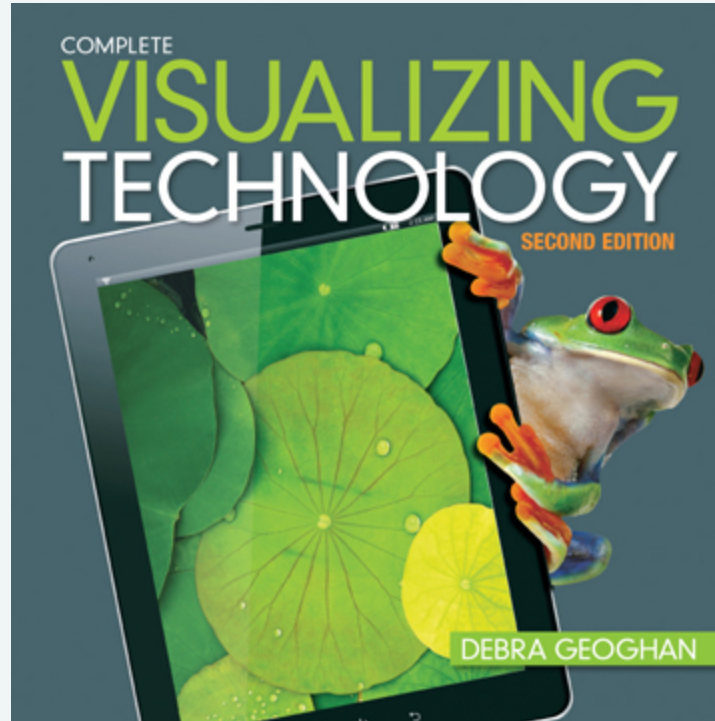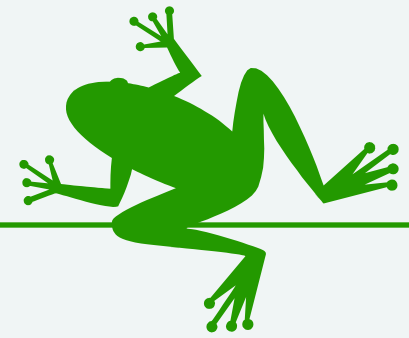# PowerPoint Presentation to Accompany

Chapter 4

Hardware

Objectives

1. Explain the function of the CPU.
2. Identify the parts of a system unit and motherboard.
3. Compare different types of storage devices.
4. List different input devices and their uses.
5. List different video and audio output devices and their uses.
6. Compare the features of different types of printers.
7. Explain and provide examples of the concept of adaptive technology.
8. Discuss the different communication devices that can be used.

Objective 1: Overview

The CPU: The Brains of the Operation

1. Examine the CPU: ALU and the control unit
2. Discuss the four steps of the instruction cycle
3. Pipelining vs. parallel processing
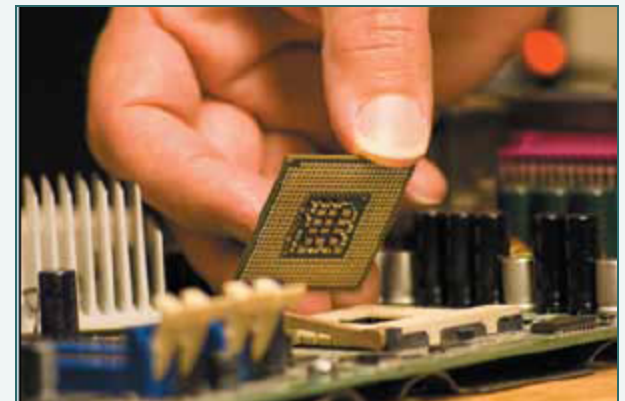4. Define and discuss multicore processor

Key Terms

- Arithmetic logic unit (ALU) and control unit
- Central processing unit (CPU)
- Clock speed and Gigahertz (GHz)
- Instruction cycle
- Multicore processor
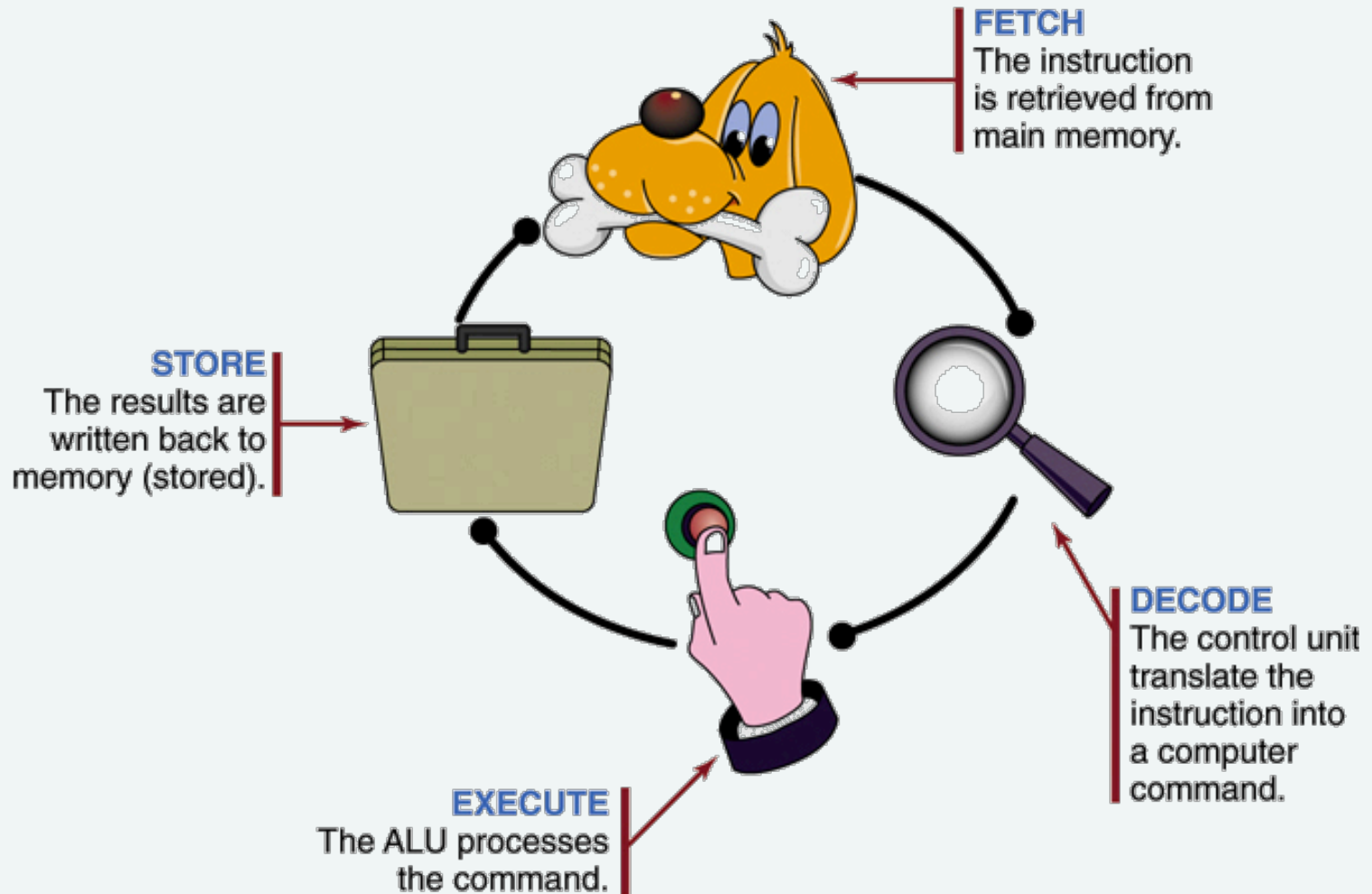- Parallel processing and pipelining processor

