LNCT GROUP OF COLLEGES
"WORKING TOWARDS BEING THE BEST"

UNIT 1

Basic Computer Engineering (BT-205)

SCHEME

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

New Scheme of Examination as per AICTE Flexible Curricula

Bachelor of Technology (B.Tech.)

I Semester (Group B)

W.E.F. JULY 2022

GROUP B: (AD, AL, CL, AU, BM, CE, CI, CM, DS, EC, FT, IO, IP, IS, ME, RA, CY, CN, CD, AI, IA)

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
Mandatory Induction Program (First three weeks)				Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations									
Fourth week onwards classes will start													
1.	BT201	BSC-3	Engineering Physics	70	20	10	30	20	150	2	1	2	4
2.	BT102	BSC-2	Mathematics-I	70	20	10	-	-	100	3	1	-	4
3.	BT203	ESC-4	Basic Mechanical Engineering	70	20	10	30	20	150	3	-	2	4
4.	BT204	ESC-5	Basic Civil Engineering & Mechanics	70	20	10	30	20	150	3	-	2	4
5.	BT205	ESC-6	Basic Computer Engineering	70	20	10	30	20	150	3	-	2	4
6.	BT206	HSMC-2	Language Lab & Seminars	-	-	-	30	20	50	-	-	2	1
7.	BT107	DLC-1	Internship-I (60 Hrs Duration) at the Institute level	To be completed during first/second semester. Its evaluation/credit to be added in third semester.									
			Total	350	100	50	150	100	750	14	2	10	21

Artificial Intelligence and Data Science (AD), CSE-Artificaial Intelligence and Machine Learning(AL), Artificaial Intelligence and Machine Learning(CL), Automobile Engineering (AU), Biomedical Engineering (BM), Civil Engineering (CE), Computer Science & Information Technology(CI), Chemical Engineering (CM), Data Science (DS), Electronics & Communication Engineering (EC), Fire Technology & Safety Engineering (FT), CSE –IOT(IO), Industrial Production Engineering (IP), CSE- IOT and Cyber Security Including Block Chain Technolgy (IS), Mechanical Engineering (ME), Robotics and Artificial Intelligence (RA), CSE-Cyber Security (CY), Cyber Security (CN), CSE-Data Science (CD), Artificial Intelligence (AI), CSE-Artificial Intelligence (IA)

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	1 Credit	1 Credit

SYLLABUS

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
New Scheme Based On AICTE Flexible Curricula
B. Tech. First Year
Branch- Common to All Disciplines

BT205	Basic Computer Engineering	3L-0T-2P	4 Credits

Course Contents:

UNIT I

Computer: Definition, Classification, Organization i.e. CPU, register, Bus architecture, Instruction set, Memory & Storage Systems, I/O Devices, and System & Application Software. Computer Application in e-Business, Bio-Informatics, health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc.

Operating System: Definition, Function, Types, Management of File, Process & Memory. Introdcution to MS word, MS powerpoint, MS Excel

UNIT II

Introduction to Algorithms, Complexities and Flowchart, Introduction to Programming, Categories of Programming Languages, Program Design, Programming Paradigms, Characteristics or Concepts of OOP, Procedure Oriented Programming VS object oriented Programming. Introduction to C++: Character Set, Tokens, Precedence and Associativity, Program Structure, Data Types, Variables, Operators, Expressions, Statements and control structures, I/O operations, Array, Functions,

UNIT III

Object & Classes, Scope Resolution Operator, Constructors & Destructors, Friend Functions, Inheritance, Polymorphism, Overloading Functions & Operators, Types of Inheritance, Virtual functions. Introduction to Data Structures.

UNIT IV

Computer Networking: Introduction, Goals, ISO-OSI Model, Functions of Different Layers. Internetworking Concepts, Devices, TCP/IP Model. Introduction to Internet, World Wide Web, E-commerce

Computer Security Basics: Introduction to viruses, worms, malware, Trojans, Spyware and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Cyber Pornography, Email spoofing, Denial of Service (DoS), Cyber Stalking, ,Logic bombs, Hacking Spamming, Cyber Defamation , pharming Security measures Firewall, Computer Ethics & Good Practices, Introduction of Cyber Laws about Internet Fraud, Good Computer Security Habits,

UNIT V

Data base Management System: Introduction, File oriented approach and Database approach, Data Models, Architecture of Database System, Data independence, Data dictionary, DBA, Primary Key, Data definition language and Manipulation Languages.

Cloud computing: definition, cloud infrastructure, cloud segments or service delivery models (IaaS, PaaS and SaaS), cloud deployment models/ types of cloud (public, private, community and hybrid clouds), Pros and Cons of cloud computing

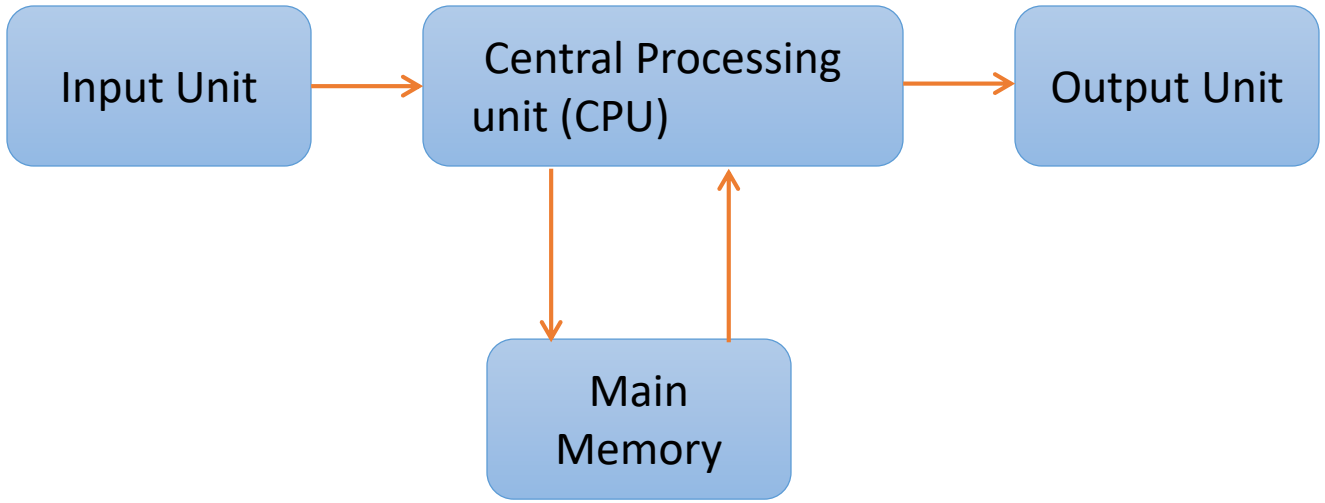
List of Experiment

01. Study and practice of Internal & External DOS commands.
02. Study and practice of Basic linux Commands – ls, cp, mv, rm, chmod, kill, ps etc.
03. Study and Practice of MS windows – Folder related operations, My-Computer, window explorer, Control Panel,
04. Creation and editing of Text files using MS- word.
05. Creation and operating of spreadsheet using MS-Excel.
06. Creation and editing power-point slides using MS- power point
07. Creation and manipulation of database table using SQL in MS-Access.
08. WAP to illustrate Arithmetic expressions
09. WAP to illustrate Arrays.
10. WAP to illustrate functions.
11. WAP to illustrate constructor & Destructor
12. WAP to illustrate Object and classes.

Computer

- A computer is an electronic device that can perform a variety of operations in accordance with set of instructions.
- Computers can access and process data millions of times faster than humans.
- A computer can store data and information in its memory, process it, and produces desired output.

Functioning of Computers



Functioning of Computers

- A computer follows input-process-output cycle.
- The first stage is termed as INPUT UNIT.
- The second stage is termed as PROCESSING UNIT.
- The third stage is termed as OUTPUT UNIT.

- INPUT UNIT
  - The input unit is formed by the input devices attached to the computer. The input unit is responsible for taking input and converting it into understandable format (binary code).

  Examples of Input devices are: Keyboard, Mouse, Joystick, Light pen, webcam, Scanner etc.

- CENTRAL PROCESSING UNIT (CPU)
  - It is the control center of computer. It guides directs and governs its performance. It acts as the brain of computer. It has two components.
    - Arithmetic and Logic Unit (ALU)
      - The ALU performs all arithmetic operations (+, -, /, *) and some logical operators (<, >, <=, >=, <>)
    - Control Unit (CU)
      - The CU guides the interpretation, manipulation and flow of data and information. It sends the control signals to the ALU to perform specific functions.
- OUTPUT UNIT
  - This unit is formed by output devices attached to the computer. The output results coming out from the CPU is fetched by output unit and displayed in understandable form.

Examples of output devices are: Monitor, Printer, Speakers, Projector, Plotter, Headphones etc.

