

SD Card Backup

Introduction

Your SD card is the most vital element in your Raspberry Pi system. It contains all the hard work you've put in long hours to tune your system.

When to backup:

1. Whenever noted in Lab instructions
2. After every lab session.
3. When you've made a successful working installation.
4. Before any planned major work on wither your applications or kernel.

Students have successfully used both methods described below to save SD card backups and restore images to SD cards. Some items of note:

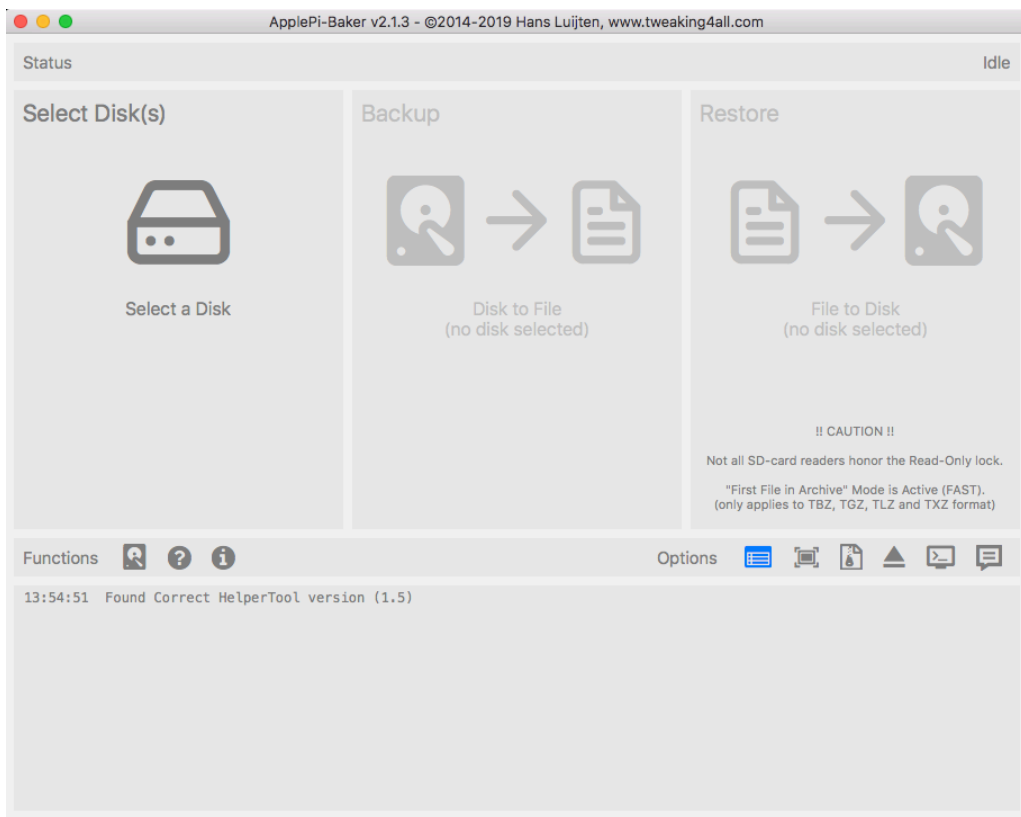
- In general, the ApplePi Baker method on a Mac is much more 'friendly' than the Win32DiskImager running under Windows. If you have access to both platforms, we suggest you maintain backups on a Mac.
- Note that both methods save an image of the entire 8 or 16 GByte SD card.
- Plan on 16 GByte per backup...and you will be doing a large number of backups, approximately 10 backups for all labs.
- If your hard drive or SSD drive is nearing its capacity, you'll want to plan ahead for backups during lab and project development. You might want to grab a blank a 256G USB Drive (16 Backups), or a 1TB external drive (64 backups!).

