Topic 1A

Computer Software Systems

Topics

❑ Introduction
❑ Computer Hardware
❑ Computer Software
❑ Programming Languages

Objectives:

❑ Know how a computer system works
❑ Be able to list the main components of computer hardware
❑ Be able to explain what is System Software and Application Software
❑ Be able to describe the various classification of programming languages

Introduction

❑ Computers are used everyday to **solve problems** in almost all fields & professions

❑ You will learn how to identify and solve problems using computers

❑ To develop this, you need to have 3 tools:

> ❑ Knowledge of computer fundamentals
>
> ❑ Understanding of problem solving techniques
>
> ❑ A programming Language

What is a Computer?

Hardware vs. Software

Hardware

Hardware is a term to describe the parts of a computer that are physical. You can touch hardware.
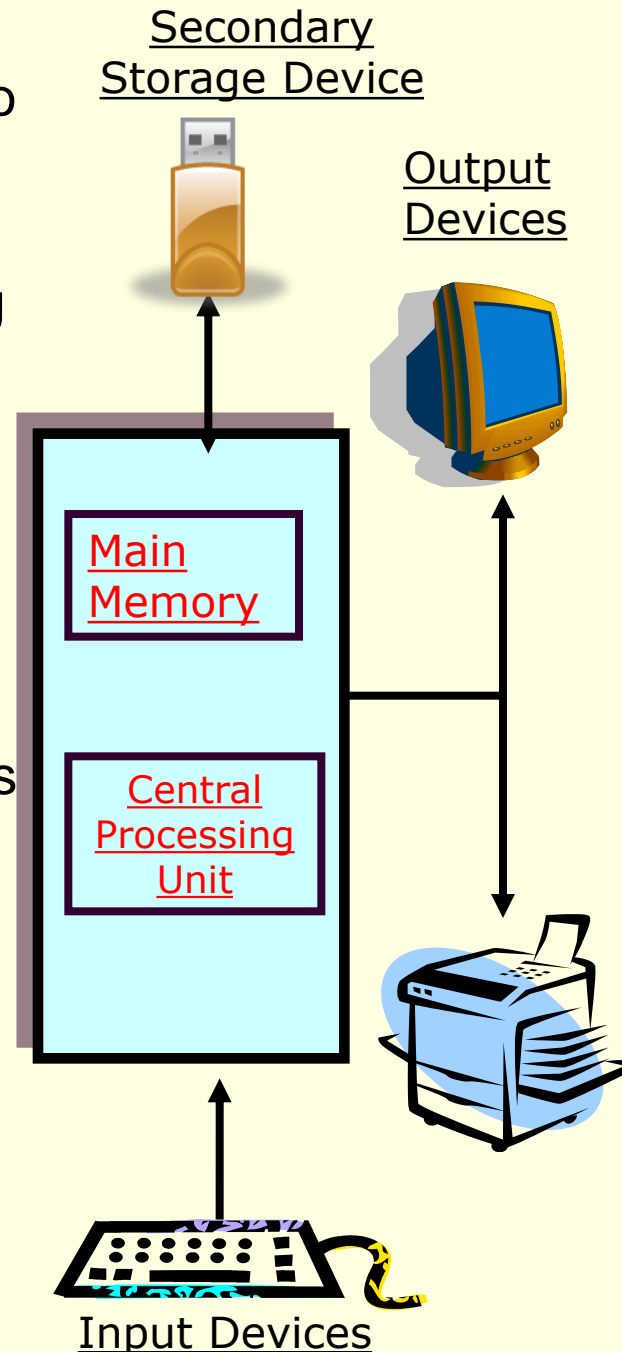
VS.

Software

Software is the information or programming that a computer uses. You can not touch software.

Computer Hardware

❑ A computer can be categorized into <u>Hardware</u> and <u>Software</u>.

❑ The physical or tangible component of a computer is known as its Hardware.

❑ The components of computer hardware include:

  ❑ Main memory
  ❑ Central Processing Unit (CPU)
  ❑ Input Devices
  ❑ Output Devices
  ❑ Secondary Storage Devices

Computer Hardware

- **Main memory** stores information for a program to run

- **Central Processing Unit** does the work in executing a program

- **Input Device** accepts information and transforms it to digital codes that the computer can process

- **Output Device** communicates the solutions of problems produced by the computer to the user

- **Secondary storage device** uses permanent, non volatile medium on which information can be stored and retrieved from

Secondary Storage Device

Output Devices

Main Memory

Central Processing Unit

Input Devices

Computer Hardware

❑ Anatomy of memory

Address	Contents	Variable names
0001	-14.5	temperature
0002	'H'	letter
0003	0.00765	smallNumber

- The computer memory is ordered in a sequence of storage locations called memory cells.

