What Is Computer?

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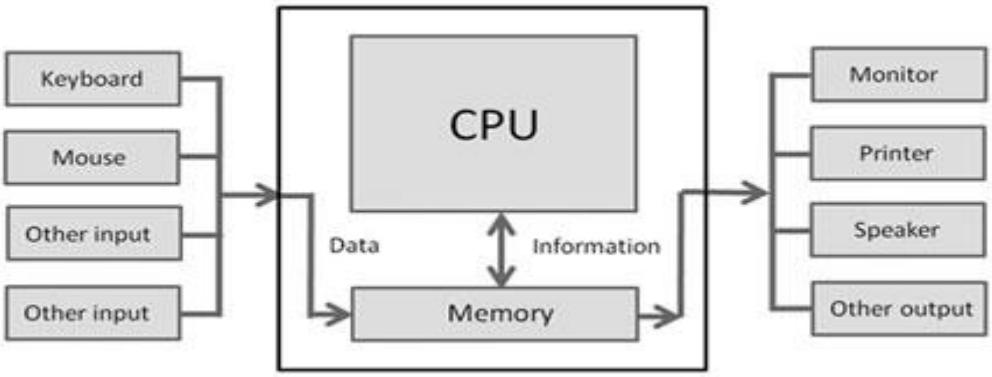


What is Computer : Computer is an electronic device that is designed to work with Information. *The term computer is derived from the Latin term* 'computare', this means to *calculate* or *programmable machine*. Computer can not do anything without a Program. It represents the decimal numbers through a string of binary digits. The Word 'Computer' usually refers to the Center Processor Unit plus Internal memory.

Charles Babbage is called the "Grand Father" of the computer. The First mechanical computer designed by Charles Babbage was called Analytical Engine. It uses read-only memory in the form of punch cards.

Computer is an advanced electronic device that takes raw data as input from the user and processes these data under the control of set of instructions (called program) and gives the result (output) and saves output for the future use. It can process both numerical and non-numerical (arithmetic and logical) calculations.

Digital Computer Definition

The basic components of a modern digital computer are: Input Device, Output Device, Central Processor Unit (CPU), mass storage device and memory. A Typical modern computer uses LSI Chips.

Four Functions about computer are:

accepts data	Input
processes data	Processing
produces output	Output
stores results	Storage

Input (Data):

Input is the raw information entered into a computer from the input devices. It is the collection of letters, numbers, images etc.

Process:

Process is the operation of data as per given instruction. It is totally internal process of the computer system.

Output:

Output is the processed data given by computer after data processing. Output is also called as Result. We can save these results in the storage devices for the future use.

Computer Classification: By Size and Power

Computers differ based on their data processing abilities. They are classified according to purpose, data handling and functionality.

According to functionality, computers are classified as:

- **Analog Computer:** A computer that represents numbers by some continuously variable physical quantity, whose variations mimic the properties of some system being modeled.
- **Personal computer:** A personal computer is a computer small and low cost. The term"personal computer" is used to describe desktop computers (desktops).
- **Workstation:** A terminal or desktop computer in a network. In this context, workstation is just a generic term for a user's machine (client machine) in contrast to a "server" or "mainframe."
- **Minicomputer:** A minicomputer isn't very mini. At least, not in the way most of us think of mini. You know how big your personal computer is and its related family.
- **Mainframe:** It refers to the kind of large computer that runs an entire corporation.
- **Supercomputer:** Itis the biggest, fastest, and most expensive computers on earth.
- Microcomputer: Your *personal computer* is a microcomputer.

Education :

Getting the right kind of information is a major challenge as is getting information to make sense. College students spend an average of 5-6 hours a week on the internet.Research shows that computers can significantly enhance performance in learning. Students exposed to the internet say they think the web has helped them improve the quality of their academic research and of their written work. One revolution in education is the advent of distance learning. This offers a variety of internet and video-based online courses.

Health and Medicine :

Computer technology is radically changing the tools of medicine. All medical information can now be digitized. Software is now able to computer the risk of a disease. Mental health researchers are using computers to screen troubled teenagers in need of psychotherapy. A patient paralyzed by a stroke has received an implant that allows communication between his brain and a computer; as a result, he can move a cursor across a screen by brainpower and convey simple messages.

Science :

Scientists have long been users of it. A new adventure among scientists is the idea of a “collaboratory”, an internet based collaborative laboratory, in which researchers all over the world can work easily together even at a distance. An example is space physics where space physicists are allowed to band together to measure the earth’s ionosphere from instruments on four parts of the world.

Business :

Business clearly see the interest as a way to enhance productivity and competitiveness. Some areas of business that are undergoing rapid changes are sales and marketing, retailing, banking, stock trading, etc. Sales representatives not only need to be better educated and more knowledgeable about their customer's businesses, but also must be comfortable with computer technology. The internet has become a popular marketing tool. The world of cybercash has come to banking – not only smart cards but internet banking, electronic deposit, bill paying, online stock and bond trading, etc.

Recreation and Entertainment:

Our entertainment and pleasure-time have also been affected by computerization. For example:

i) In movies, computer generated graphics give freedom to designers so that special effects and even imaginary characters can play a part in making movies, videos, and commercials.

ii) In sports, computers compile statistics, sell tickets, create training programs and diets for athletes, and suggest game plan strategies based on the competitor's past performance.

iii) In restaurants, almost every one has eaten food where the clerk enters an order by indicating choices on a rather unusual looking cash register; the device directly enters the actual data into a computer, and calculates the cost and then prints a receipt.

Government:

Various departments of the Government use computer for their planning, control and law enforcement activities. To name a few – Traffic, Tourism, Information & Broadcasting, Education, Aviation and many others.

Defence:

There are many uses computers in Defence such as:

1) Controlling UAV or unmanned air-crafts an example is Predator. If you have cable I would recommend watching the shows "Future Weapons" and "Modern Marvels". The show future weapon gives an entire hour to the predator.

2) They are also used on Intercontinental Ballistic Missiles (ICBMs) that uses GPS and Computers to help the missile get to the target.

3) Computers are used to track incoming missiles and help slew weapons systems onto the incoming target to destroy them.

4) Computers are used in helping the military find out where all their assets are (Situational Awareness) and in Communications/Battle Management Systems.

5) Computers are used in the logistic and ordering functions of getting equipments to and around the battlefield.

6) Computers are used in tanks and planes and ships to target enemy forces, help run the platform and more recently to help diagnose any problems with the platforms.

7) Computers help design and test new systems.

Sports:

In today's technologically growing society, computers are being used in nearly every activity.

Recording Information

Official statistics keepers and some scouts use computers to record statistics, take notes and chat online while attending and working at a sports event.

Analyzing Movements

The best athletes pay close attention to detail. Computers can slow recorded video and allow people to study their specific movements to try to improve their tendencies and repair poor habits.

Writers

Many sportswriters attend several sporting events a week, and they take their computers with them to write during the game or shortly after while their thoughts are fresh in their mind.

Scoreboard

While some scoreboards are manually updated, most professional sports venues have very modern scoreboards that are programmed to update statistics and information immediately after the information is entered into the computer.

Safety

Computers have aided in the design of safety equipment in sports such as football helmets to shoes to mouth guards

Block Diagram of Computer and Explain its Various Components

A computer can process data, pictures, sound and graphics. They can solve highly complicated problems quickly and accurately. A computer as shown in Fig. performs basically five major computer operations or functions irrespective of their size and make. These are

1) it accepts data or instructions by way of input,

2) it stores data,

3) it can process data as required by the user,

4) it gives results in the form of output, and

5) it controls all operations inside a computer.

We discuss below each of these Computer operations

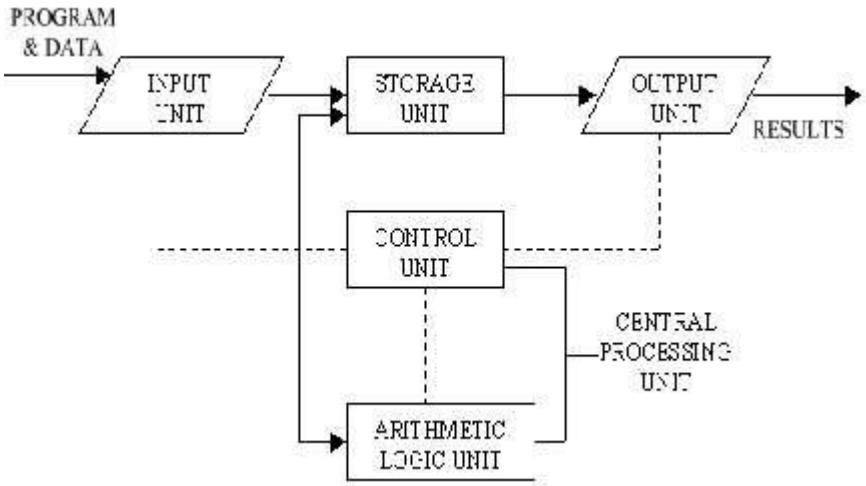


Fig : *Basic computer Operations*

1. Input: This is the process of entering data and programs in to the computer system. You should know that computer is an electronic machine like any other machine which takes as inputs raw data and performs some processing giving out processed data. Therefore, the input unit takes data from us to the computer in an organized manner for processing.

2. Storage: The process of saving data and instructions permanently is known as storage. Data has to be fed into the system before the actual processing starts. It is because the processing speed of Central Processing Unit (CPU) is so fast that the data has to be provided to CPU with the same speed. Therefore the data is first stored in the storage unit for faster access and processing. This storage unit or the primary storage of the computer system is designed to do the above functionality. It provides space for storing data and instructions.

The storage unit performs the following major functions:

• All data and instructions are stored here before and after processing.

• Intermediate results of processing are also stored here.

3. Processing: The task of performing operations like arithmetic and logical operations is called processing. The Central Processing Unit (CPU) takes data and instructions from the storage unit and makes all sorts of calculations based on the instructions given and the type of data provided. It is then sent back to the storage unit.

4. Output: This is the process of producing results from the data for getting useful information. Similarly the output produced by the computer after processing must also be kept somewhere inside the computer before being given to you in human readable form. Again the output is also stored inside the computer for further processing.

5. Control: The manner how instructions are executed and the above operations are performed. Controlling of all operations like input, processing and output are performed by control unit. It takes care of step by step processing of all operations inside the computer.

FUNCTIONAL UNITS

In order to carry out the operations mentioned in the previous section the computer allocates the task between its various functional units. The computer system is divided into three separate units for its operation. They are

1) arithmetic logical unit

2) control unit.

3) central processing unit.

Arithmetic Logical Unit (ALU) Logical Unit

Logical Unit :After you enter data through the input device it is stored in the primary storage unit. The actual processing of the data and instruction are performed by Arithmetic Logical Unit. The major operations performed by the ALU are addition, subtraction, multiplication, division, logic and comparison. Data is transferred to ALU from storage unit when required. After processing the output is returned back to storage unit for further processing or getting stored.

Control Unit (CU)

The next component of computer is the Control Unit, which acts like the supervisor seeing that things are done in proper fashion. Control Unit is responsible for co ordinating various operations using time signal. The control unit determines the sequence in which computer programs and instructions are executed. Things like processing of programs stored in the main memory, interpretation of the instructions and issuing of signals for other units of the computer to execute them. It also acts as a switch board operator when several users access the

computer simultaneously. Thereby it coordinates the activities of computer's peripheral equipment as they perform the input and output.

Central Processing Unit (CPU)

The ALU and the CU of a computer system are jointly known as the central processing unit. You may call CPU as the brain of any computer system. It is just like brain that takes all major decisions, makes all sorts of calculations and directs different parts of the computer functions by activating and controlling the operations.

Classification of Computers

Computers differ based on their data processing abilities. They are classified according to purpose, data handling and functionality.

According to purpose, computers are either general purpose or specific purpose. General purpose computers are designed to perform a range of tasks. They have the ability to store numerous programs, but lack in speed and efficiency. Specific purpose computers are designed to handle a specific problem or to perform a specific task. A set of instructions is built into the machine.

According to data handling, computers are analog, digital or hybrid. Analog computers work on the principle of measuring, in which the measurements obtained are translated into data. Modern analog computers usually employ electrical parameters, such as voltages, resistances or currents, to represent the quantities being manipulated. Such computers do not deal directly with the numbers. They measure continuous physical magnitudes. Digital computers are those that operate with information, numerical or otherwise, represented in a digital form. Such computers process data into a digital value (in 0s and 1s). They give the results with more accuracy and at a faster rate. Hybrid computers incorporate the measuring feature of an analog computer and counting feature of a digital computer. For computational purposes, these computers use analog components and for storage, digital memories are used.

According to functionality, computers are classified as :

Analog Computer

An analog computer (spelt analogue in British English) is a form of computer that uses *continuous* physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved.

Digital Computer

A computer that performs calculations and logical operations with quantities represented as digits, usually in the binary number system

Hybrid Computer (Analog + Digital)

A combination of computers those are capable of inputting and outputting in both digital and analog signals. A hybrid computer system setup offers a cost effective method of performing complex simulations.

On the basis of Size

Super Computer

The fastest and most powerful type of computer Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations. For example, weather forecasting requires a supercomputer. Other uses of supercomputers include animated graphics, fluid dynamic calculations, nuclear energy research, and petroleum exploration.

The chief difference between a supercomputer and a mainframe is that a supercomputer channels all its power into executing a few programs as fast as possible, whereas a mainframe uses its power to execute many programs concurrently.

Mainframe Computer

A very large and expensive computer capable of supporting hundreds, or even thousands, of users simultaneously. In the hierarchy that starts with a simple microprocessor (in watches, for example) at the bottom and moves to supercomputers at the top, mainframes are just below supercomputers. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe.

Mini Computer

A midsized computer. In size and power, minicomputers lie between *workstations* and *mainframes*. In the past decade, the distinction between large minicomputers and small mainframes has blurred, however, as has the distinction between small minicomputers and workstations. But in general, a minicomputer is a multiprocessing system capable of supporting from 4 to about 200 users simultaneously.

Micro Computer or Personal Computer

• Desktop Computer: a personal or micro-mini computer sufficient to fit on a desk.

• Laptop Computer: a portable computer complete with an integrated screen and keyboard. It is generally smaller in size than a desktop computer and larger than a notebook computer.

• Palmtop Computer/Digital Diary /Notebook /PDAs: a hand-sized computer. Palmtops have no keyboard but the screen serves both as an input and output device.

Workstations

A terminal or desktop computer in a network. In this context, workstation is just a generic term for a user's machine (client machine) in contrast to a "server" or "mainframe."

Characteristic of a Computer

Basic characteristics about computer are:

1. Speed: - As you know computer can work very fast. It takes only few seconds for calculations that we take hours to complete. You will be surprised to know that computer can perform millions (1,000,000) of instructions and even more per second.

Therefore, we determine the speed of computer in terms of microsecond (10-6 part of a second) or nanosecond (10 to the power -9 part of a second). From this you can imagine how fast your computer performs work.

2. Accuracy: - The degree of accuracy of computer is very high and every calculation is performed with the same accuracy. The accuracy level is 7

determined on the basis of design of computer. The errors in computer are due to human and inaccurate data.

3. Diligence: - A computer is free from tiredness, lack of concentration, fatigue, etc. It can work for hours without creating any error. If millions of calculations are to be performed, a computer

will perform every calculation with the same accuracy. Due to this capability it overpowers human being in routine type of work.

4. Versatility: - It means the capacity to perform completely different type of work. You may use your computer to prepare payroll slips. Next moment you may use it for inventory management or to prepare electric bills.

