Raspberry Pi 4 (RPi) Setup

Introduction

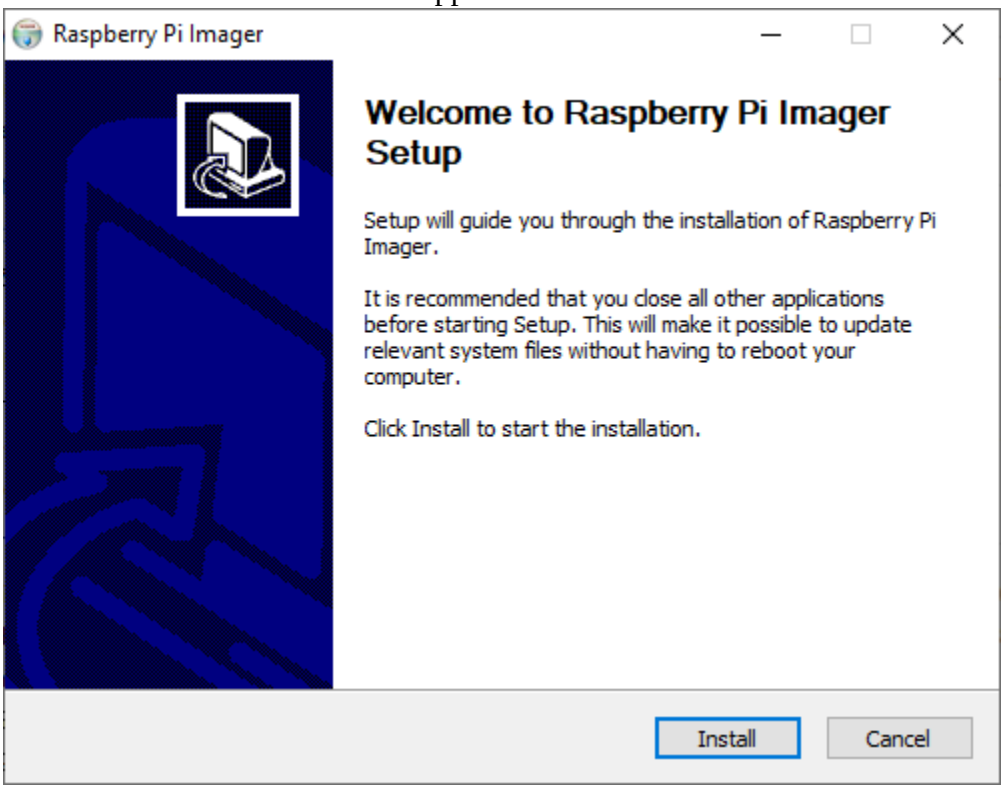
The most important part of the Pete-Kit is the Raspberry Pi. This will be the “brain” of any project done with the Pete-Kit. The RPi is a general-purpose microcomputer. This means that it can be used to do almost anything. This tutorial will walk you through how to setup the RPi for yourself.

