

RAID

The information below provides a basic guide to the RAID modes available to the LaCie 5big Thunderbolt 2. Note that the levels of performance and protection will differ based upon the number of hard drives in a volume. For instructions on how to configure RAID, see the [LaCie RAID Manager User Manual](#).

RAID EXAMPLE

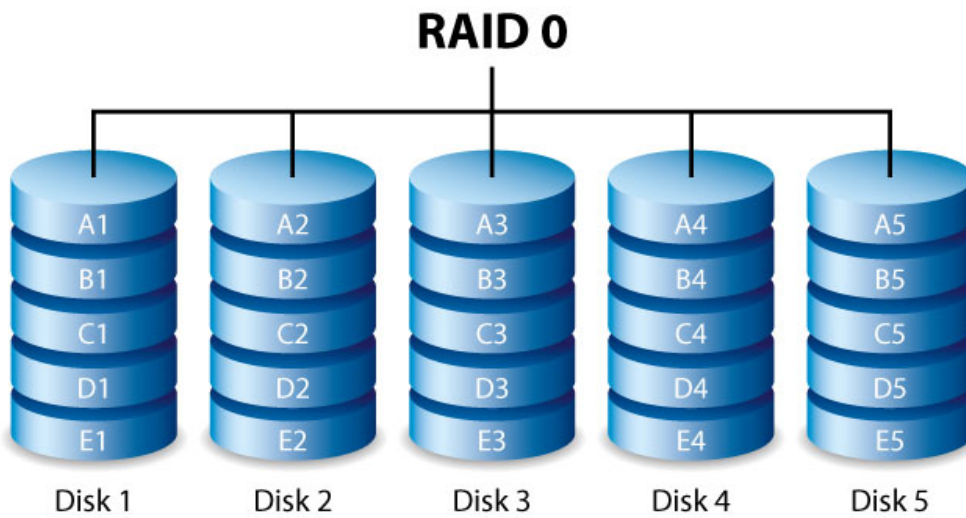
The level of RAID is contingent upon the amount of disks. For example, a volume with four disks supports all levels of RAID except RAID 1, which is not compatible with volumes greater than two disks. When making comparisons in a volume with four disks, RAID 0 appears to be the best choice since it offers 100% storage capacity and high performance. However, RAID 0's major weakness is a lack of data protection in case of hard drive failure. Further, its performance is not much greater than RAID 5, which includes data protection in case one hard drive should fail. RAID 6 and, in unique cases, RAID 10, can provide data protection in the event that two hard drives fail.

RAID LEVELS

Review the summaries of each RAID before selecting your configuration for the LaCie 5big storage.

RAID mode	Minimum hard drives
RAID 0	2
RAID 1	2
RAID 5	3
RAID 6	4
RAID 10	4

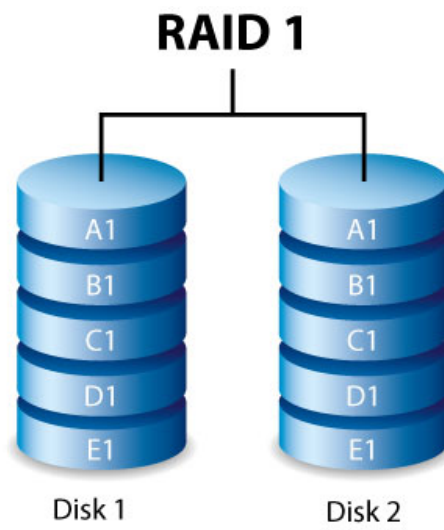
RAID 0



RAID 0 is the fastest RAID mode since it writes data across all of the volume's hard drives. Further, the capacities of each disk are added together for optimal data storage. However, RAID 0 lacks a very important feature: data protection. If one hard drive fails, all data becomes inaccessible. A recommended option is RAID 5, which offers:

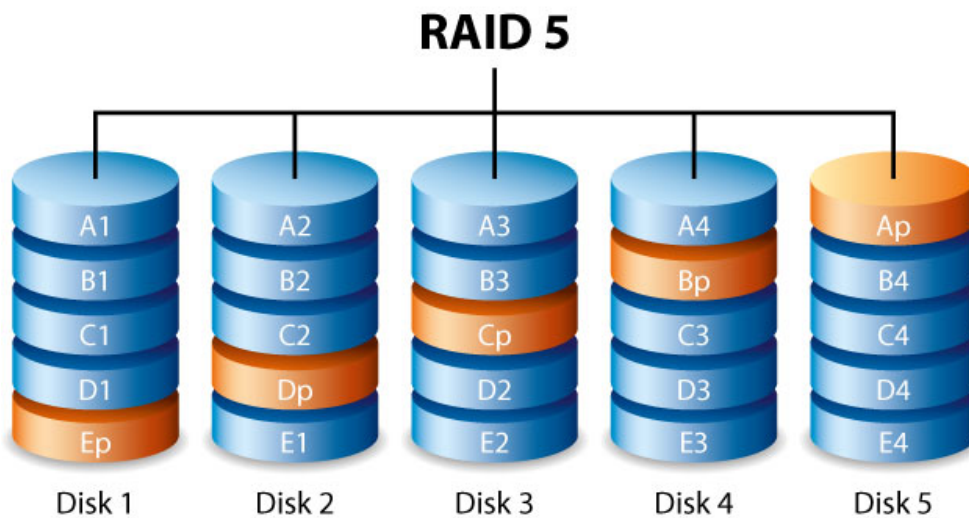
- Performance that can approach RAID 0
- Approximately 75% of the storage capacity of all the hard drives in the RAID configuration
- Data protection in case a single hard drive fails

RAID 1



RAID 1 provides enhanced data security since all data is written to each disk in the volume. If a single disk fails, data remains available on the other disk in the volume. However, due to the time it takes to write data multiple times, performance is reduced. Additionally, RAID 1 will cut disk capacity by 50% or more since each bit of data is stored on both disks in the volume.

RAID 5



RAID 5 writes data across all hard drives in the volume and a parity block for each data block. If one physical hard drive fails, the data from the failed hard drive can be rebuilt onto a replacement hard drive. While the files stored on a RAID 5 volume remain intact should one hard drive fail, data can be lost if a second hard drive fails before the RAID is rebuilt with the replacement hard drive.

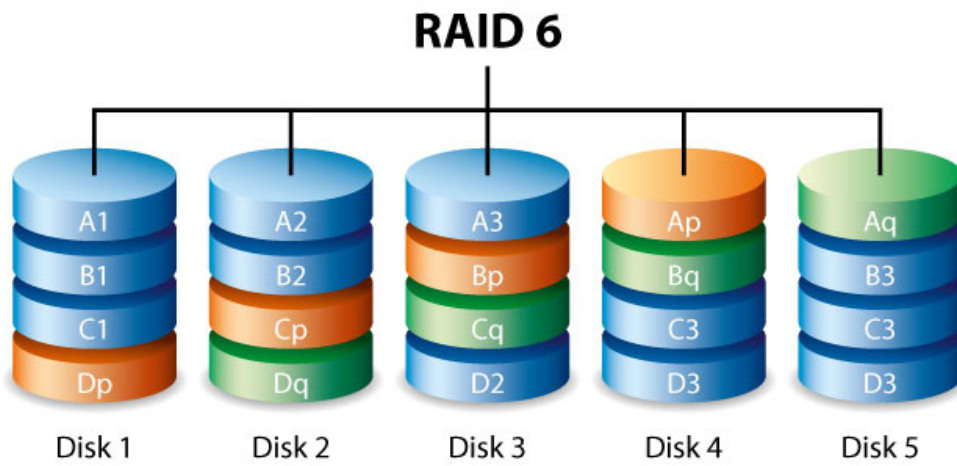
A minimum of three hard drives is required to create a RAID 5 volume.

RAID 5 offers performance that can approach RAID 0. The strong advantage that RAID 5 gives you is data protection. Additionally, you still have approximately 75% of the storage capacity of a RAID 0 array (based upon total available hard drives and storage capacities). The equation for determining the storage is: (The size of the hard drive with the smallest capacity in the array)*(Total hard drives-1).

Example 1: An array is assigned five 3TB hard drives for a total of 15TB. The equation is: $3\text{TB} * 4 = 12\text{TB}$.

Example 2: An array is assigned Three 2TB hard drives and one 3TB hard drive for a total of 9TB. The equation is: $2\text{TB} * 3 = 6\text{TB}$.