Functions of the CPU

- **Central Processing Unit** (CPU):
  - Brain of the computer
  - Housed inside system unit of the motherboard
  - Two parts
  - **Arithmetic Logic Unit** (ALU):
    - Performs arithmetic and logic
- **Control Unit:** Manages data through CPU
  - Three main functions:
    - Execute instructions
    - Perform calculations
    - Make decisions

Instruction Cycle
Fetch and Execute or Machine Cycle

FETCH
The instruction is retrieved from main memory.

DECODE
The control unit translate the instruction into a computer command.

EXECUTE
The ALU processes the command.

STORE
The results are written back to memory (stored).

CPU Performance

- Works so fast the user does not realize what is happening

- Clock speed:
    - Speed at which the processor executes the machine cycle

- Gigahertz (GHz):
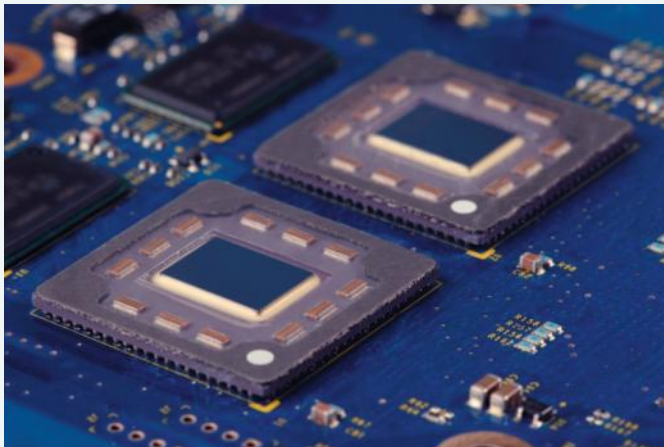   - How speed is measured, billions of cycles per second

CPU Performance

Pipelining:

- Used by a single processor
- Process is like a factory assembly line

Parallel processing:

- Uses multiple processors or multicore processors to divide work
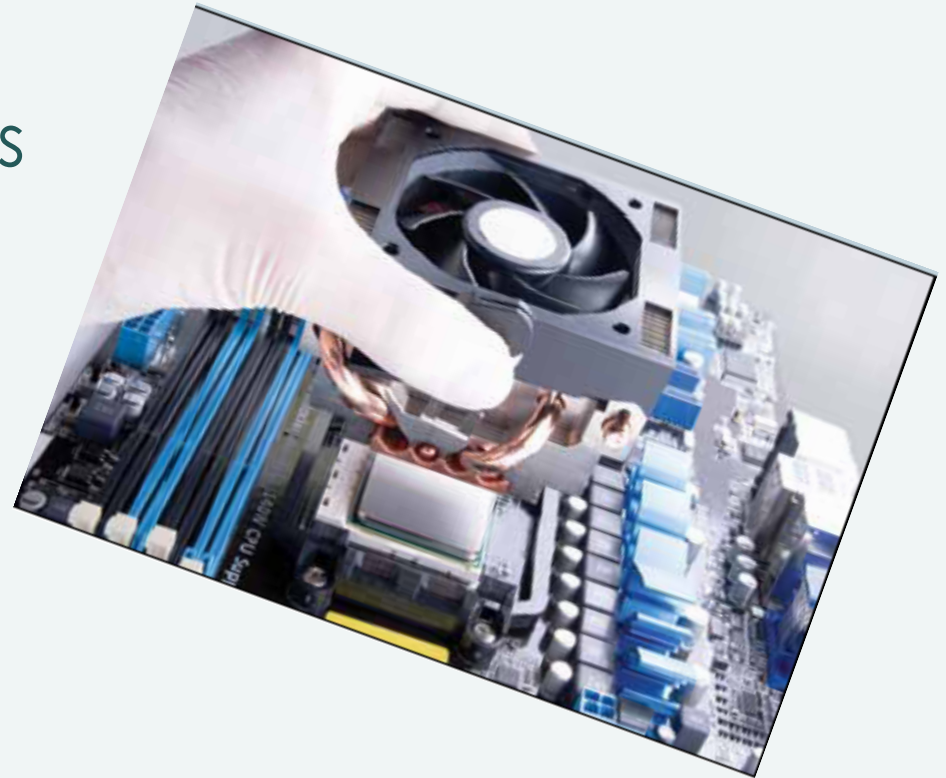- Each processor can use pipelining to further boost processing

Multicore processor:

- Two or more processors integrated on a single chip
  - Increases processing speed
  - Reduces energy consumption

CPU Performance

- Processing generates heat

- To keep CPU cool:
  - Heat sink
  - Cooling fan

What is the fastest processor available today for desktop computers? Notebooks? Netbooks? What are the two main manufacturers of processors today?

