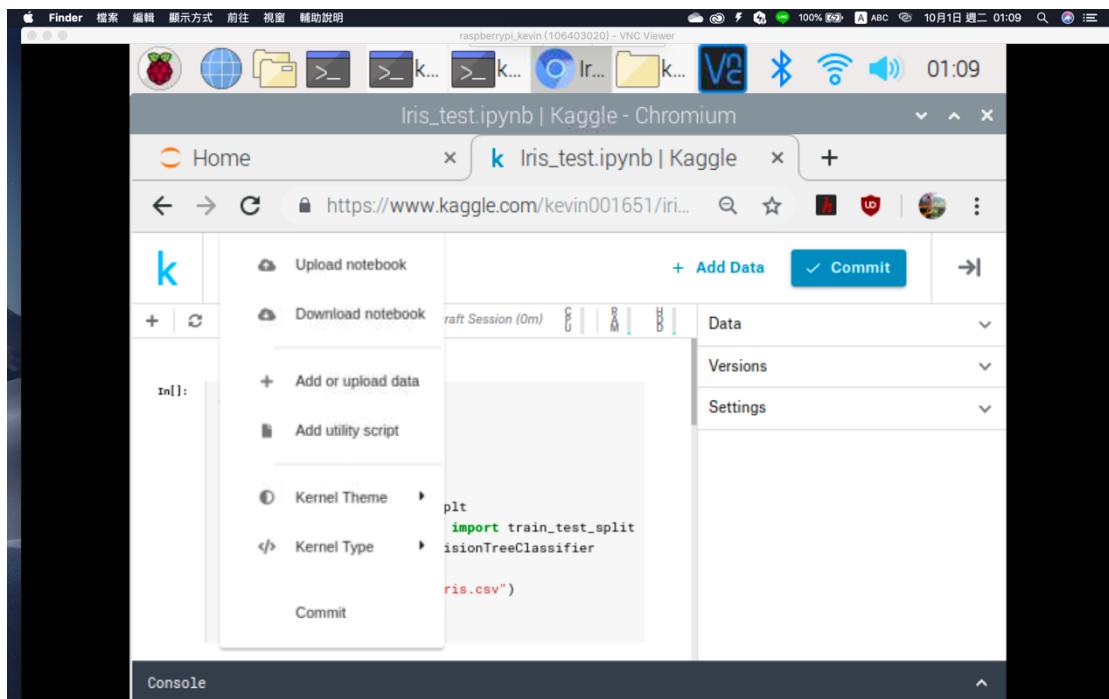
<https://www.kaggle.com/alexxela12345/iris-test-ipynb>



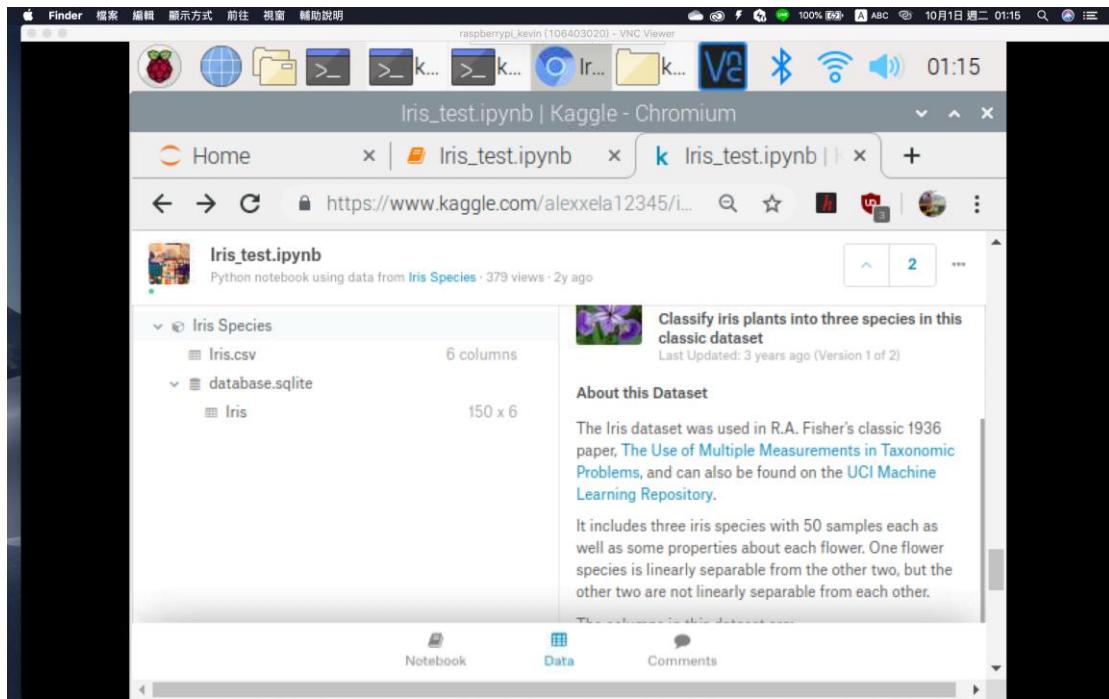
2. Secondly, we need to download the source code to own jupyter notebook. Click Edit my Copy



