SECONDARY STORAGE DEVICES

Agenda of Today's Lecture

- Introduction to Hardware
- Types of hardware devices
- Storage Devices
- Secondary Storage devices
- Magnetic Storage devices
- Optical Storage devices
- Megno-Optical Storage devices

Introduction to Hardware

- The tangible parts of the computer.
- The equipment like keyboard, mouse, processor, monitor, printers, scanners etc. are the examples of hardware.
- The computer hardware fall into four basic categories, which are;
  - Input parts
  - Output parts
  - Processing Parts
  - Storage Parts

Introduction to Hardware

- Input parts
  - **Through which data is entered into the computer.**
- Output parts
  - **Through which we can see our required output**
- Processing Parts
  - **Which converts input into output**
- Storage Parts
  - **Which stores data temporarily or permanently**

Storage Parts

Storage Parts

- Two basic categories
  - Secondary Storage devices (Permanent)
  - Primary Storage devices (Temporary)

Secondary Storage Parts

- Three basic categories
  - Magnetic Storage devices
    - ***Use Magnetic Technology***
  - Optical Storage devices
    - ***Use LASER Technology***
  - Solid-state Storage devices
    - ***Use physical switches to store data***

Magnetic Storage Devices

- Use Magnetic Technology
- Most common form of storage
- Hard drives, floppy drives, tape
- All magnetic drives work the same

Magnetic Storage Devices

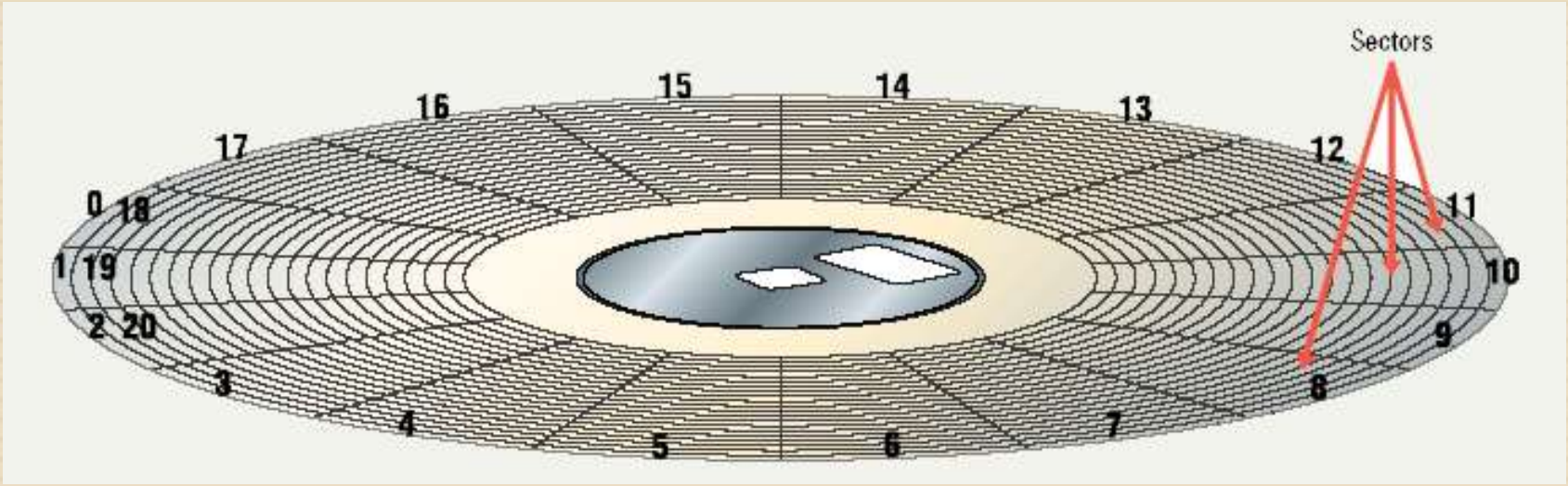
Magnetic Storage Devices

- Data storage and retrieval
  - Media is covered with iron oxide
  - Read/write head is a magnet
  - Magnet writes charges on the media
    - Positive charge is a 1
    - Negative charge is a 0
  - Magnet reads charges
  - Drive converts charges into binary

Magnetic Storage Devices

- Data organization
  - Disks must be formatted before use
  - Format draws tracks on the disk
  - Tracks is divided into sectors
    - Amount of data a drive can read

