University of Glasgow
School of Computing Science

CSC1104 – Computer Organisation and Architecture

Labs 2: Installing Raspberry Pi OS and Setup Headless Connection

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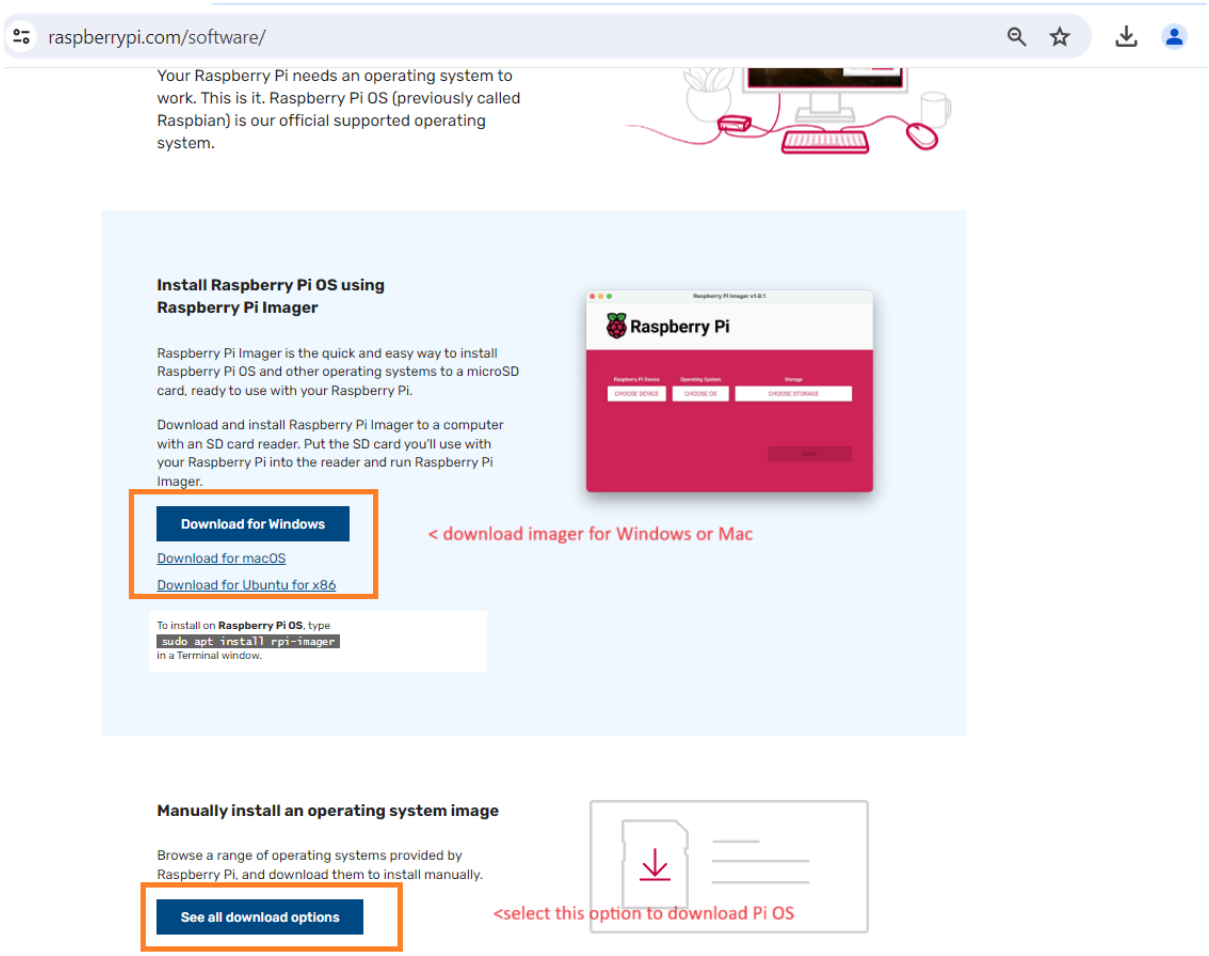
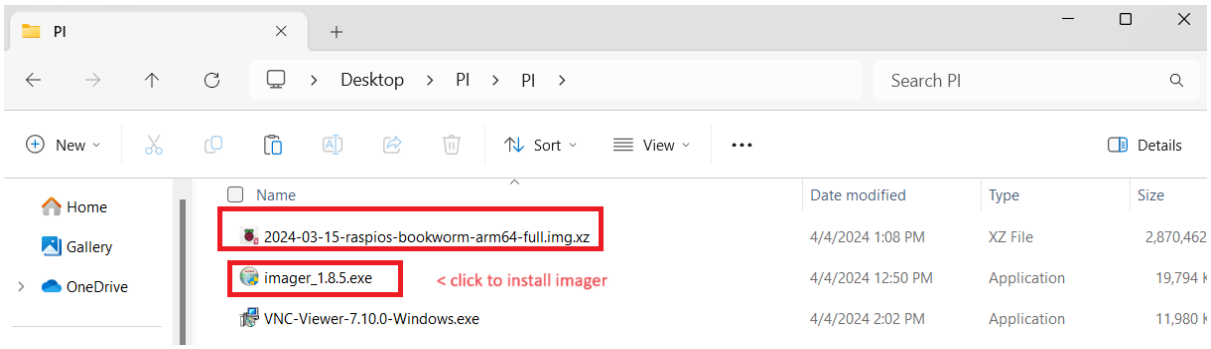
Objectives

- Install the Raspberry Pi OS.
- Steps to setup remote headless connections for Raspberry Pi 4 and laptops.

