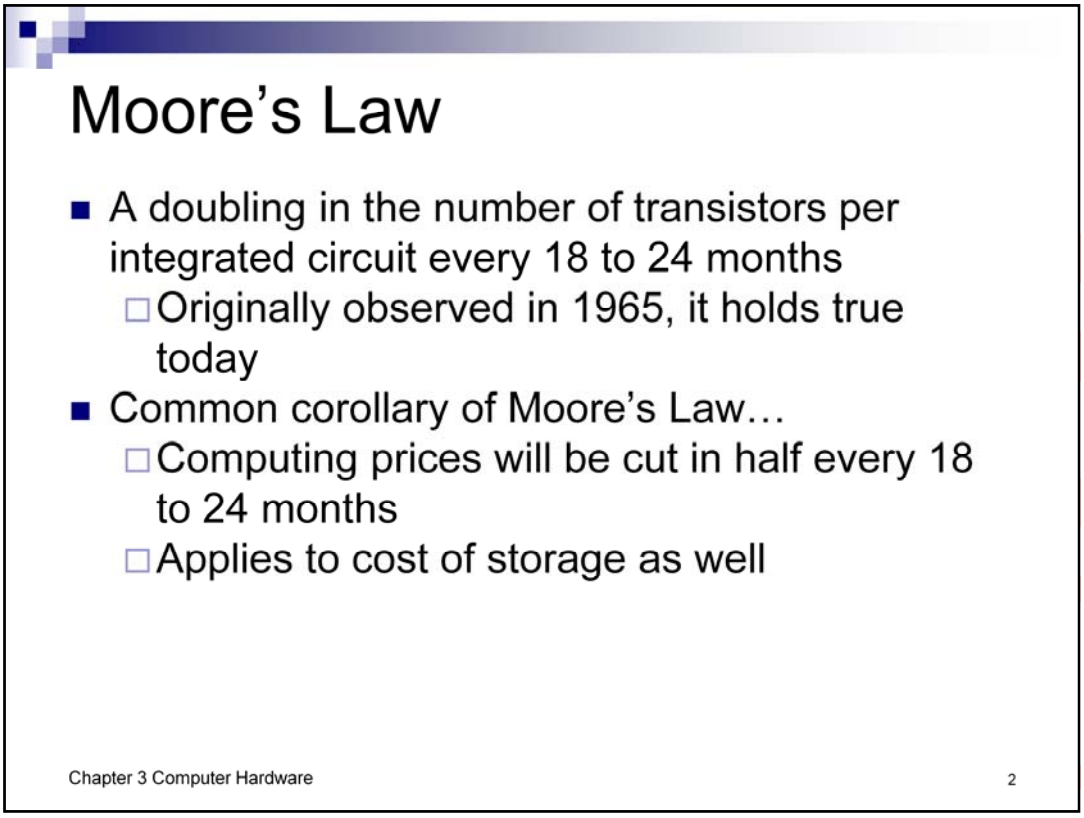
University of AL-Mustansiriyah
College Of Pharmacy

Chapter3
Computer Hardware
Section II

Computer Peripherals: Input, Output, and Storage Technologies

Present by
L.A. Mr. Hussein Salim Qasim

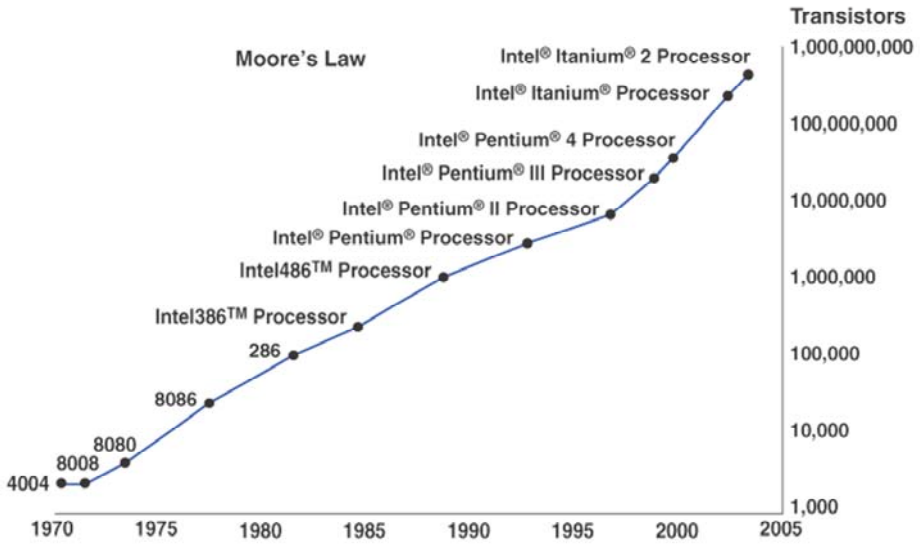


Moore's law suggests that computer power will double every 18 to 24 months. So far it has.

Additionally, the price of a given level of power will be cut in half every 18 to 24 months.

Also holds for storage costs.

Moore's Law


Transistors
Moore's Law
Intel® Itanium® 2 Processor
Intel® Itanium® Processor
Intel® Pentium® 4 Processor
Intel® Pentium® III Processor
Intel® Pentium® II Processor
Intel® Pentium® Processor
Intel486™ Processor
Intel386™ Processor
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8086
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1975
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2005

Section II

- Computer Peripherals: Input, Output, and Storage Technologies

Real World Case 2

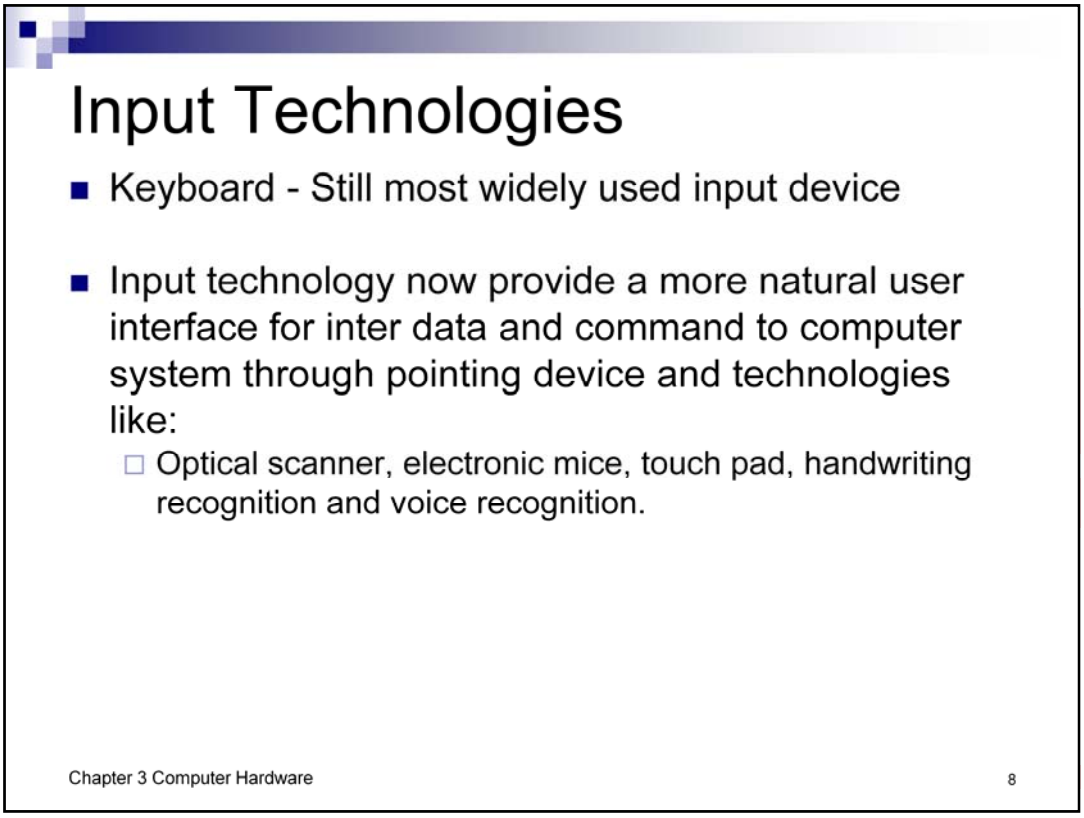
Delta and Northwest Airlines: The Business Value of Customer Self-Service Kiosks

