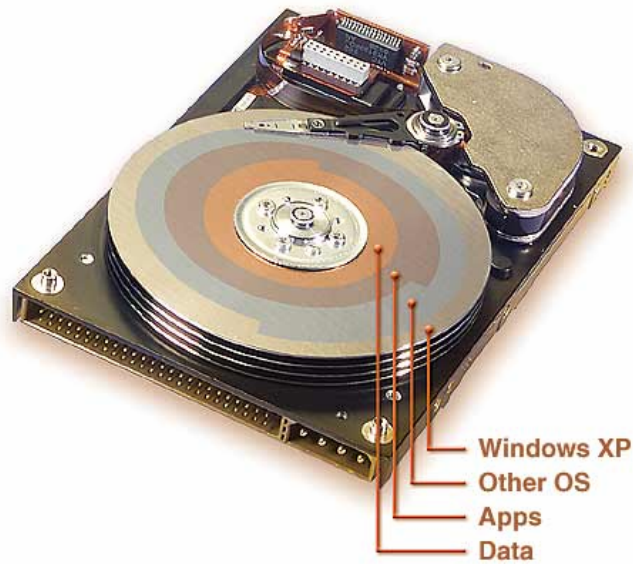
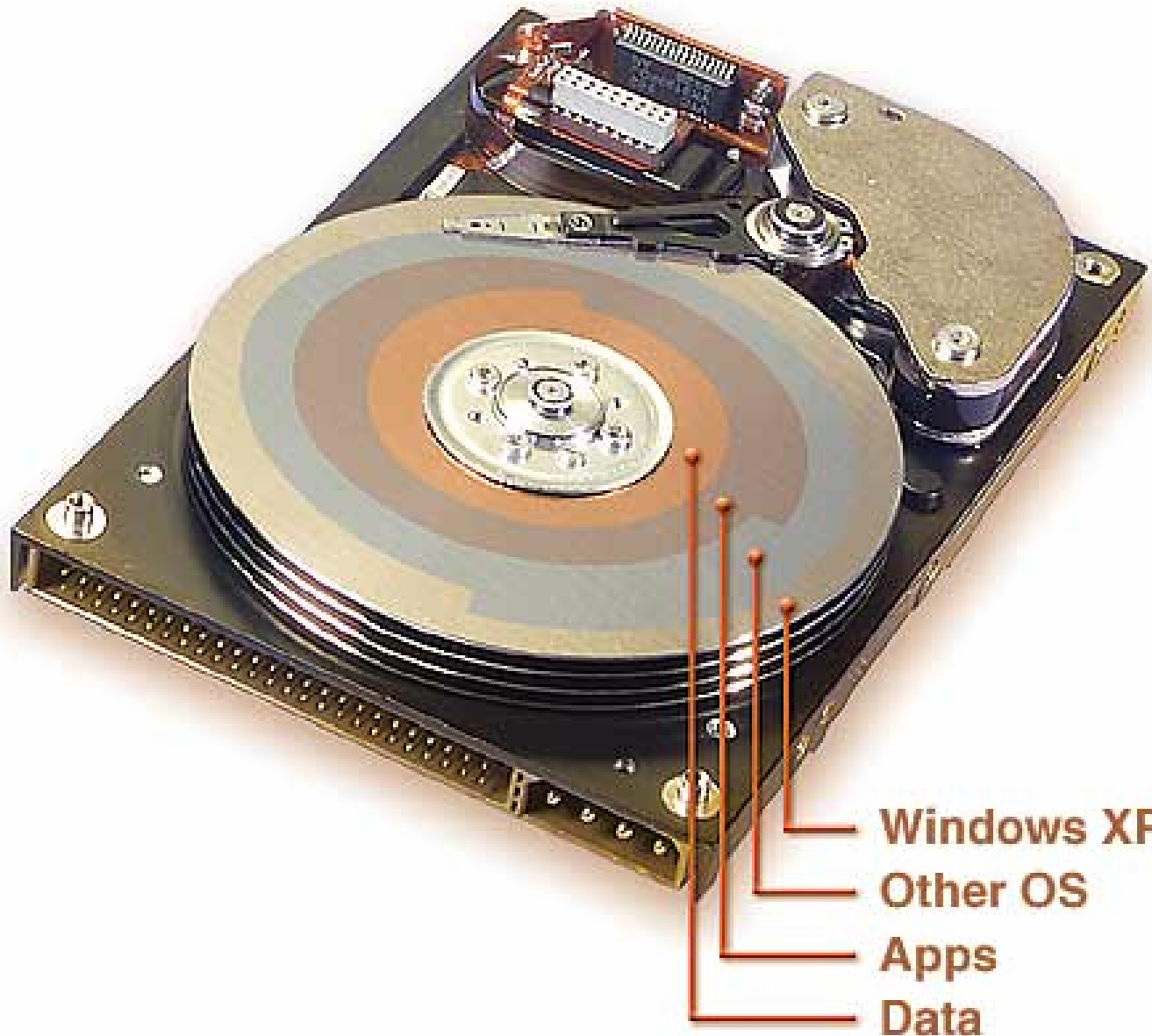


