

Introduction to Computing (SE-101)

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Questions from previous lecture?

Software Programming & Development

Lecture # 10

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Computer Program

- A set of instructions or statements, also called code, to be carried out by the computer's CPU
- Types of programs or software:
 - OS, utilities, applications
- Programs consist of modules and submodules, stored as collection of files
- Large programs may contain thousands of such files

Examples of Common Program Extensions

- Executable (.EXE) files
 - Part of a program that sends commands to the processor.
- Dynamic link library (.DLL) files
 - Partial EXE file
 - Don't run on its own rather used by other program
 - Allow to break large programs into smaller ones
 - Can be shared by many programs

Examples of Common Program Extensions

- Initialization (.INI) files
 - Contain configuration information
 - To help start the program
 - Windows Registry is replacing the use of INI files
 - Registry is a special database holding computer's information, software and hardware devices

Examples of Common Program Extensions

- Help (.HLP) files
 - Information in indexed format for the user
- Batch (.BAT) files
 - Automates common or repetitive tasks
 - Simple text file containing OS commands
 - Running batch file in prompt will execute all commands in it

Hardware/Software Interaction

- When user plays a sound, the software program generates interrupt to tell the CPU to play the sound
- Interrupt:
 - A preprogrammed set of steps that the CPU follows
- Code:
 - Statements written in any programming language
 - Programming: writing code
 - Programming is tedious and exciting!

Machine Code

- Also called machine language
- The 1s and 0s that form the language of computer hardware
- Lowest-level computer language

Programming Language

- A Higher-level language than machine language, enables the programmer to describe a program using a variation of basic English
- It is required since humans can't write effective code using 0's and 1's of Machine Language
- Source Code:
 - text written using the format and syntax of the programming language
 - Usually stored as text in files

Compiler/Interpreter

- In order to run the code written in a programming language, it must be converted to machine code.
- Compiler
 - Converts all code into machine code creating .exe file
 - Output is object code
 - Each Programming language requires its own compiler

Compiler/Interpreter

- Interpreter
 - Converts sources code to machine code
 - Translates and executes one line at a time
 - Slower than compiler as the code needs to be translated every time it is run

Program Control Flow

- The order in which program statements are executed

Flowchart

- A chart that uses arrows and symbols to show the order in which a program's statement will run

Pseudocode

- Simplified text version of programming code

Algorithm

- The steps represented in a flowchart that lead to a desired result are called an algorithm

Heuristic

- Like an algorithm, a set of steps for finding the solution to a problem
- Unlike an algorithm, a heuristic offers a good chance of finding a solution, although not necessarily the best one

Common Flow Patterns

- Conditional statement
- Loop

Conditional Statement

- A test that determines what the program should do next

Loop

- Code that repeats until some condition, called an exit condition, is met

Examples of Loops

- For
- While
- Do-while

Variable

- A label and placeholder for data being processed

Function

- A set of steps to perform one specific task

Argument

- Also called a parameter
- Used to pass input to functions as the program runs

Goto Statement

- Identifies a different line of the program to which control jumps

Structured Programming

- The practice of building programs using a set of well-defined structures

Three Control Structures of Structured Programming

Programs could be written in three control structures:

- Sequence structures
 - Control flows in a sequence
- Selection structures
 - Conditional statements
- Repetition or looping structures
 - loops

Object-Oriented Programming (OOP)

- Enhances structured programming
- Features reusable, modular components called objects
- Objects are composed of structured program pieces

Object-Oriented Programming (OOP) Terms

- Object
- Attribute
- Functions
- Class
- Instantiation
- Messages
- Inheritance

Attribute

- A component of the object's overall description

Encapsulate

- Every object has attributes and functions that may encapsulate (contain) other objects

Class

- A class consists of attributes and functions shared by more than one object

Class-related terms

- Data members
- Member functions or methods
- Subclasses
- Class inheritance

Instantiation

- In OOP language, the term for creating objects

Messages

- Messages are sent to objects, requesting them to perform a specific function

Questions?

If you have any query please feel free to ask

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Reference

- The slides were taken from the book:
 - “Introduction to computing” by Peter Norton