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## How do I backup my Raspberry Pi?

I have been writing programs for my Raspberry Pi (running Raspbian) for a few weeks now and would like to make sure I protect the work I have done.

How can I backup the files I have created?

Can I simply plug the SD card into my Windows (XP or 7) PC and copy it either to the hard drive or another SD card?

[raspbian](#) [sd-card](#) [windows](#) [backup](#)

edited Sep 9 at 13:34

asked Jun 14 '12 at 18:27



[Steve Robillard](#)  
25.6k 14 78 93

- 4 I have PC's running both Ubuntu and Windows (XP & 7), but I would expect most people to be interested in the Windows answer. I will edit the question to make that clear. – [Steve Robillard](#) Jun 14 '12 at 18:38
- 5 rsync from Raspi to your pc? – [Alex L](#) Jun 14 '12 at 18:54
- 35 For code, you may also want to consider using [distributed version control software](#) like `git` or `hg`, that way you not only have copies of your code in multiple places, but also have the complete history of how that code has changed. – [Mark Booth](#) Jun 15 '12 at 11:01
- 2 @MarkBooth I don't see why a DVCS is needed over a VCS if we are just considering being able to retrieve code later. Heck, it's even easier since you use revision numbers not commit hashes to identify a particular state. Learning a CVCS like Subversion isn't much of a time investment (as I recall... though it was a very, very long time ago). Yes, switching to Git was a bit unnerving at the time, but I have never ever looked back. – [Steven Lu](#) Apr 13 '14 at 21:17
- 1 Comments are not a good place for this kind of discussion @StevenLu, we should take this to [Raspberry Pi Chat](#). – [Mark Booth](#) Apr 13 '14 at 22:38

## 15 Answers

If you want to preserve all of the data, you will probably have to create a disk image. Furthermore, Windows cannot recognize typical Linux filesystems, so you probably won't even be able to see your files, when you plug in your SD card.

Creating a disk image will preserve not only files but also the filesystem structure and when you decide to flash your new SD card, you will be able to just plug it in and it will work.

## Linux

On Linux, you can use the standard `dd` tool:

```
dd if=/dev/sdx of=/path/to/image bs=1M
```

Where `/dev/sdx` is your SD card.

## Mac

On Mac, you can also use the standard `dd` tool with a slightly different syntax:

```
dd if=/dev/rdiskx of=/path/to/image bs=1m
```

Where `/dev/rdiskx` is your SD card.

(using `rdisk` is preferable as its the raw device - quicker)

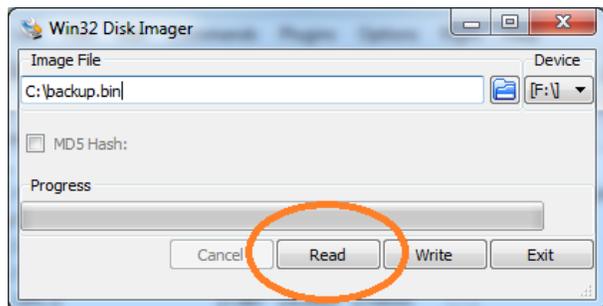
To find out which disk your device is type `diskutil list` at a command prompt - also, you may need to be root; to do this type `sudo -s` and enter your password when prompted.

## Windows

### Option 1

On Windows, you can use the reverse process that you used when flashing the SD card.

You can use [Win32 Disk Imager](#), which is the preferred tool for flashing a SD card of the Foundation. Just enter the filename (the location and name of the backup image file to be saved), select the device (the SD card) and press read:



Of course, you can also use [RawWrite](#), `dd for Windows` or similar tools, the process is quite similar.

### Option 2

If you don't want to back up your entire system, but only specific files, I suggest you connect to your Raspberry Pi via SFTP and copy the files to your local computer (You can use the [WinScp](#) client). If you have SSH enabled, SFTP usually requires no special configuration on the Raspberry Pi side.

Another option is to [copy the files to a remote system using rsync](#).

You can also install special drivers so your Windows can read `ext` filesystems (and will thus be able to read the whole SD card), such as `ext2fsd` but it is probably not worth the effort.