Peripherals

- **Peripheral** is a generic name for all input, output, and secondary storage devices
- Parts of the computer system, but are not part of the CPU.
- Depend on direct connections or telecommunications links to the CPU
  - **Online devices:**
    (Separate from the CPU, but electronically connected to and controlled by CPU)
  - Peripheral are opposite of **Offline devices: (**Separate from and not under the control of the CPU)
- All peripheral are online devices

Peripherals Advice

Peripherals Checklist
• **Monitors.** Bigger is better for computer screens. Consider a high-definition 19-inch or 21-inch flat screen CRT monitor, or LCD flat panel display. That gives you much more room to display spreadsheets, Web pages, lines of text, open windows, etc. An increasingly popular setup uses two monitors that allow multiple applications to be used simultaneously.
• **Printers.** Your choice is between laser printers or color inkjet printers. Lasers are better suited for high-volume business use. Moderately priced color inkjets provide high-quality images and are well suited for reproducing photographs. Per-page costs are higher than for laser printers.
• **Scanners.** You'll have to decide between a compact, sheet-fed scanner and a flatbed model. Sheet-fed scanners will save desktop space, while bulkier flatbed models provide higher speed and resolution.
• **Hard Disk Drives.** Bigger is better; as with closet space, you can always use the extra capacity. So go for 40 gigabytes at the minimum to 80 gigabytes and more.
• **CD and DVD Drives.** CD and DVD drives are a necessity for software installation and multimedia applications. Common today is a built-in CD-RW/DVD drive that both reads and writes CDs and plays DVDs.
• **Backup Systems.** Essential. Don't compute without them. Removable mag disk drives and even CD-RW and DVD-RW drives are convenient and versatile for backing up your hard drive's contents.



Give examples of the best use for each of the above pointing devices.

Explain why there may be environments in which each may be better suite

Pointing Devices

- Pointing device better than keyboards for issuing commands, making choices….
- Graphical User Interface (GUI) - Icons, menus, windows, buttons, bars; Selected with pointing devices
- Electronic Mouse - Most popular pointing device; Pressing mouse buttons initiates activity represented by the icon selected **using pointing-and-click or pointing-and-drag.**
- Trackball, pointing stick, and touchpad most often used in place of the mouse and easier to use than mouse for laptop.
- Trackball - Stationary device, similar to mouse; Roller ball moves cursor on screen

Pointing Devices

- Pointing Stick (Track point): Small eraser-head device embedded in keyboard; Cursor moves in the direction of the pressure placed on the stick
- Touchpad
  - Small, rectangular, touch-sensitive surface
  - Usually below keyboard
  - Cursor moves in direction your finger moves
- Touch Screen: Use computer by touching screen emits a grid of infrared beams, sound waves, or electric current, Grid is broken when screen is touched

Pen-Based Computing

- Used in Tablet PCs and PDAs
  - Pressure-sensitive layer, similar to touch screen, under Liquid Crystal Display screen (LCDs)
  - Software digitizes handwriting, hand printing, and hand drawing

