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Hard Disk Drive

Types of Formatting

Format means to prepare a storage medium for reading and writing. Formatting the hard disk - creates sectors, tracks and places the file system on the hard disks, so that the operating system store and retrieve data. The formatting the hard disk will delete all the data on the disk. There are two types of formatting. These are:

1. High-Level Formatting
2. Low-Level Formatting

1. High-Level Formatting

It is a formatting method that initializes portions of the hard disk and creates the file system structures on the disk, such as the master boot record and the file allocation table. High-level formatting prepares drive partitions for the operating system by creating a root directory, from which all other subdirectories can be created, including a File Allocation Table (FAT). FAT keeps track of all information on the disks and all the relationships between different pieces of information.

2. Low-Level Formatting

It is a formatting method that creates the tracks and sectors on a hard disk. Low-level formatting creates the physical format that dictates where data is stored on the disk. At this stage, the drive is physically divided into tracks and sectors. Low-level formatting stays unchanged for the entire life of the drive unless die drive is re-formatted. A low-level format is also called a physical format.

Types of Hard Disk Interfaces

The hard disk interface specifies the interfacing of hard disk drive with the main computer system. The interfacing can be hardware interfacing, which deals with the controller card, cable, connector, etc. used to connect the hard disk drive to the main computer system, while the other is software interfacing which deals with the way different software interact with the hard disk drive. The hard disk interface defines the physical and logical means by which the hard disk is connected to the PC.

There are many standard interfaces for the hard disk connection to the computer. Some of these are SMD, IDE, EIDE, ST506/412, SCSI, IPI, and ESDI. The SCSI, IDE and EIDE are popular now. A new interface called serial ATA will likely become the dominant interface in the next few years. Other possible drive interfaces include USB and Fire wire.
A hard disk is typically designed to use only one interface, so you must choose the hard disk interface before you choose the hard disk itself.

1. AT Attachment (ATA)

ATA was the most common hard disk interface used In PCs from early 1990 through 2009. ATA is also called parallel ATA or PATA, to differentiate it from the newer serial ATA (SATA)

interface. ATA is still used in new systems, although it is being superseded by SATA. ATA is also called IDEC (Integrated Drive Electronics).

2. Serial ATA (SATA)

Serial ATA is a newer technology that is replacing ATA. This technology has several advantages over ATA, including smaller cables and connectors, higher bandwidth, and greater reliability. Although SATA and ATA are incompatible at the physical and electrical levels, adapters are readily available that allow SATA drives to be connected to ATA interfaces and vice versa, SATA is generally compatible with ATA at the software level; which means that the operating system ATA drivers work, with either SATA or ATA interfaces and hard drives. Each interface connector is keyed with an L-shaped body, which prevent the SATA cable from being connected backward.

3. Integrated Drive Electronics (IDE)

IDE is a standard electronic interface used between motherboard data paths or bus and the disk storage devices. The IDE interface is based on the IBM PC Industry Standard Architecture (ISA) 16-bit bus standard. It is also used in computers that use other bus standards. Most computers sold today use an enhanced version of IDE, called Enhanced Integrated Drive Electronics (EIDE). In newer computers, the IDE controller is built into the motherboard. Most drives today are IDE; these drives have the controller built on the motherboard. They plug into e bus connector on the motherboard or an adapter card. Such drives are easy to install and require a minimum number of cables. This is due to the fact that the controller is on the drive itself. Fewer parts are needed and die signal pathway can be much shorter. These short signal pathways improve reliability of the drive, integrating the controller is easier for the manufacturer because they do not have to worry about complying wife another manufacturer's controller. Each drive is an independent entity.

Advantages are following:

- IDE interface ensures that the data communication between the hard disk and the controller is fast.
- The IDE interface also provides for a high data transfer rate between the hard disk and the system.

4. Enhanced Integrated Device Electronics (EIDE)

The EIDE interface supports a maximum of four hard disk drives on a system. The EEDE hard disk is a plug-and-play device. To use this device, just plug the devices to the system and use it. You do not need to install any special drives to use the hard disk.

5. Small Computer Systems Interface (SCSI)

SCSI is a universal parallel I/O interface for microcomputers to link multiple peripheral devices of different types on a single I/O bus. The SCSI interface enables the hard disk to communicate with the system at very fast speeds. This interface is used on the network servers that perform a lot of processing. There are three SCSI standards: SCSI (or SCSI 1), SCSI-2, and SCSI-3.

The SCSI standard defines the physical and electrical parameters of a parallel I/O bus used to connect computers and peripheral devices in daisy-chain fashion. The standard supports devices

such as disk drives, tape drives and CD-ROM drives. The original SCSI standard (ANSI X3.131-1986) was approved in 1986; SCSI-2 was approved in January 1994.

- **SCSI-1**
  One problem with the original SCSI-1 was that many of the commands and features were optional. This problem caused the industry as a whole to define a set of 18 basic SCSI commands called the Common Command Set (CCS), which would become the minimum set of commands supported by all peripherals. CCS became the basis for what is now the SCSI-2 specification.
- **SCSI-2**
  In addition to formal support for CCS, SCSI-2 pro-vides additional definitions for commands to access CD-ROM drives (and their sound capabilities), tape drives, removable drives, optical drives, and several other peripherals. In addition, optional higher speed versions, called Fast SCSI-2, and a 16-bit version, called Wide SCSI-2, were defined. Another feature of SCSI-2 is command queuing, which enables a device to accept multiple commands and execute them in the order that the device deems most efficient. This feature is most beneficial when you are using a multitasking operating system that could be sending several requests on the SCSI bus at the same time.
- **SCSI-3**
  The SCSI-3 supports more than eight devices' and the transfer speed is 20 MBPS. Its main objective is to support optical fiber and long distance,

Exercise:

1: What is Formatting of Hard Disk Drive?
2:List the common interface of HDD?
3: Explain Integrated Drive Electronics interface?