iOS on a Mac

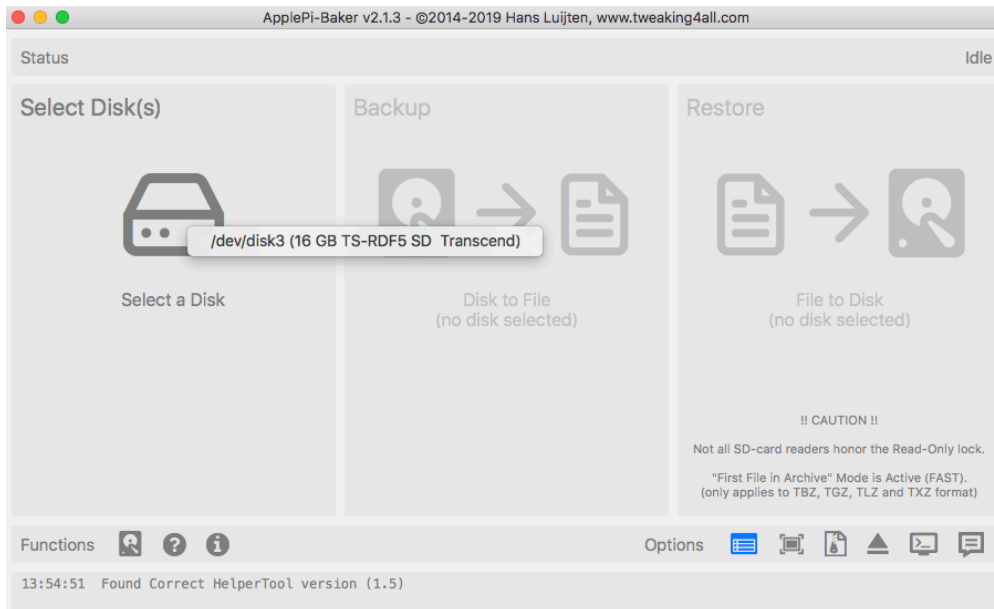
Backing up your SD Card

Use the 'Apple-Pi Baker' program to backup your SD card:

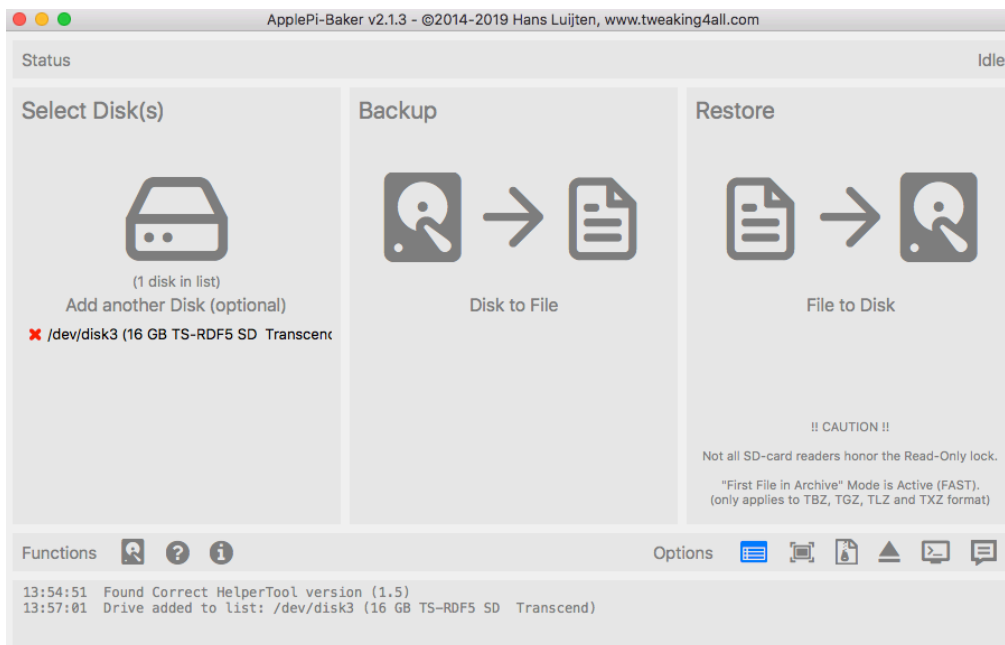
1. Get everything set up just the way you want it on your Raspberry Pi.
2. Shut down the Pi and remove the SD card. Insert the SD card into your computer. (Note: I have USB SD card readers for loan if your computer does not have an SD card slot).
3. Download the 'Apple-Pi Baker' utility from:
<https://www.tweaking4all.com/hardware/raspberry-pi/macosex-apple-pi-baker/>
4. Start Apple-Pi Baker and you will see the start-up screen:



