Unit 1

Introduction: Functional units of a computer system, Different types of computers, Computer Software and Hardware, Types of software-System software and Application programme. Characteristic of computers. Input Devices – Keyboard, Mouse, Optical input devices, Output devices – Monitors and Printers

Computer

A computer is a machine that manipulates data according to a set of instructions. A computer is a programmable machine that receives input, stores and provides output in a useful format, they can be constructed out of almost anything.



Father Of Computer

Charles Babbage, a British Mathematics professor, is regarded as the Father of Computers. He was born in England in 1792 as the son of a rich banker from Devon. He was inspired by Napier's logarithm tables and Napier's logs and bones. He began to design a "difference engine" in 1821 which was a very large and complicated machine intended for doing logarithmic calculations automatically.



Generations of Computer

There are Five Generations of computers:-1.First Generation(1946-1955) 2.Second Generation(1956-1965) 3.Third Generation(1966-1975) 4.Fourth Generation(1976-1985) 5.Fifth Generation(1986-onward)



First Generation Computer(1946-1955)

First generation computer uses Vacuum tubes, Magnetic tape drives and magnetic core memories were developed. ENIAC (Electronic Numeric Integrator And Calculator) was the first electronic digital computer. It uses about 18,000 vacuum tubes. Its size was too much large. This was very hard to read and write programs by every person. The first generation computer produces too much heat.





First generation languages (abbreviated as 1GL)

Represent the very early, primitive computer languages that consisted entirely of 1's and 0's - the actual language that the computer understands (machine language). This Language is also known as Binary language.

Page 2 8-bitASCII 100115010100100101 10011 0000 100/100 110011 52.0942532 40100000100000000011 0101001100110011 N (north) 00101010001110 1.3131269 W (west) CONTINUOUS 1001100 (101004/10

Characteristic Features of 1G Computers

- 1. They were the fastest calculating devices of their time
- 2. They were too bulky in size, requiring large rooms for installation.
- 3. They used thousands of vacuum tubes that emitted large amount of heat and burnt out frequently. Hence air-conditioned rooms required.
- 4. Each vacuum tubes consumed about half a watt power. Since a computer typically used more than ten thousand vacuum tubes, power consumption was very high.
- 5. As vacuum tubes filaments, they had a limited life.
- 6. Due to low mean time between failures, these computers required constant maintenance.
- 7. Commercial production of these computers was difficult and costly.

Second Generation Computer (1956-1965)

Second generation computer uses a new electronic device called Transistor in the place of Vacuum tube. Storage capacity of computer also increase during this generation. Second generation computers also started showing the characteristics of modern day computers with utilities such as printers, disk storage and operating systems. Many financial information was processed using these computers.





Second generation languages (2GL)

Represent a step up from the first generation languages. Allow for the use of symbolic names instead of just numbers. Second generation languages are known as assembly languages. Code written in an assembly language is converted into machine language (1GL).



Characteristic Features of 2G Computers

- 1. Faster than 1G computers.
- 2. Smaller than 1G computers
- 3. Consumed less power and dissipated less heat than 1G computers.
- 4. Less hardware failures than 1G computers.
- 5. Larger primary and secondary storage.
- 6. Easier to program than 1G computers.
- 7. Commercial production is difficult and costly.

Third Generation Computer(1966-1975)

In third generation computer transistor were replaced with Integrated Circuit (IC) which is a combination of number of transistor and other electronic components fused together on single crystal. This generation machine uses magnetic tape and magnetic disk as secondary storage device.





Third generation languages (3GL)

With the languages introduced by the third generation of computer programming, words and commands (instead of just symbols and numbers) were being used. These languages therefore, had syntax that was much easier to understand. Third generation languages are known as "high level languages" and include C, C++, Java, and Javascript, among others.



Characteristic Features of 3G Computers

- 1. They were more powerful than 2G computers.
- 2. Smaller in size than 2G.
- 3. Consumed less power and dissipated less heat than 2G.
- 4. Less hardware failures. Hence lower maintenance cost.
- 5. They had faster and larger primary and secondary storage.
- 6. Suitable for both scientific and commercial applications.
- 7. Commercial production of these systems was easier and cheaper.

Fourth generation computer(1976-1985)

In fourth generation computer IC were replaced with Microprocessors .A microprocessor chip consist of entire central processing unit in a single chip. Computing speed increased . Due to the reduction of cost and the availability of the computers power at a small place allowed everyday user to benefit.





Fourth generation languages (4GL)

The syntax used in 4GL is very close to human language, an improvement from the pervious generation of languages. 4GL languages are typically used to access databases and include SQL and ColdFusion, among others



Characteristic Features of 4G Computers

- 1. PCs were smaller and cheaper than mainframes or minicomputers of 3G.
- 2. No air-conditioning was required for PCs.
- 3. Consumed less power than 3G computers.
- 4. Less hardware failures than 3G computers.
- 5. They had faster and larger primary and secondary storage as compared to 3G computers.
- 6. Manufacturing cost is less. Hence commercial production was easier and cheaper.
- 7. Programs written in high level languages are allowed.
- 8. Graphical User Interface (GUI) enabled new users to quickly learn how to use computers.
- 9. Network computers enabled sharing of resources like disks, printers etc.

Fifth generation computer(1986-onward)

In fifth generation computer VLSI technology were replaced by Ultra large Scale Integration (ULSI) technology. This technology helped to developed very small but extremely powerful and fast computers which come to be known as ROBOTS. The fifth generation computers will be under Artificial-Intelligence. The idea of fifth generation computer was introduced by Japan's Ministry of International Trade and Industry in 1982.





Characteristic Features of 5G Computers

- 1. Portable PCs (Notebook computers) are much smaller and handy than PCs of 4G.
- 2. More powerful than 4G computers.
- 3. Consume less power.
- 4. /Less hardware failures than 4G.
- 5. Faster and larger primary and secondary storage than 4G.
- 6. Manufacturing cost is less.
- 7. High level language programs are allowed
- 8. More GUI.

Functional units of a computer system



Input unit

•Input units are used by the computer to read the data. The most commonly used input devices are keyboards, mouse, joysticks, trackballs, microphones, etc.

•However, the most well-known input device is a keyboard. Whenever a key is pressed, the corresponding letter or digit is automatically translated into its corresponding binary code and transmitted over a cable to either the memory or the processor.

Central processing unit

•Central processing unit commonly known as CPU can be referred as an electronic circuitry within a computer that carries out the instructions given by a computer program by performing the basic arithmetic, logical, control and input/output (I/O) operations specified by the instructions.

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Storage Unit(Memory unit)

- The Memory unit can be referred to as the storage area in which programs are kept which are running, and that contains data needed by the running programs.
- The Memory unit can be categorized in two ways namely, primary memory and secondary memory.
- Primary storage (RAM) is the fastest memory that operates at electronic speeds. It is also known as the volatile form of memory, means when the computer is shut down, anything contained in RAM is lost.
- Cache memory is also a kind of memory which is used to fetch the data very soon. They are highly coupled with the processor.
- The most common examples of primary memory are RAM and ROM.
- Secondary memory is used when a large amount of data and programs have to be stored for a long-term basis.
- It is also known as the Non-volatile memory form of memory, means the data is stored permanently irrespective of shut down.
- The most common examples of secondary memory are magnetic disks, magnetic tapes, and optical disks.

Arithmetic & logical unit

•Most of all the arithmetic and logical operations of a computer are executed in the ALU (Arithmetic and Logical Unit) of the processor. It performs arithmetic operations like addition, subtraction, multiplication, division and also the logical operations like AND, OR, NOT operations.

Control unit

•The control unit (CU) is a component of a computer's central processing unit that coordinates the operation of the processor. It tells the computer's memory, arithmetic/logic unit and input and output devices how to respond to a program's instructions.

•CU does not perform any actual processing of jobs, but act as the central nervous systemfor other components of the computer system.

•It manages and coordinates the operations of all other components.

•It obtains instructions from a program stored in main memory, interprets the instructions, and issues signals causing other units of the system to execute them.

Output Unit

The primary function of the output unit is to send the processed results to the user. Output devices display information in a way that the user can understand.

Output devices are pieces of equipment that are used to generate information or any other response processed by the computer. These devices display information that has been held or generated within a computer.

The most common example of an output device is a monitor.

Types of Computers

- 1. Personal Computers (Micro Computers)
- A personal computer (PC) is a multi-purpose microcomputer whose size, capabilities, and price make it feasible for individual use.
- Designed for use by only one person at a time.
- Personal computers are used to create spreadsheets, play games, track our finances, account, run databases, and many other tasks.
- 2. Mini Computers
- They are used by business and government organizations to process large volume of information.
- Minicomputers were used for scientific and engineering computations, business transaction processing, file handling, and database management.
- Mini Computers are less expensive and less powerful than mainframe and supercomputers. But more powerful and expensive than micro computers.

Types of Computers...

1. Mainframe Computers

- Mainframes are high performance computers with large amounts of memory and processors that process billions of transactions in Real time.
- A mainframe computer is a computer used primarily by large organizations for critical applications like bulk data processing for tasks such as censuses, industry and consumer statistics, enterprise resource planning, and largescale transaction processing.
- A mainframe computer is large but not as large as a supercomputer and has more processing power than micro and mini computers.

2. Super Computers

- A supercomputer is a computer with a high level of performance as compared to a general-purpose computer.
- The performance of a supercomputer is commonly measured in floatingpoint operations per second (FLOPS) instead of million instructions per second (MIPS).
- Supercomputers are used in various fields, including quantum mechanics, weather forecasting, climate research, oil and gas exploration, molecular modelling etc.

Computer Software and Hardware

HARDWARE

Hardware is the physical aspect of computers, telecommunications, and other devices.

It includes not only the computer proper but also the cables, connectors, power supply units, and peripheral devices such as the keyboard, mouse, audio speakers, and printers.

CENTRAL PROCCESSING UNIT (CPU)

- > It is the brains of the computer.
- Most of calculations take place here.
- Two typical components of a CPU are Arithmetic Logic Unit (ALU) Control Unit (CU)



MOTHERBOARD

- Is the main circuit board of a microcomputer.
- It contains the CPU, memory, expansion slots and all the controllers required to control standard hardware devices.



RANDOM ACCESS MEMORY (RAM)

- RAM is the place in a computer where the operating system, application programs, and data in current use are kept.
- It is a temporary memory and can be compared to a person's short-term memory



READ ONLY MEMORY (ROM)

It is a technology that allows you to write data only once. After the data has been written, you can read it an unlimited number of times.



<u>KEYBOARD</u>

The set of typewriter-like keys that enables you to enter data into a computer

MOUSE

A device that controls the movement of the cursor or pointer on a display screen

SCANNER

A device that can read text or illustrations printed on paper and translate the information into a form the computer can use.



OUTPUT HARDWARE

Output hardware consists of internal and external devices that transfer information from the computer's CPU to the computer user. Common output hardware are

Monitor
Printer
Speaker

MONITOR

A display screen used to present output from a computer, video camera, VCR or other video generator.

PRINTER

In computers, a printer is a device that accepts text and graphic output from a computer and transfers the information to paper



SPEAKER

Speakers or headphones to an output port to hear the audio produced by the computer.





Impact Printer

 These printers have a mechanism that touches the paper to create an image.

 printers work by banging a print head containing a number of metal pins which strike an inked ribbon placed between the print head and the paper



Dot Matrix Printer

"A typical dot matrix output"



Daisy Wheel Printer

- A daisy wheel printer is basically an impact printer consisting of a wheel and attached extensions on which molded metal characters are mounted.
- A daisy wheel printer produces letter quality print and it can't produce graphics output.
- In a daisy wheel printer, a hammer presses the wheel against a ribbon which in turn makes an ink stain on the paper in the form of a character mounted on the wheel extensions.
- Its printing speed is also very slow ,i.e. less than <u>90cps.</u>



Daisy Wheel Printer



Non-Impact Printer

- These printers create an image on the print medium without the use of force.
- They don't touch the paper while creating an image.
- Non-impact printers are much quieter than impact printers as they don't strike the paper.



Ink-Jet Printer

- It is a non-impact printer producing a high quality print.
- A standard Inkjet printer has a resolution of 300dpi.
- Inkjet printers were introduced in the <u>later half of 1980s</u> and are very popular owing to their extra-ordinary performance.
- Print head having four ink cartridges moves .
- Software instructs where to apply dots of ink, which color and what quantity to use.
- Electrical pulses are sent to the resistors behind each nozzle.
- Vapor bubbles of ink are formed by resistors and the ink is forced to the paper through nozzles.
- A matrix of dots forms characters and pictures.

Thermal Printer

- Thermal printers are in-expensive printers mostly used in fax machines.
- The Thermal printers are further classified into two types.
- (1) <u>Electro thermal printers</u>:
- (2) <u>Thermal Wax printers</u>:
- Thermal printers use heated pins and ribbons with different color bands.
- These printers contain a stick of wax like ink. The ribbon passes infront of a print head that has a series of tiny heated pins.
- The pins cause the wax to melt and adhere to the paper and when temperature reaches to a certain level, it is hardened.

Multi-function printer

- A multi function printer abbreviated as <u>MFP</u> is an all purpose device that prints, faxes, copies and scans.
- A single multi function printer can replace several bulky devices.
- A multi function printer is also known as *AIO*.
- These printers use inkjet technology and provide high quality print but at slow speed.



