

Raid Cheat sheet

AJA Sales Team

Raids

RAID (Redundant Array of Independent Disks)

The purpose of a RAID array is to increase data reliability and performance. When hard drives are running together in a RAID array, (depending on the RAID configuration or “level”) drives can instantaneously store redundant copies of your data and/or increase data read speed by spreading out smaller blocks of data across multiple drives.

Some basic definitions:

Data striping is the technique of segmenting logically sequential data, such as a single file, so that segments can be assigned to multiple physical devices.

A *Parity bit* is a bit that is added to ensure that the number of bits with the value one in a set of bits is even or odd. *Parity* bits are used as the simplest form of error detection code.

Disk mirroring is the replication of logical disk volumes onto separate physical hard disks in real time to ensure continuous availability.

Hamming code is a linear error-correcting code named after its inventor, Richard Hamming. Hamming codes can detect up to two simultaneous bit errors, and correct single-bit errors; thus, reliable communication is possible when the Hamming distance between the transmitted and received bit patterns is less than or equal to one. By contrast, the simple parity code cannot correct errors, and can only detect an odd number of errors.

Because it matters.

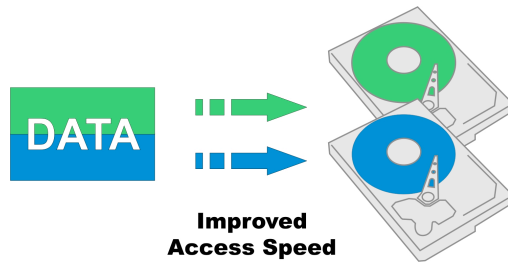


Some of the most common RAID levels are:

RAID 0

Striped set without parity or Striping

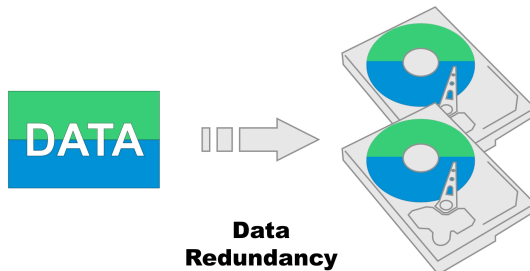
– Data is distributed across an array of drives to improve speed. RAID 0 does *not* back up your data like other arrays, so if a single drive fails then all data on the array would be lost.



RAID 1

Mirrored set without parity or Mirroring

– Data on a drive is copied in its entirety to each drive in the array simultaneously. RAID 1 provides *twice the read rate* but the same write speed of a single drive.



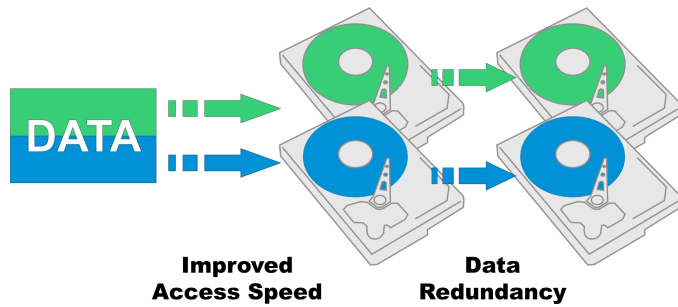
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RAID 0 + 1 (sometimes also called RAID 01)

Mirrored set without parity

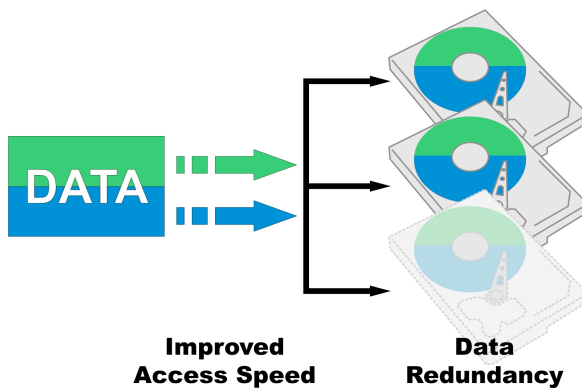
– Two or more RAID 0 (increased speed) arrays are created and they are each mirrored via an overall RAID 1 (data backup) array. By definition, this configuration *requires at least 4 drives*.



RAID 3/4

Striped disks with dedicated parity

– Combines three or more disks in a way that protects data against loss of any one disk. Fault tolerance is achieved by adding an extra disk to the array and a dedicated array is reduced by one disk. A RAID 3 or 4 array requires a minimum of three drives: two to hold striped data, and a third for parity.



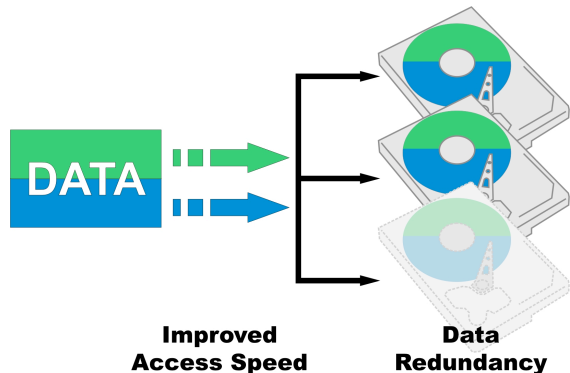
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RAID 5

Striped set with distributed parity or interleave parity

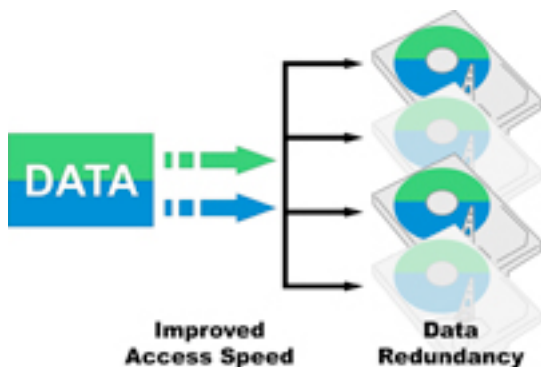
– Provides both backup and increased speed. Additionally, a RAID 5 array can *continue normally operating if one of its drives fails*. The performance speed of the array will be reduced until the failed drive is replaced, but no data loss would occur. This array *requires a minimum of 3 drives*.



RAID 6

Striped set with dual distributed parity

– Similar to RAID 5, RAID 6 offers both backup and increased speed. Additionally, a RAID 6 array can continue operating if up to two of its drives fail. This requires a *minimum of 4 drives*.



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