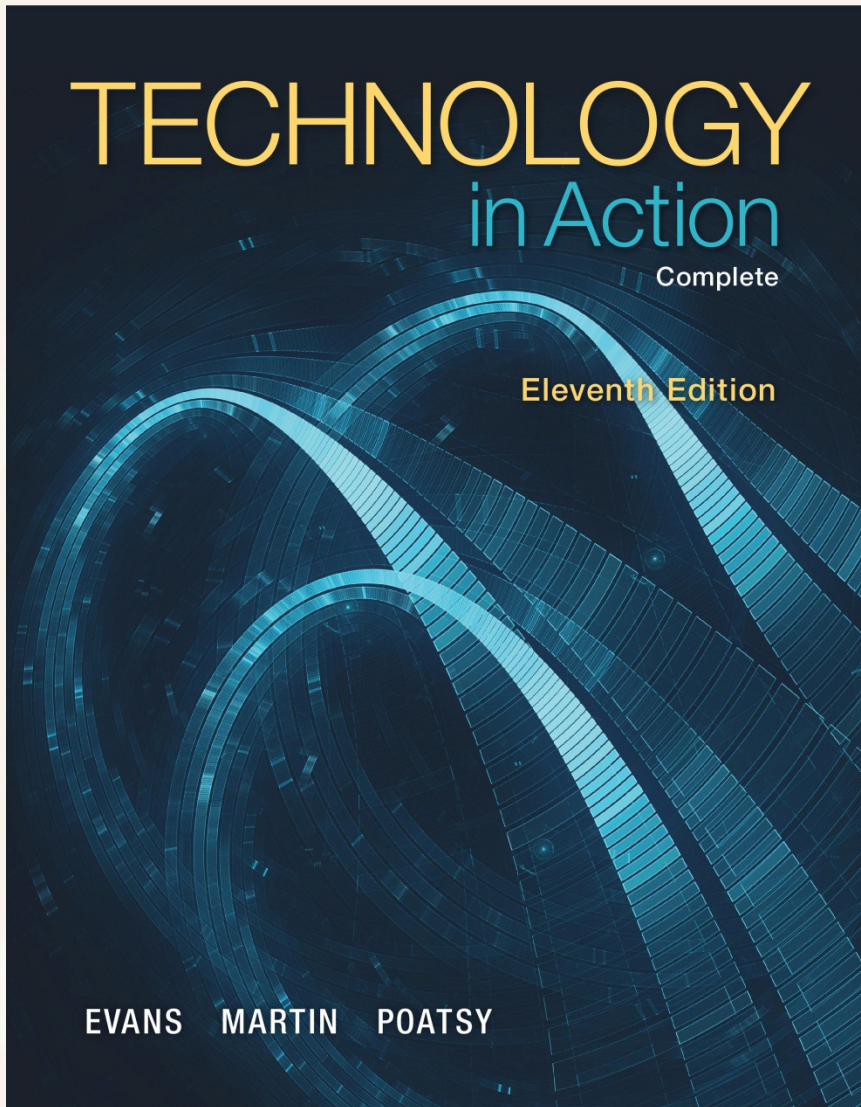




Technology in Action

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Eleventh Edition

Technology in Action

Chapter 2

Looking at Computers: Understanding the Parts

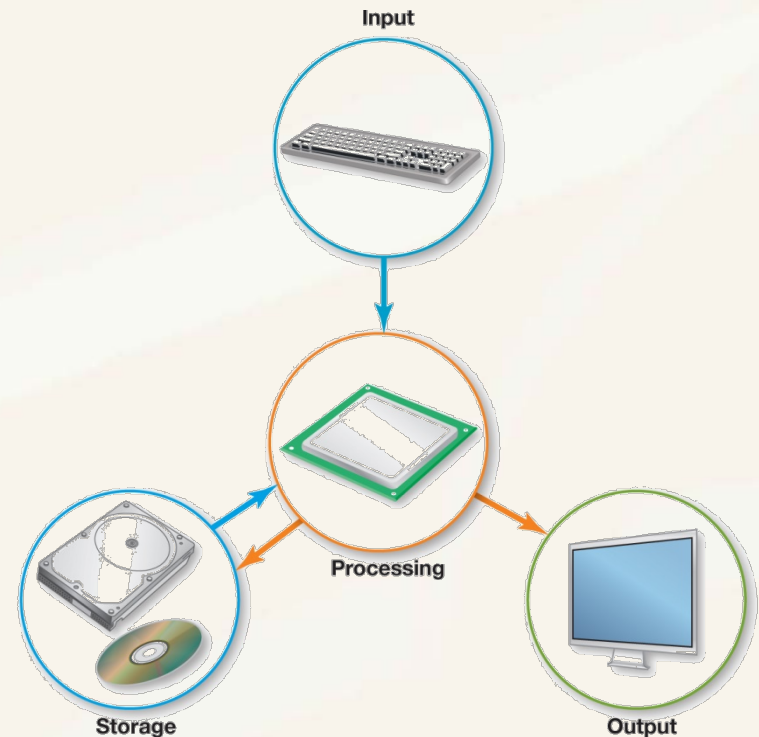
Chapter Topics

- Understanding Your Computer
- Input Devices and Output Devices
- Processing, Memory, and Storage
- Ports and Power Controls
- Setting It All Up

Understanding Your Computer:

Computers are Data Processing Devices

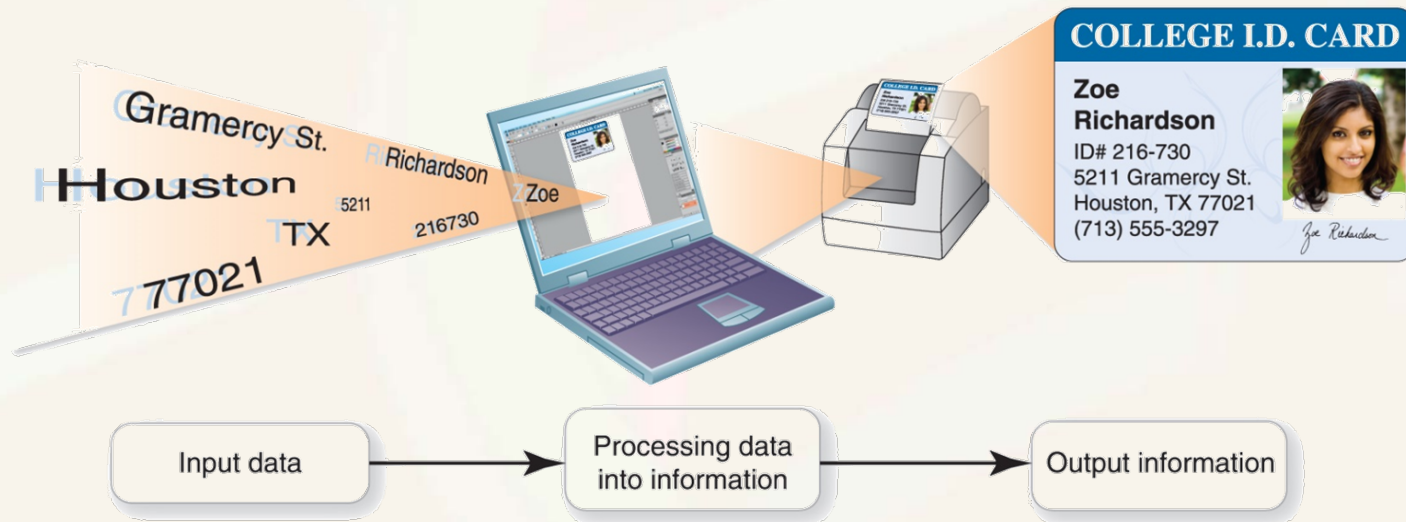
- Perform four major functions
 - Input: Gathers data, enter data
 - Process: Manipulates, calculates, or organizes data
 - Output: Displays data and information
 - Storage: Saves data and information



Understanding Your Computer:

Computers are Data Processing Devices

- Data
- Information
- Processing



Understanding Your Computer:

Bits and Bytes: The Language of Computers

- Bit
 - Binary digit
 - 0 or 1
- Byte
 - Unique combinations of 8 bits of 0s and 1s

Understanding Your Computer:

Bits and Bytes: The Language of Computers

Name	Abbreviation	Number of Bytes
Byte	B	1 byte
Kilobyte	KB	1,024 bytes (2^{10})
Megabyte	MB	1,048,576 bytes (2^{20} bytes)
Gigabyte	GB	1,073,741,824 bytes (2^{30} bytes)
Terabyte	TB	1,099,511,627,776 bytes (2^{40} bytes)
Petabyte	PB	1,125,899,906,842,62 bytes (2^{50} bytes)
Exabyte	EB	1,152,921,504,606,846,976 bytes (2^{60} bytes)
Zettabyte	ZB	1,180,591,620,717,411,303,424 bytes (2^{70} bytes)

Understanding Your Computer:

Bits and Bytes: The Language of Computers

- A combination of hardware and software processes data
 - Hardware
 - Software
 - Application software
 - System software
 - Operating system (OS)

Understanding Your Computer:

Types of Computers

- Two basic designs of computers
 - Portable
 - Tablet computers
 - Laptop or notebook computers
 - Netbooks
 - Ultrabooks
 - Tablet (convertible) PCs
 - Stationary
 - Desktop computers
 - All-in-one computers



Understanding Your Computer:

Types of Computers

- Mainframe
 - Many users simultaneously
- Supercomputer
 - Complex calculations
- Embedded
 - Self-contained
 - Example: electronic thermostat
- Smartphone

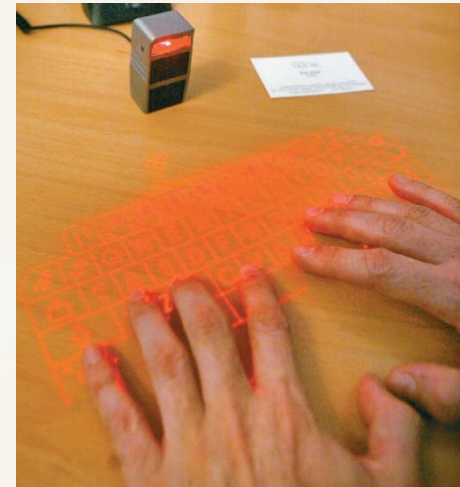


Input Devices

- Enter data and instructions
- Examples of input devices
 - Keyboards
 - Mouse
 - Microphone
 - Scanner
 - Digital camera
 - Stylus

Input Devices: Keyboards

- Touch screen keyboards
- QWERTY layout
- Wireless keyboards
- Bluetooth technology
- Alternative keyboards



Input Devices:

Mice and Other Pointing Devices

- Optical mouse
- Wireless mouse
- Touch pad or trackpad

Input Devices:

Mice and Other Pointing Devices

- Game controllers
 - Joysticks
 - Game pads
 - Steering wheels
- Most are wireless



Input Devices:

Image Input

- Digital cameras, camcorders, cell phones
- Scanners
- Webcams



Input Devices:

Sound Input

- Microphone (mic)
- Types of microphones
 - Close talk
 - Omnidirectional
 - Unidirectional
 - Clip-on (lavalier)

Output Devices

- Send data out of the computer
 - Text
 - Pictures
 - Sounds
 - Video
- Examples
 - Monitors
 - Printers
 - Speakers and earphones

Output Devices: Monitors

- Liquid crystal display (LCD)
- Light-emitting diode (LED)
- Organic light-emitting diode (OLED)



Output Devices: Monitors

- How LCD monitors work
 - Made up of pixels
 - Two or more sheets of material
 - Liquid crystal solution
 - Crystals block or let light through

Output Devices: Monitors

- Quality of an LCD
 - Aspect ratio
 - Resolution
 - Contrast ratio
 - Viewing angle
 - Brightness
 - Response time

Output Devices: Monitors

- 27-inch monitor
 - 2560 1440 pixels
- 21.5-inch monitor
 - 1680 1050 pixels
- Blu-ray movies
 - Require at least 1920 1080 pixels

Output Devices:

Monitors

- Built-in features
 - Speakers
 - Webcams
 - Microphones
 - Multiformat memory card reader
 - USB ports

Output Devices: Monitors

- Projectors
 - Entertainment projectors



Output Devices: **Printers**

- Inkjet printers
- Laser printers
- Nonimpact printers have replaced impact printers almost entirely

Output Devices: Printers

- Inkjet
 - Affordable
 - High-quality color
 - Quick and quiet



- Laser
 - Faster printing speed
 - Higher quality printouts
 - More expensive

Output Devices:

Printers

- Wireless printer
 - No wires
 - Print to same printer from different places
 - Two types
 - WiFi
 - Bluetooth
 - Print from portable devices

Output Devices: Printers

- All-in-one printer
 - Printer, scanner, copier, and fax
- Plotter
 - Prints oversize images
- Thermal printer



Output Devices: Printers

- Selecting a printer
 - Primary printing need first
 - Speed (pages per minute)
 - Resolution (dots per inch)
 - Color output
 - Cost of consumables

Sound Output

- Speaker
 - Output device for sound
 - Surround-sound speakers
 - Wireless speaker systems
- Headphones or earbuds

Check Your Understanding

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

Computers are devices that process data. They help organize, sort, and categorize data to turn it into information.

A computer's four major functions:

- Input: Gather data, or allow users to enter data.
- Process: Manipulate, calculate, or organize that data.
- Output: Display data and information in a form suitable for the user.
- Storage: Save data and information for later use.

Check Your Understanding

What is the difference between data and information?

- Data is a representation of a fact or idea
 - The number 3 and the words *televisions* and *Sony* are pieces of data
- Information is data that has been organized or presented in a meaningful fashion

Check Your Understanding

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

- Computers use *binary language*, consisting of two numbers: 0 and 1
- Each 0 and each 1 is a binary digit, or bit
- Eight bits equals one byte

Check Your Understanding

What devices can I use to get data into the computer?

- Input devices enter data (text, images, and sounds) and instructions (user responses and commands) into a computer
 - Keyboard
 - Mouse
 - Touch screens
 - Stylus
 - Scanners
 - Digital cameras
 - Camcorders
 - Webcams
 - Microphones

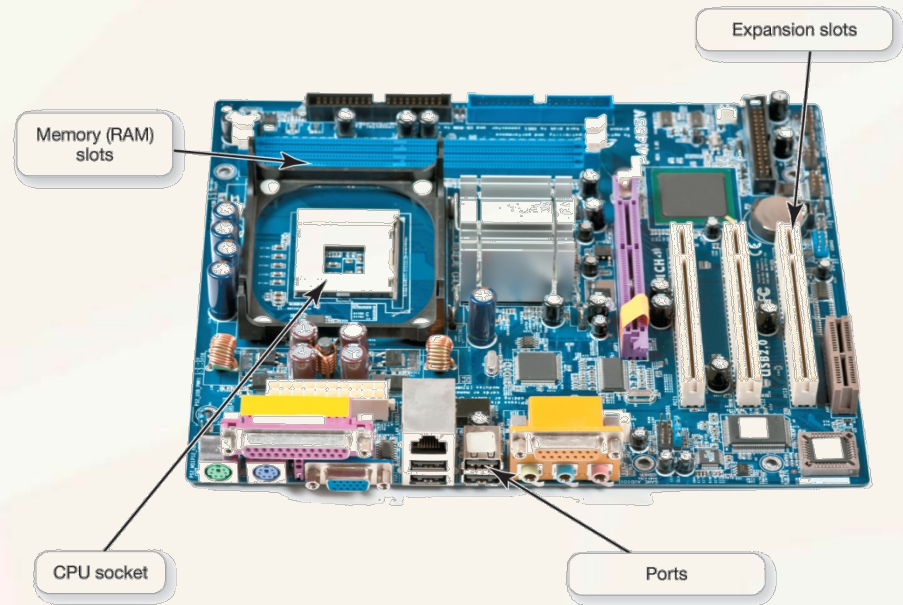
Check Your Understanding

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

- Output devices enable you to send processed data out of your computer
 - Text, pictures, sounds, or video
 - Monitors
 - Printers
 - Inkjet
 - Laser
 - All-in-ones
 - Plotters
 - Thermal printers
 - Speakers

Processing and Memory on the Motherboard

- Motherboard
- CPU
- ROM, RAM, and cache
- Slots for expansion cards
- Network interface card (NIC)



Processing and Memory on the Motherboard:

Memory

RAM

Random access memory

- Stores instructions and data
- Series of several memory cards or modules
- Temporary (volatile) storage

ROM

Read-only memory

- Stores startup instructions
- Permanent (nonvolatile) storage

Processing and Memory on the Motherboard:

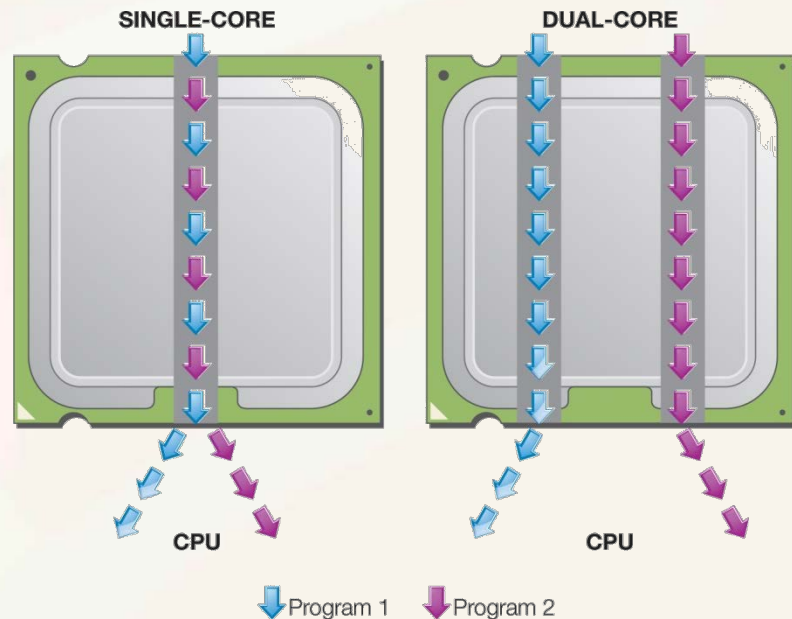
Processing

- Central Processing Unit
 - CPU or processor
 - “Brains” of the computer
 - Controls all functions of the computer’s components
 - Processes all commands and instructions
 - Billions of tasks per second

Processing and Memory on the Motherboard:

Processing

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



Storing Data and Information: Hard Drives

- Primary device for permanent storage
- Stored programs and data
 - Internal hard drive



Storing Data and Information: Hard Drives

- External hard drive
 - Outside the system
 - USB or FireWire port
- Solid-State Drive (SSD)
 - No moving parts
 - No noise
 - Emits little heat
 - Requires little power
 - Less likely to fail

Storing Data and Information: Hard Drives

- Internal drive bays
- External drive bays
 - House DVD or Blu-ray drives
 - Notebook expansion
 - Attach external drive

Storing Data and Information: Cloud Storage

- Types of Cloud Storage
 - Dropbox
 - OneDrive
 - iCloud
 - Google Drive

Storing Data and Information: Flash Storage

- External hard drives
 - Large portable storage needs
 - Small and lightweight
 - USB port



Storing Data and Information:

Flash Storage

- Flash drive—jump drive, USB drive, thumb drive
 - Solid-state flash memory
 - No moving parts
 - Significant storage capacity
 - USB
 - Appears as another disk drive
- Wireless flash drives



Storing Data and Information: **Flash Memory**

- Flash memory card
 - Convenient
 - Portable
 - Solid-state flash memory
 - Transfer data between devices

Storing Data and Information: Optical Storage

- Compact discs (CDs)
 - Audio files
- Digital video discs (DVDs)
 - Store more data than CDs
- Blu-ray discs (BDs)

Optical Storage Media Capacities

MEDIUM TYPE	TYPICAL CAPACITY
Blu-ray (dual layer)	50 GB
Blu-ray	25 GB
DVD DL (dual layer)	8.5 GB
DVD	4.7 GB
CD	700 MB

Connecting Peripherals to the Computer

- Port
 - Attaches peripherals



Connecting Peripherals to the Computer: High-Speed and Data Transfer Ports

- Thunderbolt Ports
 - Developed by Intel
 - Fiber optic technology
 - Transfer speeds up to 10 GB/s

Connecting Peripherals to the Computer: High-Speed and Data Transfer Ports

- Universal serial bus (USB)
- USB 3.0 standard port
 - Transfer speeds of 4.8 Gbps



Connecting Peripherals to the Computer: High-Speed and Data Transfer Ports

- FireWire 800
 - Doubles rate to 800 Mbps
- Declining in popularity

Connecting Peripherals to the Computer: Connectivity and Multimedia Ports

- Connectivity port
 - Access to networks and the Internet
 - Ethernet port
- Audio ports
 - Connect headphones, microphones, speakers

