

# COSC1101- Programming Fundamentals

Course Instructor:

*Maham Khan*

*Lecture 1*

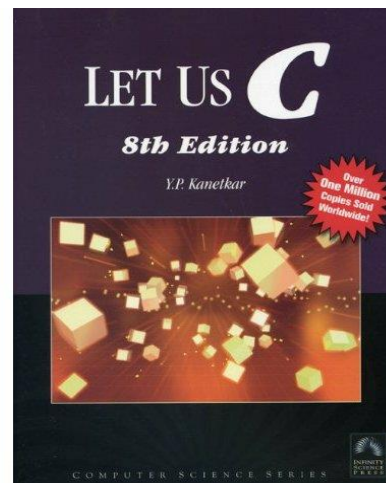
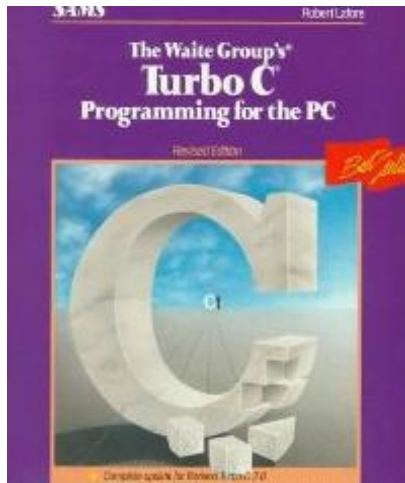
# COSC1101- Programming Fundamentals

## Course Objective

“Programming Fundamentals” aims to familiarize the students with the fundamental concepts of computer and computer programming. The students will learn basic concept of IT, fundamental concepts of programming by developing and executing programs in C and C++. The course will be focused mostly on structured programming and will be completed with the introduction to Object oriented programming.”

# Recommended books:

- The Waite Group's Turbo C Programming for the PC by Robert Lafore, Revised Ed.
- Let Us C, by Yashavant P. Kanetkar

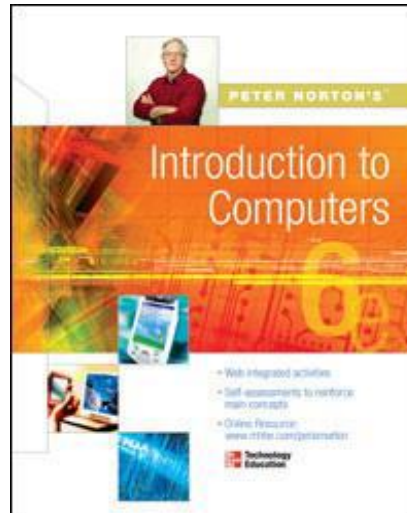
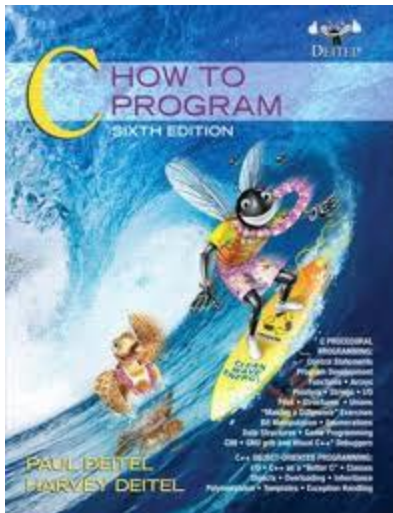


# Recommended Books:

- C How to Program, by Dietel and Dietel, 4/e 5/e or 6/e
- Introduction to Computers, by Peter Norton, 6<sup>th</sup> or 7<sup>th</sup> Ed.

*Online Learning Center of Intro to Computers:*

[http://highered.mcgraw-hill.com/sites/0072978902/student\\_view0/](http://highered.mcgraw-hill.com/sites/0072978902/student_view0/)



## Other References :

- An Introduction to Programming with C++  
By Diane Zak, Publisher Course Technology
- A Laboratory Course in C++  
By Nell Dale, University of Texas,  
Austin Jones and Bartlett Publisher

# Demo Sessions

- Each registered student should have Access to the computer having Visual C++ installed on it.
- Students will be demonstrated to setup Visual C++ environment at their home or resource centers.
- At the end of the class lessons, almost all the concepts discussed in the lectures will be demonstrated in the Visual C++ environment.
- A student must practice each lesson by him/her self and apply theoretical knowledge gained in the lessons hands on in the Visual C++ environment.

