Introduction to Computer Applications

CISY 1225

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Why Computer is Important

- Computer-literate people are skilled in using computers and the Internet.

Introduction to Computer Applications

Chapter 1
Looking at Computers:
Understanding the Parts

Chapter Topics

- Functions of a computer
- Data versus information
- Bits and bytes
- Input devices
- Output devices
- Processing
- Storage
- Ergonomics

Functions of a Computer

- **Computer** – A machine that performs the four basic functions:
  1. **Input:** Gathers data
  2. **Processing:** Processes data into information
  3. **Output:** displays data or information
  4. **Storage:** Stores data and information

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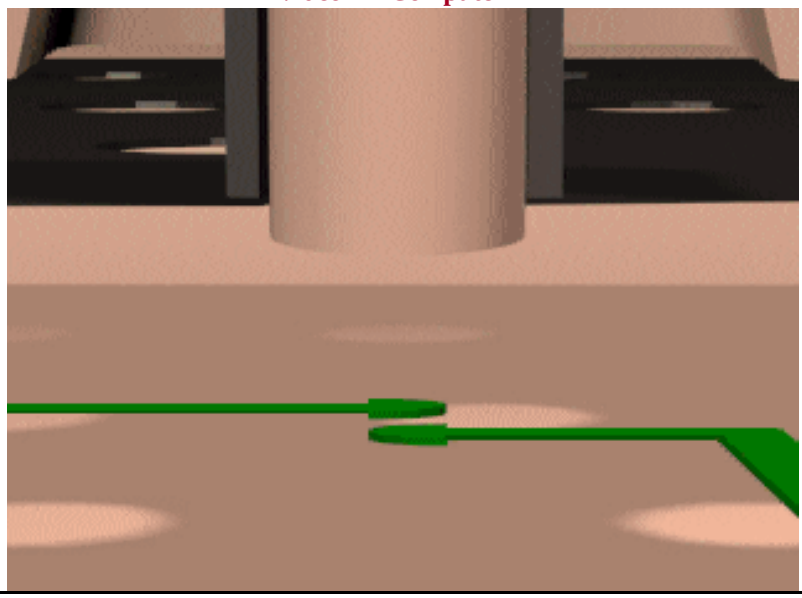
Understanding the Computer

Video#1 – Computer

Understanding the Computer

Video#2– Computer



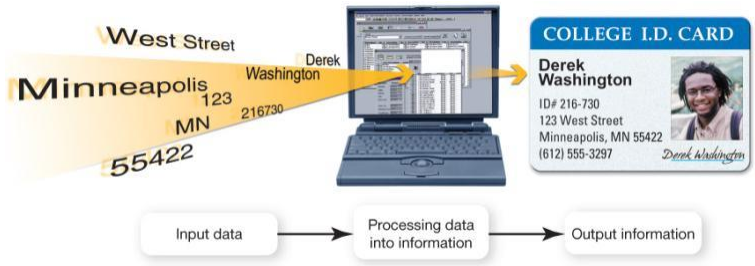
Question

- How many basic functions were performed in the last video?
- Hint: 3 or 4

- **Answer:** 3
- (Input, processing, Output)

Data vs. Information

- Data: Representation of a fact, figure, or idea
- Information: Organized, meaningful data



Bits and Bytes: The Language of Computers

- Bit
  - Binary digit
  - 0 or 1
- Byte
  - 8 bits
- Each letter, number, and character is a string of eight 0s and 1s

How Much Is a Byte?

