BASIC COMPUTER CONCEPTS

Hardware vs. Software

- Hardware
  - » The computer equipment
  - » Includes printers, monitors, disk drives, etc.
- Software
  - » Programs which tell the computer what to do
  - » Examples - word processing, gradebook, tutorials, games, etc.

HARDWARE

History of Computers

- Charles Babbage - father of computer
  - » 1800's planned analytical engine
- ENIAC - developed at end of WW II
- 1951 - 1963 1st and 2nd generation
  - » very large, used unreliable vacuum tubes
- 1963 - present - 3rd and 4th generation
  - » smaller, faster - use transistors and integrated circuits

History - Microcomputers

- Apple
  - » First sold in late 1970's
 - » Developed by Jobs and Wozniak
- IBM Personal Computers
  - » First sold in 1981
  - » Was quickly accepted by businesses
  - » IBM compatibles soon developed

Computer - Social Impact

- Threat to privacy
- Reduce personal interactions
- Displace workers and change workplace
  - » Create two tiered society
- Computer failures cause great damage
- Artificial Intelligence
  - » Create a "new life form"
  - » Machines smarter than their creators

Types of Computers – Personal Computers (PC)
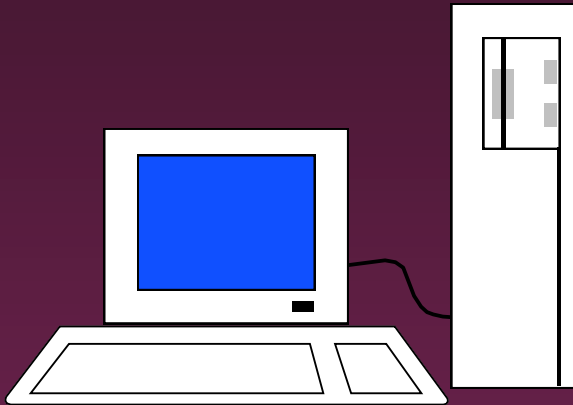
- Also called Microcomputers
- Available in desktop size, notebook size and handheld
- Can be IBM, IBM Compatible or Apple

Types of Computers - Minicomputers

- Size of filing cabinet

- Used by small and medium size companies and institutions

- Operated by computer specialist

- Terminals allow many people to use

Types of Computers - Mainframes

- Very powerful

- Very fast

- Used by large corporations and governmental agencies

- Operated by computer specialist

Types of Computers-Supercomputers

- Most powerful
- Fastest
- Most expensive
  - » Several million dollars each
- Used only by
  - » Governmental agencies
  - » Large international corporations