# Delivery:

- 32 lectures including hands on demonstrations
- Quizzes
- Assignment
- Midterm Examination
- Terminal Examination
- Practice:  
Exercises, Quizzes, Assignments

# Programming Fundamentals



# Computer

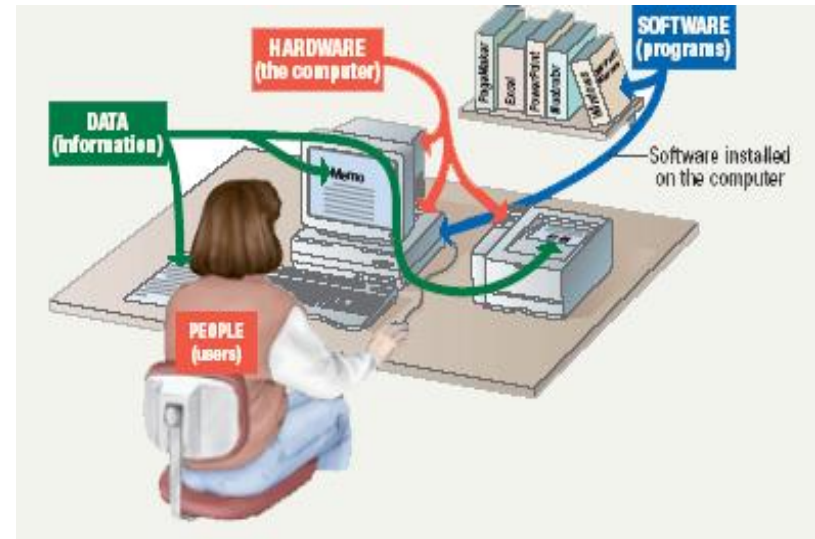
A computer is a programmable, multiuse machine that accepts data, ( raw facts and figures) and process ,or manipulates, it into information.

## Information:

“processed data on a computer is called information”

# Parts of the Computer System

- Building Blocks of computer system
  - Data (information)
  - User
  - Hardware
  - Software



# Parts of the Computer System

- Data
  - Pieces of facts
  - Computer organize and present information
- Users
  - People operating the computer
  - Computer working for the people
  - Users are most important part of the computers
  - Tell the computer what to do

# HARDWARE

- Physical Components of the Computer.
- TANGIBLE (can be touched)

# SOFTWARE

- Step-by-step instructions to perform the task.
- Also called a program
- INTANGIBLE (cannot be touched)
- Programs and software interchangeable terms

# HARDWARE :

Major components of a Computer

- INPUT DEVICES
- OUTPUT DEVICES
- CPU
- MEMORY
- STORAGE DEVICES

# HARDWARE: INPUT DEVICES

These devices allow the user to enter the data into the computer.

These devices are;

- Keyboard
- Mouse
- Scanner
- Pointer



# HARDWARE: OUTPUT DEVICES

Consist of devices that translate information processed by the computer into human understandable format.

These devices are:

- Printer
- Monitor
- Speaker



# HARDWARE: I/O DEVICES

Some devices are both input as well as output devices.

Can perform I/O simultaneously.

