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://serverfault.com/questions/848680/how-raid-1-and-raid-10-become-different-when-there-are-8-logical-disk
- The sources listed on my paper