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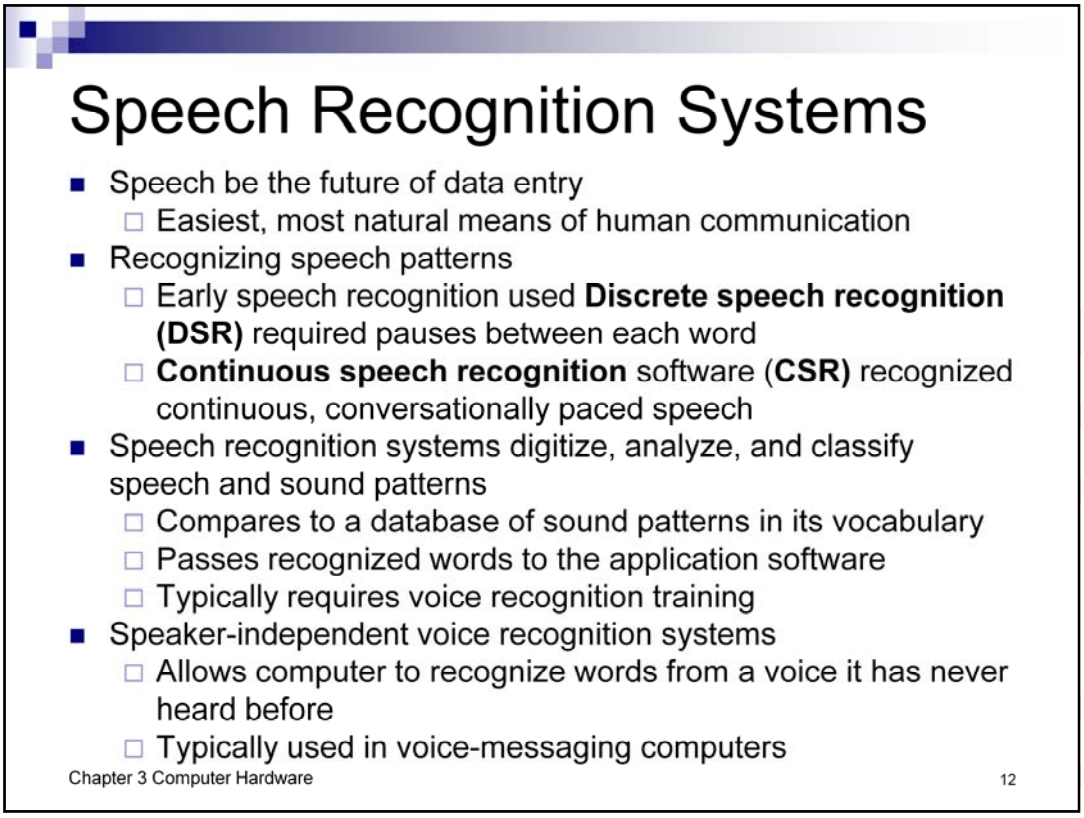
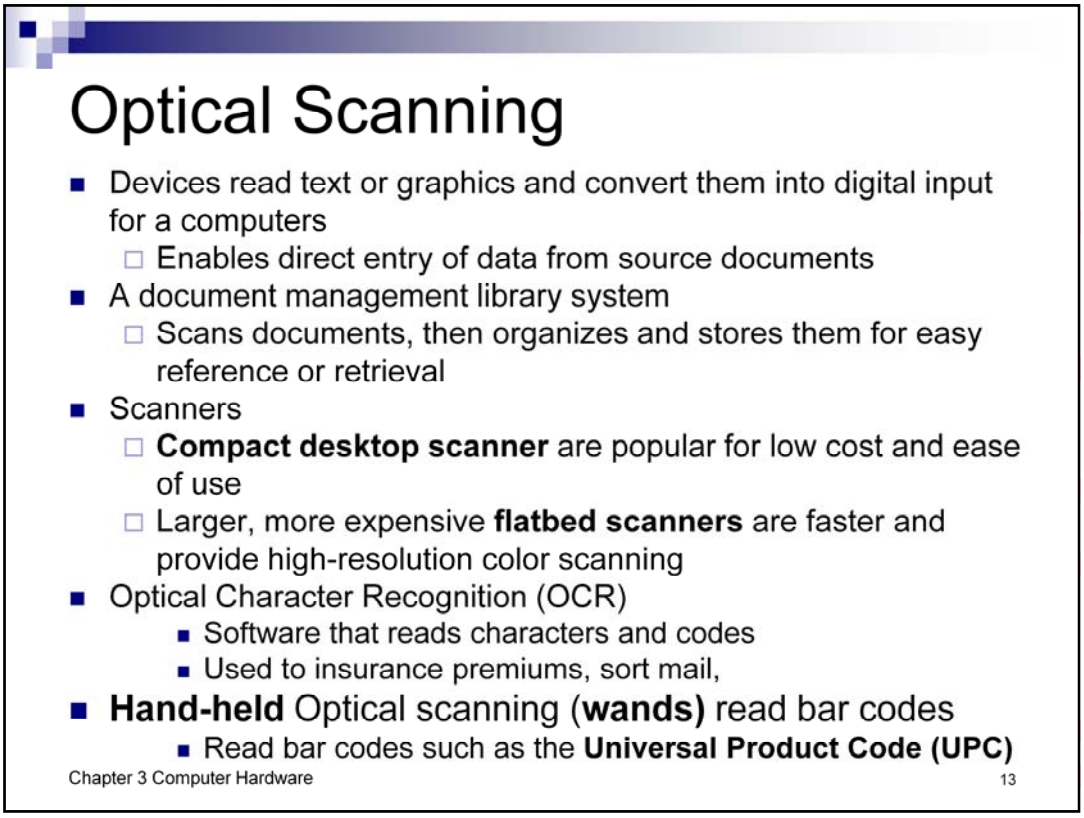
Provide updated examples of pen-based computing.

Describe how PDAs are merging their roles with cell phones and entertainment devices.

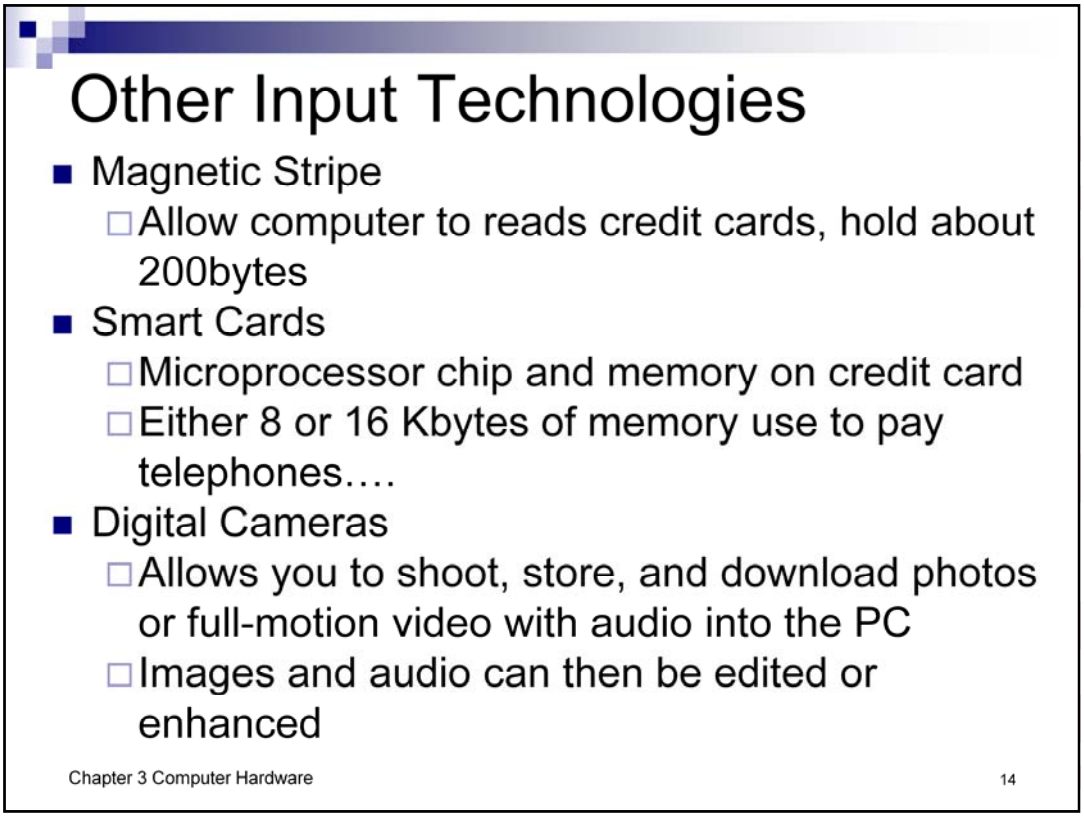


Describe some of the problems associated with the development of speech recognition systems-where does the accent go on tomato?

Provide real world examples of speech recognition systems.



Give examples and have students provide their own of various forms of optical scanning systems used commercially today-OCR-UPC for example.