Computer Operations

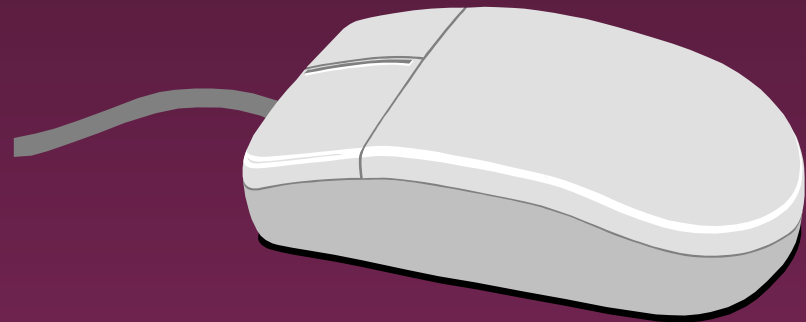Input ⟶ Processing ⟶ Output

Processing ⟶ External Storage
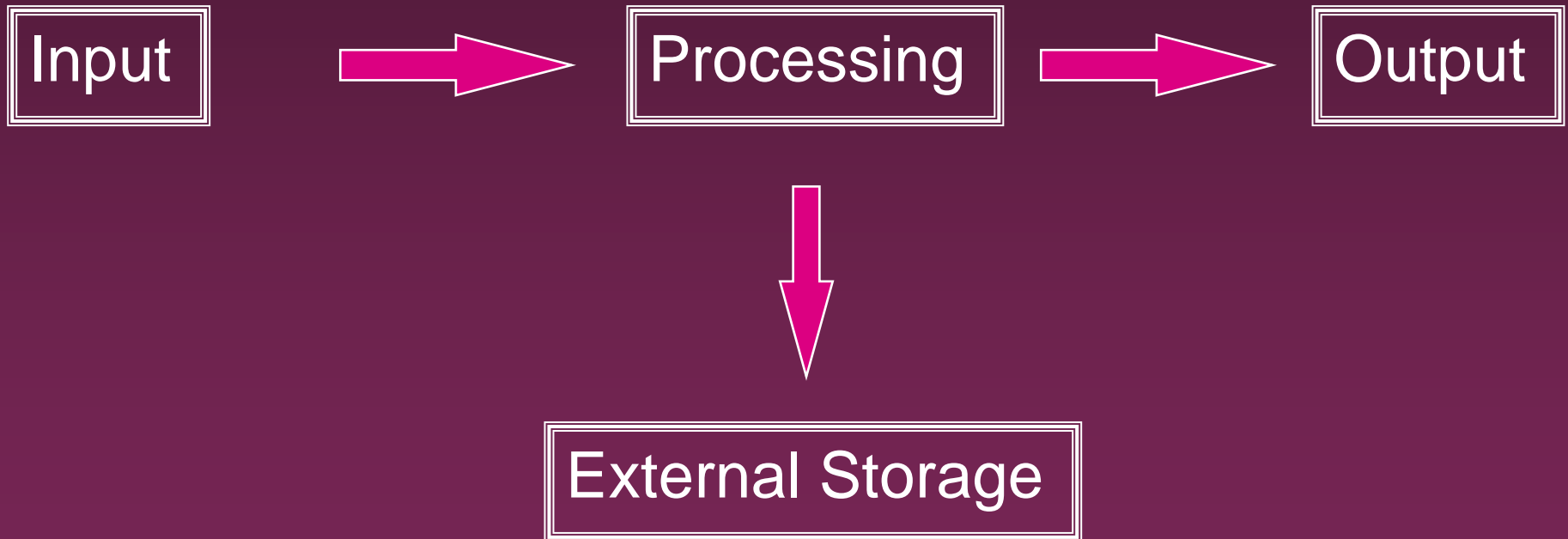
Input Devices - Keyboard

- Most commonly used input device

- Ergonomic - fit natural hand placement

- Special keys

  » Enter, Function, Ctrl, Alt, Num Lock, Esc

Input Devices - Mouse

- Controls cursor on screen

- May be mechanical or optical

- Most models have a "wheel" for scrolling

Input Devices - Other

- ☐ Pointers (replaces mouse on notepads)
  - » Track point, track ball, touch pad