Step One: Flashing the micro-SD Card

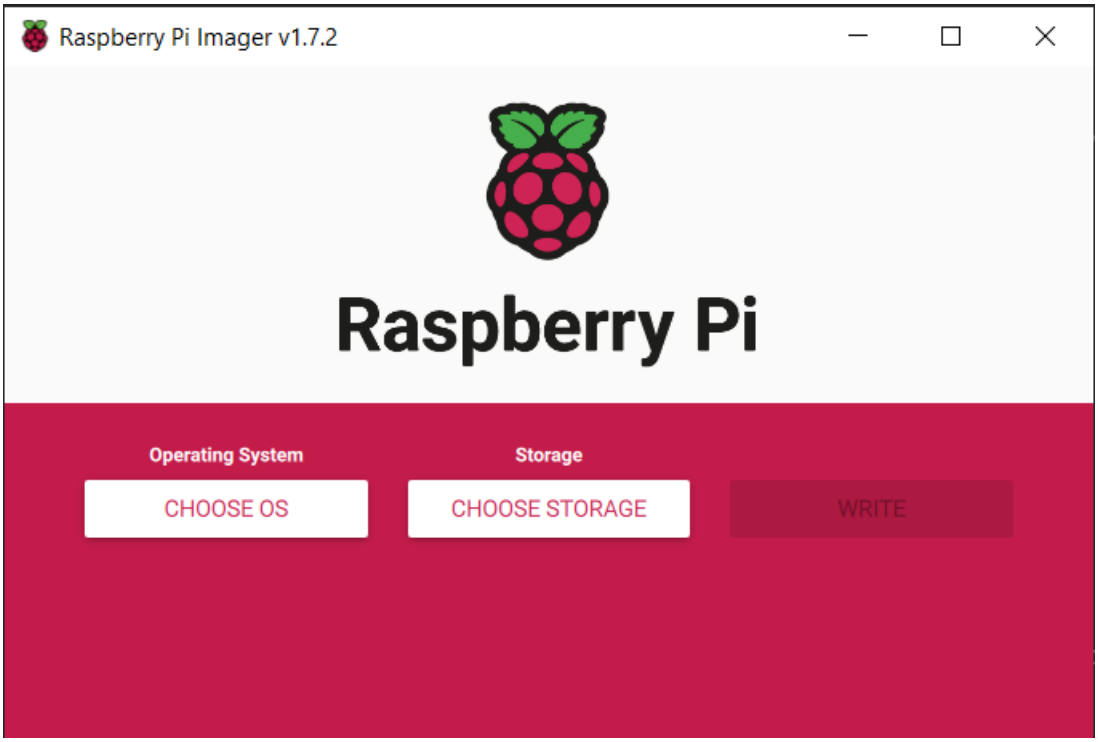
Every computer uses an Operating System (OS). Normally, the OS is stored on a hard drive, but for the RPi, it will be installed on a micro-SD card. Any operating system can be used, but the tutorials will be written using Ubuntu Desktop. Ubuntu has been chosen because it is a operating system designed for more general use, while other operating systems can be designed with a more specific purpose in mind. Most of the operating systems given in the Raspberry Pi Imager will operate similarly to Ubuntu, however.

Note that this step will not be necessary when you have first received your Pete kit. The micro-SD will already by flashed, so you can skip to step two.

1. Download the Raspberry Pi Imager installer.
2. Open the installer. The name of the installer will be similar to “imager_x.y.z.exe”
3. Click install on the window that appears



4. Wait for the program to finish installing, then click finish.
    a. There will be a check box that says “Open Raspberry Pi Imager.” If you leave this checked, the imager will open after you click finish.
5. Insert the micro-SD card into your computer.
    a. You may need an adapter. The Pete-Kit includes a micro-SD to USB adapter
6. If it is not already open, launch the Raspberry Pi Imager