1. Download Raspberry Pi Imager and Raspberry Pi OS from the link below:

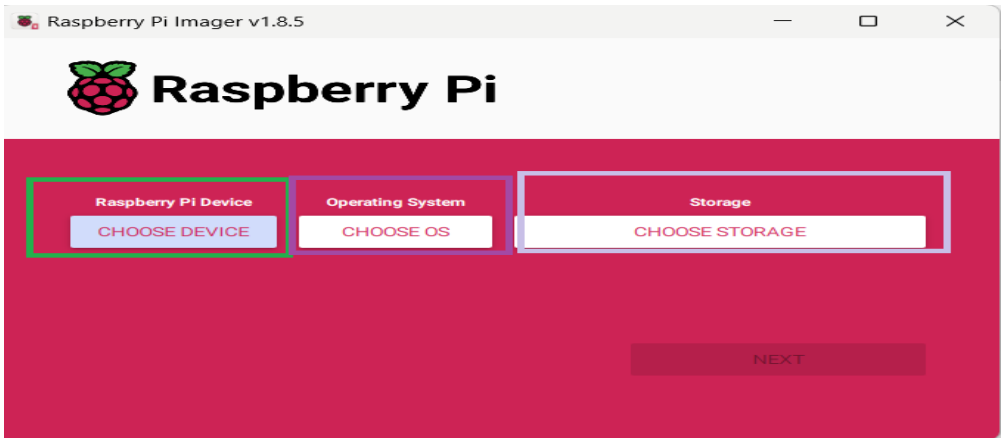
https://www.raspberrypi.com/software/



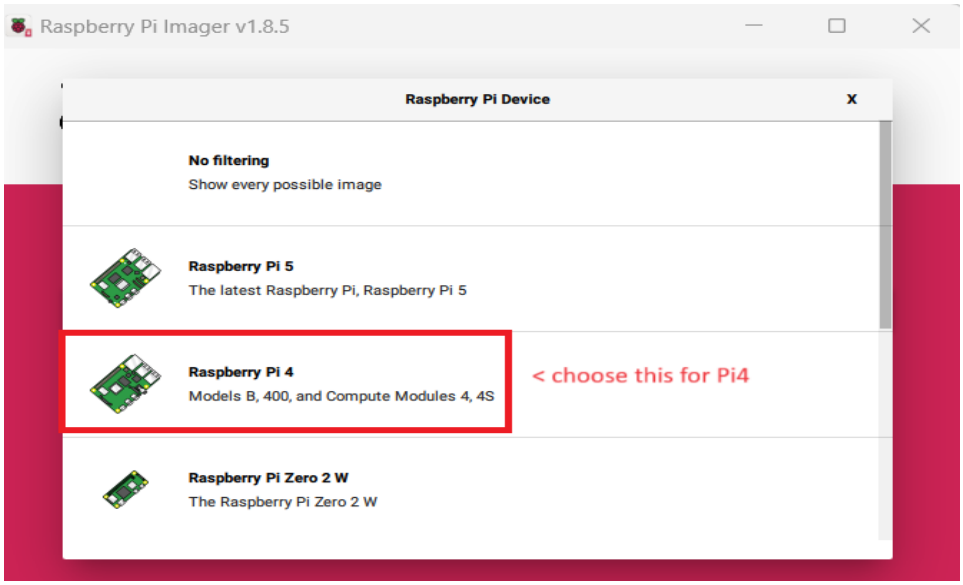


2. Click the imager_x.exe file to install the Raspberry Pi Imager on your laptop.

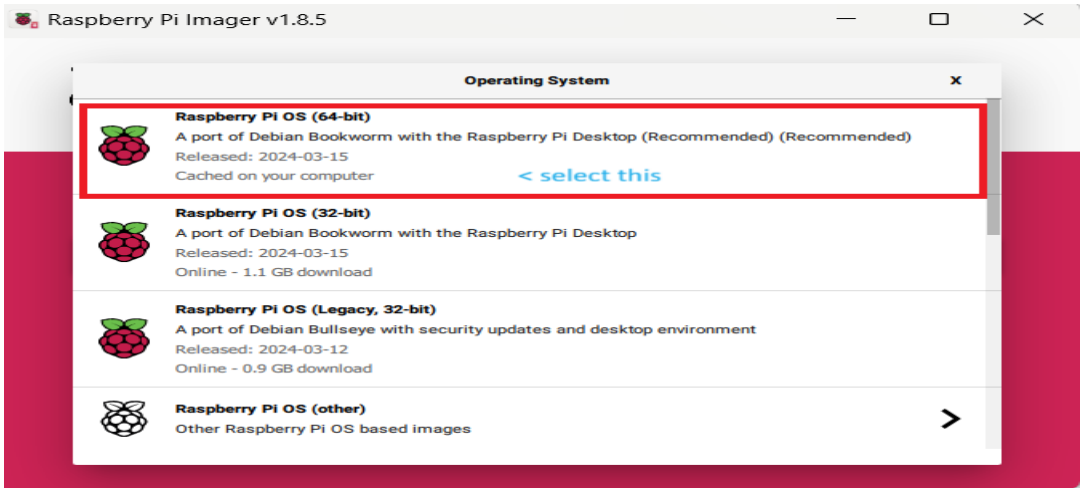
3. Insert the micro-SD card with the USB adaptor to your laptop USB portal. Then launch the Raspberry Pi Imager on your laptop.