Name	Abbreviation	Number of Bytes	Relative Size
Byte	B	1 byte	Can hold one character of data.
Kilobyte	KB	1,024 bytes (2^{10} bytes)	Can hold 1,024 characters or about half of a double-spaced typewritten page.
Megabyte	MB	1,048,576 bytes (2^{20} bytes)	Can hold approximately 768 pages of typed text.
Gigabyte	GB	1,073,741,824 bytes (2^{30} bytes)	Approximately 786,432 pages of text; 500 sheets of paper is approximately 2 inches, so this represents a stack of paper 262 feet high.
Terabyte	TB	1,099,511,627,776 bytes (2^{40} bytes)	This represents a stack of typewritten pages almost 51 miles high.
Petabyte	PB	1,125,899,906,842,62 bytes (2^{50} bytes)	The stack of pages is now 52,000 miles high, or approximately one-fourth the distance from the Earth to the moon.
Exabyte	EB	1,152,921,504,606,846,976 bytes (2^{60} bytes)	The stack of pages is now 52 million miles high, or just about twice the distance between the Earth and Venus.
Zettabyte	ZB	1,180,591,620,717,411,303,424 bytes (2^{70} bytes)	The stack of pages is now 52 billion miles high, some 20 times the distance between the Earth and Pluto.

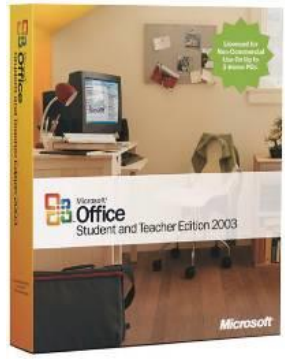
Computer Hardware

- **Hardware –** All the Computer's physical components

Computer Software

- **Software** – All the programs that give the computer its instructions
  - Two categories of software:

    System software Application software



Types of Computers

- Basic computer designs
  - Portable
    - Notebook computers
    - Netbooks
    - Tablet PCs
  - Stationary
    - Desktop computers

Two Platforms of Computer

- **Apple Macintosh**
  - First GUI Operating system
  - Processor manufactured by Motorola Company
- **IBM Compatible**
  - Windows OS
  - Processor manufactured by Intel or AMD or ….

Types of Computers

Computers for Individuals

Desktop – PC, iMac

Personal Digital Assistant

Workstation

Notebook – Laptop

All-in-One

Internet Appliance

Types of Computers

Computers for Organizations

- **Servers** are not designed for individuals. They make programs available for network users
- **Minicomputers** handle the computing for small corporations

- **Mainframes** handle gigantic processing jobs for large corporations or agencies
- **Supercomputers** are ultra-fast and handle huge amounts of scientific data

Types of Computers

- **Embedded:** Self-contained computer performing dedicated functions.
  - e.g. electronic thermostat, Gas stations
  - Typically do not receive input from user

Input: Getting Data into the Computer

- **Data –** Unorganized raw materials made up of words, numbers, images, or sounds
- The first function: input
  - Input devices enable the user to enter data into the computer
  - The computer accepts data