5. Power of Remembering: - Computer has the power of storing any amount of information or data. Any information can be stored and recalled as long as you require it, for any numbers of years. It depends entirely upon you how much data you want to store in a computer and when to lose or retrieve these data.

6. No IQ: - Computer is a dumb machine and it cannot do any work without instruction from the user. It performs the instructions at tremendous speed and with accuracy. It is you to decide what you want to do and in what sequence. So a computer cannot take its own decision as you can.

7. No Feeling: - It does not have feelings or emotion, taste, knowledge and experience. Thus it does not get tired even after long hours of work. It does not distinguish between users.

8. Storage: - The Computer has an in-built memory where it can store a large amount of data. You can also store data in secondary storage devices such as floppies, which can be kept outside your computer and can be carried to other computers.

History of computer

Each generation of computer is characterized by a major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful and more efficient and reliable devices.

The various generations of computers an listed below :

(i) First Generation (1946-1954) : In 1946 there was no 'best' way of storing instructions and data in a computer memory. There were four competing technologies for providing computer memory: electrostatic storage tubes, acoustic delay lines (mercury or nickel), magnetic drums (and disks?), and magnetic core storage.

The digital computes using electronic valves (Vacuum tubes) are known as first generation computers. the first 'computer' to use electronic valves (ie. vacuum tubes). The high cost of vacuum tubes prevented their use for main memory. They stored information in the form of propagating sound waves.

The vacuum tube consumes a lot of power. The Vacuum tube was developed by Lee DeForest in 1908. These computers were large in size and writing programs on them was difficult. Some of the computers of this generation were:

Mark I : The IBM Automatic Sequence Controlled Calculator (ASCC), called the Mark I by Harvard University, was an electro-mechanical computer. Mark I is the first machine to successfully perform a long services of arithmetic and logical operation. Mark I is the First Generation Computer. it was the first operating machine that could execute long computations automatically. *Mark I* computer which was built as a partnership between Harvard and IBM in 1944. This was the first programmable digital computer made in the U.S. But it was not a purely electronic computer. Instead the Mark I was constructed out of switches, relays, rotating shafts, and clutches. The machine weighed 5 tons, incorporated 500 miles of wire, was 8 feet tall and 51 feet long, and had a 50 ft rotating shaft running its length, turned by a 5 horsepower electric motor.

ENIAC: It was the first general-purpose electronic computer built in 1946 at University of Pennsylvania, USA by John Mauchly and J. Presper Eckert.

The completed machine was announced to the public the evening of February 14, 1946. It was named Electronic Numerical Integrator and Calculator (ENIAC). ENIAC contained 17,468 vacuum tubes, 7,200 crystal diodes, 1,500 relays, 70,000 resistors, 10,000 capacitors and around 5 million hand-soldered joints. It weighed more than 30 short tons (27 t), was roughly 8 by 3 by 100 feet (2.4 m × 0.9 m × 30 m), took up 1800 square feet (167 m2), and consumed 150 kW of power. Input was possible from an IBM card reader, and an IBM card punch was used for output. These cards could be used to produce printed output offline using an IBM accounting machine, such as the IBM 405. Today your favorite computer is many times as powerful as ENIAC, still size is very small.

EDVAC: It stands for Electronic Discrete Variable Automatic Computer and was developed in 1950.it was to be a vast improvement upon ENIAC, it was binary rather than decimal, and was a stored program computer. The concept of storing data and instructions inside the computer was introduced here. This allowed much faster operation since the computer had rapid access to both data and instructions. The other advantage of storing instruction was that computer could do logical decision internally.

The EDVAC was a binary serial computer with automatic addition, subtraction, multiplication, programmed division and automatic checking with an ultrasonic serial memory. EDVAC's addition time was 864 microseconds and its multiplication time was 2900 microseconds (2.9 milliseconds).

The computer had almost 6,000 vacuum tubes and 12,000 diodes, and consumed 56 kW of power. It covered 490 ft² (45.5 m²) of floor space and weighed 17,300 lb (7,850 kg).

EDSAC: It stands for Electronic Delay Storage Automatic Computer and was developed by M.V. Wilkes at Cambridge University in 1949. Two groups of individuals were working at the same time to develop the first stored-program computer. In the United States, at the University of Pennsylvania the EDVAC (Electronic Discrete Variable Automatic Computer) was being worked on. In England at Cambridge, the EDSAC (Electronic Delay Storage Automatic Computer) was also being developed. The EDSAC won the race as the first stored-program computer beating the United States' EDVAC by two months. The EDSAC performed computations in the three millisecond range. It performed arithmetic and logical operations without human intervention. The key to the success was in the stored instructions which it depended upon solely for its operation. This machine marked the beginning of the computer age. EDSAC is the first computer is used to store a program

UNIVAC-1: Ecker and Mauchly produced it in 1951 by Universal Accounting Computer setup. it was the first commercial computer produced in the United States. It was designed principally by J. Presper Eckert and John Mauchly, the inventors of the ENIAC.

The machine was 25 feet by 50 feet in length, contained 5,600 tubes, 18,000 crystal diodes, and 300 relays. It utilized serial circuitry, 2.25 MHz bit rate, and had an internal storage capacity 1,000 words or 12,000 characters.

It utilized a Mercury delay line, magnetic tape, and typewriter output. The UNIVAC was used for general purpose computing with large amounts of input and output.

Power consumption was about 120 kva. Its reported processing speed was 0.525 milliseconds for arithmetic functions, 2.15 milliseconds for multiplication and 3.9 Milliseconds for division.

The UNIVAC was also the first computer to come equipped with a magnetic tape unit and was the first computer to use buffer memory.

Other Important Computers of First Generation

Some other computers of this time worth mentioning are the Whirlwind, developed at Massachussets Institute of Technology, and JOHNNIAC, by the Rand Corporation. The Whirlwind was the first computer to display real time video and use core memory. The

JOHNNIAC was named in honor of Jon Von Neumann. Computers at this time were usually kept in special locations like government and university research labs or military compounds.

Limitations of First Generation Computer

Followings are the major drawbacks of First generation computers.

1. They used valves or vacuum tubes as their main electronic component.

2. They were large in size, slow in processing and had less storage capacity.

3. They consumed lots of electricity and produced lots of heat.

4. Their computing capabilities were limited.

5. They were not so accurate and reliable.

6. They used machine level language for programming.

7. They were very expensive.

Example: ENIAC, UNIVAC, IBM 650 etc

(ii) Second Generation (1955-1964) : The second-generation computer used transistors for CPU components & ferrite cores for main memory & magnetic disks for secondary memory. They used high-level languages such as FORTRAN (1956), ALGOL (1960) & COBOL (1960 - 1961). I/O processor was included to control I/O operations.

Around 1955 a device called *Transistor* replaced the bulky Vacuum tubes in the first generation computer. Transistors are smaller than Vacuum tubes and have higher operating speed. They have no filament and require no heating. Manufacturing cost was also very low. Thus the size of the computer got reduced considerably.

It is in the second generation that the concept of Central Processing Unit (CPU), memory, programming language and input and output units were developed. The programming languages such as COBOL, FORTRAN were developed during this period. Some of the computers of the Second Generation were

1. IBM 1620: Its size was smaller as compared to First Generation computers and mostly used for scientific purpose.

2. IBM 1401: Its size was small to medium and used for business applications.

3. CDC 3600: Its size was large and is used for scientific purposes.

Features:

1. Transistors were used instead of Vacuum Tube.

2. Processing speed is faster than First Generation Computers (Micro Second)

3. Smaller in Size (51 square feet)

4. The input and output devices were faster.

Example: IBM 1400 and 7000 Series, Control Data 3600 etc.

(iii) Third Generation (1964-1977) : By the development of a small chip consisting of the capacity of the 300 transistors. These ICs are popularly known as *Chips*. A single IC has many transistors, registers and capacitors built on a single thin slice of silicon. So it is quite obvious that the size of the computer got further reduced. Some of the computers developed during this period were IBM-360, ICL-1900, IBM-370, and VAX-750. Higher level language such as BASIC (Beginners All purpose Symbolic Instruction Code) was developed during this period. Computers of this generation were small in size, low cost, large memory and processing speed is very high. Very soon ICs Were replaced by LSI (Large Scale Integration), which consisted about 100 components. An IC containing about 100 components is called LSI.

Features:

1. They used Integrated Circuit (IC) chips in place of the transistors.

2. Semi conductor memory devices were used.

3. The size was greatly reduced, the speed of processing was high, they were more accurate and reliable.

4. Large Scale Integration (LSI) and Very Large Scale Integration (VLSI) were also developed.

5. The mini computers were introduced in this generation.

6. They used high level language for programming.

Example: IBM 360, IBM 370 etc.

(iv) Fourth Generation : An IC containing about 100 components is called LSI (Large Scale Integration) and the one, which has more than 1000 such components, is called as VLSI (Very Large Scale Integration). It uses *large scale Integrated Circuits* (LSIC) built on a single silicon chip called microprocessors. Due to the development of microprocessor it is possible to place computer's *central processing unit* (CPU) on single chip. These computers are called microcomputers. Later *very large scale Integrated Circuits* (VLSIC) replaced LSICs. Thus the computer which was occupying a very large room in earlier days can now be placed on a table. The personal computer (PC) that you see in your school is a Fourth Generation Computer Main memory used fast semiconductors chips up to 4 M bits size. Hard disks were used as secondary memory. Keyboards, dot matrix printers etc. were developed. OS-such as MS-DOS, UNIX, **Apple's Macintosh** were available. Object oriented language, C++ etc were developed.

Features:

1. They used Microprocessor (VLSI) as their main switching element.

2. They are also called as micro computers or personal computers.

3. Their size varies from desktop to laptop or palmtop.

4. They have very high speed of processing; they are 100% accurate, reliable, diligent and versatile.

5. They have very large storage capacity.

Example: IBM PC, Apple-Macintosh etc.

(v) Fifth Generation (1991- continued) : 5th generation computers use ULSI (Ultra-Large Scale Integration) chips. Millions of transistors are placed in a single IC in ULSI chips. 64 bit microprocessors have been developed during this period. Data flow & EPIC architecture of these processors have been developed. RISC & CISC, both types of designs are used in modern processors. Memory chips and flash memory up to 1 GB, hard disks up to 600 GB & optical disks up to 50 GB have been developed. fifth generation digital computer will be Artificial intelligence.

CPU - Central Processing Unit

Every things computer does is controlled by its Central Processing Unit (CPU). The CPU is the brains of the computer. Sometimes referred to simply as the central processor or Nerve Centre or heart, but more commonly called processor, the CPU is where most calculations take place.

In terms of computing power, the CPU is the most important element of a computer system. It add and compare its data in cpu chip. A CPU or Processors of all computers, whether micro, mini or mainframe must have three element or parts primary storage, arithmetic logic unit (ALU), and control unit. *Control Unit* (CU) - *decodes* the *program instruction. CPU chip used in a*

computer is partially made out of Silica. on other words silicon chip used for data processing are called Micro Processor.

Central processing unit (CPU) is the central component of the Pc. Sometimes it is called as processor. It is the brain that runs the show inside the Pc. All work that is done on a computer is performed directly or indirectly by the processor. Obviously, it is one of the most important components of the Pc. It is also, scientifically, not only one of the most amazing parts of the PC, but one of the most amazing devices in the world of technology. The processor plays a significant role in the following important aspects of your computer system;

Performance: The processor is probably the most important single determinant of system performance in the Pc. While other components also playa key role in determining performance, the processor's capabilities dictate the maximum performance of a system. The other devices only allow the processor to reach its full potential.

Software Support: Newer, faster processors enable the use of the latest software. In addition, new processors such as the Pentium with MMX Technology, enable the use of specialized software not usable on earlier machines.

Reliability and Stability: The quality of the processor is one factor that determines how reliably your system will run. While most processors are very dependable, some are not. This also depends to some extent on the age of the processor and how much energy it consumes.

Energy Consumption and Cooling: Originally processors consumed relatively little power compared to other system devices. Newer processors can consume a great deal of power. Power consumption has an impact on everything from cooling method selection to overall system reliability.

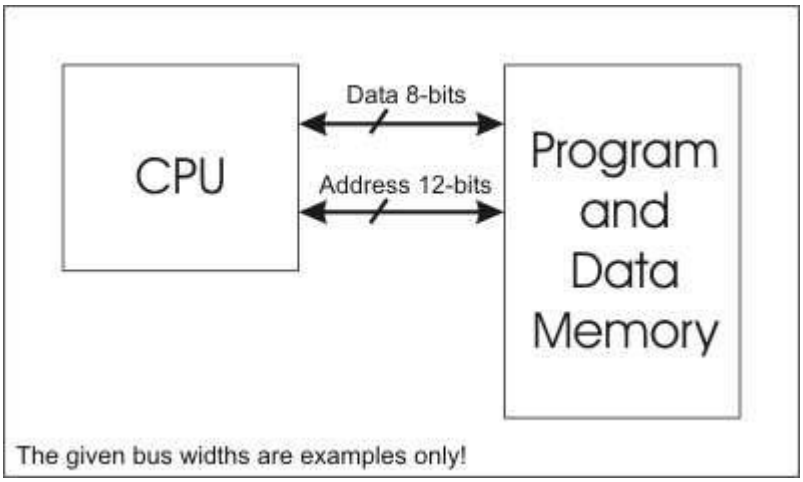
Motherboard Support: The processor that decides to use in your system will be a major determining factor in what sort of chipset we must use, and hence what motherboard you buy. The motherboard in turn dictates many facets of. The system's capabilities and performance.

Von-Neumann Architectures

Von Neumann Architecture also known as the *Von Neumann model*, the computer consisted of a CPU, memory and I/O devices. The program is stored in the memory. The CPU fetches an instruction from the memory at a time and executes it.

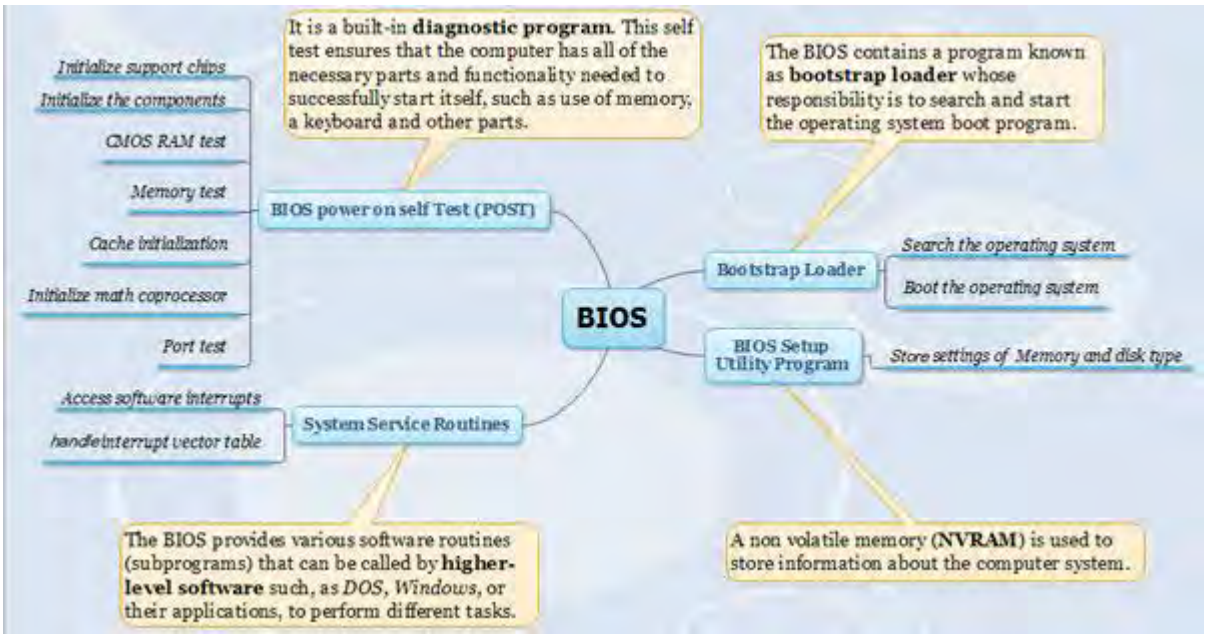
Thus, the instructions are executed sequentially which is a slow process. Neumann m/c are called control flow computer because instruction are executed sequentially as controlled by a program counter. To increase the speed, parallel processing of computer have been developed in which serial CPU's are connected in parallel to solve a problem. Even in parallel computers, the basic building blocks are Neumann processors.

