

IT 105: Introduction to Programming

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Lecture 1

About Me

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You cannot be great at start of anything, but you have to start to be great.

So making a beginning is important

Why Should You Take This Course?

"Without a strong foundation, you'll have trouble creating anything of value." - Erika Opperheimer

- A deep and clear understanding of how a program runs in a computer system forms the bedrock on which you then build a successful career in software.
- ➤ This course does exactly the same gives you crystal clear picture of what happens under the hood when a software is run.
- Thorough programming practice.
- No programming language is better than 'C' to make this bedrock rock-solid.

Above all ...

Believe in yourself!

This course is to teach you how to solve problems using a computer.

Programming nowadays is considered a basic skill similar to mathematics that is needed across all disciplines like engineering, in the sciences, and nowadays even in the arts.

we do not assume any prior experience in programming whether in C or in any other language. So, the focus will be to start from the basics.

Terms to Understand

Calculate

To determine by mathematical process.

Compute

To determine, especially by mathematical means.

Calculator



Some Terminology

- **Programming**
 - Instructing the computer about how to do a certain task
- Program
 - The set of instructions
- Programmability
 - The ability of the computer to accept a set of instructions and carry them out.

Programmability is what primarily distinguishes a computer from a calculator.

Process of Programming

1. Define and model the problem.

- 2. Obtain logical solution to your problem
 - A logical solution is a finite and clear step by step procedure to solve your problem.
 - Also called as algorithm.

Algorithms and Programs

- An algorithm is also a sequence of steps to solve a problem
 - But usually written in a natural language (such as English), precisely enough so as to be unambiguously understood by humans.

Algorithm to compute n!

- Read the value of n.
- 2. Set the value of *result* to 1
- While n>1 do (steps 3.1 and 3.2)
 - Set new value of result to (old value of result times the value of n).
 - 2. Set new value of n to (old value of n-1)
- 4. Print the value of result

Algorithm in our Real-Life

- An algorithm is a very familiar concept the most important example that you can think of are cooking recipes.
 - Ingredients
 - Instructions

Exercise for today

When an algorithm to compute the quotient and reminder when a given integer x ($x \ge 0$) is divided by another integer y ($y \ge 0$)

Assume that only addition and subtraction are available as primitive arithmetic operators.

Course Evaluation Policy – IT 105

Evaluation Distribution:

- Attendance and Surprise Quizzes— 20%
- First In-Semester Exam 20%
- Second In-Semester Exam 20%
- Final Exam 40%

Suggested Books/Literatures

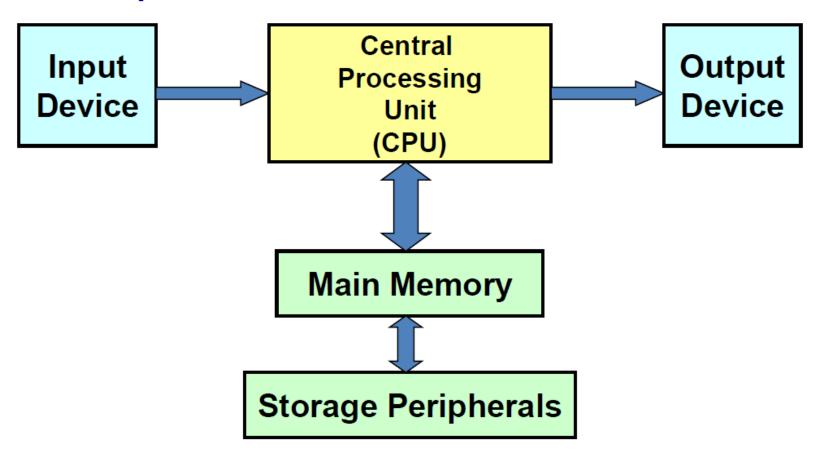
Y. Kanetkar "Let Us C", BPB publication

C The Complete Reference, Schildt, TMH

The Spirit of "C"- Henrry Mulish, Herbert L. Cooper.

What is Computer?

It is a machine which can accept data, process them, and output results.



- A digital computer is built out of tiny electronic switches.
 - From the viewpoint of ease of manufacturing and reliability, such switches can be in one of two states, ON and OFF.
 - A switch can represent a digit in the so-called *binary* number system, 0 and 1.

A computer works based on the binary number system.

Concept of Bits and Bytes

- **Bit**
 - A single binary digit (0 or 1).
- Nibble
 - A collection of four bits (say, 0110).
- Byte
 - A collection of eight bits (say, 01000111).
- **Word**
 - Depends on the computer.
 - Typically 4 or 8 bytes (that is, 32 or 64 bits).

CPU

- All computations take place here in order for the computer to perform a designated task.
- It has a large number of registers which temporarily store data and programs (instructions).
- It has circuitry to carry out arithmetic and logic operations, take decisions, etc.
- It retrieves instructions from the memory, interprets (decodes) them, and perform the requested operation.

➤ Main Memory

- Uses semiconductor technology
 - Allows direct access
- Memory sizes in the range of 256 MBytes to 4 TBytes are typical today.
- > Some measures to be remembered
 - \bullet 1 KB = 2^{10} (= 1024 bytes)
 - 1 MB = 2^{20} (= one million approx.)
 - 1 GB = 2^{30} (= one billion approx.)
 - 1 TB = 2^{40} (= one Trillion approx.)

- Input Device
 - Keyboard, Mouse, Scanner, Digital Camera
- Output Device
 - Monitor, Printer
- Storage Peripherals
 - Magnetic Disks: hard disk, floppy disk
 - Allows direct (semi-random) access
 - Optical Disks: CDROM, CD-RW, DVD
 - Allows direct (semi-random) access
 - Flash Memory: pen drives
 - Allows direct access
 - Magnetic Tape: DAT
 - Only sequential access

Typical Configuration of a PC

ightharpoonup CPU: i3/i5/i7, 2.8 – 4.2 GHz

Main Memory: 2GB

Hard Disk: 2TB

Floppy Disk: Not present

CDROM: DVD combo-drive

Input Device: Keyboard, Mouse

Output Device: 23" color monitor

Ports: USB, Firewire, Infrared

How does a computer work?

- Stored program concept.
 - Main difference from a calculator.

- ➤ What is a program?
 - Set of instructions for carrying out a specific task.

- Where are programs stored?
 - In secondary memory, when first created.
 - Brought into main memory, during execution.

Classification of Software

- Two categories:
 - 1.Application Software
 - Used to solve a particular problem.
 - Editor, financial accounting, weather forecasting, etc.

- 2.System Software
 - Helps in running other programs.
 - Compiler, operating system, etc.