- To store and retrieve contents in the cells, the computer assigns unique <u>addresses</u> to them.

- From a programmer's perspective, these cells are referred to as variables, since, its contents can vary or differ over time.

Computer Software

❑ A computer needs software to make use of its hardware capabilities to solve problems

❑ Software can be classified into:

    ❑ System software

    ❑ Application software

Computer Software : System Software

❑ In general, <u>system</u> software are programs provided by computer manufacturers to complement the hardware.

❑ Some of the more important system software are:

  ❑ Operating System

  ❑ Language translators

  ❑ Linkers

Computer Software : Application Software

❑ <u>Application</u> software are programs developed to solve problems.

❑ Commercially available application software include spreadsheet, database programs, desktop publishing software etc

❑ In this module, you will be writing application software to solve problems using C# programming language.
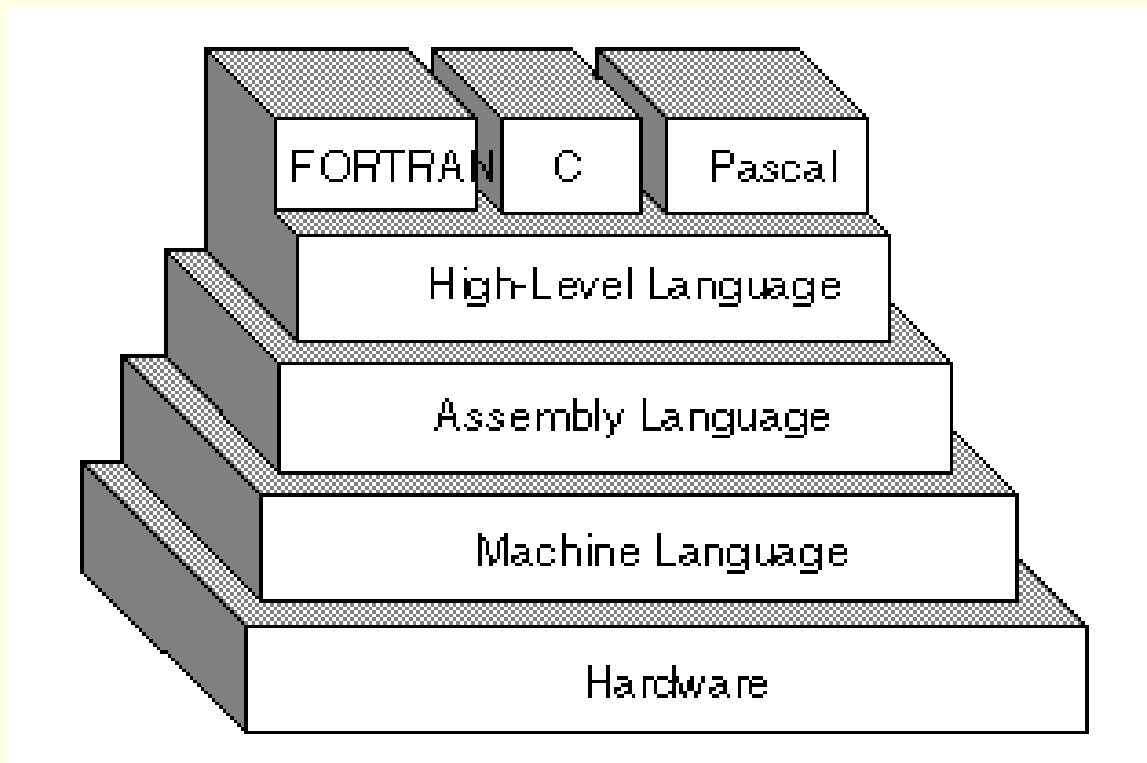
Programming Languages

❑ Computer programs are required to communicate with computers

❑ Computer programs are written in programming languages.

> **What is a Programming Language?**
>
> A language which is used to write <u>instructions</u> for <u>computers</u>. It has a small set of keywords to make up the instructions.