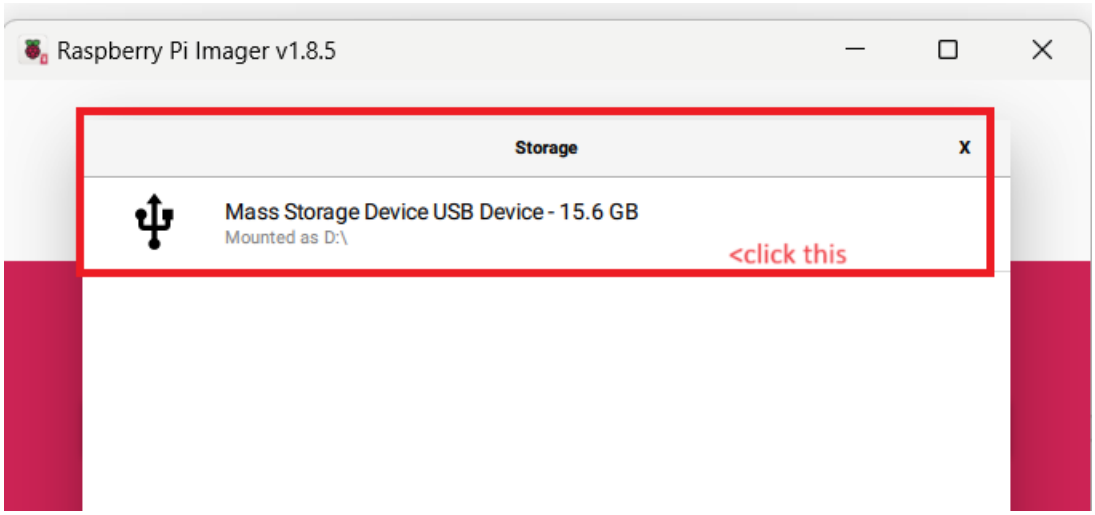
4. Click CHOOSE DEVICE, (choose Raspberry Pi 4).



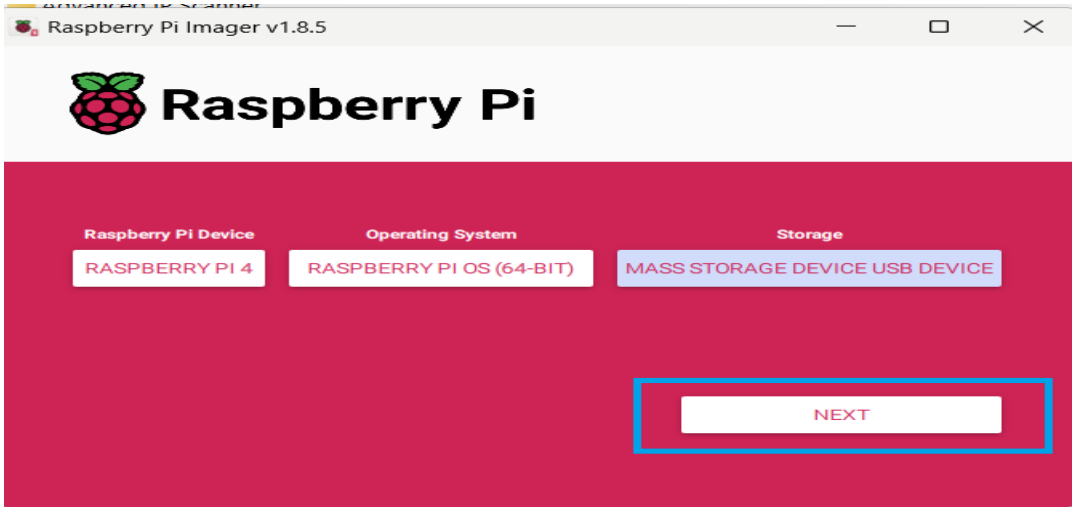
5. Click CHOOSE OS, (choose Raspberry Pi OS 64-bit).



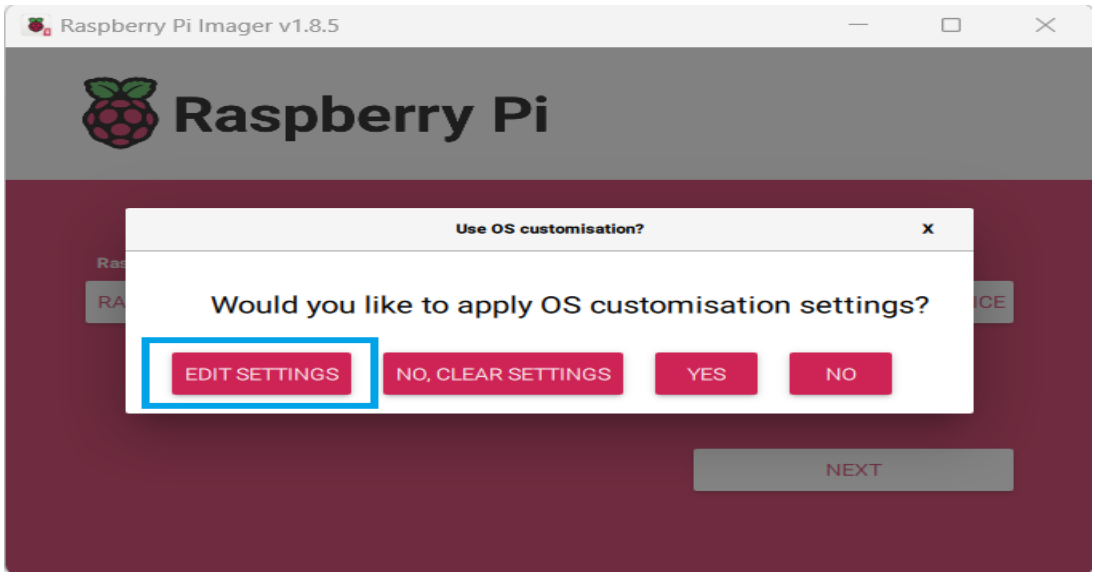
6. Click CHOOSE STORAGE.