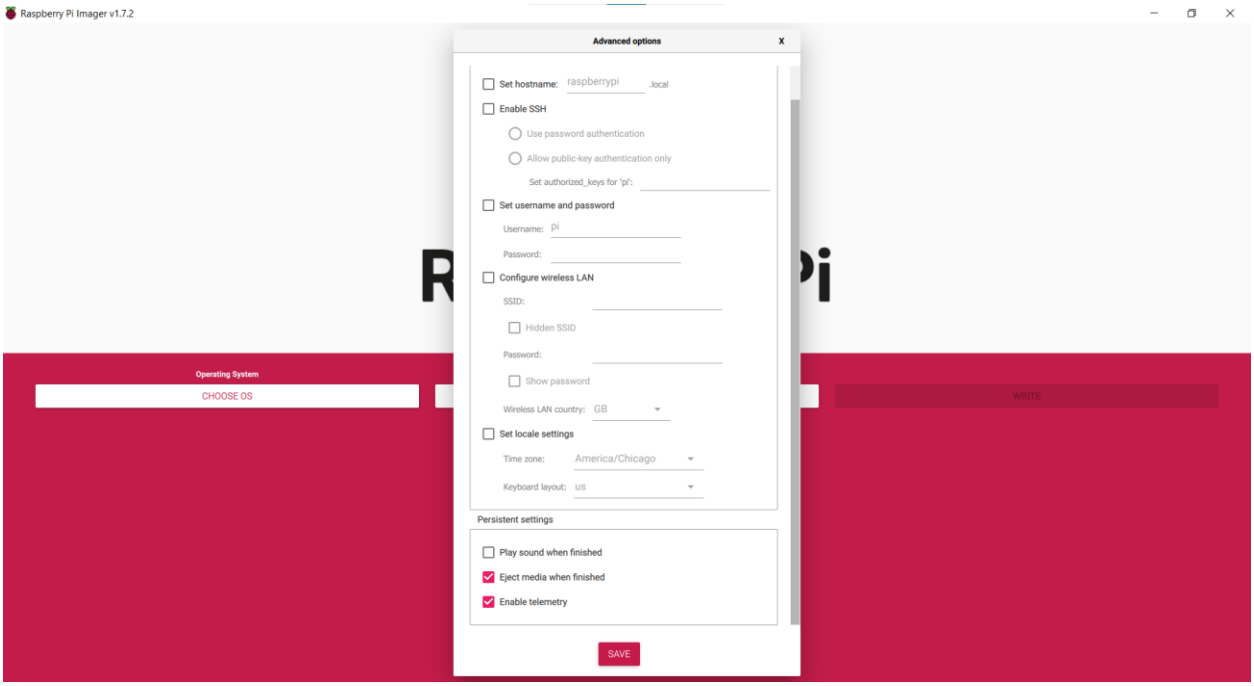


7. To select Ubuntu for Installation
    a. Click “Choose OS”
    b. Select “Other general-purpose OS”
    c. Select “Ubuntu”
    d. Select Ubuntu Desktop 22.04 LTS
8. To choose the storage device
    a. Remove any external storage from your computer to prevent flashing the wrong device. These include
        i. Flash Drives
        ii. External Hard Drives/Solid States
        iii. SD Cards
    b. Insert the micro-SD card you want to flash
    c. Verify there are no files on the micro-SD that you would like to keep. Flashing an image will remove any files that exist.
    d. Click “Choose Storage”
    e. You should now see only one storage device

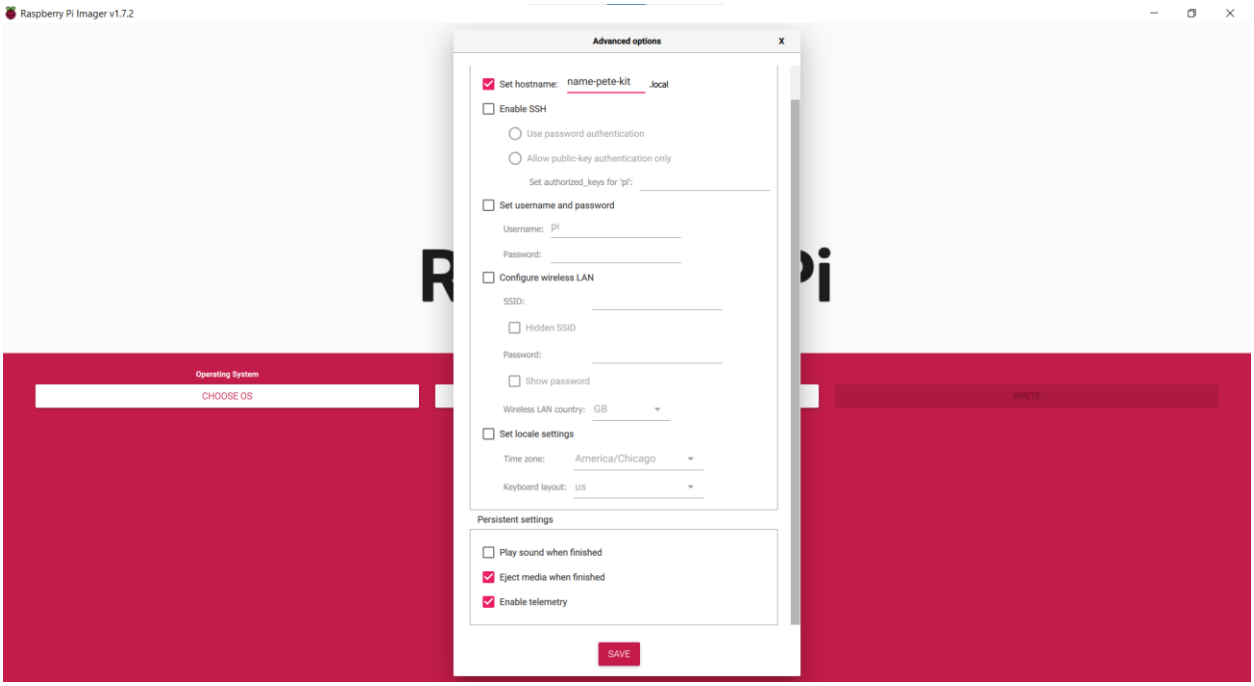
i. If you see more than one, you may still have an external device plugged in. If you do not, carefully determine which device is the SD card.