Programming Languages

□ **Programming languages can be classified into:**

- □ <u>Machine</u> language
- □ <u>Assembly</u> Language
- □ <u>High Level</u> Language

Programming Languages

❑ Machine Language

   ❑ Is a natural language of a computer

   ❑ Typically, comprises of a series of 1s and 0s which the computer understands

   ❑ Difficult, if not impossible for a programmer to learn

Example:

      00000000

      00010010

      01101101

      01100010

Programming Languages

❑ Assembly Language

   ❑ Consists of English like abbreviations

   ❑ Less cryptic than machine language

   ❑ Need language translators called assemblers to translate to machine language which computers understand.

   ❑ Is dependant on type of computer

Example:

     CLA

     ADD A

     ADD B

     STA A

Programming Languages

- ❑ High Level Language
    - ❑ Created to eliminate the shortcomings of machine and assembly languages
    - ❑ English like language where a single instruction corresponds to many operations at machine level
    - ❑ Much easier to learn
    - ❑ Examples include:
        - ❑ FORTRAN
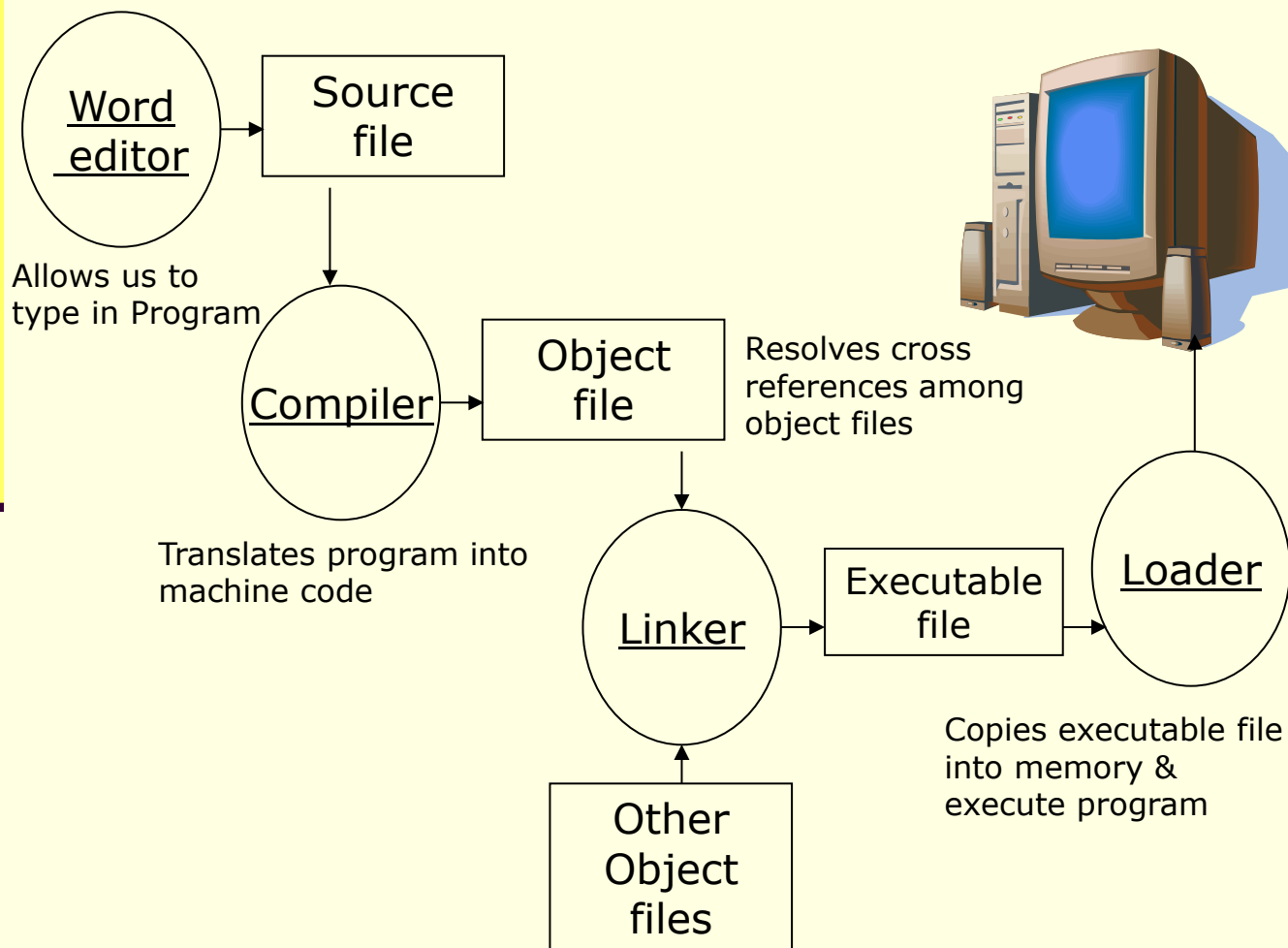   - ❑ JAVA
        - ❑ C++/C#