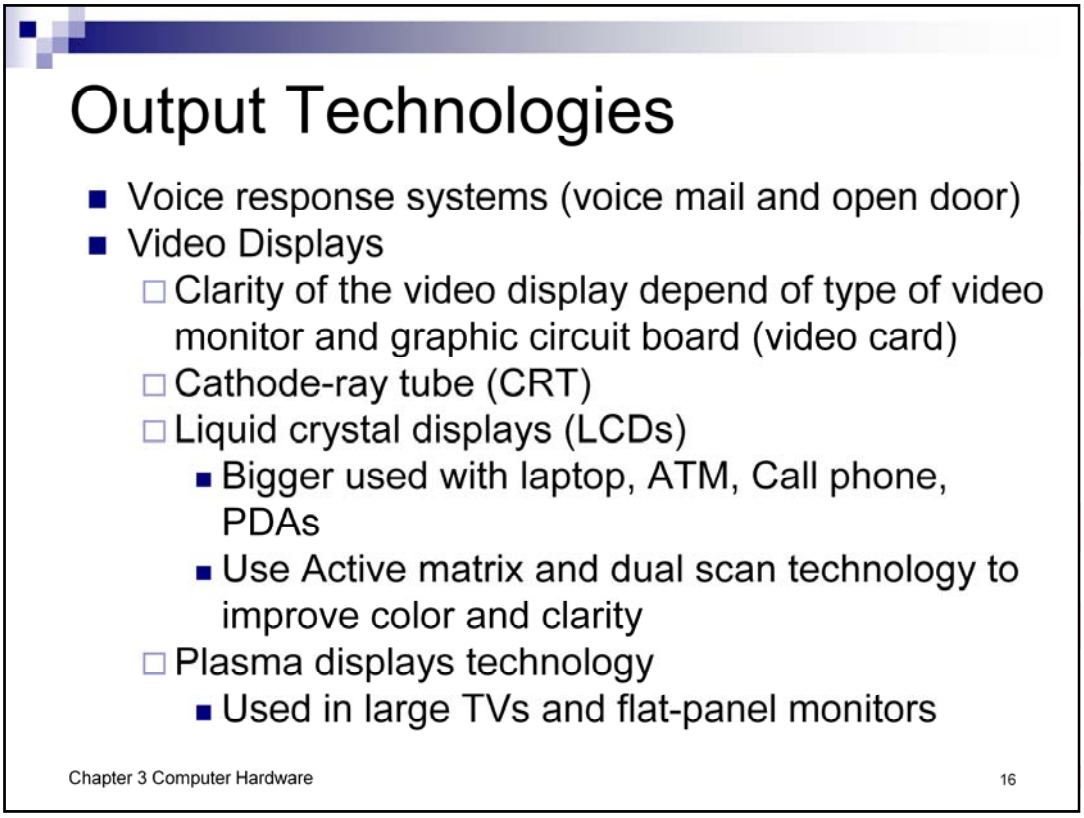


Give real world applications of magnetic input technologies

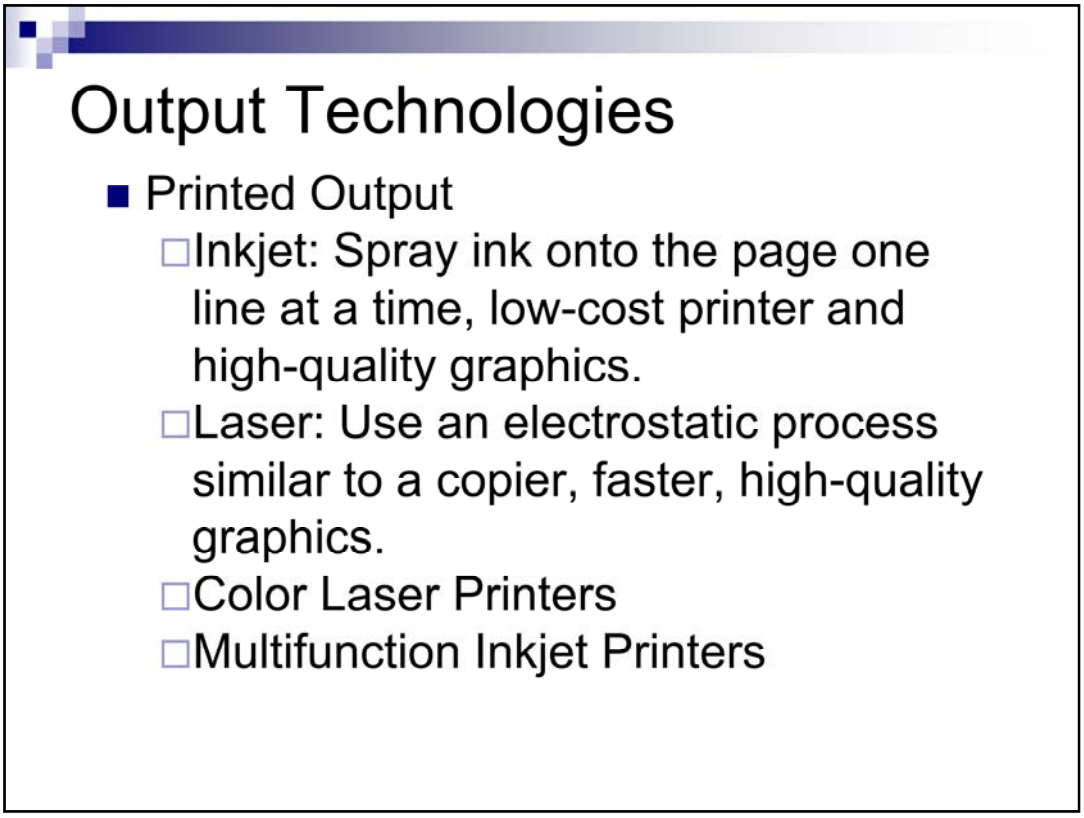
Challenge students to show how magnetic input is rapidly moving toward optical input.

Other Input Technologies

- Magnetic Ink Character Recognition (MICR)
  - Identification numbers of bank and account printed in magnetic ink on bottom of check
  - Used by banks to magnetically read checks and deposit slips, use 14 character (10 decimal digits and 4 special symbols)
  - Requires an iron oxide-based ink,
  - Reader-sorter equipment magnetizes the ink, then passes it under a reading head to sense the signal