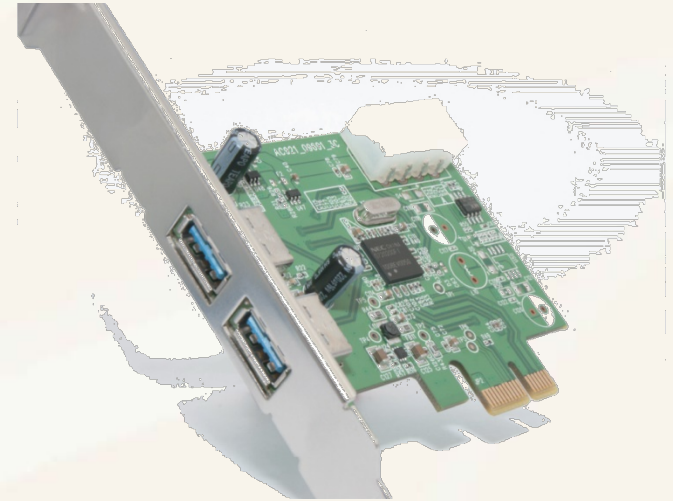
Connecting Peripherals to the Computer: Connectivity and Multimedia Ports

- Video ports
 - Connect monitors and multimedia devices
 - HDMI



Connecting Peripherals to the Computer: Adding Ports: Expansion Cards and Hubs

- Expansion cards
 - New port standards
- Expansion hubs
 - Connect several devices to a port



Power Controls

- Power supply
- Cold boot

Define power buttons and turn on password protection

Choose the power settings that you want for your computer. The changes you make to the settings on this page apply to all of your power plans.

 [Change settings that are currently unavailable](#)

Power button and lid settings

	 On battery	 Plugged in
 When I press the power button:	Hibernate ▾	Sleep ▾
 When I close the lid:	Sleep ▾ Do nothing Sleep Hibernate Shut down	Sleep ▾

Password protection on wakeup

☒ Require a password (recommended)
When your computer wakes from sleep, no one can access your data without entering the correct password to unlock the computer. [Create or change your user account password](#)

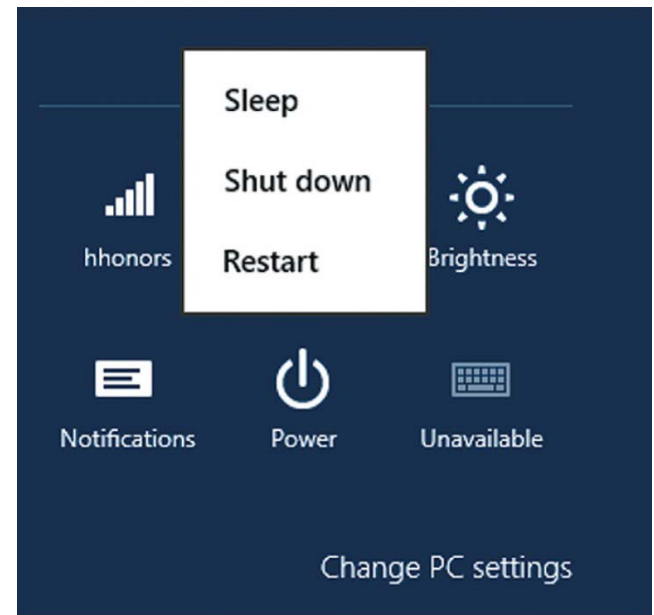
☐ Don't require a password
When your computer wakes from sleep, anyone can access your data because the computer isn't locked.

Power Controls

- Turning off your computer
 - Stress on computer vs. wasting electricity
 - Power-management settings
 - Windows 8 power-management options

Power Controls

- Sleep Mode
 - Documents, applications, data remain in RAM
- Hibernate
 - Similar to Sleep
 - Data stored on hard drive
 - Computer is powered off
- Warm boot



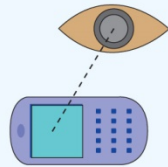
Setting It All Up

- Ergonomics
- Guidelines to follow
 - Monitor position
 - Adjustable chair
 - Proper position while typing
 - Take breaks
 - Adequate lighting

Setting It All Up

- Mobile computing and injury prevention

Preventing Injuries While on the Go

	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 8 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.