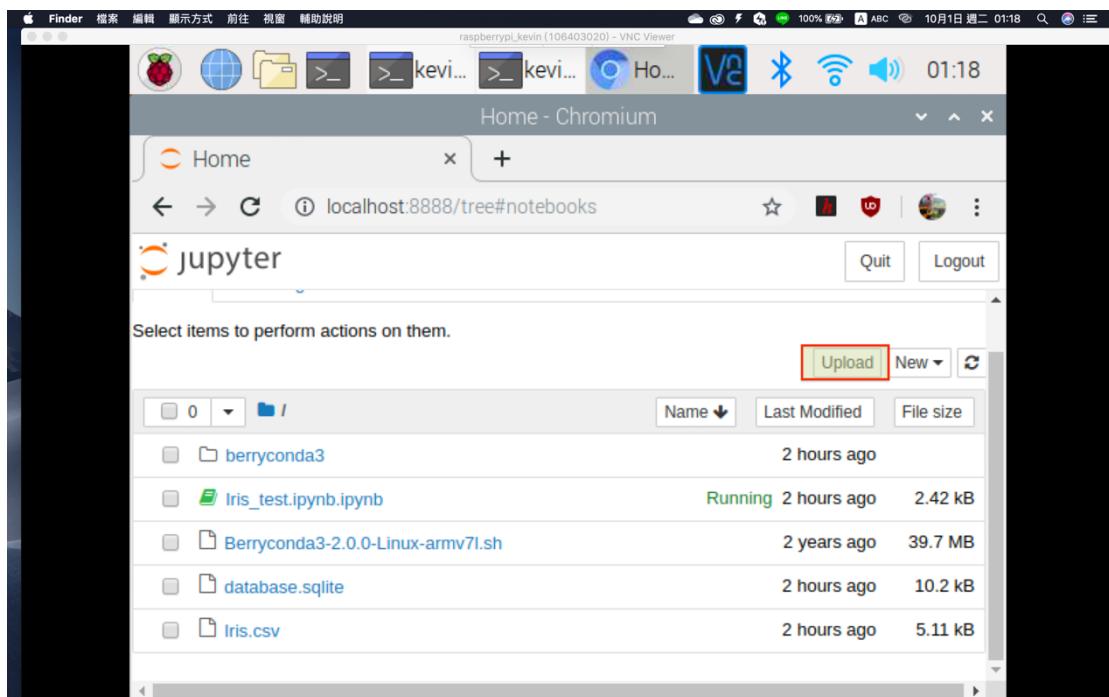
3. Download notebook!