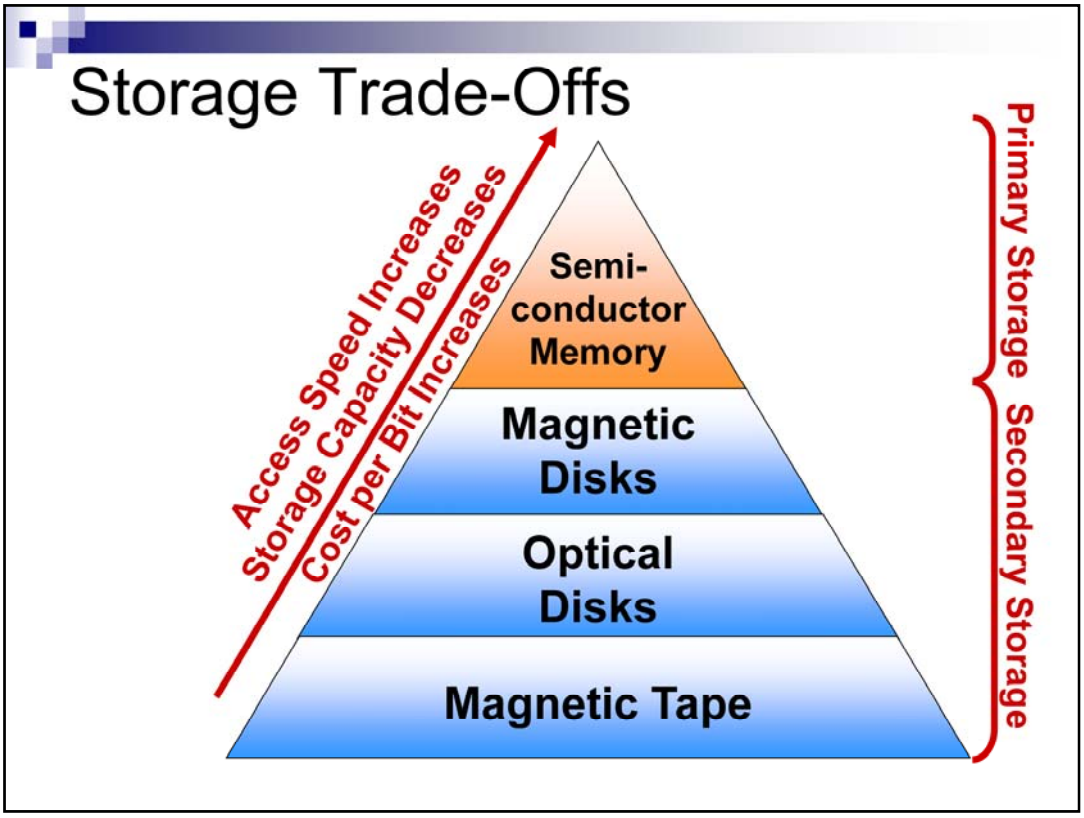


describe a variety of video output devices with which they come in contact each day.



Give examples of a variety of printer types.

Emphasize hardware costs versus operating costs and qualitative issues.



PATIENTLY ALLOW TIME FOR ANIMATIONS TO WORK

Data and information need to be stored after input, during processing, and before output. The figure on the slide illustrates the speed, capacity, and cost relationships of several alternative primary and secondary storage media. High speed storage media cost more per byte and provide lower total capacities. Conversely, large-media storage is less expensive but slower. Storage media also differ in how they are accessed by the computer:

Direct Access.

Sequential Access.

Semiconductor Memory.

- Random Access Memory (RAM).
- Read Only Memory (ROM).

Magnetic Disk.

Magnetic Tape.

Optical Disk Storage.

- Compact Disk-Read Only Memory (CD-ROM)
- Compact Disk Recordable (CD-R)
- Compact Disk Rewriteable (CD-RW)
- Digital Video Disk (DVD)

Computer Storage Fundamentals

- Binary representation
- Information is stored through the presence or absence of electronic or magnetic signals
  - Binary representation
    - 1 = ON
    - 0 = OFF

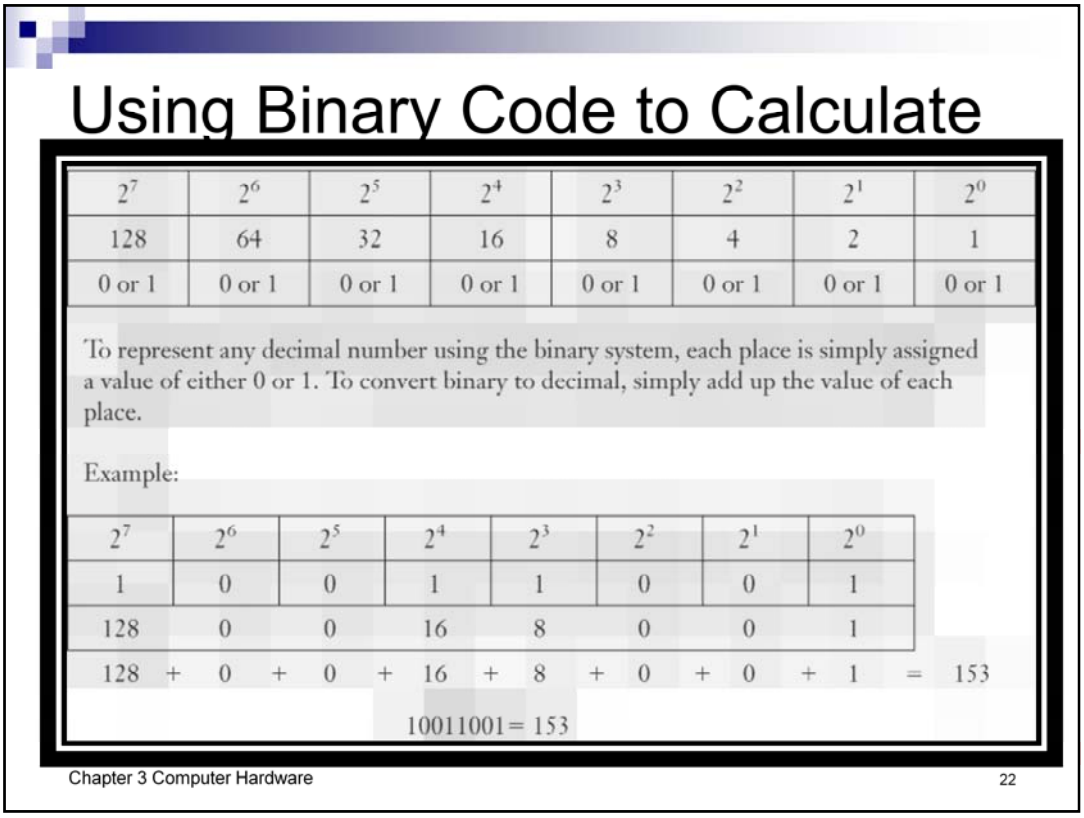
Bit and Byte

- Bit
  - Short for binary digit
  - The smallest element of data
  - May have a value of either one or zero
- Byte
  - Group of eight bits, which operate as a single unit
  - Typically, a byte consists of 8 bits and represents one character of data

Representing Characters in Bytes

American Standard Code For Information Interchange (ASCII)

Character	ASCII Code	Character	ASCII Code	Character	ASCII Code
0	00110000	A	01000001	N	01001110
1	00110001	B	01000010	O	01001111
2	00110010	C	01000011	P	01010000
3	00110011	D	01000100	Q	01010001
4	00110100	E	01000101	R	01010010
5	00110101	F	01000110	S	01010011
6	00110110	G	01000111	T	01010100
7	00110111	H	01001000	U	01010101
8	00111000	I	01001001	V	01010110
9	00111001	J	01001010	W	01010111
		K	01001011	X	01011000
		L	01001100	Y	01011001
		M	01001101	Z	01011010