Classification of Computers

- We can classify the computers according to the following three criteria:

(1) Based on operating principles

(2) Based on applications

(3) Based on size and capability

Classification of Computers

(1) Based on operating principles:

- **Analog computers**: represent data in the form of continuous electrical signals having a specific magnitude

- **Digital computers**: store and process data in the digital form.

- **Hybrid computers**: a combination of analog computer and digital computer because it encompasses the best features of both.

Analog computers are used to process continuous data. Analog computers represent variables by physical quantities. Thus any computer which solve problem by translating physical conditions such as flow, temperature, pressure, angular position or voltage into related mechanical or electrical related circuits as an analog for the physical phenomenon being investigated in general it is a computer which uses an analog quantity and produces analog values as output. Thus an analog computer measures continuously. Analog computers are very much speedy. They produce their results very fast. But their results are approximately correct. All the analog computers are special purpose computers.

Digital computer represents physical quantities with the help of digits or numbers. These numbers are used to perform Arithmetic calculations and also make logical decision to reach a conclusion, depending on, the data they receive from the user.

Various specifically designed computers are with both digital and analog characteristics combining the advantages of analog and digital computers when working as a system. **Hybrid computers** are being used extensively in process control system where it is necessary to have a close representation with the physical world.

The hybrid system provides the good precision that can be attained with analog computers and the greater control that is possible with digital computers, plus the ability to accept the input data in either form.

Classification of Computers

(2) Based on applications:

- **General purpose computers**: can work in all environments.

- **Special purpose computers**: can perform only a specified task.

Classification of Computers

(3) Based on size and capability

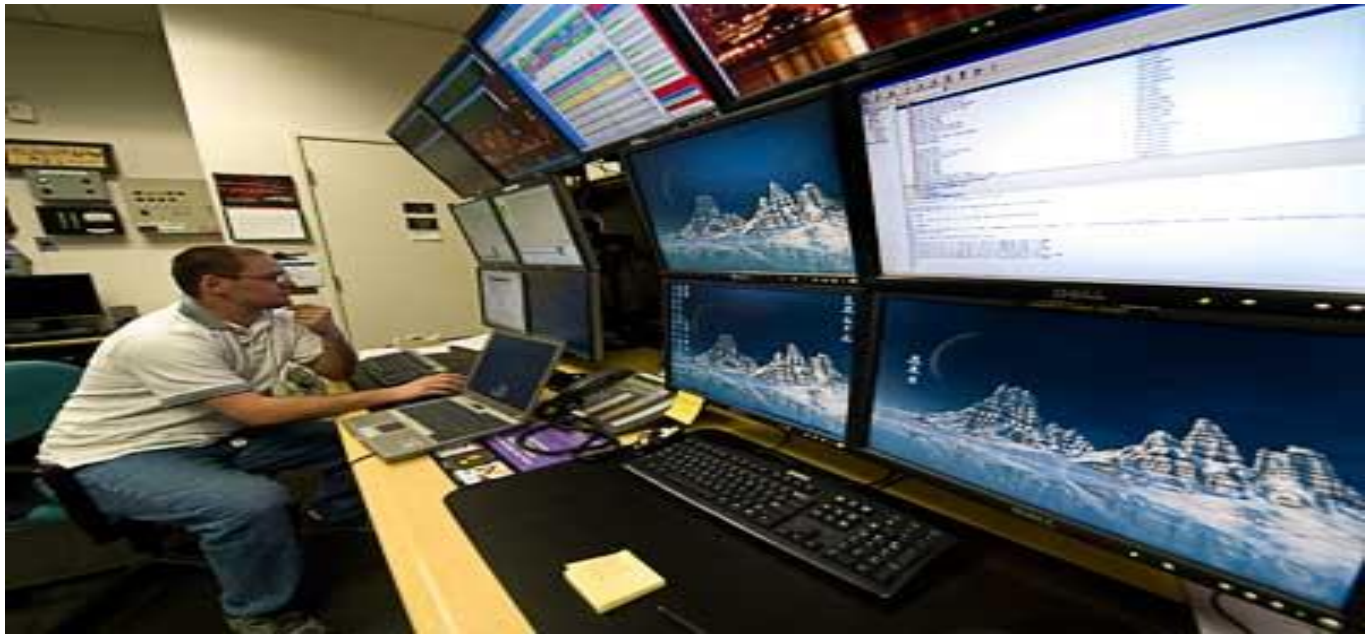
- **Microcomputers**: Designed to be used by individuals.
- **Mini Computers**: Can handle more data and more input and output than micro computers.
- **Mainframe Computers**: A very large computer
- **Super Computers**: The fastest type of computer that can perform complex operations at a very high speed.

Mini computers are smaller than mainframes, both in size and other facilities such as speed, storage capacity and other services. They are versatile that they can be fitted where ever they are needed. Their speeds are rated between one and fifty million instructions per second (MIPS). They have primary storage in hundred to three hundred megabytes range with direct access storage device.

Micro Computers are the smallest range of computers. They were introduced in the early 70's having less storing space and processing speed. Micro computers of todays are equivalent to the mini computers of yesterday in terms of performing and processing. They are also called "computer of a chip" because its entire circuitry is contained in one tiny chip. The micro computers have a wide range of applications including uses as portable computer that can be plugged into any wall.

Mainframe computers are large-sized, powerful multi-user computers that can support concurrent programs. That means, they can perform different actions or ‘processes’ at the same time. Mainframe computers can be used by as many as hundreds or thousands of users at the same time. Large organizations may use a mainframe computer to execute large-scale processes such as processing the organization's payroll.

Large scientific and research laboratories as well as the government organizations have extra ordinary demand for processing data which required tremendous processing speed, memory and other services which may not be provided with any other category to meet their needs. Therefore very large computers used are called **Super Computers**. These computers are extremely expensive and the speed is measured in billions of instructions per seconds.



Registers

- In a computer, a **register** is one of a small set of data holding places that are part of a computer processor .
- A **register** may hold a computer instruction , a storage address, or any kind of data.
- **Register** are used to quickly accept, store, and transfer data and instructions that are being used immediately by the CPU, there are various types of Registers those are used for various purpose.
- Mostly used Registers named as AC or **Accumulator**, Data Register or DR, the AR or **Address Register**, **program counter**(PC), **Memory Data Register** (MDR) ,**Index register**, ***Memory Buffer Register***.

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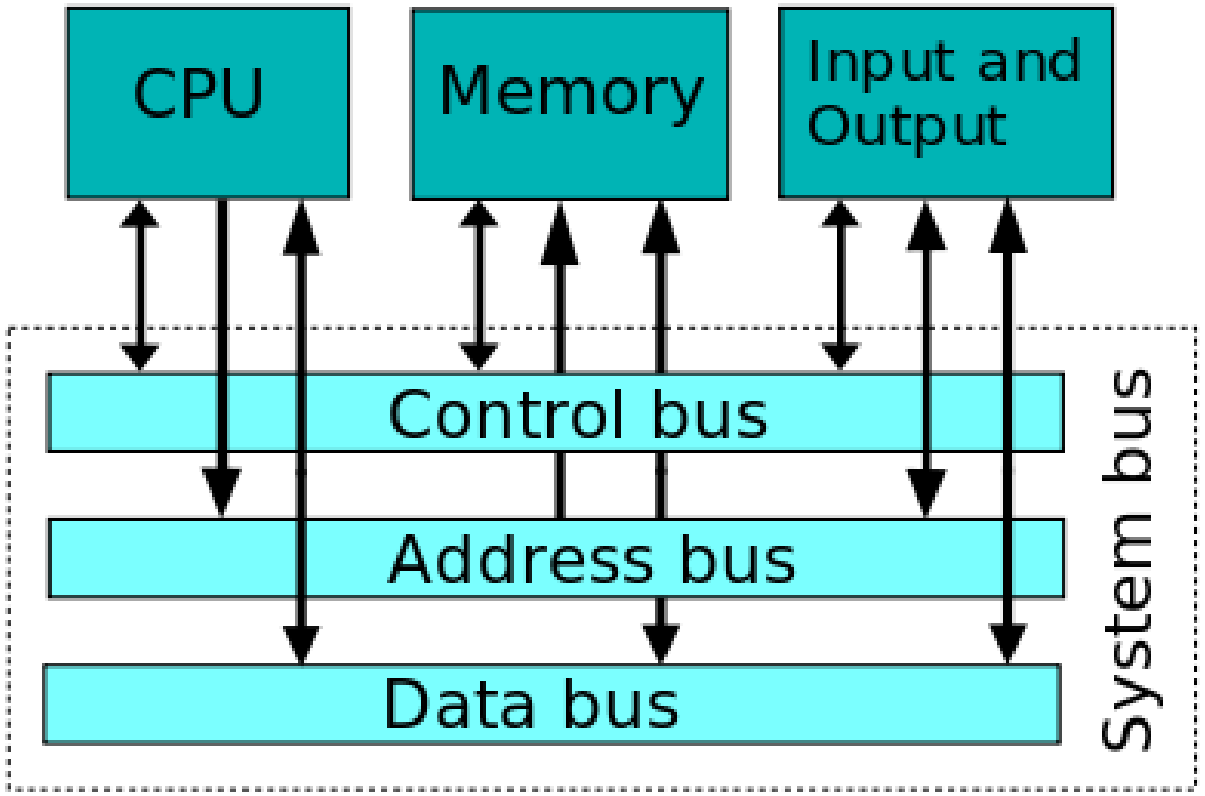
Registers

Register	Symbol	Number of Bits	Function
Accumulator	AC	16	It's a processor register.
Program counter	PC	12	It stores the address of the instruction.
Address Register	AR	12	It is used for storing memory addresses.
Data Register	DR	16	It is a general-purpose register used for storing data during calculations.
Instruction Register	IR	16	It stores the current instruction being executed.