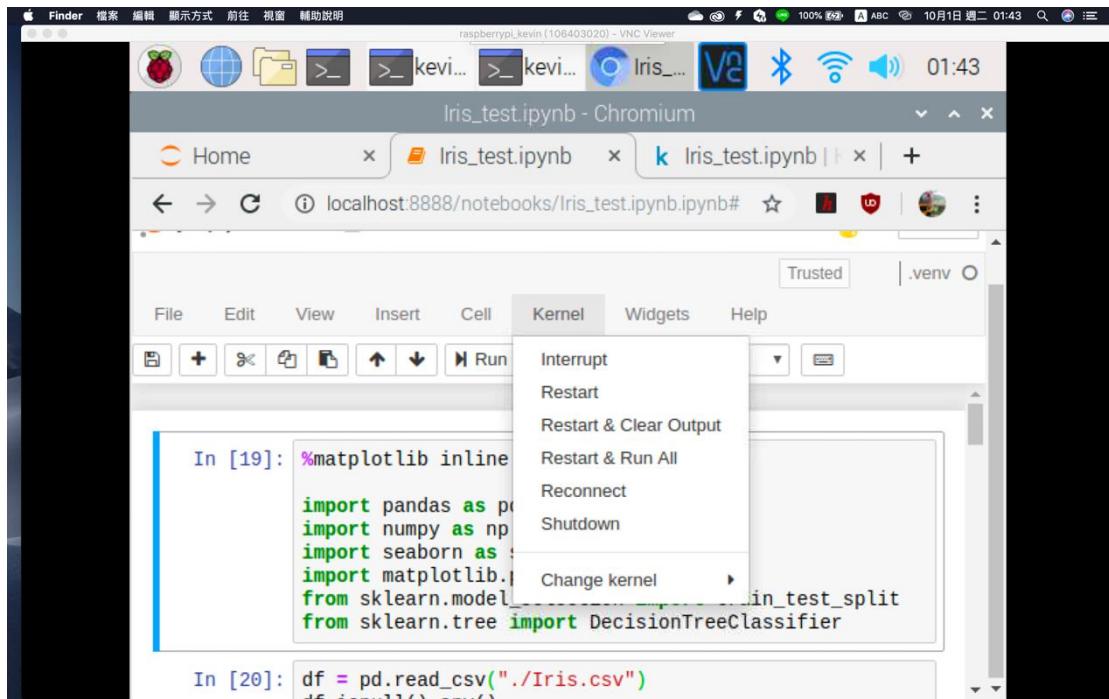
4. Then download the source data. Go to Data, and download Iris.csv and database.sqlite.



- Now go back to jupyter notebook, and you need to **upload** the source code and source data files from Downloads.



- Let's start to run this code. Click Iris_test.ipynb.ipynb. First, we change the kernel from Python3 to your own kernel.



8. Then, before running this code, we need to add seaborn packet. Go back to Terminal and add this packet! `conda install -c rpi seaborn`

```
(env_kevin) kevinwu@106403020:~ $ conda install -c rpi seaborn
Solving environment: done

## Package Plan ##

environment location: /home/kevinwu/berryconda3/envs/env_kevin

added / updated specs:
  - seaborn

The following packages will be downloaded:

      package          build
      -----          -----
patsy-0.5.0           py_1        184 KB
seaborn-0.9.0          py_0        159 KB
statsmodels-0.9.0      py36_0     14.5 MB
      -----          -----
                           Total:    14.8 MB

The following NEW packages will be INSTALLED:
```

9. Edit the path to the correct path.

A screenshot of a VNC session on a Mac OS X desktop. The title bar says "raspberrypi_kevin (106403020) - VNC Viewer". The window shows a Jupyter Notebook interface in a Chromium browser tab titled "Iris_test.ipynb - Chromium". The notebook has two cells:

```
In [19]: %matplotlib inline  
import pandas as pd  
import numpy as np  
import seaborn as sns  
import matplotlib.pyplot as plt  
from sklearn.model_selection import train_test_split  
from sklearn.tree import DecisionTreeClassifier  
  
In [20]: df = pd.read_csv("./Iris.csv")  
df.isnull().any()  
Out[20]: Id      False
```

10. Now run it and we get outputs.

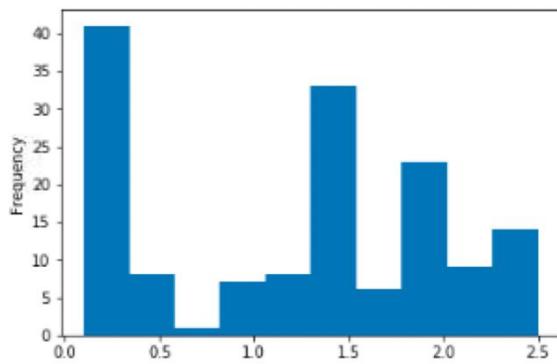
```
In [20]: df = pd.read_csv("./Iris.csv")  
df.isnull().any()  
  
Out[20]: Id      False  
SepalLengthCm    False  
SepalWidthCm     False  
PetalLengthCm    False  
PetalWidthCm     False  
Species          False  
dtype: bool  
  
In [21]: df.dtypes  
  
Out[21]: Id           int64  
SepalLengthCm   float64  
SepalWidthCm    float64  
PetalLengthCm   float64  
PetalWidthCm    float64  
Species         object  
dtype: object
```

```
In [31]: df.describe()
```

```
Out[31]:
```