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Input Devices

Keyboard

Mouse – pointing device

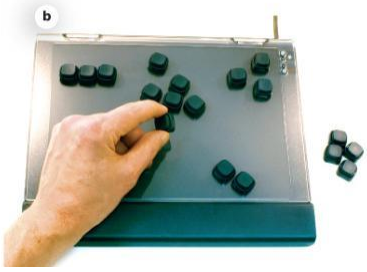
Microphone – speech-recognition

Digital Cameras

Specialty Keyboards

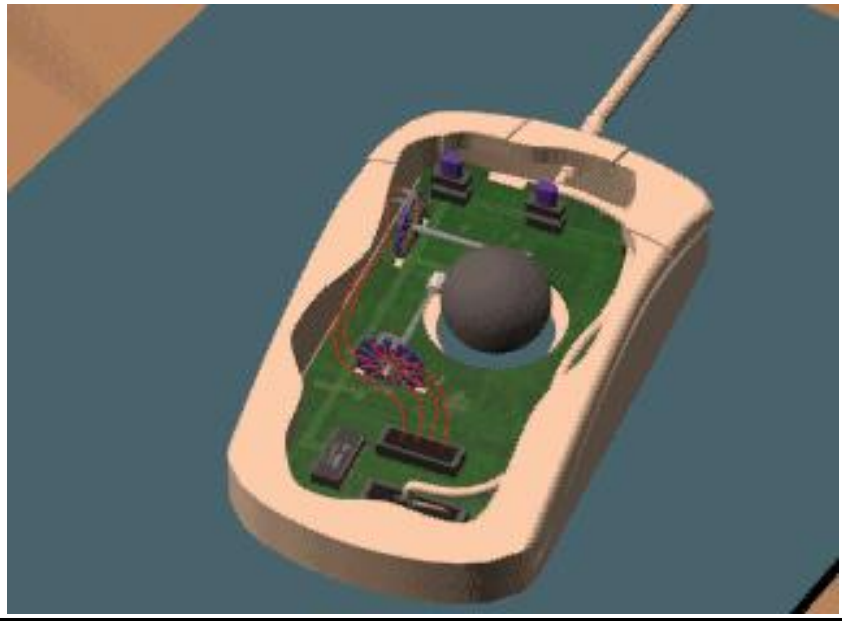
- Virtual laser keyboard

- Configurable keyboard



Video – Mouse

Video – Mouse



New Mouse Features

- Magnifier
- Customizable buttons
- Web search
- File storage

Touch Screens

- Display screen
  - responds to commands by touch with finger or stylus
- Becoming popular on many computing devices
  - Smartphones
  - Tablet PCs
  - All-in-one desktop PCs
  - Portable media players

Image Input

- Digital cameras, camcorders, and cell phones capture
  - Pictures
  - Video
- Scanners
  - Create images
- Webcams
  - Live video

Sound Input

- Microphones are used for:
  - Podcasts (**P**ersonal **O**n **D**emand Broad**cast**)
  - Videoconferencing
  - Internet phone calls
  - Speech recognition

Types of Microphones

- Unidirectional
- Omnidirectional
- Bidirectional
- Clip-on microphones
- Close-talk microphones

Types of Microphones

MICROPHONE TYPE	ATTRIBUTES	BEST USED FOR
Close Talk	• Attached to a headset (allows for listening) • Leaves hands free	• Video conferencing • Phone calls • Speech recognition software
Omnidirectional	• Picks up sounds equally well from all directions	• Conference calls in meeting rooms
Unidirectional	• Picks up sounds from only one direction	• Recordings with one voice (podcasts)
Clip-on (Lavalier)	• Clips to clothing • Available as wireless	• Presentations requiring freedom of movement • Leaves hands free for writing on whiteboards

Input Devices for the Physically Challenged Users

- Visual impairments
  - Voice recognition
  - Keyboards with large keys
  - Touch-screen keyboards
- Motor control issues
  - Special trackballs
  - Head-mounted devices

Output: Displaying Information

- The third function: output
  - The computer shows the results of the processing operation in a way people can understand
  - Output devices show the results of processing operations

Output Devices: Engaging our Senses

- **Visual output** – Text, graphics, and video
- **Audio output** – Sounds, music, and synthesized speech

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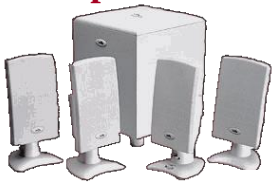
Output Devices

Monitor

Printer

Speakers



Monitors

CRT

LCD

- Display computer output on a screen.
- Screen output is referred to as **soft copy**.