Bus

- In computer architecture, a **bus** is a communication system that transfers data between components inside a computer, or between computers. This expression covers all related hardware components (wire, optical fiber, etc.) and software, including communication protocols.
- Early computer buses were parallel electrical wires with multiple connections.
- Modern computer buses can use both parallel and bit serial connections.

Bus


CPU
Memory
Input and Output
Control bus
Address bus
Data bus
System bus

Types of Buses

Data Bus-Data bus is the most common type of bus. It is used to transfer data between different components of computer. The number of lines in data bus affects the speed of data transfer between different components. The data bus consists of 8, 16, 32, or 64 lines. A 64-line data bus can transfer 64 bits of data at one time.

Address Bus.

- Many components are connected to one another through buses. Each component is assigned a unique ID. This ID is called the address of that component. If a component wants to communicate with another component, it uses address bus to specify the address of that component. The address bus is a unidirectional bus. It can carry information only in one direction. It carries address of memory location from microprocessor to the main memory.

Control Bus

- Control bus is used to transmit different commands or control signals from one component to another component. Suppose CPU wants to read data from main memory. A control signal contains the following:
- 1 **Timing information**: It specifies the time for which a device can use data and address bus.
- 2 **Command Signal**: It specifies the type of operation to be performed.

Instruction Set

- An **instruction set**, or **instruction set architecture** (**ISA**), is the native command issued by the control unit consisting various information like addressing modes, opcode, type, address of data.
- The **instruction set**, also called **instruction set architecture** (**ISA**), is a part of the computer that pertains to programming, which is basically machine language. The instruction set provides commands to the processor, to tell it what it needs to do. The instruction set consists of multiple pieces, including addressing modes, instructions, native data types, registers, memory architecture, interrupt, and exception handling, and external I/O.

Examples of Instructions

- Examples of instruction set
- **ADD** - Add two numbers together.
- **COMPARE** - Compare numbers.
- **JUMP** - Jump to designated RAM address.
- **LOAD** - Load information from RAM to the CPU.
- **OUT** - Output information to device, e.g. monitor.
- **STORE** - Store information to RAM.

Hardware

Computer hardware includes all the electrical, mechanical, and the electronic parts of a computer. Any part that we can see or touch is the hard ware.
Computer hardware includes Computer hardware includes :-
•System Unit
• Peripheral devices
•Input devices i.e. keyboard, mouse etc.
• Output devices i.e. Display Unit, printer etc.
• Storage devices like hard disk, floppy disks etc.

•**Case**:The box that holds the inner parts of the computer. One of the main parts inside the computer is the central processing unit, or CPU. This acts as the "brain" to send instructions to other parts of the computer.
•**Drives:** Nearly all computers will have an internal hard drive used to store information. There are many other types of drives, such as external hard drives, and CD and DVD drives that can be used to store information on disks.

Input Devices:

- Cameras
- Scanner
- Barcode reader
- Electronic White Board
- Joystick
- Keyboard
- Microphone
- Mouse

Output Devices:

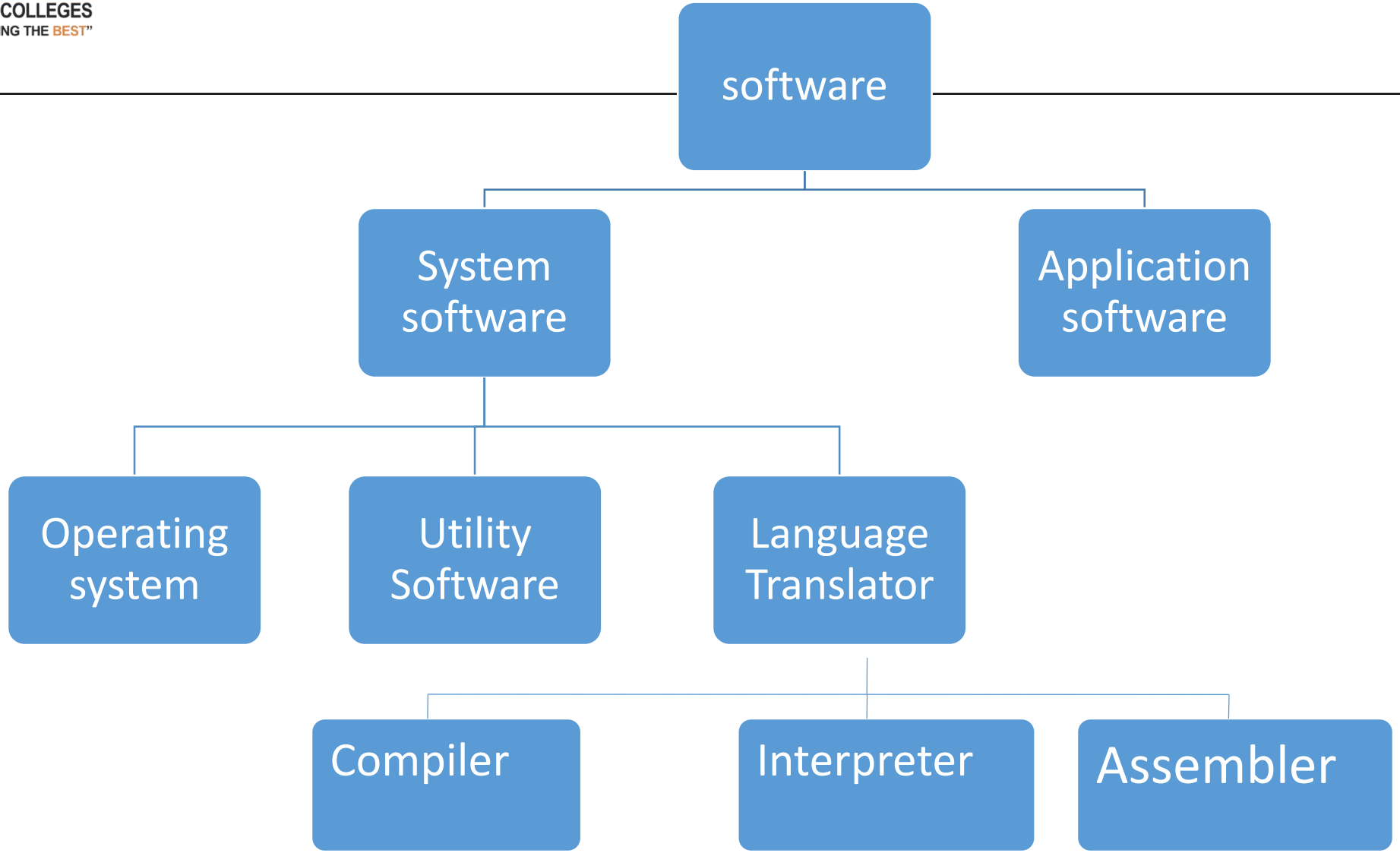
- Monitor
- Printers (all types)
- Plotters
- Projector
- LCD Projection Panels
- Computer Output Microfilm (COM)
- Speaker(s)

Computer Software

- Software is a collection of instructions that enable the user to interact with a computer, its hardware, or perform tasks.
- Without software, most computers would be useless. For example, without your Internet browser software, you could not surf the Internet
- Computer software is programming code executed on a computer processor. The code can be machine-level code, or code written for an operating system.
- System software and application software are two major type of software.

Software

- Antivirus
- Audio / Music program
- Database
- Device drivers
- E-mail
- Game
- Internet browser
- Movie player
- Operating system
- Photo / Graphics program
- Presentation
- Programming language
- Spreadsheet
- Word processor


software
System software
Application software
Operating system
Utility Software
Language Translator
Compiler
Interpreter
Assembler

System software

- System software is software on a computer that is designed to control and work with computer hardware.
- The two main types of system software are the **operating system** and the software installed with the operating system, often called **utility software**.
- The operating system and utility software typically depend on each other to function properly.
- Some system software is used directly by users and other system software works in the background. System software can allow users to interact directly with hardware functionality, like the Device Manager and many of the utilities found in the Control Panel.