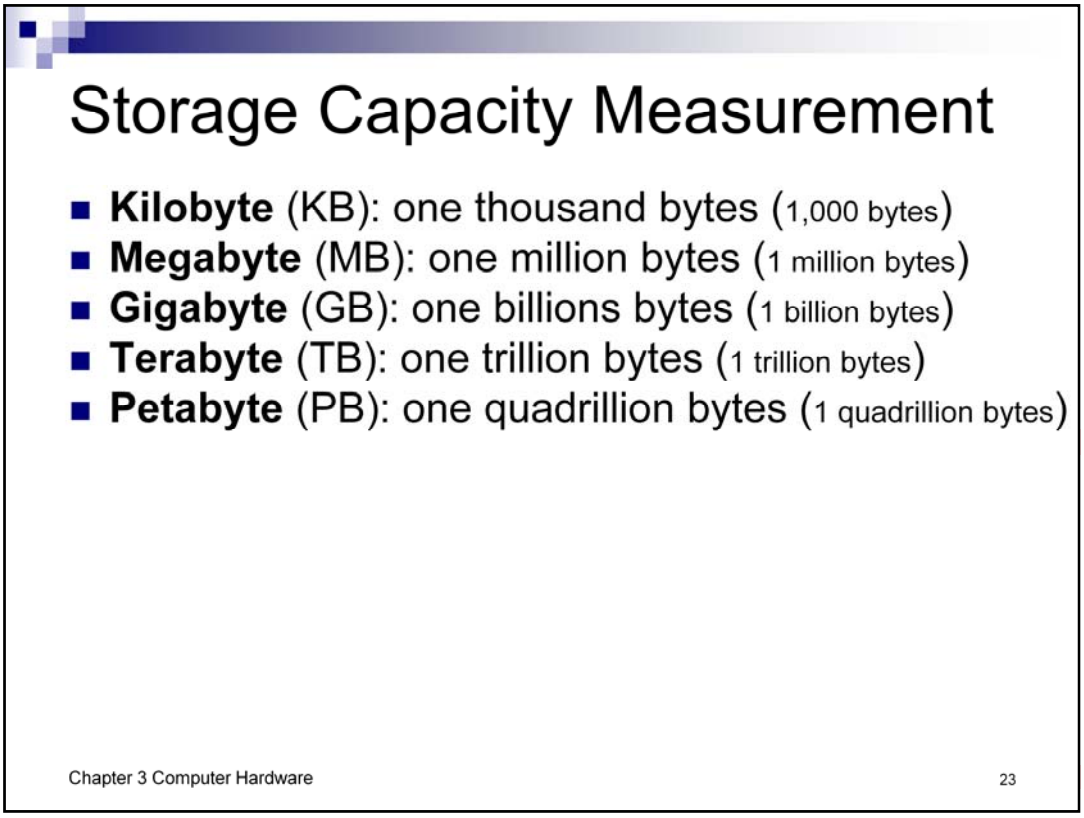
Processor has millions of switches turned either off or on.

Use the binary number system to store and compute numbers

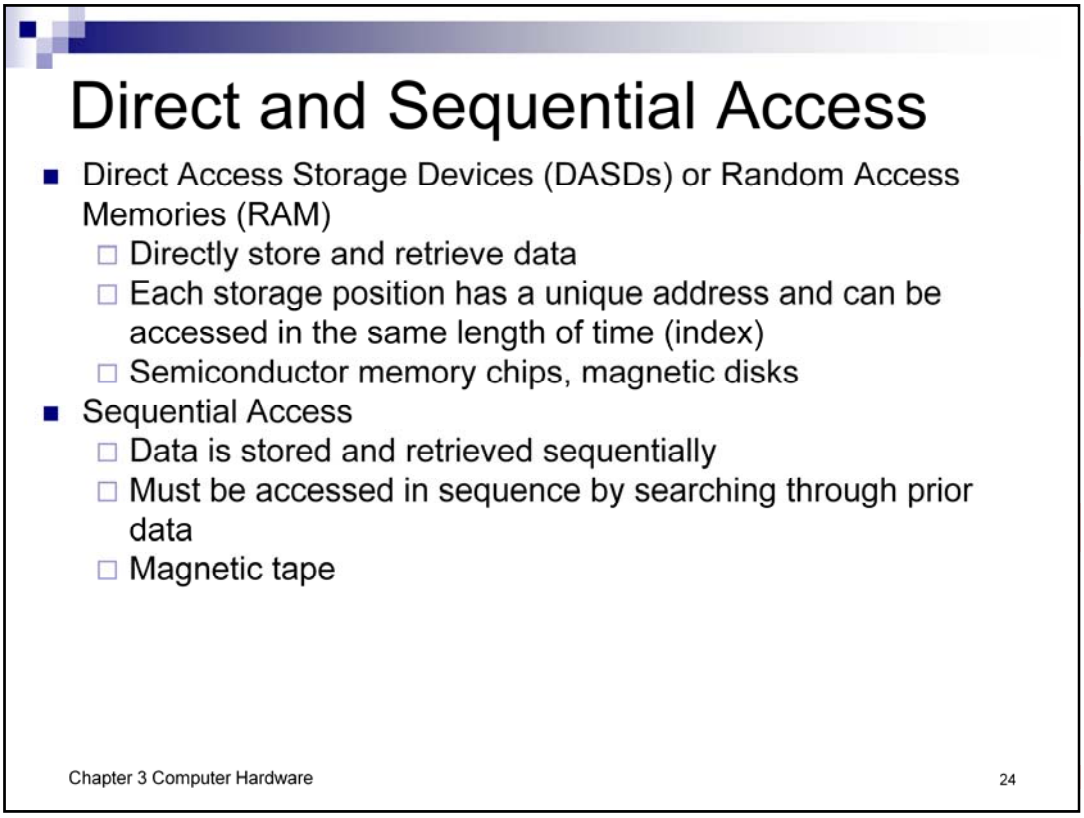
Figure shows that any integer number can be represented using 0's and 1's.

Try to represent number 250 , 100, 64, 50, 170, 0, 256 (convert dismal number to binary)

Try to represent number 01011010, 11100101, o111ooo1 (convert binary number to dismal)

