Curriculum Development
Centers Program

Awardee of The Office of the National Coordinator for
Health Information Technology

Component 4: Introduction to Information and Computer Science

Unit 1: Basic Computing
Concepts, Including History
Lecture 1

Unit 1 Objectives

- Define what a computer is
- List different types of computers (PCs, mobile devices, embedded computers, etc.)
- Define common elements of computer systems
- Describe the various hardware and software options for typical desktop, laptop and server systems for home/business use (focusing on healthcare systems)
- Explain the development of computers and the Internet, including healthcare systems up until the present time

Computer Definition

- According to Webster's Dictionary:

  one that computes; *specifically* : a programmable usually electronic device that can store, retrieve, and process data

- Originally term applied to people

Types of Computers
Personal Computers

- Desktop computer
- Laptop/Notebook/Netbook
- Tablets/iPad
- Smartphones

Laptop
http://en.wikipedia.org/wiki/Laptop

iPad
© Glenn Fleishman

Android Smartphone
http://en.wikipedia.org/wiki/File:Android_
home.png

Types of Computers
Large Scale Computers

- Mainframe
- Server
- Supercomputer

IBM 704 Mainframe
Lawrence Livermore National
Laboratory

The Columbia Supercomputer at NASA Ames

Types of Computers
Embedded Computers

DVD

MRI
Laboratory of Functional and
Molecular Imaging,
NINDS, NIH

Household Appliances

ABS Brakes
© Jeff Dean

Computer Components

- Hardware
- Software

Computer Hardware
Input Devices

- Keyboard
- Touch Screen
- Mouse
- Microphones
- Camera
- Stylus
- Scanners

Computer Hardware
Output Devices

- Monitors
- Projectors
- Printers
- Sound Output

Computer Hardware
Motherboard

- A motherboard is a circuit board
- Contains
  - Processor
  - Memory
  - Connectors
  - Expansion slots

Example motherboard

Computer Hardware
Processor

Intel 80486DX CPU
© Andrew Dunn

- The processor or Central Processing Unit (CPU) is the "brain" of the computer
- Controls all functions of the computer
- Its processing speed is measured in hertz (Hz)
  - Current systems run at GHz speeds (billion machine cycles per second)
  - Not the only determinant of overall computer speed
- Modern systems have multiple processors or cores

Computer Hardware
Memory

RAM Memory Modules

- Two types
  - Read Only Memory (ROM): permanent
  - Random Access Memory (RAM): volatile
- RAM is where programs are stored as they run
  - Known as primary storage
  - Can be multiple levels of RAM
- Too little memory can slow down computer

Computer Hardware
Secondary Storage

- Secondary storage is permanent, off chip storage
- Hard drives: internal and external
- Slower than memory

Internal View of Hard Drive

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Computer Hardware
Other storage

- Removable storage
  - Floppy disks
  - Optical disks
  - USB Flash drive

DVD

USB Flash Drive

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Computer Hardware
Connectors and Ports

- Ports are way to connect peripheral devices to your computer
- Universal serial bus (USB) port is very fast
- Other ports
  - Video
  - Audio
  - Firewire
  - Ethernet
  - Modem

USB Cable

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Computer Software
Operating System

- The operating system (OS) coordinates hardware and software
- Computers cannot run without an OS
- Allows users to interact with the computer
- Manages tasks in the CPU, memory, storage, peripheral devices, programs, etc.
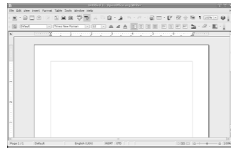- Examples
  - Microsoft Windows
  - Mac OS
  - Linux

Computer Software
Application Software

- Application software are the programs you run
- Includes
  - Word processors
  - EMR
  - Spreadsheets
  - Browsers
  - Video Games

OpenOffice Word Processor

More Components

- Networks
  - Allow computer to connect to others and to Internet
  - Hardware: network ports, connections, routers
  - Software: OS and NOS
- Databases
  - Collection of data easily stored and retrieved
  - Hardware: server (computer and storage)
  - Software: DBMS

Computer Software and Hardware

- Software is the interface between the user and the computer
- Without meaningful, easy to use applications, people wouldn't use computers
- If the hardware is slow, people won't use the applications
- Important to get a good balance

Summary

- Computers are electronic devices that input, calculate and output data
- Computers range from PCs to large mainframes and supercomputers
- Computers are also found in most electronic devices today
- Composed of hardware and software