System software Types

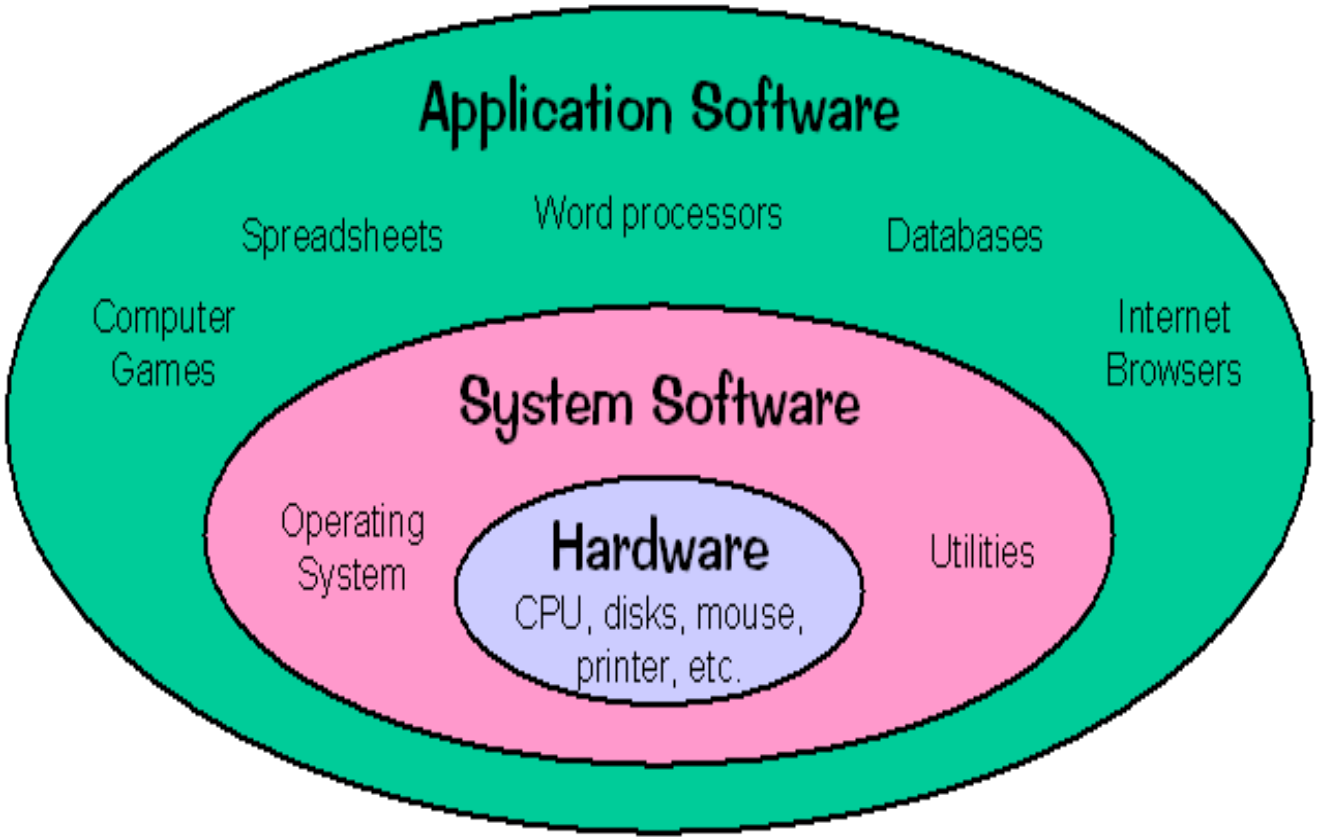
- **Operating System Software** Operating systems are responsible for each and everything from the control and allocation of memory to input from external devices and output to computer display.
- **Language Translator** : It is another system software which convert the high level language to machine level language for the purpose of machine understanding. Example Compiler , Interpreter , Assembler.
- **Utility Software** is a kind of system software designed to help, configure, optimize and maintain the computer. A single piece of utility software is usually called a utility or tool. For example, Formatting, Back-Up Recovery, Disk Defragmenter, Disk Partition.

Application Software

- Application software or software program is the most common software on the computer that performs a special function or task. For example, Microsoft Word is a word processor program that allows users to create and write documents and the browser using to view the page is a program. Without programs, a computer would still work with the operating system, but we would not be able to do anything.

Application software

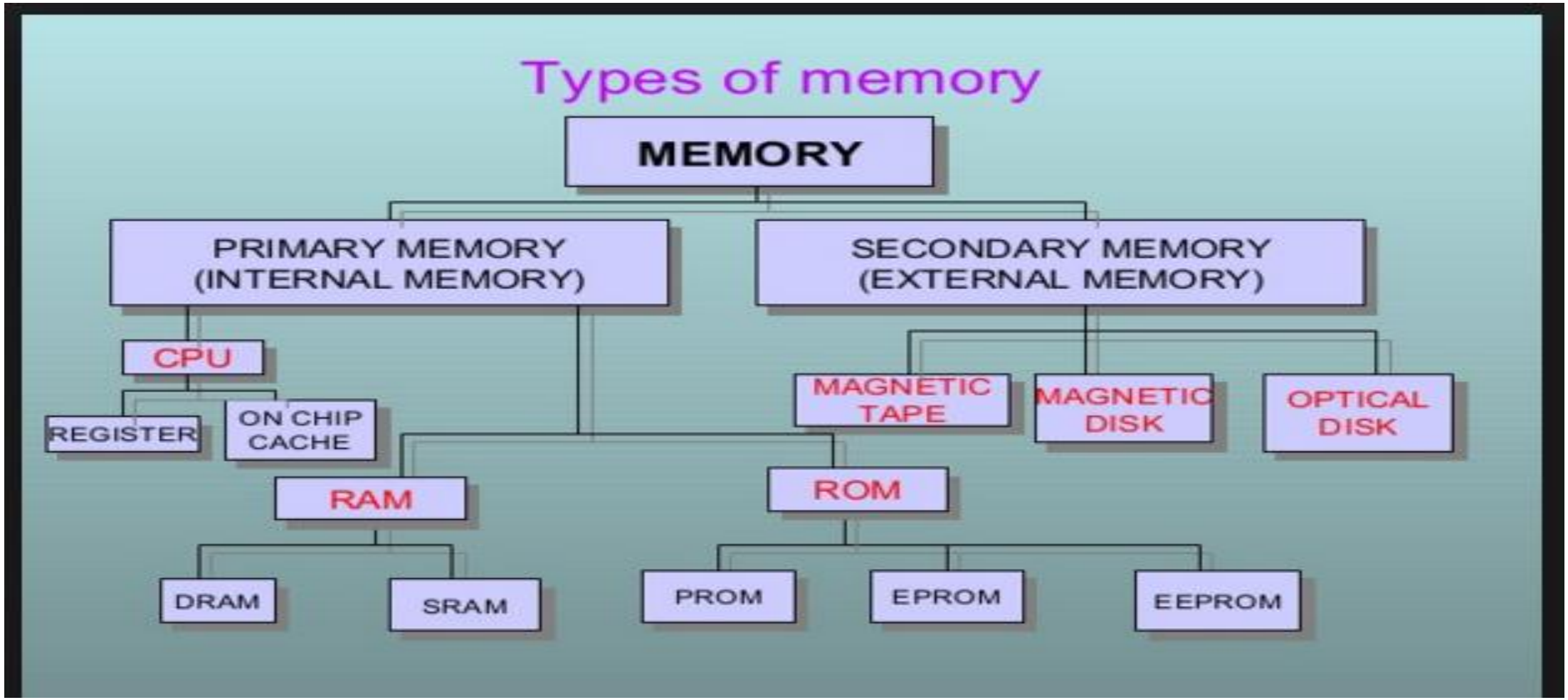
- Adobe Acrobat — PDF reader
- Adobe Photoshop — Photo editor
- FileZilla — FTP
- Google Chrome — Internet Browser
- Microsoft Excel — Spreadsheet
- Microsoft PowerPoint — Presentation
- Microsoft Word — Word processor
- Mozilla Thunderbird — E-mail client


Application Software
Spreadsheets
Word processors
Databases
Computer Games
Internet Browsers
System Software
Operating System
Hardware
CPU, disks, mouse, printer, etc.
Utilities