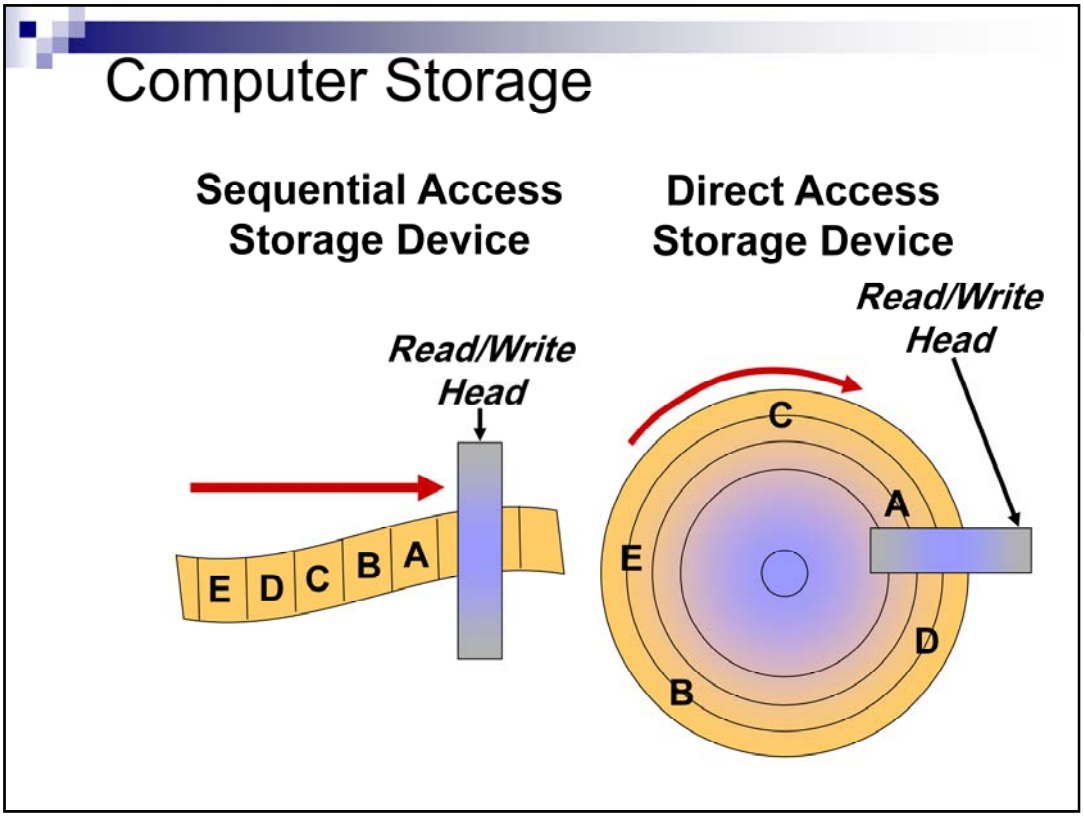


Explain how these definitions of storage are used as a measure for hard disk, RAM, and flash memory applications.



Explain the differences between direct and sequential access as to speed and cost.

Define the different categories of semi-conductor memory.



PATIENTLY ALLOW TIME FOR ANIMATIONS TO WORK

Use the graphics above to demonstrate the extreme speed available in a direct access device as opposed to sequential.

Semiconductor Memory

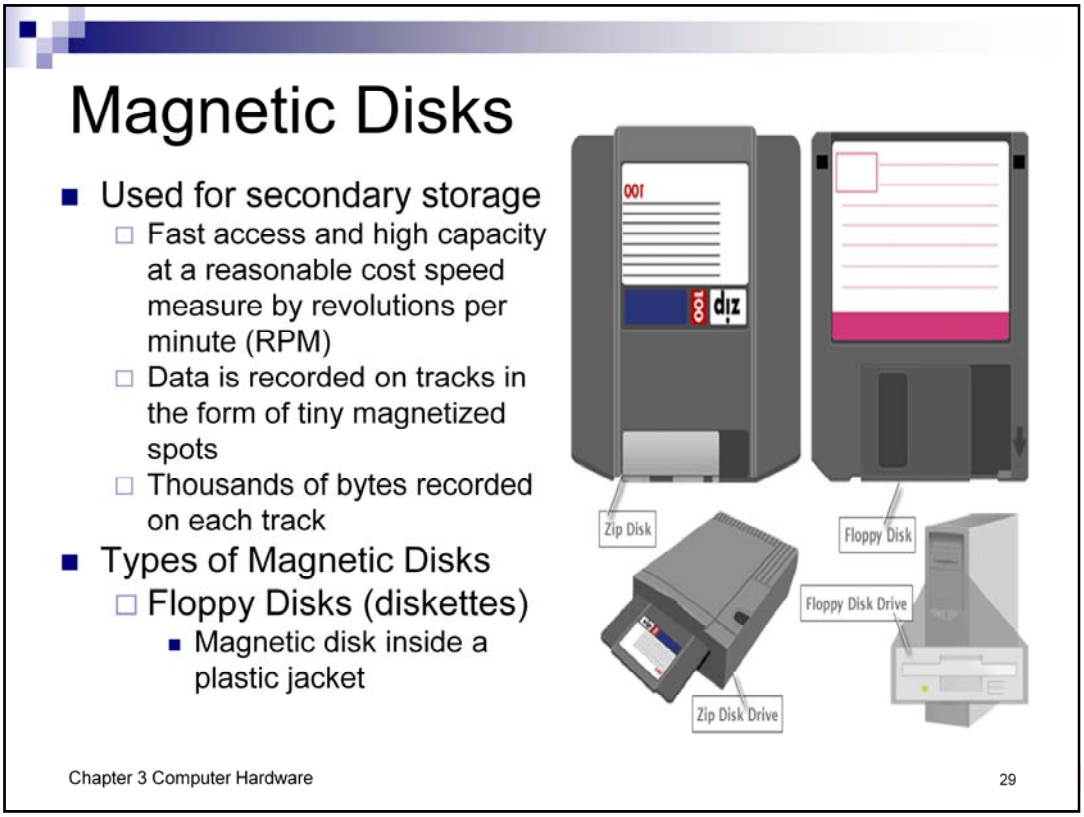
- Microelectronic semiconductor memory chips are used for primary storage
  - **Advantages**: small size, fast, shock and temperature resistance
  - **Disadvantages**: volatility; must have uninterrupted electric power or loses memory

Types of Semiconductor Memory

- Random Access Memory (RAM) read/write memory
  - Most widely used primary storage medium
  - Volatile memory
- Read-Only Memory (ROM)
  - Permanent storage, Can be read, but not overwritten
  - Frequently used programs burnt into chips during manufacturing process, Called firmware
  - Variations of ROM
    - PROM
      - Programmable read only memory
    - EPROM
      - Erasable programmable read only memory

Flash Drives

- New type of permanent storage
- Sometimes referred to as a jump drives, USB flash drives
- Uses semiconductor memory
- Uses a small chips containing thousands of transistors
- Can store data for virtually unlimited periods without power
- Easily transported and highly durable
- Storage capacity of up to 128 GB
- Plugs into any USB port



Magnetic disks are the most common form of secondary storage for modern computer systems. Magnetic disks are thin metal or plastic disks that are coated on both sides with an iron oxide recording material. Several disks can be mounted together vertically to increase storage capacity. Electromagnetic read/write heads are positioned by access arms between the slightly separated disks to read and write data on concentric, circular tracks (the unique addresses for each data element). The most popular forms of magnetic disks include:

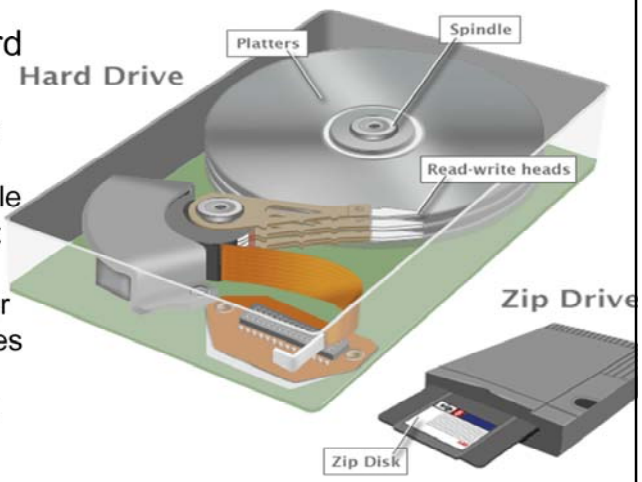
Floppy Disks. Also called magnetic diskettes, these consist of polyester film disks covered with an iron oxide compound. A single disk is mounted and rotates freely inside a protective flexible or hard plastic jacket. Floppies are extremely portable, a 3.5" disk fitting into a shirt pocket.