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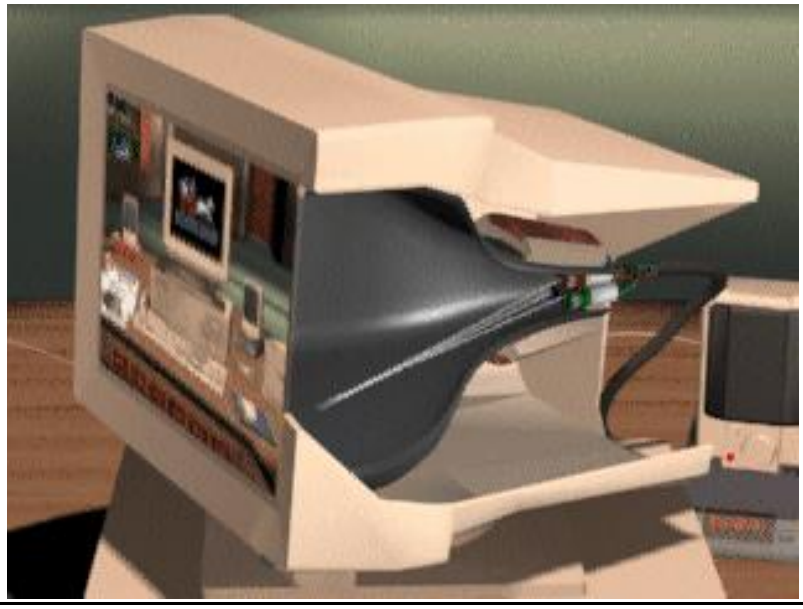
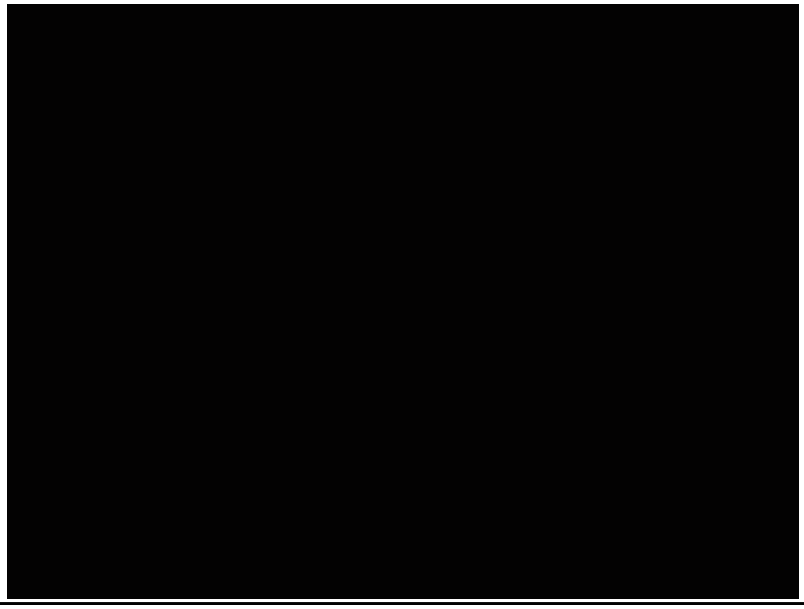
Video – CRT Monitor

Video – CRT Monitor



Video – LCD Monitor



Monitor Types

- Liquid crystal display (LCD)
  - Flat panel
  - Light and energy efficient
- Light-emitting diode (LED)
  - More energy efficient than LCD monitors
  - Better color accuracy and thinner panels
- Organic light-emitting diode (OLED)
  - Use organic compounds that produce light

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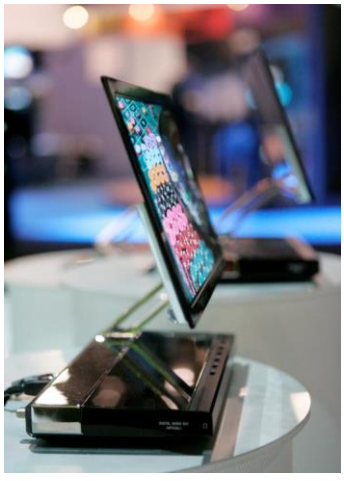
Organic Light-Emitting Diode Monitors

- Because they do not need a backlight, OLED displays are much thinner



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Flexible Organic Light-Emitting Diode Monitors

- FOLED
  - Latest technology
  - Screen can display while it is bend

How LCD Monitors Work

- Screens are grids
  - made up of millions of tiny dots called pixels
- Each pixel
  - composed of red, blue, and green subpixels (and sometimes yellow)
- Two or more sheets of material
  - filled with liquid crystal solution
- Crystals block or let light shine
  - through to cause images to form on the screen

LCD Quality Factors

- Aspect ratio
  - Width to height proportion of a monitor
  - **Old** 4:3, **new**16:9, 16:10
- Resolution
  - Number of pixels on the screen
- Contrast ratio
  - Brightest white and darkest black
  - 400:1 and 1000:1 is preferable

LCD Quality Factors (cont.)

