Computer Fundamentals

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Lecture 18

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Outline

- Creating computer programs

Objectives

- Define term computer program
- Describe use of flowcharts and pseudocode in programming
- Identify ways in which a program can work toward a solution
- Object Oriented Programming

What is a Computer Program?

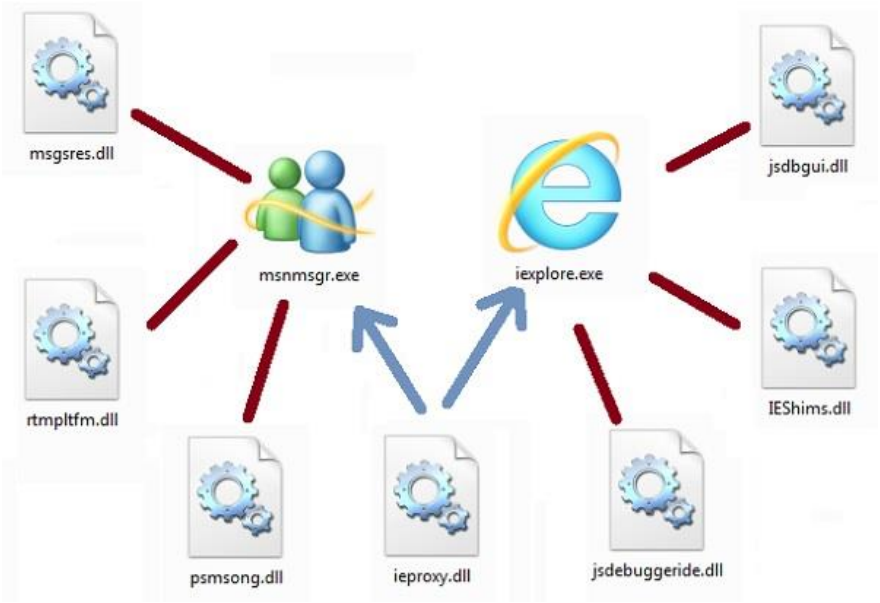
- Computer program
  - Also called software
  - A list of instructions
  - Instructions are called code
  - CPU performs instructions
  - Types
    - System software
    - Application

Software is Stored in Many Files

- Executable files
  - Contain instructions for CPU
  - Have extensions of .exe, or .com

Software is Stored in Many Files (cont.)

- Dynamic link libraries
  - Partial executable file
  - Used to support executable files
  - Have .dll extensions
  - Several .exe files can use a single .dll file



Source: *https://www.maketecheasier.com/what-are-dll-files*

Software is Stored in Many Files (cont.)

- Initialization files
  - Contain configuration settings for software
    - E.g. size and starting point of window
    - E.g. background color etc.
  - Have a .ini extension
  - Modern programs use Windows registry
    - Special database for holding user info

Software is Stored in Many Files (cont.)

- Help files
  - Contain information about software
  - Information is indexed and searchable
  - Provides an online manual
  - Have a .chm or .hlp extension
- Batch files
  - Contain sequence of commands for OS
  - Used to automate repetitive tasks
    - Created for command sequences which are repeatedly needed
  - Text files with series of OS commands
  - Have a .bat extension