Objective 2: Overview

Getting to Know Your System Unit and Motherboard

1. Identify and locate the parts of a motherboard
2. Identify and locate the parts of the system unit
3. Understand how information flows between components over data buses
4. Identify drive controllers and interfaces
5. Identify and locate ports and connectors
6. Differentiate between the types of memory

Objective 2: Overview
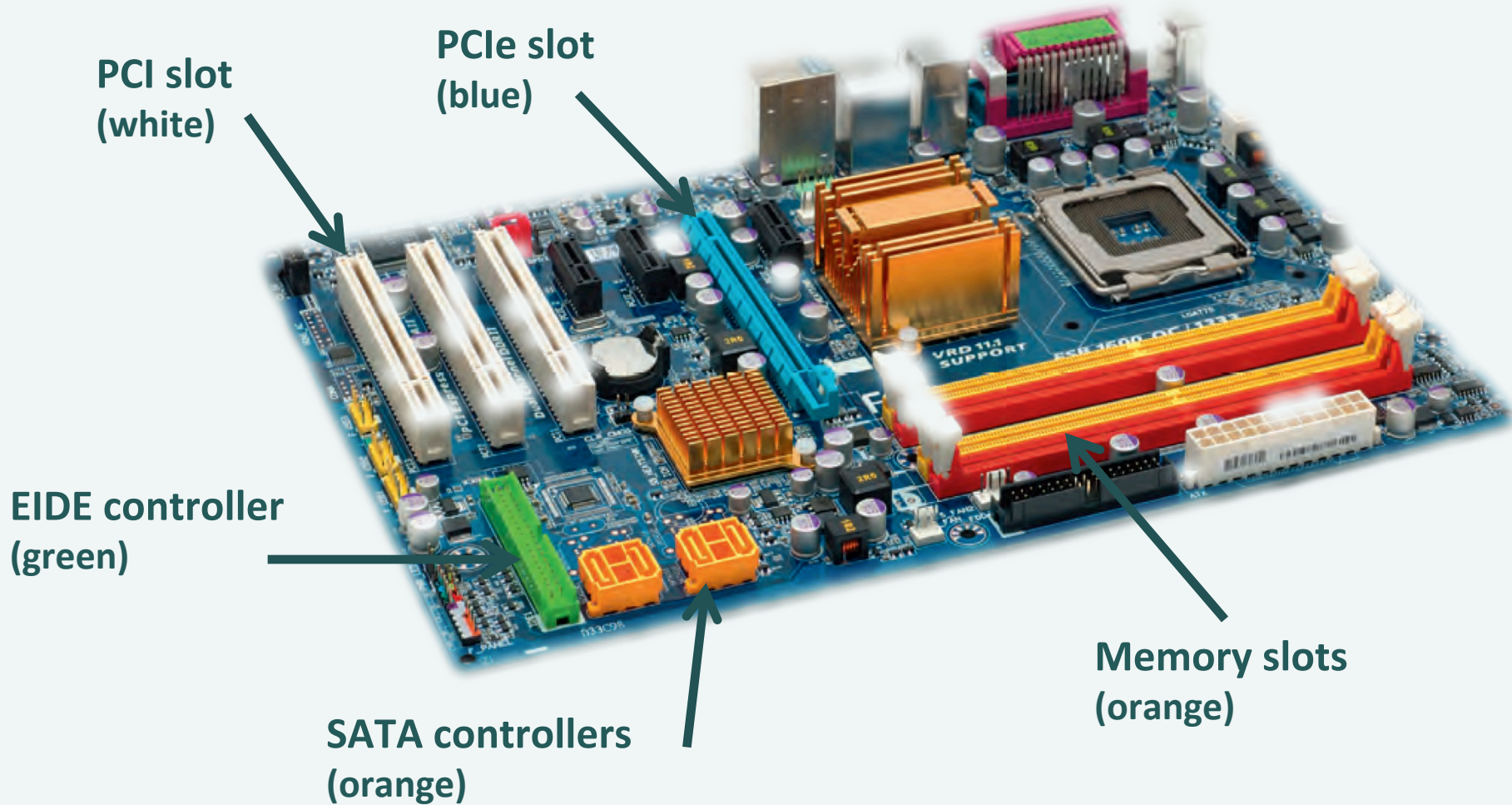
Getting to Know Your System Unit and Motherboard

Key Terms

- AGP
- BIOS
- Bluetooth
- Cache memory
- CMOS
- Data bus
- Drive controller
- EIDE
- Expansion card
- FireWire
- Hot-swappable