Setting It All Up

- Devices for People with Disabilities
 - Voice recognition
 - Larger key keyboards
 - Display screen keyboards
 - Specialized input consoles
 - Keyboards designed for one hand
 - Special trackballs
 - Head-mounted pointing devices

Check Your Understanding

What's on the motherboard?

- Motherboard - the main circuit board, contains:
 - CPU
 - Performance of a CPU is affected by:
 - Speed of the processor (measured in GHz)
 - Amount of cache memory
 - Number of processing cores
 - RAM
 - ROM
 - Slots for expansion cards

Check Your Understanding

Where are information and programs stored?

- Permanent Storage Devices
 - Hard drive
 - Flash drive
 - DVD drive
 - Cloud storage

Check Your Understanding

How are devices connected to the computer?

- Ports
 - Thunderbolt
 - USB
 - FireWire
 - Ethernet
 - HDMI
 - Audio (microphones, speakers, headphones)

Check Your Understanding

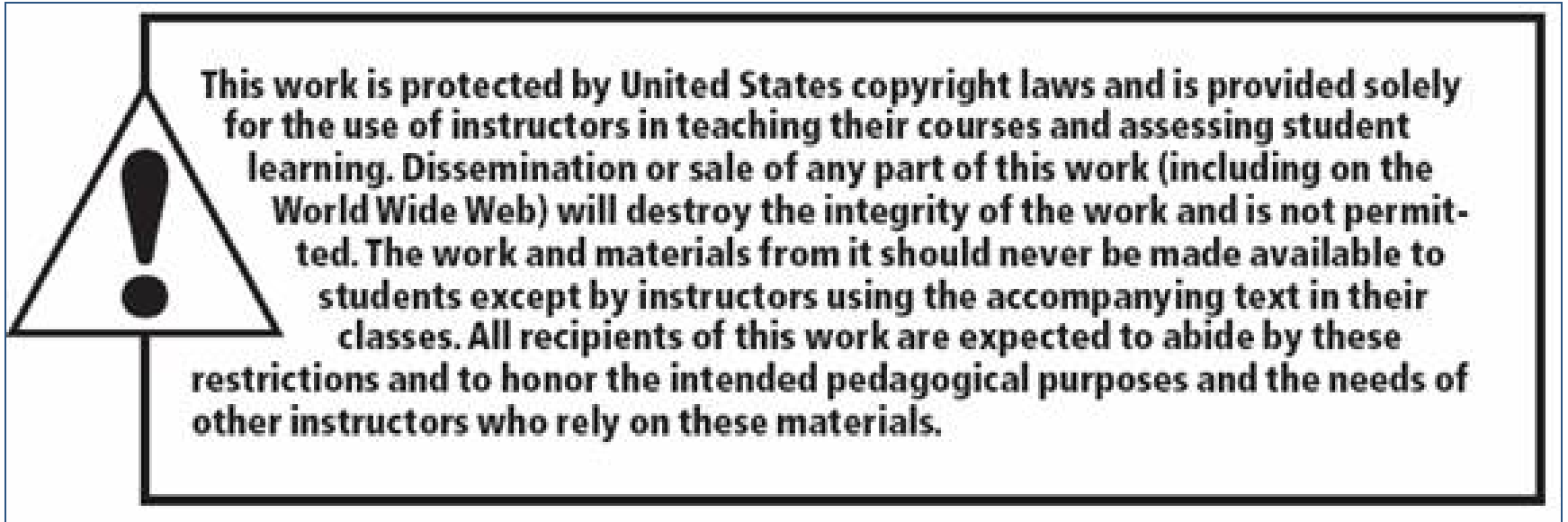
What's the best way to turn my computer on and off and when should it be done?

- Cold boot - power on your computer from a completely turned-off state
- With the power-management options of Windows 8, you only need to shut down your computer completely when you need to repair or install hardware in the system unit or move it to another location
- If you use your computer only for a little while each day, it would be best to power it off completely after use (to save electricity)

Check Your Understanding

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

- *Ergonomics* refers to how you arrange your computer and equipment to minimize your risk of injury or discomfort
 - Appropriate monitor position
 - Adjustable chair
 - Assuming a proper position while typing
 - Adequate lighting
 - Do not stare at the screen for long periods
 - Take frequent breaks
 - Ergonomic keyboards



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