- ☐ Scanner

- ☐ Digital camera

- ☐ Touch screen

- ☐ Voice

Output Devices

- Monitor

- Printer

- Disk Drive
  - » Can also be input device

- Modem
  - » Can also be input device

Monitors

- Made up of tiny elements called **pixels**

- Each row of pixels is called a **scan line**

- Picture is displayed by an electronic beam lighting up certain pixels
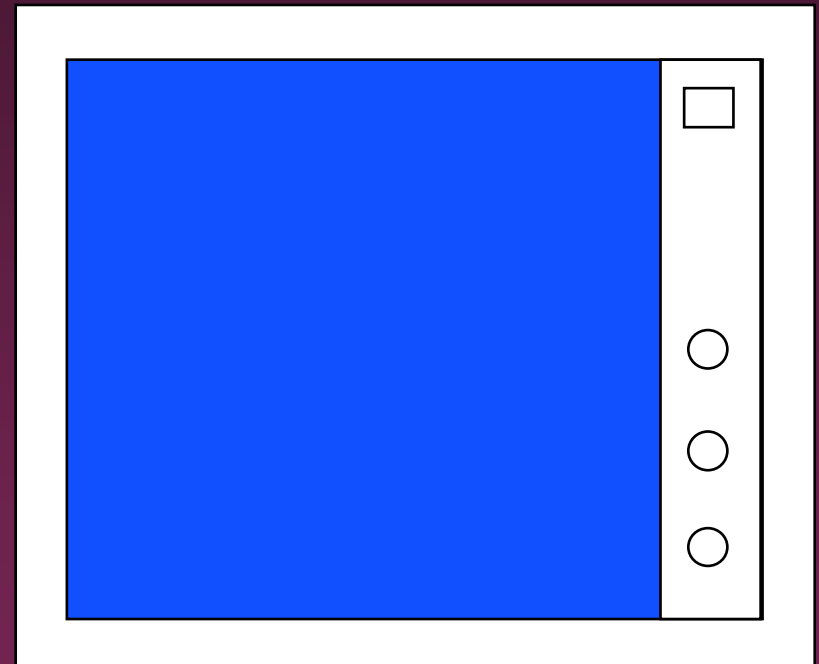
Monitors - Resolution

- Resolution is how sharp and clear the picture is

- How many scan lines on the screen
  - 640 x 480 is low resolution
  - 1600 x 1200 is high resolution

Monitors - Dot Pitch

☐ Measures the distance between pixels

☐ Commonly seen on monitors advertised
- » .49 (not very good)
- » .28 (much better)
- » .26 or lower (excellent)

Monitors - Sizes

- Screen measured diagonally
  - » May also measure actual viewing area
- 14" or 15" on bargain systems

- 17" has become the standard
- 19 and 21" available but are more expensive.

Monitors - LCD

- Liquid Crystal Display
- Similar to digital watch
- Used for notebook computers
  - » Should be an Active Matrix Screen
- Also used in flat screen monitors
  - » Much thinner than regular CRT monitor
  - » More expensive than regular CRT monitor

Monitors - Video Card

- Processes info to send to monitor
- Amount of video memory may speed up graphic intensive programs
  - » 32 megs –general purpose
  - » 128 or more megs – graphic intensive use

- AGP port can speed up graphics
- 3D accelerator card improves graphics
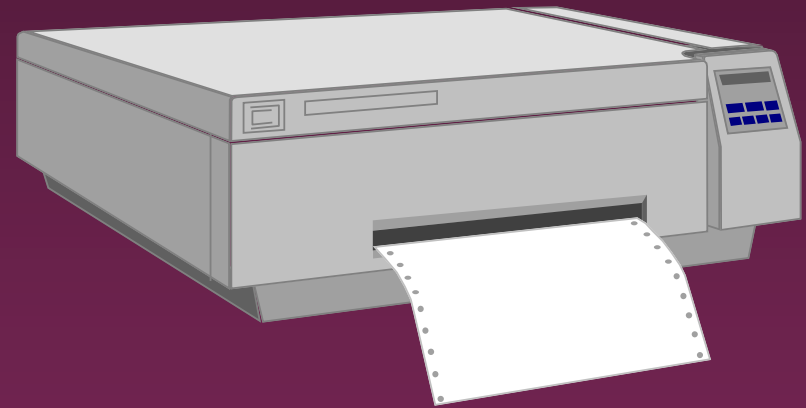
Monitor - Buying Hints

- 17" or larger
- .28 dot pitch or better
- 32 or more megs of memory on video card

Printers

- Laser

- Ink Jet

- Dot Matrix

Printers - Laser

- Works similar to a copy machine

  » Color printers available but more expensive

- Fast, quite, with excellent quality

- More expensive to buy and operate

- Some units scan, photocopy, and print

Printers - Ink Jet

- Squirts small jet of ink onto paper to form characters

- Replaced dot matrix

- Quiet

- Does good job on color

- Good quality and reliability

Printers - Dot Matrix

- Strikes pins against ribbon to print

- Comes in 9 and 24 pin

- Once very popular

- Now replaced by ink jet and laser

Printers - Speed

- Measured in pages per minute (PPM)