f. Select the storage device

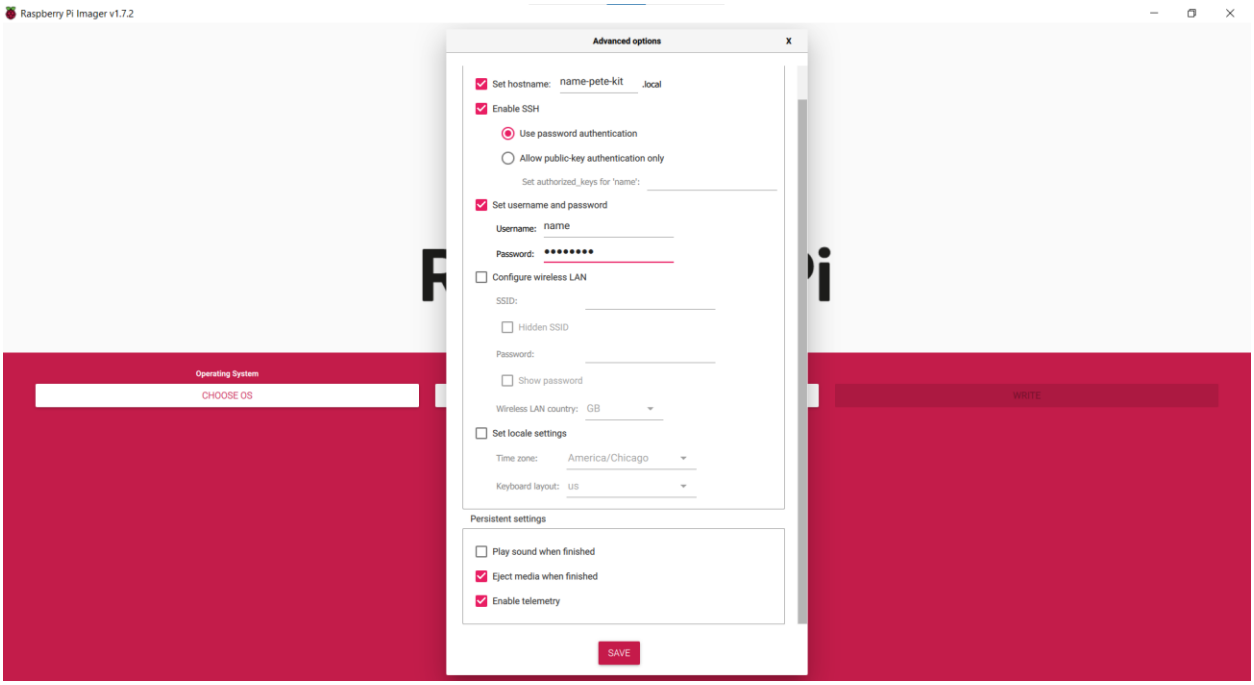
9. Press Ctrl, Shift, and X on your keyboard at the same time
10. The advanced options window is now open



