Operating Systems
RAID Hard drives

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1 RAID

- **RAID** expands to Redundant Array of independent disks. It essentially combines multiple physical drives into a single logical unit.

- One of the main purposes of RAID is data redundancy. Data redundancy refers to the existence of data additional to the existing data. This could either be in the form of a whole copy, or maybe smaller parts of the data. Data redundancy can be used sometimes to correct errors that occur in some data. Keeping multiple copies allows checking of the existing data.

- Often, the copies of data are present in different physical hard drives, though there is a single logical drive. This is because data can be restored even if there is a complete failure of one of the drives.

- RAID has different levels usually indicated by RAID *number*. Higher numbers usually mean more protection of data.

- RAID systems use the concept of parity. For example, in RAID 5 level, there are a minimum of 3 hard disks. 2 are used for Data and 1 is used for parity. Parity is essentially used to check if data transfer has occurred without any error or not. It can be used to restore data in case of losses.

2 Idea behind RAID

- The whole idea was to use an array of inexpensive disks and combine them to get better performance compared to having just one expensive disk.

- The system may end up having more disk failures as compared to other alternatives, but data redundancy makes sure that there is no data loss.

- A fast SSD can be mirrored with a cheap mechanical drive. This reduces the risk of data loss in SSD and other expensive disks.

3   Levels in RAID

- Level 0 in RAID is actually a normal stacking of all the hard-drives and there is no data redundancy or parity that is implemented. The capacity is thus equivalent to the sum of the sizes of the hard disks.

- Higher levels of RAID use sophisticated ways of parity checks to see if the data received is faulty.

4   Parity

- The concept of parity is to append a bit to every data block of required to make sure all the files are either of even bit size or odd bit size. If even bit sizes are chosen, we will essentially know that all correct files are of even bit length. This is thus a very quick way of checking if the file is correct.

- Higher levels of RAID use Vertical and Horizontal and other sophisticated ways of checking parity.