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Prelab 0.3 Booting up the Raspberry Pi

Learning Goals

Students will be able to:

1. Install Raspberry Pi OS and get ping test to make connection via ethernet

3.1 Edge computer setup for headless access

Raspberry Pi is a small and light edge computer. We will use Raspberry Pi as a headless system. A headless system is a device or computer system that can be operated without any physical interfaces like a monitor, keyboard, or mouse. As long as we have a network connection with Raspberry Pi, it is possible to access Raspberry Pi remotely at any time. Lab 1 is for preparing the headless setup and accessing Raspberry Pi via ethernet cable without physical interfaces. In Prelab 1, you will install Raspberry Pi OS and prepare the headless setup using the ethernet cable

- For one who cannot use wireless internet, in Prelab 1, your Raspberry Pi does not need to be on the Internet

3.1.1 Install Raspberry Pi Desktop OS

In order to use the Raspberry Pi, you need to make sure an operating system (OS) is installed on the Micro-SD card that will be inserted to the Raspberry Pi. Some of the Micro-SD cards that come with Raspberry Pi kits have the OS pre-installed. However, the following steps outline how to install the Raspberry PI OS if you are using a blank/fresh SD card. In this prelab, we will deal with setting up the Raspberry Pi using only an ethernet cable and your laptop without any physical interfaces.

First, connect your Micro-SD card to your laptop using any methods available to you. To install Raspberry Pi OS in the Micro-SD, you may use Raspberry Pi Imager (https://www.raspberrypi.com/software/). When the Micro-SD card is connected to your laptop, you can format the card in the Raspberry Pi Imager. After choosing RaspberryPi 4, , you can start to choose the OS. First, you need to choose '*Raspberry Pi OS (64-bit)*' as shown in the left figure of Figure 5.

- Use USB SD card reader if you encounter the issue (if it cannot recognize SD card).

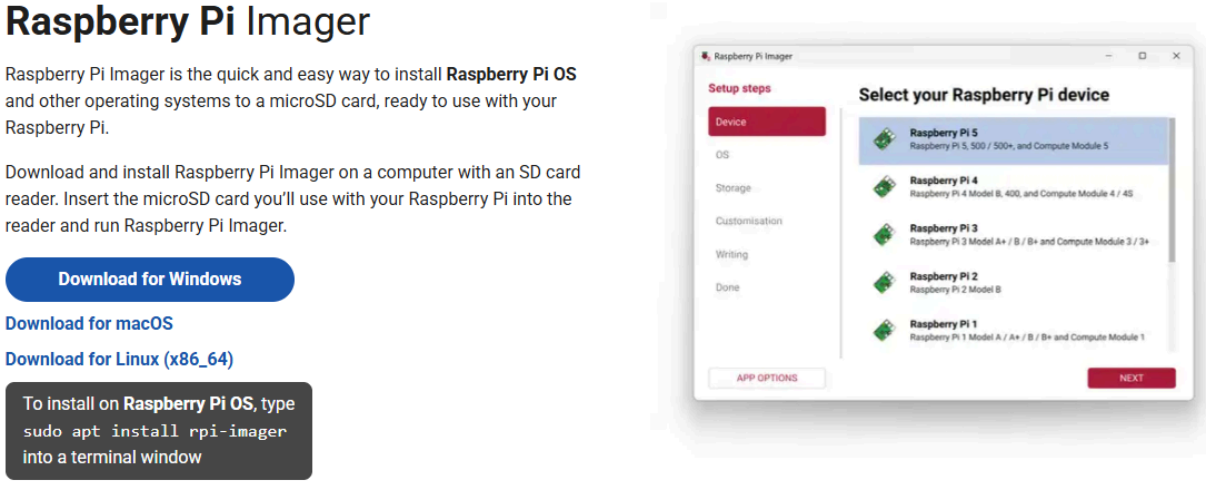


Figure 4 Capture of Raspberry Pi Imager download page at (https://www.raspberrypi.com/software/)

