RAID 10

**Definition**

RAID 10, also known as RAID 1+0, is a [RAID](https://searchstorage.techtarget.com/definition/RAID) configuration that combines [disk mirroring](https://searchstorage.techtarget.com/definition/disk-mirroring) and [disk striping](https://searchstorage.techtarget.com/definition/RAID-0-disk-striping) to protect data. It requires a **minimum of four disks**, and stripes data across mirrored pairs. As long as one disk in each mirrored pair is functional, data can be retrieved.

If two disks in the same mirrored pair fail, all data will be lost because there is no [parity](https://searchstorage.techtarget.com/definition/parity) in the striped sets

RAID 10 provides [redundancy](https://whatis.techtarget.com/definition/redundancy) and performance, and is the best option for I/O-intensive applications -- including email, web servers, databases and operations that require high disk performance -- and organizations that require little to no downtime.

The high performance of RAID 10, and its ability to perform many write options, makes it suited to highly used, mission-critical database servers. However, the four-disk minimum requirement makes RAID 10 a costly choice, and it may be overkill for small businesses or consumer use.

The two-number format of RAID 10/1+0 is known as a nested RAID configuration because it combines two RAID levels to enhance performance.

While RAID 1+0 is similar to RAID 0+1, the reversed order of the numbers indicates the two RAID levels are layered in the opposite order. RAID 1+0 mirrors two drives together and then creates a striped set with the pair. RAID 0+1 creates two stripe sets and then mirrors them. While both RAID levels use the same number of drives, they are not synonymous.

According to manufacturer specifications and independent benchmarks, RAID 10 provides lower [latency](https://whatis.techtarget.com/definition/latency) and superior throughput to all other RAID levels, except for RAID 0.

Due to disk mirroring, RAID 10 capacity is reduced when compared with RAID levels that don't involve mirroring. Because of this, levels such as [RAID 5](https://searchstorage.techtarget.com/definition/RAID-5-redundant-array-of-independent-disks), 50 (5+0) and 6 may be considered as alternatives. However, when rebuilding with RAID 10, only the surviving mirror of all the drives is read, while non-mirroring levels require all remaining drives to be read. The heavier lifting required by RAID 5, 50 and 6 could therefore result in a higher risk of failure and data loss.

RAID 1+0 combines striping and mirroring to create redundancy. As long as an array has an even number of hard disk drives, these two actions can be used together. While mirroring can reduce the amount of available capacity in a RAID 1+0 array, it creates another layer of protection against data loss.

With data mirroring, RAID 10 arrays can maintain multiple copies of data, allowing for a quicker recovery in the event of a failure. By striping mirrored data, RAID 10 combines the speed boost of striping with the added redundancy of mirroring.

**Hardware RAID vs. software RAID**

RAID 10 can be deployed by hardware or software. [Hardware RAID](https://searchstorage.techtarget.com/definition/hardware-RAID-hardware-redundant-array-of-independent-disk) requires a RAID controller inside a motherboard slot that connects the drives, while [software RAID](https://searchstorage.techtarget.com/definition/software-RAID-software-redundant-array-of-independent-disk) uses a utility application to manage the RAID configuration.

Hardware RAID often costs more than a software option, but it can have superior performance. This approach can sometimes replace disks without shutting down the server, or [hot swapping](https://whatis.techtarget.com/definition/hot-swap). With hardware RAID, higher write throughput speeds are supported, as well as faster recovery of lost data. Because of this, hardware RAID is the preferred option when dealing with mission-critical servers.

Software RAID is less expensive and less complex to deploy. Most operating systems (OSes) include software RAID support. However, while hardware RAID has a battery backup in case of power failure, software RAID does not. Software RAID is preferred by small businesses because it offers higher performance in standard RAID levels, but it does not offer nested levels like RAID 10.

### RAID 10 with SSD

### RAID 10's method of striping mirrored sets can be beneficial in a flash system.

### Considerations for using RAID 10

There are pros and cons to using a RAID 10 configuration. While RAID 1+0 writes to two disks at once, it should not be considered a replacement for traditional data backup. If the OS is corrupted, the data on both disks is at risk for corruption, so RAID should not be considered the last line of defense against data loss. RAID 10 can protect against single drive failures, but a secure data backup plan should also be in place.

