Discos Rígidos

Disco rígido

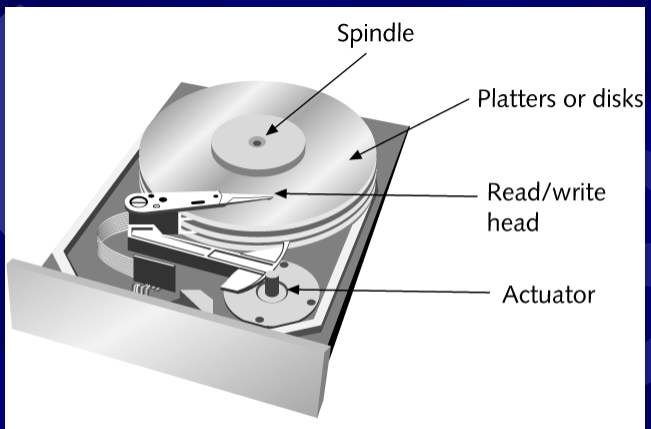

Figure 6-1 Inside a hard drive case

Disco rígido

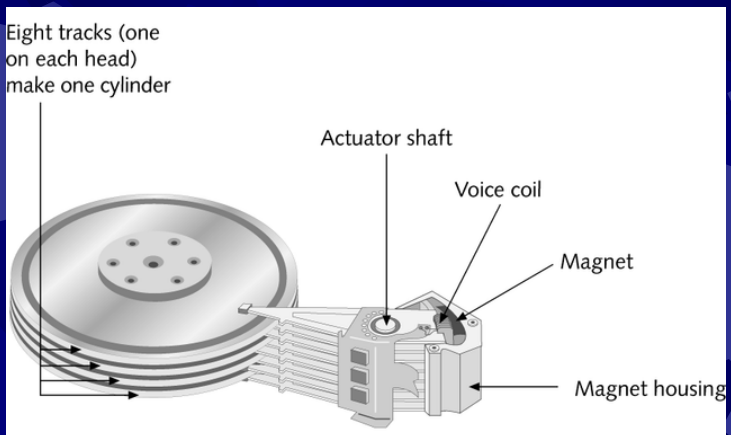

Figure 6-2 A hard drive with four platters

Tecnologia Integrated Device Electronics (IDE)

- Um disco rígido onde a controladora está incluída na drive
  - Não necessita de cabo para controlador
  - Aumenta a velocidade
  - Reduz o preço
- As boards disponibilizam normalmente duas conexões IDE

Hardware de um disco IDE

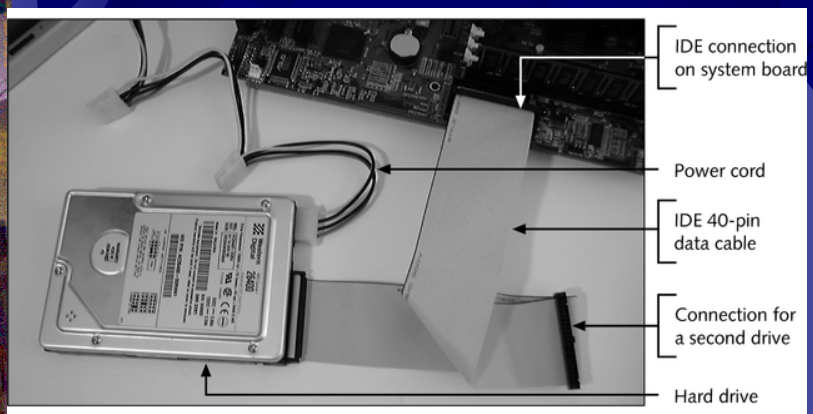

Figure 6-3 A PC's hard drive subsystem

Pistas e Sectores em tecnologias MFM e RLL

- Utiliza 17 ou 26 sectores por pista
  - Desperdiça espaço
  - O número de bytes que uma pista pode armazenar é determinado pela pista mais central