The von Neumann architecture is a design model for a stored-program digital computer that uses a processing unit and a single separate storage structure to hold both instructions and data. It is named after mathematician and early computer scientist John von Neumann. Such a computer implements a universal Turing machine, and the common "referential model" of specifying sequential architectures, in contrast with parallel architectures.



One shared memory for instructions (program) and data with one data bus and one address bus between processor and memory. Instructions and data have to be fetched in sequential order (known as the Von Neuman Bottleneck), limiting the operation bandwidth. Its design is simpler than that of the Harvard architecture. It is mostly used to interface to external memory.

What is BIOS (basic input/output system)?



A BIOS (Basic Input/Output System) Short for ROM is boot firmware program that a computer uses to successfully start operating. The BIOS is located on a chip inside of the computer and is designed in a way that protects it from disk failure.

When you turn on a PC, the BIOS first conduct a basic hardware check, called a Power-On Self Test (POST), to determine whether all of the attachments are present and working. Then it loads the operating system into your computer's random access memory, or RAM. The BIOS also manages data flow between the computer's operating system and attached devices such as the hard disk, video card, keyboard, mouse, and printer. The BIOS stores the date, the time, and your system configuration information in a battery-powered, non-volatile memory chip, called a CMOS (Complementary Metal Oxide Semiconductor) after its manufacturing process. The main functions of the BIOS are:

(i) BIOS power on self Test (POST)

(ii) Bootstrap loader

(iii) BIOS Setup utility program

(iv) System service routines

Functions of BIOS

(i) BIOS Power on Self Test (POST): It is a built-in diagnostic program. This self test ensures that the computer has all of the necessary parts and functionality needed to successfully start itself, such as use of memory, a keyboard and other parts. Then additional tests are done during booting. If errors are detected during the test, the BIOS instruct the computer to give a code that reveals the problem. Error codes are typically a series of beeps heard shortly after startup.

The BIOS also works to give the computer basic information about how to interact with some critical components, such as drives and memory that it will need to load the operating system. Once the basic instructions have been loaded and the self-test has been passed, the computer can proceed with loading the operating system from one of the attached drives. Computer users can often make certain adjustments to the BIOS through a configuration screen on the computer. The setup screen is typically accessed with a special key sequence during the first moments of startup. This setup screen often allows users to change the order in which drives are accessed during startup and control the functionality of a number of critical devices. Features vary among individual BIOS versions. The boot sequences for Award BIOS software are;

(i) Test the CPU

(ii) Initialize support chips

(iii) Initialize the keyboard

(iv) ROM BIOS test

(v) CMOS RAM test

(vi) Memory test

(vii) Cache initialization

(viii) Initialize the vector table

(ix) CMOS RAM check sum

(x) Keyboard initialization

(xi) Video circuit test

(xii) Video memory test

(xiii) DMA Controller test

(xiv) PIC tests

(xv) EISA mode test

(xvi) Enable EISA slots

(xvii) Check memory size

(xviii) Memory test

(xix) Check EISA memory

(xx) Mouse initialization

(xxi) Cache initialization

(xxii) Shadow RAM setup

(xxiii) Floppy test

(xxiv) Hard drive test

*(xxv)*Serial/parallel port test

*(xxvi)*Initialize math coprocessor

*(xxvii)*Boot speed

*(xxviii)*POST loop

*(xxix)*Security/Password information

*(xxx)*Write to CMOS RAM

*(xxxi)*Initialize adapter ROM

*(xxxii)*Set up the time

*(xxxiii)*Boot the system and control given to INT 19 boot loader.

We can also use flash-memory cards to hold BIOS information. This allows users to update the BIOS version on computers after a vendor releases an update. This system was designed to solve problems with the original BIOS or to add new functionality. Users can periodically check for updated BIOS versions, as some vendors release a dozen or more updates over the course of a product's lifetime. Mother board (System) BIOS, Video adapter firmware (BIOS), Drive controller firmware (BIOS), Modem Card firmware (BIOS), Network adapter board BIOS, SCSI adapter BIOS. The mother board BIOS provides routines to support motherboard features. BIOS ROM chips for major sub systems of computer such as video and drive control must also be included.

Actually BIOS can be placed in between the computer and external devices as its name tells it is used for reading the keystroke, displaying values on screen, Reading and writing to and from floppy and hard disks etc.

The keyboard is assigned the port number 60, which is known to BIOS. BIOS read this port and data from keyboard goes to computer.

(ii) Bootstrap Loader: To boot the operating system. The BIOS contains a program known as bootstrap loader whose responsibility is to search and start the operating system boot program. Then the boot program of operating system controls the computer system and boots the operating system.

(iii) BIOS Setup Utility Program: A non volatile memory (NVRAM) is used to store information about the computer system. During installation of a system, the user run BIOS setup program and enter the correct parameters. The settings of memory, disk types and other settings are stored in NVRAM and not in BIOS chip itself. To construct NVRAM, the material required is CMOS (Complementary metal oxide semiconductor). These CMOS chips are very efficient storage devices as they store and maintain data on very low values of current. The system's configurations therefore are also termed as CMOS settings, which we can set using BIOS set up program. The BIOS reads the parameters from CMOS RAM as and when required.

CMOS settings can be maintained by battery backup either by using capacitor or by a battery built into NVRAM chip. This chip also has system clock. If there is no battery, the setting remains for short period of time and we need to reset the system. With it there is loss of BIOS password which protects BIOS set up program.

To clear the CMOS RAM contents, two methods used are

(i) By using clear CMOS jumper.

(ii) By holding down enter key during booting of the system.

For Pentium III motherboards, different set ups are there in AMI BIOS. These are:

• **Standard CMOS Setup:** It is used to set time date, hard disk type, type of floppy drive, type of monitor and keyboard.

Advanced CMOS Setup: It is used to set typematic rate and delay, above 1 MB memory test, memory test tick sound, Hil < Del> message display, system boot up sequence etc.

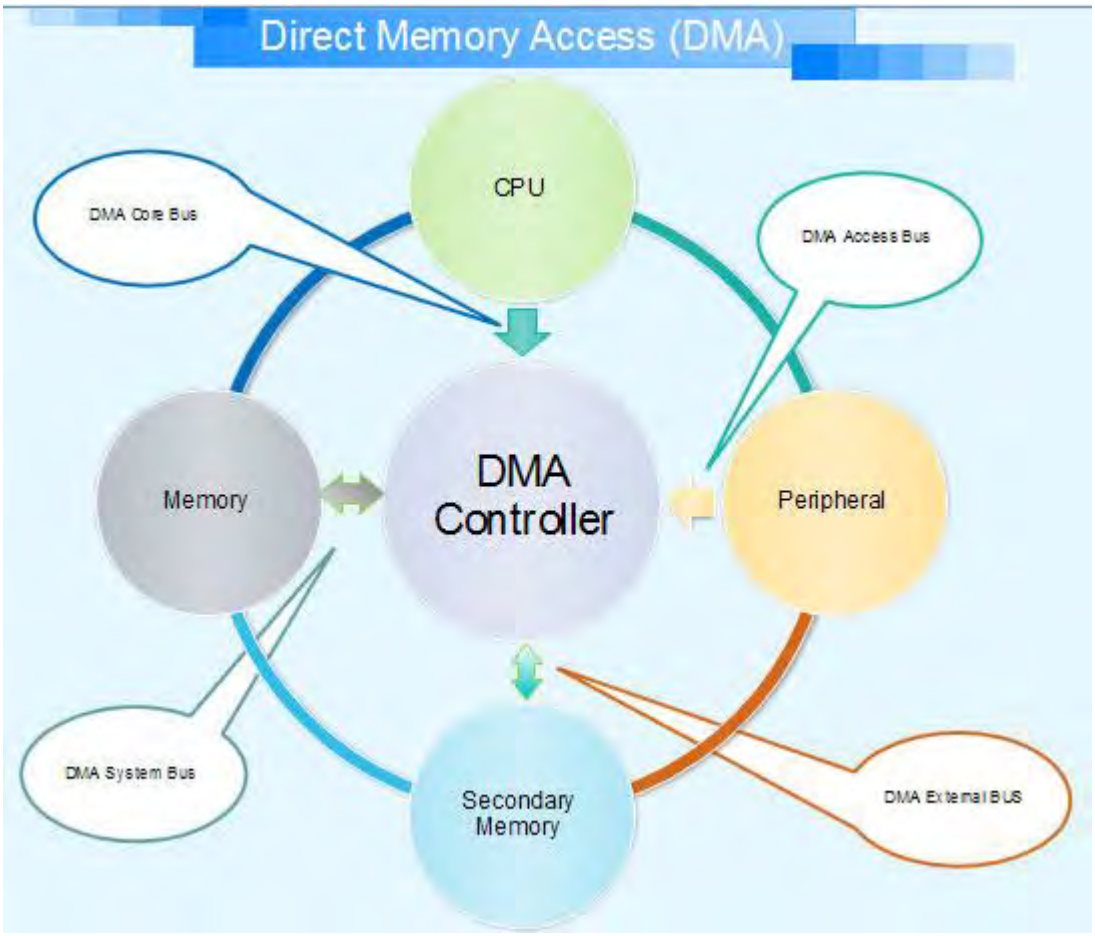
- **Advanced Chipset Setup:** It is used to set features of chipset.
- **Power Management Setup:** It is used to control power conservation options.
- **PCI/Plug and Play Setup:** It is used to SET OPTIONS of PCI bus and that of plug and play devices.
- **Peripherals Setup:** It is used to control options related to I/O controllers.
- **CPU Configuration Setup:** This setup is used to select the types of CPU installed in the motherboard. In AMI BIOS, the settings are auto as it automatically finds out the type of CPU in the computer system.

(iv) System Service Routines: The BIOS provides various software routines (subprograms) that can be called by higher-level software such, as DOS, Windows, or their applications, to perform different tasks. Virtually every task that involves accessing the system hardware has traditionally been controlled using one or more of the BIOS programs (although many newer operating systems now bypass the BIOS for improved performance). This includes actions like reading and writing from the hard disk, processing information received from devices, etc.

BIOS services are accessed using software interrupts, which are similar to the hardware interrupts except that they are generated inside the processor by programs instead of being generated outside the processor by hardware devices. One thing that this use of interrupts does is to allow access to the BIOS without knowing where in memory each routine is located.

Normally, to call a software routine you need to know its address. With interrupts, a table called an interrupt *vector table* is used that bypasses this problem. When the system is started up, the BIOS puts addresses into this table that represent where its routines are located for each interrupt it responds to. Then, when DOS or an application wants to use a BIOS routine, it generates a software interrupt. The system processes the interrupt, looks up the value in the table, and jumps to the BIOS routine automatically. DOS itself and application programs can also use this interrupt vector table.

Direct memory access (DMA)



DMA stands for "Direct Memory Access" and is a method of transferring data from the computer's RAM to another part of the computer without processing it using the CPU. While most data that is input or output from your computer is processed by the CPU, some data does not require processing, or can be processed by another device.

In these situations, DMA can save processing time and is a more efficient way to move data from the computer's memory to other devices. In order for devices to use direct memory access, they must be assigned to a DMA channel. Each type of port on a computer has a set of DMA channels that can be assigned to each connected device. For example, a PCI controller and a hard drive controller each have their own set of DMA channels.

For example, a sound card may need to access data stored in the computer's RAM, but since it can process the data itself, it may use DMA to bypass the CPU. Video cards that support DMA can also access the system memory and process graphics without needing the CPU. Ultra DMA hard drives use DMA to transfer data faster than previous hard drives that required the data to first be run through the CPU.

An alternative to DMA is the Programmed Input/Output (PIO) interface in which all data transmitted between devices goes through the processor. A newer protocol for the ATAIIDE interface is Ultra DMA, which provides a burst data transfer rate up to 33 mbps. Hard drives that come with Ultra DMAI33 also support PIO modes 1, 3, and 4, and multiword DMA mode 2 at 16.6 mbps.

DMA Transfer Types

Memory To Memory Transfer

In this mode block of data from one memory address is moved to another memory address. In this mode current address register of channel 0 is used to point the source address and the current address register of channel is used to point the destination address in the first transfer cycle, data byte from the source address is loaded in the temporary register of the DMA controller and in the next transfer cycle the data from the temporary register is stored in the memory pointed by destination address. After each data transfer current address registers are decremented or incremented according to current settings. The channel 1 current word count register is also decremented by 1 after each data transfer. When the word count of channel 1 goes to FFFFH, a TC is generated which activates EOP output terminating the DMA service.

Auto initialize

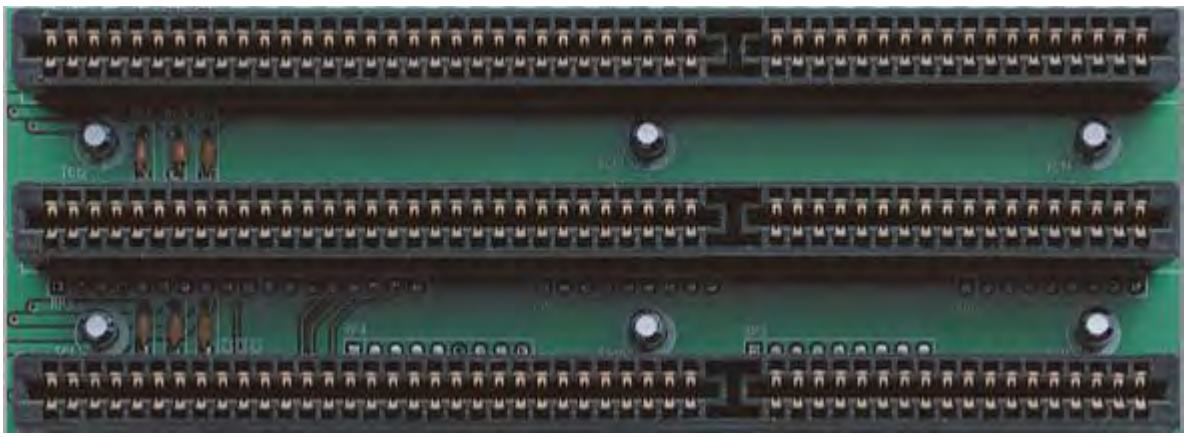
In this mode, during the initialization the base address and word count registers are loaded simultaneously with the current address and word count registers by the microprocessor. The address and the count in the base registers remain unchanged throughout the DMA service.

After the first block transfer i.e. after the activation of the EOP signal, the original values of the current address and current word count registers are automatically restored from the base address and base word count register of that channel. After auto initialization the channel is ready to perform another DMA service, without CPU intervention.

DMA Controller

*The co*ntroller is integrated into the processor board and manages all DMA data transfers. Transferring data between system memory and an 110 device requires two steps. Data goes from the sending device to the DMA controller and then to the receiving device. The microprocessor gives the DMA controller the location, destination, and amount of data that is to be transferred. Then the DMA controller transfers the data, allowing the microprocessor to continue with other processing tasks. When a device needs to use the Micro Channel bus to send or receive data, it competes with all the other devices that are trying to gain control of the bus. This process is known as arbitration. The DMA controller does not arbitrate for control of the BUS instead; the I/O device that is sending or receiving data (the DMA slave) participates in arbitration. It is the DMA controller, however, that takes control of the bus when the central arbitration control point grants the DMA slave's request.

What is ISA Bus?



The Industry Standard Architecture or ISA (Pronounced as separate letters or as *eye-sa*) bus began as part of IBM's revolutionary PC/XT and PC/AT released in 1981. However, it was officially recognized as "*ISA*" in 1987 when the IEEE (Institute of Electrical and Electronics Engineers) formally documented standards governing its 16-bit implementation. AT version of the bus is called the AT bus and became a de facto industry standard.

History

ISA stands for Industry standard architecture. It was the original IBM expansion bus and initially no standard was assigned to it. Its first version was the 8 bit bus and it ran at the speed of about 7 MHz.

In 1984, with the advent of PC AT (Intel 286), the bus width is increased to 16 bits and the frequencysuccessively 6 to 8 MHz, 8.33 MHz and finally, providing a theoretical maximum of 16 MB / s (in practice only 8 MB / s as a cycle of two was used for addressing).

The second generation of PC's used 16 bit ISA expansion bus which also ran at the same speed i.e. 7 MHz initially. The later cards allow speed of 8.33 MHz for the 16 bit ISA bus. Nowadays the I/O devices are much faster than their speed but still the ISA connectors are usually included in PC's to make them is backward compatible with the slower ISA cards.

Current motherboards no longer include ISA bus, PCI bus replaced by the faster and Plug & Play.

ISA bus architecture

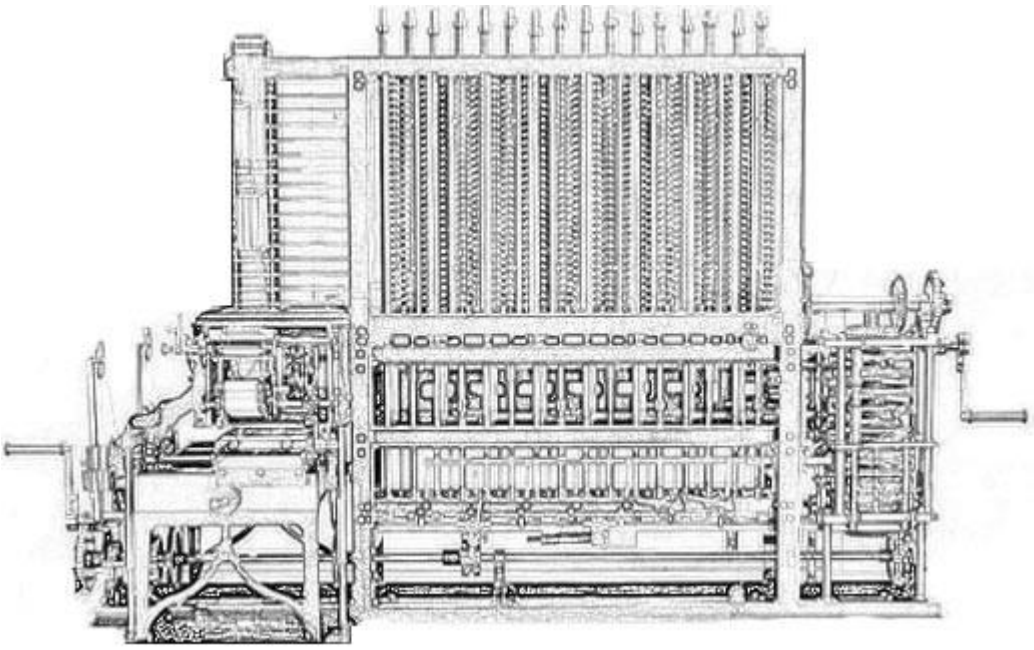
ISA bus architecture is the basis of personal computer. 8-bit ISA bus is used in single user systems with 80386 and 80486 processors. There are 24 address lines and '16 data lines in it. It operates at 8 MHz and 2 to 8 clock cycles are needed to transfer data. The data transfer rate of the system is less when 8-bit ISA bus is used with 32 bit processor having 32 bit address and data bus. So, 16 bit ISA bus is used to transfer data. Many peripherals such as disk controller, printer, and scanner can be connected to ISA bus.

Evolution of Digital Computers

The successful general purpose mechanical computers were developed. In 1930, mechanical calculations were built for automatic addition, subtraction, multiplication & division. A calculator is not a programmable device. The different eras of the Evolution of Digital Computers are listed below:

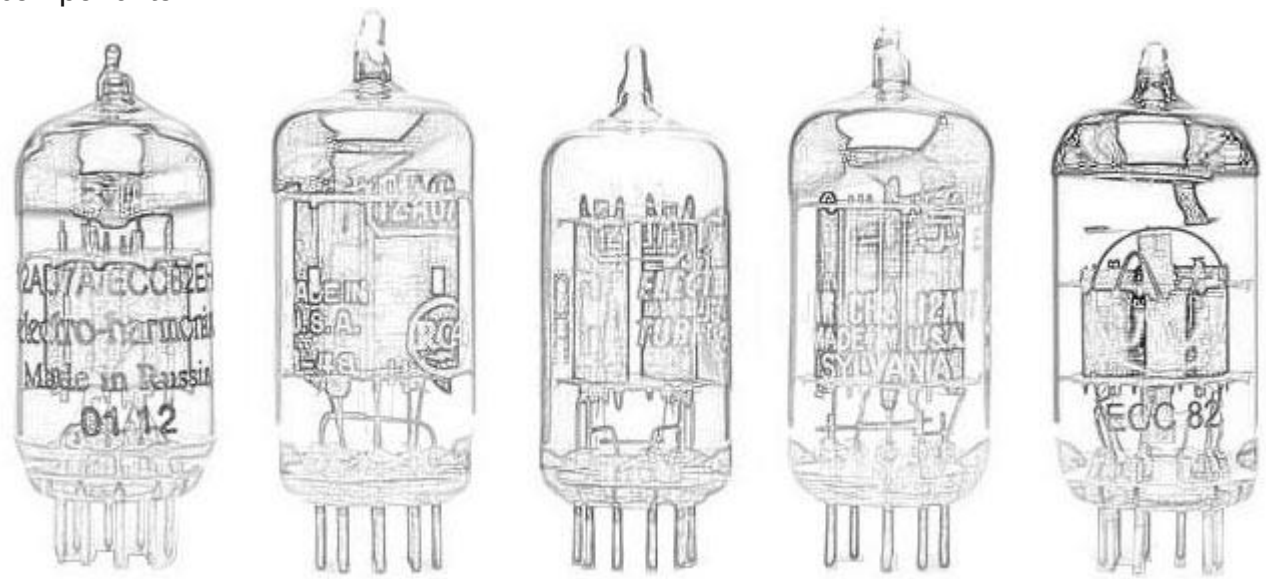
(1) Mechanical Era : There were many attempts to create a m/c that could help to perform various calculations. In 1823, Charles Babbage tried to build a mechanical as computing m/c capable of performing automatic mathematical calculations. This was designed to compute tables of functions such as logs functions etc. In 1830's Babbage made a more powerful mechanical computer. This m/c was designed to perform any mathematical calculation automatically.

It could perform addition etc. It had a memory unit. Its capacity was 1000 numbers, each no. consisting of 50 digits. The m/c was a programmable m/c. It had mechanism for enabling a program to change the sequence of its operations automatically. In the late 19th century punched cards were commercially used. Soon IBM was formed in 1924. Konand Zuse developed a mechanical computer, the Z1, in 1938 in Germany.



(2) The Electronic Era : The first electronic computer using. Valves were developed by John V. Atanas off in the late 1930's. It contained addsubtract unit. It was relatively a small computer and used about 300 valves. Its memory unit consisted of capacitors mounted on a rotating drum. It used a no. of I/O devices including a card punch and a card reader. The first popular general electronic digital computer was the ENIAC (Electronic Numerical Interpreter and calculator). John von Neumann was the consultant of the ENIAC project.

The ENIAC used a high speed memory to store both programs as well as data during program execution. Neumann and his colleagues designed and build the IAS Computers. It used RAM consisting of a cathode ray tube. The transistors were invented in 1948 at AT&T bell laboratories. Slowly they replaced Vacuum tubes. IC's were first introduced, ie, designed and fabricated in 1958-59. The examples of computers using IC's are-: IBM – 370 & PDP-8. In 1970 LSI chips were introduced is form of memory units. Computers built in 1970's & onwards used micro process and other LSI, VLSI and ULSI components.



Personal Computer - What is personal computer?

A computer is a machine that can handle and manipulate data in accordance with the instructions, and is also able to generate visible results on a screen or monitor. Different computer do different kinds of work, a small computer that has been designed to be used by one person, at home or in an office. It is often simply called a PC.

What is a personal computer?

A personal computer is a computer small and low cost, which is intended for personal use (or for use by a small group of individuals). The term "personal computer" is used to describe desktop computers (desktops). It is often shortened to the acronym PC or microcomputer, whose meaning in English is "personal computer". It is a very common type of machines.

Personal Computer (acronym PC) consists of a Processor (CPU), central processing unit (CPU) contains the arithmetic, logic, and control circuitry on an single (IC) integrated circuit; two types of memory, main memory, such as RAM, and ROM, magnetic hard disks (HDD) and compact discs and various input/output devices, including a display screen, keyboard and mouse, modem, and printer.

History of Personal Computer

Prior to the Personal Computer (acronym PC), computers were designed for large organization who attached thin terminals for multiple users to a single large computer whose resources were shared among all users. The advent of the personal computer (PC), they break up the tradition of terminals computing. By the late 1980s, technology advances made it feasible to build a small computer that an individual could own and use.

The personal computer began to be wide spread in the 1980s. The first was expensive, work late and had little capacity seen with today's eyes. History shows that they had their antecedents in particular as calculating machines. It was the development of an effective operating system and a user friendly interface which gave impetus to the development and let them be word processors.

According to the Computer History, the first "personal computer" was the Kenbak-1, launched in 1971. Had256 bytes of memory and was advertised in Scientific American for $750, however, did not have CPU and was, like other systems of this era, designed for educational use.

Uses of Personal Computers

Personal computer (PC) is used for Work with word processing, Internet communications, and sound compositions and also for DTP. The PC is a most valued piece of technology around the world. The data processing capabilities of PC have added to their usage.

CPU Cache - What is Processor Cache ?

The Processor Cache is memory that store data (code, commands etc.). it is used with the processor to facilitate the access of data from the system's main memory or RAM. Processor Cache reduces the average time to access memory. The processor cache typically consists of two levels, which are the L1 cache and the L2 cache.

The L1 cache is directly accessed by the computer's processor and holds data that the processor needs to execute instructions. The L2 cache pulls information from the system's main memory, which is then accessed by the L1 cache.

Processor Cache is much faster than RAM so provides better responsiveness if you have more cache. It is a data storage section of the CPU that next set of instructions and data that is currently needed.

The more Processor Cache you have (512 is better than 256), the more data you could have in the cache for faster processing. Modern CPU no longer uses external cache. Both L1 and L2 are parts of the CPU now.

Modern desktop PC and server CPUs have three independent caches: an instruction cache to speed up executable instruction fetch, a data cache to speed up data fetch and store, and a translation lookaside buffer (TLB) used to speed up virtual-to-physical address translation for both executable instructions and data.

Laptop - What is a Laptop Computer?

A Laptop computer (also called *portable computer* or *notebook computer* in English) (Other terms, such as *ultrabook* or *netbook*, refer to specific *types* of laptop) is designed with portability in mind. It was developed in the late 1980s. It is briefcase style with a foldout screen with a clamshell form factor, suitable for mobile use and with a miniature keyboard. It is small enough to use in your lap. The laptop is battery or AC-powered personal computer that should be charged via a plug and socket, and when it runs out of power, it must be recharged regularly.

Laptop computer originally monochrome CRT-based, The components of a laptop are built-in monitor; keyboard, touchpad (which replaces the mouse), USB, graphics card and sound cards as well as high-capacity batteries that are made to keep the laptop power for a long period of time.

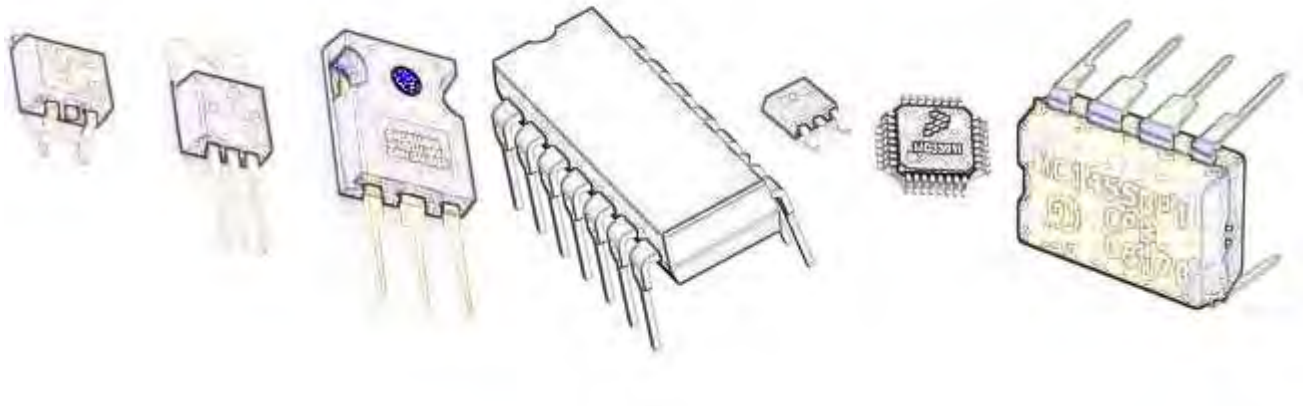
The laptops are more expensive because the technology to be more compact and they are more difficult to design and manufacture. If you have a limited space, it is worth considering a "portable" computer. They give you exactly the same comfort and performance of a desktop computer, but theytake up less space.

How is a Laptop Different from a Desktop?

There are some IMPORTANT differences between laptop and desktop is its mobility as well as its compact size. The laptops computer work with the same equipment using a desktop computer thanks to its numerous I/O ports. This basically turns your laptop computer into a desktop, with one main difference: You can easily disconnect the equipment and take the laptop with you wherever you go. However, some laptop computer, such as netbooks, sacrifices some functionality in order to be even more portable. There are many different styles and brands of laptop and they all come with different software and programs. Laptop computer can also be used to access the Internet using a USB wireless. They can also be connected to a microphone, webcam and digital camera. The screen sizes of these computers are 12 inches to 16 inches.

You get all multimedia qualities of your laptop without response time thanks to a RAM memory of 2GB on average and a graphics card that is just as powerful as a desktop. Thus you can easily enjoy yourfavorite DVDs, playing video games or edit your pictures. Your laptop can handle it all.

SemiConductor - What is SemiConductor?



Semiconductors are widely used in electronics to make components such as diodes, transistors, thyristors, integrated circuits as well as semiconductor lasers.

A semiconductor is usually a solid chemical element or compound that can conduct electricity under some conditions, making it a good medium for the control of electrical current. Its conductance varies depending on the current or voltage applied to a control electrode. Semiconductor is use for manufacturing chips.

A semiconductor device can perform the function of a vacuum tube having hundreds of times its volume. A single integrated circuit (IC), such as a microprocessor chip, can do the work of a set of vacuum tubes that would fill a large building and require its own electric generating plant.

Micro Channel Architecture (MCA Bus)

The terms Micro Channel, Micro Channel architecture, or just MCA, all refer to the same thing: a kind of *expansion bus* used in PCs. MCA was a distinct break from previous bus architectures such as Industry Standard Architecture. The pin connections in MCA are smaller than other bus interfaces. For this and other reasons, MCA does not support other bus architectures. Although MCA offers a number of improvements over other bus architectures, its proprietary, nonstandard aspects did not encourage other manufacturers to adopt it.

It has influenced other bus designs and it is still in use in PS/2s and in some minicomputer systems. The MCA bus was IBM's attempt to replace the ISA bus with something "bigger and better". When the 80386DX was introduced in the mid-80s with its 32-bit data bus, IBM decided to create a bus to match this width. MCA is 32 bits wide, and offers several significant improvements over ISA. The MCA bus has some pretty impressive features considering that it was introduced in 1987, a full seven years before the PCI bus made similar features common on the Pc. In some ways it was ahead of its time, because back then the ISA bus really wasn't a major performance limiting factor:

32 Bit Bus Width: The MCA bus features a full 32 bit bus width, the same width as the VESA and PCI local buses. It had far superior throughput to the ISA bus.

Bus Mastering: The MCA bus supported bus mastering adapters for greater efficiency, including proper bus arbitration.

Plug and Play: MCA automatically configured adapter cards, so there was no need to fiddle with jumpers. This was eight years before Windows 95 brought PnP into the mainstream!

MCA had a great deal of potential. Unfortunately, IBM made two decisions that would doom MCA to utter failure in the marketplace. First, they made MCA incompatible with ISA, this means ISA cards will not work at all in an MCA system, one of the few categories of PCs for which this is true. The PC market is very sensitive to backwards-compatibility issues, as evidenced by the number of older standards that persist to this day. Second, IBM decided to make the MCA bus proprietary. It in fact did this with ISA as well, however in 1981 IBM could afford to flex its muscles in this manner, while by this time the clone makers were starting to come into their own and weren't interested in bending to IBM's wishes.

These two factors, combined with the increased cost of MCA systems, led to the demise of the MCA bus. With the PS/2 now discontinued, MCA is dead on the PC platform, though it is still used by IBM on some of its RISC 6000 UNIX servers. It is one of the classical examples in the field of computing of how non-technical issues often dominate over technical ones. But one of MCA's disadvantages is that it has poor DMA controller circuitry.

Features of Micro Channel Architecture

• I/O data transfers of 8-, 16-, 24-, or 32-bits within a 64KB address space (16-bit address width).

• Memory data transfers of 8-, 16-, 24-, or 32-bits within a 16MB (24-bit address width) or 4GB (32-bit address width) address space.

• An arbitration procedure that enables up to 15 devices and the system master to bid for control of the channel.

• A basic transfer procedure that allows data transfers between masters and slaves.

• A direct memory access (DMA) procedure that supports multiple DMA channels. Additionally, this procedure allows a device to transfer data in bursts.

• An optional streaming data procedure that provides a faster data-transfer rate than the basic transfer procedure and allows 64-bit data transfers.

• Address- and data-parity enable and detect procedures.

• Interrupt sharing on all levels.

• A flexible system-configuration procedure that uses programmable registers.

• An adapter interface to the channel using:

• A 16-bit connector with a 24-bit address bus and a 16-bit data bus

• A 32-bit connector with a 32-bit address bus and a 32-bit data bus

• An optional matched-memory extension

• An optional video extension.

• Support for audio signal transfer (audio voltage-sum node).

• Support for both synchronous and asynchronous data transfer.

• An exception condition reporting procedure.

• Improved electromagnetic characteristics.

EISA - Extended Industry Standard Architecture

Extended Industry Standard Architecture (in practice almost always shortened to EISA and frequently pronounced "eee-suh") that extends the ISA standard to a 32-bit interface. It was developed in part as an open alternative to the proprietary "Micro Channel Architecture (MCA)" that IBM introduced in its PS/2 computers. It is a bus standard for IBM compatible computers. It was announced in late 1988 by PC clone vendors as a counter to IBM's use of its proprietary Micro channel Architecture (MCA) in its PS/2 series.

EISA, is the term used to describe the *expansion slots* and related circuitry (the *expansion bus)* found in some higher-priced PCs. If you see an ad for an EISA computer, it's talking about a PC with EISA slots.

EISA was developed by a group of PC manufacturers to compete with IBM'S *Micro Channel* expansion slots, the kind found in most IBM*PS/2* computers. Like the Micro Channel slots, EISA slots can transfer 32 bits at a time at high speed, compared with 8 or 16 bits at relatively slow speeds for the standard slots in a regular pc. But EISA slots have the advantage of accepting standard PC *add-in boards,* which are by far the most common type you can buy, and which won't fit in the Micro Channel slots.

*EISA*extends the AT bus, which the PC clone Vendors retroactively renamed to the !SA bus to avoid infringing IBM's trademark on its PC/AT computer, to 32 bits and allows more than one CPU to share the bus. The bus mastering support is also enhanced to provide access to 4 GB

of memory. Unlike MCA, EISA can accept older XT and ISA boards – the lines and slots for EISA are a superset of ISA.

EISA was much favored by manufacturers due to the proprietary nature of MCA, and even IBM produced some machines supporting it. It was somewhat expensive to implement, so it never became particularly popular in desktop PCs. However, it was reasonably successful in the server market, as it was better suited to bandwidth-intensive tasks. Most EISA cards produced were either SCSI or network cards. EISA was also available on some non-IBM compatible machines such as the AlphaServer, HP 9000-D, SGI Indigo2 and MIPS Magnum.

NetBook - What is netbook?

The concept of netbook is not so far from its portable design, but it is lighter and thinner, and limited storage than a laptop. Netbooks are like physical paper book; its design is just like a laptop. His namealso reflects its main purpose: *Net* synonymous English Internet and book for "book", in short, the book for the Internet. The term netbook promoted by Intel.

The netbook are primarily made for those who work mainly on office tools (Word, Excel or equivalent)while seeking maximum autonomy while traveling.

The first audience is of course the students, who can spend all day typing courses without needing torecharge the battery, while being able, in the evening, connect to the internet or watch movies.

All those who have a fairly limited use of their computer and will often move to acquire these newcomputers are much more than a fad.

The netbooks are serious competitors for mobile tablets and standard laptops, but each retains itsspecificity and its audience.

What is a Netbook?

A Netbook is characterized by:

CPU and Main Memory: Intel has developed a specific processor, the Atom. Its main objective, provide a processor with a very low power consumption and low cost. Few netbooks are not equipped with an Atom processor.

For the RAM, it is typically 1-2 GB, We recommend 2 GB, 1 GB, but enough to use his netbook in acceptable conditions.

The size of the screen: in fact, the largest netbooks offer a screen measuring between 7 "(17.8 cm) and 10" (25.4 cm) while laptops usually have a screen with a diagonal of 15 (38.1 cm). "These small screens are therefore limited to resolutions of 800 × 480 for the 7 "and 1024 × 600 for the 10".

Size and weight: If there is only one inch difference in the diagonal of the screen between a 9 inch netbook and 10 inches in practice increases the size of several centimeters. With a 10 inch screen, the surface of the netbook is closer to an A4 sheet of paper half an A4 ... Generally, 10-inch netbooks exceed 1 Kg "fateful" but limiting itself to a weight of 1 , 5kg up where other portable exceed 2kg. On the other hand, a larger netbook also offers a larger and therefore more comfortable to use keyboard. Do not overlook the size of the charger that there must also be kept as small as possible.

Storage: It is imperative to identify its needs in terms of storage capacity. Netbooks with non-volatile memory (SSD or Solid State Drive) is limited to 12 GB or 20 GB as those offered with a standard hard drive offer at least 80 GB of storage. This ability is more suited to multimedia use

and can store videos and music in abundance. However, the hard drive is more sensitive to shocks while being a little heavier. Some versions are now available with hard drives of 160GB.

Do not underestimate the capacity for netbooks do not sound with optical drives (CD or DVD drives).

Autonomy: Netbooks are in fact characterized by a range of over the phone. But depending on the model, this time varies from 2 hours to over 10 hours. Educate yourself before you make your purchase.

Equipment: In addition to the disk and display the characteristics of netbooks are usually very close: 3 USB ports, a VGA output, a network port, a memory card reader SDHC, WiFi and a webcam. Some models are equipped with original Bluetooth and / or WiFi 802.11n (faster than standard 802.11g). Finally, the cheapest model, the webcam is usually limited to 0.3 Mega pixels against 1.3 Mega pixels on netbooks "upscale." Given the intended use of a netbook, standard equipment is usually enough.

Please note that some models offered by telephone companies come with a 3G module (internal or external USB).

What can you do with a netbook?

Generally, netbooks can do a little of everything except 3D applications but they quickly show theirlimits whether in computing power, storage space or because of their small screen and smallresolution.

Components that fit netbooks are not powerhouses.

Even on the Internet, it may be expected to slow or jerky Flash animations including Youtube,Dailymotion, etc. This type of inconvenience does not occur with a conventional portable even less powerful.

Netbooks are capable of playing against trouble-free 720p HD video, DivX (and derivatives such asXvid), DVDs (external drive is required) and audio formats compressed or not. Listen to music orwatch a DivX seeking just the processor and it is possible to surf or work at the same time.

In terms of photo editing, use a word processor, a spreadsheet, a presentation program, it is often the limited resolution of the netbook which is disadvantageous. We must "scroll" a lot and in all directionsbecause the toolbars are highly invasive in 1024 × 600! Side games, sure, netbooks are not made for that

Ultrabook - What is an Ultrabook?

The term Ultrabook, what do they really mean? The ultrabook is a new Intel-defined format. Basically it is a new way of calling *notebooks* or *laptops*, to differentiate a little ocean of varieties available. Unlike netbooks that are smaller but also less powerful, ultrabooks offer virtually the same comfort as laptops.

This new category of notebooks with the name ultrabook, where requirements are to have a latest generation powerful processor (core i5, core i7), be ultra lightweight, ultra-thin (less than 20 mm).

The first offer the advantage of having access to all the tools such as Word, Excel, Photoshop, AdobeReader etc. This type of machine is dedicated to professionals as offering great performance. Note thatthe name "ultrabook" is the property of the Intel. Therefore, all machines that bear the name of "ultrabook" are automatically equipped with an Intel Core i5 or i7 processor, generally.

Ultrabook Technology

In terms of capacity, ultrabooks have nothing to envy to other laptops. Indeed, although it slightly larger in width and length than a netbook, but significantly lower in height, which leaves a few millimeters. They are equipped with facilities at the forefront of technology. Thus, you will be able to find a wide variety of processor-equipped ultrabook with an Ivy Bridge technology. Graphics cards up to 1 GB, all backed by the RAM between 4 and 16 GB The display quality is at the rendezvous with surprising resolutions for these small cars. Also, you will not be disappointed by the complete connection of ultrabooks.

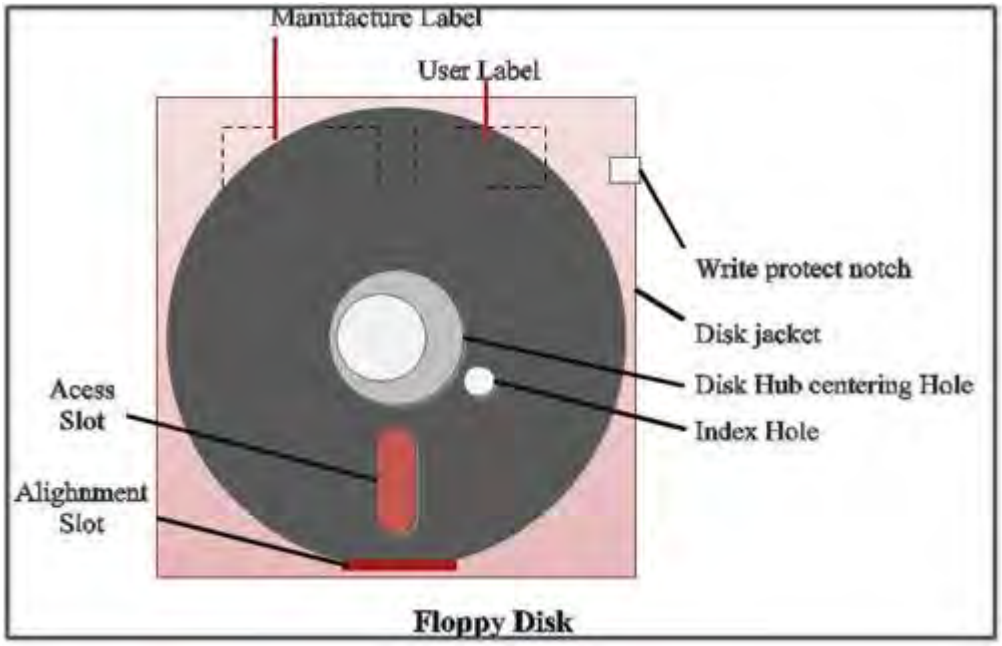
Connectivity

Indeed, they are equipped with Ethernet, HDMI, USB 2.0 and 3.0 ports, WiFi, but also a Thunderbolt port. Recall that the Thunderbolt technology offers data transfer rate that is 20 times faster than the USB 2.0. In terms of storage capacity, you will delighted, because many of the machines are equipped with SSD sometimes reaching the size of 256GB or accompanied by mounted SATA hard drives with capacities from 500 GB to 1 TB The use of SSD provides an opportunity for ultrabooks be particularly fast at startup.

Autonomy

Power and battery of an ultrabook is more than obvious that these machines are not useful if they were not independent. Thus, we will be entitled to models that can run up to 11h in a row even if we say that the average range of these machines is 6:30. There are also equipped with touch screens ultrabooks which gives rise to a mid-computer combination, half tablets. To provide better handling, this type of ultrabooks running Windows 8. You will be able to find from Asus, Toshiba, Samsung, Aspire and many others. However, you should know that the major parts of ultrabooks are not equipped with CD / DVD player. You have understood, everything is done to preserve the smoothness of these machines.

What is Floppy Disk?



The floppy disk drive *also known as floppy or FDD* is the primary removable storage medium for a personal computer. The *FDD,* once called a mini disk, is the primary medium for getting voluminous information into and out of a micro computer system. If you have two FDDs of different storage capacities, A: In *DOS and Windows* the identifier used for the first *floppy disk drive;* the second floppy disk is designated as drive B:.

A floppy disk, often called a diskette Drive in the PC world, is a thin, round, flat piece of Mylar. It has an extremely thin coating of ferric oxide or magnetic oxide layer that is capable of storing magnetic fields, like thick recording tape. The *read-write head* in a *floppy disk drive* stores data on the disk by altering the magnetic particles.

The large, 5.25-inch floppy disks that most PCs use are kept in a paper envelope. The smaller, 3.5-inch floppy that all Macintoshes and some PCs use is enclosed in a rigid plastic case with a sliding metal shutter for head access.

Floppy disks retrieve information far more slowly than HDD because they rotate at lower speed (300 rpm as against 10,000+ rpm).

Data is written on to the floppy disk by the disk drive's read/write heads as the disk rotates inside the jacket.

Because floppy disks store information magnetically, any magnet can destroy the data (information) on the disk. This means you should never allow your floppy disks near a magnetic paper clip holder, the telephone, the stereo, a portable radio, or any other electronic device-and don't pin them to a filing cabinet with a magnet!

IBM Computer used 5.25" inch floppy disks can contain 360 KB, while modern 3.5" inch disks hold 1.44 Mb. Floppy disks became the main medium for software distribution during the formative years of personal computing.

In Floppy Disks, information is organized in *tracks.* Each track is subdivided into *sectors* and each sector into bytes. The smaller 3.5" Floppy Disks use 80 tracks per side, 18 sectors per track, and 512 bytes per sector, yielding a capacity of 1.44 MB. Floppy disks first appeared in the late 1960s when IBM used them in an early minicomputer.

The advantage of the floppy disk is that it is removable, and so can be used to distribute *software,* to transfer data from one computer to another, or to *back up files* from a *hard disk.* But compared to a hard disk, floppy disks are also slower, offer relatively small amounts of storage, and can be easily damaged.

What is BUS?

Bus: The electrically conducting path along which data is transmitted inside any digital electronic device. A bus consists of a set of parallel conductors, which may be conventional wires, copper tracks on a PRINTED CIRCUIT BOARD, or microscopic aluminum trails on the surface of a silicon chip. Each wire carries just one bit, so the number of wires determines the largest data WORD the bus can transmit: a bus with eight wires can carry only 8-bit data words, and hence defines the device as an 8-bit device. A bus normally has a single word memory circuit called a LATCH attached to either end, which briefly stores the word being transmitted and ensures that each bit has settled to its intended state before its value is transmitted.

The bus helps the various parts of the PC communicate. If there was no bus, you would have an unwieldy number of wires connecting every part to every other part. It would be like having separate wiring for every light bulb and socket in your house. There are a variety of buses found inside the computer. The data bus allows data to travel back and forth between the microprocessor (CPU) and memory (RAM). The address bus carries information about the location of data in memory. The control bus carries the control signals that make sure everything is flowing smoothly from place to place. If your computer has *expansion slots,* there's an expansion bus. Messages and information pass between your computer and the *add-in boards* you plug in over the expansion bus. Although this is a bit confusing, these different buses are sometimes together called simply "the bus." A user can think of the computer's "bus" as one

unit made up of three parts: data, address, and control, even though the three electrical pathways do not run along each other (and therefore don't really form a single "unit") within the computer.

There are different sizes, or widths of data buses found in computers today. A data bus' width is measured by the number of bits that can travel on it at once. The speed at which its bus can transmit words, that is, its bus BANDWIDTH, crucially determines the speed of any digital device. One way to make a bus faster is to increase its width; for example a 16-bit bus can transmit two 8-bit words at once, 'side-by-side', and so carries 8-bit data twice as fast as an 8-bit bus can. A computer's CPU will typically contain several buses, often of differing widths, that connect its various subunits. It is common for modern CPUs to use on-chip buses that are wider than the bus they use to communicate with external devices such as memory, and the speed difference between on- and off-chip operations must then be bridged by keeping a reservoir of temporary data in a CACHE. For example many of the Pentium class of processors use 256 bits for their fastest on-chip buses, but only 64 bits for external links.

An 8-bit bus carries data along 8 parallel lines. A 16-bit bus, also called ISA (Industry Standard Architecture), carries data along 16 lines. A 32-bit bus, classified as EISA (Enhanced Industry Standard Architecture) or MCA (Micro Channel Architecture), can carry data along 32 lines.

The speed at which buses conduct signals is measured in megahertz (Mhz). Typical PCs today run at speeds between 20 and 65Mhz. Also see CPU, Expansion Card, Memory, Motherboard, RAM, ROM, and System Unit.

How Does It Work?

A bus transfers electrical signals from one place to another. An actual bus appears as an endless amount of etched copper circuits on the motherboard's surface. The bus is connected to the CPU through the Bus Interface Unit.

Data travels between the CPU and memory along the data bus. The location (address) of that data is carried along the address bus. A clock signal which keeps everything in synch travels along the control bus.

The clock acts like a traffic light for all the PC's components; the "green light" goes on with each clock tick. A PC's clock can "tick" anywhere from 20 to 65 million times per second, which makes it seem like a computer is really fast. But since each task (such as saving a file) is made up of several programmed instructions, and each of those instructions takes several clock cycles to carry out, a person sometimes has to sit and wait for the computer to catch up.

What is Arithmetic Logic Unit (ALU)?

Arithmetic Logic Unit (ALU): A subunit within a computer's CENTRAL PROCESSING UNIT that performs mathematical operations such as addition, and logical shifts on the values held in the processors REGISTERS or its ACCUMULATOR.

It is the size of the word that the ALU can handle which, more than any other measure, determines the word-size of a processor: that is, a 3Z-bit processor is one with a 32-bit ALU.

The simplest sort of ALU performs only addition, BOOLEAN LOGIC (including the NOT or complement operation) and shifts a word one bit to the right or left, all other arithmetic operations being synthesized from sequences of these primitive operations. For example, subtraction is performed as complement-add, multiplication by a power of two by shifting, division by repeated subtraction. However, there is an increasing tendency in modern processors to implement extra arithmetic functions in hardware, such as dedicated multiplier or divider units.

The ALU might once have been considered the very core of the computer in the sense that it alone actually performed calculations. However, in modern SUPERSCALAR processor architectures this is no longer true, as there are typically several different ALUs in each of several separate integer and floating-point units. An ALU may be required to perform not only those calculations required by a user program but also many internal calculations required by the processor itself, for example to derive addresses for instructions that employ different ADDRESSING MODES, say by adding an offset to a base address. Once again, however, in modern architectures there is a tendency to distribute this work into a separate load/store unit.

The three fundamental attributes of an ALU are its operands and results, functional organization, and algorithms.

Operands and Results

The operands and results of the ALU are machine words of two kinds: *arithmetic words,* which represent numerical values in digital form, and *logic words,* which represent arbitrary sets of digitally encoded symbols. Arithmetic words consist of digit vectors (strings of digits).

Functional Organization of an ALU

A typical ALU consists of three types of functional parts: storage registers, operations logic, and sequencing logic.

What is 32-Bit?

The word *"bit"* attached to a number can refer to several things, depending on the context. The term 32-bit is often applied to the following:

1. 32-bit refer how much information stored in the "registers" of the computer's *central processing unit,* which is an indication of speed and performance.

2. 32-bit refer the size of data *bus* through which the processor sends out the information. 32-bit bus can address 4,294,967,296 words (232), which would correspond to 4 gigabytes. The larger data bus enables faster transfer of data to and from storage. Most personal computers today use a 32-bit bus,

3. It can refer to how much information in *memory* a computer can use.

4. It can refer to the depth of the pixels on the monitor, which creates the color and the resolution of the images, 32-bit Color (so-called TRUE COLOUR).

5. It can refer to the program that uses the 32-bit internal registers and large memory capacity.

6. It can refer to the Operating System;WINDOWS 2000 are true 32-bit operating systems,

7. It can refer to FAT file system, FAT32 allows each disk to be divided into a larger number of clusters (allocation units);

8. It can refer to binary address.

9. It can refer to 32-bit chip.

A *bit* is a tiny electronic signal. In any context, the bigger the bit number, the more powerful, faster, or more colorful the feature.

What is control unit?

A *control unit* (or *controller,* same thing) is a piece of *hardware* that manages the activities of *peripherals* (separate devices attached to the computer, such as monitors, hard drives, printers, etc.) Control units found on personal computers are usually contained on a single printed circuit board. The control unit acts as a sort of "go-between," executing transfers of information between the computer's memory and the peripheral. Although the *CPU (central processing unit-the* "big boss" in the computer) gives instructions to the controller, it is the control unit itself that performs the actual physical transfer of data.

The control unit fetches one or more new instructions from memory (or an INSTRUCTION CACHE), DECODES them and dispatches them to the appropriate FUNCTION UNITS to be executed. The control unit is also responsible for setting the LATCHES in various data paths that ensure that the instructions are performed on the correct operand values stored in the REGISTERS.

In a CISC processor the control unit is a small processor in its own right that executes MICROCODE programs stored in a region of ROM that prescribe the correct sequence of latches and data transfers for each type of macroinstruction. A RISC processor does away with microcode and most of the complexity in the control unit, which is left with little more to do than decode the instructions and turn on the appropriate function units.

What is Boot? How does it Work?

To boot or boot up means to start your computer system, usually by turning on the power and/or pushing the "on" button. It's called "booting" because the computer is going inside itself and turning itself on (doing a lot of preliminary checking and adjusting before it's ready to run your programs). Hence the machine is considered to be "pulling itself up by its own bootstraps."

When the computer is first turned on or restarted, it reads the startup instructions found in the ROMBIOS chips. These instructions tell the computer to check the system over (a series of tests called the POST). Certain information (such as the amount of memory and the number and type of disk drives) about the PC is stored in a special chip called CMOS, and that information is also verified during boot. The last thing that happens during boot is the loading of the operating system, which is found on the hard disk drive or on a floppy disk in drive A. The computer cannot do anything without first loading an operating system into memory, because it's the operating system that manages all of the computer's basic functions.

Information in the operating system files continues the booting process. During a PC boot, the CONFIG.SYS file is located, and its instructions are executed. The CONFIG.SYS is a special file that fine-tunes the PC, customizing it so it can access optional peripherals (such as the mouse or the modem) and unused areas in memory. Next, the AUTO EXECBAT file is located, and its instructions are executed. The AUTOEXEC BAT file contains commands (such as those to start a particular program or change the prompt) that the user wants run at boot. Once the startup files have been found and executed, the computer is fully booted and ready to go.

How Does it Work

DOS is made up of three parts: IO.SYS, MSDOS.SYS, and COMMAND.COM. IO.SYS works with ROM BIOS to control the computer's input/output functions; MSDOS.SYS(sometimes called the kernel) manages files, runs programs, and performs basic system functions; COMMAND. COM performs all the DOS commands. In addition,

COMMAND.COM functions as the overall "manager" for the computer. During the boot process, the three parts of the operating system are loaded into memory one at a time. After IO.SYS is loaded, it checks to see if all the system components are responding properly. MSDOS.SYS is loaded next so it can perform the commands in the CONFIG.SYS (a special configuration file). COMMAND.COM is loaded last and is kept in memory so that DOS commands (such as COPY) can be executed when needed. COMMAND.COM then executes the commands in AUTOEXEC.BAT, which completes the boot process.

What is 32-bit computer?

The term 32-bit computer (or 8-bit or 16-bit) refers to the power of the *central processing unit (CPU),* which is the chip that runs the computer. A CPU that can process 8 *bits* of information at a time (the minimum configuration for a computer) is called an 8-bit

computer. If the CPU can process 16 bits at a time, it is a 16-bit computer, and the same for 32-bit.

But you know what? Even though the CPU can internally process 16 or 32 bits at a time, it doesn't mean the rest of the computer can use that big of a chunk of information. After the data gets processed, it has to get on a *bus* and be sent to the rest of the computer. Many computers with 16-bit processors (cpus) have an external data bus that is only 8 bits wide, so essentially it doesn't matter whether the CPU is 16 bits or not-only 8 bits can get used at a time anyway. (Yes, you can think of the bus as a little thing with wheels that carts information around to where it needs to go.) The same is true for computers advertised as 32-bit machines; on some computers the external data bus is only 16 bits wide. Nowadays most computers are made with data buses to match the processor.

What is analogue or analog Computer?

The word analog is derived from the Greek ana-logon, meaning "according to a ratio." A computer that represents numbers by some continuously variable physical quantity, whose variations mimic the properties of some system being modeled. Analogue computers have been built using mechanical motion (such as rotation), pneumatic or hydraulic pressure, or electrical voltage as the requisite quantity.

For example, an old fashioned carburetor may be considered a simple analogue computer that computes a petrol/air mixture strength function given the inputs of throttle pedal position and engine airflow.

The military has used analogue computers for artillery range finding, and they are used to simulate car suspensions and similar elastic systems where real-time performance is valuable. However, in common with other analogue circuits, they lack digital logic's robustness against errors introduced by stray fluctuations.

In an electronic *analog computer,* the output voltage of an operational amplifier varies in response to its input signals analogously to how a variable in the physical system being *modeled* responds to its conditions.

What is Hybrid Computers?

During the period from the early 1960s to the early 1970s, electronic analog computers were increasingly combined with a digital computer in *hybrid systems.* The idea was to combine the easy programmability of a general purpose digital computer with the ability of a large electronic analog computer to solve substantial, complex problems, notably large sets of nonlinear differential equations, or to simulate challenging spaceflights and "person-in-the-Loop" situations in real time.

A number of specialty hybrid systems emerged in the mid- to late 1960s and early 1970s. An unusual such system was the Trice digital analog computer developed by the Packard Bell Company and used by NASA for spaceflight simulation.

What is Microcomputer?

Your *personal computer* is a microcomputer. Technically, a microcomputer is a computer in which the *CPU* (central processing unit, the brains of the computer) is contained on one single *chip,* a *microprocessor.* Most *workstations* are also considered microcomputers, for the same reason, although some personal computers are as fast as the fastest workstation. And a computer used by more than one person (a *multi-user* computer) is still a microcomputer as long as it has a microprocessor for its CPU.

The next step up from a microcomputer On size, speed, capabilities, and price) is a *minicomputer.* Then a *mainframe.* Then a *supercomputer.*

How BIOS (Basic Input Output System) Works

BIOS stand for Basic Input Output System (pronounced "by ose," that's "ose" as in comatose). BIOS are a set of instructions that tell the computer how to handle the flow of information between the computer and its peripherals, such as the keyboard (input) or the printer (output). . The BIOS is *firmware,* meaning it is a program built into the *read-only memory (ROM)* in your computer, rather than stored on a disk (because The BIOS is stored in a ROM chip and automatically executed whenever the power is switched on, it's sometimes called the ROMBIOS). Since the ROM BIOS instructions are read-only memory, they cannot be changed.

Modern PCs employ FLASH MEMORY rather than ROM to store the BIOS routines so that they can be updated from a floppy disk whenever a new version is released, say to support some newly invented device. These chips are normally divided into blocks. Each block can be erased and programmed independently. Blocks can also be locked to prevent accidental reprogramming. This ability to program the BIOS after it has been installed forestalls the obsolescence of BIOS chips as new hardware features are installed. In this way the BIOS can be updated by modemor directly from a disketteto bring the code in line with new hardware capabilities.

When you turn on your computer, the BIOS is responsible for checking all the hardware, including memory; it will display an error message if it finds a problem. The BIOS then loads the operating system-whether it's DOS, os/2, Unix, or what have you-into memory from disk. Even after the operating system is running, the BIOS handles many essential chores, putting characters on the screen, getting characters from the keyboard, reading and writing sectors to the floppy or hard disk. You'll see this as your ROMBIOS chip on your computer that works with your software.

One function that BIOS performs happens only when the computer is turned on or restarted (booted). ROM BIOS checks out the computer by performing the power on self test (POST). The computer reads these instructions each time it is turned on and performs a self check of the computer and its components.

The BIOS keeps a store of crucial parameters, such as the number and nature of disks present and the type of PROCESSOR fitted, in a small, separate writeable memory area called the CMOS-one of these settings determines on which disk to look for an operating system. The user can inspect and alter these CMOS settings by holding down certain combination of keys (e.g. function key Fl for some makes of PC) to interrupt the computer's BOOT-UP sequence.

How Does It Work?

