Course Contents

Unit-01:Introduction to Computer (4 Hrs.)

- **Introduction of Computer**
- **Characteristics of Computer**
- **History of Computer**
- **Generations of Computer**
- **Digital and Analog Computers**
- **Classification of Computer based on size**
- **The Computer System**
- **Application of Computers**

Introduction to computer

Computer:

- A computer is an electronic device, operating under the control of instructions stored in its own memory that can accept data (input), process the data according to specified rules, produce information (output), and store the information for future use.

- A computer is a programmable machine. The two principal characteristics of computer are:
  - It responds to a specific set of instructions in a well-defined manner.
  - It can execute a prerecorded list of instructions (program)

Introduction to computer

Computer:

- All general-purpose computers require the following hardware components.

- Central Processing Unit (CPU) : The heart of the computer, the component that actually executes instructions.

- Memory: Enables a computer to store, at least temporarily, data and programs.

- Input Device: Input devices are the devices which are used to feed programs and data to the computer. The input system connects the external environment with the computer system.

Introduction to computer

Computer:

- Output Device: The output devices give the results of the process and computations to the outside world. The output units accept the results produced by the computer, convert them into a human readable form and supply them to the users. The more common output devices are printers, plotters, display screens, magnetic tape drives etc.

- Mass storage device: Allows a computer to permanently retain large amounts of data. Common mass storage devices include disk drives and tape drives.
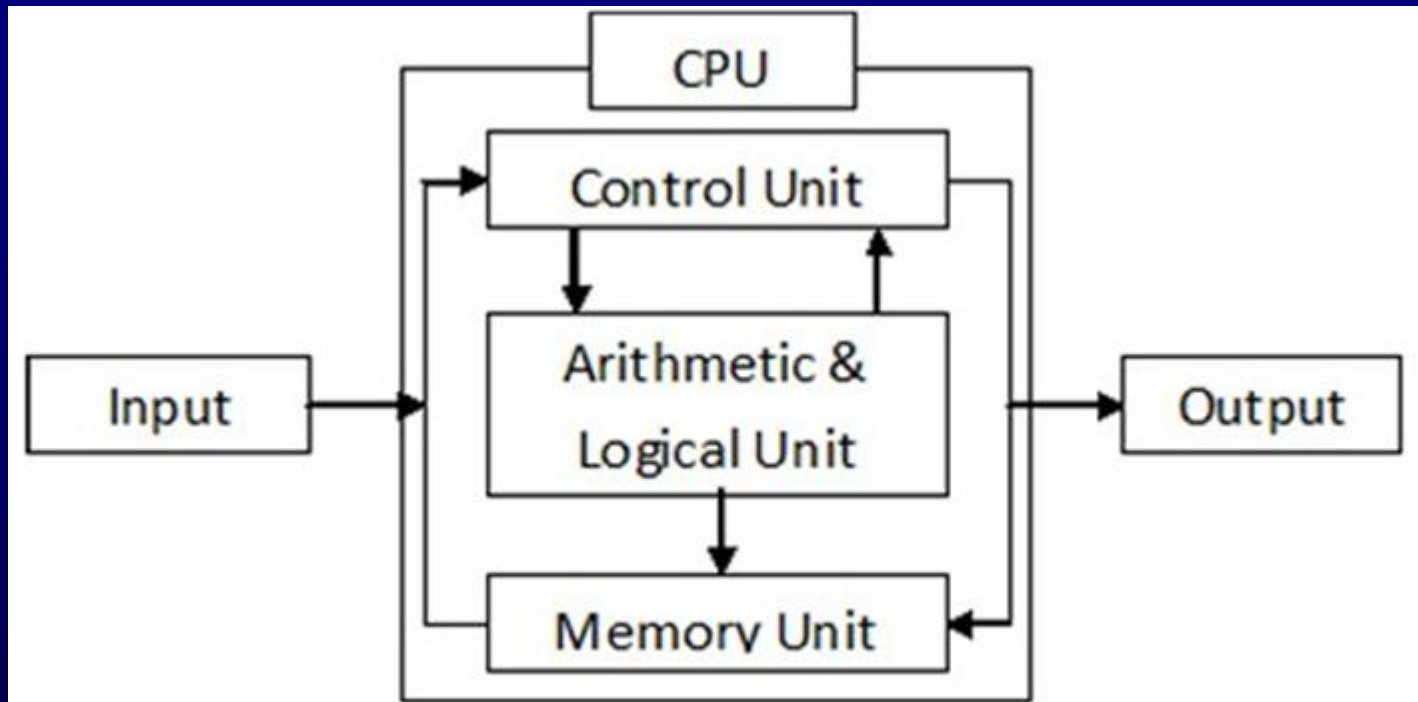
Introduction to computer
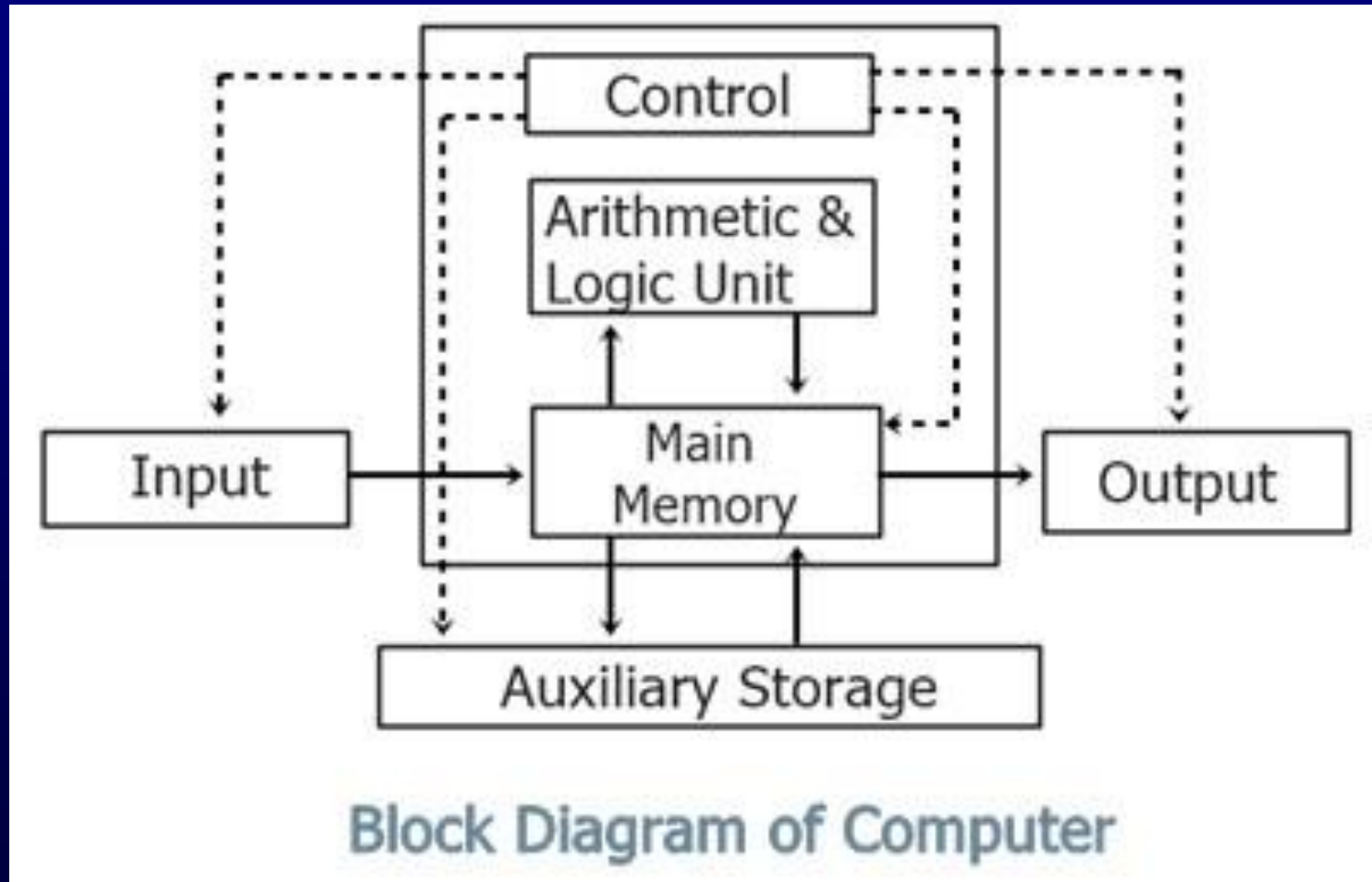
Block Diagram of Computer:

Fig. Block Diagram of Computer

Introduction to computer

Block Diagram of Computer:

Block Diagram of Computer

Introduction to computer
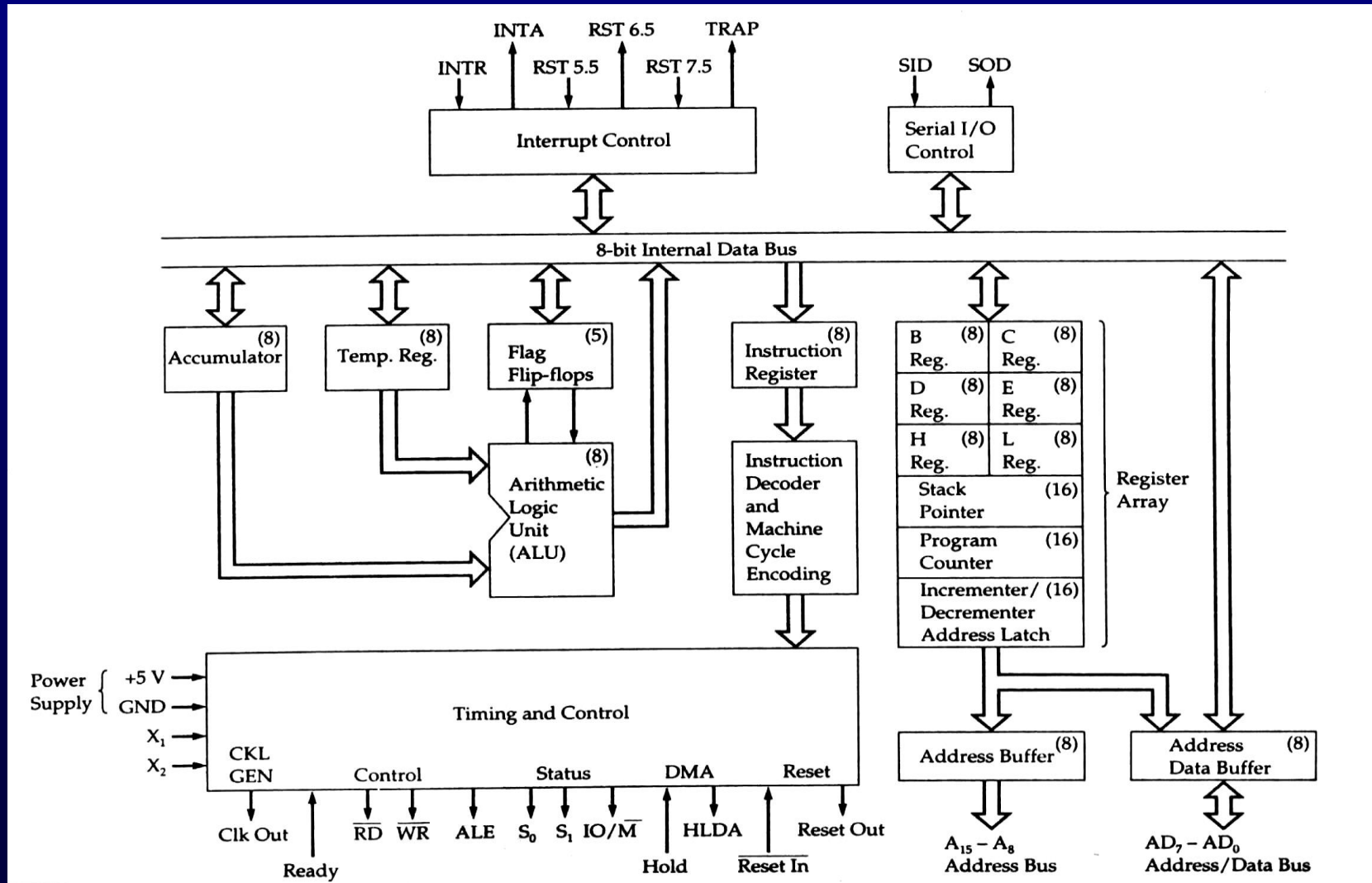
8085 Block Diagram:

Figure: Intel 8085 CPU Block Diagram

Characteristics of Computer

Characteristics of Computer:

1. Word length
2. Speed
3. Storage
4. Accuracy
5. Versatility
6. Automation
7. Deligence

Characteristics of Computer

Characteristics of Computer:

1. Word length:

Difference between bit, nibble, byte and wordlength.

Word length is the computing power of computer and varies as 8, 16, 32 or 64 bits. Longer the word length, more powerful the computer is.

2. Speed: time taken to perform any task by computer is called the speed of the computer. The speed of computer is measured in terms of micro or nano-second.

Milliseconds(ms) = 1/1,000 ; microseconds(μs)= (1/1,000,000), Nanoseconds(ns)=(1/1,000,000,000) , Picoseconds(ps) = (1,000,000,000,000)

Characteristics of Computer:

3. Storage:

- Digital data storage is essentially the recording of digital information in a storage medium, typically by electronic means.

- Computers have their own main memory and auxiliary memory storage systems which computer use when needed.

- The storage capacity is measured in terms of

Symbol	Prefix
k	kilo
M	mega
G	giga
T	tera

Characteristics of Computer

Characteristics of Computer:

3. Storage:

Symbol	Prefix	SI Meaning	Binary meaning	Size difference
k	kilo	$10^3 = 1000^1$	$2^{10} = 1024^1$	2.40%
M	mega	$10^6 = 1000^2$	$2^{20} = 1024^2$	4.86%
G	giga	$10^9 = 1000^3$	$2^{30} = 1024^3$	7.37%
T	tera	$10^{12} = 1000^4$	$2^{40} = 1024^4$	9.95%
P	peta	$10^{15} = 1000^5$	$2^{50} = 1024^5$	12.59%
E	exa	$10^{18} = 1000^6$	$2^{60} = 1024^6$	15.29%
Z	zetta	$10^{21} = 1000^7$	$2^{70} = 1024^7$	18.06%
Y	yotta	$10^{24} = 1000^8$	$2^{80} = 1024^8$	20.89%

Characteristics of Computer

Characteristics of Computer:

4. Accuracy:

- Computer is the accurate machine with high accuracy and every calculation is performed with the same accuracy.

- It can perform large number of task without errors but if we feed wrong data, it returns the same wrong information called GIGO(Garbage In Garbage Out).

5. Versatility:

Versatile means, computer can not only perform calculation but same computer can perform many different types of Job depend upon the different program fed to it.

Characteristics of Computer

Characteristics of Computer:

6. Automation:

● Automation is the technology by which a process or procedure is performed with minimal human assistance.

● Computers are capable for automation, provided they are programmed correctly.

● Computers can proceed on its own till its completion.

Characteristics of Computer

7. Diligence:

- Diligence of computer is the capacity of performing same task repeatedly multiple times without feeling tiredness, boring, lack of concentration and fatigue with same speed and accuracy.

Characteristics of Computer

7.   Diligence:

- Human being suffer from weakness like tiredness, lack of concentration etc. Human have feelings they become sad, depressed, bored, and negligent and will reflect on the work they do.

- Human beings can't perform the same or similar tasks over and over again with the same precision, accuracy and enthusiasm as the first time. This will effect the performance.

   Being a machine, a computer doesn't have any of these human weaknesses.

Introduction to computer

History Vs Generation of Computer ?

Introduction to computer

History of Computer:

History of computing is a timeline of how computers evolved from their humble beginnings to the machines of today that surf the Internet, play games and stream multimedia in addition to crunching numbers.

https://www.livescience.com/20718-computer-history.html

https://wikieducator.org/History_of_Computer_Development_%26_Generation_of_Computer

Introduction to computer

Generations of Computer:

- Computer generation is a change in technology a computer is/was being used.

- Initially, the generation term was used to distinguish between varying hardware technologies.

- But nowadays, generation includes both hardware and software, which together make up an entire computer system.

https://www.webopedia.com/DidYouKnow/Hardware_Software/FiveGenerations.asp

https://wikieducator.org/History_of_Computer_Development_%26_Generation_of_Computer

Introduction to computer

Generations of Computer:

First Generation: Vacuum Tubes (1940-1956):

➢ Used vacuum tubes for circuitry and magnetic drums for memory, and taking up entire rooms. Very expensive to operate and in addition to using a great deal of electricity, the first computers generated a lot of heat, which was often the cause of malfunctions.

➢ Relied on machine language to perform operations and solve one problem at a time. Would take operators days or even weeks to set-up a new problem. Input was based on punched cards and paper tape, and output was displayed on printouts.

➢ UNIVAC and ENIAC computers are examples of first-generation computing devices. The UNIVAC was the first commercial computer delivered to a business client, the U.S. Census Bureau in 1951.

Introduction to computer

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Introduction to computer

Generations of Computer:

Second Generation: Transistors (1956-1963):

➢ Transistor was used in place of vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable. Though the transistor still generated a great deal of heat but was a vast improvement over the vacuum tube. Still relied on punched cards for input and printouts for output.

➢ Moved from binary to assembly languages. High-level programming languages were also being developed at this time, such as early versions of COBOL and FORTRAN. These were also the first computers that stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology.

➢ The first computers of this generation were developed for the atomic energy industry.

Introduction to computer

Generations of Computer:

Third Generation: Integrated Circuits (1964-1971):

➢ Integrated circuit was the hallmark of the third generation of computers. Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers.

➢ Used keyboards and monitors instead of punched cards and printouts and interfaced with an operating system, which allowed the device to run many different applications at one time with a central program that monitored the memory.

➢ Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.

Introduction to computer

Generations of Computer:

Fourth Generation: Microprocessors (1971-Present):

➢ The microprocessor-thousands of integrated circuits were built onto a single silicon chip. The Intel 4004 chip, developed in 1971, located all the components of the computer—from the central processing unit and memory to input/output controls—on a single chip.

➢ In 1981 IBM introduced its first computer for the home user, and in 1984 Apple introduced the Macintosh.

➢ Computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet.

➢ Fourth generation computers also saw the development of GUIs, the mouse and handheld devices.

Introduction to computer

Generations of Computer:

Fifth Generation: Artificial Intelligence (Present and Beyond):

➢ Fifth generation computing devices, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today. The use of parallel processing and superconductors is helping to make artificial intelligence a reality.

➢ Quantum computation and molecular and nanotechnology will radically change the face of computers in years to come. The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization.

Generations of Computer

Generations of Computer:

Following are the main five generations of computers.

S.N.	Generation & Description
1	First Generation The period of first generation: 1942-1954. **Vaccum tube based**.
2	Second Generation The period of second generation: 1952-1964. **Transistor based**.
3	Third Generation The period of third generation: 1964-1972. **Integrated Circuit based**.
4	Fourth Generation The period of fourth generation: 1972-1990. **VLSI microprocessor based**.
5	Fifth Generation The period of fifth generation: 1990-onwards.**ULSI microprocessor based**

Generations of Computer

Generations of Computer:

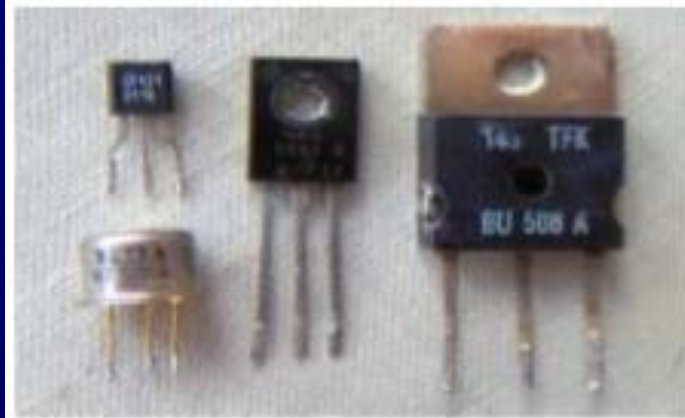Following are the main five generations of computers.

Vacuum tube

Fig 1.5 Transistors

Fig 1.6 i) Integrated Circuit

ii) Integrated Circuit

Fig. 1.7 VLSI

Classification of Computer

Classification of Computers

PS/2 Mouse Cable

5 ● 6
3 ● ● 4
1 ● 2

ComputerHope.com

Classification of Computers

Based on Signal Processing	Based on Speed & Size	Based on Model	Based on Brand

Analog

Digital

Hybrid

Super

Mainframe

Mini

Micro

XT

AT

PS/2
Personal System/2 port

IBM PC

APPLE PC

Classification of Computers

Classification of Computers based signal processing:
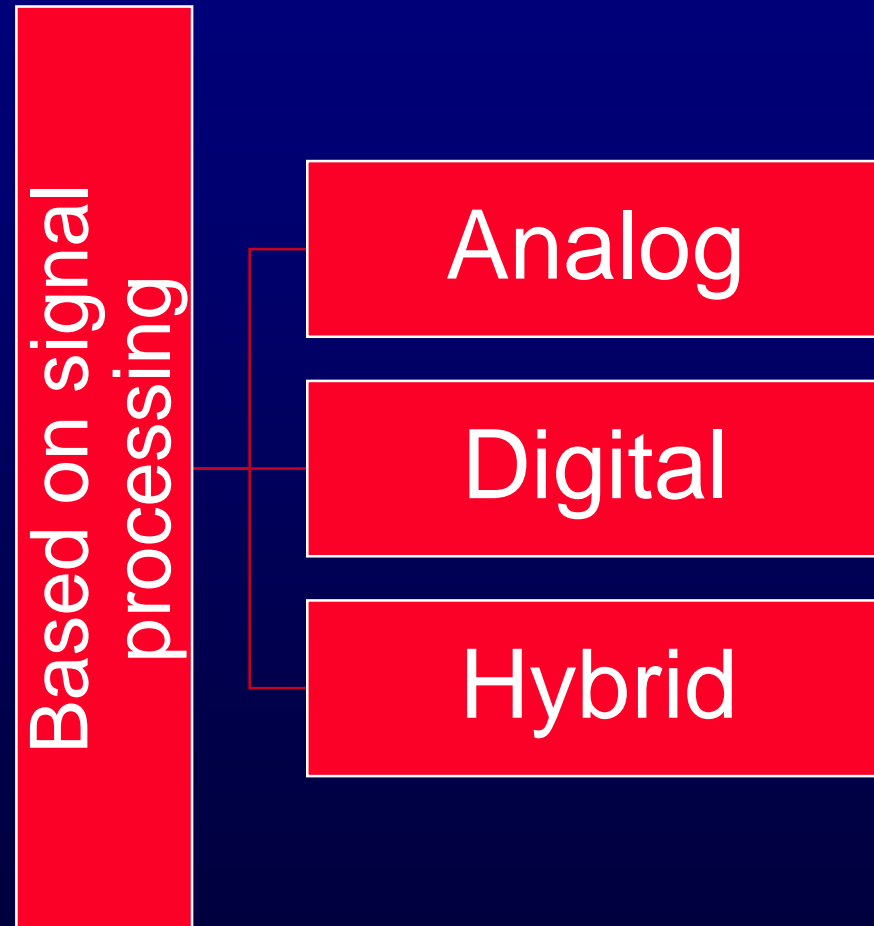
Based on signal processing
- Analog
- Digital
- Hybrid

Classification of Computers

Classification of Computers:(Based on Signal Processing)

- **Analog Computer:** Analog computer is that computer, which is use to process continuously varying data. Everything we see and hear is change continuously. This changeable continuous stream of data is called analog data. Analog computer can be used in scientific and industrial applications such as measure the electrical current, frequency and resistance of capacitor, etc.

Analog Audio Source   Sampling Stage
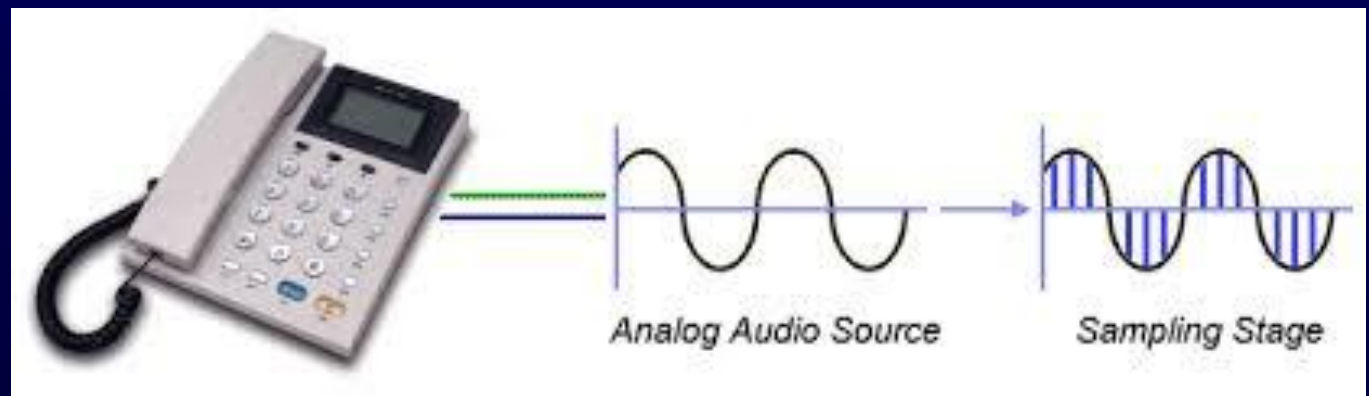
Classification of Computers

Classification of Computers:

- Digital Computer: These are high speed electronic devices. These devices are programmable. They process data by way of mathematical calculations, comparison, sorting etc. They accept input and produce output as discrete signals representing high (on) or low (off) voltage state of electricity. Numbers, alphabets, symbols are all represented as a series of 1s and 0s.
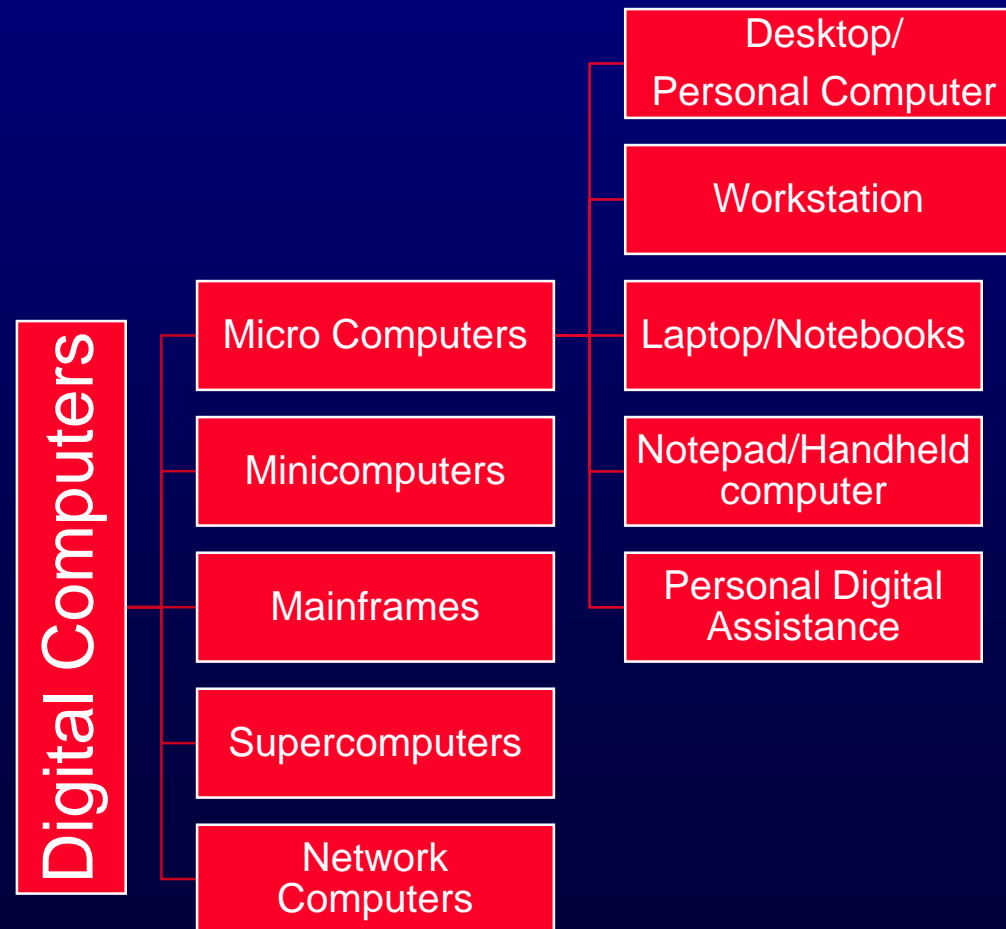
Classification of Computers

Classification of Computers:

- Hybrid Computer: Hybrid computer is a digital computer that accepts analog signals, converts them to digital and processes them in digital form.

- Hybrid computer processes both analog and digital data.

- Examples: Computer used in hospitals to measure the heartbeat of the patient. Devices used in petrol pump.

- In scientific applications or in controlling industrial processes.

- The first desktop hybrid computing system was the Hycomp 250, released by Packard Bell in 1961.

Classification of Computers

Classification of Computers:

Classification of digital computers on the basis of their capacity to access memory and size are like:

Classification of Computers

Classification of Computers based on size:

Super Computer:

- A supercomputer is a type of computer that has the architecture, resources and components to achieve massive computing power. Today's supercomputers consists of tens of thousands of processors that are able to perform billions and trillions of calculations or computations per second.

- As of 2013, IBM Sequoia is the fastest supercomputer to date. It has more than 98,000 processors that allow it to process at a speed of 16,000 trillion calculations per second.

Classification of Computers

Classification of Computers based on size:

Mainframe:

- Mainframe Computers are less costly, small in size and slower in speed than the super computers.

- used as a storage for large database and serve as a maximum number of users simultaneously.

- millions of instructions are executed simultaneously.

- The first successful mainframe computer is invented by IBM. Mainframe computer's speed is comparatively less than Supercomputers.

Classification of Computers

Classification of Computers based on size:

Minicomputer:

- A minicomputer is a type of computer that possesses most of the features and capabilities of a large computer but is smaller in physical size.

- A minicomputer fills the space between the mainframe and microcomputer.

- Minicomputers are mainly used as small or mid-range servers operating business and scientific applications. However, the use of the term minicomputer has diminished and has merged with servers.

- A minicomputer may also be called a mid-range computer.

- Examples are IBM AS, Prime series, HP 9000, PDP 11, IBM 8000 series.

Classification of Computers

Classification of Computers:

BASIS FOR COMPARISON	SUPERCOMPUTER	MAINFRAME COMPUTER
Basic	Supercomputers fastly perform large and complex mathematical computations.	Mainframe computers act as a server, stores large database and serve a large number of users simultaneously.
Invention	The first successful Supercomputer was invented by Seymour Cray in the year 1976 Cray 1.	IBM invented the first successful mainframe computer and is still a dominant company for producing the mainframe computers.
Speed	The supercomputer can execute billions of floating point operations in a second.	Mainframe computers can execute millions of instruction simultaneously.
Size	Supercomputers are the largest computers in the world.	Mainframe computers are also large computers but somewhat smaller than supercomputer.
Expense	Supercomputers are the most expensive computers of the worlds.	Mainframe computers are also expensive but less than supercomputers.
Operating system	The modern supercomputers have Linux operating system and derivative variants of Linux operating system.	Mainframe computer has the ability to run multiple operating system. simultaneously.

Classification of Computers

Classification of Computers:

| Mainframe	Minicomputer
In mainframe computer, large size of disk is used.	While in minicomputer, small size of disk is used.
Mainframe computers have large memory storage.	While minicomputers have small or less memory storage than mainframe computer.
The processing speed of mainframe computer is faster than minicomputer.	While the processing speed of minicomputer is slower than mainframe computer.
Mainframe computer is costlier than minicomputers.	Whereas supercomputer's cost is less or it is Inexpensive.
The first microcomputer was invented by the team leader Bill Pentz .	The first successful mainframe computer is invented by IBM.
Mainframe computers support thousand or millions of users simultaneously.	Whereas minicomputers support hundreds of users at a time.

Classification of Computers

Mainframe Computer:
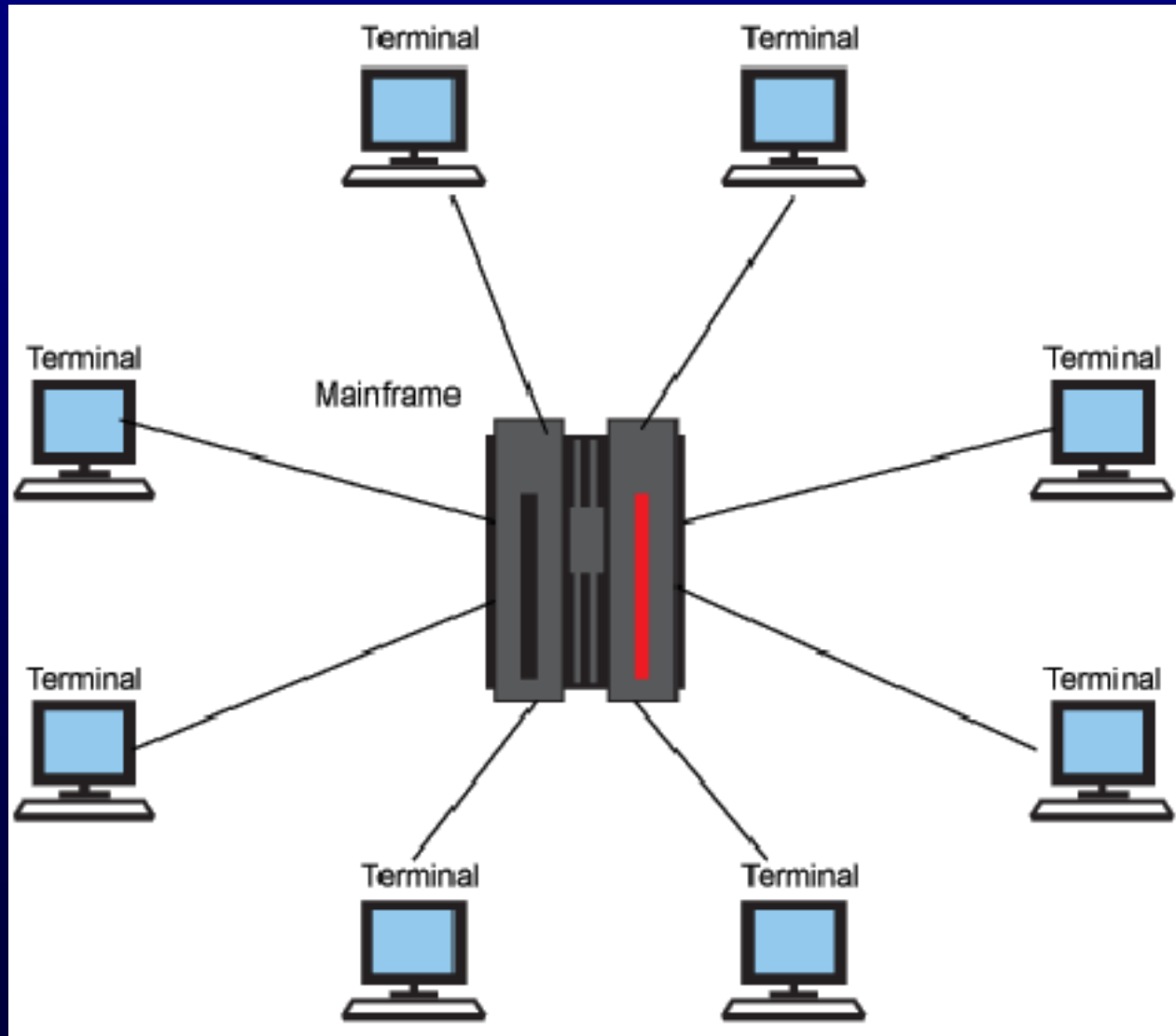
Classification of Computers

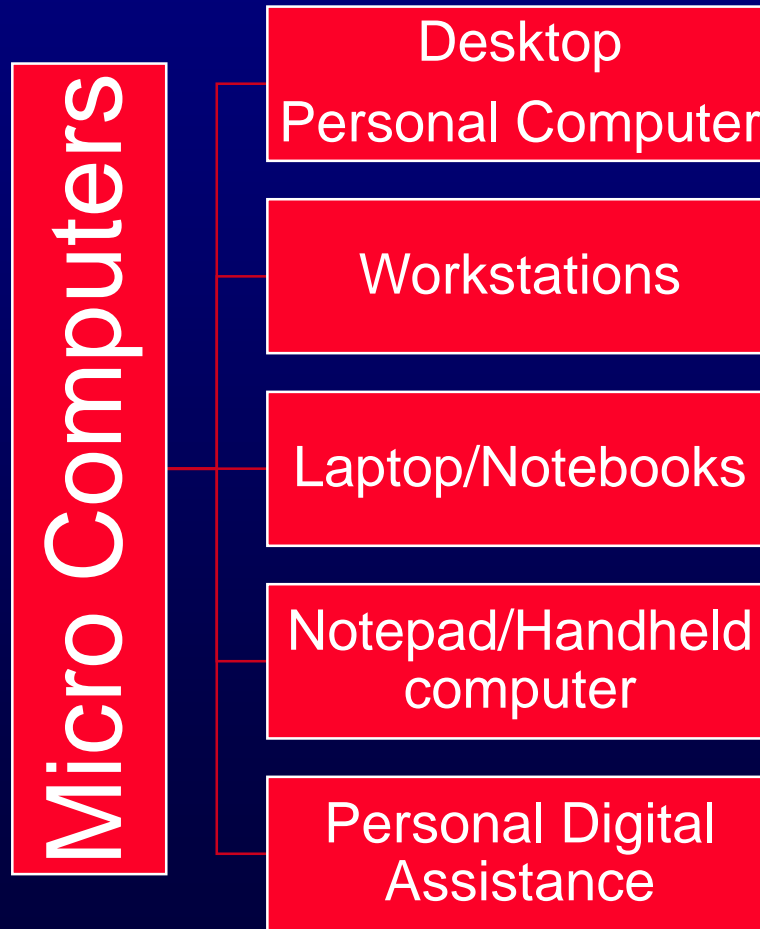**Classification of Computers based on size:**

Network Computer:

- A network computer is an inexpensive personal computer designed for a centrally-managed network where data are stored and updated on a network server.

- Network computer doesn't have a disk drive, CD-ROM drive or expansion slots.

- A network computer depends on network servers for processing power and data storage.

Classification of Computers

Classification of Computers based on size:

Micro computer:

Micro Computers
- Desktop Personal Computer
- Workstations
- Laptop/Notebooks
- Notepad/Handheld computer
- Personal Digital Assistance

Classification of Computers

Classification of Computers based on size:

Micro computer:

**1.	Desktop/Personal Computer**

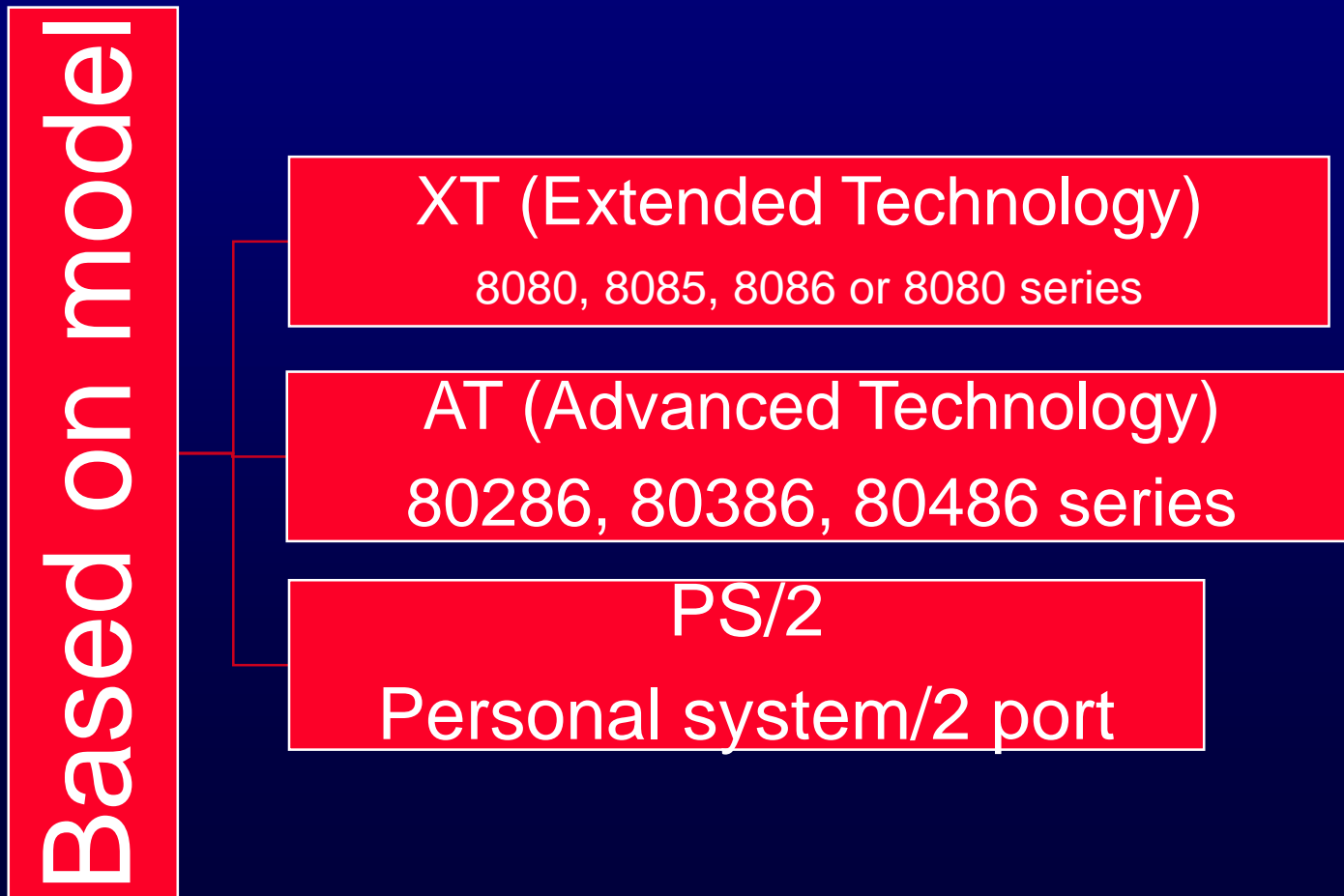A desktop computer is a personal computer designed for regular use at a single location on or near a desk or table due to its size and power requirements.

Classification of Computers

Classification of Computers based on model:

Classification of digital computers on the basis of their model are like:

Based on model

XT (Extended Technology)
8080, 8085, 8086 or 8080 series

AT (Advanced Technology)
80286, 80386, 80486 series

PS/2
Personal system/2 port

Classification of Computers

Classification of Computers based on model:

Classification of digital computers on the basis of brand/Manufacturer are like:
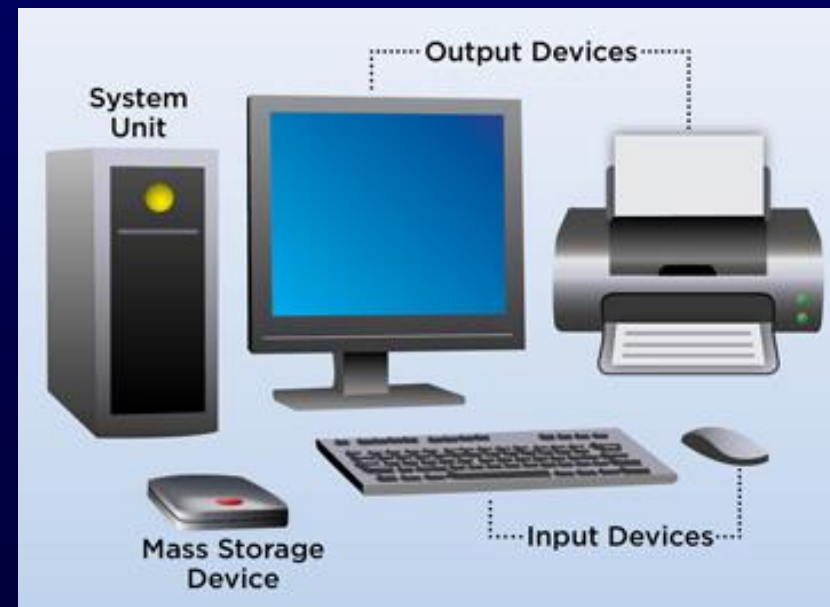
Based on Brand
- IBM PC
- APPLE PC

The Computer System

The Computer System:

COMPUTER SYSTEM is a collection of entities (hardware, software and liveware/humanware) that are designed to receive, process, manage and present information in a meaningful format.

There are three major components of a computer system:

- Computer Hardware
- Computer Software
- Humanware

The Computer System

COMPONENTS OF COMPUTER SYSTEM

1. Computer Hardware - Are physical parts/ intangible parts of a computer. e.g. Input devices, output devices, central processing unit and storage devices

2. Computer Software - also known as programs or applications. They are classified into two classes namely - system software and application software

3. Liveware - is the computer user. Also known as orgware or the humanware. The user commands the computer system to execute on instructions.

The Computer System

- Hardware and software exist together to make up the actual computer. The humanware component adds in the human factor in order to bring the whole computer into functional and productive existence.

- Each of these components is necessary in order to enable meaningful productivity. If installed separately, each may be useful to an extent but incapable of achieving complete computing potential. Hardware and software need the human factor in order to make input and connectivity possible.

The Computer System

1. Computer Hardware –

These are computer system components that can be touched by the human hand. Examples include:

- Display monitor.
- Keyboard.
- Mouse.
- Motherboard.
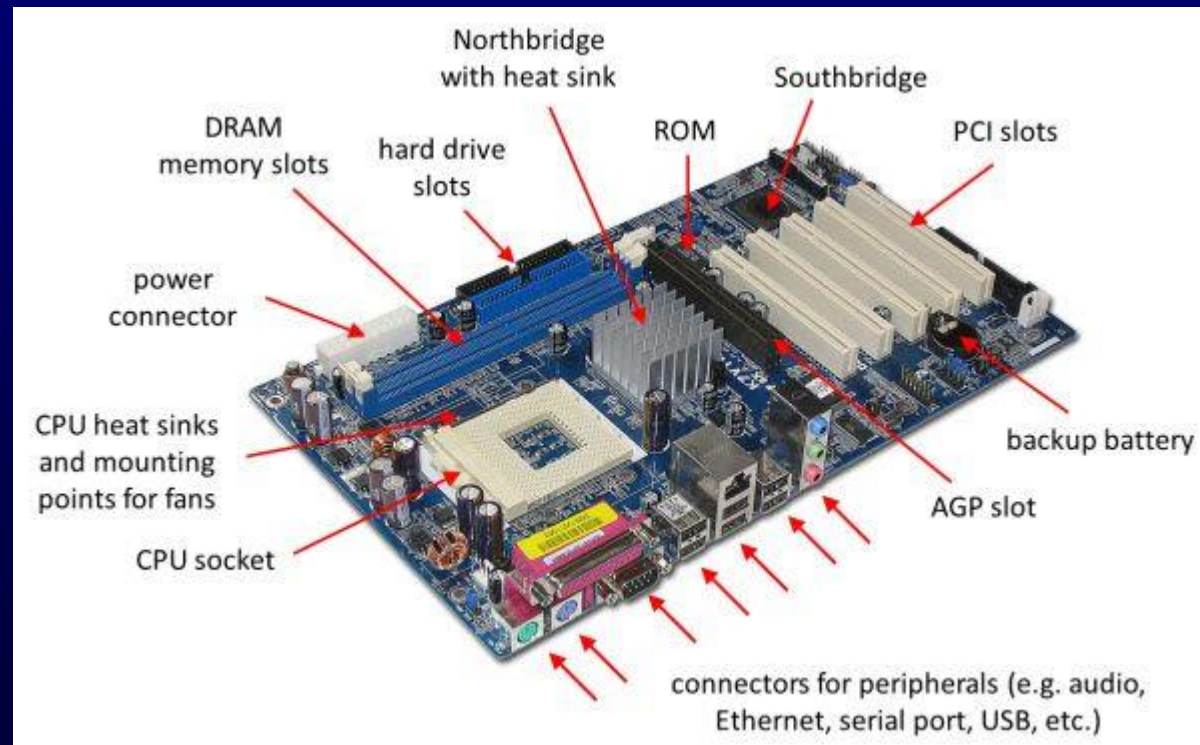- Memory modules.
- Disk drive.
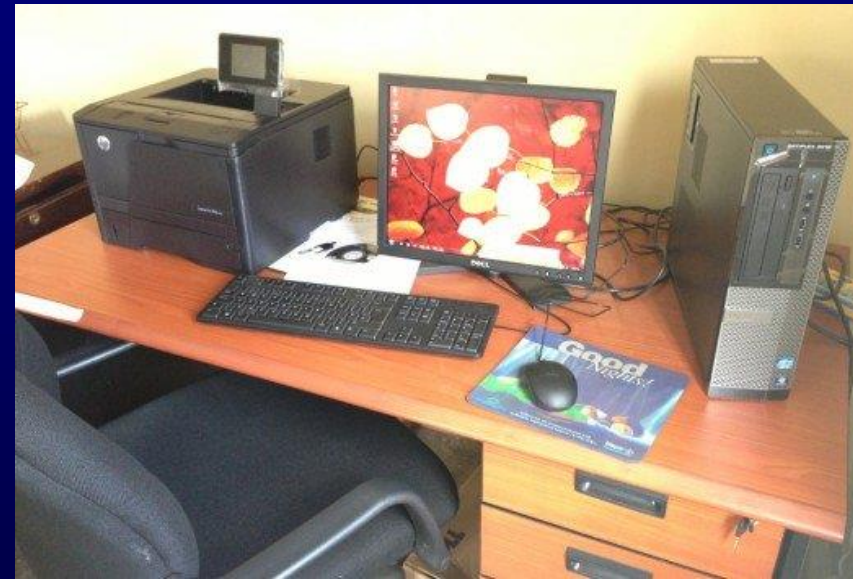
These parts are housed within the laptop or desktop system unit housing. For the desktop, however, the keyboard, mouse and monitor are attached externally.

The Computer System

1. **Computer Hardware** –

- The most important piece of hardware is the microprocessor chip. It is commonly known as the central processing unit (CPU).
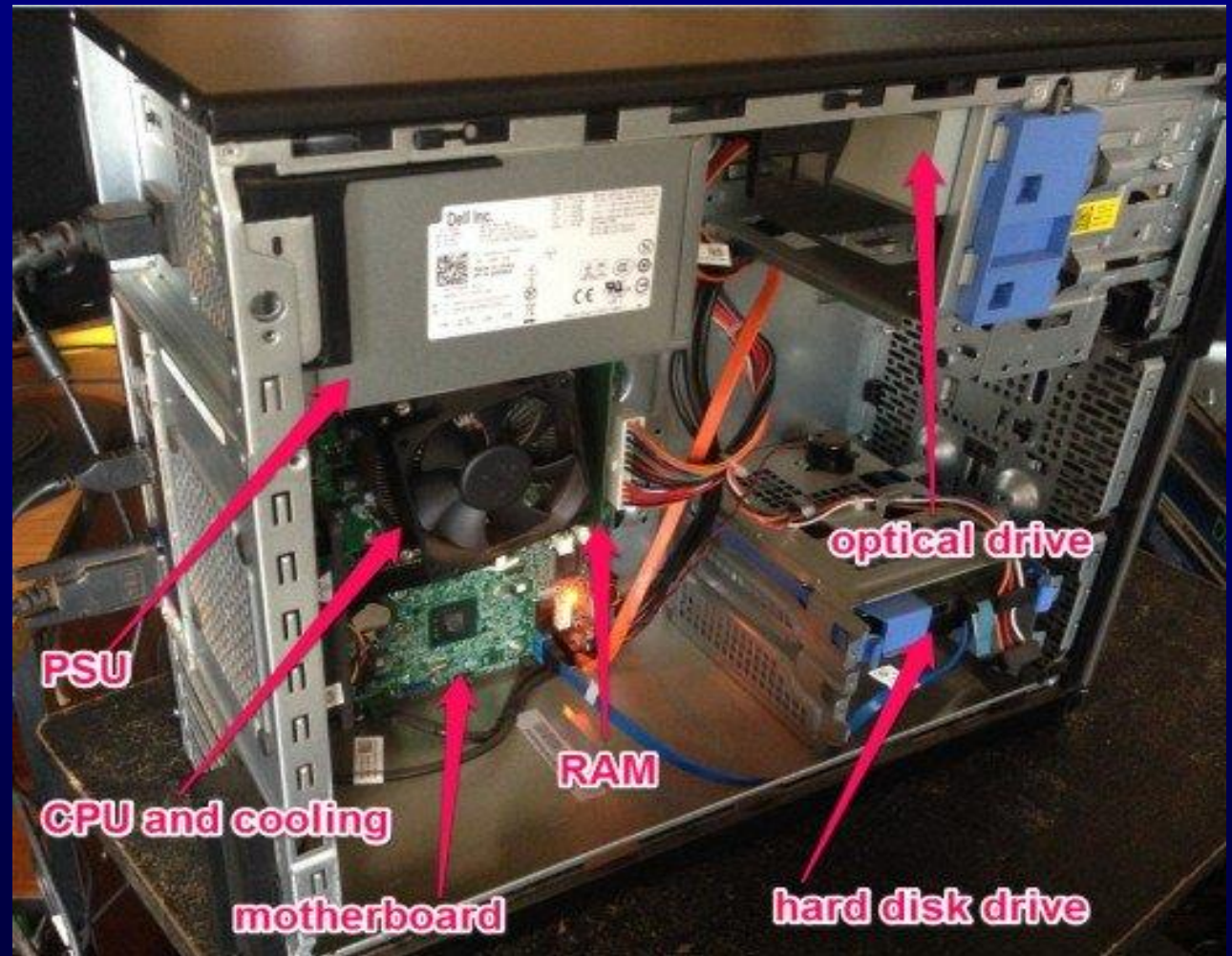
The Computer System

1. Computer Hardware –

- Another important component is the disk drive. This is where computer data is stored. It is classified as secondary memory.