Since the image will be of the same size as your SD card, you may want to compress it. This can be achieved simply by using your favorite compression tool, such as `gzip`, `7zip`, `WinZip`, `WinRar` ...

edited Jul 27 at 11:04

community wiki  
12 revs, 6 users 75%  
Tibor

- 
- 1 If my SD card became corrupted, how would I install this image to a new SD card? – [Flipper](#) Feb 3 '13 at 8:57
  - 2 Your link to Win32 Disk Imager comes up with no downloads available. I assume it's the same as [sourceforge.net/projects/win32diskimager](http://sourceforge.net/projects/win32diskimager) ? – [Yamikuronue](#) Feb 14 '13 at 1:03
  - 2 oh my, I can't distinguish if "read" in that picture means "read the image file" or "read the PARTITION AND WRITE IT INTO the image file".... same for "write"... That gui needs to be sanitized. Something like "Image -> Device" and "Device -> Image" (or a better alternative) – [Olivier Dulac](#) Dec 5 '13 at 18:43
  - 1 When I use WinDiskImager, I get an image that is the size of the storage partition - the boot partition appears to be missing. Have you tried writing the image onto a new SD card? I don't have a second one with which to test at the moment. – [me--](#) Jan 3 '14 at 3:46
  - 1 Win32DiskImager seems to only be able to deal with partitions Windows recognizes. I've had little to no luck with it cloning Noobs/Raspbian SD cards. Found this freeware program: [hddguru.com/software/HDD-Raw-Copy-Tool](http://hddguru.com/software/HDD-Raw-Copy-Tool). It works like a charm to do a byte-by-byte clone of the SD card in Windows (I used it with Win7 64-bit), regardless of partitioning scheme and contents. – [techie007](#) Feb 3 '15 at 16:37
-

If you are running Linux then you can use the `dd` command to make a full backup of the image:

```
dd if=/dev/sdx of=/path/to/image
```

or for compression:

```
dd if=/dev/sdx | gzip > /path/to/image.gz
```

Where `sdx` is your SD card.

To restore the backup, you reverse the commands:

```
dd if=/path/to/image of=/dev/sdx
```

or when compressed:

```
gzip -dc /path/to/image.gz | dd of=/dev/sdx
```

edited Jun 7 '15 at 14:56



[Peter Mortensen](#)  
1,703 1 10 17

answered Jun 14 '12 at 18:37



[Jivings](#)  
17.3k 9 71 123

6 This is brilliantly handy. – [phalt](#) Jun 15 '12 at 9:14

3 I highly recommend using `gzip` - I have backed up some desktop partitions today and a 20Gb partition was saved in 8.9Gb. – [Alex Chamberlain](#) Jul 4 '12 at 15:48

6 @AlexChamberlain: `gzip` is pretty awesome. – [Jivings](#) Jul 4 '12 at 16:00

1 `bzip2` should compress even better, and is available on all Linux systems. On newer Linux systems `xz` should compress even better. The decompressors for these are `bunzip2` and `unxz` respectively. – [Arne](#) May 29 '13 at 12:10

4 @Arne I wouldn't expect such a difference! Still, that seems to be far below *my* concerns. (Btw, it's cool when you reply to a comment almost 1 year old, and you get a response in 2 minutes :) ) – [yo](#) Mar 24 '14 at 10:00

Besides those block-level backups, there are two common approaches to deal with the sources: to archive it continuously (1), or to use the revision control system (2).

We are going to use the command-line (any local terminal or [SSH](#) connection to a Raspberry Pi machine), right?

## 1. Archive

```
cd ~/projects
tar czvf your-raspberry-project-top-level-dir-v1.0.tgz \
    ./your-raspberry-project-top-level-dir
scp your-raspberry-project-top-level-dir-v1.0.tgz \
    user@backup-host:/home/user/backups/
```

## 2. RCS (Git for instance)

```
cd ~/projects/your-raspberry-project-top-level-dir
make clean # Or clean it manually using rm (rm ./*.o
./*.pyc)
git init # Create new repo here
git add . # Add source files to the staging index
git status # Verify if it's OK
git commit -a -m "Initial import" # Fix application's source changes
git add remote https://github.com/user/your-raspberry-project.git
git push -u origin master # Sends the sources to your github repo
git pull && git push && git status # Now origin/master is your tracking branch
```

edited Jun 7 '15 at 15:00



[Peter Mortensen](#)  
1,703 1 10 17

answered Aug 2 '12 at 10:00



[okertanov](#)  
539 3 2

1 It might also be worth noting that people can set up bare repos on other machines on their network and push from their Raspberry Pi to there, rather than having to set up a github account, ssh keys etc and push to there. – [Mark Booth](#) Apr 13 '14 at 12:06

1 That's a good start for the real answer. Code needs to be managed under version control if one wants to be able to maintain it. Version control allows to track changes, understand history of changes, manage different branches (e.g. stable vs dev) and merge between them. But it is not backup per se. However, one simply need to backup the

repository (e.g. the .git folder for Git). Check Linux/Unix forums, wikis, stackexchanges, etc. for ways to backup folders under Linux. Note: I don't consider github as backup. And you don't want to publish everything to github! – Huygens Feb 28 '15 at 20:27

You can run this command from your Linux PC with lots of space:

```
ssh root@raspberrypi gzip -c /dev/mmcblk0 > img.gz
```

As a prerequisite you'll need to have generated .ssh keys and copied the id\_XXX.pub over to /root/.ssh/authorized\_keys .

