

**Component 4: Introduction to Information and Computer Science**

Unit 1: Basic Computing Concepts, Including History

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**Unit 1 Objectives**

- Define what a computer is
- List different types of computers (PC's, 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

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**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



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### Types of Computers Personal Computers


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



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



Android Smartphone  
[http://en.wikipedia.org/wiki/Android\\_%28mobile\\_device\\_platform%29](http://en.wikipedia.org/wiki/Android_%28mobile_device_platform%29)



iPad  
© Glenn Fleishman

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### Types of Computers Large Scale Computers

- Mainframe
- Server
- Supercomputer



The Columbia Supercomputer at NASA Ames



IBM 704 Mainframe  
Lawrence Livermore National Laboratory

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### Types of Computers Embedded Computers




DVD  
© Filipe Micaroni Lalli



ABS Brakes  
© Jeff Dean



Household Appliances



MRI  
Laboratory of Functional and Molecular Imaging,  
NINDS, NIH

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## Computer Components

- Hardware
- Software



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## Computer Hardware Input Devices

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



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## Computer Hardware Output Devices

- Monitors
- Projectors
- Printers
- Sound Output



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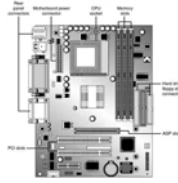
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## Computer Hardware Motherboard

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



Example motherboard

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10

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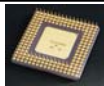
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## Computer Hardware Processor

- 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



Intel 80486DX CPU  
© Andrew Dunn

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11

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## Computer Hardware Memory

- 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



RAM Memory Modules

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12

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### 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



USB Flash Drive



DVD

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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



Start Button from Windows OS

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## Computer Software Application Software

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



OpenOffice Word Processor

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## 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

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### 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

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19

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### Summary

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

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20

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