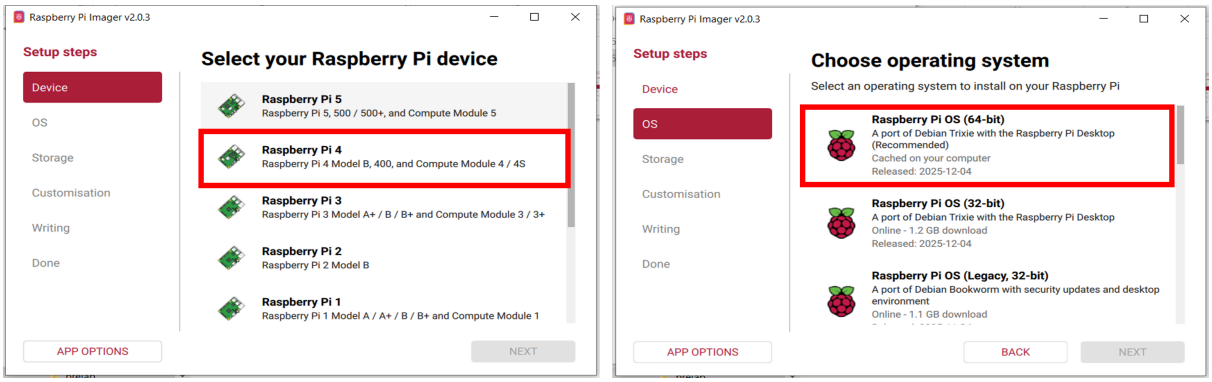


Figure 5 Select the operation system that will be installed in Raspberry Pi

Then, select the SD card where you want to install your os.

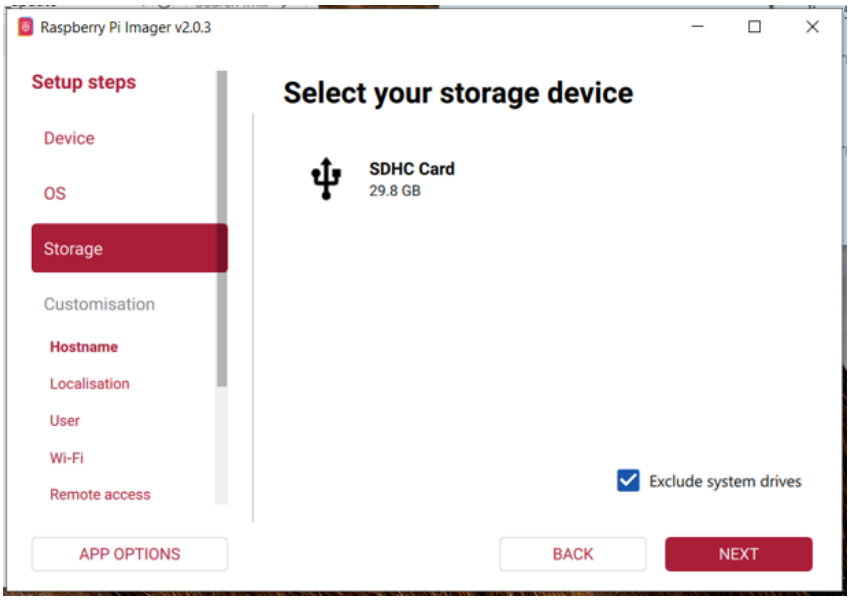


Figure 6 check your SD card

Make sure the options as below (Figure 7). Do not change other options. Note that the hostname (computer name) is your '*firstnamelastname*'. Then, click '*next*'.

- Set '*Hostname*', '*Localization*', '*Username*', '*Wi-Fi*', '*SSH authentication*', and '*Pi connect*'.