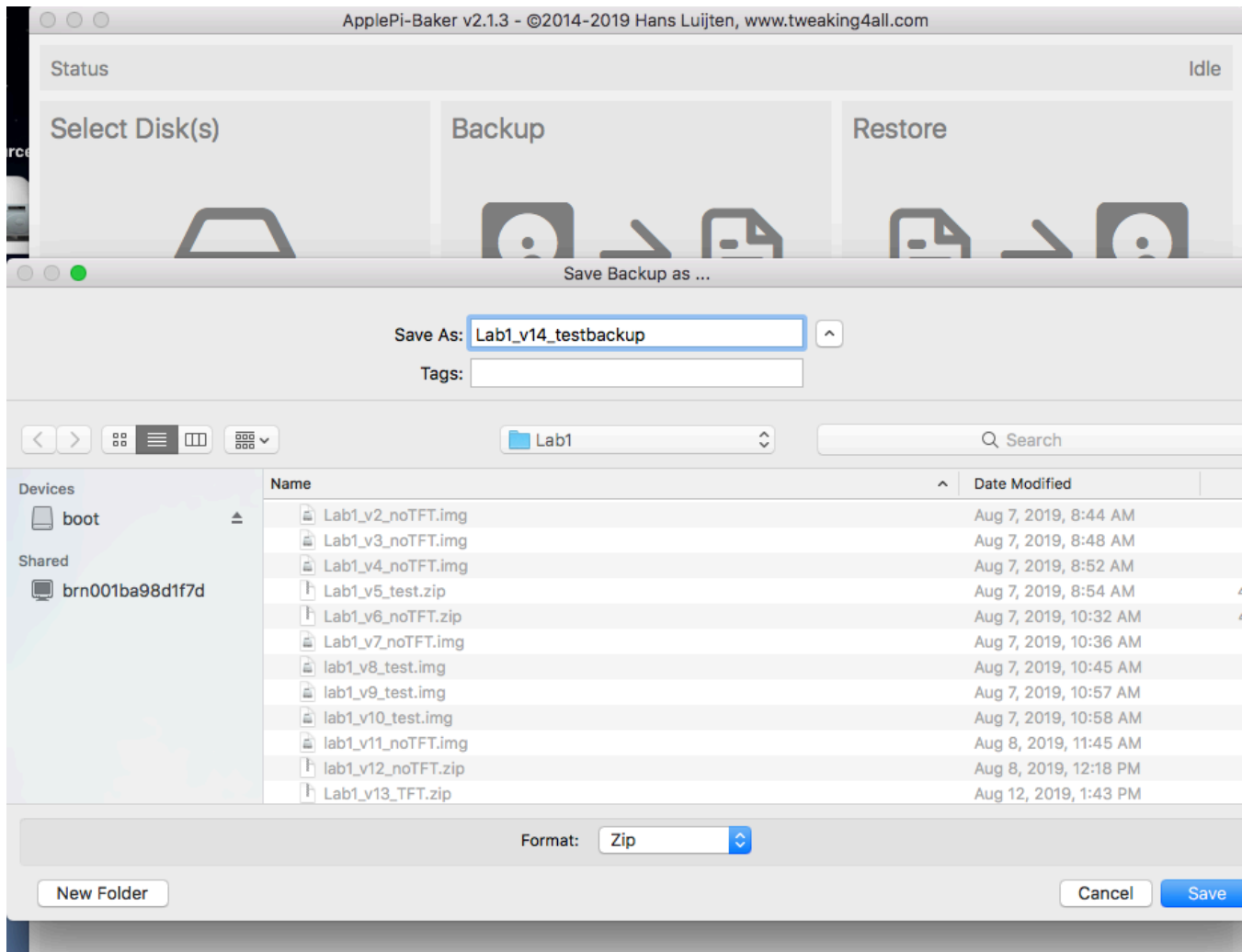
5. Click 'Select a Disk' and you should see the SD card info:



6. Select the SD card and the 'Backup' and 'Restore' screens will become active. Note that if you hover over the icons in these areas, an info message describing the functions will pop up:



7. Hit the 'Disk to File' icon. The 'Save backup as' screen pops up and you can enter a name for your backup (note: I am saving my backup as Lab1_v14_testbackup, and I am saving this into a folder 'Lab1' on my laptop drive). Also note that the format of the backup defaults to 'zip'. I suggest using this default as the complete 16 G backup will be automatically compressed by Apple Pi Baker. Once you are ready, hit 'Save'




8. Once the backup begins, you will see a progress screen:

ApplePi-Baker v2.1.3 - ©2014-2019 Hans Luitjen, www.tweaking4all.com

Status Backup is running

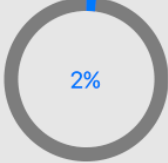
Select Disk(s)



(1 disk in list)
Add another Disk (optional)

✖ /dev/disk3 (16 GB TS-RDF5 SD Transcend)

Backup Progress


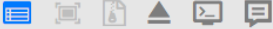


Average Speed: 24.2 MB/sec
Expect completion at: 14:18:33

Time left: 10 minutes 52 seconds

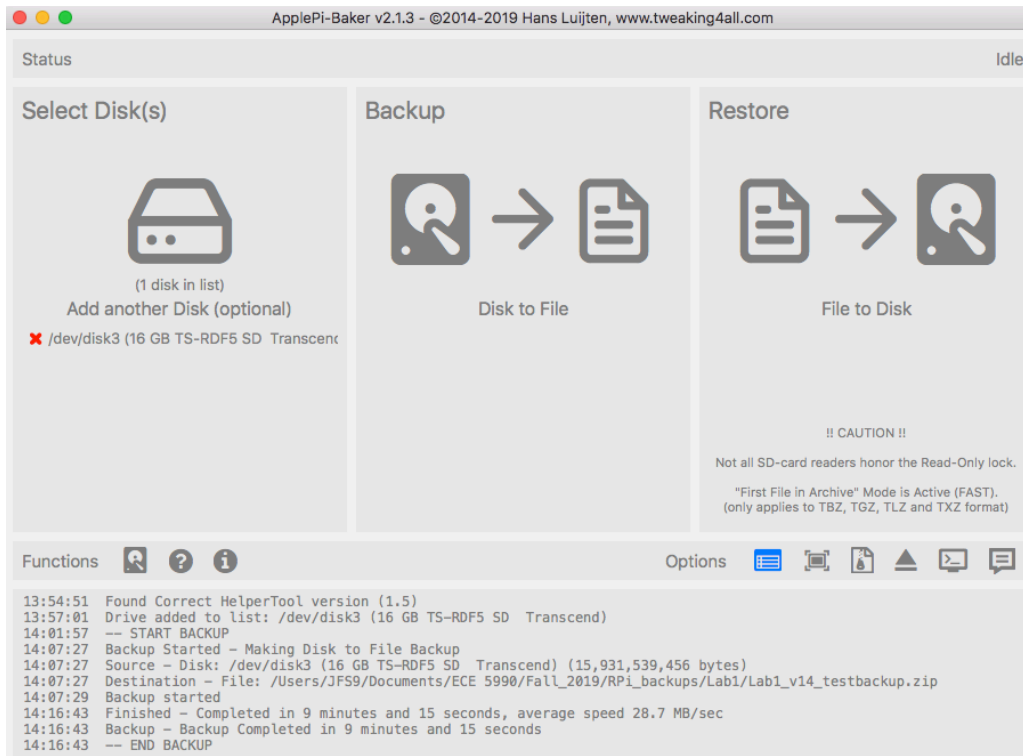
From: /dev/disk3 (16 GB TS-RDF5 SD Transcend)
To: /Users/JFS9/Documents/ECE 5990/.../RPI_backups/Lab1/Lab1_v14_testbackup.zip
Size: 15,931,539,456 bytes

