12.7.5 RAID Facts

Redundant Array of Independent Disks (RAID), also called Redundant Array of Inexpensive Disks, is a disk subsystem that combines multiple physical disks into a single logical storage unit.

This lesson covers the topic of Redundant Array of Independent Disks

Redundant Array of Independent Disks

Depending on the configuration, a RAID array can improve performance, provide fault tolerance, or both. RAID can be implemented through hardware, using a special RAID disk controller, or software. Hardware RAID is more expensive, but provides much better performance than software RAID.

RAID Configuration	Description
RAID 0 striping	A stripe set breaks data into units and stores the units across a series of disks by reading and writing to all disks simultaneously. Striping: ▪ Provides an increase in performance. ▪ Does not provide fault tolerance. ▪ Does not protect data. A failure of one disk in the set means all data is lost. ▪ Requires a minimum of two disks and may contain up to 32 disks. ▪ Has no overhead because all disk space is available for storing data. ▪ Is the fastest of all RAID types. However, it does not provide fault tolerance.
RAID 5 striping with parity	A RAID 5 volume combines disk striping across multiple disks with parity for data redundancy. Parity information is stored on each disk. If a single disk fails, its data can be recovered using the parity information stored on the remaining disks. RAID 5: ▪ Provides an increase in performance. ▪ Provides fault tolerance. ▪ Does not provide fault tolerance if two or more disks fail. ▪ Requires a minimum of three disks. ▪ Has an overhead of one disk in the set for parity information (1 / n - 1). A set with three disks has 33% overhead. A set with four disks has 25% overhead. A set with five disks has 20% overhead
RAID 1 mirroring	A mirrored volume stores data to two duplicate disks simultaneously. If one disk fails, data is present on the other disk and the system switches immediately from the failed disk to the functioning disk. RAID 1: ▪ Provides fault tolerance. Does not increase performance. ▪ Requires two disks. ▪ Has a 50% overhead. ▪ Writes data twice, meaning that half of the disk space is used to store the copy of the data. ▪ Has overhead of 1 / n where n is the price of the second disk. ▪ Is the most expensive fault tolerant system.
RAID 0+1	RAID 0+1 combines disk striping (0) and disk mirroring (1). Multiple disks are striped, creating a single volume. A second set of disks is then added to mirror the first set. RAID 0+1:

	▪ Provides fault tolerance. ▪ Protects data if one or more disks in a single set fails. ▪ Does not protect data if two disks in different mirrored sets fail. ▪ Provides an increase in performance. ▪ Requires an even number of disks with a minimum of four disks. ▪ Has a 50% overhead.
RAID 1+0 mirroring a striped set	RAID 1+0 combines disk mirroring (1) and disk striping (0). Multiple disks are configured into two mirrored arrays. The mirrored set are striped across the other set. RAID 1+0: ▪ Provides fault tolerance. ▪ Protects data if one or more disks in a single set fails. ▪ Protects data if two disks in different sets fail. ▪ Provides an increase in performance. ▪ Requires an even number of disks and a minimum of four disks. ▪ Has a 50% overhead. ▪ Is the fastest, most fault tolerant, and most expensive RAID arrays. ▪ Performs better and provides more fault tolerance than RAID 0+1 arrays.