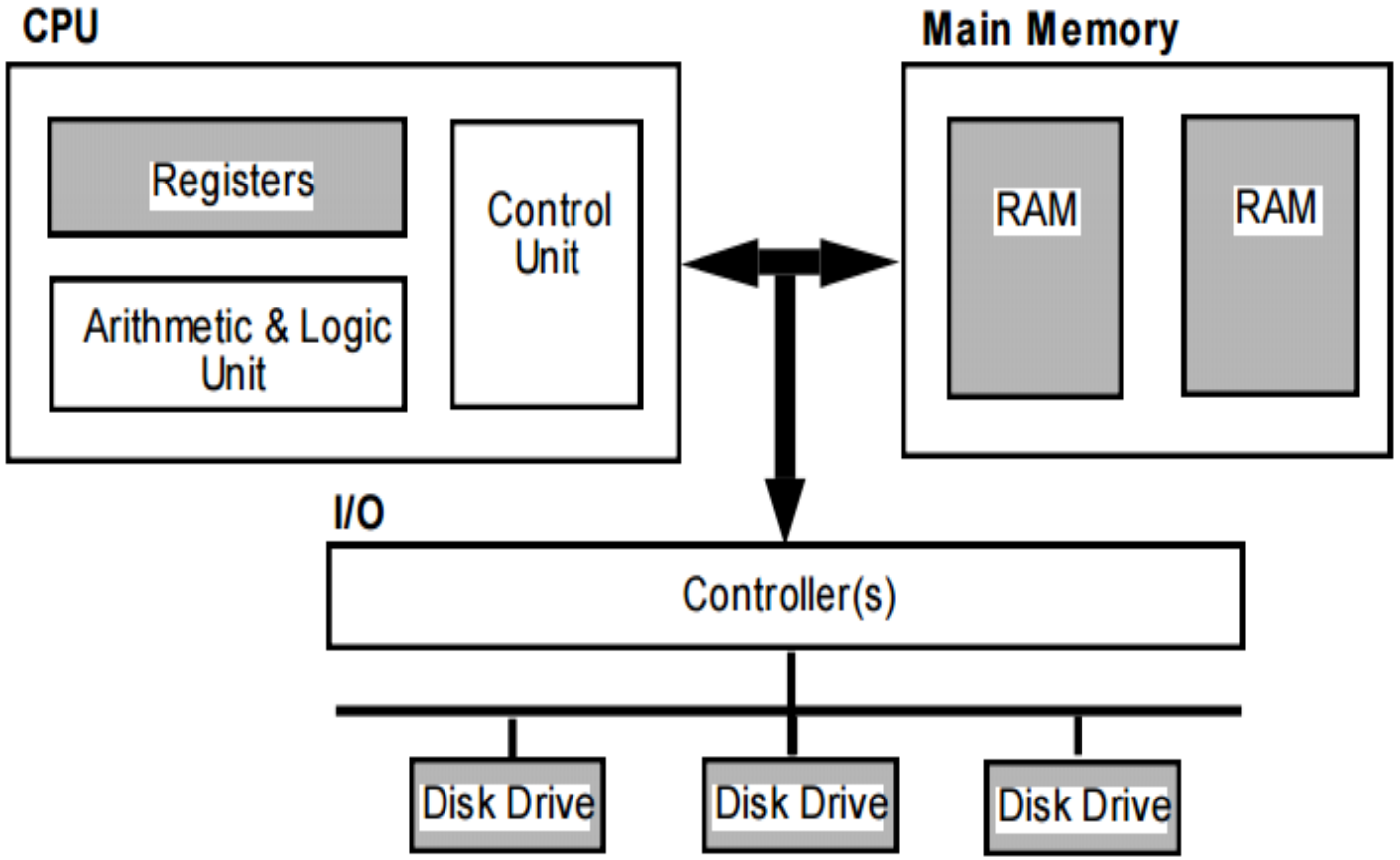
System Vs Application Software

1. System software is used for operating computer hardware. Application software is used by user to perform specific task.
2. System software are installed on the computer when operating system is installed. Application software are installed according to user's requirements.
3. In general, the user does not interact with system software because it works in the background. In general, the user interacts with application software .
4. System software can run independently. It provides platform for running application software. Application software can't run independently. They can't run without the presence of system software.
5. Some examples of system software are compiler, assembler, debugger, driver, etc. Some examples of application software are word processor, web browser, media player, etc.

Memory


Types of memory
MEMORY
PRIMARY MEMORY
(INTERNAL MEMORY)
SECONDARY MEMORY
(EXTERNAL MEMORY)
CPU
REGISTER
ON CHIP
CACHE
RAM
DRAM
SRAM
ROM
PROM
EPROM
EEPROM
MAGNETIC
TAPE
MAGNETIC
DISK
OPTICAL
DISK

Memory


CPU
Registers
Arithmetic & Logic Unit
Control Unit
Main Memory
RAM
RAM
I/O
Controller(s)
Disk Drive
Disk Drive
Disk Drive

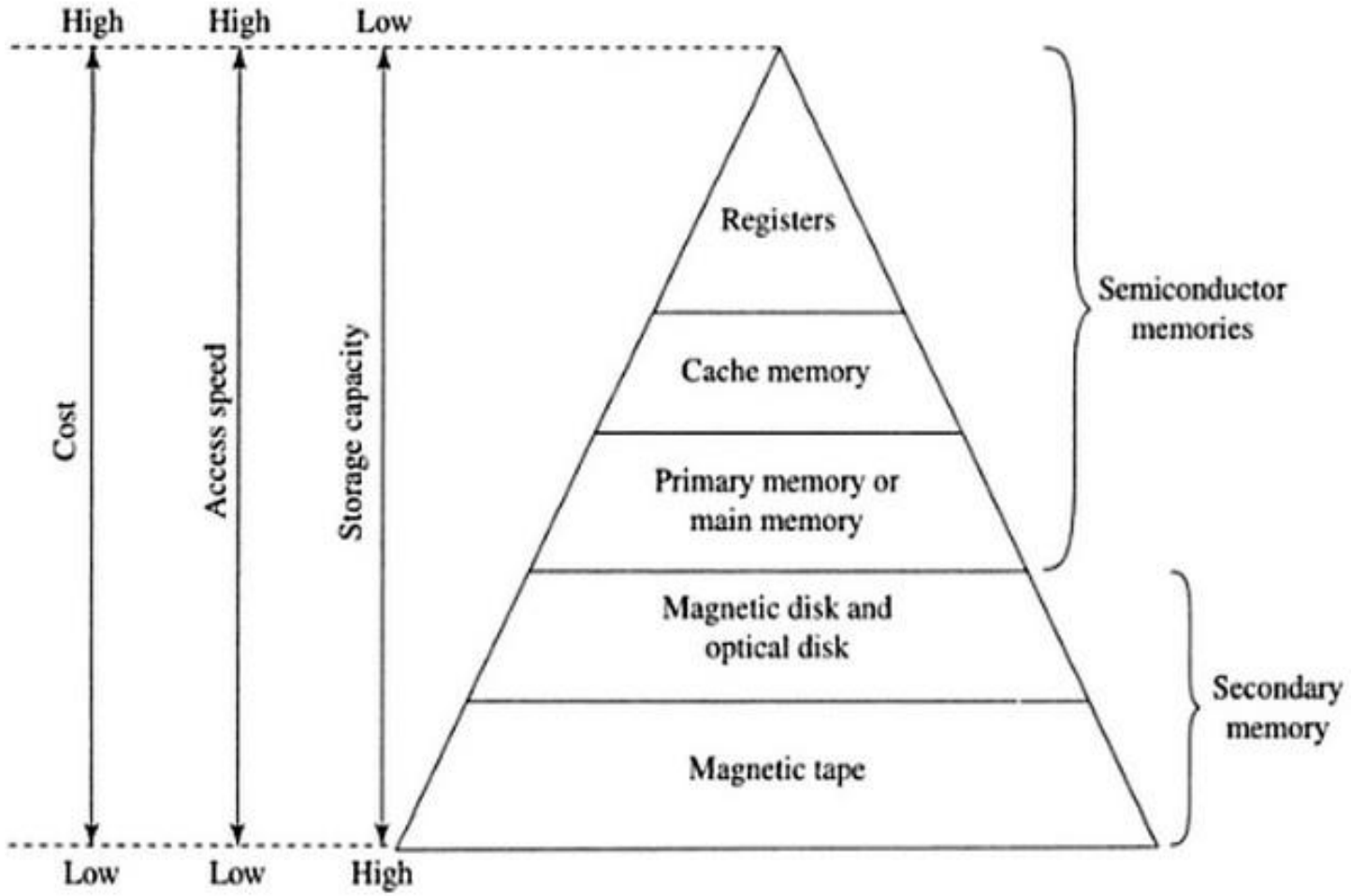
- **Memory** is an essential element of a computer. Without its memory, a computer is of hardly any use. Memory plays an important role in saving and retrieving data. The performance of the computer system depends upon the size of the memory. Memory is of following types:

1. Primary Memory / Volatile Memory.

2. Secondary Memory / Non Volatile Memory.

- **1. Primary Memory / Volatile Memory:** Primary Memory is internal memory of the computer. RAM AND ROM both form part of primary memory. The primary memory provides main working space to the computer.

Memory Hierarchy



- **Registers:** The CPU processes data and instructions with high speed; there is also movement of data between various units of computer. It is necessary to transfer the processed data with high speed. So the computer uses a number of special memory units called registers. They are not part of the main memory but they store data or information temporarily and pass it on as directed by the control unit
- **Cache Memory:** The speed of CPU is extremely high compared to the access time of main memory. Therefore the performance of CPU decreases due to the slow speed of main memory. To decrease the mismatch in operating speed, a small memory chip is attached between CPU and Main memory whose access time is very close to the processing speed of CPU. It is called CACHE memory. CACHE memories are accessed much faster than conventional RAM. It is used to store programs or data currently being executed or temporary data frequently used by the CPU. So each memory makes main memory to be faster and larger than it really is. It is also very expensive to have bigger size of cache memory and its size is normally kept small.