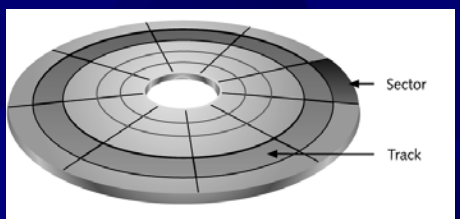

Figure 6-4 Floppy drives and older hard drives use a constant number of sectors per track

Pistas e Sectores numa drive IDE

- Gravação de bits por zona
  - Pistas centrais têm um número inferior de sectores por pista
  - O numero de sectores aumenta à medida que as pistas são maiores
  - Um sector tem 512 bytes

Zone Bit Recording

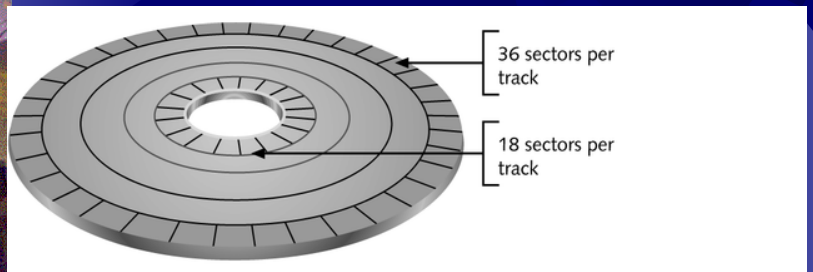

Figure 6-5 Zone bit recording can have more sectors per track as the tracks get larger

Drives Enhanced IDE (EIDE)

- Suporta drives mais recentes e rápidas que permitem tamanhos suoeriores a 504 MB e suportar 4 dispositivos no mesmo controlador

Standards ANSI para drives

Table 6-1 Summary of ANSI interface standards for hard drives

Standard (May Have More Than One Name)	Speed	Description
IDE/ATA ATA	Speeds range from 2.1 MB/sec to 8.3 MB/sec	The first ANSI hard drive standard for IDE hard drives. Limited to no more than 528 MB. Supports PIO and DMA transfer modes.
ATA-2 Fast ATA	Speeds up to 16.6 MB/sec	Breaks the 528-MB barrier. Allows up to 4 IDE devices. Supports PIO and DMA transfer modes discussed later in the chapter.
ATA-3	Little speed increase	Improved version of ATA-2
Ultra ATA Fast ATA-2 Ultra DMA DMA/33	Speeds up to 33.3 MB/sec	Defined a new DMA mode, but only supports slower PIO modes
Ultra ATA/66 Ultra DMA/66	Speeds up to 66.6 MB/sec	Uses a special 40-pin cable that provides additional ground lines on the cable to improve signal integrity

Technologia SCSI (Small Computer Systems Interface)

- Fornece um standard para a comunicação entre os dispositivos periféricos e o bus do sistema
- As drives SCSI são normalmente do tipo IDE

SCSI Technology

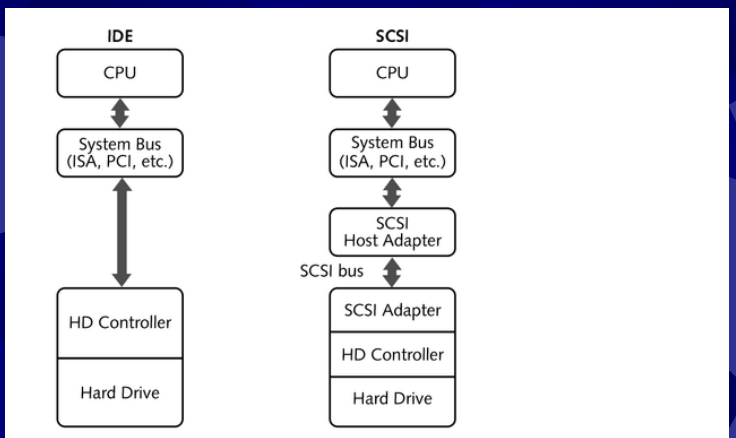

Figure 6-6 SCSI hard drives communicate with the CPU through the SCSI host adapter, but IDE drives communicate directly on the system bus

