Setting up an SD card on a Mac

To get started with the Raspberry Pi, you will:

- Format an SD card
- Download Raspbian Linux
- Install the correct version of the Raspbian Linux kernel onto the SD card

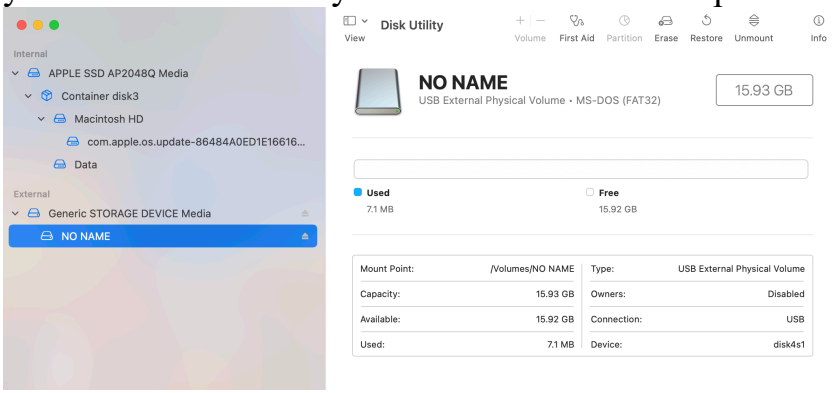
Once this SD card is setup, you can move on to configuring the Raspbian Linux Operating System for the Raspberry Pi.

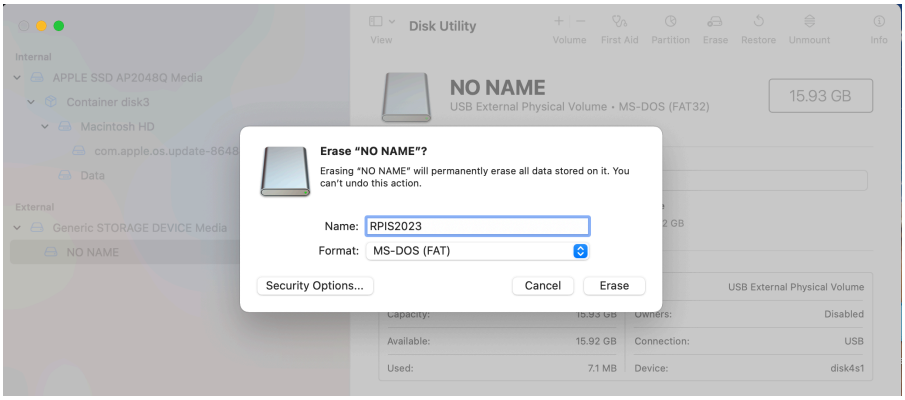
Format the SD card

As one example, here is the expanded process for iOS on a Mac:

Plug the SD card into your laptop (SD card slot or using a USB/SD adapter)
Hold control and click on the SD card icon on the desktop to get info on the card

Open the Disk Utility application and erase the card (CAUTION: make sure you erase your SD card and not your Mac hard drive…important safety tip!):





Notes for using this utility:

- Naming the card: This utility allows only upper-case characters…. Lower case characters are ignored.
- The correct format Type is MS_DOS (FAT)

Once you erase and format the card, you can recheck disk info:

Install the Raspberry Pi OS on the SD card

As mentioned in class, there are two methods for installing the Raspberry Pi OS onto the SD card. Please read through the two methods detailed below. I am using 'method 2' because it allows for downloading current and past versions of the OS. Note that at the end of this guide document there are additional changes you will want to use for customizing the installation of your SD card.

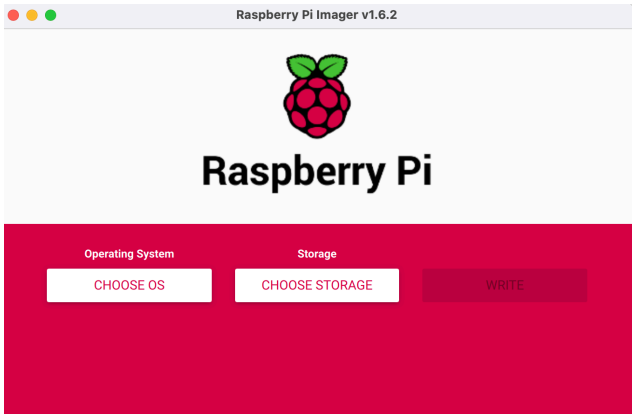
Method 1 (preferred method):

The Raspberry Pi organization provides an SD card installation program, Raspberry Pi Imager, which may be found here:

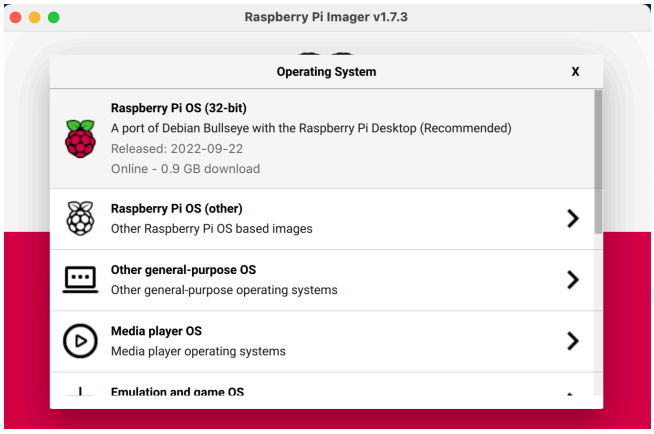
https://www.raspberrypi.org/documentation/installation/installing-images/