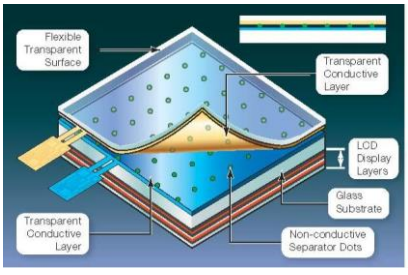
- Viewing angle
  - Measures how far you can move to the side
- Brightness
  - Greatest amount of light
- Response time
  - Time for a pixel to change color
  - Lower response time means faster transitions

Size May Matter

- Bigger the monitor, the more you can display
- 27-inch monitor
  - 2560 x 1440 pixels
- 21.5-inch monitor
  - 1680 × 1050 pixels
- HD-DVDs and Blu-ray movies
  - Require at least 1920 × 1080 pixels

Touch Screen Technology

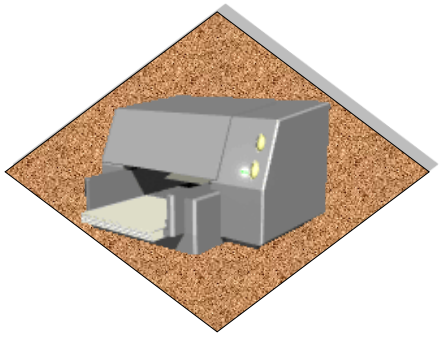
- Used in smartphones, tablets, notebook, and desktop monitors
- Finger or stylus is placed on screen
- Changes the state that the device is monitoring



Capacitive system detects touches and translate them into meaningful commands

Printers

- A peripheral device
- Produces a physical copy or **hard copy** of the computer's output.



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Types of Printers

- Inkjet printers
  - Spray tiny drops of ink onto page
- Laser printers
  - Use laser beams and static electricity to deliver toner to page
- All-in-one printers
- Plotters
- Thermal printers

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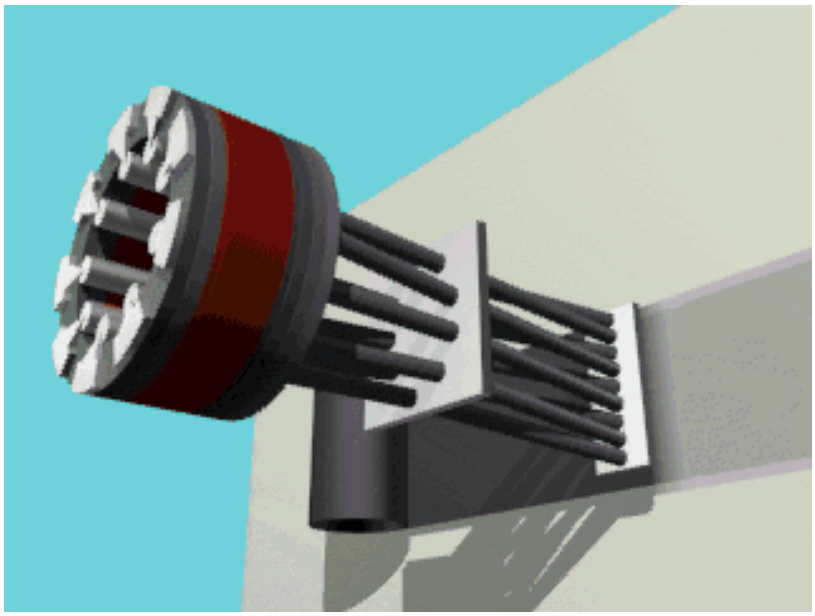
Nonimpact Printers