Example: C++ code

cout << "Enter a number";

cin >> num;

result = num * num;

cout << "square=" << result;

Programming Languages

- ## Computers do not understand high level languages

- ## Your program must be translated to the computer's machine language

Word editor

Source file

Allows us to type in Program

Compiler

Translates program into machine code

Object file

Resolves cross references among object files

Linker

Other Object files

Executable file

Loader

Copies executable file into memory & execute program

Summary

- ❑ Uses of computers
- ❑ Components of computer hardware
- ❑ Classifications of computer software
- ❑ Types of programming languages

Review Resources

Visit these websites for your review exercise:

Different types of computes:

http://computer.howstuffworks.com/question543.htm

Overview of a PC:

http://www.howstuffworks.com/pc.htm

Programming languages:

http://ecommerce.hostip.info/pages/884/Programming-Language.html

http://microsoft.toddverbeek.com/lang.html

http://www.webopedia.com/TERM/P/programming_language.html

Review Exercise

1. What are the main components of a computer system?

2. Which part of the computer hardware does the work of executing the program?

3. Which of the following is not an input device?

    a. Keyboard

    b. Mouse

    c. Printer

    d. Touch screen

4. What is the primary purpose of secondary storage devices?

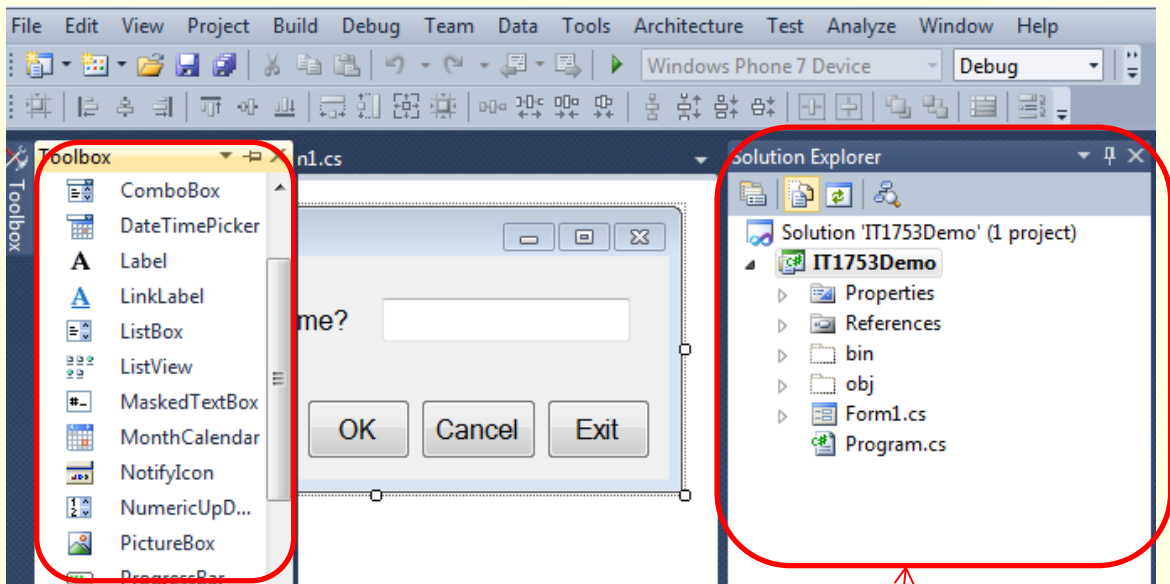5. What are the 2 main categories of computer software? Give 3 examples of application you use everyday.

Review Exercise

6. Which of the following is not classified under system software?

    a. Compilers

    b. Operating System

    c. Spread sheets

    d. Linkers

7. What "language" does a computer understands ?

8. What is a Programming Language ? Why do we need it ?

9. Why are there different types of Programming Languages

10. What are the 3 categories of programming languages? Which is the most commonly used? Why?

11. What is the main function of a compiler or interpreter?

Introduction to VS (Visual Studio)

12. Find the folder IT1753demo (Student download the zip file from Blackboard).

❑ Open the IT1753demo.sln by double clicking with the mouse.