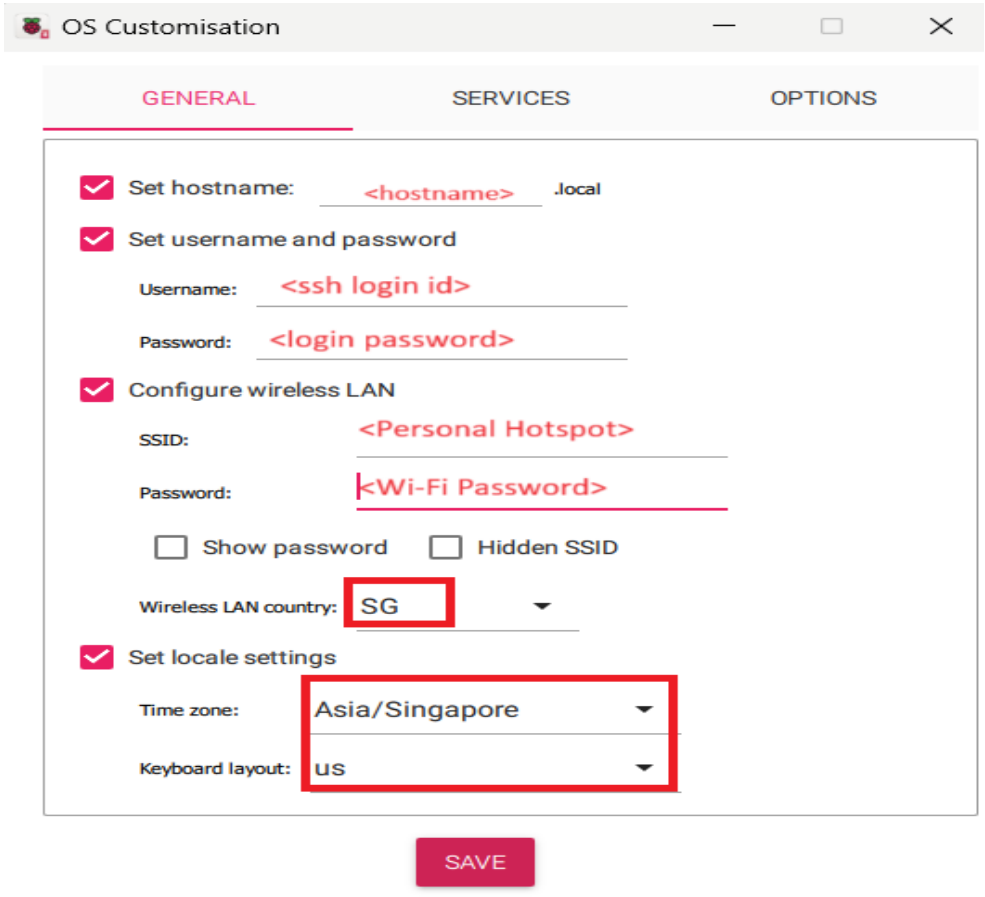
7. click next



8. Click EDIT SETTINGS



9. Click the GENERAL tab, to set the hostname, username, password, wireless LAN SSID of your mobile Personal Hotspot, locale, etc.



Set your host name of your Raspberry Pi. For example, set your name as the host name.

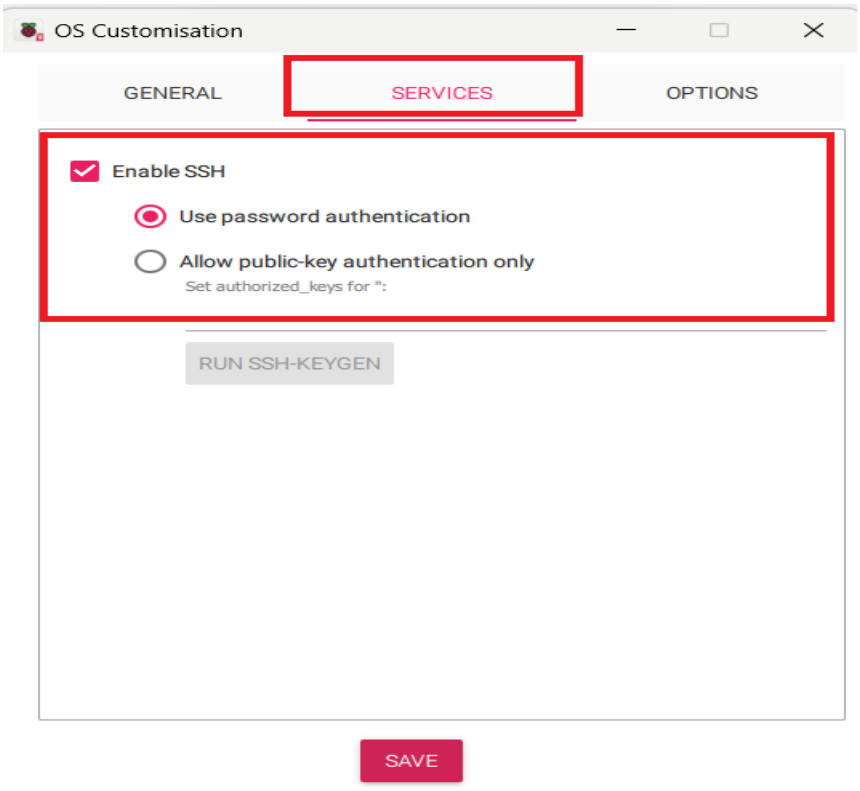
Set your username and password of your Raspberry Pi. For example, set your name initial_pi (abc_pi) as the username. Sete the password as your name_Raspberry (abc_Raspberry).

Configure the wireless LAN using your mobile Personal Hotspot information.