When the computer is booted, the CPU activates the ROM BIOS chips. ROM BIOS then begins a series of system checks, called the power on self test (POST). The POST tells the CPU to check the bus (a series of connections that link all of the PC's components), the memory (RAM), the peripherals (keyboard, mouse, etc.), and the disk drives. This system check is fast and not very thorough. The POST determines whether everything is connected properly, but it does not check to see if everything is functioning perfectly. After the POST check is complete, the computer is ready to load the computer's operating system. At this point, a user may notice that the light in drive A comes on again as the CPU checks to see whether a bootable disk has been placed in the drive. If it does not find the operating system software there, the CPU continues to the hard drive, where it copies the operating system into memory so it is ready to go.

What is Supercomputer?

Supercomputers are the biggest, fastest, and most expensive computers on earth. The cheapest supercomputer costs well over $1 million. They're used for scientific simulations and research such as weather forecasting, meteorology, nuclear energy research, physics and chemistry, as well as for extremely complex animated graphics.

Besides raw speed, one big difference between a supercomputer and a *mainframe* is that a mainframe serves many people at once or runs several programs concurrently, whereas a

supercomputer funnels its power into executing a few programs at high speeds. Mainframes are mostly used for large data storage and manipulation tasks, not for computationally-intensive tasks.

What is ENIAC (electronic numerical integrator and calculator)?

ENIAC is an acronym for electronic numerical integrator and calculator. The ENIAC, assembled in 1946, was the first operational digital computer. This monster occupied 1,800 square feet, used 18,000 vacuum tubes, and performed simple addition calculations at a rate of 5,000 per second (very, very slow by today's standards).

What is mainframe computer?

The term mainframe has shifted from its original reference to the main housing, or frame, that contained the *central processing unit* (CPU) of the computer. In those days, all computers were big-like the size of a garage-and the frame for the CPU might have been as big as a walk-in closet. Now mainframe refers to the kind of large computer that runs an entire corporation.

While "large" can still mean as big as a room, most of today's mainframes are much smaller, although they're still quite a bit bigger than a *personal computer* or even a *minicomputer.* A mainframe has an enormous storage space on disk and tape (like thousands of *kilobytes,* measured in *gigabytes),* and an enormous amount of *main memory.* Theoretically, it works a lot faster than the fastest personal computer. A mainframe also costs big bucks, from half a million or so on up.

Mainframes are tended by special technicians who feed them the programs they run and who scramble around trying to fix them whenever they stop working, which is often. All mainframes are *multi-tasking, multi-user* machines, meaning they are designed so many different people can work on many different problems, all at the same time.

Mainframes serve most often as information stores and processors. An army of smaller computers is connected to the mainframe. These smaller computers are not in the same room; they may be connected through phone lines across the world. Ordinary people in the company never touch the mainframe itself. Instead, they interact with the computer using a *terminal,* which is more or less a keyboard and a monitor connected to the mainframe with wires, or by modem over the phone lines. People use the smaller computers and get information from and send information to the mainframe.

The difference between a minicomputer and a mainframe is arbitrary, and different people may use either term for the same machine. Even if you don't work for a large company, you might have contact with a mainframe: when you connect to an *online information service* or a commercial *e-mail* service from your personal computer, you are often connecting to a mainframe.

In the '60s the mainframe vendors were called "IBM and the seven dwarfs": Burroughs, Univac, NCR, Control Data, Honeywell, GE, and RCA. They turned into IBM and the BUNCH after Honeywell ate GE's computer division and Univac ate RCA's.

What is Batch File?

A batch file is a file containing a series of commands that the operating system will carry out for you, one at a time. A batch file is a collection of DOS commands. MS-DOS batch files consist of the normal operating system commands (e.g. DIR, DEL, COPY and MKDIR) together with some extra commands such as IF, FOR, GOTO, SHIFT and PAUSE that provide conditional control of execution and enable PARAMETERS to be passed so that the same batch file can be used in many different contexts. Under UNIX, batch files are called SHELL SCRIPTS, and are written in a c-like scripting language.

A batch file, such as WP.BAT, ends with the letters .BAT. When the user types in the name of a batch file and presses Enter at the DOS prompt, the commands in that batch file are performed

one at a time-with no additional instructions from the user. For example, if the user typed WP and pressed Enter, WordPerfect (a popular word processing program) would start.

Batch files are great when you use a given set of commands repeatedly-instead of activating each command separately every time you want to carry out that set of commands, you can accomplish the same thing in one step.

A user can create a batch file to perform any routine task. For example, a batch file could be created to prepare a disk for use (a process called formatting). Because the commands are in a batch file, the user doesn't have to type them herself, or even remember what they are-all the user would have to do is type the name of this batch file to format a disk.

The most important batch file is the AUTOEXEC BAT. This file contains commands that are performed automatically each time the PC is turned on or restarted. Typical AUTOEXEC BAT commands include those which change the system prompt, display the current date and time, and set the directories in which DOS looks for files.

Batch files were very important before Windows came along, when everyone had to deal with DOS (the PC's operating system). DOS required the user to type everything in-which made each task tedious and easy to make mistakes. Batch files eliminated mistakes because the user no longer typed in the command, just the name of the batch file. With Windows, there is little typing involved in issuing commands. Instead, the user selects commands from a list called a menu, or he selects an icon that represents the command he wants performed. Automation is still desirable in Windows, but instead of saving a list of typed commands, the user records his actions and saves them in a macro. A macro is like a batch file; when it's activated, the actions recorded in the macro are carried out.

What is Bus Contention?

Bus Contention: A loss of performance that can arise when two or more devices – for example computer PROCESSORS or disk controllers - try to transfer data simultaneously over the same BUS. For example hesitation may be introduced into a video or audio playback whenever the disk is being accessed. Contention is ameliorated by some kind of ARBITRATION scheme that regulates bus usage in a fair and orderly way, ensuring that all the contending devices are granted access for a reasonable duration and within a reasonable time ..It can be avoided altogether by changing the hardware architecture so as to provide separate buses for each device.

What is Minicomputer?

A minicomputer isn't very mini. At least, not in the way most of us think of mini. You know how big your personal computer is and its related family. A *workstation* is the next step up in size, performance, and price, and is similar to a personal computer in that it is used by one individual.

Then comes the *minicomputer.* A minicomputer costs from $20,000 to $200,000 or so. It is built to perform different tasks for different people at the same time. Each person using a minicomputer has their own *terminal* attached by wires or via a modem to the computer proper. (A terminal isn't a computer-it's basically just a keyboard and a monitor; see the full definition.) The minicomputer spends a little bit of time on one person's task, then moves on to the next, and so on, juggling the work based on which jobs it thinks are most important. If you're the only one using a minicomputer, this can be one fast machine.

But once many users (people) are "on" the system, the thing begins to slow down-you may type something and then wait for a minute or more before you see a response on the screen. Minicomputers used to be the only option for companies. Now, many firms are turning to networks of personal computers to accomplish the same thing faster and cheaper.

What is AUTOEXEC.BAT File?

The name of this *batch file* comes from a combination of the words automatically executed batch file. Like other batch files, AUTOEXEC.BAT contains a series of *DOS* commands that your *(IBM-compatible) PC* runs for you, one after the other, so that you don't have to type the commands individually. It gives the computer various basic instructions about starting Windows, running antivirus checks in the background, identifying the keyboard, and so on.

The file was typically used to issue configuration and initialization commands to the operating system and PERIPHERAL devices such as CD-ROM drives and sound cards, a typical entry being. What's special about AUTOEXEC.BAT is just that DOS automatically runs this particular batch file each time you turn on or restart the computer. Most people wind up calling AUTOEXEC.BAT the "AUTOEXEC" file for short.

AUTOEXEC.BAT must be stored in the ROOT DIRECTORY of the computer's BOOT DRIVE in order to be found and executed, and the commands it contains follow the same syntax as any other MS-DOS BATCH File, that is, a list of operating system commands exactly as they would be typed manually at the COMMAND PROMPT, plus certain control structures such as GOTO that cannot be deployed manually.

You can customize the AUTOEXEC file yourself, filling it with exactly the commands you want to get your system up and running to your specifications and to suit the needs of your software and *peripherals.* AUTOEXEC.BAT is typically used to set the look of the DOS prompt, tell DOS which *directories* it should search when looking for programs to run, configure the *serial ports,* load the mouse *driver,* and start *memory resident* programs and utilities. If you like, you can use the AUTOEXEC file to start a particular application program (such as your word processor) or to start Windows.

Here's an excerpt from a typical AUTOEXEC.BAT file:

PROMPT pg

PATH=C: \ WINDOWS;C: \DOS;C: \ UTILS

SET TEMP=D: \ TEMP

These lines set the DOS prompt to show the current directory; set the DOS *path;* and tell the system to look for temporary files in the D: \ TEMP directory.

BOOT

The process of starting or restarting a computer. Boot is a process that the computer goes through to get ready to receive input. During this boot process, certain configuration files, such as the AUTOEXEC.BAT, are used. For example, at startup, the commands in AUTOEXEC.BAT are executed one at a time automatically, without the user typing them in.

BATCH FILE

A type of executable file that contains a "batch" or listing of DOS commands to be executed in order, as if the user had typed each one in separately. One example of a batch file is the AUTOEXEC.BAT, whose instructions are executed whenever the system is booted.

DOS PROMPT

A symbol that indicates DOS is ready for the next command. The DOS prompt generally looks like C:\>, but it can be changed by commands in AUTO.EXEC.BAT.

What is coprocessor?

A coprocessor is a *chip* that works side-by-side with the computer's main *processor* (the chip called the *central processing unit,* or *CPU).* The coprocessor handles some of the more

specialized tasks, such as doing math calculations or displaying graphics on the screen, thereby taking some of the work load off the main processor so it can go on with the business of directing and keeping order over the whole show. A coprocessor is installed to reduce the burden on a computer's CPU and thus free it for more general duties such as transferring data and handling multiple tasks.

Math coprocessors, for example, are specialized for performing calculations on numbers, and they are much faster at it than the main processor in your computer. So if you have a program that does many math calculations, such as a *spreadsheet* or a *CAD* program, then adding a math coprocessor to your system can sometimes remarkably improve your computing speed.

There are video coprocessors that are used to speed up the display of graphics on your screen. Again, if you use any graphics-based application, including Windows, then adding a video coprocessor to your system on an *add-in board* can speed up your system even more than buying a faster computer.

One catch, however, with any kind of coprocessor, is that the software you use must be written so that it knows the coprocessor is there, otherwise your system will not recognize its existence and won't be able to use it.

A coprocessor may be designed to work just with a particular type of CPU, in which case its instructions can be included in the main program and are passed on to the coprocessor by the CPU as it encounters them. In other cases, the coprocessor may require its own separate program and program memory, and communicates with the CPU by interrupts or message passing via a shared memory region.

What is 32-bit addressing?

If a computer uses 32-bit addressing, that means the address can have 32 numbers. With the possibility of each number being either a one or a zero, there are 4 billion different addresses available (232). Four billion bytes (each memory location holds one byte) is 4,096 *megabytes,* which is 4 *gigabytes.* So with 32-bit addressing you can theoretically address 4 gigabytes of memory.

Alas, at this point in technology there are still some limitations in the hardware, so you can't really install and use (address) all 4 gigabytes. A PC with an 80386 or 80486 microprocessor can address 4 gigabytes of memory all right, but they don't make PCs that can hold that many memory chips. The most a modular Mac (any of the Mac II family) can address is "only" 128 megabytes, and some of the Quadra's can go up to 256 megabytes.

What is File Format?

A file format refers to the particular structure that a *document* (also called a "data file") is stored in, whether it contains graphics, text, a spreadsheet, etc. For instance, in a word processing document, the file format would include the codes that represent each character; the codes for creating the text styles, such as italic or bold; and information such as the type of application the document was created in.

Each program has its own way of storing this information-its own file format. The MacWrite format is different from the Word format which is different from the WordPerfect format. To use a document created by another application, the program has to convert the foreign format into its own "native" format.

In addition to native file formats for every word processor, there are generic text file formats, such as ASCII (text-only) or RTF (rich text format). There are many different file formats for graphics, as well, such as TIFF, PICT, PCX, MacPaint, WMF, DRW, EPS. Different programs can use different formats, and many programs can open and use more than one.

What is access time?

Access time refers to how fast the disk or memory can locate and begin retrieving (accessing) a specific piece of information or transfer data to the CPU. A low access time indicates

a fast hard drive. Access time is measured in *milliseconds,* or *ms.* when making comparisons, look for 'memory access time' (measured in nanoseconds), Memory access time refers to the time it takes to transfer a character from memory to or from the processor, and/or 'disk access time' (measured in milliseconds) refers to the time it takes to place the *read / write* heads over the requested data. Sometimes the speed of a disk drive is measured by the rate at which it transfers data - in this case, a higher' data transfer rate' indicates a faster drive. For a disk drive the access time includes both the head SEEK TIME and the LATENCY.

For a disk, total access time is the sum of seek and rotational times to reach a particular record. *RAM*may have an access time of 80 nanoseconds or less, while *hard disk* access time could be 18 milliseconds or less.

For a floppy drive, the average access time is 25 ms; the access times for CD-ROMs approximately twice as long as for floppy disks.

For a drum or fixed-head disk, average access time is a half-revolution and maximum access time is a full revolution, since both have heads that are fixed over the data areas. Average access times for drums are 5 to 10 ms.

What is Bus Cycle?

Bus Cycle: The sequence of primitive operations for transferring each item of data over a computer's BUS, which are performed in time with the system CLOCK SIGNAL. Each bus cycle may take several clock cycles, and may be either a READ or WRITE cycle depending on the direction of data transfer. The steps for a read cycle might be:

1.Request control of the bus.

2. When granted, place target address on bus.

3.Receivedata from bus.

4. Release bus.

Different bus PROTOCOLS employ variants and enhancements to this simple schema, for example possibly transferring more than one data item per cycle.

What is addressing mode?

A particular method of specifying the OPERAND for a MACHINE CODE instruction for some computer processors.

The simplest possible addressing modes are: REGISTER ADDRESSING, in which the operand is actually present in the specified register; IMMEDIATE ADDRESSING, where the operand value is supplied as part of the instruction, and ABSOLUTE ADDRESSING, also called direct addressing, where the memory address of the operand is given as part of the instruction.

Other commonly supported modes are: REGISTER INDIRECT, where the operand is to be found at the address contained in a specified register; and INDEXED ADDRESSING, where the operand address is calculated by adding an offset to a BASE ADDRESS contained in a register. There are dozens, if not hundreds, of possible addressing modes, and different processors vary widely in the number and kind that they support.

What is address bus?

The BUS upon which a computer's CENTRAL PROCESSING UNIT issues addresses to the memory system in order to read or write a word of data. In some system architectures, the data word itself may be transported via a separate DATA BUS.

What is CISC architecture or CISC chips?

CISC (pronounced "sisk") stands for complex instruction set computing. A CISC chip is a *microprocessor* that has a large set of instructions that are built into its microcode so it can

carry out most computations directly. Compare CISC chips with *RISC chips,* which recognize fewer instructions. CISC term applied to all the older computer ARCHITECTURES to distinguish them from the new RISC designs introduced in the 1990s. RISC (reduced instruction set computing) technology is touted as faster than CISC and is increasingly common, although there is a great deal of debate over the pros and cons of each type of architecture.

A CISC INSTRUCTION SET contains instructions that perform several steps in one, and therefore take many CYCLES to execute - such as the Intel 8086's ADC instruction, which takes more than 20 cycles to add the contents of a REGISTER to a memory location. The concept grew through the early days of computing from a desire to make life easier for MACHINE CODE programmers, but now that most programming is done in HIGH-LEVEL languages it is less necessary and hinders hardware efficiency. RISC designs employ a larger number of simple, one cycle operations that are automatically generated by a COMPILER.