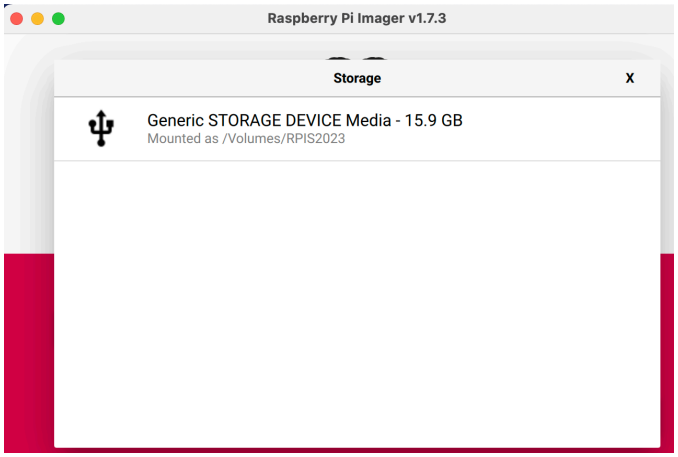
You can elect to follow the instructions on this link to install the most recent Raspberry Pi OS on your SD card.

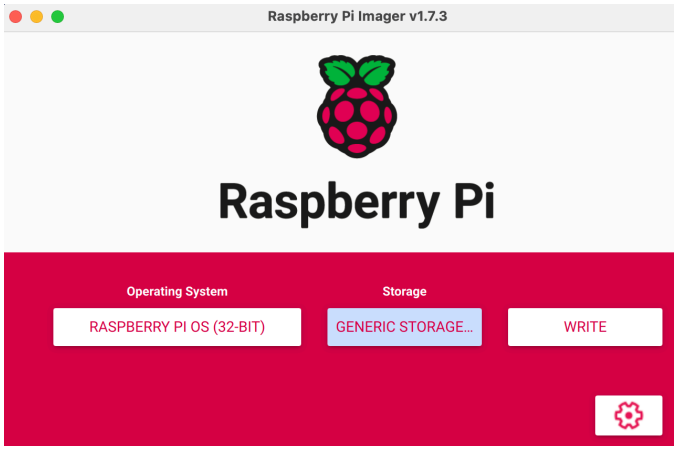
After I installed Raspberry Pi Imager and launched it:



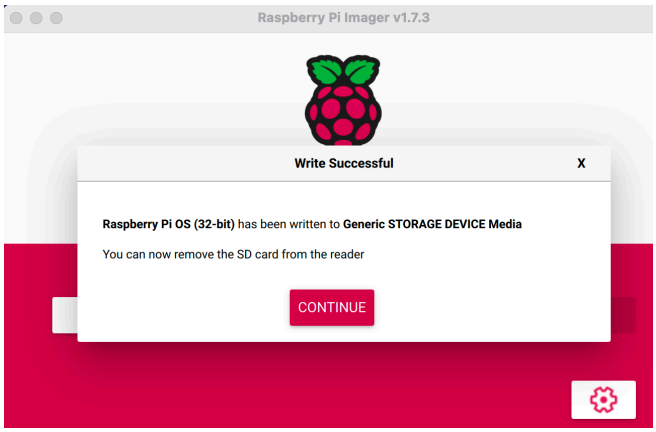
And, as shown in the following screen grabs, I selected the 32bit Raspberry Pi OS and the 16 GByte SD card:







I hit ‘Write’ and there were some checks for permission and accessing a removable volume, then writing to the SD card started.



Once the process was complete, the Raspberry Pi Imager posted the above message that the process was done.

Method 2: Older method using a past example

The second method is detailed below. Using this method, you will download the latest version of the Raspberry Pi OS to your laptop, then install it onto your SD card.

Download the correct kernel version

In past semesters, we have used the New Out Of The Box Software (NOOBS) tool to load the latest Raspbian kernel onto the SD card. NOOBS has some features allowing exploration of external kernels but comes at a cost of additional SD card use.

As a result, we will skip NOOBS and load the correct version of the kernel directly.

The first step is to locate and download the correct kernel version. Visit:

http://downloads.raspberrypi.org/raspbian/images/

to see a list of the available Raspbian kernels for the Raspberry Pi. Here's a snip from the site:

raspbian-2019-04-09/	2019-04-09 23:46	-
raspbian-2019-06-24/	2019-06-24 07:20	-
raspbian-2019-07-12/	2019-07-12 14:55	-
raspbian-2019-09-30/	2019-09-30 15:52	-
raspbian-2020-02-07/	2020-02-07 08:23	-
raspbian-2020-02-14/	2020-02-14 15:33	-

For example, for the Fall 2020 semester, we used the February 14, 2020 release which is a 'Buster' Release.