Standards SCSI

- Tipos
  - Narrow (8 bits)
  - Wide (16 bits)
- Standards
  - SCSI-1 (Regular SCSI)
  - SCSI-2 (Fast SCSI)
  - SCSI-3 (Ultra SCSI)

Standards SCSI

Table 6-2 Summary of SCSI standards

Names for the SCSI Interface Standard	Bus width Narrow = 8 bits Wide = 16 bits	Transfer ZRate (MB/sec)	Maximum Length of Single-ended Cable (meters)	Maximum Length of Differential Cable (meters)	Maximum Number of Devices
SCSI-1 (Regular SCSI)[1]	Narrow	5	6	25	8
SCSI-2 (Fast SCSI or Fast Narrow)	Narrow	10	3	25	8
Fast Wide SCSI (Wide SCSI)	Wide	20	3	25	16
SCSI-3 (Ultra SCSI or Ultra Narrow or Fast-20 SCSI)	Narrow	20	1.5	25	8
Wide Ultra SCSI (Fast Wide 20)	Wide	40	1.5	25	16
Ultra2 SCSI	Narrow	40		12 LVD[2]	8
Wide Ultra2 SCSI	Wide	80			16
Ultra3 SCSI	Narrow	80		12 LVD[2]	8
Wide Ultra3 SCSI	Wide	160		12 LVD[2]	16

Exemplo

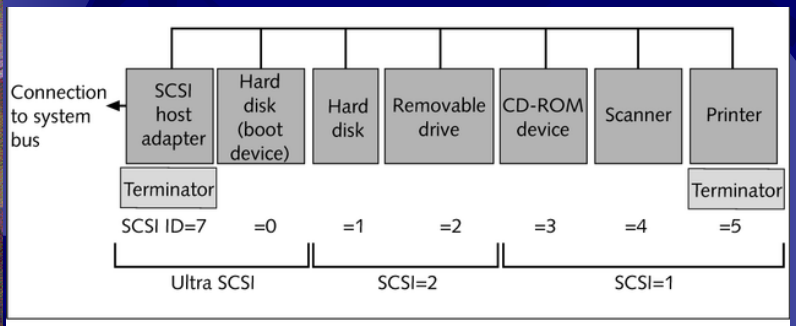

Figure 6-7 Sample SCSI subsystem configuration

Conceitos

- Termination, Terminador de corrente
- Device drivers
  - Advanced SCSI Programming Interface (ASPI)
  - Common Access Method (CAM)