- Laser printers range from 20-45 ppm

  - » Color printing is slower

Printers - Quality of Print

- ☐ One measure is dots per inch (DPI)
  - » 300 dpi for general purpose uses
  - » 600 dpi for higher quality
  - » 1200 dpi for photo quality
- ☐ May have different vertical and horizontal resolution
  - » 600 x 300
- ☐ Other factors can affect quality

Basic Processing Cycle

Central Processing Unit

Data Bus

Internal Memory

How Information Is Stored

- Memory consist of switches which can be either on or off - Off=0 On=1
- Each on/off switch is called a **bit**
- Eight bits make up a **byte**
- It takes one byte to store a character
  - » Character can be letter, space, punctuation, etc.
  - » ASCII code used

Other Memory Terms

- **Byte** is eight bits

- **Kilobyte** (KB) is approx. 1,000 bytes

- **Megabyte** (MB) is approx. 1million bytes

- **Gigabyte** (GB) is approx. 1 billion bytes

Central Processing Unit

- Also called CPU, processor or microprocessor

- Is the "brains" of the computer

- Performs all computer operations

CPU - IBM COMPATIBLES

- Many made by company called Intel

- Also made by AMD

Pentium class processors

- Needed to run most current software

- Intel – Celeron or Pentium IV

- AMD

CPU - Clock Speed

- Number of "cycles" per second computer can operate
- Measured in megahertz (MHz)
- One MHz = 1 million cycles per second
- One gigahertz(GHz)=1 billion cycles
- Current speeds 2-4 GHz

CPU - Misc.

- Performance also affected by speed of data bus
  - » 400-800 MHz on most current systems
- Cache can increase speed
  - » Stores data you will likely need next in an area that has faster access
  - » Both memory cache and disk cache used
  - » Should be 512 K or better

CPU - Buying Hints

- Minimum of Pentium IV or AMD Athlon

- Minimum of 2 GHz clock speed

- Minimum of 512K of cache

Internal Memory - RAM

- RAM - Random Access Memory
  - » CPU can access any location as quickly as any other
- Can not only read current info but also write new info
- Very important in determining capabilities of the computer system
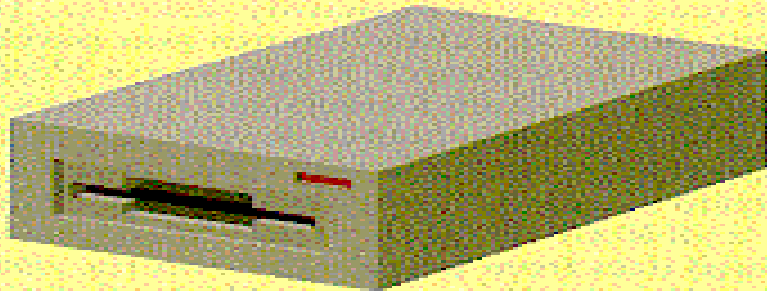- Computer should have at least 256 megs - 512 preferred (can add to later)

