

## How do Hard Disks Work?

Initially, the hard drive was developed to meet the needs of the Personal Computer market. However, with time, hard drives are increasingly being used at data storage devices in other electronic equipments such as mobile phones, PDAs, digital audio video players, and video games.

### How Do Hard Disks Store Data?

Hard disk is the main storage space inside your PC. Therefore, it is also sometimes referred to as the brain of the computer. Hard disk data storage is a permanent form of data storage, unlike the system memory or RAM. Hard disk consists of circular platters. It uses these platters to store the data. Data is stored on a hard disk in binary digits i.e. 1s and 0s.

There are many 1's and 0's that are used for the purpose of data storage. The 1's and 0's, also known as binary digits, are arranged in many different ways to represent different characters. However, only when these binary digits are read back by the hard disk head, the data is retrieved and processed.

### What Are the Main Components of a Hard Disk?

A hard disk consists of mainly:

- Platters
- Heads
- Hard Disk Drive Controller
- Spindle Motor
- Integrated Drive Electronics (IDE) Input/Output Card

Hard disk platters are made of aluminium alloy. With the advent of new hard disk technology, the gap between the platter and the hard disk head is decreasing, and the speed at which these platters spin is constantly increasing.

The hard disk platters are organised in such a way that they are able to retrieve and store the data in the most organized manner. Each platter is further broken down into thousands of tightly packed concentric circles called tracks. Each track is then further broken down into sectors. Each sector typically holds approximately 512 bytes of data.

Each platter can be accessed for read and write purposes using two read and write heads. One of these heads is situated on the top of the platter and the other head is located at the bottom of the platter. These read and write heads never touch the platter when the platter is spinning. Instead, these heads float on an extremely thin cushion of air.

The hard disk platters are turned with the help of a spindle motor. As discussed earlier, the hard drive stores information in the form of binary digits. When these digits are read back, the data can be processed. This task is performed with the help of a hard disk drive controller. The hard drive controller, along with the sense and amplification circuits, interprets the data.

### What Are the Various Types of Hard Drives?

There are many types of hard drives available in the market. The main differentiators between these hard disks are the price and performance. Typically, high performing hard drives will command more price than lower performing hard drives. However, the reliability of the hard drive also plays an important role in determining the price of the hard drive. Various types of hard disks are:

- ATA
- FireWire
- SCSI
- RAID and Fibre Channel

ATA hard drives can be Serial ATA disk type or Parallel (Ultra) ATA disk type. If your objective is to attain a high level of performance, ATA disks may

not be the right choice for you. Experts agree that SCSI disks offer a higher level of performance than ATA disks.

FireWire disks are not recommended for all systems. In addition, most of the FireWire disk drives cannot match the performance displayed by Ultra ATA and SCSI disk drives. SCSI disk drives are the fastest hard disk drives. Technological improvements have made SCSI disks the most favoured disk drive amongst hard drive users, especially users using hard disk drives for audio video capture and playback.

Multiple ATA, SCSI, or FireWire disk drives are grouped together and treated as a single data storage device. This is called the RAID technology. This technology helps the users to record data on multiple drives in parallel. Fibre Channel is used for high-speed data throughput for high-capacity data storage systems. These systems are usually set up as RAID systems. Typically, fibre channel drives have higher performance than SCSI disk arrays.

### **What Can Go Wrong With a Hard Drive?**

Hard disks are made of miniature internal components. In addition, they have a very complex working structure. These components and working structure can be easily disrupted by hardware or logical (software) failures. Hardware failures responsible for damaging a hard drive include mechanical failure, operating system failure, electrical failure and a hard drive crash. Logical failures, though not physical failures, are capable of damaging the data on the hard drive considerably.

### **About the Author**

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