Use SSID: Your hot spot SSID
Password: Your hot spot password

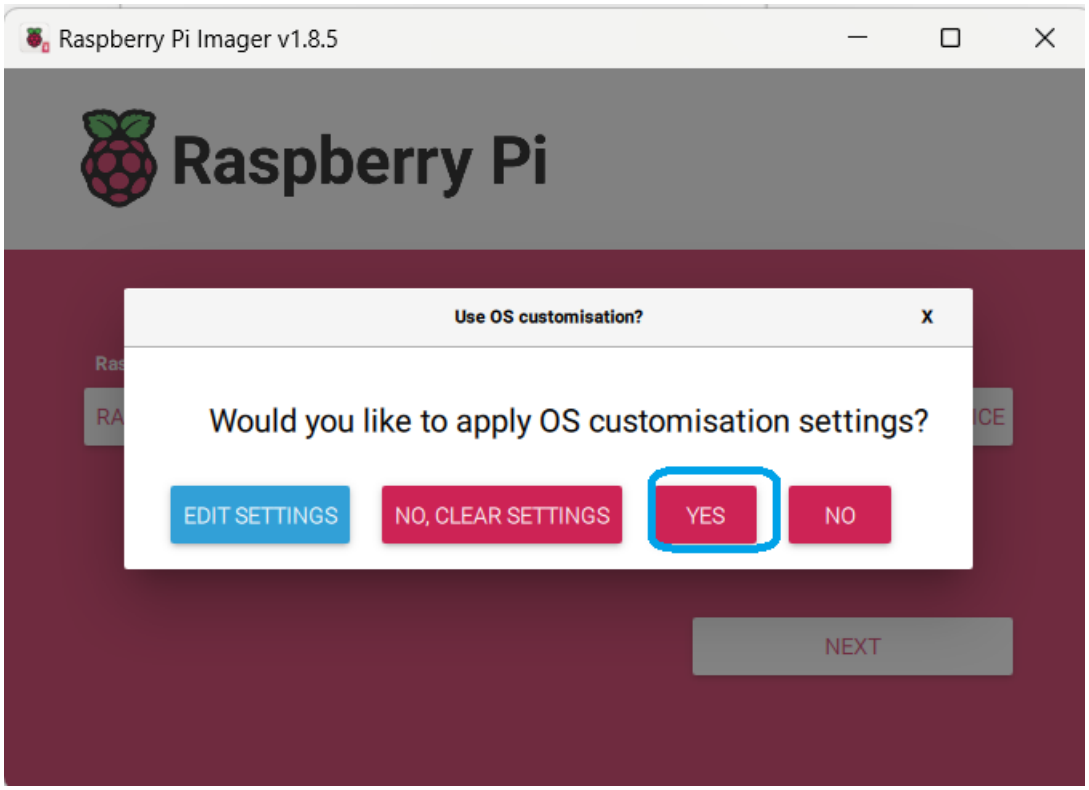
Set the locale as SG.

10. Click the SERVICES tab, choose “Use password authentication”.

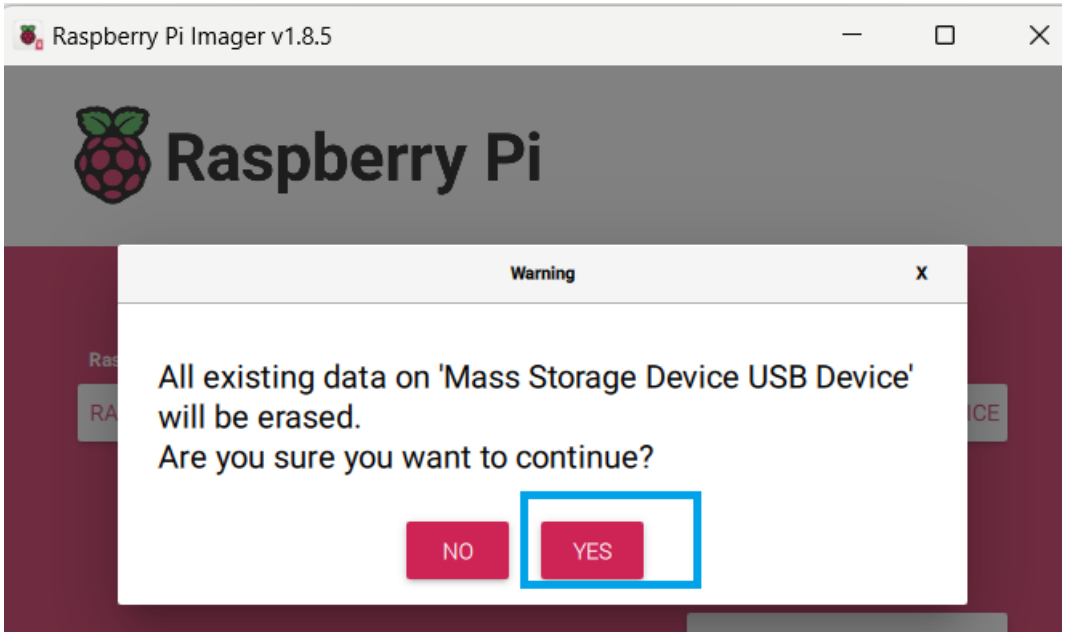


11. Click Save

12. Click Save to save the customisation settings.



13. Click Yes to continue write data into the USD device. The Raspberry Pi Imager will start writing the OS into the micro-SD card.



