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INTRODUCTION to COMPUTRE

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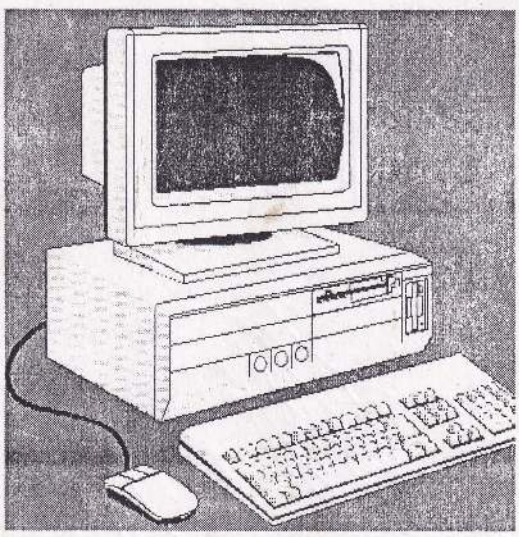


Introduction to Computer

When early tribes to raise useful animals such as sheep, counting and keeping records became necessary. To represent abstract numbers by physical means first he might have used his toes and fingngers. But the limited number of fingers might have forced then to use stones, sticks, and scraches on a rock or knot in a string to represent each sheep in the flock. By using these ease of performing calculation is increased and commerce developed stones and sticks no longer met the needs of early traders. During this peroid roman numbers were introduced to represent numbers. These are adequate to represent numbers but performing anithmetic using these numbers is very difficult. For this reson humans designed and used manual calculating device called ABACUS (3000BC).

Later Arabic numbers were intorduced. For many centuries after the adoption of Arabic numbers, people used their own brainpower to perform anithmentic. As commerce and trade further developed money became more common rather than bartening. So the need for the anithmetic increased. To reduce drudgery associated with anithmetic, John Napier discovered the use of Logaanithms in the 17th century. Based on this NAPIER'S BONES AND SLIDE RULE were invited, Slide rules were used extensively by engineers until the recent past.

Later in 1642 Blaise Pascal developed the first truly mechanical calculator called PASCALINE. Mulitication and division was done in Pascaline by repeated addition or subtraction. This was rectified in 1671, by G.Von Leibniz using multiplier weel with teeth of different lengths. The potential of the binary system was recognized by him.

The designer of the first true Computer was CHARLES BABBAGE. He spent several years to build a special purpose calcultor called DIFFERENCE ENGINE for calculating numeral values in the log table. Based pon this he designed a first programmable computer called ANALYTICAL ENGINE(1830). This machine contained a stone for data, a mill for performing anithmetic operation, a control until, which determine the operation to be performed and perform operations in the reocuired sequence. Here input data were specified using punch cards. Then these cards were fed into number of efectromechanical machines that perform processing steps. Earlier punch cards were used by French weaver named Joseph M. Jacquard to control his looms. Our modern computers still use babbage's. concepts.

In the 1840, LADY ADA LOVELACE mathermatication and the daughter of the poet Lord Byron worked together with Babbage. she is referred to as the first computer programmer. (Software Engineer) for her publications on the principles of the computer program.

In 1887, DR. HERMAN HOLLERITH won a computer to produce a device "Census Machine" which used the machine readable card concept for counting the 1890 US census. After census he converted his machine for bussiness use and setup. Tabulating Machine Company to manufacture and market his machine and subsequently this company became the computing tabulating and recording company in 1911 and is now the company known as IBM.

Prof. Howard Aiken with Harvard graduate students and IBM engineers built the MARKI (15.5*2.4*0.6 m3) computers (1944). It contained nearly one milllion electromagnetic devices and 500 miles long wire. The average multiplication time was seconds. It was very noisely and became oboslete almost before it was completed.

The first prototype electronic computer was conceived in 1938 by Dr.J.V.Atansoff Lafer (Lowa state university) and his graduate assistant C. Berry. They built a special purpose electronic computer using vacuum tubes (Atanasoff - Berry computer - ABC) to slove system of simulthaneous equations. Impreserved by this work J.W. Machly, and J.P. Eclcert started to work on a first general purpose eletronic Computer called ENIAC (1946) (Electronic Numberical Integrator and calculator). It was funded by the US Army ENIAC coasted serveral million US$.

Weighted 30 Tons, took up nearly 1550 Sq.Ft of space, contained about 19,000 valves and consumed 1.50Kw of power. It had to remain switched on at all times. It could perform 300 multiplications per second (1000 times better than MARK1) ENIAC stored programs (operating instruction) and data extermally.
In 1944 John Neumann suggested that

1. Binary numbering systems be used
2. Programs and fdata should be store electronically inside the computer

Von Neumann's concept of stored program control was very profound one and he was responsble for computing today. This concept was used to create EDVAC (Electronic Discrete Variable Automatic Computer by the designers of ENIAC and it was completed in 1951.

Before EDVAC the computer EDSAC (Electronic Delay Storage Automatic Computer - by M.V. Wickes) the first stored program electronic computer was created at Cambridge University in 1949. It was the first computer to changeable program of instructions within its own memory.

Later the first commercially avaiable computer UNIVACI was created in 1951 by the designers of ENIAC. A similar computer WHIRL WINDI was built in 1951 at MTT. In 1953, IBM installed its first computer IBM 701. Later in 1954, the IBM developed a general purpose computer IBM 650 which had a magnetic drun as its storage device. It was very popular until 1959. Later IBM 709, IBM 1401, RAMAC 350, etc were created.

The Computers produced during the peroid (1951 - 1958) are referred to as the FIRST GENERATION COMPUTERS. They generally used valves, were large, required much air conditionnig, had less internal storage and were relavtively slow.

In the late 1940s the transistoe was invented at Bell laboratories it is. It is small consumes low power and much more reliable than valves. The computer built using transistors (1958 - 1964) were smaller, faster and have greater computing capacity and they are referred to as the SECOND GENERATION COMPUTERS. (eg. IBM 7090 (addition time - 4.5 m.s), CDC 1604, PHILCO 2000, UNIVACLARC, IBM 7094). These computers used magnetic core memories, which were more reliable and had faster access than value memories. During this period FORTRAN, ALGOL and COBOL were introduced.

The computer built using ICs are referred to as THIRD GENERATION COMPUTERS (1965 - 1970) and they had the provision of facilities for time sharing and multi programming.

In Late 60s much smaller computers became available using miniature circuits. The size and cost of the computers further declined whrer as the computing ability increased.

In 1971, a small senniconductor firm called INtel constrcted a chip set 4004 9 (a single circuit board) for a Japanese - calculator. Than it marketed MCS - 4 microcomputer. A number of separate electronic components such as transistors and diodes are combined to form computer circuits. Thousands of these circiuts are now integrated and packaged on a Single silicon thumb

sized chip known as a Microprocessor. Which by itself can perform the control arithmetic and logical functions of a computer. The terns ADVANCED THIRD GENERATION COMPUTERS AND FOURTH GENERATION COMPUTERS are used designate microcomputers, which use large Scale IC's (LSI) and Very Large Scale IC's (VLSI) in their memory unit respectively.

Almost all the computers today use "Von Neumann" architecture. The conventional Von Neumann's type computer, which works on sequential control system, is very slow particularly when using for an applications. The next generation computer should be easier to operate and any one could be able to give them orders. This computer would learn how to solve problems by parallel processing like as human brain. Most of the research now aimed towards developing new architectural topologies to safisfy parallel processing and logic programming. Logic programming reserach involves the development of architecture (an alternative to Von Neumann's) to run logic - programming languages such as PROLOG efficiently. It would lead to FIFTH GENERATION (1981 - 1990) computer devices. The 5th GC's consists three subsytems.

1. External Interface of Basic Software System
2. Basic Software System (Problem solving knowledge base and Intelligence Interface) and
3. Hardware System

Classification of Computers

With changing technology we had seen that the history of computers for all the generations. Computer systems can be classified into Portable, Micro (Personal), Super Micro, Mini, super Mini, Mainframe, Super (Monster) computer categories depending on size, cost and system performance.

Any such classification is ablilty the most powerful system in one category may exceed the capabilities (and cost) of the last powerful system in another.

Super Computers: are used if very large amount of data to be proceed or very large calculations need to be performed very quickly or in complex modelling such as metrological applications and complex simultaneously. (Ex. IBM 3081, NEC S1000, HITAC S - 810)

Mainframe Computers: use specialized processors have multiple I/O channels to pass data, handle mixed tasks simultaneously, and handle huge memory. Price of this fall between 0.1 - 1 million and it has above 17 - to 120 - user supports facility. (Ex. IBM 4341, NEC S 430)

Mini Computers: are more powerful the micro in terms of processing capabilities and power and the number of user support facilities, About 2 -16 people normally able to use this at the same time. (Ex IBM 9370, NEC S410, DEC PDP11)

Micro Computers: also known as personal computers (PC) is samll general Purpose processing system, which has almost all the functional elements found in any larger system. It brought computing into the local office environment and homes. Word processing systems Local Area networks and the mass production of standard software packages depend on the usage of PC's.

dvance in semiconductor technology ensure the chips to be very small. This leads to the creation portable computers such as Laptop, Notebook and Palmtop computers.

rkstations are powerful & expensive than a PC Often connected to large computer systems.

Computers are further classified into digtal, analog and hybrid according to the type of data they are designed to process. Data may be obitained by counting or measuring. Data obtained by counting is known as discrete data. Data obtained through measurement are called continuous data.

A gigital computer is a counting device that operates data. It operates by directly counting numbers (or digits) that represent numbers, Letters or other special symbols. They use binary numbers system to represen information.
Analog computers do not computer directly with rather they deal with variables that are measured along the continuous scale and are recorded to same predetemined degrees of accurancy is required.

Finally digital computers can also be classified as special purpose and general - purpose computers according to the usage of them. Some computers are designed to perform only one specific task. These are known as special purpose computers. The program of instruction are permanently stored in such a machine. Althought it lacks versatility it does its single task quickly and effciently. But it may not be able to do other simple tasks. (for eg. The computer designed to control a missle or space craft or to paint a car may not be able to add 1+1) Where as general purpose computers can be used in countless applications. (eg. Process a payroll, to creat a report to perform mathematical calculations, to create a music piece, to play chess, to identify a decease etc) The versatility of a general - purpose computer is limited only by human imagination.

What is a Computer?
A computer is an electronic device, operating under the control of instructions stored in its own memory unit, which can accept and store data /e.g. data entered using a keyboard. Perform anthmetic and logical operation on that data without human intervention.

Computer : (ISO) A programmable functional unit that consists of one or more associated processing units and peripheral equipment that is controlled by internally stored programs and that can perform substantial computation, includind numerous airthmetic operation or logic operations, without human intervention during a run.

Why Computers Needed?
Fundarmental Charactenstics, to Increase *Accuracy * Speed * Storage capacity
The three fundamental charactenscs enable the following by - products

*Increased Productivity *Efficient Decsion Making *Cost Reduction

PROGRAM: Series of instruction written in a computer language to slove a specific problem is called a program.

Bir
A bit is basic unit of informatino in the binary numbering systems, representing either 0 (for off) or 1 (for on). Bits can be grouped together to up larger storage units, the most common being the bit byte.
Ex:01000001 is used to store character A and 00110001 is used to store the number1.

Byte:
A byte can represent all kinds of information including the letters of alphabet, the numbers 0 through 9 and punctuation symbol.

1024 BYTES = 1KB (KILO BYTE)
1024 KB = 1MB (MEGA BYTE)

1024 MB = 1GB (GIGA BYTE)
1024 GB = 1TB (TERA BYTE)
1024 TB = 1PB (PETA BYTE)
1024 PB = 1EB (EXA BYTE)

Data: (ISO) a representation of facts, concepts or instruction in a formalized manner suitable for communication, interpreation or processing by human beings or by automatic means. Letters, numbers, colors, symobls, shapes, temperatures, sound or other and figures are data suitable for processing.

Information: (ISO) the meaning that applied to data by means of the conversions applied to that data. L.e. processed data.

Input: The data and instructions ready to feel the computer.

Output: Output is the result.

Hardware: The term hardware refers to the physical components of a computer system, therefore the CPU, Monitor, Keyboard, Printer and Disk drives are belonging to Hardware.

Software: A set of programs, which instruct and guide the operation of the Hardware.

Liveware: This covers they human elements such as computer operator, programmer, systems analysts and Data Processing Manager.

Fireware: Some sort of software, which is built into the computers Rom.

CPU (Central Processing Unit) : The most complex and powerful part of the computers system is called CPU. This unit some refereed as the brain or nervous system of the computer. This unit consists of the following section.
ALU (Anithmetic and logical Unit): Where all the anithmetic and logical operations are performed.

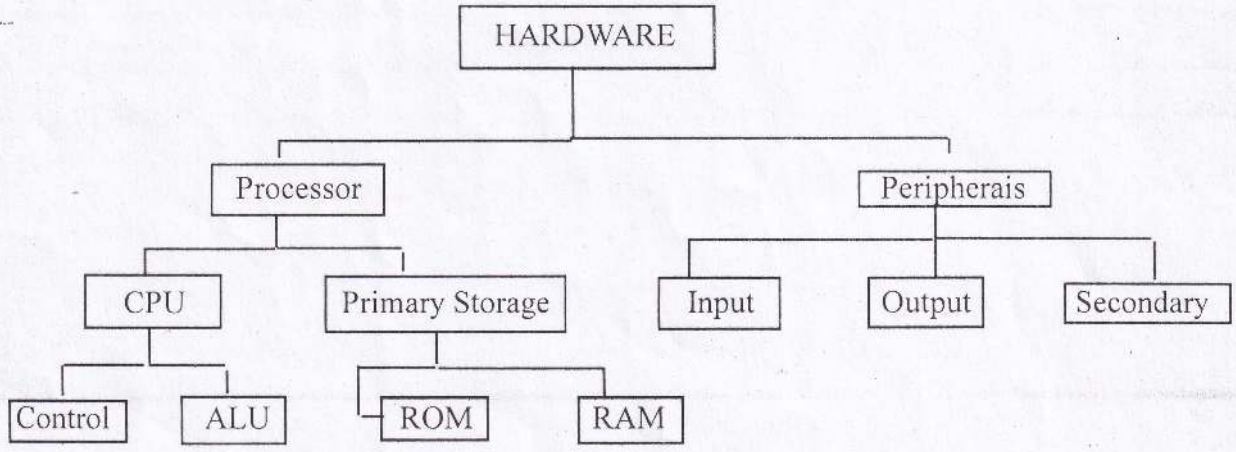
Control Unit: Where all the program steps are interpreted and necessary instructions are issued to carry out the function of the other unit. Futher the control unit, control the entire computer system.

Primary Memory or Main Memory: Where the data and instructions are being held before, during and after processing. This is a VOLATILE MEMORY (Temporary)

File: Files is a collection of inforamtion.

DATA PROCESSING: Data processing is the term for the process of producing meaningful information by collecting all the items of data together and performing operations on them to extract the required information's from them.

HARDWARE



As mentioned above the data processing unit (CPU and primary storage) and all the other perpheral equipments connected to all refereed to as HARDWARE OF THE SYSTEM.

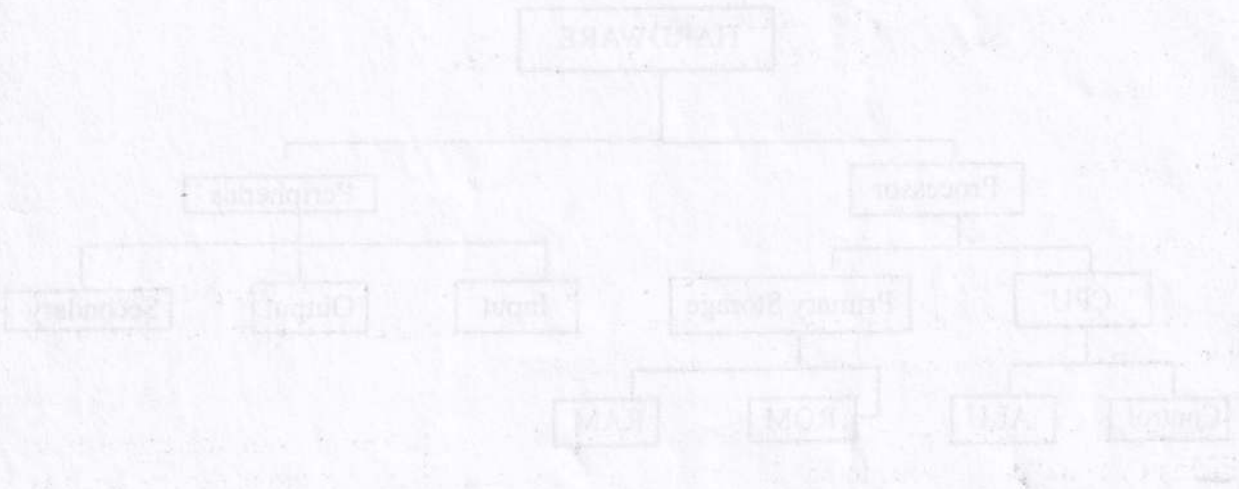
Processor:
This unit can be subdivided into CPU and primary storage. The CPU is the unit that actually processes the data and the internal memory holds data and instructions prior to processing, intermediate results and the processed data before outputting.

Motherboard:
The most important componet of personal computer system is the motherboard. Normally the motherboard contains the or the brain of the computer, memory and many other supporting logic circuits to make the complete computer work as proper system. This board contain a number of slots on to which difference devices could be connected.

Main Processor (CPU):
The main processor or the CPU (Central Processing Unit) of a computer system is located on the motherboard. CPU is the brain of the computer, it does all the anithmetic and logical operations such as two numbers, compaining two values etc.

Math Coprocessor:
The math coprocessor or numeric coprocessor unit (NPU) or floating point processor (FPU) all are the same thing. This processor is used with the main processor to help the main processor in mathematical operation. The math coprocessor does not perform normal integer calculations, that work is done by the CPU it self, it is specially made to do floating point operations and many trigonometic, roots, loganthm and other complex operations. The coprocessor can do these operations at 10 - 100 times the speed of the normal CPU.

Clock Speed:
The clock speed of my processor is measurned in Mega Hertz (Mhz) or millions of cycles per second and it specifies how fast a processor can perform different internal operations. On some processor some instruction may require more than one clock pluse to finish. A better way to specify the CPU speed is the term MIPS (Millions os instructions per seconds) or MFLOPS (Millions of floating point operation per second). If a CPU clock speed is 25 Mhz and at average different instructions require about 5 cycles to excute then the CPU speed is 5MIPS.



BUS:

Bus is a connection between two componets to transuit signal between them. Thin lines you see on the motherboard are the busses that take data, address, control signals and electric power from one place to another on the mothebrboard.

Depending on their use bus is divided into threee major types.

1.Data bus

2.Address bus

3.Control bus

Data bus:

The computer is digtial equiment and inside the computer, data is stored as binary sugnal. If the processor has only one line as data path or data bus then only one binary digit or bit of information can receive 64 bits of data in a signal transmission.

The internal bus is the bus inside the processor using which the processor communicate with its different internal parts, the external bus is the through which different external devices such as memory etc.

Address bus:

The signal on the address bus is used to select a particular memory location and connect this location to the data bus so that the computer can read data from or write data to that particular location. If the processor has one address line it can address two locations, a binary 0 on the line will select one location and binary 1 on the line will select another location.

Control bus:

The control bus used to send different control signals such as read write signals to the memory etc the most of the lines in this bus is a one direction only line. (Out put only/ input only).

Register:

Registers are memory location inside the CPU Different CPUs contain different numbers of registers depending on the processors capability and complexity. The CPU as data storage area uses these internally during mathematical and logical operation and to keep track of the different pointers.

Memory

Primary memory:

The main memory or the memory on the motherboard of the computer is called the primary memory. This is also called online memory because it is always directly available to the processor.

This memory can be further dived into two types of memory. RAM & ROM

The Ram is a type of memory which stores the temporary values programs, the Ram is also called a volatile memory. A non-volatile memory such as ROM is used inside the computer to keep permanent information.

Ram:

Ram or Random access memory is the main memory used inside the computer to store program, data and results. Any part of this memory can be accessed without going through all the pervious parts. The Rom, EPROM etc are also random access memories, a better term describe the RAM would be read/ write memory.

The Ram can be further divided into two types.

Dram & Sram

Dram:

A dynamic ram is cost wise cheaper and this is the main reason of using the DRAM in the computer as te main memory. The problem with the DRAM is once data is stored into it can't retain the data for a long time unless the data written back or refershed after sometime.

Sram:

Unlike the DRAM information stored inside SRAM remains as it is as long as the power supply is provided to the SRAM chip.

Rom:

Rom or read only memory is as its suggested is a memory that can be read only. It does not lose its content when the power supply is cut off. There are many types of ROM available in the market some of then are.

Mask Rom:

A mask ROM is the basic ROM chip. As the information is written at time of manufactuing you can't change the information.

Prom:

Programmable read only memory is a ROM memory with a small difference. The information on this chip is written after they are manufactured. Once some information is stored into PROM by "burning" the information into it becomes equal to ROM.

Eprom:

Erasable programmable read only memory, is a PROM but with an option to be able to remove or erase it contents if the user wants to write some new information onto it. To erase the contents the EPROM is put under a short wave ultra - violet light source inside an EPROM erasure device. (It can be reprogrammed)

Eeprom:

Electrically Erasable programmable Read only mempry is another type of EPROM. The contents of EEPROM is removed by using a higher than normal voltage its content can be deleted without removing it from the circuit.

Eaprom:

Electrically alterable read only memory another type of ROM, which can be written and read in somewhat the same fashion as the RAM. Applying high voltage to a particular bit of the memory the content of alters the contents that location can be changed. Write operation is very slow computered to the RAM.

Flash Ram:

A new type of EEPROM that can be erased and reprogrammed using the normal operating voltage is called flash memory.

CACHE

Inernal Cache:

The internal cache internal to the processor i.e it is a part of the same chip as the processor. This cache is also known as primary cache or L1 cache. This cache is a part of the processor itself, this improves the access time of the cache system.

This cache is sometimes divided in to different types based on the function, such as data cache and instruction cache is used in the 586 and p6 processor, this further increrases the performance of the cache system.

External Cache:

External cache separate high-speed memory in between the processor and the main memory, which is controlled by cache controlls. This cache is also known as the secondary cache, second level cache or the L2 cache.

This cache is called the external cache because it is external to the main processor but the recent p6 processor from the Intel has put this cache also within the processor inside the same packing.

The Bios

Bios or the basic Input Output System, is a set of programs stored inside a programmable Read Only Memory (PROM) and put into the motherboard, the main job of the program stored into this ROM is as the name suggest is to provied the computer user with a set of standard routines to take care of input/output from different input , output and storage devices connected to the computer.

Other BIOS Function

Other than the input/ output function explained so far the BIOS ROM contain two more modules
Power on self test and
Bootstrap loader

Post (power ON Self Test)

POST or power On Self Test is another program stored inside the BIOS ROM the basic job of this program as the name suggest is to check the processor, memory, support circuits and other devices connected to the computer when the computer is first powered on or switched on. When the computer is switched on the POST routine the BIOS ROM takes over and cheks all the basic devices connected to the computer, if this routine finds any error or fault during this POST routine the error depending one its sevenity is formed to the user as error beep code or as some error message displayed in the screen.

Bootstrap Loader

The next part of the BIOS after the routine contains a program called bootstrap loader. It is the job of this part of the BIOS to load the operating system from the floopy disk or the hard disk into conputer main memory (RAM)

Unless the boot process is successfully completed i.e. the Operating System (OS)s copied to the main memory the user cannot use the computer. A successful transfer of the OS into the RAM or the boot processor is indicated by displaying the DOS prompt such as A:\ or C:\> on the computer monitor.

Once this prompt is displayed on the screen, the user can started using the computer.

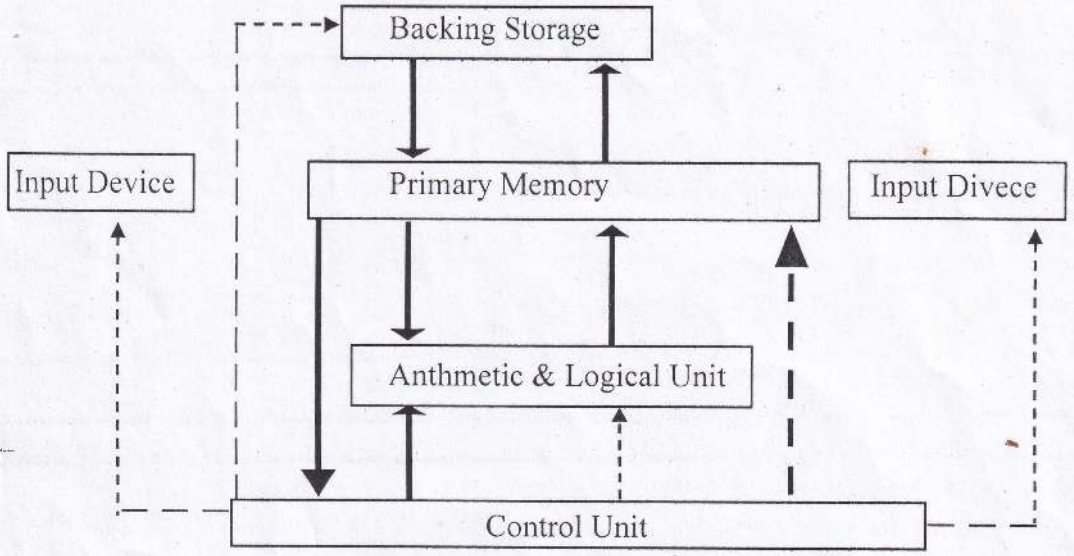
CMOS:

Complementary metal oxid senuc on ductor. A type of integrated circuit used in processors and for memory. In the PC, battery backed CMOS is used to stored operating parameters such as hard disk type when the computer is switched off.

COMPONENTS OF COMPUTER SYSTEM

(Computer Architecture)

Block Diagram Computer



Data / Information flow

Control Instruction Flow

Program Instruction Flow

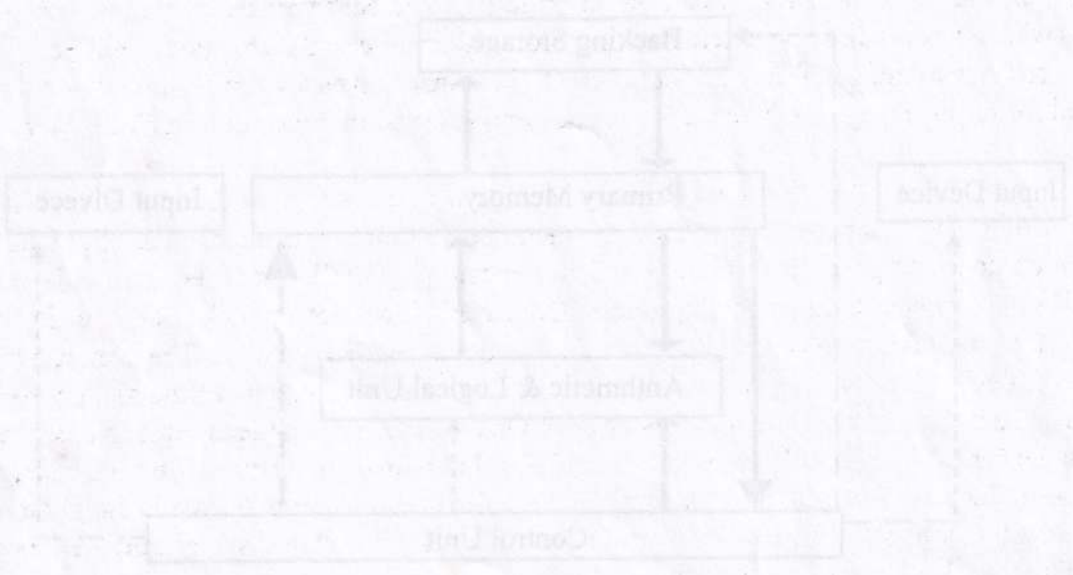
Input Devices

Input devices are used to feed data and instructions the computer systems. They consists of a range of devices that take data and programs from the outside world that people can read or comprehend and convert them so a from that the computer can manipulate. The from of the input may be by means of Keyboard, Printing device Writing & drawing input devices Video, Text, Voice input.

Data may be input to a computer by direct or indirect, means. In direct input, the computer is linked diretly to the source of data. These are also called on - line methods. On the other hand, separate machines (called encordes) are involved in in-direct input. First, lets look at some in-direct input devices.

Punch Card

One of the most common indirect medias is a punched card. It is a precut cardboard card with holes. Each column of the card contains a pattem of to represent one characters up to 80 characters of data may be punched in this card. This is called an 80 - column card.



Data from a source document is punched on to cards by a keyboard machine. The machine has a Typewriter like keyboard, a hole punching mechanism, and a card transport mechanism for moving cards through the machine. A stack of blank cards is placed in the machine. Once card at a time is moved to the punching station. An operator then types the data to apper on the card.

Key punched data is checked by using a card verifer. A verfying operator feeds the card punched by the keypunch operator and retypes all the information. The card verifier, without punching holes, checks whether holes already punched in the card are the name as the charaters being retyped by the card - verifying operator. If they are not correct, the verifer gives a warning signal and the card as marked for re-punching. A new card is punched and inserted in the deck to replace the bad card.

Verification is an expensive and time consuming process. The verifying operator should not be same person as the keypunch operator, or the name mistake might be made in verfication does not guarantee perfection. But it ensures high reliablity. Verification is expensive, but it is often cheaper than correcting errors. Once cards have been punched and verfied, they are entered into the main computer system through a device called - reader. The computer operator places the deck of cards in the input hopper. Cards are then read one at a time as they pass a read station and are then stacked in an output hopper. One popular reading technique is to shine intense light at the card. Where a hole is punched, the light shine through, where there is no hole, the light is blocked. Photo sensors detect light throug the holes and the computer reads the photo sensors, converting the hole patterns in corresponding bit patterns. Some high- speed card readers can process more than 1000 cards per minute.

Punched cards were the primary data entry mediun through the early 1970. They had many disadvantages. Cards are bulky to handle expensive to produce process and store. They cannot be resued and can me only as much information as can be start in 30 charaters. Furthermore the following file integrity problems are possible with cards, they can be removed from files, replaced with other cards with altered data, and easily lost or stolen, because of the availability of improved input methods, the vast majority of computer system built today do not even have card readers.

Key to Tape and Key to Disk systems

Because of the disadvantages of punched card, in early 1970s lager data entry installations replaced keypunch machine with Key to Tape and to Disk machines. These are sometimes called intelligent data entry devices because they have hair own built - in computers to control the data entry process. Instead of punching hole in non-reusable cards, operators type on a keyboard to enter computerized data directly into reasonable magnetic tapes and disks. Althought the systems are more complex than keypunching they are more economical.

Direct Input Devices

Keyboard

It's similar as normal typewriter keyboard, plus a number of special keys. Standard keys are used to enter words & numbers. Special keys so called "function keys" labelled as F1, F2 .... are used to enter commands. A numeric keypad that resembles an electronic calculator's keypad.

Cursor - movement key

QWERTY keyboard 104 key enhanced keyboard

Used for data entry and issue commands into the system.

Pointing device - Mouse

A mouse is a device that can be rolled on a desktop to pointer (cursor) on the computers display screen. The cursor is the symbol on the screen that shows where data may be entered next or the command to be activated. Pointing devices commanly hav two or three buttons that are used to issue commands to the computer.

Pointing Device - Trackball

A trackball performs like a stainatory - upside down mouse.

Most portable laptop computer use a built in or clip - on trackball.

Graphics Input - Scanner

Image scanner or graphic scanners convent the printed or photographic image on paper into electronic signals and that into digital form. This digital information then can be stored in a computer & mainpulated.

Text Input - Scanner

Text are scanned from the printed page the computer as an attempt to reduce errors in data entry while speeding up the process as well. The software incorporaratel covered the scanned images into characters codes and unable text processing.

Text Input - OCR

Optical Character Recognition (OCR)

An input device that can read and recognizes the symbols of text (special printed charaters) & convent them to the machine readable form.

Writing & Drawing Input Devices - Touch Screen

The touch screen is video display screen that has sensitized to receive input from the touch of a finger.

Writing & Drawing Input Devices - Light Pen

The light pen is a light sensitive stylus, or pen like device, connected by a wire to the computer terminal.

The user brings the pen to desire point on the display screen and presses the pen button, which identifies that screen location to the computer.

Writing & Drawing Input Devices - Digitizing Tablet

A digitizing tablet consists of a tablet connected by a wire to a stylus or puck. A stylus is a pen like device with the user sketches an image. A puck is a copying device with which the user copies an image as it is moved over a desired path on a sketch.

More sophisticated stylus or pointing devices with high accuracy are used by designers, architects, artists, desktop publishers, map makers, etc.

Video input (Digital Camera)

As with sound most films & video are generated and recorded in analog forms in which the signals are in continously varying nature. Thus the signals come from the systems such as VCR, videodisk or laser disk, or a cancorder must be converted to digital form through a special video capture card installed in the computer.

Voice input (Voice Recognition)

Converts the person's speech in to digital code by companing the electrical patterns produce by the speaker's voice with a set of pre - recorded patterns stored in the computer.

Source Data input - MICR

Magnetic Ink Character Recogaition (MICR)

MICR characters which are printed with magnetic ink, containing magnetic particles are read by MICR equipment producing digital signals. Used by banks to read the information such as printed serial numbers on the bottom of cheques using magnetic ink. MICR reader/ sorter can process cheques and other documents at speeds of up to 2000 documents per minute.

Source Data input - Magnetic strip

Used on the backs of credit cards and bank debit cards, and various other plastic cards, Enables readers, such as automated teller machines (ATM) to read account inforamtion.

Source Data Input - OMR

Optecial - Mark Recognition (OMR)

An input device that senses marks on a piece of paper, using a light beam, and converts them into electronic siganls which are sent to the computer for processsing, commonly used to mark the questions or school examination answer sheets where the students, using pencils mark certain boxes on the examination answer sheets provided.

Source Data Input - Bar codes

Commonly used by sales and stock people in retail stores and supermarkets. Point - of - sale (POS) terminal scans the bar codes of the Universal Product Code (UPC) to register the price, which is programmed into the host computer, as well as to deduct the item from stock.

Output Devices

Translate information processed by the computer into a form that human or another machine can recognize. The two - principal kinds of output are hardcopy & softcopy.

* Hardcopy refers to a printed output.
* Softcopy refers to the information that is shown on the display screen or is in audio or video form.