Plotter

- A large scale printer which is very accurate in producing engineering drawings and architectural blueprints.
- Two types of plotters are flatbed and drum.
- Flatbed plotters are horizontally aligned while drum plotters are vertically positioned





LG Pocket Photo Printer



Planon PrintStik

- Planon PrintStik is a small portable printer which prints without ink By Damir Beciri.
- The PrintStik is remarkably small, about 2.5 x 5 x 27.5cm (1 x 2 x 11inches), and it has a cartridge with 20 pages of paper inside, making it easy to carry in a coat pocket, laptop bag, or your suitcase or purse.
- It is also light and weights just o.7kg (1.5 pounds). There isn't much to control on the printer itself.
- Buttons on the side are for power on/off and paper feed.
 Lights indicate if the unit is on, data rate and the battery level.





- 3D printing is a process of melting plastic filament and creating solid objects by building them up in very thin layers.
 - The technology is used in a wide range of industries from construction to aerospace, and is now starting to make its way into the mainstream.

Disadvantage Of 3D Printer

- Many of the 3D printers on the market today rely on a process called "heated thermoplastic extrusion and deposition", which emits ultrafine particles (UFPs) into the air. These particles are less than 100-nanometres in diameter.
- In an industrial environment, these particles would normally be removed by a ventilation system, but commercially available printers are currently sold as standalone devices without any exhaust ventilation or filtration accessories.
- If these particles are inhaled they can build up in the lungs or be absorbed directly into the bloodstream, potentially resulting in adverse health effects including total and cardio-respiratory mortality, hospital admissions for stroke, and asthma symptoms.



CONNECTING HARDWARE

Connecting device allow hardware devices to communicate with each other Common devices are

ModemLAN Card

MODEM

Modems connect a personal or portable computer to dial-up networks through a regular telephone line



LAN CARD

A Local Area Network (LAN) card is used to provide wireless Internet access to computer users in home or roaming networks.



STORAGE HARDWARE

A computer storage device is any type of hardware that stores data. Some common storage devices are

Hard Disc
 Floppy Disc
 CD ROM

HARD DISC

A magnetic disk on which you can store computer data. The term hard is used to distinguish it from a soft, or Floppy disk.

FLOPPY DISC

A flexible plastic disk coated with magnetic material and covered by a protective jacket, used primarily by computers to store data magnetically.

CD ROM

A CD-ROM is a CD that can be read by a computer with an optical drive



SOFTWARE

A set of instructions that enables physical components of a computer to work in a synchronize way is known as Software.

This set of instructions is often called a program.

Computers cannot do any useful work without instructions from software

TYPES OF SOFTWARE

Computer software is also divided in four major types

> System Software
 > Programming Software
 > Application Software
 > Utility Software

SYSTEM SOFTWARE

System software helps in running the computer hardware and the computer system.

Operating systems
 Device drivers



DEVICE DRIVERS

In computing, a device driver is a computer program allowing higher-level computer programs to interact with a hardware device

OPERATING SYSTEMS

An operating system is an interface between hardware and user; it is responsible for the management and coordination of activities and the sharing of the limited resources of the computer.

UTILITY SOFTWARE

Utility software helps in the management of computer hardware and application software. It performs a small range of tasks. Some typical examples of utility software are



DISK DEFRAGMENTORS

It detect computer files whose contents are stored on the hard disk in disjointed fragments, and move the fragments together to increase efficiency.

BACKUP

This utility make a copy of all information stored on a disk, and restore either the entire disk or selected files

DISK PARTITIONER

It divide an individual drive into multiple logical drives, each with its own file system which can be mounted by the operating system and treated as an individual drive.

>ANTI-VIRUS

These utilities scan computer for viruses.

PROGRAMMING SOFTWARE

This is one of the most commonly known and popularly used forms of computer software. These software come in forms of tools that assist a programmer in writing computer Programs.

The tools that help the programmers in instructing a computer system include

- text editors
- compilers
- interpreters

APPLICATION SOFTWARE

It enables the users to accomplish certain specific tasks. Following are the types of application software



WEB BROWSING SOFTWARE

It allows one to surf the Web. Example MS Internet Explorer

WORD PROCCESSING SOFTWARE

Allows users to create, edit a document. Example MS Word

SPREADSHEET SOFTWARE

Allows users to create document and perform calculation. Example: MS Excel etc

DATABASE SOFTWARE

Allows users to store and retrieve vast amount of data. Example: MS Access etc.

PRESENTATION GRAPHICS SOFTWARE

Allows users to create visual presentation. Example MS Power Point

THANK YOU