

AN OVERVIEW OF RAID TECHNOLOGY

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What is RAID

- Redundant Array of Inexpensive Disks
- Developed at the University of California Berkeley in 1987
- Better than Single Large Disk
- Added Redundancy
- Performance Improvements



Levels of RAID - Introduction

Most Common:

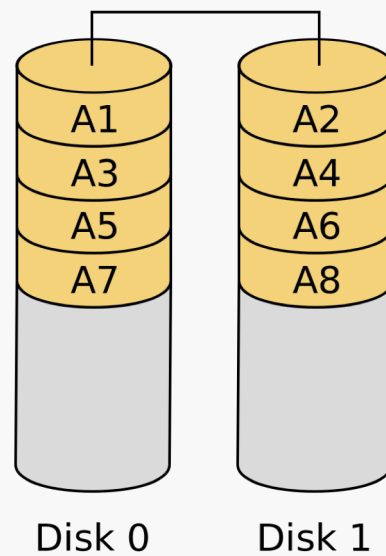
- RAID 0
- RAID 1
- RAID 5
- RAID 6

Not Used Much:

- RAID 2
- RAID 3
- RAID 4

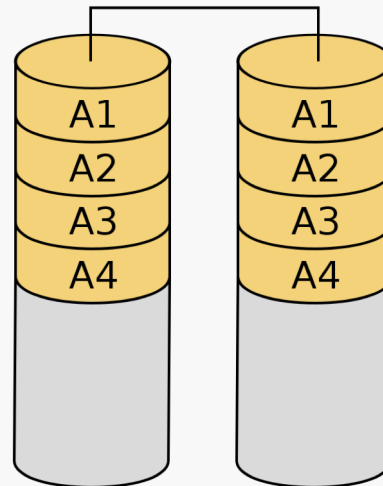
RAID 0

- Data is striped
- Fastest Level for Reading and Writing
- No Data Redundancy



RAID 1

- Data is Mirrored Exactly
- Data Redundancy
- Writing isn't faster
- Improved performance with reading



Parity

Bit Parity:

Disk1 : 10100

Disk2 : 01101

Parity : 11001

Block Parity:

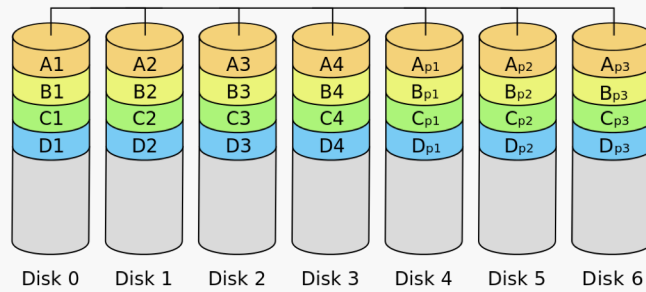
Disk 1 : 10100 1

Disk 2 : 01101 0

Parity: 11001 1

RAID 2

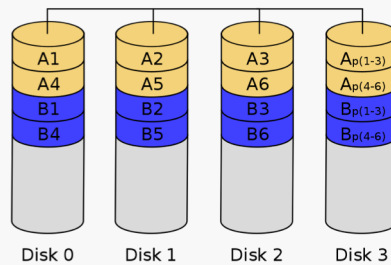
- Hamming Code
- Discs Must be synced
- Not Used Anymore