14. After the writing process of the Raspberry Pi Imager completes, insert the micro-SD card into the Raspberry Pi.

15. Power on the Raspberry Pi board.

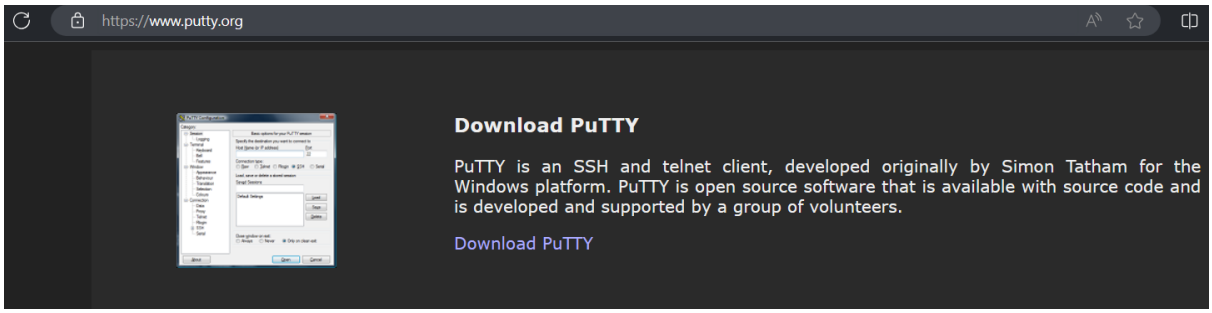
16. Turn on your mobile phone Personal Hotspot. connect your laptop and the Raspberry Pi to your mobile Personal Hotspot.

17. Open a CMD prompt on your laptop, check the IP address of your Raspberry Pi board.

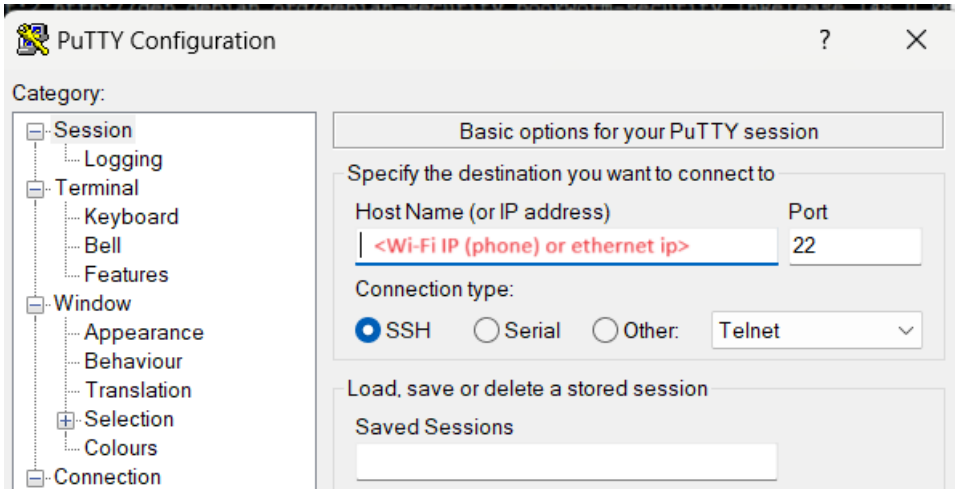
For example, the IP address of the Raspberry Pi is: 172.20.10.4

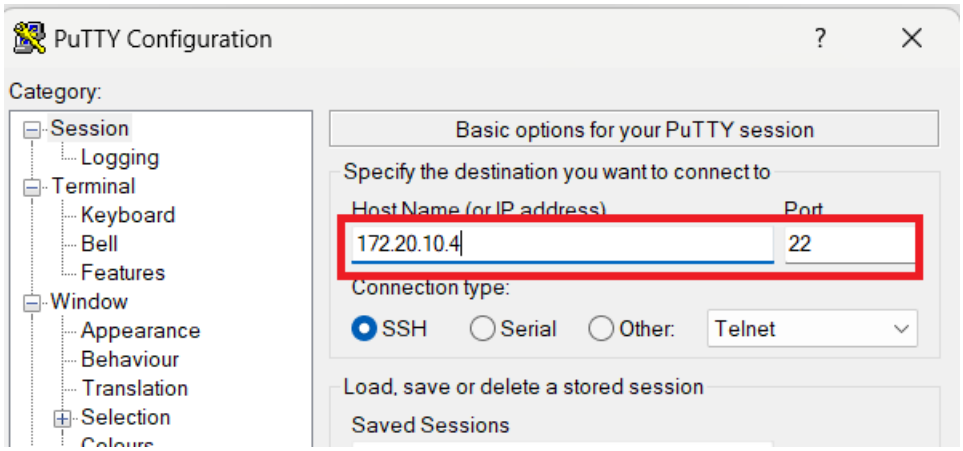
18. Download and install putty (for Windows laptop) from the web link below. For MacOS, open a Terminal in the MacBook.