- IEEE 1934
- Memory
- Motherboard
- PCI
- PCIe
- Port
- PS/2 port
- RAM
- ROM
- Serial ports
- Parallel ports
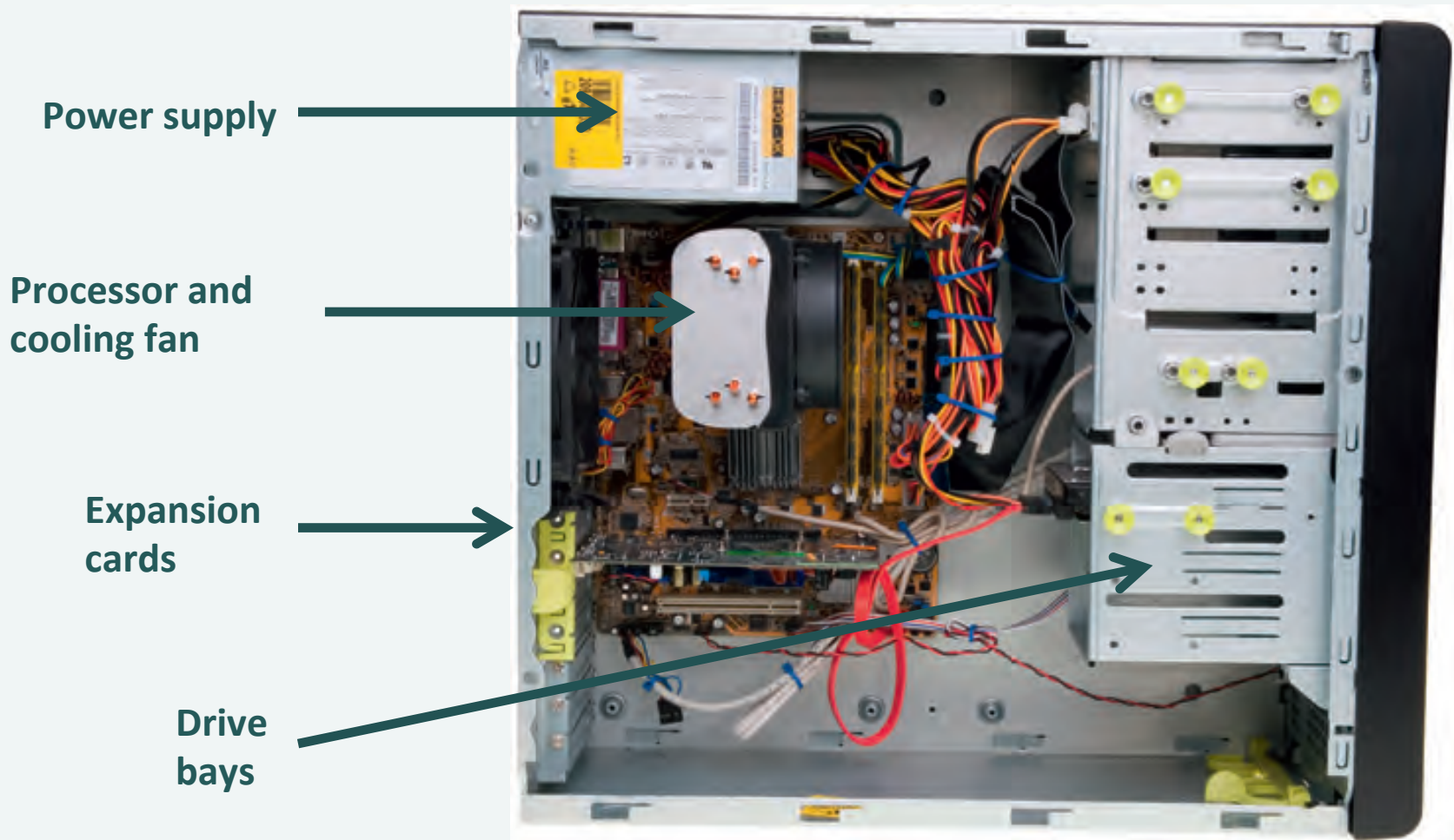- SATA

- System unit
- USB
- USB hub

The Motherboard
The Main Circuit Board of the Computer

PCI slot
(white)

PCIe slot
(blue)

EIDE controller
(green)

Memory slots
(orange)

SATA controllers
(orange)

The System Unit
The Physical Case

Power supply

Processor and cooling fan

Expansion cards

Drive bays

Drive Controller & Interfaces
Connect Disk Drives to the Processor

SATA cable

EIDE cable

Sound card

Network card
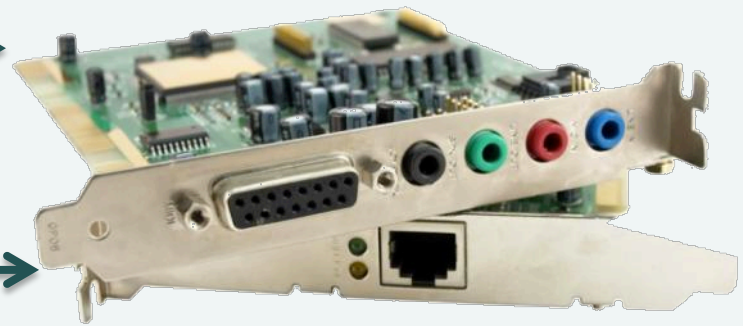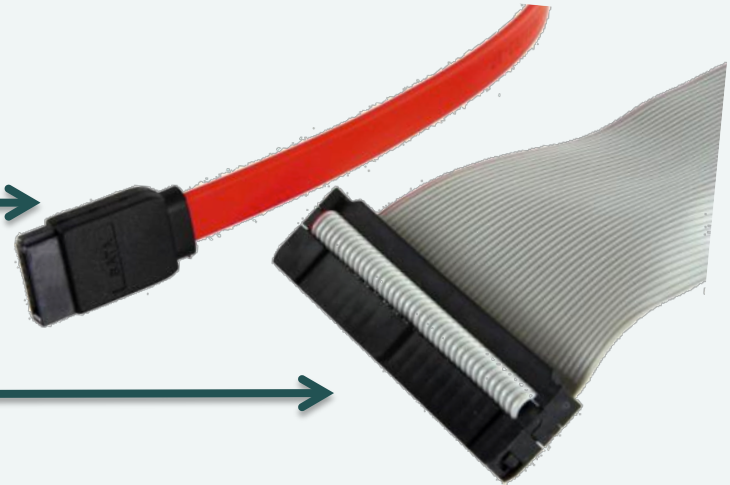
Ports & Connectors
Connect Peripherals to the Motherboard

PS/2 Keyboard mouse (purple/green)

Standard (VGA) video (blue) DVI (white)

Ethernet (network)

HDMI video

USB 3 (blue)