Subsistema SCSI

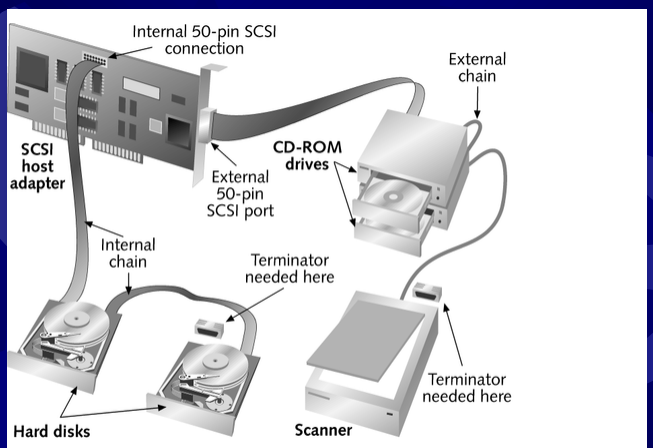

Figure 6-8 SCSI subsystem showing terminators at each end of the SCSI chain

Cabos SCSI e Terminadores

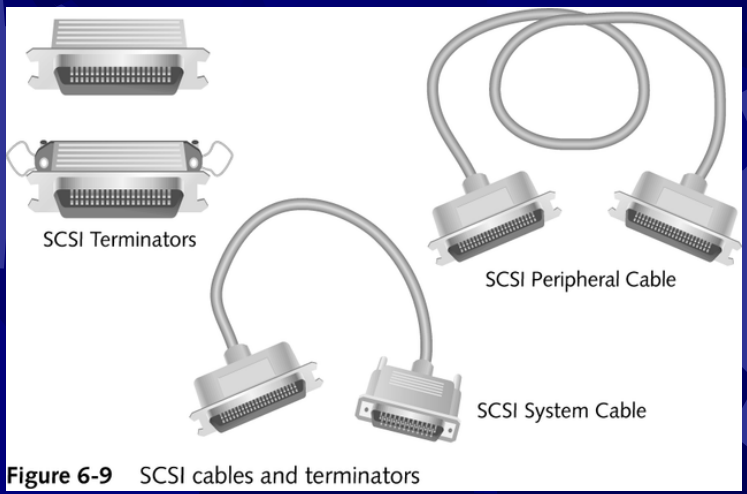

Figure 6-9 SCSI cables and terminators

Diferenças entre Discos SCSI e Discos EIDE

- SCSI mais caro do que o EIDE
- SCSI tem uma transferência de dados mais elevada
- bus SCSI suporta multitasking; EIDE processa os dados de cada dispositivo
- SCSI host adapter allows connection to non-SCSI devices
- Sem SCSI, apenas uma drive IDE pode estar ativa no mesmo adaptador

Preparação de uma drive

- Formatação de baixo nível
- Criação de partições
- Formatação de alto nível

Partições

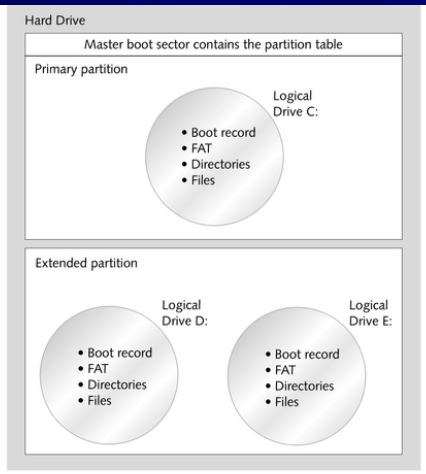

Figure 6-10 A hard drive is divided into one or more partitions that contain logical drives

Tabela de partições

Table 6-3 Hard drive partition table

Item	Bytes Used	Description
1	446 bytes	Program that calls the boot program on the OS boot record
2	16-byte total	Description of first partition
	1 byte	Is this the bootable partition? (Yes = 90h, No = 00h)
	3 bytes	Beginning location of the partition
	1 byte	System indicator; possible values are: 0 = Not a DOS partition 1 = DOS with a 12-bit FAT 4 = DOS with a 16-bit FAT 5 = Not the first partition 6 = Partition larger than 32 MB
	3 bytes	Ending location of partition
	4 bytes	First sector of the partition table relative to the beginning of the disk
	4 bytes	Number of sectors in the partition
3	16 bytes	Describes second partition, using same format as first partition
4	16 bytes	Describes third partition, using same format as first partition
5	16 bytes	Describes fourth partition, using same format as first partition
6	2 bytes	Signature of the partition table, always AA55

Drives lógicas

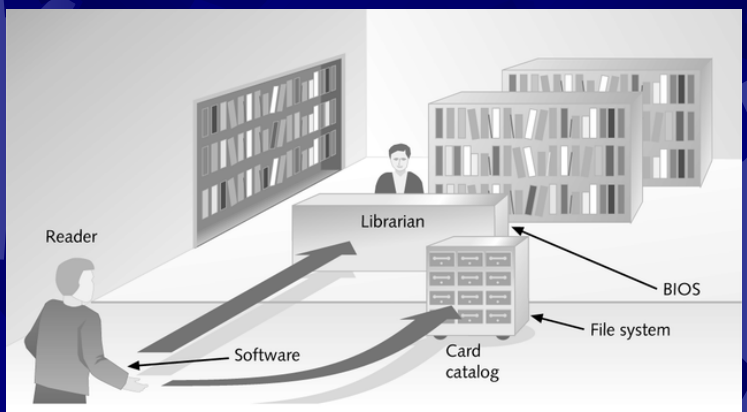

Figure 6-11 In some libraries, the reader (software) is not allowed in the stacks and depends on the librarian (BIOS) to know where to locate a book