Hard Drive Presentation



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Hard Drive Internally





Operating Systems, OS

- Performs basic tasks
- Acts as an interface between hardware & software
- Different OS use different file systems



File Systems

- The way the OS organizes and accesses the files on a disk
- Examples of file systems are FAT, FAT32, HPFS, NTFS, and Linux Ext2



File System Types

FAT or FAT16 (File Allocation Table, 16 bit-clusters)

- Developed by Microsoft
- Used by DOS (including MS-DOS, PC-DOS and DR-DOS), Windows 95a, Windows 98, Windows NT, Windows 2000, Windows XP, OS/2, Linux, and other operating systems.
- Partitions can only be up to 2 GB in size
- Can result in large amounts of wasted space in partitions > 1 GB in size.



File System Types

FAT32 (File Allocation Table, 32 bit-clusters)

- File system extension developed by Microsoft
- Used by Windows 95B or later, Windows 98, Windows 2000, Windows Me, Windows XP and newer versions of Linux.
- Supports partition sizes up to 2 terabytes.



File System Types

HPFS (High Performance File System)

- Used by IBM's OS/2 versions 1.2 and later
- Designed to access the hard disk faster than the FAT system and in a less wasteful manner



File System Types

NTFS (New Technology File System)

- Developed by Microsoft
- Used by Windows NT, Windows 2000 and Windows XP
- Uses space more efficiently than FAT systems
- Offers better data security & file system recovery
- Supports extremely large storage media
- Uses a MFT, Master File Table to reference other files