- Inkjet
  - Less expensive device
  - Print high-quality color images cost effectively

- Laser
  - More expensive device
  - Faster printing speed
  - Color lasers are becoming less expensive

Video - LaserJet

Video – Dot Matrix, InkJet



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Choosing a Printer

- Speed (ppm)
  - Range 8-38 ppm
- Resolution (dpi)
  - 1,200 to 4,800 dpi
- Color output
- Use and cost
- Cost of consumables
  - Cartridges and papers

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Specialty Printers

- All-in-one printer
  - Functions as printer, scanner, copier, and fax
- Thermal printer
  - Emerging as popular technology for mobile and portable printing
- Plotter
  - Used to print oversize images

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Plotter

- A printer that uses a pen
- Moves over a large revolving sheet of paper.
- Used in engineering, drafting, map making, and seismology.

Sound Output

- Speaker is output device for sound
  - Inexpensive speakers come with computers
  - Surround-sound speakers
  - Wireless speaker systems
- Headphones or earbuds avoid
  - distracting others

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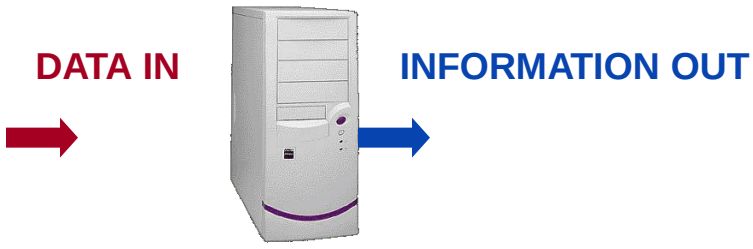
Processing: Transforming Data into Information



- The processing function:
  - Computers convert data into information

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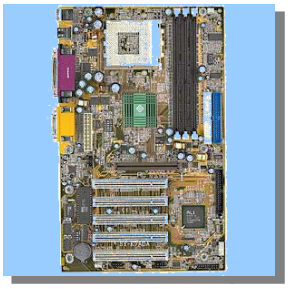
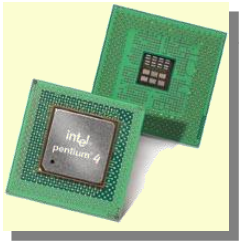
Processing Devices