- **Random Access Memory (RAM):** The primary storage is referred to as random access memory (RAM) because it is possible to randomly select and use any location of the memory directly store and retrieve data.
- It takes same time to any address of the memory as the first address. It is also called read/write memory.
- The storage of data and instructions inside the primary storage is temporary. It disappears from RAM as soon as the power to the computer is switched off.
- The memories, which lose their content on failure of power supply, are known as volatile memories .So now we can say that RAM is volatile memory.

- **SRAM** is an acronym for Static Random Access Memory. The basic architecture of SRAM includes one or more rectangular arrays of memory cells with support circuitry to decode addresses and implement the required read and write operations. Additional support circuitry for special features such as burst operation or pipelined reads may be present on the memory chip.
- **DRAM** (Dynamic RAM) is not as fast as SRAM but is cheaper and is used for main memory. Each bit uses a single capacitor and single transistor circuit. Since capacitors lose their charge, DRAM needs to be refreshed every few milliseconds. The memory system does this transparently. There are many implementations of DRAM, two well-known ones are SDRAM and DDR SDRAM.
- **SDRAM** (Synchronous DRAM) is a form of DRAM that is synchronised with the clock of the CPU‟s system bus, sometimes called the front-side bus (FSB)

- **DDR SDRAM** (Double-Data Rate SDRAM) is an optimisation of SDRAM that allows data to be transferred on both the rising edge and falling edge of a clock signal, effectively doubling the amount of data that can be transferred in a period of time.

Memory Type	Speed	Volatile?	Use Case
RAM	Fast	Yes	Running apps, OS
ROM	Slow	No	Boot instructions, firmware
Cache	Superfast	Yes	Frequently used data
Register	Ultra-fast	Yes	CPU calculations
HDD/SSD	Slow–Fast	No	Long-term storage

- **Read Only Memory (ROM):** There is another memory in computer, which is called Read Only Memory (ROM). Again it is the ICs inside the PC that form the ROM. The storage of program and data in the ROM is permanent.
- The ROM stores some standard processing programs supplied by the manufacturers to operate the personal computer.
- The ROM can only be read by the CPU but it cannot be changed. The basic input/output program is stored in the ROM that examines and initializes various equipment attached to the PC when the power switch is ON. The memories, which do not lose their content on failure of power supply, are known as non-volatile memories. ROM is non-volatile memory.

- **PROM:** There is another type of primary memory in computer, which is called Programmable Read Only Memory (PROM).
- You know that it is not possible to modify or erase programs stored in ROM, but it is possible for you to store your program in PROM chip.
- Once the programmers' are written it cannot be changed and remain intact even if power is switched off. Therefore programs or instructions written in PROM or ROM cannot be erased or changed.

- **EPROM:** This stands for Erasable Programmable Read Only Memory, which overcome the problem of PROM & ROM.
- EPROM chip can be programmed time and again by erasing the information stored earlier in it.
- Information stored in EPROM exposing the chip for some time ultraviolet light and it erases chip is reprogrammed using a special programming facility. When the EPROM is in use information can only be read.
- **EEPROM** (Electrically Erasable PROM). As the name implies the contents of EEPROMs are erased electrically.

- **Magnetic Tape:** Magnetic tapes are used for large computers like mainframe computers where large volume of data is stored for a longer time.
- In PC also you can use tapes in the form of cassettes.
- The cost of storing data in tapes is inexpensive. Tapes consist of magnetic materials that store data permanently. It can be 12.5 mm to 25 mm wide plastic film-type and 500 meter to 1200 meter long which is coated with magnetic material. The deck is connected to the central processor and information is fed into or read from the tape through the processor. It's similar to cassette tape recorder.

- **Magnetic Disk:** You might have seen the gramophone record, which is circular like a disk and coated with magnetic material. Magnetic disks used in computer are made on the same principle. It rotates with very high speed inside the computer drive. Data is stored on both the surface of the disk. Magnetic disks are most popular for direct access storage device. Each disk consists of a number of invisible concentric circles called tracks. Information is recorded on tracks of a disk surface in the form of tiny magnetic spots
- **Optical Disk:** With every new application and software there is greater demand for memory capacity. It is the necessity to store large volume of data that has led to the development of optical disk storage medium.

Computer Applications

e- Business OR e-Commerce

- E-business or e-commerce refers to the buying, selling, and exchanging of goods or services over digital platforms, primarily the internet.
- It refers to the buying and selling of products or service over the Internet and other computer network.
- It refers the entire online process of developing, marketing, selling, delivering, servicing and paying for the product or service.
- Modern electronic- commerce uses the WWW.
- E-COMMERCE that takes place between business is referred as Business-to-Business(B2B).

Computer Applications

Computer in Business:

- Present scenario is an example of integration of information and communication technology (ICT) in business.
- Use of computers and information technology in business has revolutionized the business productivity and profit margins drastically.
- Use of information and communication technology(ICT) enhances following business process:
  - Production process: Automation and Computerization of production process has changed whole scenario.
  - Management process: Internal management, training, recruitment processes.
  - Supply chain management: Involvement of Information and communication technology in demand and supply process eases the customer /supplier hassles.

Computer Applications

Computers in Bio-Informatics:

- Computers in bioinformatics are used to analyze, interpret, and visualize biological data, enabling discoveries in genomics, proteomics, and molecular biology.
- Bio-Informatics is the science of using information to understand Biology.
- Also known as Computational biology, the application of quantitative analytical techniques in modeling biological systems.
- It is the science of developing computer databases and algorithms to facilitate biological research.

Computer Applications

BIO-INFORMATICS…

- It is the combination of biology and information technology.
- It refers to the computational tools and methods used to manages, analyzed and manipulate large sets of biological data.
- It deals with the management and analysis of DNA, RNA, Proteins etc.
- Computers are important in Bio-informatics for 2 reasons:

1. Many bioinformatics problems require the some tasks to be repeated million of times.
2. Computers are required for their computational & problem solving power.

Computer Applications

Computers in Health-care

- Computers in healthcare are used to manage patient data, support diagnostics, streamline medical workflows, and enhance treatment outcomes through technology.
- Computers have become essential in almost every aspect of healthcare.
- All health care services have gained a greater ability to treat, diagnose and care for patients with the help of computers.
- Use of computers in health care is diversified and can be illustrated as:
  - Report diagnosis.
  - Production of drugs.
  - Hospital management system.
  - Technologically advance diagnostic tools.
  - Tele medicine etc.

Computer Applications

Computers in Remote Sensing & GIS

- Computers in remote sensing and GIS are used to process, analyze, and visualize spatial data for mapping, environmental monitoring, and decision-making.
- Remote sensing is science of gathering of data without actual contact with the materials or objects being studied.
- GIS(Geographic Information System) is a software tool for mapping and analyzing any object on earth, from forest land to urban landscape, Earthquake faults, tennis courts, oil rigs etc.
- Both system uses computer technological ability extensively to study, evaluate and produce respective prediction and results.

Computer Applications

REMOTE SENSING

- It is the process of collecting information about an object on earth without making physical contact with the object.
- It is widely used for gathering of information about the places from a distance.
- Remote sensing is widely used by the geologist for identifying an areas rock type, natural events such as flood or land slides, fisheries, forestry etc.