- Hard disk: This drive is mechanical by design and stores data on magnetic and metallic platters. Its data is read magnetically by read/write heads which make it reliant on an uninterrupted supply of power. A sudden power outage can lead to data loss or drive failure. It must be used properly for the sake of data integrity and long lifespan.

- Solid state disk: This new type of disk drive stores data on flash memory chips and is less prone to erratic behavior. It is faster and reliable even in the event of sudden power outages.

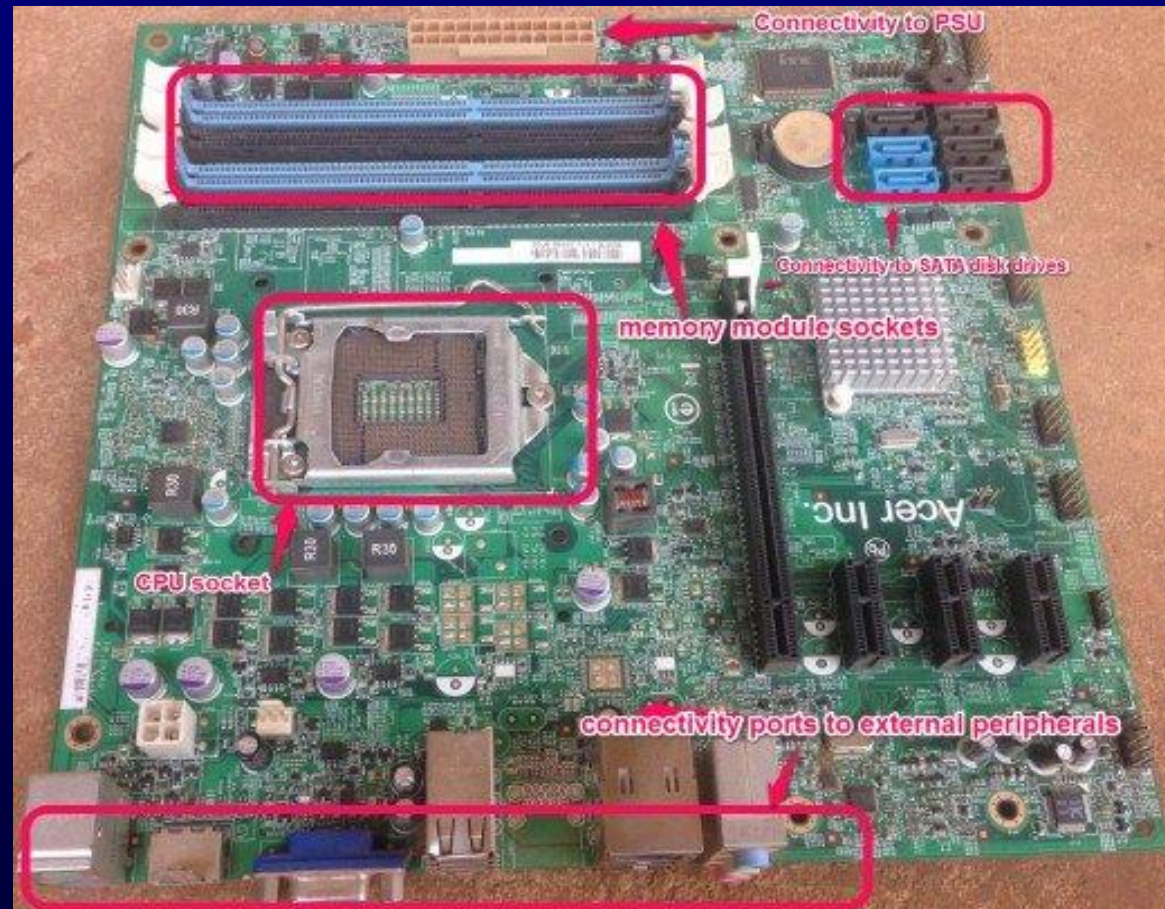# The Computer System

1. Computer Hardware –

various hardware components inside the system unit.

The Computer System

1. Computer Hardware –

Another vital part within a system is the motherboard. It provides communication and direct connectivity to devices throughout the computer.

The Computer System

1. **Computer Hardware** –

Connectivity to a motherboard can be internal or external. Internal devices that connect to the motherboard include:

- Microprocessor (CPU).
- Disk drive.
- Random access memory (memory modules).
- Power supply unit (PSU).

External peripherals that connect to the motherboard include:

- Monitor.
- Keyboard.
- Mouse.
- Printer.

The Computer System

2.   Computer Software –

The software component refers to the instructions, programs, data, and protocols which run on top of hardware. It is also retained temporarily and persistently in primary and secondary hardware media. The random access memory chip is an example of primary hardware while the hard disk drive is an example of secondary hardware.

Software can be divided into following categories:

- system
- application
- malicious
- programming

The Computer System

2.   Computer Software –

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The Computer System

2. **Computer Software** – System Software

- The system manages other software and devices inside the computer. The foremost example of system software is the operating system (OS).

- In a typical setup, the operating system is like the motherboard for software. It is the first thing that is installed, followed by applications and other software. Three popular operating systems for traditional computers include Windows, Mac OS X, and Linux.

- Popular mobile operating systems include Android OS, iPhone OS, Windows Phone OS, and Firefox OS.

The Computer System

2. Computer Software – Application Software

- This is designed for end users to perform a specialized assignment in order to output useful information.

- An example would be a word processing application used to compose letters or brochures, such as Microsoft Word.

- Other popular examples include Adobe Photoshop, Corel Draw, and AutoCAD.

- A collection of application software is bundled in a package that is commonly known as a software suite. A typical suite includes software for word processing, presentation, graphic design, and spreadsheet.

- Examples include Microsoft Office, OpenOffice, and iWork.

- Software is written in computer languages such as Visual Basic, C, and Java.

The Computer System

2. **Computer Software** – Malicious Software

- Malware, is short for malicious software, which is a generic term that refers to exploitative code designed by criminals and black hat hackers to maim normal operations of a computer. Malware attack will result in data loss and hacker access to private information.

- Affected computers can also be converted into zombies and used in a bigger mission of criminal activities like launching denial of service attack and spreading spam.

- Malware scripts are delivered to the computer as viruses, trojans, rootkits, keyloggers, worms, or through email and websites as adware, spyware, ransomware and scareware.

The Computer System

2. **Computer Software** – Programming Software

- These are tools used by developers to create all kinds of software like Windows OS and Word processing. Also called languages, they are used to write source codes, debug errors, maintain and create new software for computers and write malicious scripts like viruses and trojans.

- Popular examples of high-level languages are Java, Javascript, BASIC, PHP, Visual Basic, Visual C++, Visual Basic, Python, Ruby, Perl, Java.

The Computer System

3. Humanware

▪ The humanware component refers to the person that uses the computer. More specifically, it is about the individual that makes hardware and software components productive.

▪ Typically, a great deal of testing is done on software packages and hardware parts to ensure they enhance the end-user experience to aid in creating documents, musical and video recordings, and all forms of raw and finished data.

Applications of computers

Applications of computers:

Today computers find widespread applications in all activities of the modern world. Some of the major application areas include:

- Scientific, Engineering and Research
- Business
- Medicine
- Information
- Education
- Games and Entertainment

https://wikieducator.org/History_of_Computer_Development_%26_Generation_of_Computer

Applications of computers

Applications of computers:

- Uses of Computers in Education
  - Benefits of CBT
  - Computer Aided Learning (CAL)
  - Distance Learning
  - Online Examination
  - Online Training Resources
- Uses of computers in Medical Field
  - Hospital Management System
  - Patient History
  - Patients Monitoring
  - Life Support Systems
  - Diagnosis Purpose

Applications of computers

Applications of computers:

- Computers in Business
  - Marketing
  - Stock Exchange
- Use of computer at Home
  - Computer Games
  - Working from Home
  - Entertainment
  - Information