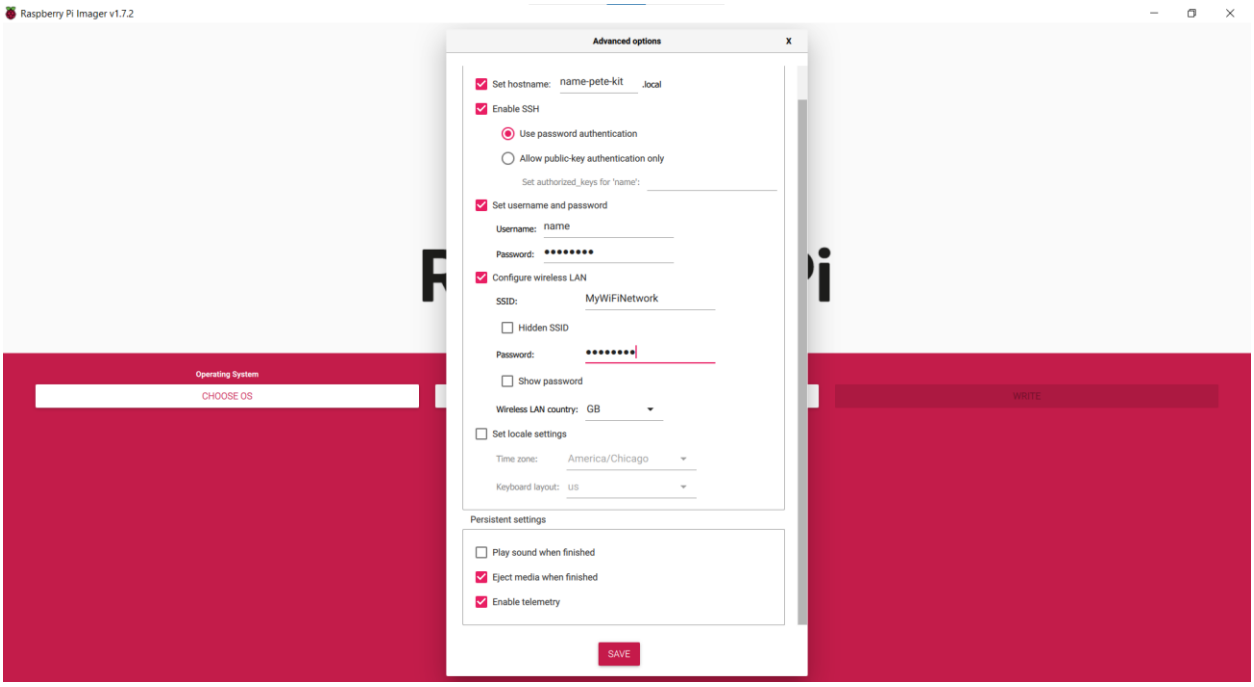
11. Click the box next to Set hostname and set the hostname to something unique
    a. An example would be “yourname-pete-kit”



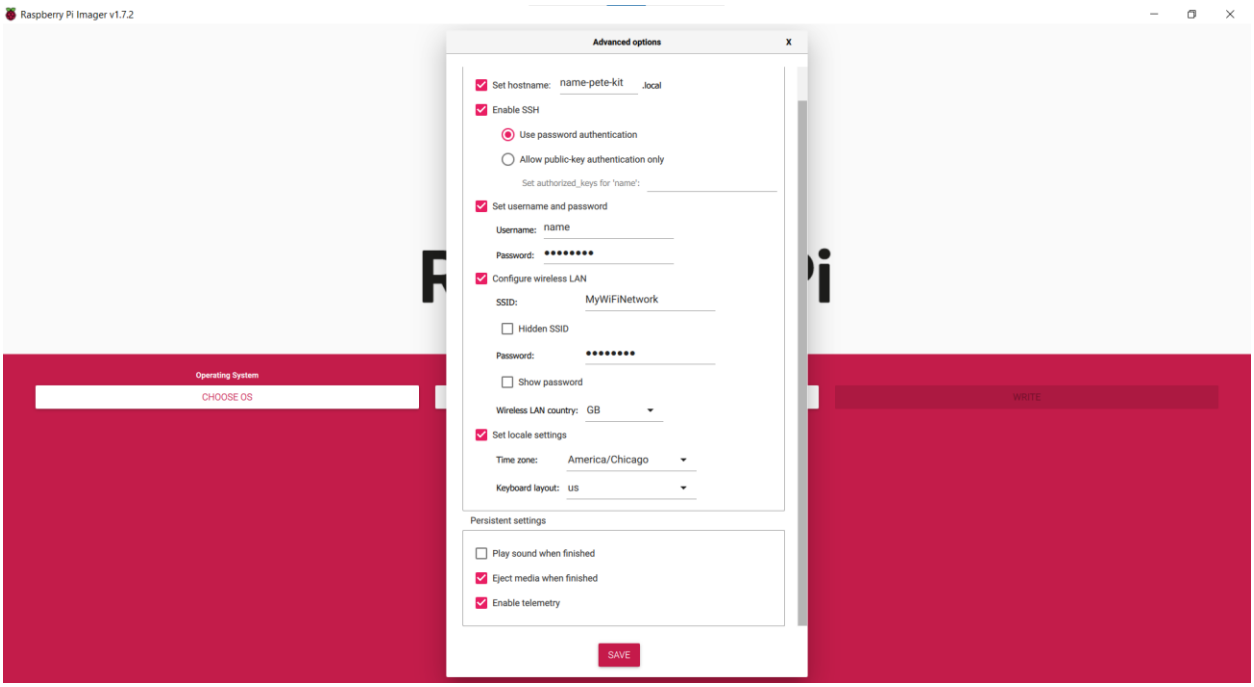
12. Click the box next to Enable SSH
    a. Leave “Use password authentication” selected
13. Set username and password is now selected as well
    a. Create a username and password for logging into the Pi



14. Click the box next to Configure wireless LAN
    a. In the blank next to “SSID” type the name of your Wi-Fi network. The name is case sensitive.
    b. In the blank next to “Password”, type in the password for your Wi-Fi network
    c. In the drop down next to “Wireless LAN country” select US.