Drives lógicas

- Tratadas pelo sistema operativo como sendo uma drive física:
  - Boot record
  - FAT
  - Root directory

Boot Record

Table 6-4 Layout of the boot record

Description	Number of Bytes
Machine code	11
Bytes per sector	2
Sectors per cluster	1
Reserved	2
Number of FATs	1
Number of root directory entries	2
Number of logical sectors	2
Medium descriptor byte	1
Sectors per FAT	2
Sectors per track	2
Heads	2
Number of hidden sectors	2
Total sectors in logical volume	4
Physical drive number	1
Reserved	1
Extended boot signature record	1
32-bit binary volume ID	4
Volume label	11
Type of file system (FAT12, FAT16, or FAT32)	8
Program to load operating system (boot strap loader)	Remainder of the sector

Boot Record

Table 6-5 Disk type and descriptor byte

Disk Type	Descriptor Byte
3½-inch double-density floppy disk, 720K	F9
3½-inch high-density floppy disk, 1.44 MB	F0
Hard disk	F8

FAT e directoria Root

- O OS utiliza a FAT e directorias para controlar em que clusters estão um determinado ficheiro (Figura 6-12)

FAT e directoria Root

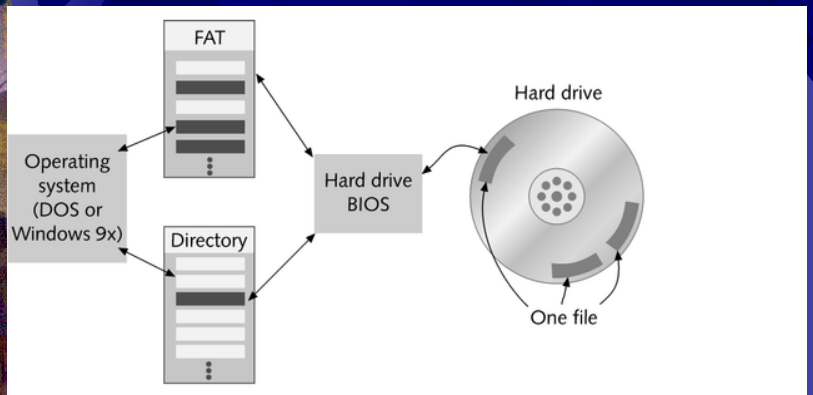

Figure 6-12 How the operating system views the hard drive when managing a file

FAT e directoria Root

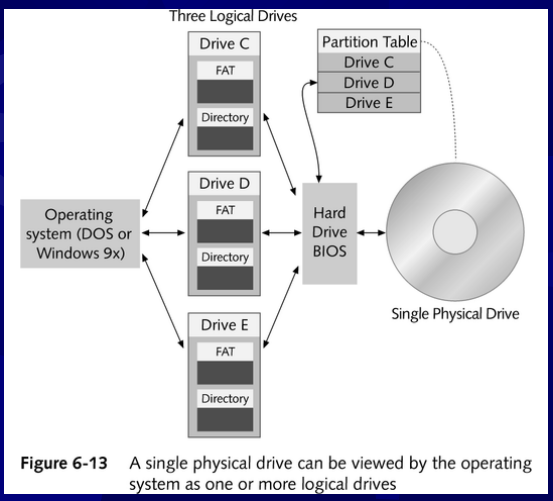

Figure 6-13 A single physical drive can be viewed by the operating system as one or more logical drives

FAT e directoria Root

- Virtual file allocation (VFAT)
  - Método que permite o acesso á drive com nomes longos (32-bit)
- FAT32
  - Melhor gestão do disco