

Table 3.5

Redundant arrays of inexpensive disks (RAID) levels

RAID Level	Explanation	Overhead	Fault Tolerance	Usage and Comments
0	Data striped across disks	None	None	Widely used; fragile
1	Data mirrored	Each disk duplicated	1 of 2	Widely used; very high overhead
2	Hamming code ECC protection; data + ECC bits striped across many disks	Very high for few disks; reasonable only for a large disk array	Single disk failure	Not practical; requires too many disks to amortize cost of ECC bits
3	Data striped; single parity disk per word	Parity disk per striped block	Single disk failure	Available; high data bandwidth, poor transaction bandwidth
4	Data not striped (interleaved at block granularity); single parity disk	Parity disk per block set	Single disk failure	Available; poor write performance due to parity disk bottleneck
5	Data not striped (interleaved at block granularity); parity blocks interleaved on all disks	1 of n disk blocks used for parity (e.g., 5 disks provide data capacity of 4)	Single disk failure	Widespread; writes require updates to two disks—one for data, one for parity
6	Data not striped (interleaved at block granularity); two-dimensional parity blocks interleaved on disks	2 of n disk blocks used for parity (e.g., 6 disks provide data capacity of 4)	Multiple disk failure	Available; writes updates to three disks—one for data, one for row parity, one for column parity

Source: Patterson et al., 1988.

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