https://www.putty.org

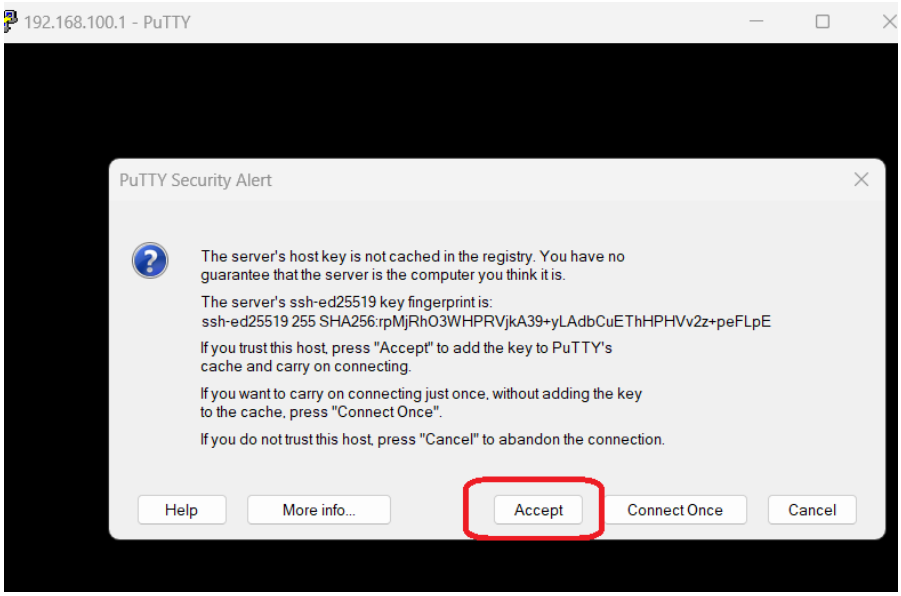


19. Use Putty to remote login to the Raspberry Pi using its IP address. For example, 172.20.10.4



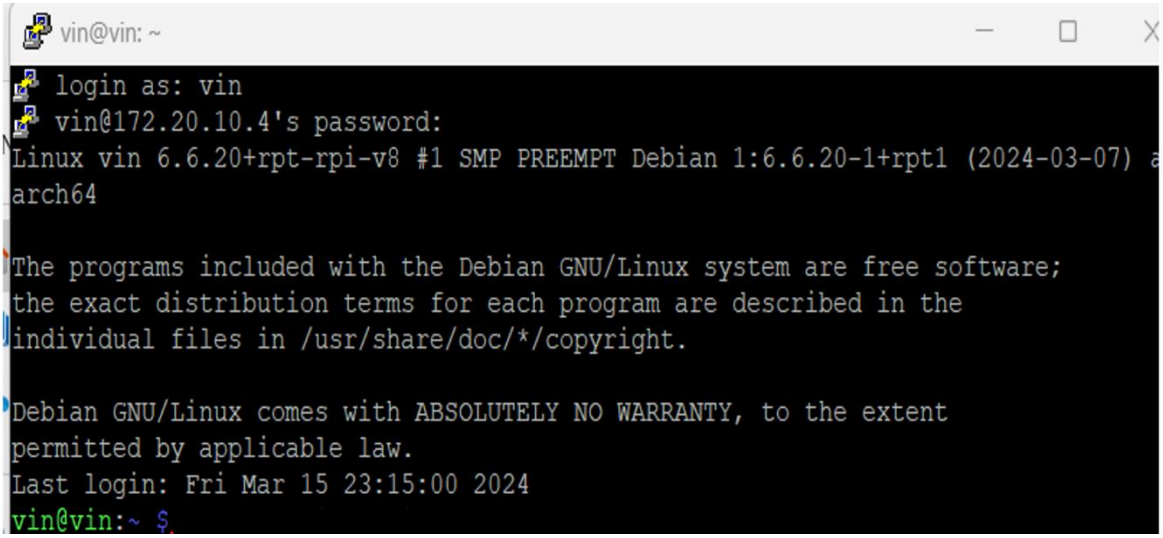


20. Accept the Putty Security key.



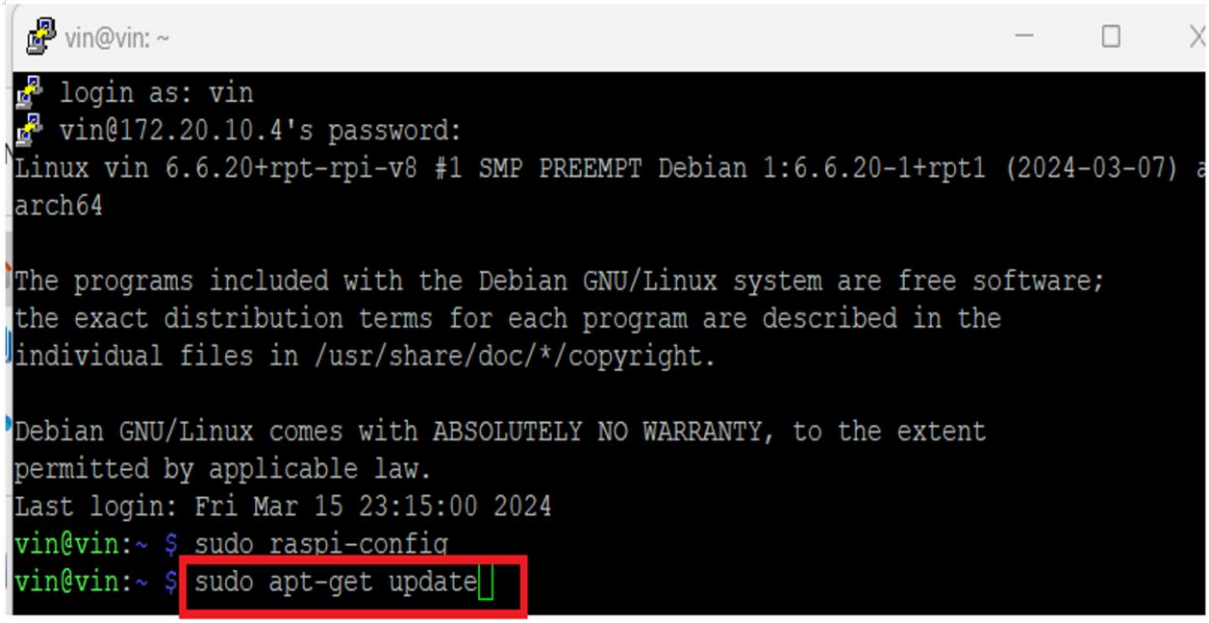
21. You will be asked for username and password of your pi. Login to the Raspberry Pi, using the username and password. Now, this is your raspberry pi's terminal. You can use your pi with different Linux commands.