Hard Disk Drives. The "hard drive" combines several magnetic disks, access arms, and read/write heads into a sealed module. This allows higher speeds, greater data-recording densities, and closer tolerances within a sealed, more stable environment.

RAID STORAGE. RAID stands for redundant arrays of inexpensive disks. They combine from 6 to over 100 small hard disk drives and their microprocessors into a single unit. RAIDs provide large capacities with high speed access via parallel multiple paths from many disks. They are also fault tolerant in that more than one copy of the data exists. If a track, sector, or disks fails, backup is possible from one of the redundant disks.

Magnetic Disks

- Hard Disk Drives (hard drives)
  - Magnetic disk, access arms, and read/write heads in sealed module for stable environment
  - Platters and spindle
  - Higher speeds, greater data recording densities
  - Fixed or removable
  - Capacity from several hundred MBs to hundreds of GBs



RAID Storage

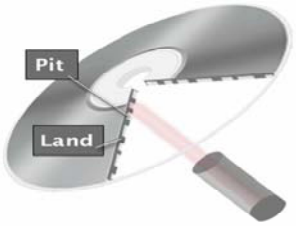
- Redundant Arrays of Independent Disks (RAID)
  - Disk arrays of hard disk drives
  - Provides large capacities with high access speeds
  - Combines from 6 to more than 100 small hard disk drives into a single unit
  - Data are accessed in parallel over multiple paths from many disks
  - Redundant storage of data on several disks provides fault-tolerant capacity
  - Storage area networks (SANs)
    - High-speed Fiber channel LANs that can connect many RAID units

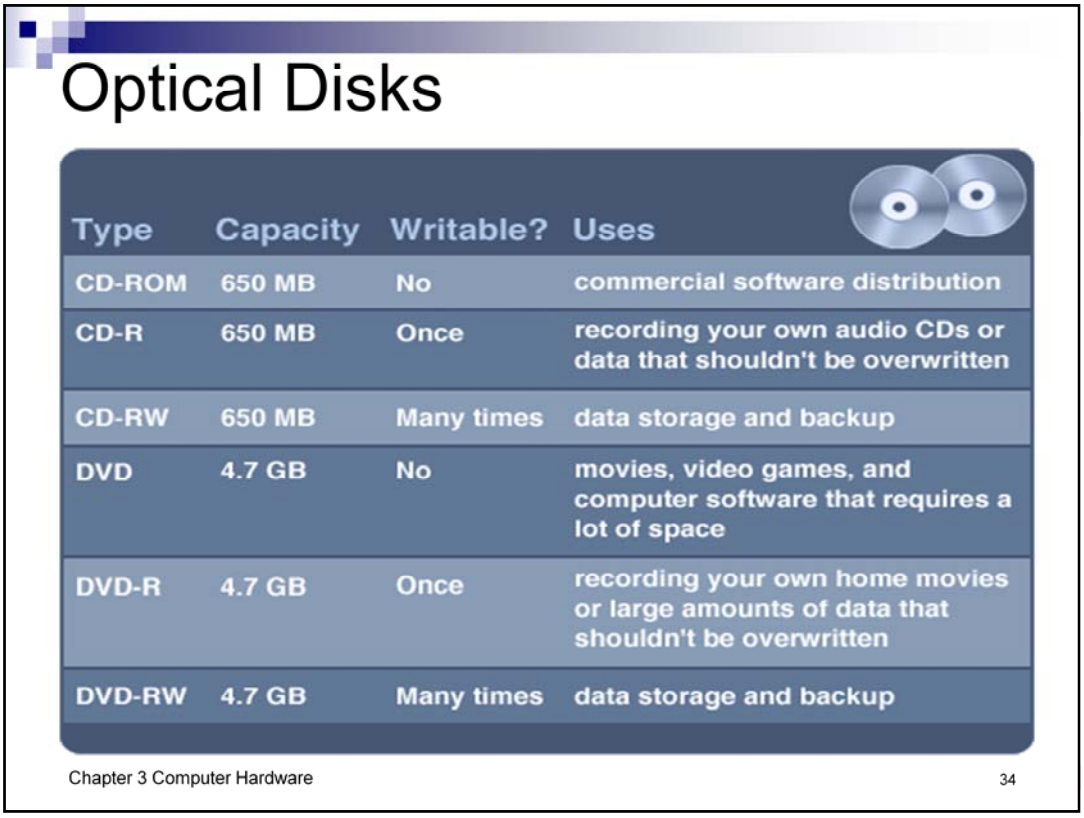
Magnetic Tape

- Secondary storage
  - Tape reels, cassettes, and cartridges
  - Used in robotic, automated drive assemblies
  - Archival and backup storage
  - Lower-cost storage solution

Optical Disks

- Laser prime , pit when have data (1 binary) and land when no data found (0 binary)
- CD-ROM compact disk-read only memory
- CD-R compact disk-recordable
- CD-RW compact disk-rewritable
  - Leaser heat microscopic point on the disks surface using magneto-optical technology
- DVD digital video disk or digital versatile disk
- DVD-ROM
- DVD-RAM





Describe the above optical disk formats and tendency to move toward standardization.

Uses of Optical Disks

- Image processing
  - Long-term storage of historical image files
  - Storage of scanned documents
- Publishing medium
  - Allows fast access to reference materials
  - Catalogs, directories, and so on
- Interactive multimedia applications
  - Video games, educational videos, and so on

Summary

1. Three Major Types of Computer Systems
   - Microcomputer
   - Midrange Systems
   - Mainframe Systems

2. Microcomputers are Used as Personal Computers, Network Computers, Personal Digital Assistants, Technical Workstations, and Information Appliances.

Summary

3. Midrange Systems are used for Many Multiuser Business Data Processing and Scientific Applications.

4. Mainframe Systems are Larger and More Powerful than Midrange Systems, Have More Memory, and Support More Users and Peripheral Devices, and High Volumes of Data.

Summary

5. Computer Systems Perform Input, Processing, Output, Storage, and Control Functions.
6. Hardware Consists of Input and Output Devices, a Central Processing Unit, Primary and Secondary Storage Devices.
7. Supercomputers are a Special Category of Extremely Powerful Mainframe Systems Designed for Massive Computational Assignments.
8. Peripheral Devices are used for a Wide Array of Input, Output, and Storage Applications.


Thanks
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