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
count	150.000000	150.000000	150.000000	150.000000	150.000000
mean	75.500000	5.843333	3.054000	3.758667	1.198667
std	43.445368	0.828066	0.433594	1.764420	0.763161
min	1.000000	4.300000	2.000000	1.000000	0.100000
25%	38.250000	5.100000	2.800000	1.600000	0.300000
50%	75.500000	5.800000	3.000000	4.350000	1.300000
75%	112.750000	6.400000	3.300000	5.100000	1.800000
max	150.000000	7.900000	4.400000	6.900000	2.500000

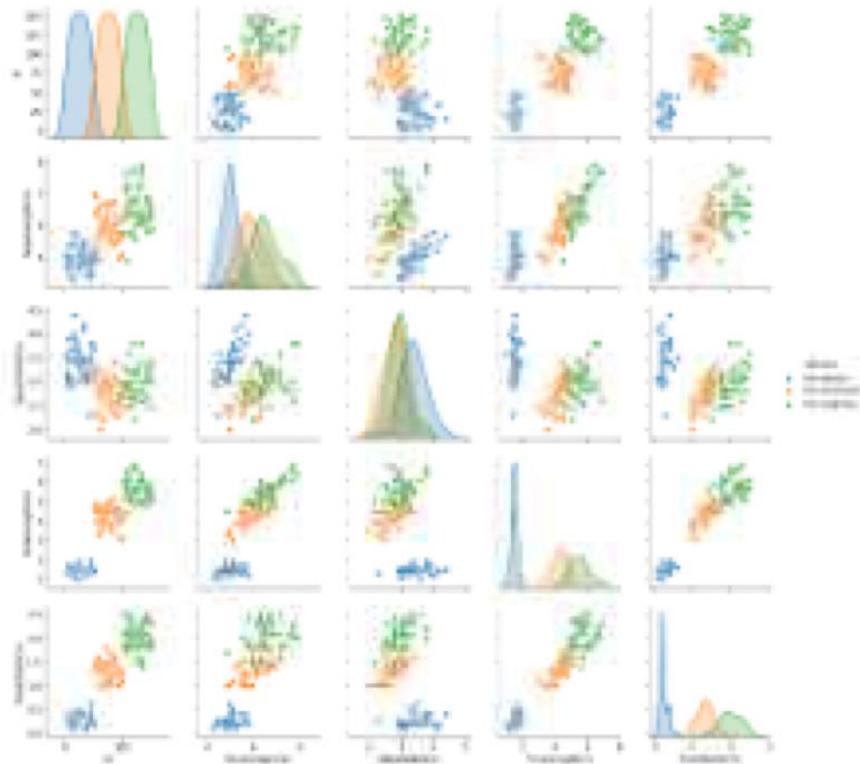
```
In [32]: df['PetalWidthCm'].plot.hist()  
plt.show()
```



```
In [27]: sns.pairplot(df, hue='Species')
```

/home/kevinwu/berryconda3/envs/env_kevin/lib/python3.6/site-packages/scipy/stats/_stats.py:1798: FutureWarning: Using a non-tuple sequence for multidimensional indexing is deprecated; use `arr[tuple(seq)]` instead of `arr[seq]`. In the future this will be interpreted as an array index, `arr[np.array(seq)]`, which will result either in an error or a different result.
return np.add.reduce(sorted[indexer] * weights, axis=axis) / sumval

```
Out[27]: <seaborn.axisgrid.PairGrid at 0x64c7a270>
```



```
In [33]: all_inputs = df[['SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm'  
all_classes = df['Species'].values  
  
(train_inputs, test_inputs, train_classes, test_classes) = train_
```

/home/kevinwu/berryconda3/envs/env_kevin/lib/python3.6/site-packages/sklearn/model_selection/_split.py:2026: FutureWarning:
From version 0.21, test_size will always complement train_size unless both are specified.
FutureWarning)

```
In [30]: dtc = DecisionTreeClassifier()  
dtc.fit(train_inputs, train_classes)  
dtc.score(test_inputs, test_classes)
```

```
Out[30]: 0.9555555555555556
```

We did it ~!