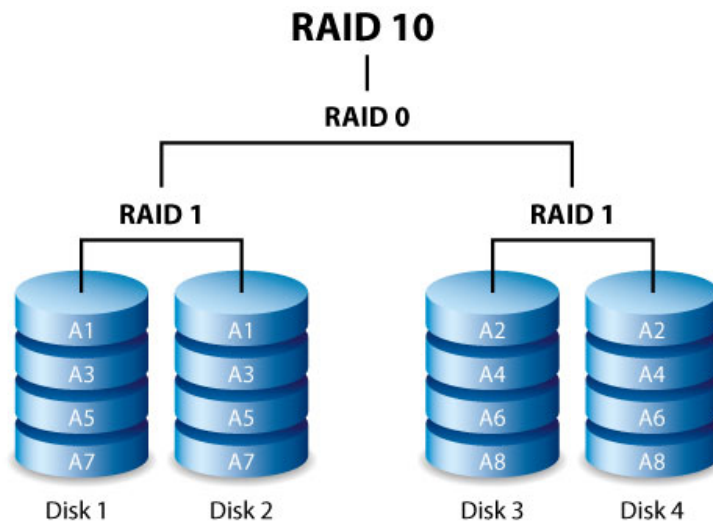
RAID 6



RAID 6 writes data across all disks in the volume and two parity blocks for each data block. If one physical disk fails, the data can be rebuilt onto a replacement disk. With two parity blocks per data block, RAID 6 supports up to two disk failures with no data loss. RAID 6 synchronizing from a failed disk is slower than RAID 5 due to the use of double parity. However, it is far less critical due to its double-disk security.

A minimum of four disks is required to create a RAID 6 volume. RAID 6 offers very good data protection with a slight loss of performance compared to RAID 5.

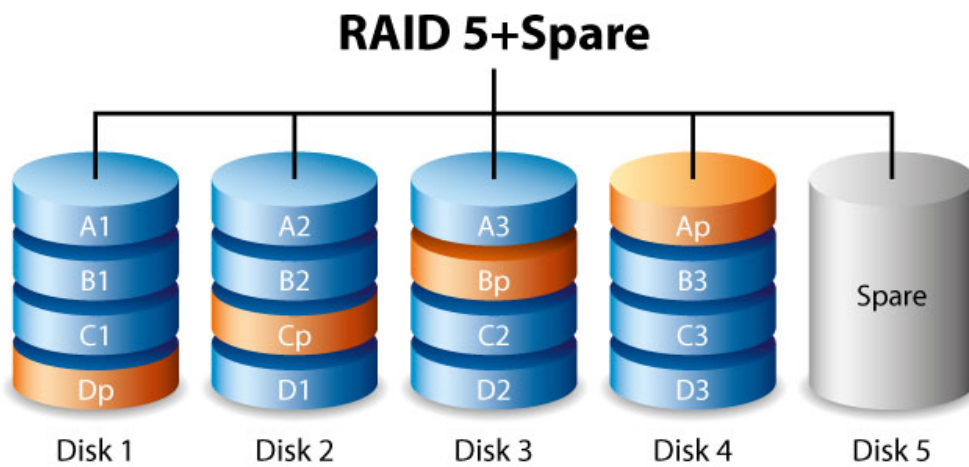
RAID 10



RAID 10 combines the protection of RAID 1 with the performance of RAID 0. Using four disks as an example, RAID 10 creates two RAID 1 segments, and then combines them into a RAID 0 stripe. Such configurations offer exceptional data protection, allowing for two disks to fail across two RAID 1 segments. Additionally, RAID 10 writes data at the file level and, due to the RAID 0 stripe, gives users higher performance when managing greater amounts of smaller files. This means a more generous input output per second for data, referred to as IOPS.

RAID 10 is a great choice for database managers that need to read and write a multitude of smaller files across the volume's disks. The impressive IOPS and data protection offered by RAID 10 gives database managers impressive reliability both in keeping files safe and rapid access.

RAID 5+Spare and RAID 6+Spare



A RAID+Spare volume gives you a “hot-spare” that is ready to synchronize data immediately should a hard drive fail. If a hard drive in the volume fails, the data starts to synchronize with the spare. The clear advantage for a RAID volume with a spare is that you do not have to wait for a replacement hard drive. However, the spare cannot be used as storage during standard operation since its sole task is to take over should a hard drive fail. You can replace the failed hard drive immediately and, once synchronization is complete, assign it as new hot spare.

Important info: For RAID+Spare volumes, data remains intact when a single hard drive fails and the spare begins synchronizing automatically. However, if a second hard drive in a RAID 5 volume fails before synchronization is complete, all data in the volume will be lost. The same is true for a RAID 1 volume. In the case of RAID 10, the second failed hard drive would have to be on the same mirrored set as the spare hard drive.. RAID 6 allows for two hard drives to fail.