Motherboard

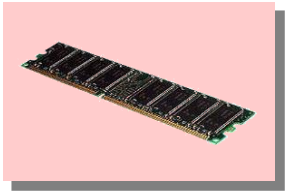


Expansion Card

Central Processing Unit – CPU

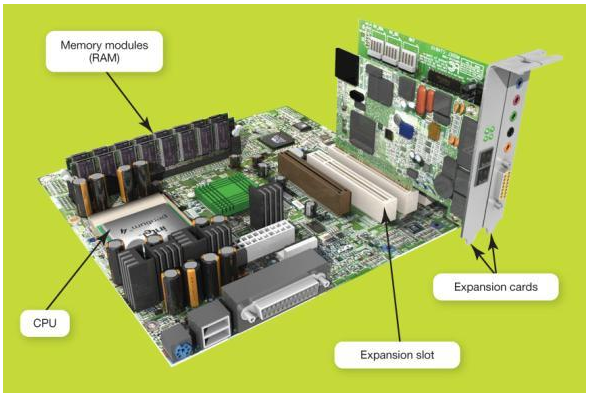


Random Access Memory– RAM



The Motherboard

- CPU
- RAM
- Expansion cards and slots
- Built-in components



RAM vs. ROM

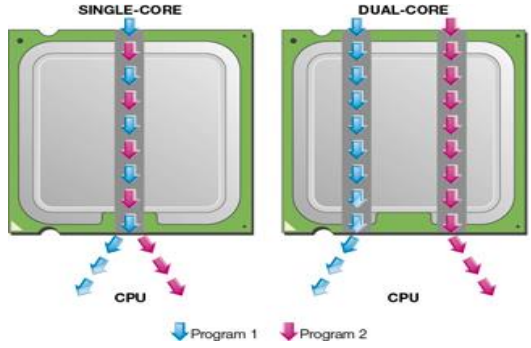
- Random access memory (RAM)
  - Stores instructions and data
  - Temporary (volatile) storage
  - Consists of several memory cards or modules
- Read-only memory (ROM)
  - Stores startup instructions
  - Permanent storage

Central Processing Unit

- Also called **CPU** or processor
- Referred to as the “brains” of the computer
- Controls all functions
  - performed by the computer’s other components
- Processes all commands and instructions
- Can perform billions of tasks per second

CPU Performance Measures

- Processor speed measured in hertz (Hz)
  - Megahertz (MHz) or Gigahertz (GHz)
- Number of cores
  - Single
  - Dual
  - Quad
  - Eight



Hard Drive

- Primary device for permanent storage
- Holds stored programs and data

Internal

External

Drive Bays

- Internal drive bays
  - Cannot be accessed from outside the system
  - Are reserved for internal hard drives
- External drive bays
  - Can be accessed from outside the system
  - CD or DVD drives
  - Floppy and Zip drives (legacy technology)

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Portable Storage

- External hard drives
  - Large portable storage needs
  - Small and lightweight
  - Attach to computer via USB port
  - Care must be taken when transporting

Flash Storage

- Flash drive, jump drive, USB drive, thumb drive
  - Use solid state flash memory
  - No moving parts
  - Significant storage capacity
  - Plug into USB ports
  - Appears as another disk drive

Optical Storage

- Compact discs (CDs)
  - Initially used to store audio files
- Digital video discs (DVDs)
  - Store more data than CDs
    - One-side/one layer
    - Double–sided/single layer
    - Double-sided/double layer
- Blu-ray discs (BDs)

Connecting Peripherals

- A port is a place through which
  - a peripheral device attaches to computer
- Many ports are located on back of computer
- Some commonly used ports
  - placed on front and sides for easier access

High Speed and Data Transfer Ports

- Universal serial bus (USB)
  - Most common port type
  - Used to connect input and output devices to computer
- USB 2.0 port is current standard
  - Transfer data at 480 megabits per second
- New USB 3.0 standard
  - Provides transfer speeds 10 times faster
  - Should quickly become the port of choice

Other Types of Ports

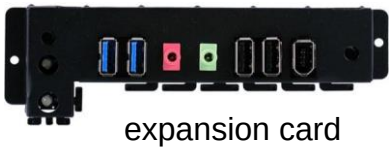
- FireWire 400
  - Move data at 400 Mbps
- FireWire 800
  - Doubles rate to 800 Mbps
- FireWire 3200
  - Has been ratified
  - Yet to reach market

Connectivity and Multimedia Ports

- Connectivity port
  - Give access to networks and the Internet
  - Ethernet port
  - Modem port
- Video ports
  - Connect monitors and multimedia devices
- Audio ports
  - Connect headphones, microphones, speakers

Adding Ports

- Expansion cards
  - New port standards
- Expansion hubs
  - Enable several devices to be connected to a port