✖ Abort

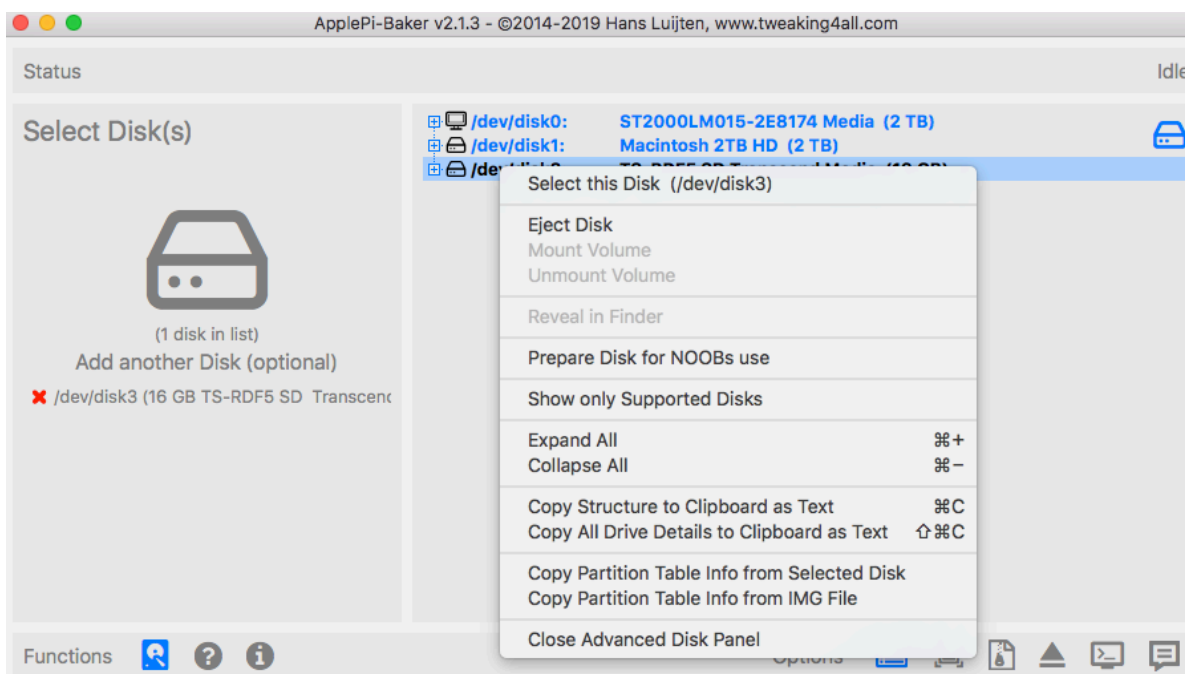
Functions  Options 

```
13:54:51 Found Correct HelperTool version (1.5)
13:57:01 Drive added to list: /dev/disk3 (16 GB TS-RDF5 SD Transcend)
14:01:57 -- START BACKUP
14:07:27 Backup Started - Making Disk to File Backup
14:07:27 Source - Disk: /dev/disk3 (16 GB TS-RDF5 SD Transcend) (15,931,539,456 bytes)
14:07:27 Destination - File: /Users/JFS9/Documents/ECE 5990/Fall_2019/RPI_backups/Lab1/Lab1_v14_testbackup.zip
14:07:29 Backup started
```