Tracks and Sectors



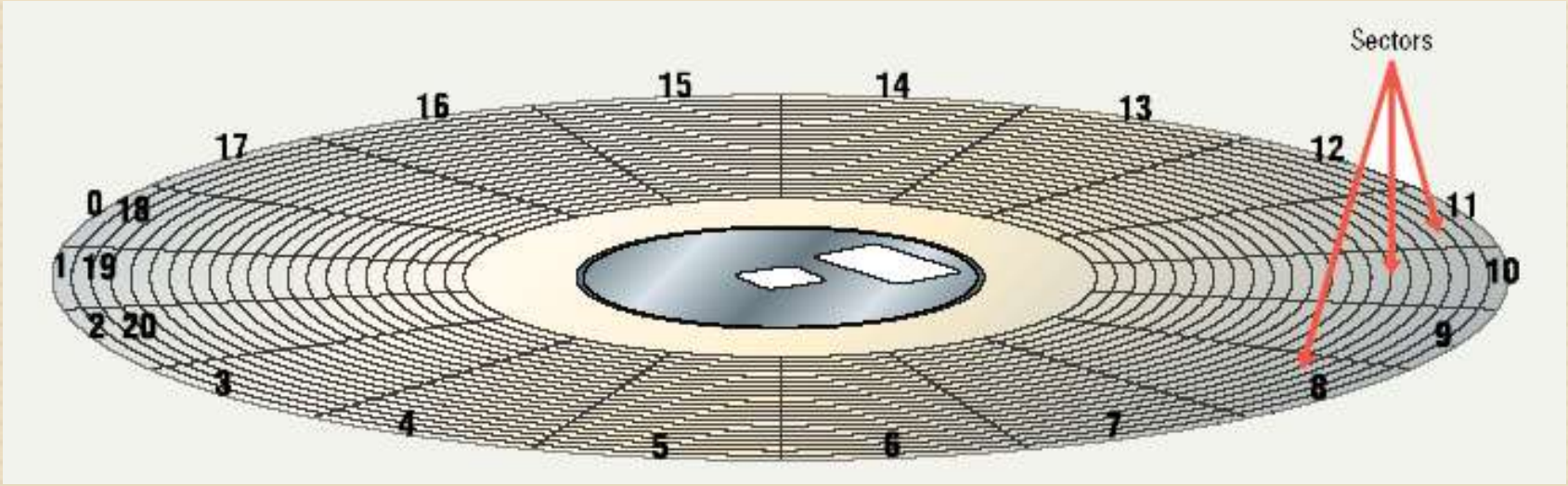
Magnetic Storage Devices

- Finding data on disk
  - Each track and sector is labeled
    - Some are reserved
  - Listing of where files are stored
    - File Allocation Table (FAT)
    - FAT32
    - NTFS
  - Data is organized in clusters
    - Size of data the OS handles

Magnetic Storage Devices

- Diskettes
  - Also known as floppy disks
  - Read with a disk drive
  - Mylar disk
  - Spin at 300 RPM
  - Takes .2 second to find data
  - 3 ½ floppy disk holds 1.44 MB

Why the capacity of Floppy Disk is 1.4 MB?



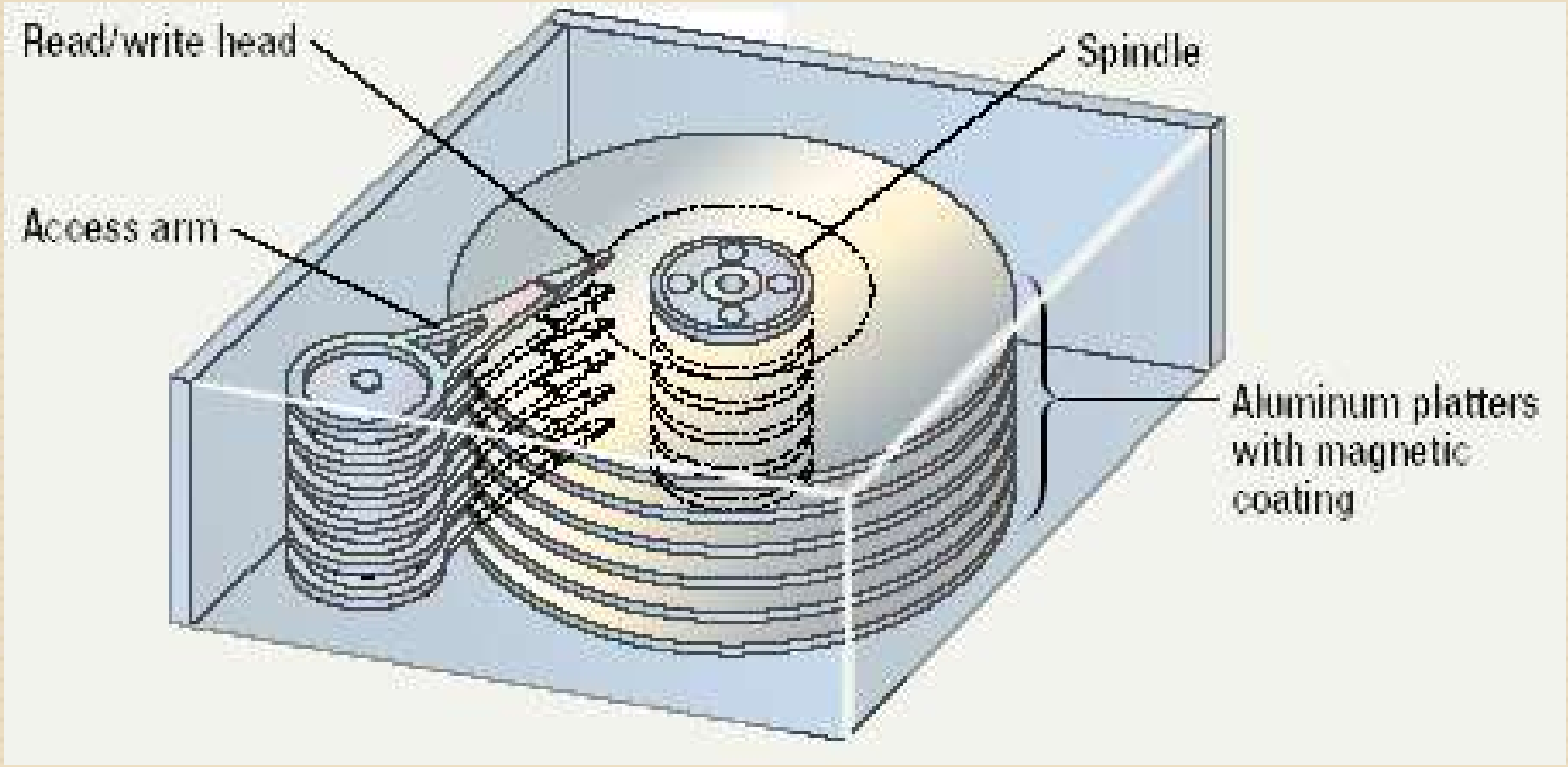
Why the capacity of Floppy Disk is 1.4 MB?