Advantages of remote sensing

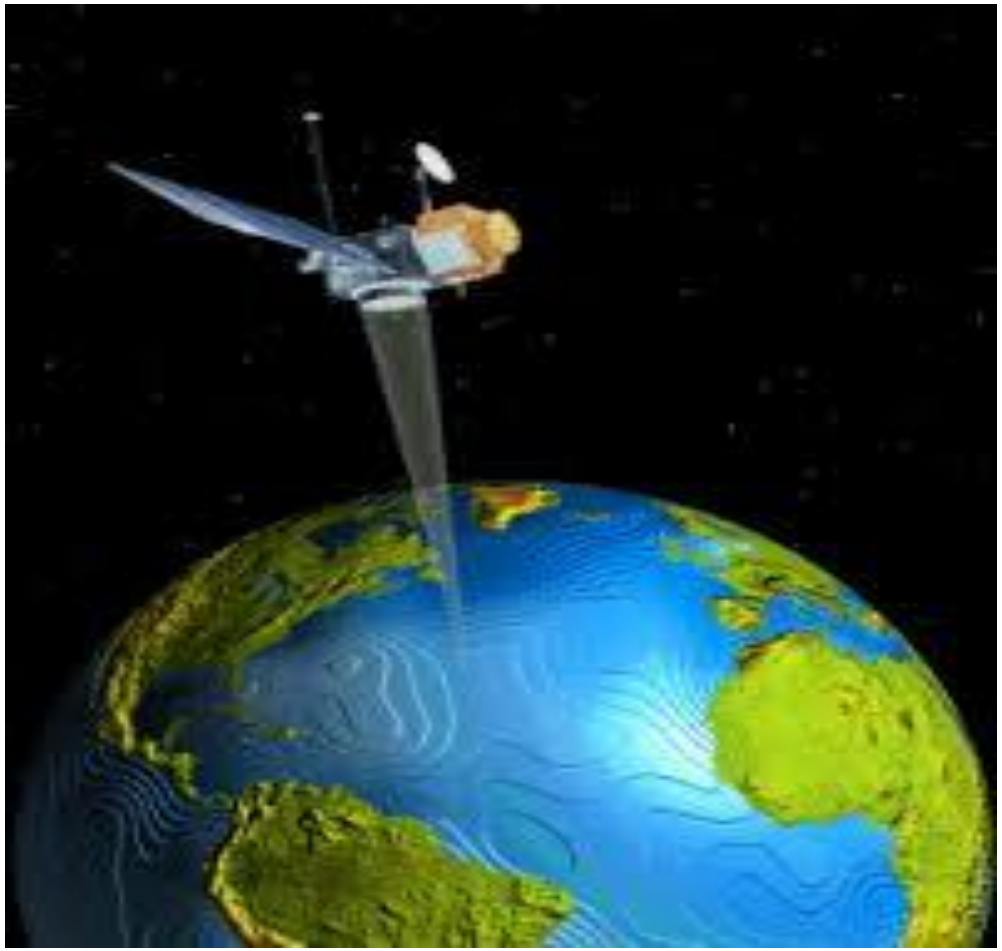
- It make it possible to gather information about inaccessible area where it is not possible to gather information through ground survey.
- This technique save times and efforts as information about large area can be gathered quickly.

Computer Applications

- **Gis(Geographic Information System)-** It is the software tool that can input, store, retrieve, analyzed and displayed geographical information.
- Function of GIS:

1. Data pre-processing, manipulation and retrieval
2. Data analysis
3. Data display
4. Database management

REMOTE SENSING




River
BASIN
Dipping beds
(in structural dome)
Google earth

Gis(Geographic Information System)

ERDAS Imagine, ESRI, Map Info, ER MAPPER
Are the most common software used in remote sensing.

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Computer Applications

Computers in Meteorology & Climatology

- Computers in meteorology and climatology are used to model atmospheric processes, analyze weather data, and predict climate patterns for forecasting and research.
- Meteorology studies changes in weather, the state of atmospheric properties for a given location.
- Climatology examines weather properties over a period of time for a location.
- The calculations involved in climatology and meteorology are enormous. Thus accurate and effective tool like Computer is needed to record, process, manipulate and analyze the data.

Computer Applications

Computers in Animation, Multimedia, Gaming

- Computers in animation, multimedia, and gaming are used to create, render, and interact with dynamic visual content, enhancing entertainment, storytelling, and user engagement.
- Multimedia is combination of more than one media into an information source or presentation. It is capability of integrating two or more types of media.
- Animation deals with generation, sequence and display of a set of images to create an effect of visual motion.
- With advent of computer animation and multimedia technology, computer gaming found its place in todays life.
- All the above said areas are not possible to imagine without existence of computers.

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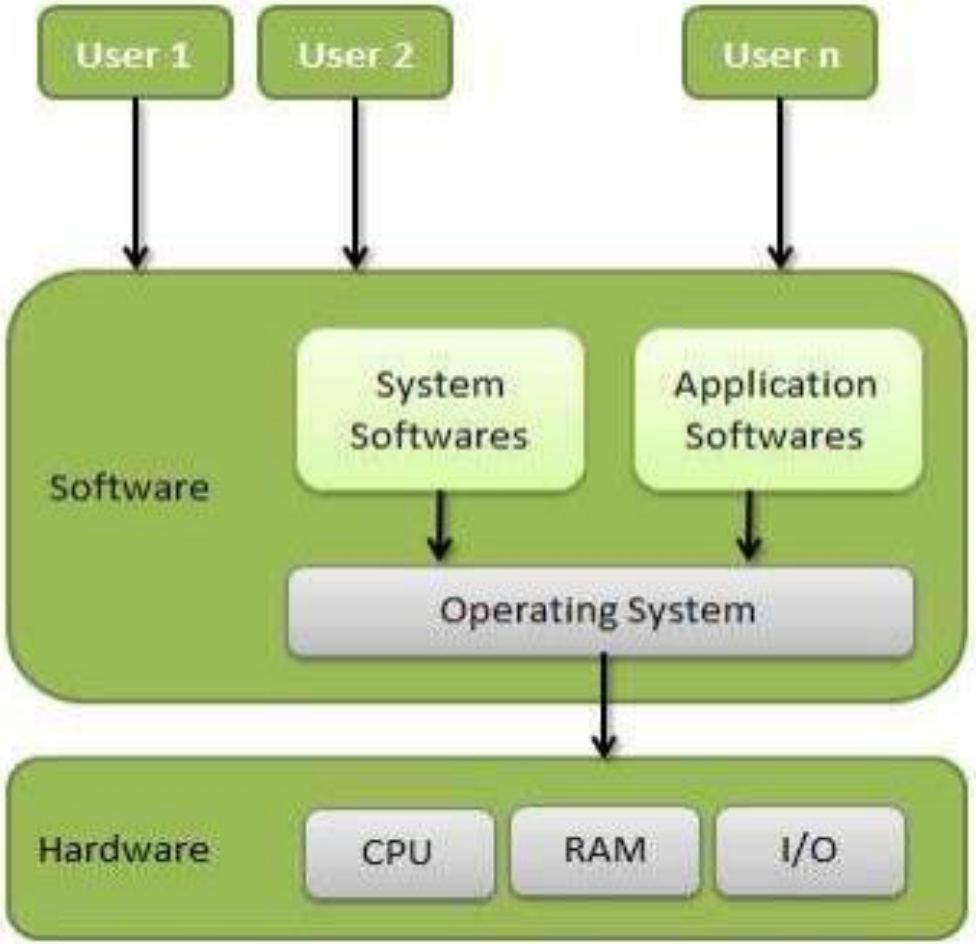
OPERATING SYSTEM


User 1
User 2
User n
Software
System Softwares
Application Softwares
Operating System
Hardware
CPU
RAM
I/O