Internal Memory - ROM

- ROM - Read Only Memory

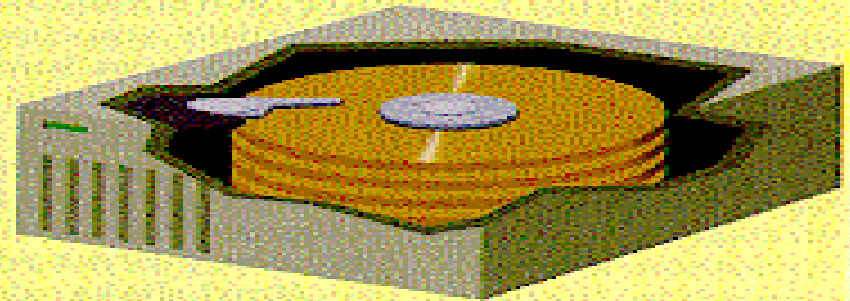 » Can read info Stored in ROM

  » Can not write new info into ROM

- Used for "internal workings" of computer

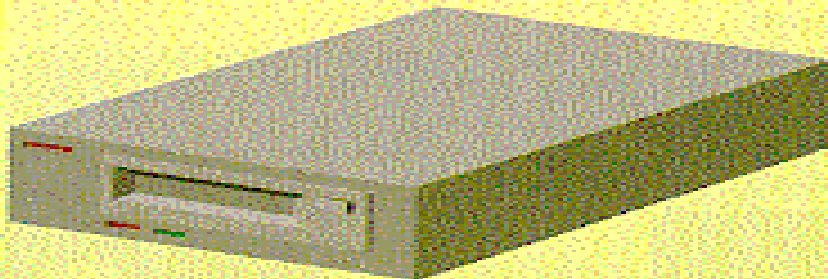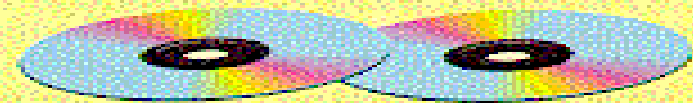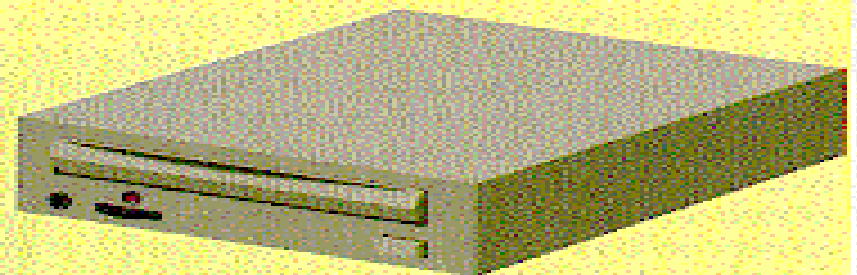- Buyer is not very concerned with ROM

External Memory

Dissette drive with removable diskettes

Hard disk drive with fixed metal platters

Tape drive with tape cartridges

CD-ROM drive with compact discs

Floppy Drives

- Comes in 5 1/4" and 3 1/2"

  » All systems now only have 3 1/2"

- HD - High density - comes on all current systems

  » 3 1/2" - 1.44 megs

Hard Drives

- Built into machine
- Made up of stack of platters
- Can store much more than floppy drives
  - » 40 gigabytes should be minimum
- Can access info much faster than floppy drive

CD ROM

- Same as music CDs
- Are read only
- Can store over 650 megs
- All programs now only sold on CD
- Make multimedia possible
- Come in different speeds - 20x, - 50x

DVD-ROM

- Digital Video Disk

- Can store up to 17 GB

- Can store full-length movies

- Can also read CD-ROM disk

CD-RW & DVD-RW DRIVES

- ☐ Allows you to write to disk
- ☐ Useful for
  - » Data backup
  - » Storage of large files
  - » Recording music and other multimedia files
- ☐ DVD-RW
  - » Allows you to write to both CD and DVD disk
  - » Still somewhat expensive

Storage Devices - Other

- USB drive
  - » Very popular – 64-512 MB
- Tape drive
  - » Similar to cassette tape
  - » Used for backup

- Zip drive
  - » 100 MB to 2 GB capacity
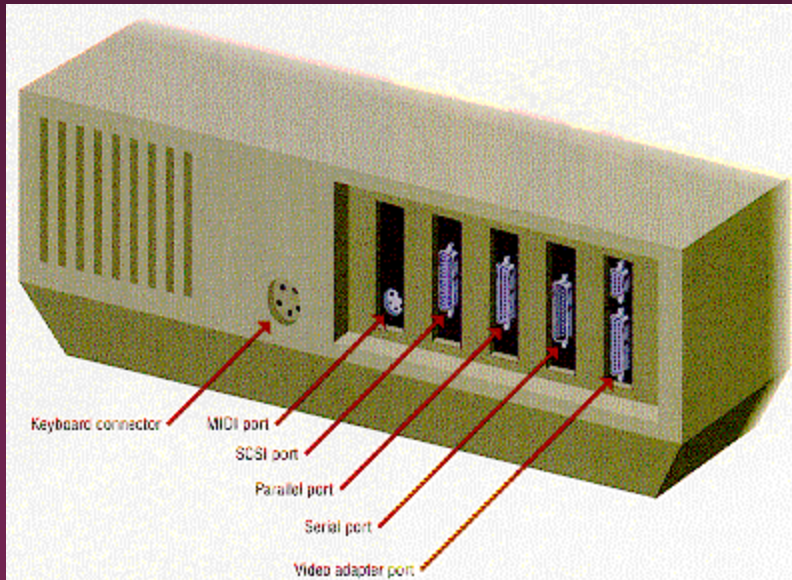 - » Everyday use and backup