- Tracks = 80
- Sectors = 18 Per Track
- Total Sectors = 80 * 18 = 1440 sectors one side
- Total Sectors = 1440 + 1440 = 2880 sectors one sides
- 1 Sector = 512 bytes
- 2880 sectors = 2880 * 512 = 1474560 bytes
- 1474560 bytes = 1474560 / 1024 = 1440 KB
- 1440 KB = 1440 / 1024 = 1.4 MB

Magnetic Storage Devices

- Hard disks
  - Primary storage device in a computer
  - 2 or more aluminum platters
  - Each platter has 2 sides
  - Spin between 5,400 to 15,000 RPM
  - Data found in 9.5 ms or less
  - Drive capacity greater than 40 GB

Hard Disk


Read/write head
Spindle
Access arm
Aluminum platters
with magnetic
coating

Magnetic Storage Devices

- Removable high capacity disks
  - Speed of hard disk
  - Portability of floppy disk
  - Several variants have emerged
  - High capacity floppy disk
    - Stores up to 750 MB of data
  - Hot swappable hard disks
    - Provide GB of data
    - Connect via USB

Magnetic Storage Devices

- **Tape drives**
  - Best used for
    - Infrequently accessed data
    - Back-up solutions
  - Slow sequential access
  - Capacity exceeds 200 GB

Optical Storage Devices

- Use the laser beams
- Five Categories
  - CD-ROM
  - CD-Writer
  - DVD-ROM
  - DVD-Writer
  - Combo Drive

CD-ROM

- **Compact Disc Read Only Memory (CD-ROM)**
- **Media is CD (Compact Disc)**
- Most software ships on a CD
- Read using a laser
- A 10 X will read 1,500 Kbps
- Standard CD holds 650 MB

CD-Writer

- Two Media
  - CD-R
  - CD-RW
- CD Recordable (CD-R)
  - Create a data or audio CD
  - Data cannot be changed
  - Can continue adding until full
- CD Regrettable (CD-RW)
  - Create a reusable CD
  - Cannot be read in all CD players
  - Can reuse about 100 times

DVD-ROM

- **DVD-ROM**
  - Digital Video Disk
  - Use both sides of the disk
  - Capacities can reach 18 GB
  - DVD players can read CDs

DVD-Writer

- **Two Media**
  - **DVD-R**
  - **DVD-RW**
- **DVD Recordable**
  - Several different formats exist
  - None are standardized
  - Allows home users to create DVDs
  - Cannot be read in all players
- **DVD-RW**
  - Allow reusing of DVD media
  - Not standardized
  - Cannot be read in all players

Combo Drive

- Combination of CD-ROM, CD-Writer and DVD ROM
- Media are CD, DVD, CD-R and CD-RW

Solid-state Storage Devices

- Use physical switches to store data
  - Flash memory
  - Smart cards

Recap

- Introduction to Hardware
- Types of hardware devices
- Storage Devices
- Secondary Storage devices
- Magnetic Storage devices
- Optical Storage devices
- Megno-Optical Storage devices