## RAID 1

RAID 1 configuration is a fairly simple one as it stores identical data on two or more disks for better data redundancy. In a RAID 1 configuration, every data is written to both the disks simultaneously while the read operations are fast as the data is read from two or more disks at the same time. This offers data redundancy and works well when you’re dealing with mission-critical data. Simply put, RAID 1 does mirroring where the same data is copied to two or more disks. Let’s take a brief look at its advantages and disadvantages.

### Advantages

The advantages of RAID 1 are:

* RAID 1 offers fast read performance at speeds comparable with RAID 0, especially if the [RAID controller](https://www.enterprisestorageforum.com/storage-hardware/raid-controllers.html) uses multiplexing to read data simultaneously from many disks.
* It is ideal for mission-critical data where data loss can have disastrous consequences.
* It provides improved performance, even if the write operations tend to be a bit slower.

### Disadvantages

The disadvantages of RAID 1 are:

* RAID 1 requires twice the storage space, and this can prove to be expensive.
* Accessing data from the failover disk is not automatic, and the system has to be shut down to fix the secondary disk, in case of failure of the first one.
* There are no security measures in place.

## RAID 5

RAID 5 also offers fault tolerance like RAID 1, but instead of using mirroring, it uses parity and checksum where the data is striped and stored evenly across all disks, along with their parity, so the data can be reconstructed at any time.

### Advantages

The advantages of RAID 5 are:

* Read operations are fast and can serve multiple users at the same time.
* Provides a high level of data redundancy.
* Efficient utilization of disk space since the RAID controller uses parity to rebuild data. There is no data duplication, and hence, disk space can be used better.
* The system doesn’t have to be shut down when a disk fails as the parity information is used to rebuild this data.

### Disadvantages

Some of the disadvantages of RAID 5 are:

* The write operations are a bit slow because parity has to be calculated. Of course, this parity information is also distributed, so there are no bottlenecks like RAID 4.
* Requires a minimum of three disks.
* Recovery operations are a bit slower because of parity calculations.

Now that we have a fair idea of RAID 1 and RAID 5, let’s stack it up against each other to assess the performance.

## RAID 1 vs. RAID 5

Let’s compare the performance of RAID 1 and RAID 5 through common operations and features.

|  |  |  |
| --- | --- | --- |
| Operations | RAID 1 | RAID 5 |
| Read | Read is fast in RAID 1 because read requests are sent to parallel drives and the one with the fastest performance returns the data first | Read is extremely fast in RAID 5 too because data is accessed quickly and sent back to the user. |
| Write | Write operations are slower than reading since the same data has to be written across multiple disks | Write operations are slow in RAID 5 too because the parity information has to be calculated during each write and this takes time. |
| Fault tolerance | Fault tolerance is good since more than one disk contains the same data. However, in the case of a write operation, both the disks can get corrupted which will eventually result in a data loss. | Even if one system fails, the data will be reconstructed using the parity information. Though read and write operations may be slow during this data reconstruction, there is no need to power down the system. |
| Data storage | Only 50% of the data capacity can be used since the same data has to be written across both the disks | About 4/5th of the disks will be used and only the remaining one will be used for storing parity information. |
| Applications | Data archival and any other application that stores or uses mission-critical data | File and application servers as they require a good balance between storage, performance, security, and failure resistance. |
| Data storage | Data is not divided into two disks and the same data is just mirrored, so each disk has an identical copy. | Data is split evenly across all disks. |
| Number of drives | If you plan to use only two drives, RAID 1 is the most efficient implementation. | RAID 5 can support up to 16 drives. |
| Extra cache | Implementing extra cache is difficult in RAID 1 because it is hardware-based | An extra cache can be easily implemented in RAID 5 |
| Security | Low security | Good security and decent performance because of parity checking. |

Compare he throughput achieved by a RAID level 5 organization with that achieved b

a RAID level 1 organization for the following:

a. Read operations on single blocks

b. Read operations on multiple contiguous blocks

Ans : 1)The amount of throughput depends on the number of disks in the RAID system. A RAID Level 5 comprising of a parity block for every set of four blocks spread over five disks can support four to five operations simultaneously.

A RAID Level 1 comprising of two disks can support two simultaneous operations. Of course, there is greater flexibility in RAID Level 1 as to which copy of a block could be accessed and

that could provide performance benefits by taking into account position of disk head.

2) RAID Level 5 organization achieves greater bandwidth for accesses to multiple contiguous blocks since the adjacent blocks could be simultaneously accessed. Such bandwidth improvements are not possible in RAID Level 1.