A PRIMER ON RAID LEVELS: STANDARD RAID LEVELS DEFINED

RAID 0: Disk striping

Description: Data is striped across one or more disks in the array.
Performance: Since more writers and readers can access bits of data at the same time, performance can be improved.
Upside: Performance.
Downside: No redundancy. One disk failure will result in lost data.
Application(s): Applications that can access data from more sources than just the RAID 0 storage array.

RAID 1: Disk mirroring

Description: Data is written to two or more disks. No master or primary, the disks are peers.
Performance: Read operations are fast since both disks are operational data can be read from both disks at the same time. Write operations, however, are slower because every write operation is done twice.
Upside: If one disk fails, the second keeps running with no interruption of data availability.
Downside: Cost. Requires twice as much disk space for mirroring.
Application(s): Applications that require high performance and high availability including transactional applications, email, and operating systems.

RAID 3: Virtual disk blocks

Description: Byte-level striping across multiple disks. An additional disk is added that calculates and stores parity information.
Performance: Since every write touches multiple disks, every write slows performance.
Upside: Data remains fully available if a disk fails.
Downside: Performance.
Application(s): Good for sequential processing applications such as video imaging.

RAID 4: Dedicated parity disk

Description: Block-level striping across multiple disks with a cache added to increase read and write performance.
Performance: Striping blocks instead of bytes and adding a cache increases performance over RAID 3.
Upside: Data remains fully available if a disk fails.
Downside: If the parity disk is a bottleneck performance suffers.
Application(s): With the increased performance, file serving applications can work well. Not suitable for applications requiring high performance.

RAID 5: Striped parity

Description: Identical to RAID 4 with added rotating parity protection. If you configure the system with a hot spare disk, data from a failed drive can be rebuilt to protect against a second drive failure.
Performance: Better than RAID 4 because there's no single parity disk bottleneck. Rebuilding drives will degrade performance.
Upside: Balances data availability and read/write performance.
Downside: Possible performance issues during drive rebuilds, and if cache isn't used, write performance suffers. Also, RAID 5 requires between three and five drives per RAID group.
Application(s): Good for read intensive applications, file sharing and Web applications.

RAID 6: Dual parity

Description: Identical to RAID 5 and adds a second parity drive to guard against a second drive failure during a drive rebuild.
Performance: Since each parity region is calculated separately, the RAID 5 performance impact is doubled. You must also consider the performance impact of rebuilding drives in the background.
Upside: More data protection. If two disks fail, you would still have a complete data set.
Downside: Cost and performance during multi-drive parity calculations and drive rebuilds.
Application(s): Particularly useful in large-capacity Fibre Channel and SATA disk environments where you want to rebuild drives in the background.

RAID 10

Description: RAID 1 and RAID 0 combined with no parity. Data is mirrored and then striped. If you lose a drive in a stripe set, all access to data must be from the other stripe set.
Performance: Read operations are better because of striping, but write operations mirror the performance degradation of RAID 1.
Upside: Much better performance than RAID 1, and better redundancy than RAID 0.
Downside: Capacity issues with RAID 1.
Application(s): Transactional applications because of the striping and because either mirror can respond to requests.

RAID 50

Description: A combination of RAID 5 and RAID 0. RAID 50 stripes RAID 5 groups like RAID 0.
Performance: The RAID 0-like striping of the RAID 5 groups increases data throughput.
Upside: Performance.
Downside: RAID 50 increases costs and lowers available capacity.
Application(s): Where the combination of RAID 5 economics and RAID 0 performance is required.

For more information on RAID levels, check out SearchSMBStorage's article on protecting your application data with RAID storage systems.