There are several ways to produce onput

* Text output * graphics output * Sound output * Video output

Text Output

Simply the alphanumaric charaters that make up our language. Text output apperance rangers from typewritten to typeset quality.

Graphics Output

Includes line drawings, maps, presentations business graphics, computer -aided design, computer painting, photographic reproduction. Sound output rangers from the message beeps produced by the computer system to the human voice to music and other forms sound.

Sound output

Rangers from the message beeps produced by the computer system to the human voice to music and other forms of sound.

Video output

Photographs (still imagee) or moving images such as television and videotaped material.

Printer

A printer provides hard copy output on paper. The basic criteria for evaluating printers include:

* Quality of the printed output
* Speed at which printed pages are produced
* Cost of printing media (ribbons, cartidges)
* Sound level during printing
* Conservation of paper

Impact Printers

Form charaters or images by striking a mechinism such as print hammer or wheel aganiset an inked ribbon leaving an images on paper. Make high noise. Now used less.

Non - Impact Printers

Form characters or images without making direct physical contact printing mechanism and paper.

Impact Printres

First printing techonology

Early days typewriters were adapted, produced same high -quality output. Cannot change fonts nor can print graphics or colours. Only the symbols available in the printing mechanism can be produced on the paper.

Followed by dot-matrix printers, Dot-matrix output is produced by printers that use wires in the print head. These wires extend out in diferent patterns, pressing aganist the ribbon to print the characters on paper. As this mechanism enables the print control up to the dot level on the paper the can be used to produce both text and graphics. Fast but noisy. Wear out ribbons very quickly.

Non-Impact Printers Laser Printing

Provide high - Quality non-input printing. Output is created by directing a laser beam onto a drum to create an electrical charge that forms a pattern of letters or images. As the drum rotates, it picks up black toner on the images and transfer them to paper. The heating process then fixes the toner particles permanently on the paper.

Excellent print quality and font selection.

Fast printing E.G. 8-500 pages per minute.

High quality graphics with colour high resoulation

Medium level noise, but high cost.

Primary disadvantages are expensive.

Maintaince and the high cost of toner.

Non - Impact Printers - Inkjet Printing

Inkjet printer transfer charaters and images to paper by spraying a fine jet of ink. Offers nearly the quality of laser printing but not the speed . Low cost alternative for high quality printing.

Plotters

It is a specialized output device designed to produced high quality graphics in a variety of colours. That are especially useful for creating maps and architectural drawings, although they may also produce less complicated charst and graphics.

Type of potters: Pen plotters, Thermal plotter.

- Video Monitor

Provides soft copy outout. Comes in either monochorme or colour. A monochrome display single colour aganist a different coloured background, such as green on black amber on black or white on black. Colour display can show variety of colours.

Video Displays

Resolution describes the degree of details in a video dispaly. The higher the resolution the characters and images are sharper and crisper as film image. Conventional television display is low resolution as we can seelings, jagged edgas and grainness in the image.

Bit - mapped display offers extremely high - resolution. Bit map means that each dot on the screen, called a pixel (for picture element) is represented by one bit (a 1 or 0) by the computer. (monochrome) Bit-mapped graphics i the colour version of a bit map display. Each pixed identifies a number 9e.g 1.256 on a 256 colour pattern) indicating what colour that pixel should be. The liguuid crystal display (LCD) is flat screen display commonly used with portable computers.

Terminal

A monitor -keyboard combination. Has no system unit if its own, but instead uses the facility from a central computer via a communication link. Mainframes, minicomputers and workstation systems support mulitple teminals. Dumb terminal performs the simplest input and output operations but no processing.

Smart (intelligent) terminal may have its own CPU or processing capablities, as well as built in disk for storage.

Virtual Reality

An artifical three dimesional reality created by the computer giving the real world like feeling to the user. Involves many human senses. Special gloves and stereoscape eyewear are used. pilots being trained in a flight simulator.

Computer Output on Microform (Com)

If print output does not need to be distrbuted and read but merely filled possible reference in the futhure it can be output on microfilm or microfiche instead of papre. This method is known as COM (Computer Output on Microfilm). It makes large amounts of printed material very easy to store inexpensively. Output is written onto magnetic tape, which is then fed into a machine called a microform recorder which reads the magnetic tape and copies the data onto microforms. The information can sub sequently be inspected by using a viewer which projects onto a screen. Full size copies can be made in stationary costs and storage space. Actually the computer output is projected on to a cathode ray tube and then photographed into a very much reduced from (i.e microform). Alternativaly COM can be produced using laser bean, electron beam or opetical fiber techonolgy. The microform is not reble by naked eye, but it can be read using a magnifying reading device with a viewing.

Microform may be produced either on line or off line production microform producing peripheral device os on line to the CPU. In off line data in a magnetic tape or disk is used with off line microform producer. Microform is a suitable storage medium for archive unformation or reference information. Large volums of data can be condensed in a very small physical space. Microform frames can be reproduced on paper in readable form. But it needs a special reading device. If the data in micro form is in regular use by various person, it may create a problem for reading devices.