Audio
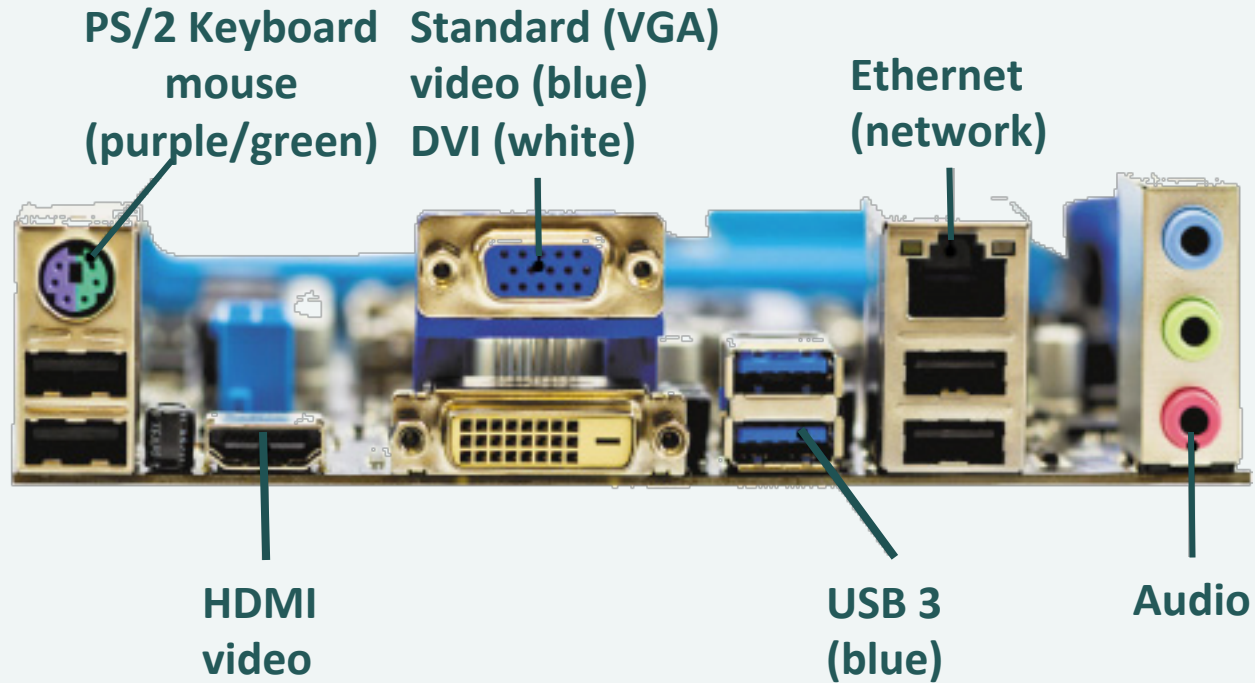
Ports & Connectors
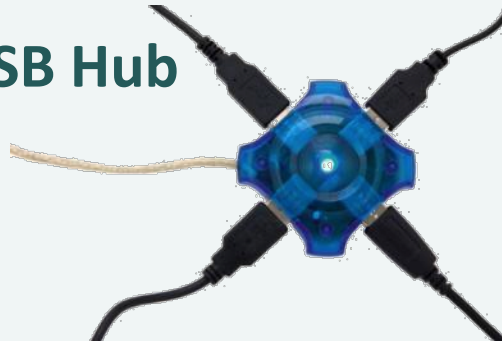## Connect Peripherals to the Motherboard
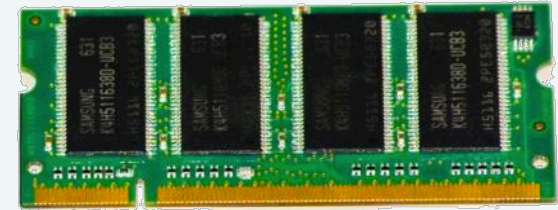
USB

FireWire

USB Hub

Memory
Temporary Storage Holds Instructions & Data

- Known as primary storage
- Types of memory used by computers:
  - Random Access Memory (RAM):
    - Volatile memory that holds the OS, programs, and data the computer is currently using
  - Cache memory:
    - Fast memory used to store frequently accessed information close to the processor

Using the Internet, research RAM. What is the fastest RAM available today for desktops? Notebooks? Netbooks? What is the average amount of RAM for each type? Which type of RAM is found in the most expensive systems?

Objective 3: Overview

A Place for Everything … & Everything in Its Place

1. Compare the different types of storage devices
2. List the characteristics of each type of storage device
3. Differentiate between optical and magnetic storage
4. List and describe different types of memory cards

Key Terms

- Blu-ray disc, CD, and DVD
- Flash drive and flash memory
- Hard drive
- Memory card
- Optical disc
- Solid-state storage

Storage Devices

- Optical discs
- Solid-state storage
- Magnetic storage

Solid State Drives

Flash Drives:

- Up to 128 GB of information
- Also known as:
  - Key drives
  - Thumb drives
  - Pen drives
  - USB drives

Memory cards:

- Storage in:
  - Digital cameras
  - Video games
  - Other devices
- Examples:
  - Secure Digital (SD)
  - Micro SD
  - xD-Picture Card (xD)

Hard Drives

- Main mass-storage devices
- Form of nonvolatile storage
  - When the computer is powered off, the data isn't lost
- Types:
  - Internal drives
  - External drive

Look at computer ads. What is the average size of a hard drive in desktop computers? Notebooks? Netbooks? Which types of optical drives are found in each of these types? Which other types of storage devices are listed? Can you add more storage later?

Objective 4: Overview

What Goes In ...

1. Discuss the different types of input devices
2. Discuss which devices input images, video, and audio
3. Discuss the most common input devices

Key Terms

- Biometric scanner
- Game controller
- Input device
- Joystick
- Keyboard
- Keypad
- Microphone

- Mouse
- RFID tag
- Scanner
- Stylus
- Touchpad
- Touch screen
- Webcam

Input Devices
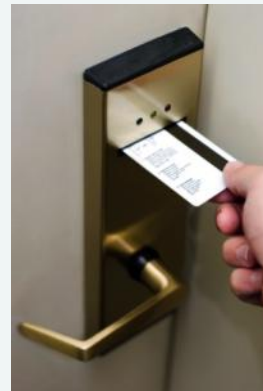## Devices Used to Get Data into the Computer

- Keyboard

- Keypad

- Mouse

- Touchpad

- Stylus

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Input Devices
Devices Used to Get Data into the Computer

- Digital cameras & webcams
- Optical scanners
- RFID scanners
- Magnetic strip reader
- Biometric scanners

Input Devices
Devices Used to Get Data into the Computer

- Microphones
- Game controllers
- Joysticks

A mouse and keyboard are standard input devices. Think about how you might use your computer in the future. Which other input devices might you need? Pick one device and research current models and cost. Which model would you choose and why?