It's possible to have issues with the file system since it's a live backup, but if your Raspberry Pi isn't real busy it will usually be OK.

It's probably faster to do the compression on the PC like this:

```
ssh root@raspberrypi dd if=/dev/mmcblk0 | gzip -c > img.gz
```

edited Jun 7 '15 at 14:58



Peter Mortensen  
1,703 1 10 17

answered Aug 2 '12 at 5:07



John La Rooy  
9,034 9 40 68

1 or with sudo 'ssh pi@raspberrypi sudo dd if=/dev/mmcblk0 | gzip -c > raspberry.img.gz' – cupakob Nov 25 '12 at 14:35

and as a reference for passwordless login, [raspberrypi.stackexchange.com/a/1687/22603](http://raspberrypi.stackexchange.com/a/1687/22603) – Paolo Jan 3 '15 at 10:47

2 I also found useful to add block size and, as it was available, use pv to check progress. ssh root@raspberrypi dd if=/dev/mmcblk0 bs=1M | pv | gzip -c > img.gz – Paolo Jan 3 '15 at 14:08

This is a great answer if you don't want to unmount your SD card, and also works for macOS. Here's the command-line I'm using: ssh pi@raspberrypi sudo dd if=/dev/mmcblk0 | xz -9 -e --threads=4 > sd.img.xz. Doesn't require generating SSH keys doing it this way. Ctrl-T can be pressed to see the progress. – Learn OpenGL ES Dec 9 '16 at 19:36

Why is gzip preferable over dd command? – Igor Ganapolsky Jan 25 at 14:19

**On the Mac** you don't want to be using /dev/diskn . You should use /dev/rdiskn instead, where n is the number the OS uses to identify your SD card. This decreases the time required to copy by a huge amount.

So for the optimal backup process on a Mac, I would recommend doing the following:

Run `diskutil list` , and find the disk corresponding to your Raspberry Pi's SD card:

```
$ diskutil list
/dev/disk0
#:  
0:      GUID_partition_scheme          *500.1 GB   disk0  
1:      EFI                            209.7 MB   disk0s1  
2:      Apple_HFS Macintosh HD          499.2 GB   disk0s2  
3:      Apple_Boot Recovery HD         650.0 MB   disk0s3
/dev/disk1
#:  
0:      FDisk_partition_scheme         *7.9 GB    disk1  
1:      Windows_FAT_32                  58.7 MB    disk1s1  
2:      Linux                            7.9 GB     disk1s2
```

Clearly /dev/disk1 is my 8GB SD card, the Linux partition name is also a bit of a clue.

However, instead of using /dev/disk1 with dd , you should use /dev/rdisk1 , like so:

```
sudo dd if=/dev/rdisk1 of=/path/to/backup.img bs=1m
```

And to restore it, just swap the if (input file), and of (output file) parameters:

```
sudo dd if=/path/to/backup.img of=/dev/rdisk1 bs=1m
```

Or, with gzip , to save a substantial amount of space:

```
sudo dd if=/dev/rdisk1 bs=1m | gzip > /path/to/backup.gz
```

And, to copy the image back onto the SD:

```
gzip -dc /path/to/backup.gz | sudo dd of=/dev/rdisk1 bs=1m
```

For more information, see this wiki page.

edited Jun 7 '15 at 15:05

 [Peter Mortensen](#)  
1,703 1 10 17

answered Dec 28 '12 at 14:40

 [Alex Coplan](#)  
311 2 6

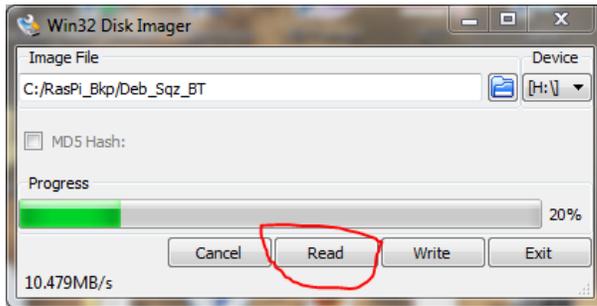
1 I find this to be the most efficient answer and voted for it, thanks @Alex Coplan. – [bosch](#) Sep 25 '16 at 10:11

However, I was looking for a fool-proof GUI tool for MacOS (as Windows users have) and without the dd risks and I found "SD Clone" from Two Canoes (which I trust as I am a user of WinClone). It's pretty new -2016- and expensive (100\$ with a 2 week trial) but seems to be geared towards RasPi so I'll give it a try right now and let you know in a new comment. – [bosch](#) Sep 25 '16 at 10:25

1 When copying back, unmount your SD Card if you get the following message: "Resource busy" – [Spipau](#) Apr 4 at 5:55

### If you are using Windows:

1. Download Win32 Disk Imager.
2. Create the file path you wish to use to save your image. (I use C:\RasPi\_Bkp)
3. Run Win32 Disk Imager
4. Browse to your backup file path spot, and type a file name.
5. Click save
6. Make sure the device shown in the drop down to the right of your file path is the one you want to back up.



7. Click "Read"
8. Wait.

answered Jul 5 '12 at 9:56

 [zenbike](#)  
1,760 3 13 25

1 Thanks - just the job. (Oddly, when I plug my SD card into my main PC, Windows 7 goes to BSOD! Fortunately its fine on another machine.) – [Jon Egerton](#) Jul 5 '12 at 10:01

For anyone that has trouble with Win32 Disk Imager as I have, try Rufus. – [DavidB](#) Dec 26 '16 at 0:26

If your programs are all in the pi userid, there's really no reason to back up the entire filesystem, as is being suggested. what I do is to just back up the single id. I run the command:

```
tar -czf pi.tgz *
```

from pi's home directory, which creates the file pi.tgz, containing all the files and directories contained there (excluding hidden files). I then scp this file to another linux computer, but you could ftp it or e-mail it somewhere for safe-keeping... anything that got it onto another computer.

This creates a much smaller file for your back-up.

Concerned about all the additional packages you've installed along the way? Create a script that will perform those installs for you again should you need to recreate your SD card, and keep it in pi's home directory somewhere. (I have a ~/bin directory for such things). Have all the commands you need to do the installs to bring you back to the position you want to be in. It documents your changes, and allows you to quickly build up a new SD card. It would contain commands in the form of:

```
apt-get --assume-yes install apache2 mysqld mysql php5 php-pear
```

Start it out with

```
apt-get update  
apt-get --assume-yes upgrade
```

so that your system also is brought up to the current level before you start adding your packages.

Since this will be in your pi.tgz file, you'll have it when you need it.

edited Apr 20 '15 at 20:14



**Ghanima** ♦  
10.2k 7 32 70

answered Aug 2 '12 at 12:48



**Robert Nix**  
91 2

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Note that for the Raspbmc spin-off, the apt-get *upgrade* is apparently known to cause issues. It did for me, and apparently [it's a known issue](#) . – [Cristi Diaconescu](#) May 6 '13 at 16:11

This can be done remotely too, i.e.: ssh pi@raspberrypi.local "sudo tar -cvp ~/"" | xz -9 -e --threads=4 > raspbian.home.tar.xz – [Learn OpenGL ES](#) Dec 9 '16 at 20:06

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I run Raspbian and use dd and cron to do automated backups of my SD card to my external USB drive.

It is a really simple solution. It runs once a week at 2 am on a Monday morning and makes an image of the SD card.

I wrote a script which shuts down services such as lighttpd and cron, to minimise the risk of the SD card being written to in the middle of the backup, it then calls dd, before starting to the services again when the backup has finished.

I've put the script and some instructions on my blog,  
<http://www.stuffaboutcode.com/2012/08/raspberry-pi-auto-backups.html>

edited Jun 7 '15 at 15:02



**Peter Mortensen**  
1,703 1 10 17

answered Oct 2 '12 at 12:51



**Martin O'Hanlon**  
546 4 10

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1 This might be a reasonable solution if you can't unplug the card. However, dd ing an sd? device with mounted partitions doesn't sound quite safe. – [yo](#) Mar 24 '14 at 9:58

Your probably right, but I haven't had a problem. – [Martin O'Hanlon](#) Mar 24 '14 at 13:57

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For Debian you could use dd and tar. This would make a complete copy of your SD card and would require external (to SD card) storage, probably mounted USB or network drive.

```
dd if=/dev/sdd of=yourbackupfilenamehere.dd  
tar zcvf yourbackupfilenamehere.dd.tar.gz
```

With /dev/sdd being the location of your SD card, and of being the output file name.

edited Jun 7 '15 at 14:57



**Peter Mortensen**  
1,703 1 10 17

answered Jul 5 '12 at 10:33



**Forkrul Assail**  
149 3

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This has the limitation of needing somewhere to write the image to though (that is also large enough to take the image(s)). Presumably it also means a large data io through the usb hub - would take a while? – [Jon Egerton](#) Jul 5 '12 at 10:38

True, but it's kind of required in the question: "I want a full image of the SD card." – [Forkrul Assail](#) Jul 5 '12 at 10:39

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1 Why do you make a .tar.gz file of the dd-file? Wouldn't it be better to just run gzip or bzip2 on the dd-file directly? – [Anders](#) Jul 25 '12 at 21:11

What does /dev/sdd mean? I have /dev/mmcblk0p1 and /dev/mmcblk0p2 listed... – [Igor Ganapolsky](#) Jan 25 at 14:20

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Fortunately the Raspberry Pi can create a backup of itself which is independent of the primary OS used to access the Raspberry (Windows, Linux, Mac). dd, tar and rsync are different tools

to create backups on Linux. All these types of backups can be created by the working Pi provided it's stopping all busy tasks as mysql, smb, dnsmasq, owncloud, seafiler, apache et al before creating the backup. There is a different question where [the approach](#) is explained in more detail and a possible solution [is explained here](#)

edited Apr 13 at 12:56



answered Dec 19 '14 at 23:25



If your Raspberry Pi is connected to a network and you want automatic on-the-fly backups, probably the easiest way is Bittorrent Sync - very easy install and running smoothly and stable on the Pi and many other platforms.

edited Jun 7 '15 at 15:06



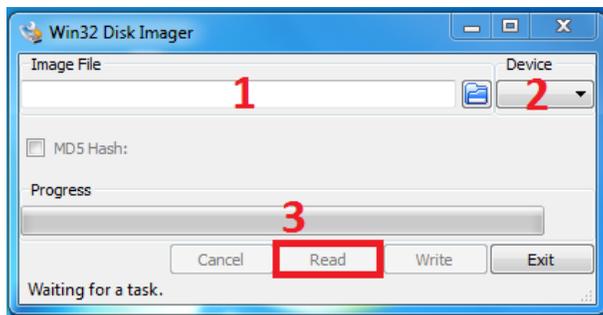
answered Dec 30 '14 at 21:08



I'd just like to add that Sync and backup are two different things – Pitto Jul 7 '16 at 15:43

Here are 3 options:

1. In the latest version of Raspbian, there is a tool that converts your OS and files into a .img file that you can then place onto a USB, or your PC.
2. Plug your SD card into a Windows PC, and start up Win32 Disk Imager (install [here](#) if you haven't already.)



In (1) type a filename & location for the image file. In (2), select the drive letter of your SD card. Then press 3. This does the same as option 1.

3. Plug in a USB stick to your Pi, and copy any important files across.

edited Sep 25 '16 at 16:33



answered Sep 25 '16 at 16:30



While searching to create an image of my customized SD card I found this post. The best answer here discusses imaging the SD card, but what I was looking for required shrinking down the filesystem to make the image as small as possible. I ended up creating my own tool to do this and outline the process at: <https://raspberrypi.stackexchange.com/a/37899/32585>

edited Apr 13 at 12:56



answered Nov 4 '15 at 14:39



This android app will read an SD card into an .img file, and zip it at the same time: <https://play.google.com/store/apps/details?id=com.redrobe.raspicardimager>

answered Jan 24 at 11:42



I've been using usbit for Windows. It's the only tool I can find that will allow you to swap from a larger SD card to a smaller one. All I did was tick the following on the options page; *Ignore size checks* and *Truncate oversize images*.

This allowed me to swap my [OpenELEC](#) and Xbian images from a 16 GB class 4 SD card to an 8 GB class 10 card.

It's MUCH easier than resizing partition tables, etc.

edited Jun 7 '15 at 15:04



[Peter Mortensen](#)  
1,703 1 10 17

answered Oct 5 '12 at 21:41



[Craig](#)  
39

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2 Have you ever verified the files? I mean with `find -type f -exec md5sum {} \; > filelist.txt ?-`  
[Avio](#) Oct 5 '12 at 22:16

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2 This is not guaranteed to work, as data stored on the second half of the disk is dropped. Furthermore, the partition table is corrupted. – [Alex Chamberlain](#) Oct 6 '12 at 9:22

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**protected** by [Jivings](#) Feb 19 '13 at 16:27

Thank you for your interest in this question. Because it has attracted low-quality or spam answers that had to be removed, posting an answer now requires 10 [reputation](#) on this site (the [association bonus](#) does not count).

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