RAID 3 & 4

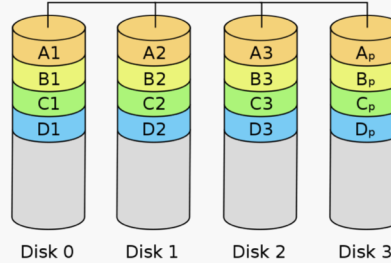
RAID 3

- Byte level striping
- Dedicated Parity



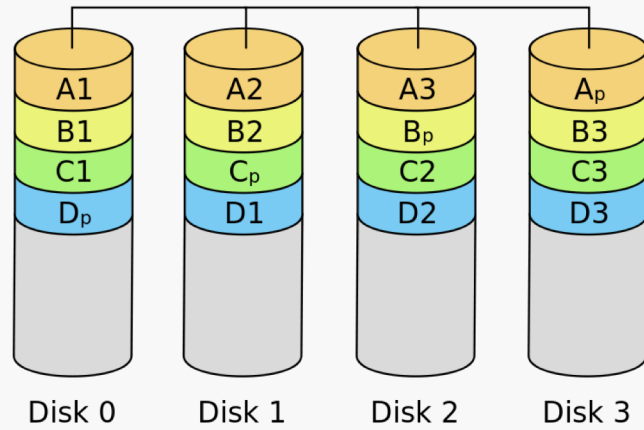
RAID 4

- Block level striping
- Dedicated Parity
- More I/O operations can be executed in parallel



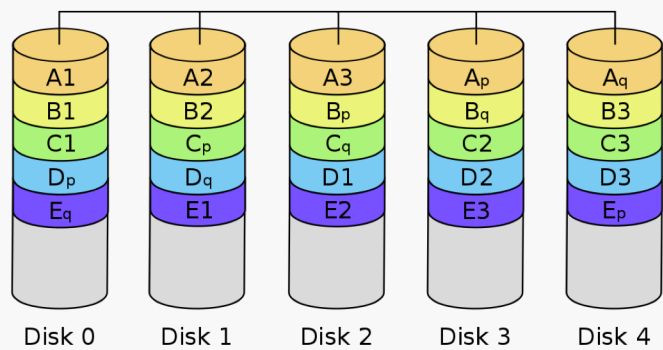
RAID 5

- Block Level Striping
- Distributed Parity
- Faster than Raid 4
- Better Protected against data loss



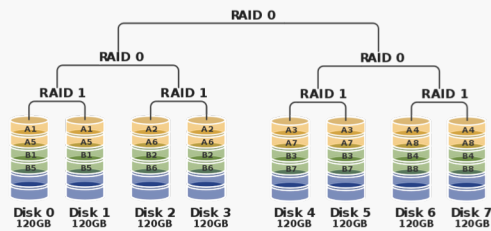
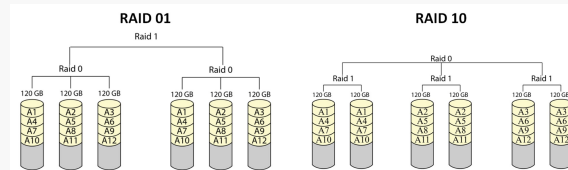
RAID 6

- Block Level Striping
- Double Distributed Parity
- Two Drives can Fail
- Better for Large Drives



Nested RAID

- RAID 01
- RAID 03
- RAID 10
- RAID 50
- RAID 60
- RAID 100



RAID System Controllers

- Hardware Controller
 - Dedicated Processing
 - Hot Swapping
 - Frees Disk Cache
- Controlled by Software
 - Uses the power of the system CPU
 - No additional hardware is required
 - Not restricted by Hardware Controller

Conclusion

- RAID is a powerful tool to increase performance and data redundancy
- Things to know
 - *Failures rise proportionally with the number of disks.*
 - *Does not replace a system backup*
 - *More complicated Systems have more complicated problems*
- Don't use it for the computer in your apartment or dorm room (Probably).

Sources

- <https://commons.wikimedia.org/wiki/>
- https://www.wikiwand.com/en/Standard_RAID_levels
- <https://serverfault.com/questions/848680/how-raid-1-and-raid-10-become-different-when-there-are-8-logical-disk>
- <https://www.dataplugs.com/en/software-raid-vs-hardware-raid-advantages-disadvantages/>
- <https://en.wikipedia.org/wiki/Cylinder-head-sector>
- The sources listed on my paper