Objective 5: Overview

… Must Come Out

1. List the different video output devices and their uses
2. List the different audio output devices and their uses
3. Differentiate among CRT, LCD, OLED, and AMOLED
4. Differentiate between DLP and LCD projectors
5. Understand the purpose of the video card
6. Understand the purpose of the audio card

Key Terms

- DLP projector
- Headphones
- LCD and OLED
- LCD projector
- Legacy technology

- Output device
- Plasma monitor
- Projector
- Resolution and pixel
- Video/sound card

Output Devices
Information Returned to the User

Video Output Devices

- Monitors
- CRT
- LCD
- Plasma
- OLED
- Projectors
- DLP
- LCD

Audio Output Devices

- Speakers
- Headphones

Printer Output Devices

- Inkjet
- Photo
- Dye-sublimation thermal
- Laser
- Plotters
- Multifunction

Video Output Devices

- CRT
  - Cathode ray tube; considered legacy technology
- LCD
  - Liquid crystal display; popular in desktops and notebooks
- Plasma
  - Larger in size; mostly used with media center systems or in conference rooms
- OLED
  - Organic light-emitting diode; considered next technology of monitors
- AMOLED
  - Active matrix OLED screens; found in some mobile devices
  - Sharper and have a wider viewing angle
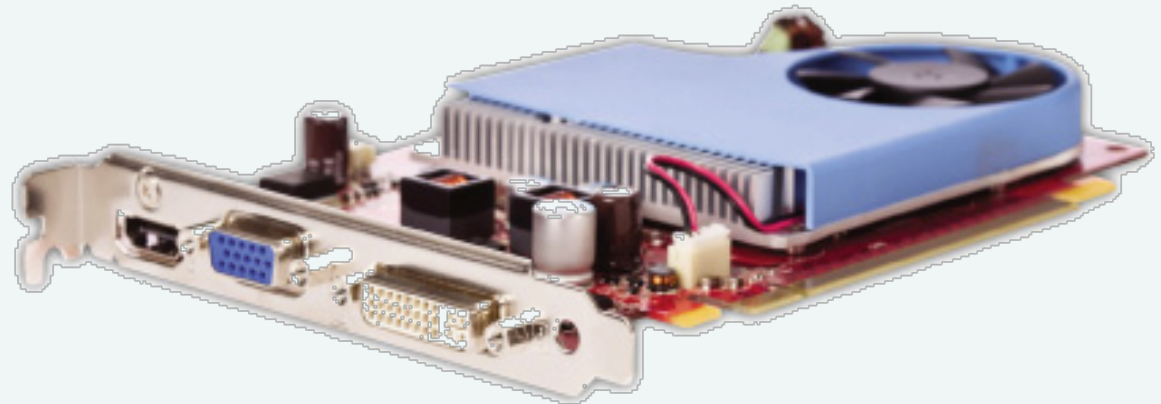
Video Output Devices
Information Returned to the User

- Digital light processing (DLP)
- Liquid crystal display (LCD)

DISPLAY TYPE/SIZE	ADVANTAGES	DISADVANTAGES
LCD Size: 13" to 65" and larger	• Panels weigh less than plasma • Use less energy than CRTs or plasmas • Better in bright-light situations	• Picture is slightly less natural than top plasmas • More expensive than comparable plasmas • Screens larger than 52" are very expensive
Plasma Size: 32" to 61"	• The screen's phosphor coating creates lifelike color and truer blacks that are closest to conventional tube TVs.	• Not available in sizes smaller than 32" • Heavy and fragile, plasmas are difficult to install

The Video Card

- Data signal and connection for a monitor or projector
- Also called:
  - Graphics card
  - Display adapter
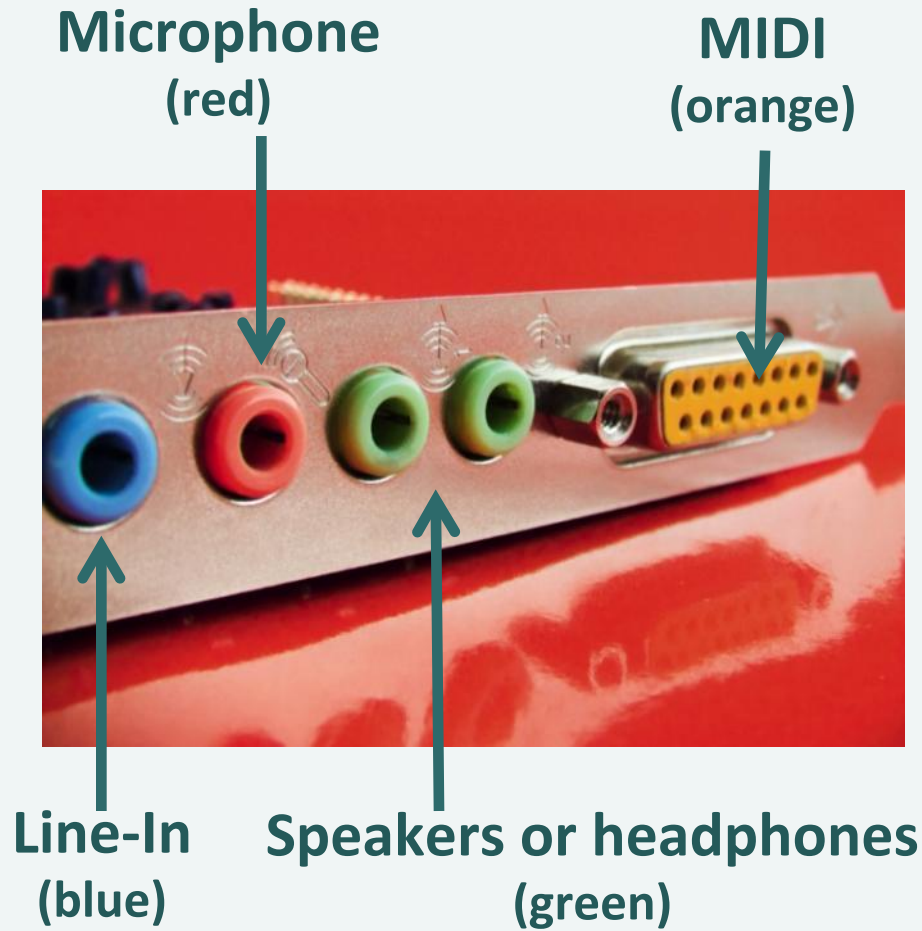
Digital Visual Interface Ports