15. (Optional) Click the box next to “Set locale settings”
    a. Select the proper time zone
    b. Select the proper keyboard layout



16. Click “Save” at the bottom of the Advanced Options window
17. Click “Write”
18. Click “Yes”
19. Wait for writing to finish. This could take several minutes.

20. Once finished, you may remove the micro-SD from your computer

After completing these steps, the micro-SD card is now ready to be used with the Raspberry Pi!

Step Two: Connecting to the RPi

This section outlines connecting to the Raspberry Pi, including making the proper connections. There will be two methods discussed here. The first is a physical connection and the second is a wireless connection.

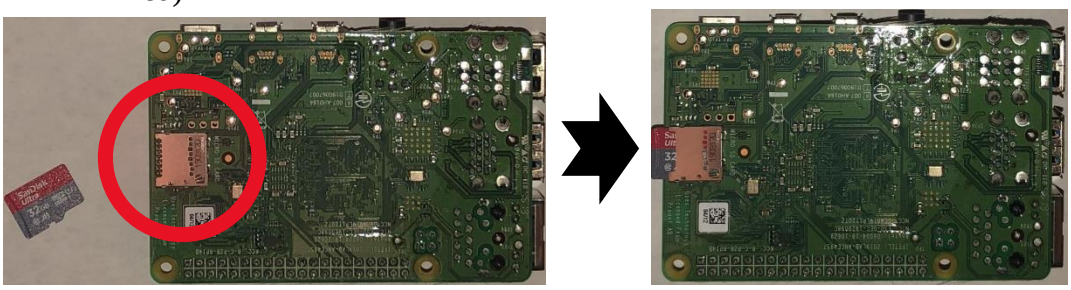
Method One: Physical Connection

To make this connection, you will need the following:

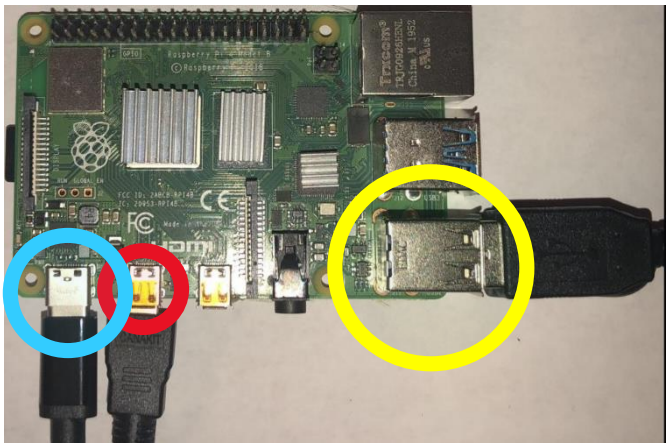
- Micro-HDMI to HDMI cable
- A screen with an HDMI connection
- A keyboard
- A mouse
- USB Type C Power Brick for RPi

To make all the proper connections, follow these steps. The images show the RPi outside of the case for better visualization:

1. On the bottom side of the RPi, insert the micro-SD Card into the micro-SD slot (circled in red)



2. Flip the RPi over again
3. Plug in the micro-HDMI end of the micro-HDMI cable into the left HDMI port
    a. See the following figure (Red Circle)
    b. Be sure to plug the other end of this cable into your monitor
4. Plug the mouse and keyboard into the USB ports
    a. See the following figure (Yellow Circle)
5. Plug the USB-C Power cord into the power port
    a. Note that, while a newer phone cable may use USB-C, phone charges do not supply a constant current and may cause issues with reliability
    b. See the following figure (Blue Circle)