  > Username: pi
  > Password: raspberrypi

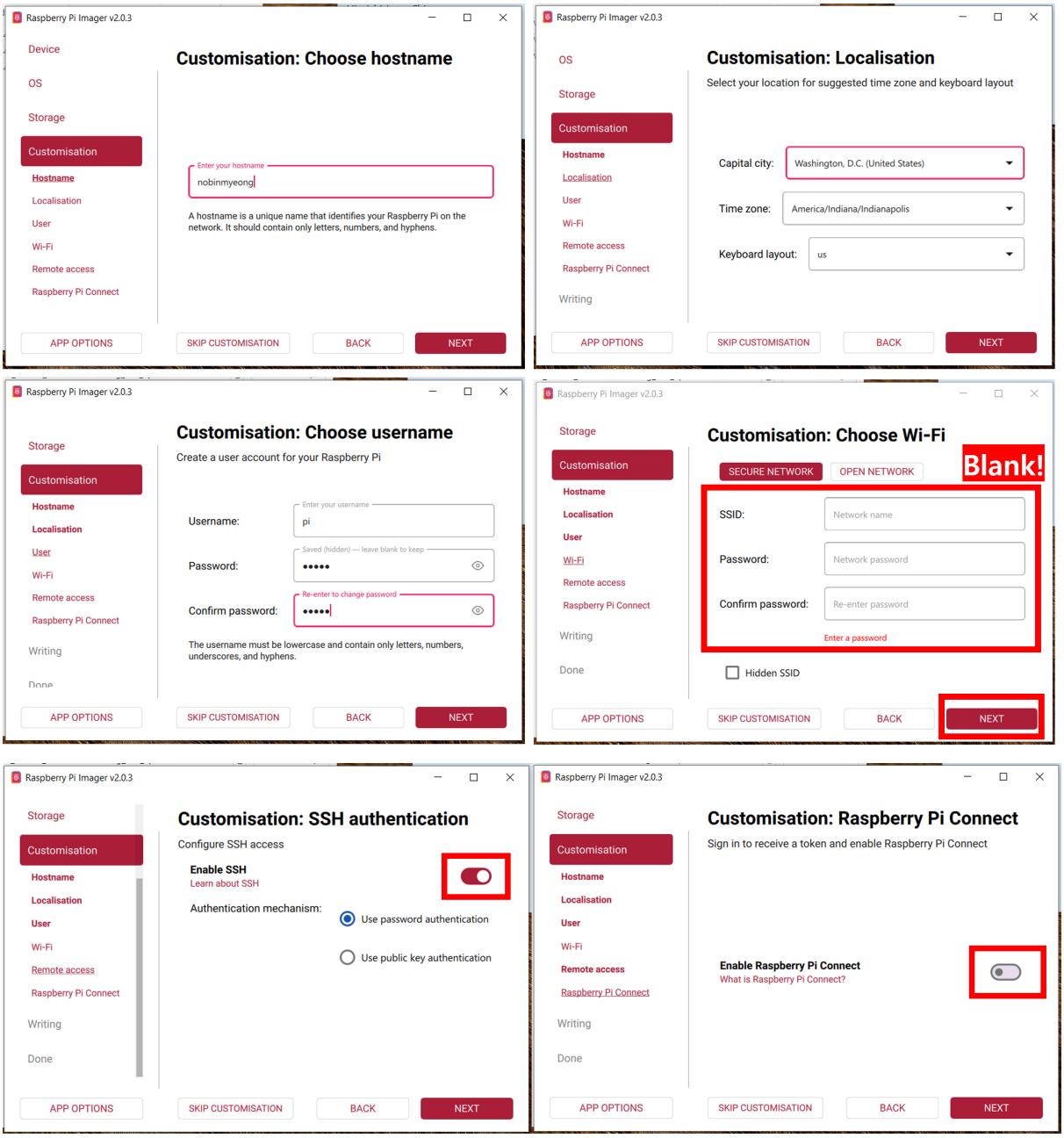
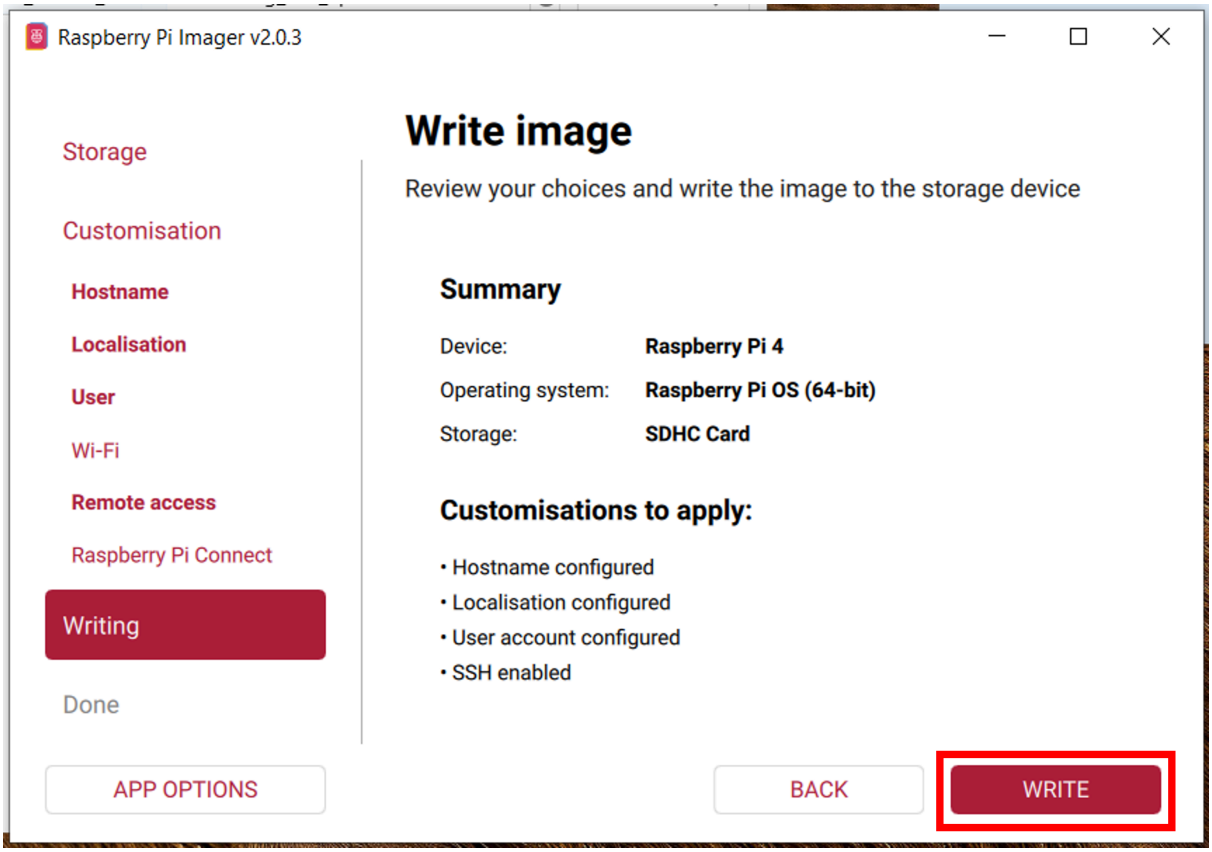