- DVI (digital visual interface)
- HDMI
- S-Video (Super video)
- VGA (Video graphics array)

Audio Output Devices
Information Returned to the User

- Speakers:
  - Convert digital signals into sound
- Headphones:
  - Convert digital signals into sound

The Sound Card

Microphone
(red)

MIDI
(orange)

Audio connections:
- Input devices
- Output devices
- Integrated on the motherboard
- Connected via:
  - Expansion card
  - External USB
  - FireWire

Line-In
(blue)

Speakers or headphones
(green)

If you were going to purchase a new desktop computer today, one decision you would have to make is what type and size of monitor you would choose. Think about the room, lighting, and purpose. Determine the type and size of monitor you would need. Using the Internet, compare several models, and choose the one that best fits your needs.

Objective 6: Overview

Pick a Printer

1. Compare the different types of printers
2. List and compare printer features
3. Discuss the types of specialized printers

Key Terms

- CMYK
- Dye-sublimation
- Inkjet printer
- Laser printer
- Multifunction device
- Photo printer

- PictBridge
- Plotter
- Thermal printer

Printer Options

Inkjet:

- Sprays droplets of ink onto paper

Photo:

- Prints high-quality photos

Dye-sublimation:

- Uses heat to turn solid dye into a gas that is then transferred to special paper

Thermal:

- Heats specially coated heat-sensitive paper, which changes color when heat is applied

Thermal Printer

Printer Options

Laser:
- Uses a laser beam to draw an image on a drum

Plotter:
- Uses pens to draw an image on a roll of paper used to produce very large printouts

Multifunction:
- Has built-in scanner, fax, copy, and print capabilities

CMYK
Cyan, Magenta, Yellow, Key (Black)

Colors used by inkjet and
dye-sublimation printers
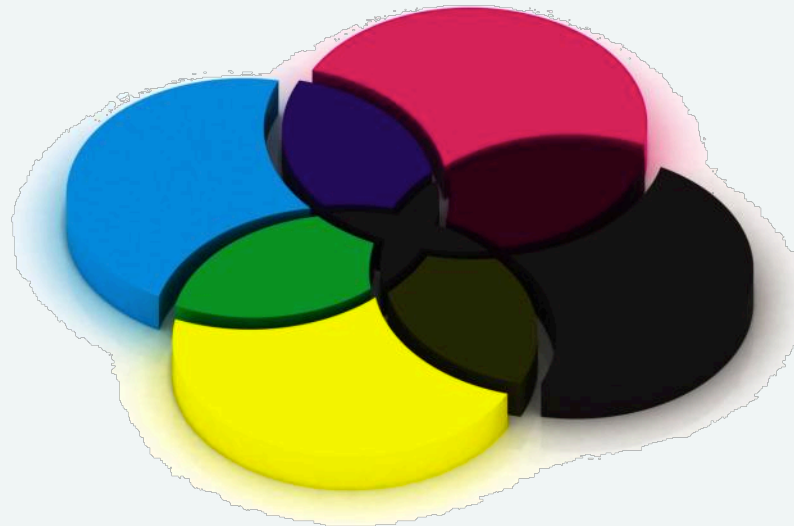
3D Printers

- Create objects such as prototypes and models
  - Image is created by scanning an object or designed using computer software
  - Creates the model by building layers of material
- Uses:
  - Dental and medical imaging
  - Paleontology
  - Architecture
  - Creating sculpture and jewelry
  - And more!

You need to purchase a printer. Think about the documents you will print. Will you print mostly text? Will you print photos? Do you want to connect a camera via USB or by memory card? Do you need to scan or fax? Using the Internet, compare several models, and choose the one that best fits your needs.

Objective 7: Overview

Adaption: Making Technology Work for You

1. Explain the concept of adaptive technology
2. Provide examples of adaptive technology

Key Term

- Adaptive technology

Adaptive Technology

- Assistive technology
- Used by individuals with disabilities to interact with technology
- Includes both hardware and software
- Modern OSs include accessibility settings
- **Americans with Disabilities Act** (ADA) requires employers to make reasonable accommodations for disabled employees

Adaptive Technology

Adaptive Input Devices

- Braille-writing devices
- Eye-driven keyboards
- Keyboards with locator dots or large-print key labels
- On-screen keyboards
- Voice recognition software

Adaptive Output Devices

- Standard monitors can be adapted by magnifying the screen
- Speech synthesis screen-reader software and audio alerts
- Closed captions and visual notifications
- Braille embossers translate text to Braille

