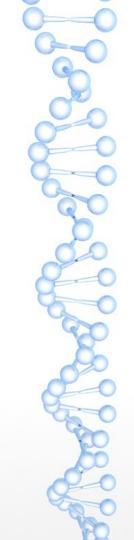


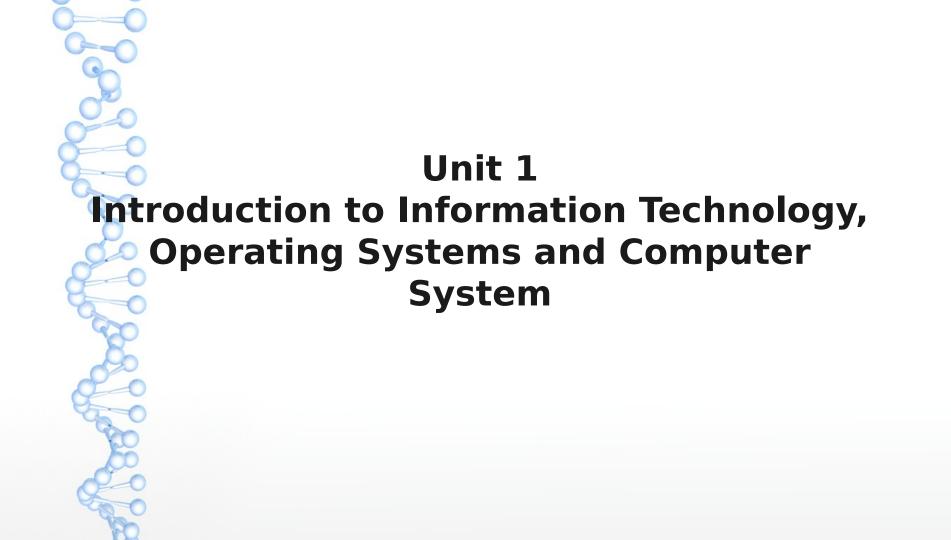
# INTRODUCTION TO INFORMATION TECHNOLOGY (221601101)



#### **Reference Book:**

**Information Technology** 

**Authors: Pradeep K Sinha Publications: PHI** 



#### Introduction to Information

#### What is Information?

Before moving towards the term information it is important to learn what is data?

**Data** can be defined as a representation of facts, concepts, or instructions in a formalized manner, which should be suitable for communication, interpretation, or processing by human or electronic machine.

**Information** is organized or classified data, which has some meaningful values for the receiver. Information is the processed data on which decisions and actions are based.

#### Introduction to Information

#### What is Information?

The different characteristics that a Information should hold are:

- Timely Information should be available when required.
- Accuracy Information should be accurate.
- Completeness Information should be complete.

#### Introduction to Information

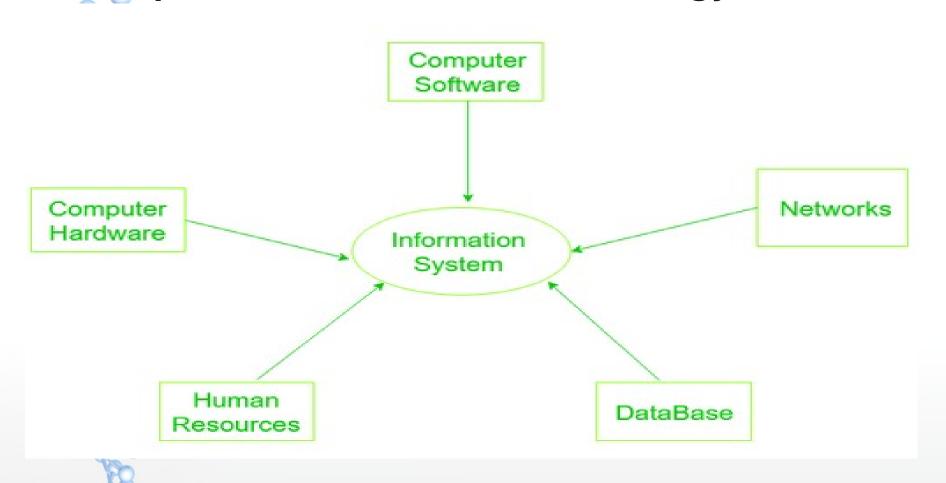
#### **Need for Information**

- Information is needed to survive in the modern competitive world.
- Increasing impact of information processing for organizational decision making.
- Improvement in communication and transportation brought in by use of information processing.
- Growth of IT industry and its strategic importance.
- Information is needed to create strong information systems and keep these systems up to date.

#### Introduction to Information Technology

#### Information Technology

- •In simple words we can say that the technology involving the development, maintenance, and use of computer systems, software, and networks for the processing and distribution of data.
- Information technology (IT) involves the study and application of computers and any type of telecommunications that store, retrieve, study, transmit, manipulate data and send information. Information technology involves a combination of hardware and software that is used to perform the essential tasks that people need and use on the everyday basis.



## 1. Computer Hardware:

Physical equipment used for input, output and processing.

# 2. Computer Software:

The programs/ application program used to control and coordinate the hardware components.

#### 3. Databases:

Data are the raw facts and figures that are unorganized that are later processed to generate information. Softwares are used for organizing and serving data to the user, managing physical storage of media and virtual resources. Data are managed using Database management system.

#### 4. Network:

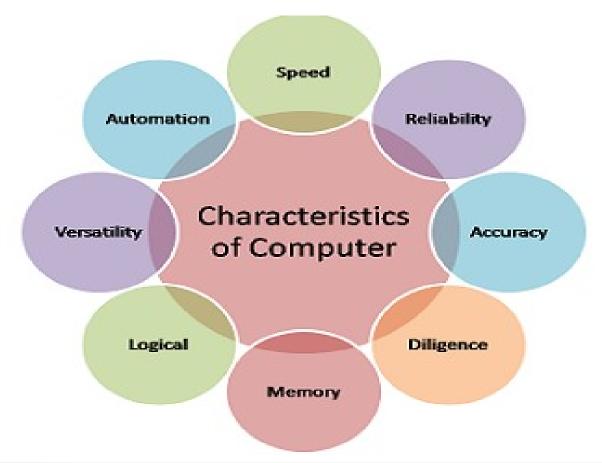
A network is a collection of computers, servers, mainframes, network devices, peripherals, or other devices connected to allow data sharing.

#### 5. Human Resources:

It is associated with the manpower required to run and manage the system. People are the end user of the information system, end-user use information produced for their own purpose, the main purpose of the information system is to benefit the end user. The end user can be accountants, engineers, salespersons, customers, clerks, or managers etc.



## **Computer & its Characteristics**





#### 1.Speed:

A computer is a very fast device. The computer takes a fraction of seconds to perform any operation. The speed of computer is measured in microseconds ( $10^{-3}$ ), Milliseconds ( $10^{-6}$ ), nanoseconds ( $10^{-9}$ ) and even Picoseconds ( $10^{-12}$ )

#### 2. Reliability:

Because, computer is an electronic device thus it perform all operations with 100 % accuracy and reliability.

#### 3. Accuracy:

The accuracy of computer is very high and the degree of a particular computer depends upon its design. But for a particular computer, each and every calculation is performed with the same accuracy. Errors can occur in a computer but these are mainly due to human rather than technological weakness.

#### 4. Diligence:

Unlike human being a computer is free from monotony, tiredness, lack of concentration etc. and hence can work for hours together without creating any error. A computer can perform the last calculation with exactly the same accuracy and seed as the first one.

#### 5. Memory:

Computers can store data and instruction with a lot of volume and very high efficiency.

#### 6. Logical:

Logic is not only important but absolutely fundamental to everything humans do whenever they do it using their brain, and computers are no exception.

#### 7. Versatility:

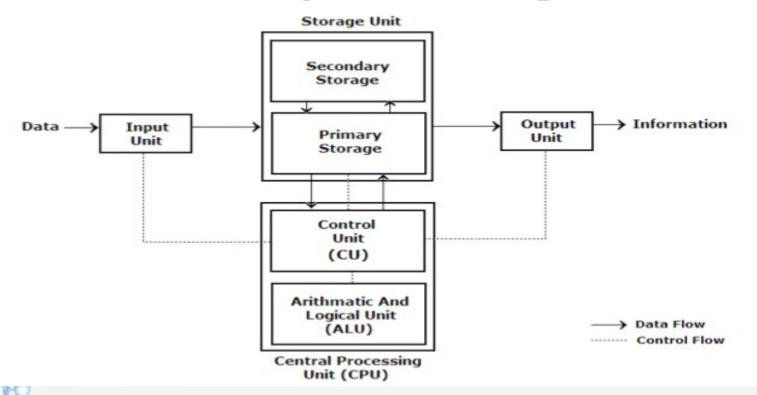
Versatility is one of the most wonderful things about the computer. One moment it can do any one operation and next moment if can perform any other operation. A computer is capable of performing almost any task according to given instructions.

#### 8. Automation:

Computers can automate certain routine tasks like launching software, sending emails, scanning viruses etc. using its task schedulers.

#### **Block Diagram of Computer**

## Block diagram of computer



#### The Five Basic Operations of a Computer System

**Inputting:** The process of entering data and instructions into the computer system.

**Storing:** Saving data and instructions to make them readily available for initial or additional processing whenever required.

**Processing:** Performing arithmetic operations (add, subtract, multiply, divide, etc.) or logical operations (comparisons like equal to, less than, greater than, etc.) on data to convert them into useful information.

**Outputting:** The process of producing useful information or results for the user such as a printed report or visual display.

**Controlling:** Directing the manner and sequence in which all of the above operations are performed.

# **Input Unit**

- The input unit of the computer system is used for feeding data and instructions to the computer.
- Data and instructions given to the computer are called as input and the devices used for giving input are called input unit or devices.
- Examples of input devices include keyboards, mouse, scanners, digital cameras and joysticks.
- An input unit of a computer system performs the following functions:
  - 1. It accepts (or reads) instructions and data from outside world.
  - 2. It converts these instructions and data in computer acceptable form.
  - 3. It supplies the converted instructions and data to the computer system for further processing

# **Output Unit**

- The output unit of the computer system is used for giving data and instructions from the computer.
- Data and instructions given from the computer are called as output and the devices used for giving output are called output **unit or devices.**
- Examples of output devices include screen, projector, printer, etc.
- An output unit of a computer system performs the following functions:
  - 1. It accepts the results produced by the computer, which are in coded form and hence, cannot be easily understood by us.
  - 2. It converts these coded results to human acceptable (readable) form.
  - 3. It supplies the converted results to outside world.

# **Storage Unit**

- Computer memory is the storage space in computer where data is to be processed and instructions required for processing are stored.
  - Storage unit is divided into two parts:
    - Primary Storage
    - Secondary Storage
    - The storage unit of a computer system holds (or stores) the following :
    - 1. Data and instructions required for processing (received from input devices).
    - 2. Intermediate results of processing.
    - 3. Final results of processing, before they are released to an output device.

# Two Types of Storage

- **Primary storage:** Also called as main memory. Primary memory holds only those data and instructions on which computer is currently working.
- It has limited capacity and data is lost when power is switched off.
- A computer cannot run without primary memory.

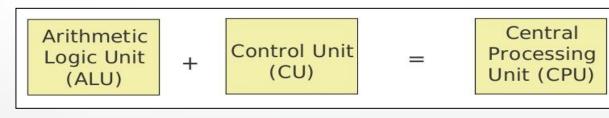
#### • Functions of Primary Storage:

- Used to hold running program instructions.
- Used to hold data, intermediate results, and
- results of ongoing processing of job(s)
- Fast in operation
- Small Capacity
- Expensive
- Volatile (looses data on power dissipation)

# Two Types of Storage

- **Secondary storage:** A secondary storage device refers to any non volatile storage device that is internal or external to the computer.
- It is also known as an auxiliary storage device or external storage.
- Functions of Secondary Storage:
  - Used to hold stored program instructions
  - Used to hold data and information of stored jobs
  - Slower than primary storage
  - Large Capacity
  - Lot cheaper that primary storage
  - Retains data even without power

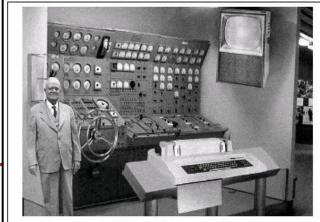
- Arithmetic Logic Unit (ALU)
  - Arithmetic Logic Unit of a computer system is the place where the actual executions of instructions takes place during processing operation.
- Control Unit (CU)
  - Control Unit of a computer system manages and coordinates the operations of all other components of the computer system.
- Central Processing Unit (CPU)
  - It is the brain of a computer system. It is responsible for controlling the operations of all other units of a computer system.



# **Generations of Computers**

- Generation in computer terminology 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.
- There are totally five computer generations known till date.
- Each generation has been discussed in detail along with their time period and characteristics

# Generations of Computer



First Generation



Second Generation



Third Generation



Fourth Generation

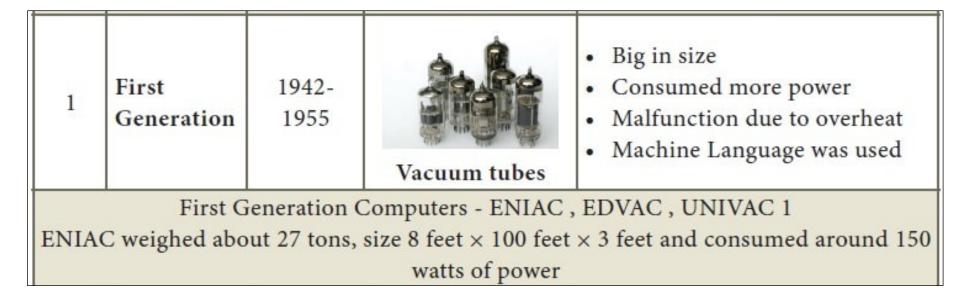


Fifth Generation

# Generations

No.	Generation & Description			
1	First Generation			
8	The period of first generation: 1946-1959. Vacuum tube based.			
2	Second Generation			
	The period of second generation: 1959-1965. Transistor based.			
3	Third Generation			
8	The period of third generation: 1965-1971. Integrated Circuit based.			
4	Fourth Generation			
8	The period of fourth generation: 1971-1980. VLSI microprocessor based.			
5	Fifth Generation			
Q.	The period of fifth generation: 1980-onwards. ULSI microprocessor based			

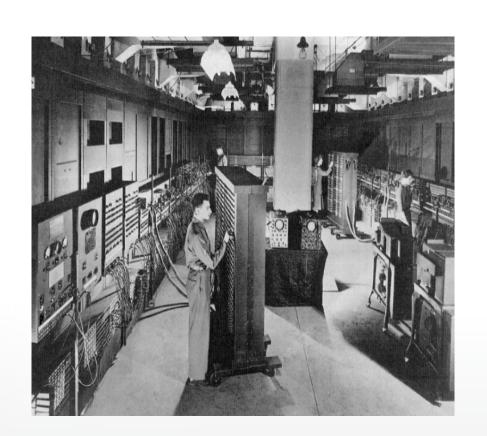
# Generations of Computer



# **First Generation**



# **First Generation**



#### **First Generation**

- The period of first generation was 1946-1959. The computers of first generation used vacuum tubes as the basic components for memory and circuitry for CPU (Central Processing Unit).
- These tubes, like electric bulbs, produced a lot of heat and were prone to frequent fusing of the installations, therefore, were very expensive and could be afforded only by very large organisations.
- In this generation mainly batch processing operating system were used.
   Punched cards, paper tape, and magnetic tape were used as input and output devices.
- The computers in this generation used machine code as programming language.

#### **Main Features of First Generation**

- Vacuum tube technology
- Unreliable
- Supported machine language only
- Very costly
- Generated lot of heat
- Slow input and output devices
- Huge size
- Need of A.C.
- Non-portable
- Consumed lot of electricity

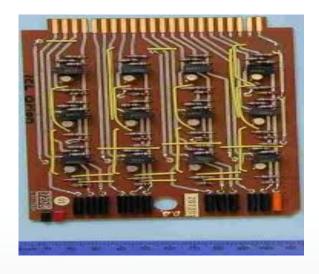
# Generations of Computer

2 Second General Second	nd 1955 ration 196		<ul> <li>Smaller compared to First Generation</li> <li>Generated Less Heat</li> <li>Consumed less power compared to first generation</li> <li>Punched cards were used</li> <li>First operating system was developed - Batch Processing and Multiprogramming Operating System</li> <li>Machine language as well as Assembly language was used.</li> </ul>
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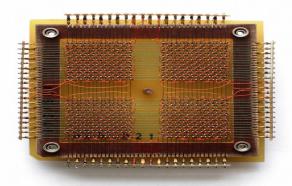
# **Second Generation**



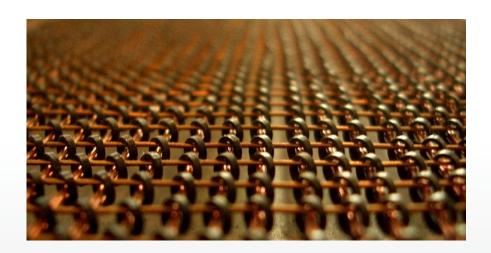
**Transistors** 



# **Second Generation**







# **Second Generation**



## **Second Generation**



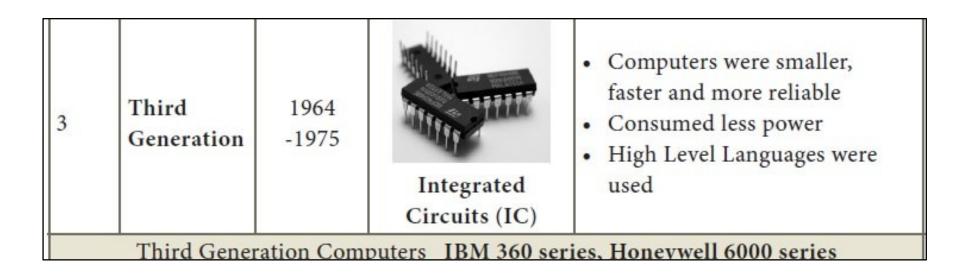
#### **Second Generation**

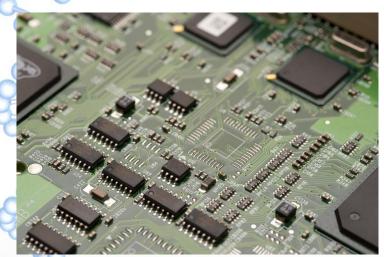
- The period of second generation was 1959-1965.
- In this generation transistors were used that were cheaper, consumed less power, more compact in size, more reliable and faster than the first generation machines made of vacuum tubes.
- In this generation, magnetic cores were used as primary memory and magnetic tape and magnetic disks as secondary storage devices.
- In this generation assembly language and high-level programming languages like FORTRAN, COBOL were used.
- The computers used batch processing and multiprogramming operating system.

#### **Main Features of Second Generation**

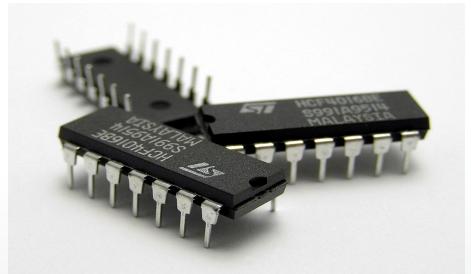
- Use of transistors
- Reliable in comparison to first generation computers
- Smaller size as compared to first generation computers
- Generated less heat as compared to first generation computers
- Consumed less electricity as compared to first generation computers
- Faster than first generation computers
- Still very costly
- A.C. needed
- Supported machine and assembly languages

## Generations of Computer





**Integrated Circuits** 







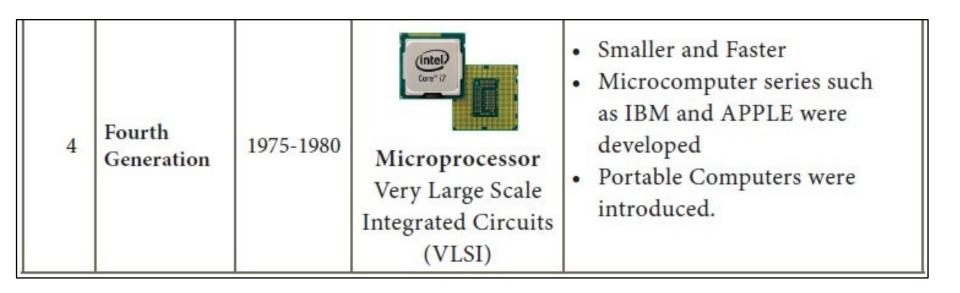
- The period of third generation was 1965-1971.
- The computers of third generation used integrated circuits (IC's) in place of transistors.
- A single IC has many transistors, resistors and capacitors along with the associated circuitry.
- The IC was invented by Jack Kilby. This development made computers smaller in size, reliable and efficient.
- In this generation remote processing, time-sharing, multi-programming operating system were used.
- High-level languages (FORTRAN-II TO IV, COBOL, PASCAL PL/1, BASIC, ALGOL-68 etc.) were used during this generation.

#### Main Features of Third Generation

- IC used
- More reliable in comparison to previous two generations
- Smaller size
- Generated less heat
- Faster
- Lesser maintenance
- Still costly
- A.C needed
- Consumed lesser electricity
- Supported high-level language

- The period of fourth generation was 1971-1980.
- The computers of fourth generation used Very Large Scale Integrated (VLSI) circuits.
- VLSI circuits having about 5000 transistors and other circuit elements and their associated circuits on a single chip made it possible to have microcomputers of fourth generation.
- Fourth generation computers became more powerful, compact, reliable, and affordable. As a result, it gave rise to personal computer (PC) revolution.
- In this generation time sharing, real time, networks, distributed operating system were used.
- All the high-level languages like C, C++, DBASE etc., were used in this generation.

## Generations of Computer



## **Fourth Generation**





VLSI

## **Fourth Generation**



## Fourth Generation.



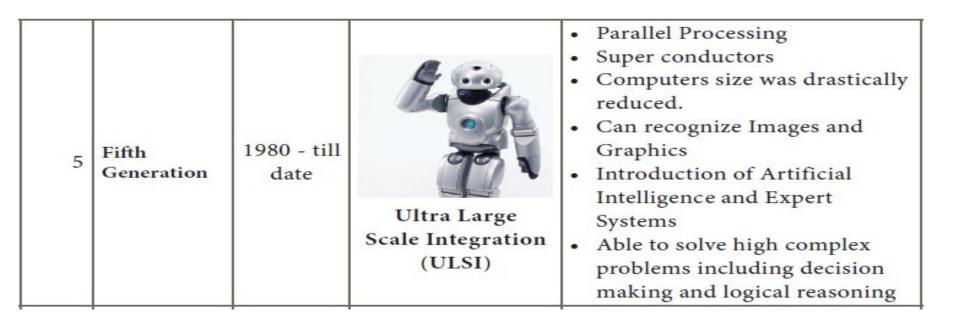
#### **Main Features of Fourth Generation**

- VLSI technology used
- Very cheap
- Portable and reliable
- Use of PC's
- Very small size
- Pipeline processing
- No A.C. needed
- Concept of internet was introduced
- Great developments in the fields of networks
- Computers became easily available

#### Fifth Generation

- The period of fifth generation is 1980-till date.
- In the fifth generation, the VLSI technology became ULSI (Ultra Large Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components.
- This generation is based on parallel processing hardware and AI (Artificial Intelligence) software.
- AI is an emerging branch in computer science, which interprets means and method of making computers think like human beings.
- All the high-Natural language understanding and generation.

### Generations of Computer



## **Fifth Generation**



## **Fifth Generation**

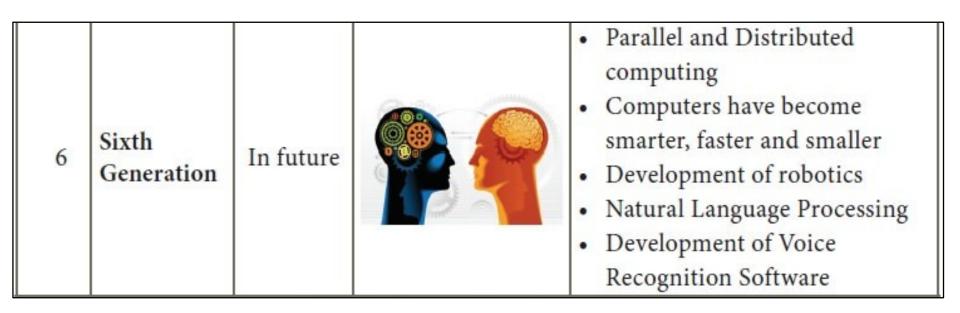




#### Main Features of Fifth Generation

- ULSI technology
- Development of true artificial intelligence
- Development of Natural language processing
- Advancement in Parallel Processing
- Advancement in Superconductor technology
- More user friendly interfaces with multimedia features
- Availability of very powerful and compact computers at cheaper rates