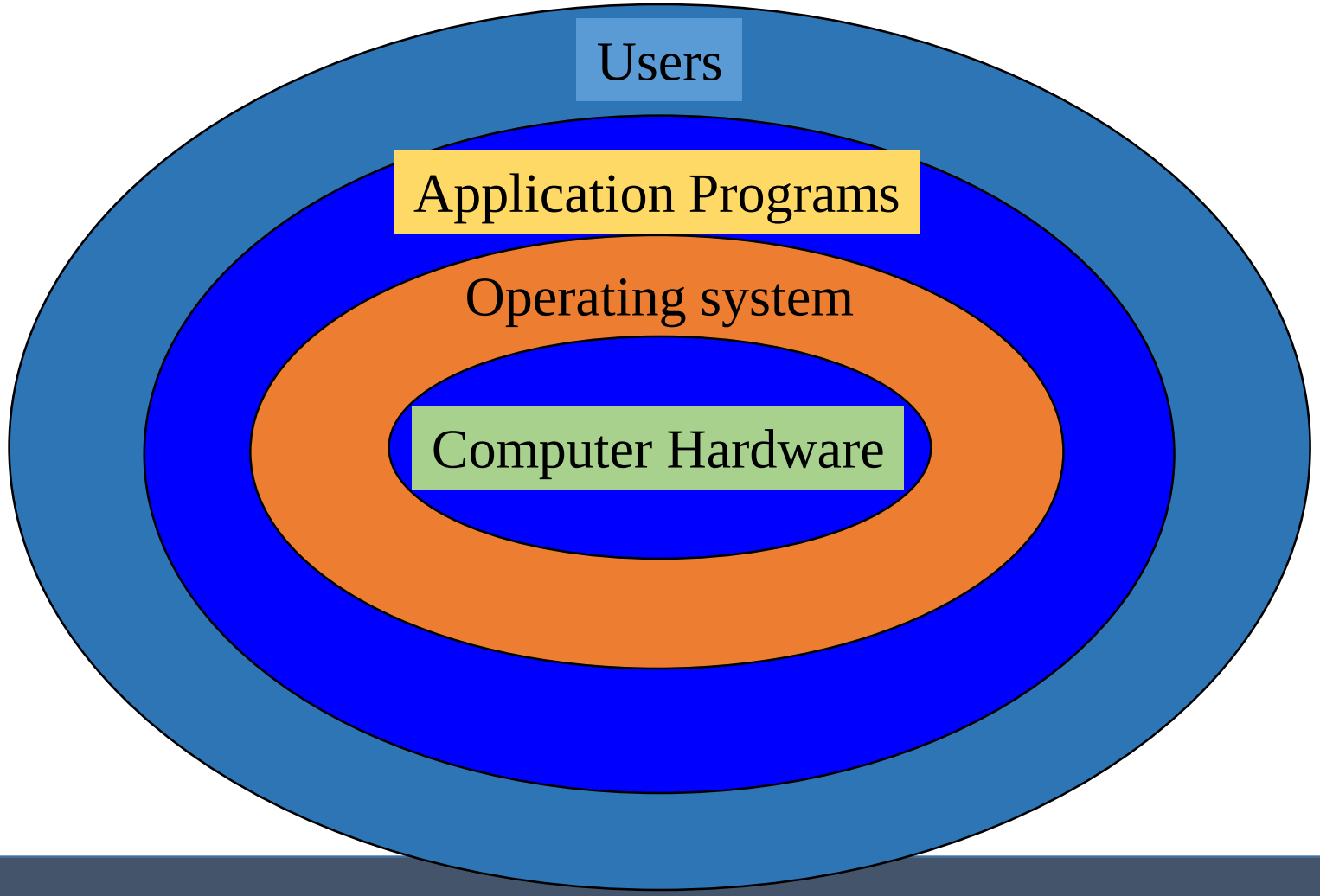
OPERATING SYSTEM

- An Operating System is a system software which may be viewed as an organized collection of software's, operating a computer and providing an environment for execution of programs.
- It is the most fundamental of all the system programs, which controls all the computer’s resources and provides the base upon which the application programs can be written.

OPERATING SYSTEM

- An Operating System is an interface between user and hardware of a computer system.
- It make the computer system *convenient to use.*
- To use the computer hardware in *an efficient manner.*
- An Operating System is a control program.
- An Operating System can be defined as a Resource Manager.

Abstract view of the components of a computer system



FUNCTION OF OPERATING SYSTEM

- Memory Management
- Processor Management
- Device Management
- File Management
- Security
- Control over system performance
- Job accounting
- Error detecting aids
- Coordination between other software and users

- **Running Programs:** It provides facility to run any programs.

1. User Interface: Operating System provides the facility of the user interface. The user interface includes the windows menus. Apart of GUI , all operations of computer is performed by the commands.

- **Managing Files:** The data and programs are stored permanently on the disk for the future use. System contains thousands of files. The Operating System maintains and manages these files.
- **Memory Management**: Operating System performs memory management . The data and programs are loaded from disk in to the RAM by the operating system and allocates the memory area. Operating System does the following activities for memory management.

1. Keeps tracks of primary memory i.e. what part of it are in use by whom, what part are not in use.
2. In multiprogramming, OS decides which process will get memory when and how much. Allocates the memory when the process requests it to do so. De-allocates the memory when the process no longer needs it or has been terminated.

Processor Management : In multiprogramming environment, OS decides which process gets the processor when and how much time. This function is called process scheduling. Operating System does the following activities for processor management.

1.Keeps tracks of processor and status of process. Program responsible for this task is known as traffic controller.

2.Allocates the processor (CPU) to a process.

Device Management: OS manages device communication via their respective drivers. Operating System does the following activities for device management.

- Keeps tracks of all devices. Program responsible for this task is known as the I/O controller.
- Decides which process gets the device when and for how much time.
- Allocates the device in the efficient way
- De-allocates devices

File ManagementA file system is normally organized into directories for easy navigation and usage. These directories may contain files and other directions. Operating System does the following activities for file management:

- Keeps track of information, location, uses, status etc. The collective facilities are often known as file system.
- Decides who gets the resources.
- Allocates the resources.
- De-allocates the resources

Types of Operating system.

- Simple Batch System
- Multiprogramming Batch System
- Multiprocessor System
- Desktop System
- Distributed Operating System
- Clustered System
- Realtime Operating System
- Handheld System

Simple Batch Systems

- In this type of system, there is no direct interaction between user and the computer.
- The user has to submit a job (written on cards or tape) to a computer operator.
- Then computer operator places a batch of several jobs on an input device.
- Jobs are batched together by type of languages and requirement.
- Then a special program, the monitor, manages the execution of each program in the batch.
- The monitor is always in the main memory and available for execution.

Multiprogramming Batch Systems

- In this the operating system picks up and begins to execute one of the jobs from memory.
- Once this job needs an I/O operation operating system switches to another job (CPU and OS always busy).
- Jobs in the memory are always less than the number of jobs on disk(Job Pool).
- If several jobs are ready to run at the same time, then the system chooses which one to run through the process of CPU Scheduling.

Distributed Operating System

- The motivation behind developing distributed operating systems is the availability of powerful and inexpensive microprocessors and advances in communication technology.
- These advancements in technology have made it possible to design and develop distributed systems comprising of many computers that are inter connected by communication networks. The main benefit of distributed systems is its low price/performance ratio.
- Advantages Distributed Operating System
- As there are multiple systems involved, user at one site can utilize the resources of systems at other sites for resource-intensive tasks.
- Fast processing.
- Less load on the Host Machine.

Real Time Operating System

- It is defined as an operating system known to give maximum time for each of the critical operations that it performs, like OS calls and interrupt handling.
- The Real-Time Operating system which guarantees the maximum time for critical operations and complete them on time are referred to as Hard Real-Time Operating Systems.
- While the real-time operating systems that can only guarantee a maximum of the time, i.e. the critical task will get priority over other tasks, but no assurity of completing it in a defined time. These systems are referred to as Soft Real-Time Operating Systems.

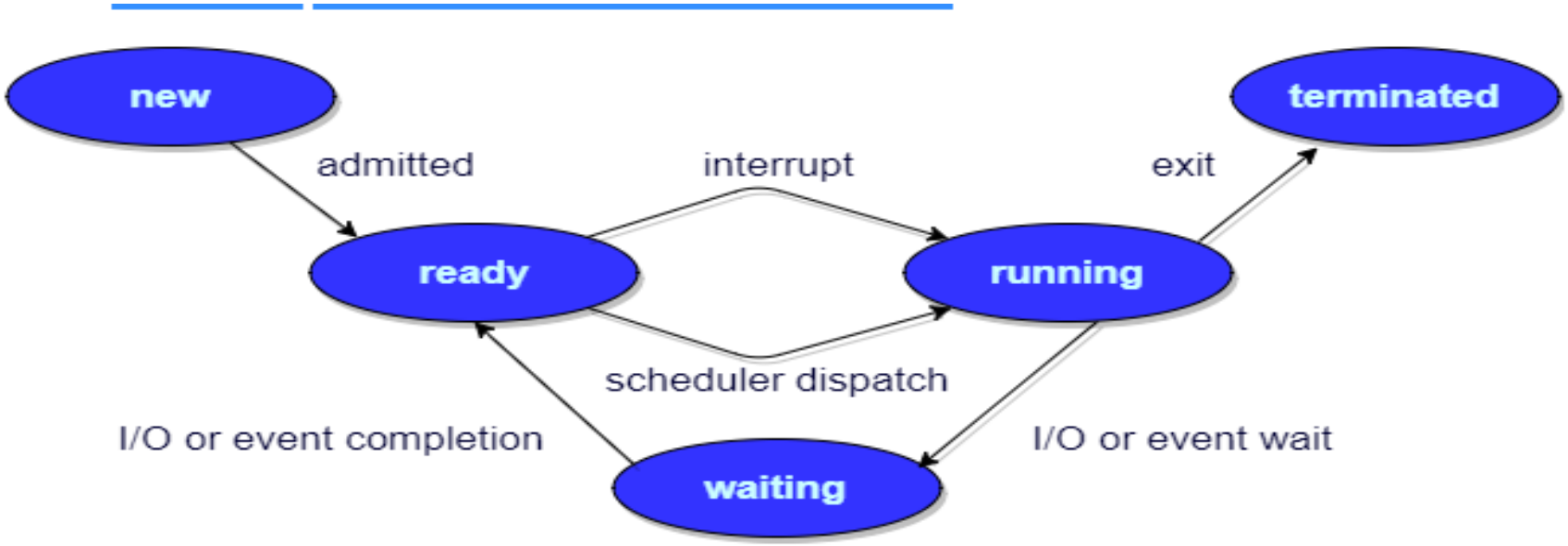
Process

- A process is a program in execution. Process is not as same as program code but a lot more than it. A process is an 'active' entity as opposed to program which is considered to be a 'passive' entity. Attributes held by process include hardware state, memory, CPU etc.
- Process memory is divided into four sections for efficient working :
- The Text section is made up of the compiled program code, read in from non-volatile storage when the program is launched.

Different Process States

- Processes in the operating system can be in any of the following states:
- NEW- The process is being created.
- READY- The process is waiting to be assigned to a processor.
- RUNNING- Instructions are being executed.
- WAITING- The process is waiting for some event to occur(such as an I/O completion or reception of a signal).
- TERMINATED- The process has finished execution.

Different Process States



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Thankyou