Storage Configuration: Disk RAID and Disk Management > RAID configurations defined

Next

RAID configurations defined

The RAID configuration you choose depends upon how you plan to use the storage node. The storage node can be reconfigured with RAID0, RAID1, RAID10, RAID5, RAID5+hot spare, RAID50, or RAID6, depending on the model. See Table: RAID levels and default configurations for storage nodes for a list of RAID levels by model.

RAID0

RAID0 creates a striped disk set. Data is stored across all disks in the array, which increases performance. However, RAID0 does not provide fault tolerance. If one disk in the RAID set fails, all data on the set is lost.

Storage node capacity in RAID0 is equal to the sum total capacity of all disks in the storage node.

NOTE: Due to the lack of fault tolerance, RAID0 is not recommended for long-term storage of data that is not easily reproduced.

RAID1 and RAID10

RAID 1 mirrors data within disk pairs. RAID10 combines mirroring data within pairs of disks and striping data across the disk pairs. RAID10 combines the data redundancy of disk mirroring (RAID1) with the performance boost of striping (RAID0).

Storage Capacity in RAID1 and RAID10

Storage capacity in RAID1 and RAID10 is half the total capacity of RAID0 in the storage node. The capacity of a single disk pair is equal to the capacity of one of the disks, thus yielding half the total capacity. Or, to put it another way,

RAID10 capacity = (single disk capacity x total # of disks) / 2

RAID5, RAID5 + spare, or RAID50

RAID5 provides data redundancy by distributing data blocks across all disks in a RAID set. Redundant information is stored as parity distributed across the disks.

Parity allows the storage node to yield more disk capacity for data storage than RAID10 allows.

Parity and storage capacity in RAID5 or RAID5 + spare

Parity in a RAID5 set equals the capacity of one disk in the set. Therefore, the capacity of any RAID5 set is (N−1) x single disk capacity, where N is the number of drives in the storage node, as illustrated in Table: Storage capacity of RAID5 sets in storage nodes.

Table: Storage capacity of RAID5 sets in storage nodes

Model	Number of disks in RAID5 set	Storage capacity of disks
	4 disks	3 x single disk capacity

NSM 160	3 disks plus a spare	2 x single disk capacity
NSM 260	6 disks (x 2 RAID sets) 5 disks plus a spare (x 2 RAID sets)	10 x single disk capacity 8 x single disk capacity
DL380	6 disks	5 x single disk capacity
DL320s (NSM 2120)	6 disks (x 2 RAID sets)	10 x single disk capacity
IBM x3650	6 disks	5 x single disk capacity
Dell 2950	6 disks	5 x single disk capacity
NSM 2060	6 disks	5 x single disk capacity
NSM 4150	5 disks	4 x single disk capacity
HP LeftHand P4300	8 disks	7 x single disk capacity
HP LeftHand P4500	6 disks (x 2 RAID sets)	10 x single disk capacity
HP StorageWorks P4300 G2	8 disks	7x single disk capacity

HP StorageWorks P4500 G2	6 disks (x 2 RAID sets)	10 x single disk capacity

RAID5 and hot spare disks

RAID5 configurations that use a spare designate the remaining disk of the RAID set as a hot spare. With a hot spare disk, if any one of the disks in the RAID5 set fails, the hot spare disk is automatically added to the set and RAID starts rebuilding.

Table: Storage capacity of RAID5 sets in storage nodes lists the RAID5 configurations by model, and indicates which configurations support a hot spare.

RAID50 on the NSM 4150

RAID50 combines distributing data blocks across disks in a RAID5 set and striping data across multiple RAID5 sets. RAID50 combines data redundancy (RAID5) with the performance boost of striping (RAID0).

The total capacity of the NSM 4150 in RAID50 is the combined capacity of each RAID5 set in the storage node.

For RAID50, the NSM 4150 is configured with three RAID5 sets. For example, if the disks are 750 GB, the total capacity for that NSM 4150 equals 9 TB (12 x the single disk capacity).

RAID6

RAID6 is essentially a RAID5 configuration with dual parity. The dual parity of RAID6 provides fault tolerance from two drive failures in each of two RAID sets. Each array continues to operate with up to two failed drives. RAID6 allows a second hard disk drive to fail without data loss while the RAID array is rebuilding.

Parity and storage capacity in RAID6

In RAID6, data is striped on the block level across a set of drives, as in RAID5, but a second set of parity is calculated and written across all the drives in the set. RAID6 provides extremely high data fault tolerance and can withstand multiple simultaneous drive failures.

Parity in a RAID6 set equals the capacity of two disks in the set. Therefore, the capacity of any RAID6 set is (N−2) x single disk capacity, where N is the number of drives in the storage node.

Table: Storage capacity of RAID6 sets in storage nodes

Model	Number of disks in RAID6 set	Storage capacity of disks
NSM 160	4 disks 3 disks plus a spare	2 x single disk capacity 1 x single disk capacity
NSM 260	6 disks (x 2 RAID sets) 5 disks plus a spare (x 2 RAID sets)	8 x single disk capacity 6 x single disk capacity
DL380	6 disks	4 x single disk capacity
DL320s (NSM 2120)	6 disks (x 2 RAID sets)	8 x single disk capacity

IBM x3650	6 disks	4 x single disk capacity
Dell 2950	6 disks	4 x single disk capacity
NSM 2060	6 disks	4 x single disk capacity
NSM 4150	5 disks	3 x single disk capacity
HP LeftHand P4300	8 disks	6 x single disk capacity
HP LeftHand P4500	6 disks (x 2 RAID sets)	8 x single disk capacity
HP StorageWorks P4300 G2	8 disks	6 x single disk capacity
HP StorageWorks P4500 G2	6 disks (x 2 RAID sets)	8 x single disk capacity

Drive failure and hot swapping in RAID6

The following platforms support RAID6 and also support hot swapping in the event of a drive failure.

- DL320s (NSM 2120)
- HP LeftHand P4300 and P4500
- HP StorageWorks P4500 G2 and P4300G2

Hot swapping means that you can physically remove a failed drive

and insert a new one without powering down the unit.

In addition to redundancy during normal operation, RAID6 further protects the RAID array against data loss during degraded mode by tolerating an additional drive failure during this vulnerable stage.

Prev | Up | Next

Configuring and managing RAID | Explaining RAID devices in the RAID setup report