Basics

Machine, software, and program design

Computer Organization

- CPU - central processing unit
  - Where decisions are made, computations are performed, and input/output requests are delegated
- Memory
  - Stores information being processed by the CPU
- Input devices
  - Allows people to supply information to computers
- Output devices
  - Allows people to receive information from computers
Computer Organization

CPU

- **Brains** of the computer
  - Arithmetic calculations are performed using the Arithmetic/Logical Unit or ALU
  - Control unit decodes and executes instructions
- Arithmetic operations are performed using binary number system
Control Unit

- The fetch/decode/execute cycle is the steps the CPU takes to execute an instruction.
- Performing the action specified by an instruction is known as *executing the instruction*.
- The program counter (PC) holds the memory address of the next instruction.

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Input and Output Devices

- Accessories that allow computer to perform specific tasks
  - Receive information for processing
  - Return the results of processing
  - Store information

- Common input and output devices
  - Speakers, Mouse, Scanner
  - Printer, Joystick, CD-ROM
  - Keyboard, Microphone, DVD

- Some devices are capable of both input and output
  - Floppy drive, Hard drive, Magnetic tape units

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Monitor

- Display device that operates like a television
- Controlled by an output device called a graphics card
- Displayable area
  - Measured in dots per inch, dots are often referred to as pixels (short for picture element)
  - Standard resolution is 640 by 480
  - Many cards support resolution of 1280 by 1024 or better
  - Number of colors supported varies from 16 to billions

Software

- Application software
  - Programs designed to perform specific tasks that are transparent to the user

- System software
  - Programs that support the execution and development of other programs
  - Two major types
    - Operating systems
    - Translation systems
Application Software

- Application software is the software that has made using computers indispensable and popular

- Common application software
  - Word processors
  - Desktop publishing programs
  - Spreadsheets
  - Presentation managers
  - Drawing programs

- *Learning how to develop application software is our focus*

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Operating System

- Examples
  - Windows®, UNIX®, Mac OS X®

- Controls and manages the computing resources

- Important services that an operating system provides
  - File system
    - Directories, folders, files
  - Commands that allow for manipulation of the file system
    - Sort, delete, copy
  - Ability to perform input and output on a variety of devices
  - Management of the running systems
Translation System

- Set of programs used to develop software
- A key component of a translation system is a translator
- Some types of translators
  - Compiler
    - Converts from one language to another
  - Linker
    - Combines resources
- Examples
  - Microsoft Visual C++®, CBuilder®, g++, Code Warrior®
    - Performs compilation, linking, and other activities.

Software Development Activities

- Editing
- Compiling
- Linking with precompiled files
  - Object files
  - Library modules
- Loading and executing
- Viewing the behavior of the program
Software Development Cycle

Source Program

Compile

Library routines

Link

Other object files

Edit

Load

Think

Execute

IDEs

- Integrated Development Environments or IDEs
  - Supports the entire software development cycle
    - E.g., MS Visual C++, Borland, Code Warrior
  - Provides all the capabilities for developing software
    - Editor
    - Compiler
    - Linker
    - Loader
    - Debugger
    - Viewer