- Touchpad Screens

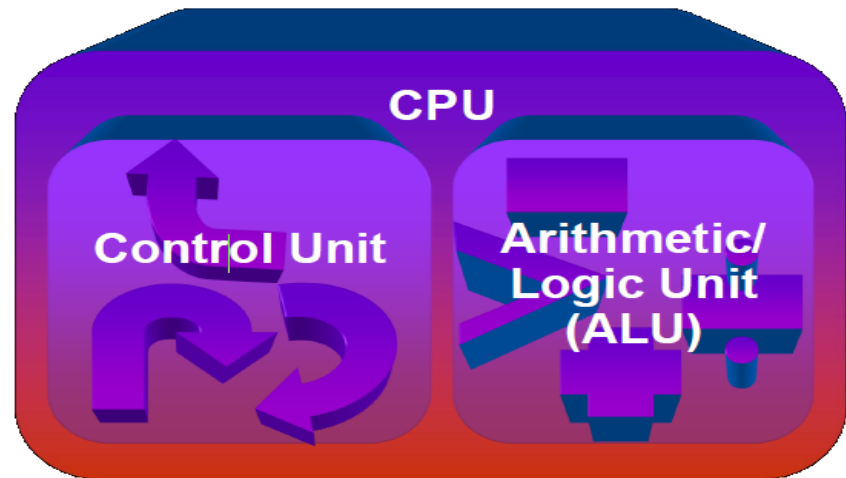




# HARDWARE :

## CPU; Central Processing Unit

- Brain of the computer.
- Two parts are:
  - ALU
  - CU



# HARDWARE :

## CPU; CONTROL UNIT

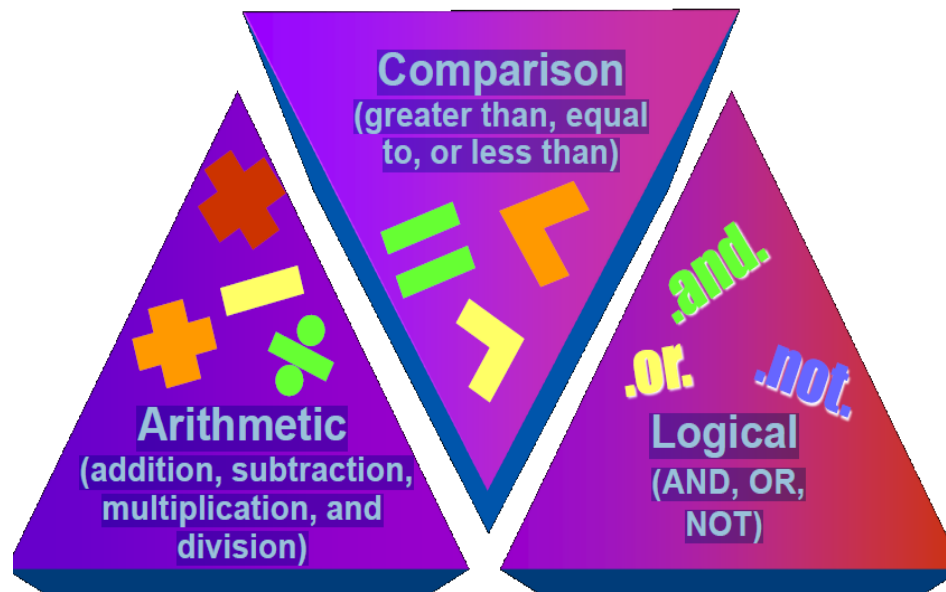
- Directs and coordinates flow of data through the CPU and to and from other devices
- Traffic cop
- CPU's Instruction set is built into the Control unit called Commands that a CPU can execute



# HARDWARE :

## CPU; ALU

### Arithmetic Logic Unit



# HARDWARE: MEMORY

Two categories of Memory

- Volatile Memory

Loses its contents when the computer's power is turned off

- Non-volatile Memory

Does not lose its contents when the computer's power is turned off

# HARDWARE: MEMORY

Stores Data or programs  
(workspace or archiving/storage space)

RAM: Random Access Memory (Volatile)

- Stores current Data and programs
- More RAM results in a faster system

ROM: Read Only Memory (non-volatile)

- Permanent storage of programs/instructions
- Holds the computer boot directions



# HARDWARE:

## Memory; CPU Registers (Part of ALU)

- High speed memory locations built directly into the CPU
- Temporary storage location used by the CPU (Scratchpad)
- Used to hold data currently being processed
- Results of the calculations
- Very expensive that's why very limited.

# HARDWARE: STORAGE DEVICES

- Hold data and programs permanently
- Different from RAM
- Magnetic storage; Uses a magnet to access data  
(Floppy and hard drive, USB drives)
- Optical storage; Uses a laser to access data  
(CD and DVD drives )



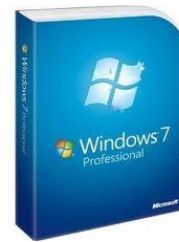
# TYPES OF SOFTWARE

## SYSTEM SOFTWARE

Enables the application to interact with the computer and manages the computer internal resources.

Examples:

- Operating System
- Device Drivers



## APPLICATION SOFTWARE

It performs useful work on General-purpose task.