Figure 7, 8 Customization

This allows us to access the Raspberry Pi via SSH (Secure Shell). SSH is a network communication protocol that enables two computers to communicate and share data. An inherent feature of SSH is that communication between the two computers is encrypted meaning that is suitable for use on an insecure network.

When you click '*Write*', the process will begin to clean the SD card of any previous content, and install the OS on the card.



Once that process is done, remove the SD card from your laptop and insert it into your Raspberry Pi.

3.1.2 Access to headless system of Raspberry Pi with an ethernet cable

In this section, you will first try to access Raspberry Pi from your laptop. No physical interfaces are needed other than an ethernet cable.

Turn on the Raspberry Pi. Then make a connection between the Raspberry pi and your laptop using an ethernet cable. The first time booting up may take a couple of minutes to get access from your laptop.

The defualt hostname (computer name) of the Raspberry Pi is 'firstnamelastname'. In local TCP/IP communication, you can get access to a computer using the hostname by automatic search. First, we will try ping test. Ping test is a fast and accurate tool for quality measurements of the network/Internet connection. It checks delays in millisecond between your computer and selected remote computer. The ping value (response rate and latency) depends on the distance to the remote computer. Therefore, a ping test is run for troubleshooting to know connectivity as well as response rate. In this case, because we directly connect the Raspberry Pi and your laptop, the response rate will be less than 1 msec.

Open up '*Command Prompt*' in your laptop and then run the command below.

Windows - Command Prompt

```
ping firstnamelastname.local
```

※ This command means doing a ping test to a computer where hostname is raspberrypi in local network.