### Generations of Computer



## Types / Classification of Computers

- Mainframe
- Supercomputers
- Client and Server Computers
- Handheld Computers
- Micro Computer / Personal Computers
- Laptops
- Wearable Computers

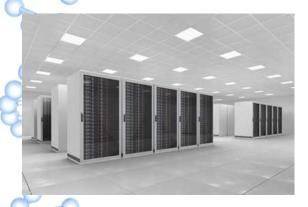
## **Mainframe Computer**

- Mainframe is a large, expensive, powerful computer that can handle hundreds or thousands of connected users simultaneously.
- Mainframe store tremendous amount of data, instructions, and information.
- A data processing system employed mainly in large organizations for various applications, including bulk data processing, process control, industry and consumer statistics, enterprise resource planning, and financial transaction processing.

## **Mainframe Computer**

- Mainframes process more than 83 % of transactions around the world.
- Mainframe also can act as servers in a network environment.
- Mainframes use proprietary operating systems, most of which are based on Unix, and a growing number on Linux.
- Over the years they have evolved from being room-sized to networked configurations of workstations and servers that are an extremely competitive and cost effective platforms for e-commerce development and hosting.
  - IBM builds mainframe computers.

## **Mainframe Computer**







## SuperComputer

- A Supercomputer is the fastest, most powerful computer and the most expensive.
- The fastest supercomputers are capable of processing more than 135 trillion instructions in a single second.
- These computers can store more than 20,000 times the data and information of an average desktop computer.
- Application requiring complex, sophisticated mathematical calculations use supercomputers.
- Large scale applications in medicine, aerospace, automotive design, online banking, weather forecasting, nuclear energy research, and petroleum exploration.

## SuperComputer

- On June 20, 2016, China was declared as the country having fastest super computer. (China builds world's fastest supercomputer without U.S. chips)
- Sunway TaihuLight is the new No. 1 system with 93 petaflop/s (quadrillions of calculations per second).



## SuperComputer





## **Handheld Computers**

- A handheld computer is effectively any computing device not constrained in its location to a desktop or data centre.
- In recent years the variety of handheld computing devices available has rapidly increased.
- A handheld computer is a personal computer you can carry from place to place.
- A handheld device is a computing device small enough to hold in your hand.

### **Handheld Computers**

- These includes pocket-sized to full-alpha-keyboard handheld devices, industrial PDAs, pistol-grip terminals, Vehicle Mounted computers
- The most popular type of mobile computer is the notebook computer.
- Mobile computing involves mobile communication, mobile hardware, and mobile software.



### Micro Computer / Personal Computers

- A microcomputer is a complete computer on a smaller scale and is generally a synonym for the more common term, personal computer or PC.
- A computer designed for an individual.
- A microcomputer contains
  - a microprocessor (a central processing unit on a microchip )
  - O memory in the form of read-only memory and random access memory
  - I/O ports
  - O a bus or system of interconnecting wires
  - O housed in a unit that is usually called a motherboard .

### Micro Computer / Personal Computers

- They are cheap in price, compact and can be easily accommodated on a study table.
- It supports many higher level languages, multimedia, graphics, 3D graphics and games.
- IBM, Hewlett Packard, Apple, Compaq are some well known companies which manufacture microcomputers.
- With the introduction of personal computers, the term desktop became very common because these computers can now fit on a desk.
- Since these computers were often too underpowered for use in some work environments, companies used computers that have better specifications.

  These computers were called workstations.

## Micro Computer / Personal Computers





## Laptops

- A laptop, laptop computer, or notebook computer is a small, portable personal computer (PC) with a screen and alphanumeric keyboard.
- Laptops combine all the input/output components and capabilities of a desktop computer, including the display screen, small speakers, a keyboard, data storage device, sometimes an optical disc drive, pointing devices (such as a touchpad or pointing stick), with an operating system, a processor and memory into a single unit.



## **Wearable Computers**

- A wearable computer is any small technological device capable of storing and processing data that can be worn on the body.
- Wearable computers are designed for accessibility and convenience, as well as improvements to workplaces by making information quickly and readily available to the wearer.