Drives - Buying Advice

- 40 gigabyte hard drive

- One 3 1/2" high density floppy drive

- CD-RW drive

- DVD not yet essential but useful

Expansion Slots

☐ Allows you to add capabilities

☐ Example of cards you can add

» Network card
» Modem

Ports

Keyboard connector
MIDI port
SCSI port
Parallel port
Serial port
Video adapter port

- Connects computer to another device

- Parallel port
  - » Used primarily by printers

- Serial ports
  - » Modem, mouse, etc.

- SCSI - chain devices

- USB –may be needed for
  - » Digital Cameras
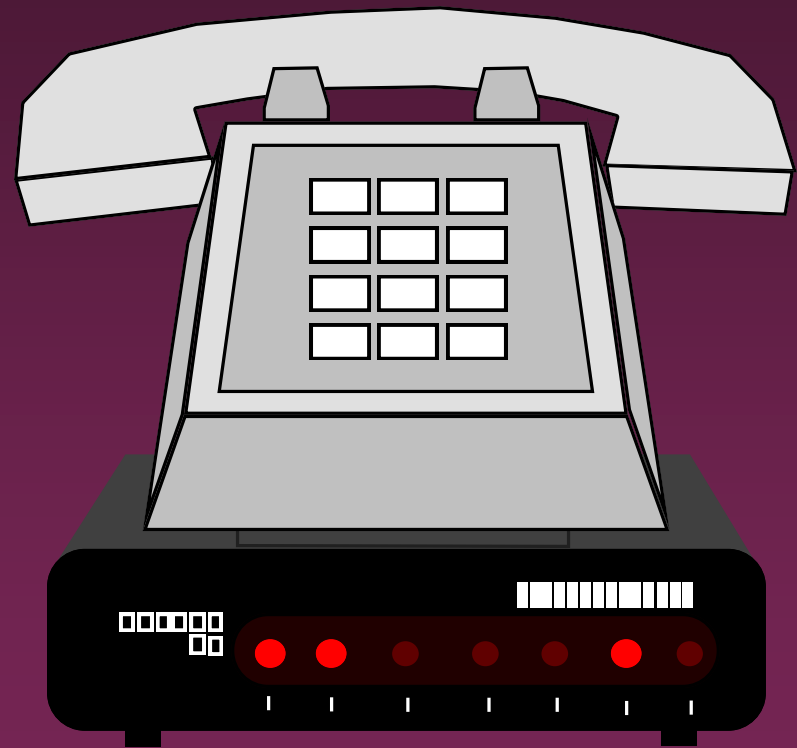 - » Mp3 players
  - » Other devices