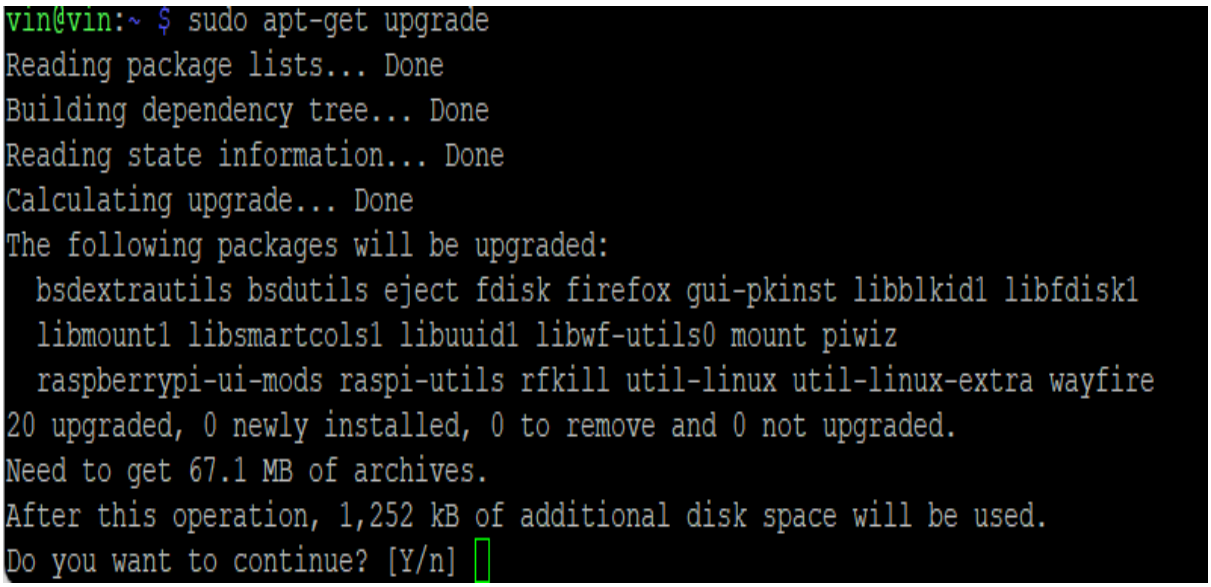
Congratulations, you have successfully installed the Raspberry Pi OS, and remote login to it.



22. You can update the Raspberry Pi OS, using the command:

sudo apt-get update





23. With ssh access remotely to the Raspberry Pi platform from your laptop, you can now develop your C program, and perform the compilation in Raspberry Pi.

24. At the terminal of Raspberry Pi, create a new directory named as project using the command:

mkdir project

25. Download the hello.c file from LMS xSite into your laptop.

```c
#include <stdio.h>

int main()
{
    printf("\nHello world, CS Cohort of CSC1104\n");
    return 0;
}
```

26. Once it is downloaded into your laptop, you can then transfer the hello.c file to the Raspberry Pi platform using scp commands.

For example, the hello.c file has been downloaded in the directory of your laptop at: C:\users\download\hello.c. In your laptop, open a command prompt terminal CMD. Type the command below to transfer the file.

scp C:\Users\user\projects\hello\hello.c pi@172.20.10.4:project\hello.c

where the IP address of the Raspberry Pi is 172.20.10.4. The file will be transferred and stored as pi/project/hello.c.

27. Switch the Raspberry Pi terminal, please go to the Raspberry Pi's directory of pi/project/. You can check the file helloworld.c has been in the folder.

28. At the Raspberry Pi terminal, please use GCC to compile the hello.c file using the command below:

gcc -o hello hello.c

A new file helloworld.exe will be generated. Please execute this file using the command: ./hello
and check if the results are correct.

Section 3. Add more Wi-Fi networks in Raspberry Pi

If you have already gotten your Raspberry Pi connected to a Wi-Fi network, such as your mobile personal Hotspot Wi-Fi, then you can add your home Wi-Fi for your Raspberry Pi without requiring to re-install the Raspberry PI OS.

Please follow the instructions below to add multiple Wi-Fi networks for your Raspberry Pi.

- In the Raspberry Pi terminal, open the file stored at the directory: /etc/wpa_supplicant/wpa_supplicant.conf using the command as follows:

  sudo nano /etc/wpa_supplicant/wpa_supplicant.conf

- You can see the existing contents in this wpa_supplicant.conf file, for example:

```
ctrl_interface=/var/run/wpa_supplicant
update_config=1

network={
ssid="your personal Hotspot SSID"
scan_ssid=1
psk=" your personal Hotspot password"
key_mgmt=WPA-PSK

}
```

- Next, modify the content of this wpa_supplicant.conf file, by adding the WiFi ssid and password of your home WiFi.

```
ctrl_interface=/var/run/wpa_supplicant
update_config=1

network={
ssid=" your personal Hotspot SSID"
scan_ssid=1
psk=" your personal Hotspot password"
key_mgmt=WPA-PSK

}
```

```
network={
ssid="home SSID"
scan_ssid=1
psk="home password"
key_mgmt=WPA-PSK

}
```

- After revising this file, press your keyboard keys of CTRL + o to save this file. Then enter to confirm. Finally, press your keyboard keys of CTRL + x to exit the nano editor.
- If you power off then power on your raspberry pi board, then switch your laptop WiFi network to either your mobile phone hotspot ssid or home ssid, you can login your raspberry pi using your local host name: for example: mynamepi.local

If you want, please read more information from the post here:

https://forums.raspberrypi.com/viewtopic.php?t=336180