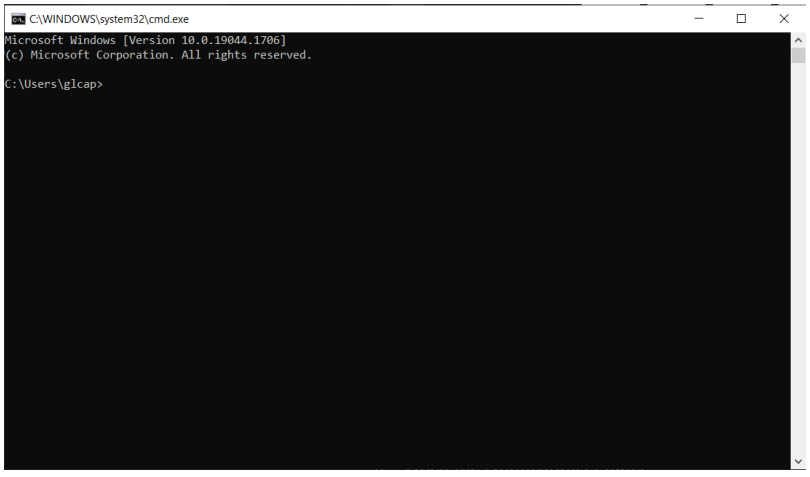


6. The RPi should now be booting. If your monitor is not already on, turn it on now.
7. Follow the on-screen setup (if necessary) to complete the setup process.
    a. The process will only be necessary if you did not use the advanced setup screen in the imager to configure the operating system before flashing the micro-SD

Method Two: Secure Shell Remote Connection

If you followed the advanced setup instructions in step one, then you should be able to use a secure shell (SSH) connection to connect to your RPi. An SSH connection allows you to remotely access the terminal of the computer's operating system.

1. (Optional) Connect the RPi to ethernet.
    a. This provides a more stable connection but is not necessary if the RPi is able to connect to the Wi-Fi network.
2. Connect your RPi to power.
3. Open the console/terminal on a separate computer
    a. For Windows:
        i. Press Windows Key and R simultaneously
        ii. Type "cmd" and press Enter



    b. For Linux distros
        i. Open a terminal (Ctrl + Alt + T)

    c. For Mac users
        i. Open Launchpad
        ii. Open the Applications Folder
        iii. Open the Utilities Folder
        iv. Open “Terminal”
4. Type “ssh” followed by your host name
    a. If your host name was “pete-kit” you would type “ssh pete-kit”
5. If this is the first time you have made this connection, you will be notified that the key does not match the key on record. This is because there is no key on record. It is okay to accept this IF you know the device you are connecting to.
    a. In the future, if you try to connect to your device and it gives you this prompt again, it means the device you are connecting to now is not the device you have previously connected to.
6. You will be prompted for the username and password. You set these in Step One in the advanced setup screen.
7. Type your username and press Enter
8. Type your password then press Enter
    a. Note that it will look like you aren’t typing. Instead of placing dots for each character you type, SSH usually leaves the area blank.

Step Three: General Maintenance and Operation

This section will outline the general maintenance steps for your Raspberry Pi. These should be done on first startup and occasionally after that.

1. If you did not use the SSH method in the previous step, open a terminal on the Raspberry Pi. (Shortcut: Ctrl + Shift + T)
2. Run the following commands in the order they are given

```
sudo apt-get update -y
sudo apt-get upgrade -y
```

   The first command updates the packages list on your system. This must be done before running upgrade. Upgrade compares all installed packages to the current package list. If a package is outdated, upgrade will retrieve the new version of the package and upgrade the old version with it. The “-y” flag auto-accepts any prompts. Sometimes, upgrade will prompt you that it needs a certain amount of space and asks if this is ok. The “-y” flag skips this prompt.
3. That’s it. Now the software on your system is up to date.

To work with your RPi from the terminal, a few commands are important to know.

1. To edit a file, use the “nano” command. If the file does not exist, nano will create it.

```
nano myfile.txt
```

2. To check the directory you are currently in, use the “pwd” command. Short for Print Working Directory

```
pwd
```

3. To make a directory, use the “mkdir” command. Short for “make directory”

```
mkdir myDirectory
```

4. To move around directories, use cd

```
cd myDirectory
```

   Also note that to move up a directory, use “..” This will move you into the parent directory.

```
cd ..
```

5. Occasionally, you will need administrative, or “root”, access. To get this, add “sudo” before the command you are trying to run

```
sudo nano myfile.txt
```

6. To list files in a directory, use the “ls” command. Short for List

```
ls
```

   To list files that are hidden, use the -a flag. To list more details, use the -l flag. Some flags can be combined.

```
ls -a -l
```

```
ls -al
```

7. From here, other important commands are based on the packages you install. You can always use google or another search engine to find information on packages and their usage!