Adaptive Technology for Everyone
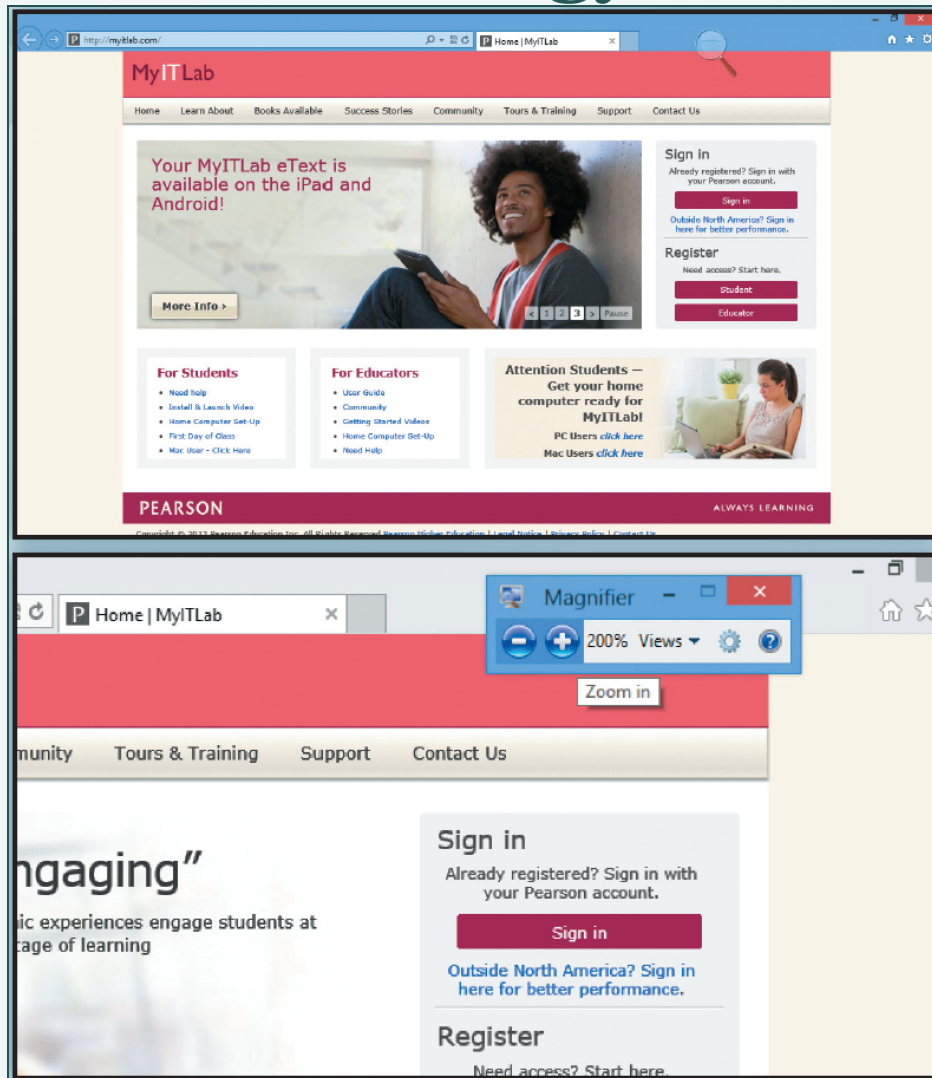
Are there any adaptive technology devices that you would include to meet the needs of any of the users for this computer?

Objective 8: Overview

Communicate, Communicate, Communicate

1. Discuss the different types of communications devices
2. Discuss how these communications devices can be used
3. Discuss the difference between analog and digital signals

Key Terms

- Communication devices
- Modem
- Network adapter

Communication Devices
Network Adapters| Modems | Fax Devices

- Communication devices serve as both input and output devices

- Allows you to connect to other devices on a network or the Internet

- Includes:

  - Network adapters

  - Modems

  - Fax machines

Communication Devices
Network Adapters| Modems | Fax Devices

- Network adapters:
  - Establish a connection with a network
- Modems:
  - Connect a computer to a telephone line
  - Used for dial-up Internet access
- Fax devices:
  - Stand-alone
  - Part of a multifunction device
  - Built into a modem

Communication Devices
Analog & Digital Signals

Analog signals: Continuous waves
Digital signals: On/off transmissions
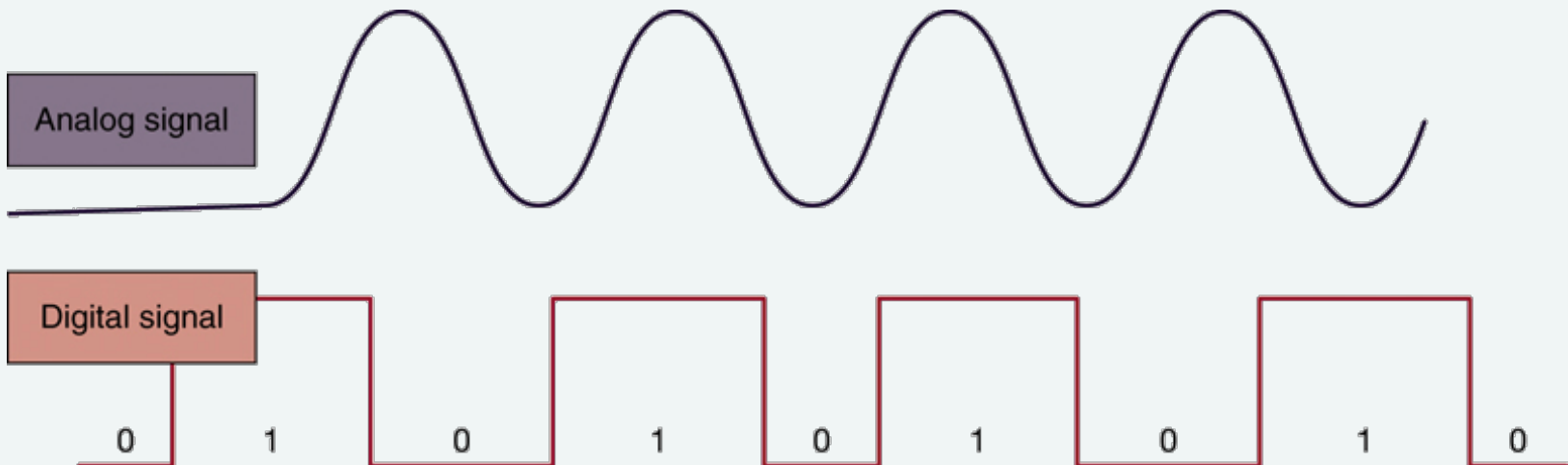
Think about the location for this computer. What type of communication devices do you need to connect to the Internet? Will it connect to a network? Is it wired or wireless? Do you need fax capabilities?