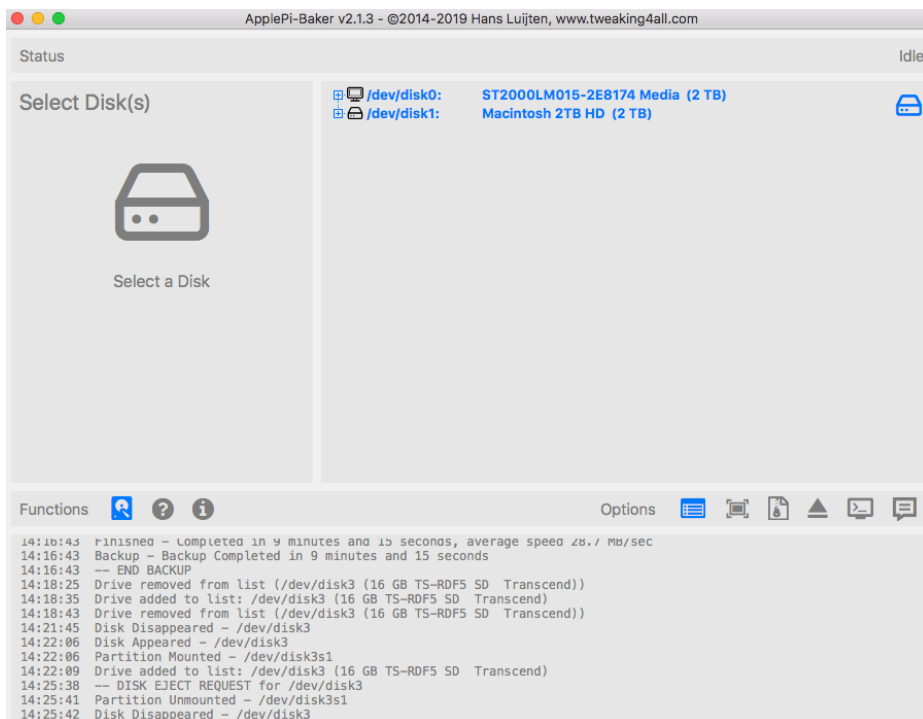
9. ApplePi Baker will indicate the progress of the backup and let you know when it is done. Typical 16 G cards require 5-10 minutes for a backup:



10. Once completed, hit the first icon next to functions. The advanced disk Panel will pop up. Find the SD card and ‘ctrl-click’ the disk to get the function menu. From this, hit ‘Eject Disk’:



11. Once SD card is ejected, the log and pi Baker display will indicate the SD card can be unplugged and re plugged into the RPi:



Restoring your SD Card using Pi Baker

If anything ever goes wrong with your Pi, you can restore your saved image using the reverse instructions:

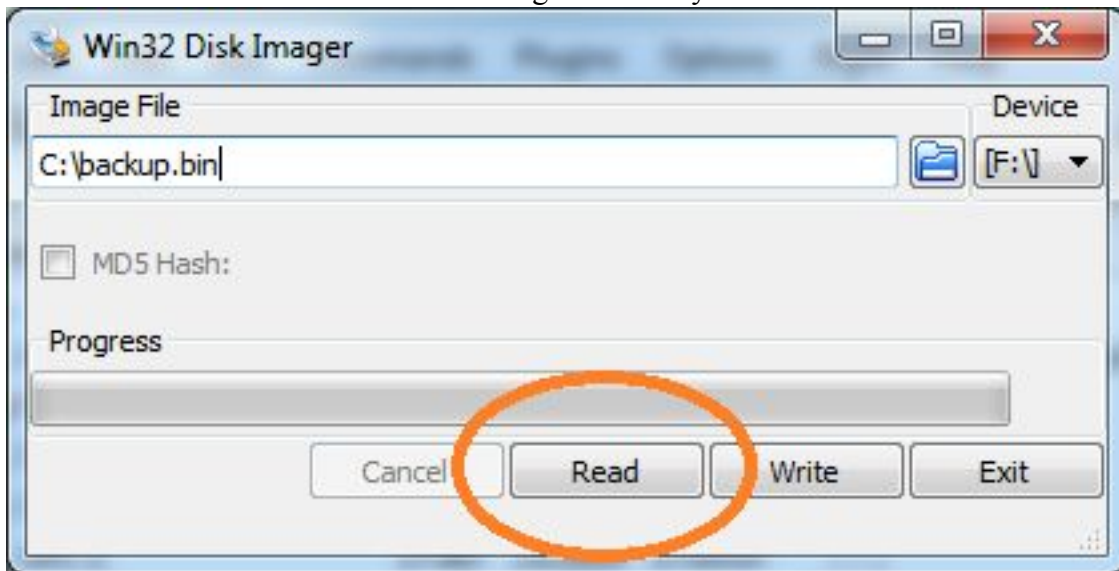
1. Insert the SD card back into your computer.
2. Use 'disk utility' to check the format. Make sure the SD card is erased and formatted to as FAT32
3. Start ApplePi Baker.
4. Select the SD card from the 'select disks' menu
5. In the 'Restore' area, click the icon and a menu pops up to navigate to a previously saved backup.
6. Once the correct file is selected, click 'open' and the restore will begin. Note that a saved 'zip' file backup can be selected. Apple Pi baker will automatically expand this compressed format.
7. ApplePi Baker will indicate the progress of the image restore process.
8. Typical 16 G images require 15-20 minutes to restore to an SD card
9. Once complete, elect the disk as described in the 'backup' section, unplug the SD card and plug it into the RPi

Windows

Backing up your SD Card

Use the 'Win32DiskImager' program to backup your SD card:

1. Get everything set up just the way you want it on your Raspberry Pi.
2. Shut down the Pi and remove the SD card. Insert the SD card into your computer.
3. Startup Win32DiskImager
4. In the "Image File" box, enter the path of your soon-to-be image file. For example, C:\Users\jfs9\SD_backups\Lab1_8G_v1.img
5. Under the "Device" box, select your SD card.
6. Click the "Read" button to create the image file from your card.



7. When it's done creating the image file, you can eject your SD card and put it back in your Raspberry Pi. Keep that IMG file in a safe place.

Restoring from your SD Card

If anything ever goes wrong with your Pi, you can restore your saved image using the reverse instructions:

1. Insert the SD card back into your computer.
2. Head to the start menu or screen and type "disk management." Open the disk management program and find your SD card in the list.
3. Right-click and delete all the partitions on your SD card. When it's empty, right-click on it and format it to Fat32 type.
4. Open Win32DiskImager again and browse for your image file. Select your device from the Device dropdown just as you did before.
5. This time, click "Write" to write the image to the SD card.
6. When it finishes, eject the SD card and re-insert it into your Raspberry Pi. When you boot it up, it should be in the exact same state it was in when you first cloned the SD card.

Notes on alternate backup methods

Because this is Linux, there are a large number of alternates (to everything!)

- The Etcher application seems to be good for moving images to SD cards. Note that Etcher was used to move the original Raspbian kernel to a blank SD card. However, it takes some work to first create a complete image from an existing SD card. Etcher may be used to save a portion of the SD card (the boot partition, for example), but this will not be a complete backup image. For now, we don't recommend a backup using Etcher.
- There are a number of sites that suggest backup using the Linux dd command, which is a utility for copying files in Linux. These methods will work, but there is little information returned while they are running and the commands are easy to mess up. Messing up a dd command could wipe either the SD card or, YOUR ENTIRE LAPTOP HARD DRIVE. Because of these issues, it is safer to use one of the methods in this document.... The use of dd is NOT recommended at this time.