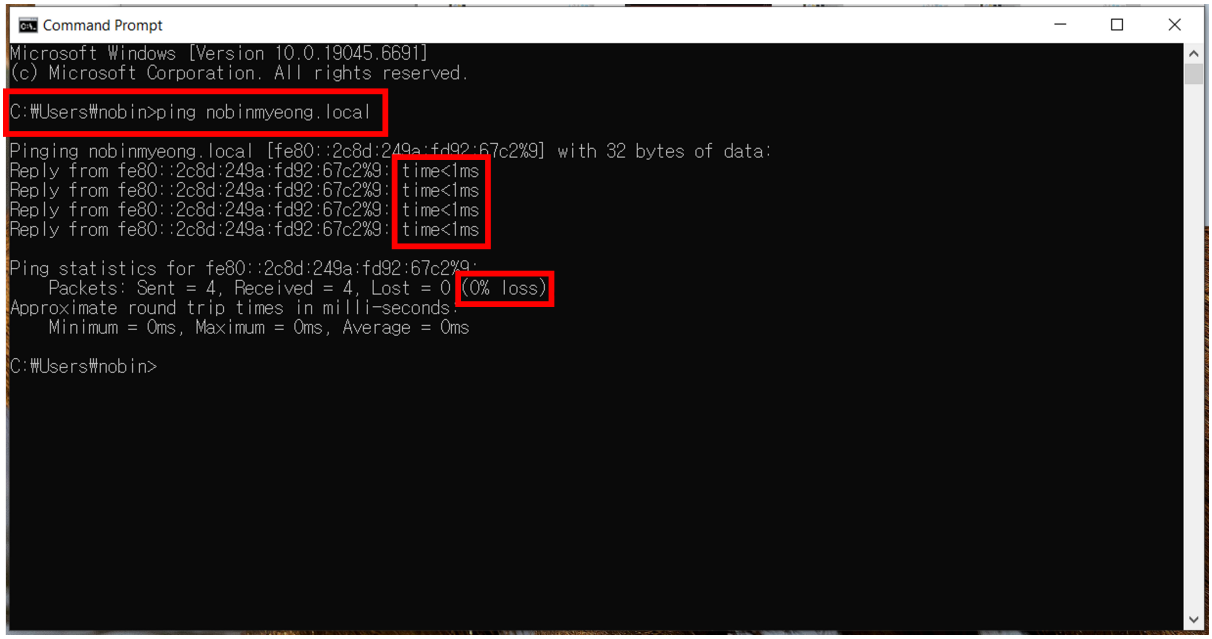
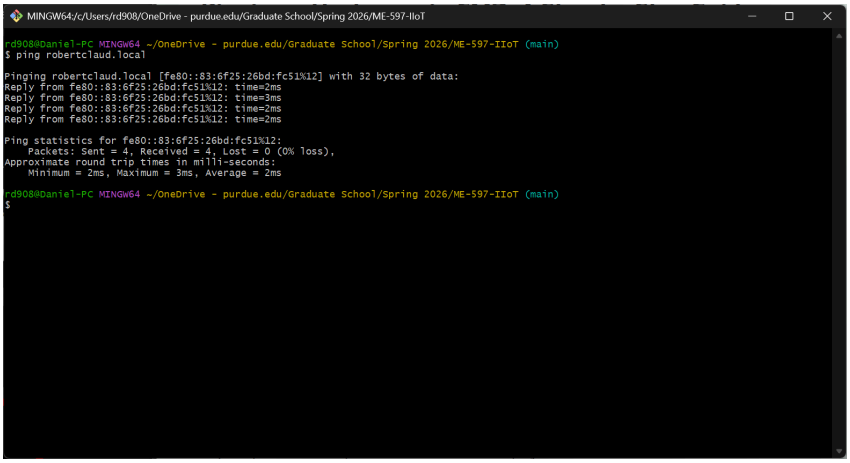


Figure 10 Ping test result from Windows to my Raspberry Pi (nobinmyeong.local)

Now, you are ready to get access to the Raspberry Pi!

Task 3.1

Capture your ping test result as Figure 8 and attach it to the report below:



Task 3.2

Please provide a response to the following prompts.

1. Answer the following question:

In [5]:
```
#@title What issues did you encounter as you install and connect Raspberry Pi OS? How did you solve them?

Text = 'I used the default raspberry pi os microSD card supplied with my kit.\n' \
'This was a little easier to set up but required me to go into the terminal on\n' \
'the pi to change the hostname and ssh settings using the command raspi-config.\n' \
'From there I was able to change the settings to the ones used in class.\n' \
'The other issue that I encountered is that I am using a laptop that does\n' \
```

```
'not have an ethernet port, so to connect I used SSH instead.\n' #@param {type:"string"}

print(Text)
```

```
I used the default raspberry pi os microSD card supplied with my kit.
This was a little easier to set up but required me to go into the terminal on
the pi to change the hostname and ssh settings using the command raspi-config.
From there I was able to change the settings to the ones used in class.
The other issue that I encountered is that I am using a laptop that does
not have an ethernet port, so to connect I used SSH instead.
```

Get back to Lab Index Page