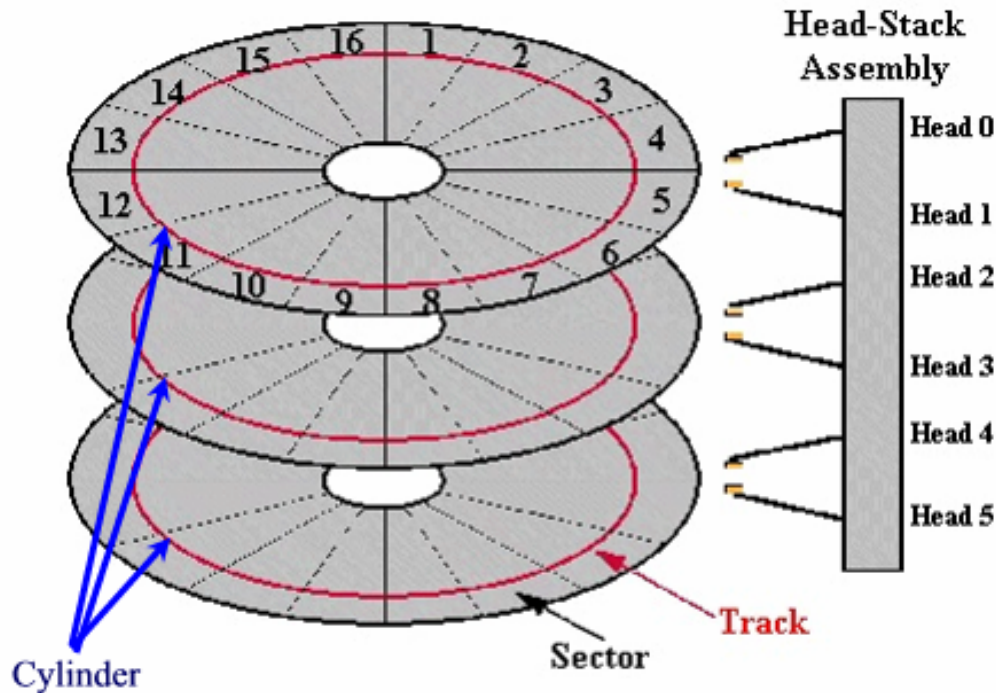
File System Types

Ext2

- This file system is the default system for Linux
- Used only by Linux installations
- Supports partition sizes up to 4 terabytes

Physical & Logical Organization

Drive Physical and Logical Organization



Cluster – group of disk sectors. Each FAT entry represents one cluster, 2K-32K
512 bytes / sector

Hard Drive Capacity = $C \times H \times S \times 512$ bytes / sector

C = # cylinder the disk contains

H = # tracks per cylinder (Same as the # heads)

S = # Sectors / Track



Partition Types

- Primary – HD can only have four partitions
- Extended – Can not hold data
- Logical – Created inside Extended partition
 - Can have many



Formatting Steps

- **Low Level Formatting** – First step in making the drive ready for data storage. The drive is physically divided into ***tracks and sectors***.
- **Partitioning** – This divides the drive into ***logical drives (C:, D:, E:, etc)***. May be performed using FDISK, Partition Magic, Partition Commander.
- **High-Level Formatting** – This ***prepares the drive partitions for the operating system*** by creating a root directory and a File Allocation Table (FAT). This operation is usually done using FORMAT.exe, Partition Magic or Partition Commander.

Operating System Partition Information

Operating System	Boots from	Supported Partition Types	Boot Code Boundary	Space Required OS
DOS 6.22 and earlier	Primary	FAT	2 GB	8MB
Windows 95a	Primary	FAT	2 GB	90 MB
Windows 95b	Primary	FAT or FAT32	8 GB	90 MB
Windows 98	Primary	FAT or FAT32	8 GB	175 MB
Windows 98SE	Primary	FAT or FAT32	8 GB**	190 MB
Windows ME	Primary	FAT or FAT32	8 GB**	300 MB
Windows NT	Primary*	FAT or NTFS	2 GB	120 MB
Window 2000	Primary*	FAT, FAT32, or NTFS	8 GB**	650 MB
Windows XP	Primary*	FAT, FAT32, or NTFS	8 GB**	>2 GB
Linux (LILO)	Either	Linux Ext2	8 GB	>250 MB



Operating System Partition Information

- * Windows NT/200/XP must boot from a primary partition on the first drive. However, only a few files must reside on that partition; the remaining files can reside on a logical partition located on the first or subsequent drives.
- ** Having an LBA-compatible (Logical Block Addressing) MBR (Master Boot Record) hard drive will not imposed the boundary code limit.



Partition Magic 7.0

PartitionMagic® allows you to create, resize, merge and convert partitions on your hard drive without destroying data.

Features

- Create Partitions
- Format Partitions
- Delete / Undelete Partitions
- Hide / Unhide Partitions
- Resize Partitions
- Merge Partitions
- Copy Partitions (exact duplicate)
- Convert Partition File Types (FAT, FAT32, NTFS)
- Remap Drive Letters



Drive Image 2002

Makes an exact copy of everything on your hard drive, including operating system, applications and all of your data.

Features

- Create and restore drive images while running Windows
- Save image file directly to another section of your hard drive by automatically creating a dedicated backup partition
- LAN support save or restore images from a network drive
- Automatic backup scheduler
- Support most CD-RW, IDE, SCSI, and PCMCIA drives
- Supports FAT, FAT32, NTFS, and Linux Ext2 / Swap file systems
- Image Explorer allows restoring individual files or folders from existing image file