Examples:

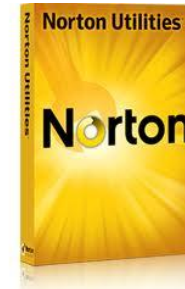
- MS-Word
- PowerPoint
- Google(search engine)





# Utility Programs

- Utility Programs provide services not provided by the system software.
- Usually used to recover the system, data or resources.
- Examples:
  - Screen savers
  - Data recovery
  - Backup
  - Virus protection
  - Norton utilities



# How CPU works?

Four basic operations:

1. Fetch: obtain a program instruction or data item from memory.
2. Decode: translate the instruction into commands.
3. Execute: carry out the command.
4. Store: write the result into the memory

# Machine Cycle

A Machine Cycle comprises i-time and e-time:

- Instruction time or i–time to fetch and decode
- Execution time or e–time to execute and store the result

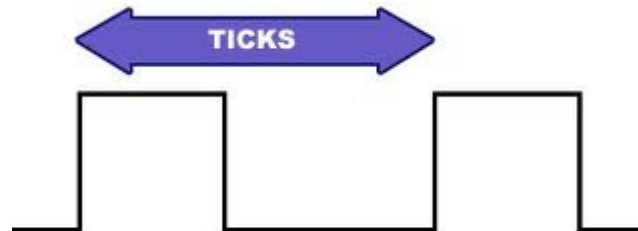


# How CPU Synchronizes? Through System Clock

System Clock Synchronizes all computer operations

- Train of binary pulses
- Faster clock speed means the CPU can execute more instructions each second
- Units: MHz and GHz

Hz = cycles per second



# Types of Computers

1. Supercomputers
2. Mainframes
3. Minicomputers
4. Microcontrollers

# Supercomputer

- Most powerful computers
- Physically largest in size
- Hundreds of thousands of processors that can process huge amounts of data
- Perform over 1 quadrillion calculations per second. e.g. IBM ASCI White, Cray
- Ideal for handling large and highly complex problems that require extreme calculating power



# Mainframe

- Mainly used by large organizations for critical applications, typically bulk data processing
  - Banks, Airlines, Insurance Companies
- Measured in millions of integer operations per second (MIPS)
- Vary in size from small, to medium, to large, depending on their use.
- Normally Dumb Terminals are connected to these main frames. Processing is done by Main Frames.
- Dumb terminals only have keyboard, monitors.



# Minicomputers

- Class of multi-user computers that lies in between mainframe computers (multi user) and microcomputers or personal computers (single user)
- Midrange computer, such as the higher-end SPARC, POWER and Itanium-based systems from Sun Microsystems, IBM and Hewlett-Packard.





# Computers for individuals -PCs

## Microcomputers

- Workstation
- Desktop computers
- Notebook computers
- Tablet computers
- Handheld computers
- Smart phones



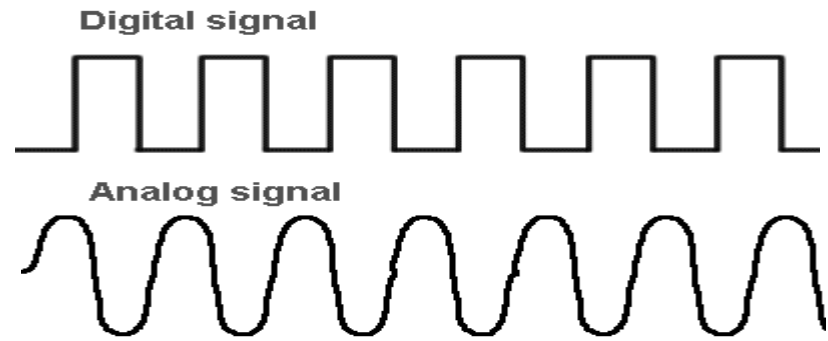
# Microcontroller

- Embedded computers are small in size, specialized microprocessors
- Designed for small or dedicated applications
- Installed in "smart" appliances from automobiles to washing machines

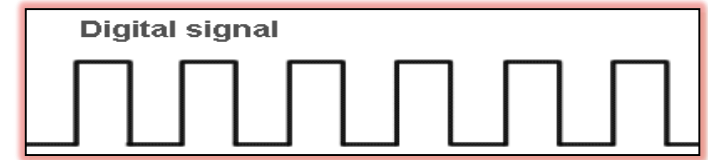


# What is IT?

Base of the Computer was/is:  
**digital signal**;



Base of Communication devices  
was **analog signal** transferred to **digital signal**



The day Communication changed its base from analog to digital; There was natural merger of the two technologies

## **Computer and Communication**

The following industries also joined : Mass storage, Consumer Electronics, Entertainment, Multimedia

The Name given to the family

## ***Information Technology : IT***