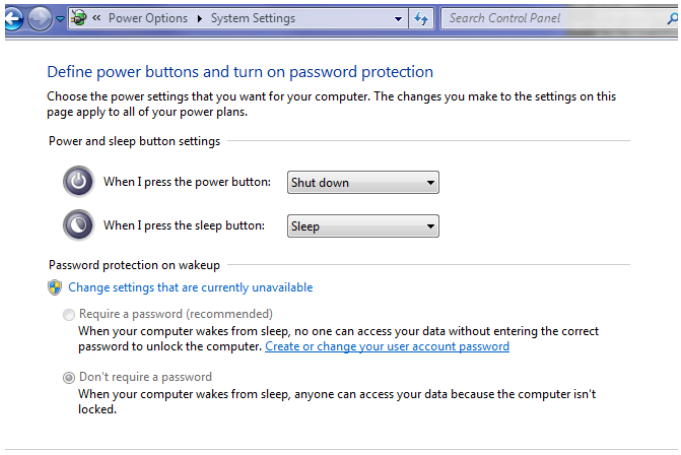
expansion card

expansion hub

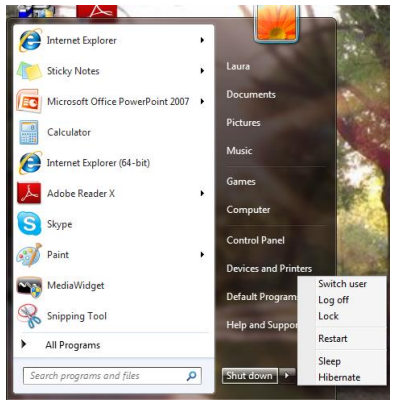
Power Controls

- Power supply
  - transforms wall voltage to voltages required by computer chips
- Cold boot: Power on your computer from a completely turned off state
- Warm boot: restart
- Power off computer properly
  - Save energy
  - Keep computer more secure
  - Ensure data is saved

Power Management Options



Windows 7 Start Menu



- Restart
  - Warm boot
- Shut Down
  - Power down
- Sleep
  - All documents and data remain in RAM
- Hibernate
  - Stores data in RAM and saves to hard drive

Setting It All Up: Ergonomics

- Ergonomics: Minimizing injury or discomfort while using the computer
- Steps to follow
  - Position monitor correctly
  - Use adjustable chair
  - Assume proper position while typing
  - Take breaks
  - Ensure adequate lighting

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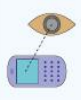
Setting It All Up (cont.)

- Mobile computing devices present challenges to injury prevention

Preventing Injuries While on the Go

	PDA/SMARTPHONE REPETITIVE STRAIN INJURIES	PORTABLE MEDIA PLAYER HEARING DAMAGE	SMALL-SCREEN VISION ISSUES	LAP INJURIES	TABLET REPETITIVE STRAIN INJURIES
					
Malady	Repetitive strain injuries (such as DeQuervain's tendonitis) from constant typing of instant messages	Hearing loss from high-decibel sound levels in earbuds	Blurriness and dryness caused by squinting to view tiny screens on mobile devices	Burns on legs from heat generated by laptop	Pain caused from using tablets for prolonged periods in uncomfortable positions
Preventative measures	Restrict length and frequency of messages, take breaks, and perform other motions with your thumbs and fingers during breaks to relieve tension.	Turn down volume (you should be able to hear external noises, such as people talking), use software that limits sound levels (not to exceed 60 decibels), and use external, over-ear style headphones instead of earbuds.	Blink frequently or use eye drops to maintain moisture in eyes, after 10 minutes take a break and focus on something at least 9 feet away for 5 minutes, use adequate amount of light, and increase the size of fonts.	Place a book, magazine, or laptop cooling pad between your legs and laptop.	Restrict the length of time you work at a tablet, especially typing or gaming. Use the same ergonomic position you would use for a laptop when using a tablet.

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Chapter 2 Summary Questions

- What exactly is a computer, and what are its four main functions?

Chapter 2 Summary Questions

- What is the difference between data and information?

Chapter 2 Summary Questions

- What are bits and bytes, and how are they measured?

Chapter 2 Summary Questions

- What devices do I use to get data into the computer?

Chapter 2 Summary Questions

- What devices do I use to get information out of the computer?

Chapter 2 Summary Questions

- What's on the motherboard?

Chapter 2 Summary Questions

- Where are information and programs stored?

Chapter 2 Summary Questions

- How are devices connected to the computer?

Chapter 2 Summary Questions

- How do I set up my computer to avoid strain and injury?