Networks
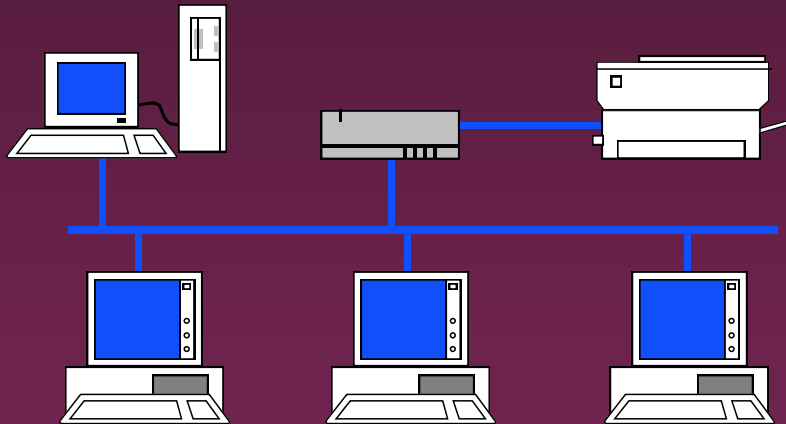
- Connects computers
- LAN - Local Area
- WAN - Wide Area
- Wireless
- Allows sharing of programs, files, printers, etc.
- Server is "main" computer

Modems - General

- Allows 2 computers to communicate over phone lines
- Can be internal or external
- Can also have fax capabilities

Modems

- Bits per second(bps) indicates speed
  - » Old modems - 9,600, 14,400, 28,800, 33,600
  - » 56,000 (56K) has becoming standard

- Ways of connecting to the Internet
  - » Dial-up modem – used in most homes
  - » Cable modem – uses TV cable lines
  - » DSL – modified phone line
  - » T1 line – used by schools, businesses, etc.

Buying Hints Summary - Min Hardware Requirements

- 2 GHz Pentium IV Class Processor
- 256 megabytes of RAM
- 17", .28 dot pitch monitor with 32 meg card
- 40 gigabyte hard drive
- CD-RW
- 56k modem
- Ink jet or laser printer

Buying Hints - Software Bundles

- Many systems come with software included
- Productivity
  - » Microsoft Works
  - » Microsoft Office, Lotus SmartSuite, etc
  - » Quicken, Money, or other financial software
- Reference
  - » Microsoft Encarta or Compton's encyclopedia
- Games

Buying Hints - Service and Warranty

☐ Toll-free 24 hr 7 day support (800 #)

☐ 1 year warranty on parts and labor

☐ Optional extended warranty

☐ 30 day return policy

Buying Hints - Web Sites

- On-line computer stores

  - » C-Net Hardware – reviews and prices from many vendors
  - » Dell - http://www.dell.com/
  - » Gateway - http://www.gateway.com/

SOFTWARE

Programs

☐ Set of instructions to the computer

☐ Programming languages
  » Machine language
  » Assembly language
  » Procedural languages
    – Basic, Fortran, Cobol
  » Object oriented languages
    – Visual Basic, C++, C#, Java

Systems Software

□ Run fundamental operations
  » Loading and running programs
  » Saving and retrieving data
  » Communicating with printers, modems, etc.

□ Examples of systems software
  » DOS
  » Windows 3.1, 95, 98, Me, 2000, and XP
  » Unix
  » Linux

Applications Software

- Helps you to accomplish a certain task

- Examples
  - » Word processing - memos, reports, etc.
  - » Spreadsheets - budgets, etc.
  - » Database - search, sort, select data
  - » Educational - simulations, practice
  - » Graphics - charts, diagrams
  - » Desktop publishing - pamphlets, etc.

Software - Legal Issues

- Commercial software
  - » Can only make backup copies for yourself
  - » Can only use on one machine at a time
    - – Site license - use on more that one machine

- Shareware
  - » Can use - make copies and give to anyone
  - » Should pay if you continue to use

- Freeware – can copy and use indefinitely

Software Viruses

- Illegal code added to a program
- May spread to many computers
  - » Copy files from one computer to another
  - » Download files by modem
  - » E-mail attachments
- Virus may be relatively harmless
  - » Writes "You've been stoned" on screen
- Virus may also be very damaging
  - » Erases everything on hard drive
- Virus may activate on a certain date

Virus Protection

- Be careful where you copy files from
- Do not open e-mail attachments unless you are sure that it is safe
- Use virus protection program
  - » Detects and removes illegal code
  - » Should be updated often

BASIC COMPUTER CONCEPTS

End of Slide Show