MA 511: Computer Programming

Lecture 1

http://www.iitg.ernet.in/psm/indexing_ma511/y08/index.html

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Mon 10:00-10:55 Tue 11:00-11:55 Fri 9:00-9:55 Class: 1G2

MA512 Lab : Wed 14:00-16:55

Time Table

D/T	9-9:55	10-10:55	11-11:55		2-4:55
Mon:		MA511			
Tue:			MA511		
Wed:					MA512
Thu:					
Fri:	MA511				

Class Room

MA511: 1G2, MA512: Comp. Lab, Dept. of Math

Tests and Marks distribution

- MA511:Computer Programming
  - Mid semester 30%
  - Quiz 20% (best of two among three)
  - End Semester 50%
- MA512:Computer Programming Lab
  - Mid semester 30%
  - Quiz + Assignments + viva 30%
  - End semester 40%

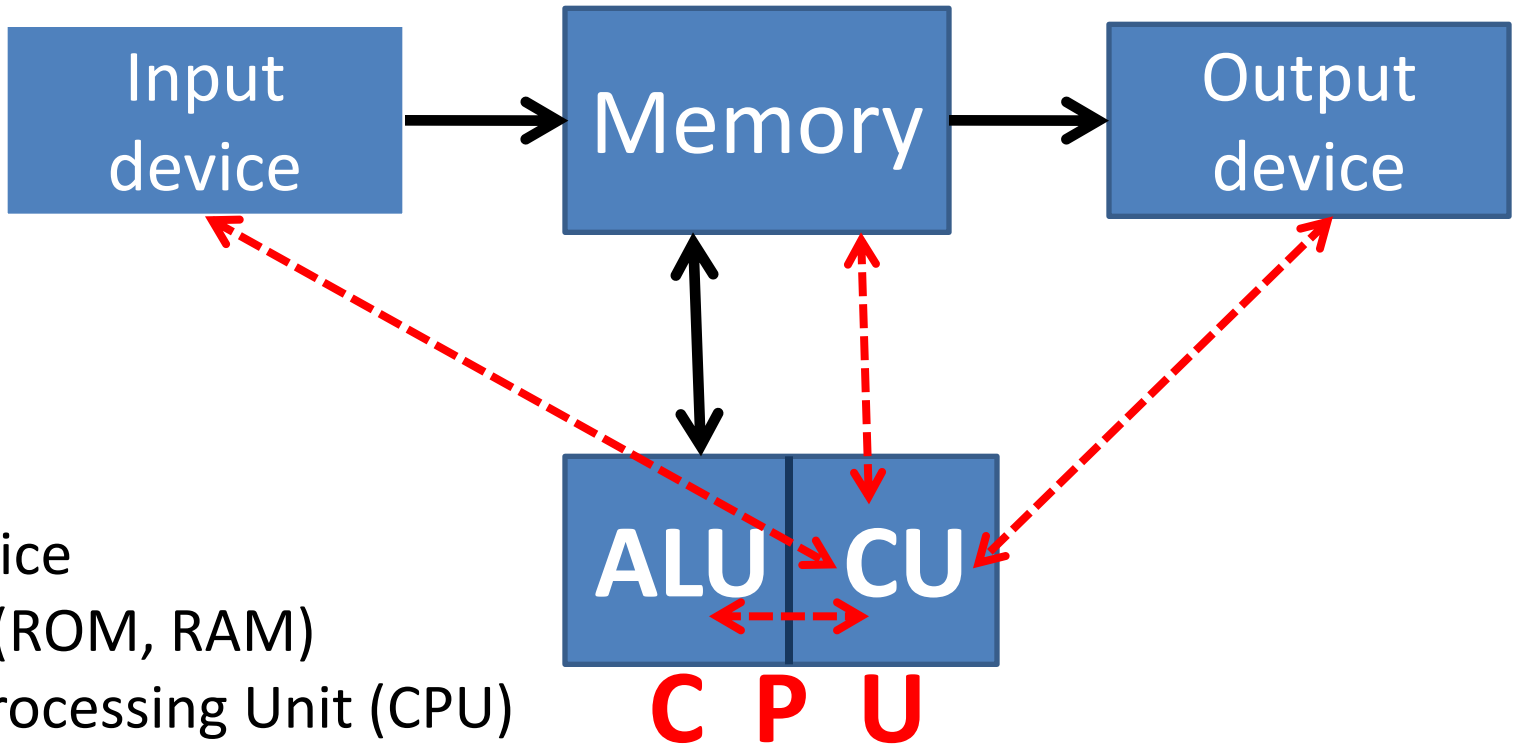
Reference Books

- **The C Programming Language** by Brian W. Kernighan & Dennis M. Ritchie
- **Programming with C** by Byron S Gottfried
- **Computer Programming in C** by V. Rajaraman

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

Block Diagram of Computer



1. Input device
2. Memory (ROM, RAM)
3. Central Processing Unit (CPU)
   a) Arithmetical Logical Unit (ALU)
   b) Control Unit (CU)
4. Output device

Memory

- All data stored in memory are encoded as some unique combination of 0 and 1 called *bits* (*bi*nary digi*ts*)
- 8-bits = one bytes
  - A single character will occupy one byte of memory
  - A single numeric quantity may occupy 1 to 8 bytes, depending on *precision*.
- 1KB = 1024 bytes = 2^{10} bytes
- 1MB = 1024 KB = 2^{20} bytes
- 1GB = 1024 MB = 2^{30} bytes

Memory

- Main memory (Random Access Memory, or RAM)
  - fast, but volatile (i.e. contents lost on power off)
  - access time ~ 100 nano sec (nano = 10^{-9})

    Random access: to any specified part of memory
  - typical capacity today: 512 MB to a few GB
- Main memory (Read Only Memory, or ROM)
  - fast, but non-volatile
- Secondary Memory
  - Hard Disc, Flash Drive, DVD, CD, Pen drive, External Disc

CPU

- *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
- CPU executes instructions which are stored in memory
- Program = sequence of instructions
  - E.g:
    1. Cut potatoes
    2. Boil for 10 minutes
    3. Fry with salt and pepper

Speed and Reliability

- Adding two numbers, is usually expressed in terms of microseconds, (1 μsec = 10^{-6} sec) or nanoseconds (1 nsec = 10^{-3} μsec = 10^{-9} sec).
- If a computer can add two numbers in 10 nanosec , 100 million (10^{8}) additions will be carried out in one sec.
- This high speed is also equally guarantee high reliability. Computer never make mistake unless programming errors and data entry errors occur.

Hardware vs Software

- Physical components are called hardware; CPU, RAM, keyboard, mouse, monitor etc
- Software are programs such that with help of hardware its capable to perform any task.
  - System Software ; OS
  - Application Software

Operating System

- It’s a system software that help the users to operate the computer and manage its resources.
- Its an interface between the computer and the user. Ex: MS-DOS, Windows, Linux