Hardware/Software Interaction

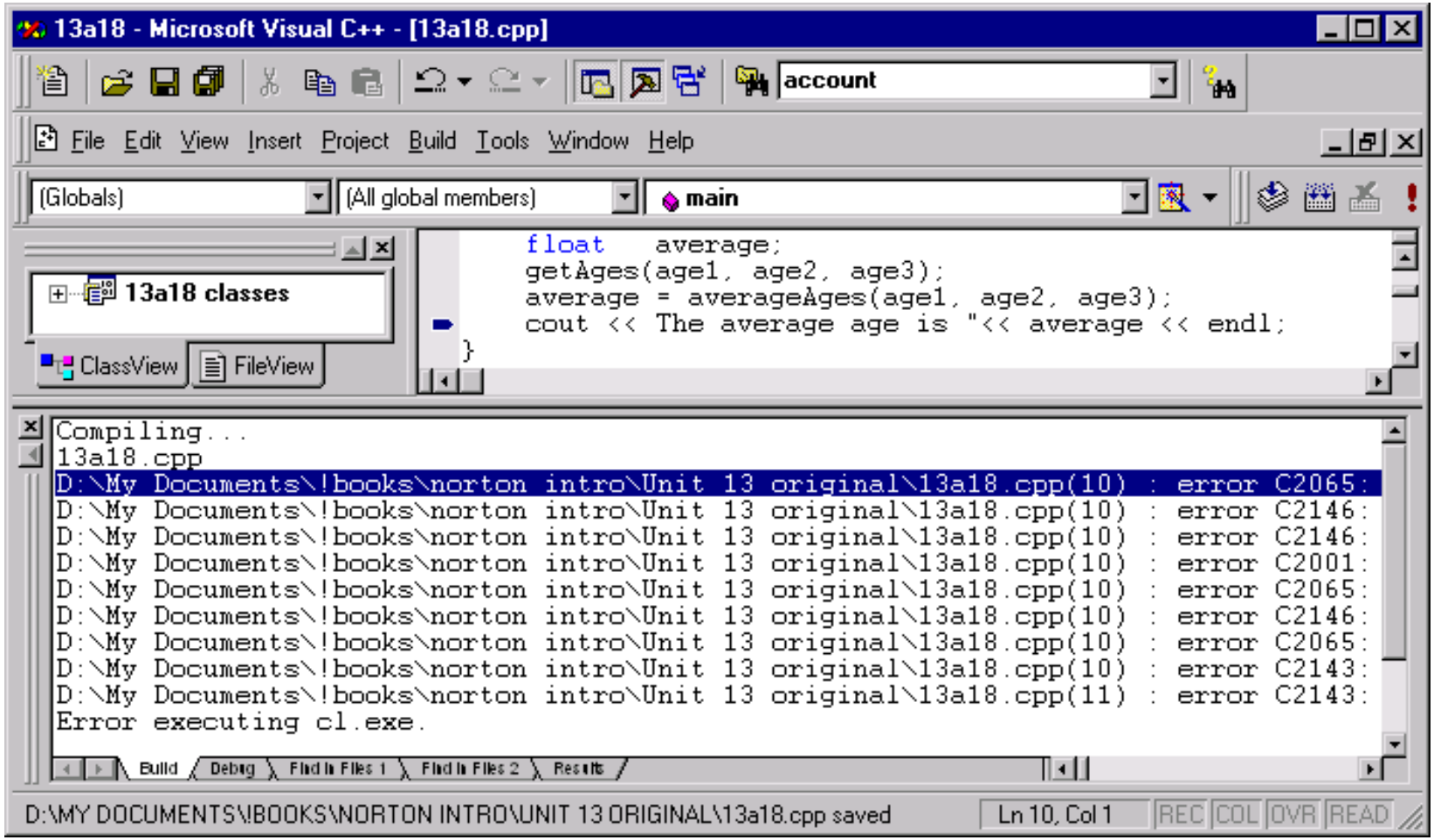
- Program execution
  - Software executes at CPU level
  - Code to play a sound
    - Code generates an interrupt
    - CPU tells the sound card to play
    - Sound card plays the file
  - Programmer creates code

Hardware/Software Interaction (cont.)

- Code
  - Statements written in a programming language
  - Writing code can be tedious
    - Code must be perfect
    - Order of steps must be exact
  - Writing code is quite exciting
    - Problems are solved
    - New ideas are formed

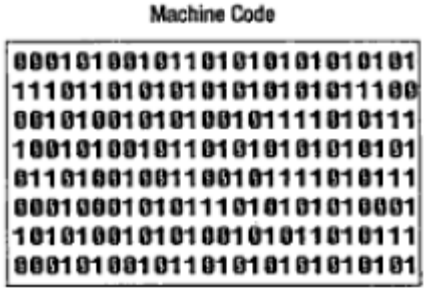
Hardware/Software Interaction (cont.)

- Writing code



Hardware/Software Interaction (cont.)

- Machine code
  - Computers operate in binary
  - Code is translated into machine code
    - CPU executes the machine code
  - CPUs have a unique machine code
  - Machine language is too obscure
    - Complex for using in software development



Hardware/Software Interaction (cont.)

- Assembly language
  - Low-level language
  - Designed for a specific family of processors
  - Represents various instructions in symbolic code
  - More understandable form
  - Assembly language converted into executable machine code by a utility program referred to as an assembler

Assembly Code

```
;CLEAR SCREEN USING BIOS
CLR: MOV AX,0600H        ;SCROLL SCREEN
     MOV BH,30           ;COLOUR
     MOV CX,0000         ;FROM
     MOV DX,184FH        ;TO 24,79
     INT 10H             ;CALL BIOS;
;INPUTTING OF A STRING
KEY: MOV AH,0AH          ;INPUT REQUE;T
     LEA DX,BUFFER       ;POINT TO BUFFER WHERE STRING STORED
     INT 21H             ;CALL DOS
     RET                 ;RETURN FROM SUBROUTINE TO MAIN PROGRAM;
; DISPLAY STRING TO SCREEN
SCR: MOV AH,09           ;DISPLAY REQUEST
     LEA DX,STRING       ;POINT TO STRING
     INT 21H             ;CALL DOS
     RET                 ;RETURN FROM THIS SUBROUTINE;
```

Hardware/Software Interaction (cont.)

- Programming languages
  - Simplifies the writing of code
    - English is used to describe the binary
  - Original code is called source code
  - Several hundred languages exist

Hardware/Software Interaction (cont.)

- Compilers and interpreters
  - Converts source code into binary
    - Allows code to execute
  - Checks source code for correctness

Hardware/Software Interaction (cont.)

- Compiler
  - Covert source code to machine code all at once
  - Creates an executable file
    - Compiler output contents are called object code
  - Executable can run on its own
  - Each language has its own compiler
  - C++ and Java are compiled languages

Hardware/Software Interaction (cont.)

- Interpreter
  - Runs program one line at a time
  - More flexible than compilers
    - Translates code on the fly
  - Slower than compilers
  - Visual Basic and Perl are interpreted languages