There was a recent name change by the RaspberryPi.org foundation; The name of the Linux Operating System for the raspberry Pi was changed from 'Raspbian' to 'Raspberry Pi OS'. Using the above link, you will be able to access past Raspbian releases. The new Raspberry Pi OS releases may be found at:

http://downloads.raspberrypi.org/raspios_armhf/images/

Here is a snip from this site:

Index of /raspios_armhf/images

Name	Last modified	Size	Description
Parent Directory		-	
raspios_armhf-2020-05-28/	2020-05-28 06:02	-	
raspios_armhf-2020-08-24/	2020-08-24 17:20	-	
raspios_armhf-2020-12-04/	2020-12-04 07:08	-	
raspios_armhf-2021-01-12/	2021-01-12 15:28	-	
raspios_armhf-2021-03-25/	2021-03-25 15:36	-	
raspios_armhf-2021-05-28/	2021-05-28 16:08	-	
raspios_armhf-2021-11-08/	2021-11-08 07:49	-	
raspios_armhf-2022-01-28/	2022-01-28 16:53	-	
raspios_armhf-2022-04-07/	2022-04-07 12:03	-	

As this is a fairly recent change, there are only a few entries for the newly names releases. For the Fall 2022 semester, we will be using the 4/07/2022 release. Details of this release:

Index of /raspios_armhf/images/raspios_armhf-2022-04-07

Name	Last modified	Size	Description
Parent Directory		-	
2022-04-04-raspios-bullseye-armhf.img.xz	2022-04-04 13:32	837M	
2022-04-04-raspios-bullseye-armhf.img.xz.sha1	2022-04-07 11:54	83	
2022-04-04-raspios-bullseye-armhf.img.xz.sha256	2022-04-07 11:54	107	
2022-04-04-raspios-bullseye-armhf.img.xz.sig	2022-04-07 07:40	488	
2022-04-04-raspios-bullseye-armhf.img.xz.torrent	2022-04-07 11:54	33K	
2022-04-04-raspios-bullseye-armhf.info	2022-04-04 13:17	177K	

Download the file 2022-04-04-raspios-bullseye-armhf.img.xz to your laptop. This is an xz compressed file containing the compiled Linux kernel.

Load kernel onto the SD card

Navigate to this link:

https://www.balena.io/etcher/

for instructions on downloading the 'balenaEtcher' application. balenaEtcher will allow you to load a Raspbian image from a zipped image file onto a correctly formatted SD card, which you created earlier in this process. Note that you do not need to expand the zip file; balenaEtcher will handle the expansion as part of its processing.

I use balenaEtcher on a Mac and it works correctly. There is also a link for Windows for the balenaEtcher app. I have not tested it yet but suspect it will work identically as on the mac.

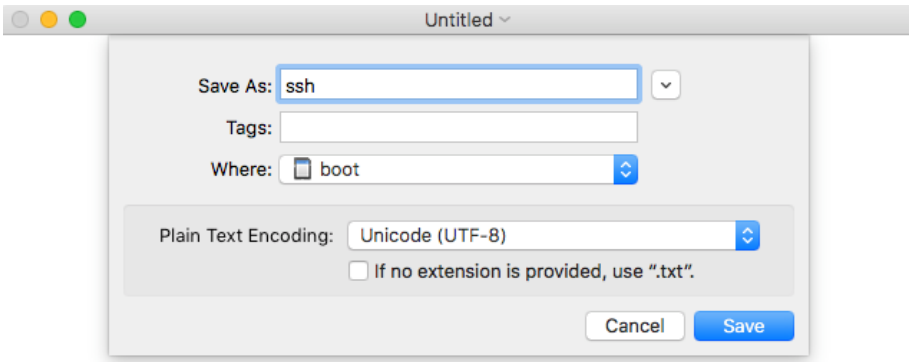
Once balenaEtcher is finished (about 5 minutes), the initial Raspbian kernel should be loaded to the SD card.

A few more Modifications

The modifications in this section will make it MUCH easier to use your Raspberry Pi remotely and will definitely help when using the Raspberry Pi remotely. These modifications will be made to the 'slash boot' or, /boot, directory in the filesystem of the kernel installed on the SD card. You should make these changes using a text editor on your laptop (I used TextEdit on a Mac. On windows, use a TextEditor such as NotePad)

Changes to setup Secure Shell (ssh) at first boot:

First, there needs to be a modification to the initial kernel to enable Secure Shell (ssh) on the initial boot of the kernel to the Raspberry Pi. With the SD card still plugged into your laptop, open your favorite text editor and locate the folder named 'boot' (which is a directory in the filesystem on the SD card). In this directory, you will add a file named ssh. The contents of the file will be a single space. Here is the save screen after I opened a new file in TextEdit and added a single space; Once you hit 'Save', this will save the file as ssh in the /boot directory on the SD card. Note: DO NOT add a 'dot txt' extension to this file (sometimes text editors do this by default.) Make sure the file is named simply ssh without any file extensions.



Here is a listing of the /boot directory; note that the ssh file has been created: