

SoftRAID[®] 6

QuickStart Guide

Welcome to the SoftRAID QuickStart Guide

This guide will help you get started using SoftRAID as quickly as possible.

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Introduction

SoftRAID is a powerful software RAID application for Mac OS X. Use SoftRAID to create and maintain RAID 0 (stripe), RAID 1 (mirror), RAID 4, RAID 5, RAID 1+0 and non-RAID volumes (*note: only RAID 0 and RAID 1 are available with SoftRAID Lite*). In addition, SoftRAID provides tools for disk testing and continuous disk monitoring. The full version of SoftRAID includes email notifications and a command line interface.

System requirements

SoftRAID version 5 requires an Intel Mac running Mac OS X 10.10.5 or later

Using the 30-day evaluation

You can use SoftRAID on a trial basis for 30 days for free. At the end of the 30 day period, your SoftRAID volumes will still mount and you can use all the files on them but most SoftRAID features will be disabled.

If you wish to continue using SoftRAID, you can purchase a license from our web site. This will provide you with a serial number which you can use to unlock SoftRAID. Once the serial number has been entered, all SoftRAID features will be enabled.

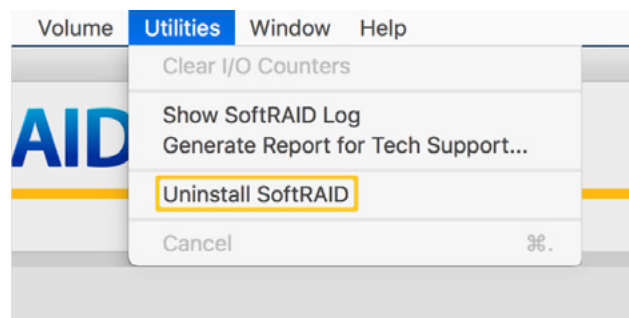
Installing SoftRAID

There is no installer for SoftRAID

The SoftRAID application acts as an installer the first time you run it. The SoftRAID application will install (or upgrade) the SoftRAID driver, SoftRAID Monitor and all other SoftRAID files the first time you run it.

Each time you download a new version of the SoftRAID application and run it, the application will upgrade all the SoftRAID files.

If you ever want to uninstall SoftRAID, just select **Uninstall SoftRAID** from the **Utilities** menu. The SoftRAID application will then remove the SoftRAID driver, SoftRAID Monitor and all of the other SoftRAID files.

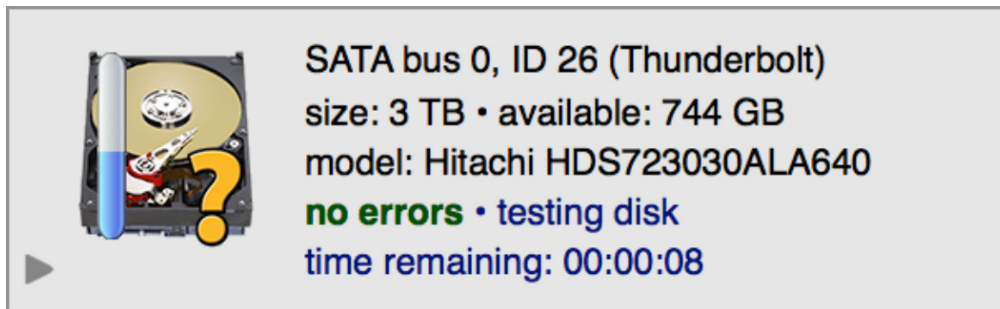


Creating a SoftRAID volume

You can create a volume with SoftRAID by following these 3 easy steps:

Step 1: Initialize the disks

1. Launch the SoftRAID application and select the tile or tiles for the disks you want to use for your new volume. Then select “Initialize” from the “Disk” menu.



The tile for a disk which is being initialized. The disk will also be tested for 10 seconds to ensure that the connection to the disk is reliable.

2. You can select more than one disk tile at a time by shift-clicking, command-clicking or dragging through the list of disk tiles. When you select “Initialize”, all of the selected disks will be initialized simultaneously.

Step 2: Determine which RAID level you want to use

Note: For a better understanding of each RAID level and its benefits, please visit www.softraid.com/pages/features/raid_levels.html



RAID 1+0: Choose RAID 1+0 for most critical types of work where you want speed and reliability. A RAID 1+0 volume does not use a write cache so it is less susceptible to damage from power outages than a RAID 4 or RAID 5 volume. It is not as fast as a RAID 4 or RAID 5 volume.

A RAID 1+0 volume requires an even number of disks (e.g. 2, 4, 6, 8...) and creates a volume which is half as big as the sum of sizes of all the disks (i.e. 4 disks which are each 4 TB in size will create a 8 TB RAID 1+0 volume).



RAID 5: Choose RAID 5 for the fastest possible volume which also protects you from disk failure. A RAID 5 volume is well suited for reading and writing large files or for reading small files. It is slower for writing small files.

RAID 5 volumes are more susceptible to damage from power outages. This is why we recommend that you use a UPS (Uninterruptible Power Supply) for your Mac and disks when you are using a RAID 5 volume.



RAID 4: Choose RAID 4 if you are using SSDs.

Like RAID 5, RAID 4 provides the fastest possible volume which also protects you from disk failure, but works better than RAID 5 if you have SSDs.



Stripes (RAID 0): Choose RAID 0 for the fastest possible volume for both small and large files. A RAID 0 volume is an excellent choice for scratch disks used in photo or video editing.

RAID 0 volumes offer no protection from disk failure. If a disk fails on a RAID 0 volume, you will lose all the files on that volume.



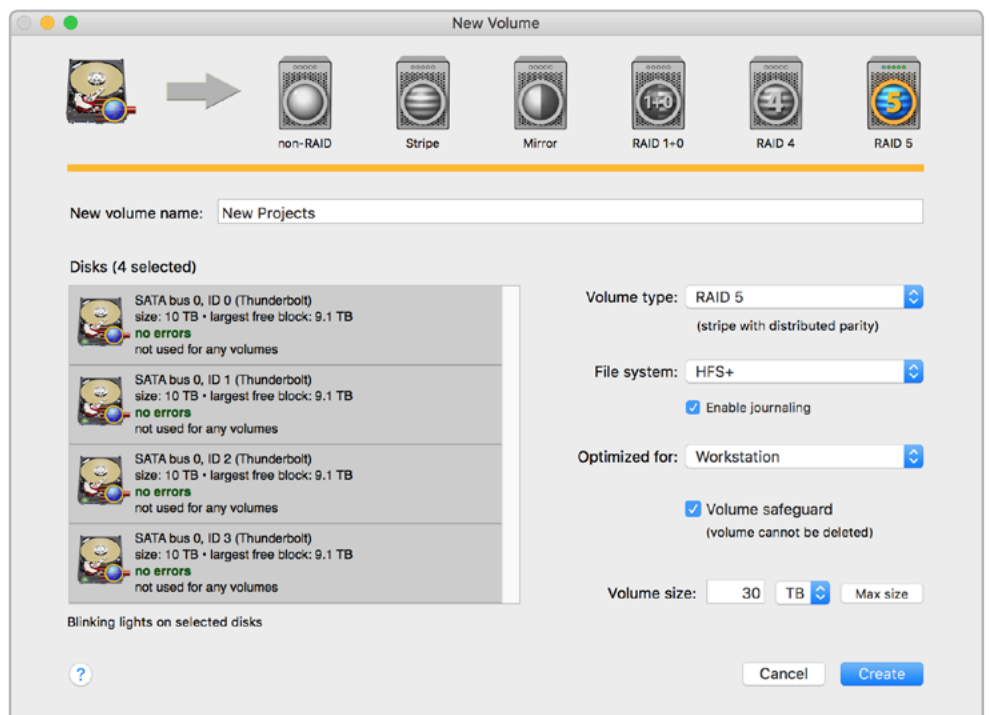
Mirrors (RAID 1): Choose RAID 1 for the most reliable volume. A three disk mirror provides the reliable type of volume with the ultimate protection from disk failure.

Add a fourth external disk and you have a back up solution. You can store the external disk off-site, bring it back every week to re-sync it and then return it to its off-site location.

Step 3: Create your RAID volume

Once your disks are initialized, select “New” from the “Volume” menu. Enter a name for your volume, select the disks you want to use and click on the “Create” button.

Note that SoftRAID will blink the lights on the disks which correspond to the tiles you have selected. This will make it easier for you to select the correct disks.



SoftRAID Best Practices

We want SoftRAID to help protect you from data loss from failing disks. If you follow these suggestions, you will greatly increase the protection your volumes have.

These suggestions are based on many years of experience helping thousands of SoftRAID users. If you have any questions about any of these suggestions, please don't hesitate to email us at: support@softraid.com

1. Watch the SoftRAID Monitor in the menu bar



The SoftRAID Monitor is always present in your menu bar no matter what application you are running.

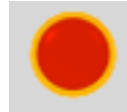
The SoftRAID Monitor is always watching for disk and volume errors. When it sees one, it changes the color of the indicator in the menu bar and puts up a dialog to get your attention. It also writes an entry in the SoftRAID log file so you can go back later and see what happened.



A blue indicator tells you that there are no problems with any of your SoftRAID disks or volumes.



A yellow indicator tells you that one of your SoftRAID volumes is degraded. You may no longer be protected from disk failure.

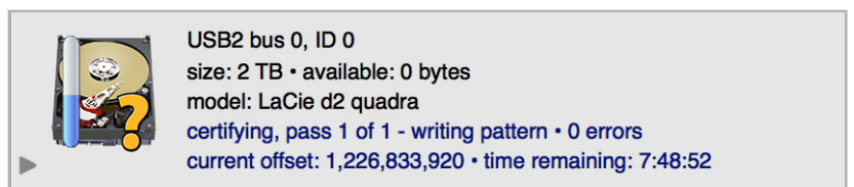


A red indicator tells you that one of your SoftRAID disks must be replaced immediately.

When the SoftRAID Monitor indicator changes from blue to yellow or red, you should investigate the cause immediately. Launch the SoftRAID application and you will immediately see which disk is causing the problem.

2. Certify your disks before you use them

When you certify a disk with the SoftRAID application, you are writing a pattern to every sector on the disk, reading the pattern back and checking it. It is only after certifying a disk with SoftRAID before using it that you will know that the disk is truly reliable.




The tile of a disk which is being certified shows the progress, and if any errors have occurred.

There are two periods of time when a disk is more likely to fail, when it is new and when it has been used for several years. *If you certify all new disks before using them, you will be much less likely to have a new disk fail when you are already using it for a volume.*

3. Replace disks which are predicted to fail

SoftRAID uses SMART data from each disk to determine if a disk is more likely to fail. It interprets this SMART data based on the results of a study performed by Google on consumer grade disk drives. It checks the number of reallocated sectors and the number of unreliable sectors that each disk reports. If either number is greater than 0, the disk is much more likely to fail.

Once SoftRAID predicts that a disk is likely to fail, it may continue to function normally for a while with no outward signs that anything is wrong. In our testing, we have seen disks completely stop working in as little as 24 hours after they were first predicted to fail. Other disks continue to function for a month or two.




Offsite Backup #1 • SATA bus 0, ID 23
 size: 2 TB • available: 21 KB
 model: ST2000DM001-9YN164
disk failure predicted

SoftRAID ID: 05EDD985520EF1C0 • disk identifier: disk4
 total bytes: 2,000,398,934,016
 format: GPT (for Intel)
 SN: S240CJAK • firmware: CC4B
 SMART status: passed test • **failure predicted**
reallocated sectors: 1784 • unreliable sectors: 2424
 i/o requests: 243,766,963 • i/o errors: 0 • hours of use: 8097

The tile of a disk which is predicted to fail. This prediction is based on information from the SMART test.

4. Replace disks which fail the SMART test

When a disk fails the SMART test, the disk has determined that some part of its mechanical mechanism or electronic circuitry is not working properly. By the time a disk fails the SMART test, it is usually so broken that it will most likely fail completely in the near future.



SATA bus 0, ID 26 (Thunderbolt)
 size: 3 TB • available: 744 GB
 model: Hitachi HDS723030ALA640
failed SMART test

The tile of a disk which failed the SMART test. This disk should be replaced immediately.

SoftRAID checks the SMART status of all disks that support SMART each time the application is launched. In addition, the SoftRAID Monitor will check the SMART status of all disks that support SMART each time your Mac starts up and every 24 hours thereafter. SoftRAID uses the SMART status not only to check that a disk is running normally but also to see if a disk is more likely to fail. When it detects a disk that is not running normally or is more likely to fail, SoftRAID (or the SoftRAID Monitor) can display a dialog, write to the SoftRAID log and send out an email notification.

5. Investigate all disk errors

Modern disks are very reliable. In our lab, we see most disks able to handle over a billion read and write requests without encountering any errors. This is the number of requests a typical disk gets in 3–5 years of use in a workstation or server.



Offsite Backup #1 • SATA bus 0, ID 23
size: 2 TB • available: 21 KB
model: ST2000DM001-9YN164
i/o errors

SoftRAID ID: 05EDD985520EF1C0 • disk identifier: disk4
total bytes: 2,000,398,934,016
format: GPT (for Intel)
SN: S240CJAK • firmware: CC4B
SMART status: passed test
reallocated sectors: 0
i/o requests: 243,766,963 • **i/o errors: 8** • hours of use: 8097

The tile of a disk which has disk errors.
The cause of these errors should be investigated immediately.

If you see a disk with an error, even just one, something is wrong. It might be something as simple as a bad cable—or it might be something much more serious like a failing power supply, or a failing disk.

6. Use a UPS with RAID 4 or RAID 5 volumes

All modern RAID 4 and RAID 5 systems use a cache to improve write performance. This is true of both software RAID systems, like SoftRAID and hardware RAID controllers. The write cache allows the RAID systems to combine many small writes into a single larger write which the system can handle more efficiently.

The disadvantage of using a cache is that if you lose power between the time a file has been written to your RAID volume and when the file data gets written out from the cache, that file data will be lost. ***We recommend that you use a UPS (Uninterruptible Power Supply) on your Mac and disks whenever you are using a RAID 4 or RAID 5 volume.*** If you are not using a UPS, we recommend that you disable the write cache using the SoftRAID preferences.

SoftRAID features you should know about

These are some of the advanced features in SoftRAID you may not know about. If you want more information on these features, you can search the SoftRAID online help for more detailed information.

1. Accelerated Rebuilds

This version of SoftRAID includes an upgraded RAID architecture. At its heart is a RAID engine, a software emulation of a RAID controller which has allowed us to add RAID 4, RAID 5 and RAID 1+0 volumes to SoftRAID version 5.

Unlike most RAID controllers, this RAID engine can actually perform many RAID operations at exactly the same time. The number of simultaneous RAID operations is limited only by the number of processors in your Mac. With SoftRAID, the latest Mac Pros which have up to 12 cores and HyperThreading can actually perform 24 simultaneous RAID operations.

In addition, the RAID engine keeps track of not only which disks are out of sync in a volume, but also which parts of those disks need rebuilding. If you only write to the first 1% of a volume while a disk is disconnected, then only that 1% will be rebuilt when the disk gets reattached. This dramatically reduces volume rebuild times; a 16 TB volume can usually be rebuilt in under 10 minutes (with 10 - 30 GB of changes).

2. Labeling Disks

SoftRAID can attach a label to a disk. Just click on the tile for a disk and select **“Add Label”** from the **“Disk”** menu. You can use the **“Blink Disk Light”** feature (under the **“Disk”** menu) to make sure you are selecting the correct disk.

You can even select multiple disks and add a label to all of them. If you have more than one multi-disk enclosure, this makes it easy to keep track of which enclosure contains each of your disks.

Once you’ve added a label to a disk, SoftRAID will remember the label and always display it in tiles for that disk. It will also display that label on any error dialog, warning message, email or log entry for that disk.

3. Email Notifications from SoftRAID

The SoftRAID Monitor has the ability to send out email messages when errors arise. These email messages can be sent out even when there is no one logged into your Mac and do not require you to configure Apple’s Mail application.

Email notifications can be sent out not only in response to error conditions (disk errors, SMART test failures, predicted disk failures) but also in response to routine events (volume rebuilds completed, Mac restarted) and when certain thresholds are reached (high network activity, low free space on a volume or high CPU utilization).

The email engine in the SoftRAID Monitor supports an unlimited number of recipients and up to two outgoing email servers. If one email server is unavailable, your email notification will still be delivered.

The outgoing mail can be delivered over SSL or TLS connections. A convenient popup menu makes configuring the outgoing email server settings a breeze for many popular email providers.

4. SoftRAID Command Line Interface

SoftRAID automatically installs a tool which provides access to most features from the command line. In fact, this tool is the same one which the SoftRAID application uses to perform most of its functions. The tool, called **softraidtool**, gets installed the first time you run the SoftRAID application and can be accessed from any terminal window by simply typing:

```
> softraidtool
```

Running `softraidtool` requires root access (e.g. `sudo softraidtool...`) for any function other than simply getting the current status of a disk or volume. This prevents an unauthorized user from erasing your SoftRAID volumes. If you want to remove SoftRAID, the `softraidtool` gets removed, along with the driver, the SoftRAID Monitor and all the SoftRAID-specific preferences when you select Uninstall SoftRAID from the Utilities menu.

The commands for `softraid` tool all take the form:

```
> softraidtool [disk|volume] identifier command parameters
```

For instance, if you want to get the status of the disk at `disk3`, you would type:

```
> softraidtool disk disk3 info
```

If you wanted to get the status of your boot volume, you would type:

```
> softraidtool volume / info
```

For a complete list of commands, simply type:

```
> softraidtool help
```

If you wish to use the command line interface to remotely use `softraidtool` from another Mac or iPhone, you must enable Remote Login in the Sharing pane of System Preferences. In addition, you must make sure that your firewall can forward requests from the Internet to the Mac running SoftRAID. Please only do this if you have taken adequate security precautions (e.g. are using a strong password, etc.).

5. Hours of Use on Disks

SoftRAID reports the hours of use for all disks. For disks which support SMART, this value is the actual number of hours the disk has been turned on (either with the platters spinning or when they are stopped). We recommend that you replace disks with rotating platters after 20,000 hours of use as the incidence of failure can increase substantially after that point.

On disks which don't support SMART, an "hours of use" counter is created the first time the disk is initialized with SoftRAID. This counter will continue to increase even if you later use SoftRAID to reinitialize the disk.

6. Validating Volumes

Ever wonder if all the sectors of a volume are actually readable? Ever wonder if each disk in a mirror or RAID volume contains exactly the correct information? SoftRAID has the ability to validate volumes. This function uses the RAID engine. It reads every sector of a volume at the device level, bypassing the file system cache. This allows us to ensure that all the sectors on your volume can be read. Since the RAID engine is part of the SoftRAID driver, you can keep validating a volume even if the SoftRAID application is not running.

On mirror and RAID 1+0 volumes, the RAID engine goes one step further. After reading the sectors from each disk for the mirror volume (or mirror pair for RAID 1+0), the RAID engine compares the data from each disk to ensure that they are identical. If the RAID engine finds that a disk does not match the other mirror disks (or other disk in its mirror pair for RAID 1+0), it will write the correct information out to that disk.

On RAID 4 and RAID 5 volumes, the RAID engine computes the parity information for each block of the volume. It then compares the newly computed parity information with the parity information which is stored on the volume's disks. If the parity information stored on the disks is incorrect, the RAID engine will write the correct parity information for that block out to the disks.

7. The SoftRAID Log

SoftRAID now logs all SoftRAID-specific events and errors to a log file. This gives you one place to go when you want to know what is happening with SoftRAID on your Mac. You can view the log file either by selecting Show SoftRAID Log under the Utilities menu or by opening the file at `/Library/Logs/SoftRAID.log` using the Console application.

8. The Release Notes

You might want to read about the changes made since the last release of SoftRAID. You can see what features have been added and which bugs have been fixed. To read the Release Notes, open the Documentation folder and then double click on the Release Notes.pdf file.

Getting Help with SoftRAID

SoftRAID has over 100 help pages

1. Online Help

SoftRAID has extensive online help. All SoftRAID windows and dialog boxes have a help button. Anytime you have a question about some SoftRAID feature or want instructions on how to perform a task, just click on the help button.



help button

If you are experiencing problems with SoftRAID, please visit the support pages of our web site for detailed problems solving tips. Our support pages are at:

<http://softraid.com/pages/support.html>

If you need additional assistance with SoftRAID, please contact us via email at:

support@softraid.com.

2. Technical Support via Email

Your purchase of SoftRAID 5.0 comes with one year of free technical support via email. If you wish phone support, you can purchase it on a incident-by-incident basis or for an entire year. Most users, once they experience our prompt response to support emails, opt not to purchase phone support.

SoftRAID 5.0 includes an incredibly powerful report generator for helping us figure out the nature of your problem. If you choose, Generate Report for Tech Support from the Utilities menu, you will generate a file which allows us to quickly pinpoint the nature of your problem.

In addition, if you choose the option to Include extended disk and volume info, you will be sending us the partition maps and volume headers from your disks. In many instances, this information allows us to recover volumes which have been deleted by accident.