Toolbox contains controls, you can use to 'drag and drop' onto the Form

Solution Explorer Window displays all the files in your project

The display you have open up, as shown above, is called an IDE (or Integrated Development Environment). Not to worry, we will be learning how to use this in subsequent lessons.

If you fail to view the Toolbox, click

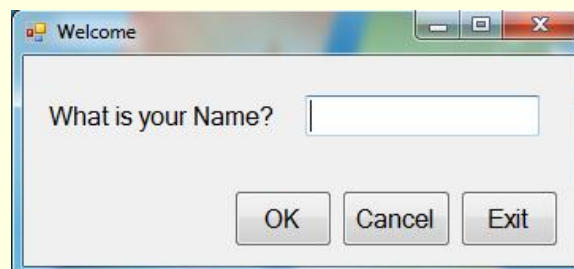If you fail to view the Solution Explorer, click

Introduction to VS (Visual Studio)

❑ Compile the file by pressing **F6** or clicking on the highlighted menu item shown highlighted in red below. Notice if compilation is successful, a message *"Build successful"* is displayed on the bottom left.
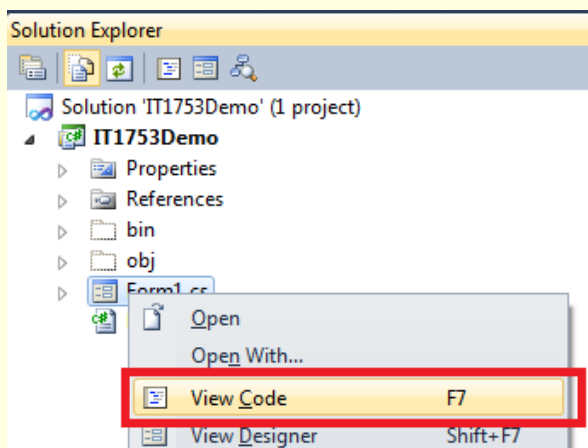

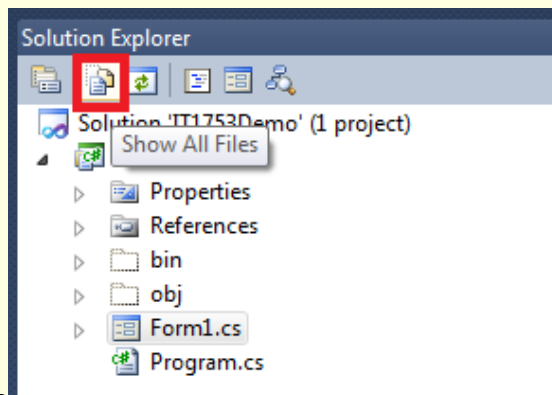❑ Execute the file by pressing **Ctrl F5**. The following Form will appear。 Enter your name and press the OK button。

❑ You will learn in next lesson how to develop this simple program using less than only 5 lines of code **!**

Introduction to VS (Visual Studio)

❑ Find the source file Form1.cs

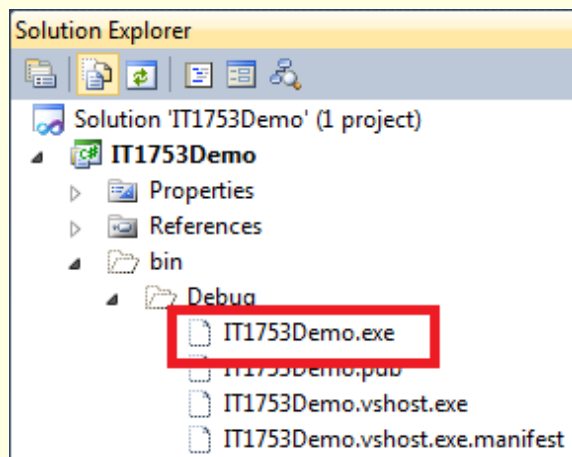❑ View the C# source files by mouse right clicking Form1.cs and selecting the highlighted menu item :

❑ Find the executable file. This is the file which will run to display the Form you have just seen. To find this file, click on Icon which highlights *show all files* when mouse over

Introduction to VS (Visual Studio)

❑ Expand the bin folder to show the executable file. Executable files have the letters *exe* after the .

❑ Using window explorer, run the executable file (IT1753demo.exe)

❑ You do not **need VS** to run the application.

❑ The executable file is the application to be delivered to client

Review Exercise

❑ What is the name of the programming software used?

❑ What is the name of the source file and extension?

❑ What is the name of the executable file and extension?

❑ What do you see when you open the source and executable files?

End of
Topic 1A

Computer Software Systems