What is 16-bit Slot?

Slot One type of socket fitted to a computer's MOTHERBOARD into which expansion cards can be plugged.

pcs have several different types of *slots*. The slots can also act as input/output ports for attaching external devices (such as digital cameras) via a cable. The slots in the original IBM PC could transfer only 8 *bits* of information at a time between the *motherboard* and the card in the slot; these are 8-bitslots. The *PC/AT was* the first PC to have 16-bit slots, and set the standard still followed by most pcs today (see *ISA* and *bus).* The 16-bit slots actually have two separate slots arranged in a line; the slot toward the back of the computer is exactly the same as an 8-bit slot.

In other words, you can plug an 8-bit add-in board into a 16-bit slot (but not the other way around, of course). *EISA* slots are 32-bit slots which accept standard 8-bit and 16-bit boards, as well as special 32-bit boards. Then there are the 32-bit *Micro Channel* slots, which take only Micro Channel boards. See also *full-length slot.*

What is address generation?

An operation that calculates the address of the next instruction or piece of data required, performed within the CENTRAL PROCESSING UNIT of a computer.

What is Bus Speed?

Bus Speed: The rate at which a computer's PROCESSOR BUS can transmit data, which is a crucial determinant of its overall performance. The bus speed of most personal computers remained at 33 MHz for a decade, only recently being increased to 100 MHz, and technologies such as the two-level processor CACHE, DIRECT MEMORY ACCESS or the Accelerated GRAPHICS PORT can be seen as ways to surmount this restriction by bypassing the processor bus.

What is expansion bus or Microcomputer Buses?

On a microcomputer, the bus is usually called an*expansion bus*because its design determines the degree to which the minimum configuration of the system can be expanded with regard to memory, processing speed, graphics capability, and peripheral support. The expansion bus is the collection of wires, paths, connectors, and controllers responsible for distributing the data and instructions from the microprocessor to the peripheral expansion cards.*Slots*connected to the bus provide places to plug those cards in, and the bus then provides a mechanism for communicating with them.

In modern designs the expansion bus is not normally the same bus that the CPU uses to access MAIN MEMORY, as the contention this would cause could slow the whole system down. Expansion cards may also be allowed to use DIRECT MEMORY ACCESS to avoid involving the CPU in most of their memory operations.

Examples of expansion buses include the ISA BUS and PCI BUS in the PC world, the VMEBUS for UNIX systems and the NUBUS for the Apple MACINTOSH

What is PDA (personal digital assistant)?

PDA stands for personal digital assistant, a term for a new breed of handheld computers. PDAs are supposed to combine the power and flexibility of a real computer with the convenience of those little electronic organizers- the kind made by Sharp and Casio-that let you keep track of your names and addresses and to-do items.

A PDA can run much more complex software than an electronic organizer, and you're not stuck with the built in software-you can buy separate programs to customize the PDA to your specific tasks. With many PDAs you can use a *stylus* to write on the little screen. The PDA most people are talking about is the Newton, made by Apple, but many other companies are planning their own versions.

What is bad sector?

A disk has two sides (a top and a bottom). Each side of the disk has tracks or concentric rings on the surface. Each ring is divided like a pie into equal wedges, or sectors, which are the smallest units of storage space on the disk. If one of these units is damaged or flawed, it is considered a bad sector and cannot be used.

If there was already data in that sector when it got damaged, chances are slim that you can recover that data unless you have the specialized hardware and software necessary for that sort of operation. Almost all hard disks are born with bad sectors, so don't freak out if your software utility reports them. Other bad sectors should not start appearing, though, after you start using the disk.

What is Analytical Engine?

The Analytical Engine, designed by Charles Babbage between 1833 and 1846, anticipated many features of electronic computing devices invented in the 1940s and 1950s. Although mechanical in all its operations, the Analytical Engine could carry out calculations of arbitrary complexity under the control of punched cards. Conditional branching was possible, and Babbage had prepared test programs that included elaborate calculations based on nested loop structures. In a beautiful anticipation of twentieth-century thinking, Babbage showed that, given sufficient time, any finite calculation could be carried out by the Analytical Engine.

What is (floppy disk, high density) FDHD?

FDHD stands for floppy disk, high density and refers to the floppy disk drive in current Macintosh models. This drive can read and write single sided disks (400K), double-sided disks (800K), and *high-density disks 0.2* megabytes). It can also understand 3.5" Dos-formatted disks from IBM PCs and Apple II machines. An FDHD is also known as a *SuperDrive.*

What is bus width?

If you think of the computer's bus as being a freeway that carries data, then it is easy to visualize the bus width as the number of lanes on this freeway. Naturally, the more lanes available, the more data that can be carried at any given moment. Bus widths are generally designated in multiples of eight; a *32-bit* bus width has the capability to carry four times the information of an *8-bit* bus in the same amount of time

What is Parallel Computer?

A computer with multiple processors that can all be run simultaneously on parts of the same problem to reduce the solution time. The term is nowadays mostly reserved for those MASSIVELY PARALLEL computers with hundreds or thousands of processors that are used in science and engineering to tackle enormous computational problems.

There are two fundamental divisions in parallel computer architecture. The first is between those architectures in which each processor has it own memory space and communicates with others by MESSAGE PASSING, and those architectures in which all the processors communicate through a shared memory (SHARED-MEMORY MULTIPROCESSORS). The increasing number of high-end PCs and servers that contain more than one processor fall into this latter category.

The other fundamental division is between those computer architectures in which each processor executes the same program on a different data item (SINGLE-INSTRUCTION MULTIPLE-DATA or SIMD)and those in which each processor executes a different program (MIMD or multiple-instruction multiple-data). Within these subdivisions, the processors can be connected together in many different ways (their TOPOLOGY) which profoundly affect the efficiency of communication between them.

What is Bus Locking?

Bus Locking: A type of BUS architecture in which some particularly bandwidth-hungry device, for example a GRAPHICS PROCESSOR, is permitted to keep control of a computer's bus for many successive cycles to the exclusion of other devices. It was employed in some early Apple MACINTOSH systems to improve graphics throughput, but would be frowned on in today's highly multitasking, multiprocessor environments

What is Bus Snooping?

Bus Snooping: A mechanism for maintaining CACHE COHERENCY in MULTIPROCESSOR computers, under which each cpu's cache-control logic watches the external memory bus, looking for reads or writes made by other processors (that is, it 'snoops' on their transactions). Whenever such a transaction is detected, the cache logic enquires whether a copy of the target address exists in its own cache, and if so either writes that line back to memory or declares it invalid.

What is Dumb Terminal?

A *terminal* consists of a screen and keyboard which allow you to interact with a multi-user computer; the computer itself is often located in another room or even a different building. A dumb terminal, which is the most common type of terminal, has no computing capabilities of its own. You enter commands on the terminal's keyboard to tell the computer what to do, and the computer sends messages back to you on the terminal's screen. The computer does all the work (of running programs, for example), with no help from the dumb terminal.

What is Bus Master?

Bus Master: Any device within a computer that is capable of taking control of the BUS and initiating data transfers with the memory and PERIPHERALS (which are slave devices and can only respond passively to access attempts). In simple systems the CPU is the only bus master, but in others such as the PC I BUS, there may be multiple masters: for example it is common for a SCSI disk controller to be granted bus master status so that it can transfer data to and from memory without CPU involvement.

What is FPU (math coprocessor)?

FPU stands for floating point unit, a small *chip* built into some computers. Sometimes referred to as a *math coprocessor* or a *math chip,* an FPU can calculate complex mathematical problems and various graphic tasks much faster than the "general purpose" *CPU (central processing*

unit) found in all computers. It's called a *floating point* unit because its speed really shows when calculating equations involving numbers having decimal portions, such as 67.9345x 0.00345.

What is Density?

Density reflects the closeness of data on a disk: the closer the data is, the denser a disk is said to be. Of course, when data is placed closer together (more densely), a disk can store more data. Floppy disks, which are magnetic data storage devices, come in two commonly used sizes: 3.5-inch and 5.25-inch. Both sizes are available in two densities: double- density and high-density.

Inside a floppy disk is a thin piece of film with a magnetic coating. The magnetic coating is where data is stored. Density refers to the amount of magnetic particles in the coating.

Regardless of the size of the particle, it can only store one piece of data. A high-density disk has smaller magnetic particles, which allows more particles to fit on a disk, and makes it possible for the disk to store more data. A double-density disk has larger particles that are not so tightly packed; therefore, it holds less data. (A hard disk, by the way, uses a different type of magnetic material that is much denser than the magnetic material used on any floppy disk. This allows a hard disk to hold a lot more data.)

A 3.5-inch double-density disk can hold 720 kilobytes of data. A 3.5-inch high-density disk can hold 1.44 megabytes of data. A 3.5-inch disk can only be used in a 3.5-inch floppy disk drive. A 5.25-inch double-density disk can hold 360 kilobytes of data, and a 5.25-inch high-density disk can hold 1.2 megabytes. A 5.25-inch disk can only be used in a 5.25-inch floppy drive. It is also important to know what type of density the floppy drive is made to handle. Most new disk drives are high-capacity drives, and can handle both high-density and double-density disks. However, older drives were low-capacity and can only handle double-density disks.

What is Dual Floppy Drive?

A computer with a dual floppy drive has two slots in which to insert a floppy disk. Although several years ago this meant you simply had two of the same kind of floppy drives so you could work from two different disks, it now usually means that one of the drives will take a 3.5-inch high-density floppy disk, and the other will take a 5.25-inch floppy disk.

What is backside bus?

A second PROCESSOR BUS built into high-performance microprocessors, such as the PENTIUM II and later, used to connect the processor to its LEVEL 2 CACHE memory so that the latter does not have to share the bandwidth of the ordinary I/O bus with main memory accesses.

What is Docking Station?

A docking station is a unit that attaches to a laptop or notebook computer, either directly or by cable, providing the laptop with more hardware. This arrangement increases the laptop's capabilities almost to that of a standardized desktop computer. A docking station typically includes standard *expansion slots,* as well as additional *ports* (sockets) for connecting a printer, modem, keyboard, etc.

So if you have a laptop computer and a docking station, you can take your laptop with you wherever you go, accepting its limitations as a laptop. Then when you come home or go back to the office, you can connect your laptop to the docking station (with some units this is like inserting a giant video tape into a VCR). Then your laptop virtually turns into a regular desktop computer, complete with large monitor, large hard disk, more *RAM,* etc

Computer Components

A computer is a collection of digital electronic circuits which carry out logical and computational operations. Digital circuits consider only extreme values of the voltages applied in the circuit.Typical values of the applied voltages are 0 volts and 5 volts; many systems also work on 0 and 3 volts. In a digital system, the high value of voltage may be coded as 1, while the low value may be coded as 0. This notation makes the use of binary number system possible in programming. Figure shows the major components of a computer and various connections between them.

The digital circuits used for computer applications are very large and are generally connected together. These are manufactured on small chips made of semi conducting materials. The circuits embedded on different chips carry out different functions. The main chip in a computer is the microprocessor chip, which is also known as the CPU (central processing unit). Figure shows the inside structure of a typical computer microprocessor. This chip is considered to be the controlling chip of a computer system since it controls the activities of other chips as well as outside devices connected to the computer, such as monitor and printer. In addition, it can also perform logical and computational tasks. Microprocessors work on a *parallel system,* which implies that if it is a 32-bit system (which is the most commonly used system these days), there would be 32 parallel circuits on the chip for processing data. Also, if input and output terminals are different, then the chip will contain 32 terminals for input and 32 terminals for output. Similarly, in a 64-bit system, the number would increase to 64; inside the chip there would be 64 parallel circuits, one for each bit. There would be more terminals for control, for interruptions, and for connections to various other devices. Thus, you would find a large number of terminals on a CPU. Figure shows a typical structure of one of the first-generation microprocessors. The recent ones possess greater complexity, although the basic design concept has not changed much.

The various activities that a microprocessor performs, such as storing data, doing arithmetic calculations (addition, subtraction, multiplication, division, etc), are the result of instructions given to the CPU in the form of sequences of Os and 1s, which are ultimately converted to indicate the application of appropriate set of voltages on the appropriate circuit terminals. Since these voltages are either 0 volts or say 5 volts, we can devise a code to denote the high voltage as 1 and low voltage as 0. In this manner we can express an instruction to a CPU as a set or sequence of Os and 1s. Microprocessors are designed to carry out a large number of instructions and all the instructions may be represented by different sequences of Os and 1s. Each instruction is represented by a unique set of Os and 1s. The output of the microprocessor is also represented in the form of set of voltages on output terminals. Some terminals will be at 5 volts, while some will be at 0 volts. Therefore, the output generated from a microprocessor may also be coded as a set of Os and 1 s, representing a binary number. Thus, we see that all inputs to a microprocessor are in the form of binary numbers and outputs are also in the form of binary numbers; we can therefore safely conclude that all computers work on binary numbers. Some sequences of these numbers are interpreted (coded) as letters such as A, B, etc., while others are interpreted as digits or operators such as +, -, *, etc. Still others are instructions that may be used for control and manipulation of data. In order to ensure that every computer behaves in a uniform manner, the character representations are standardized as per ASCII (pronounced as as-key) code. This is a universal code. The details of this code are given in Appendix A. In different computer languages, these codes are used along with some specific codes of the language itself to enable writing of computer programs. A computer program forms a part of the software without which the computer cannot perform any function.

The internal structure of a typical CPU consists of circuits which form a number of registers (the typical number is 16), an arithmetic unit for carrying out arithmetic operations, a logic unit, and a control unit. It contains a large number of terminals for connection to external devices (for instance, a typical CPU has as many as 478 terminals; another dual core processor has about 775 terminals). Out of these, a group of terminals is used for data input, another group of terminals for data output, another group for memory addresses, and still another group for control purposes. Besides, some terminals are reserved for interrupt service. An interrupt service may be explained as follows:

Suppose you are busy with some work and someone rings the door bell. You stop your work and attend to the person at the door. After that, you return and resume your work. In the same way, consider that some program is being executed on the computer, when a signal on the interrupt line is detected. In such a scenario, the computer first saves the ongoing program status, attends to the item on the interrupt, and after finishing work on it, the computer resumes the ongoing program.

Every CPU supports a set of instructions designed by its manufacturer. The manufacturer supplies the codes of instructions in the form of sequences of Os and Is or in the form of assembly codes discussed in the following section. The circuit designs of different manufacturers are different and hence the codes for carrying out different processes on the data are also different. The sets of instructional codes for a CPU are called machine language codes or simply machine language.

The CPU is mounted on a printed circuit board called the main board or mother board. The main board connects the CPU to other chips and ports, such as parallel port, serial port, USB port, etc. External devices such as mouse, keyboard, printer, pen drive, etc., are connected to the CPU through these ports. The mother (or main) board, in general, also contains circuits called *modems* to enable connection to display devices such as monitors, internet, sound systems, etc.

What is Cloud Computing?

Cloud Computing is a model that allows access to a shared pool of configurable computing resource (eg. networks, servers, storage, applications, and services) network on demand. Cloud computingliterally, is the use of remote servers (usually accessible via the Internet) to process or store information. Access is usually using a Web browser. Save files on a server via the Internet is one example. The software itself can be mounted also on the remote computer.

Cloud computing is the best solution to manage your applications yourself; it is a shared *multi-tenant*platform that is supported. When using an application running in the cloud, you simply connect to it, customize it and use it. It's that simple, cloud computing!

Today, Millions of us are happy to use a variety of applications in the cloud, such as applications ofCRM, HR, accounting, and even business applications. These applications based in the cloud can beoperational in a few days is not possible with traditional enterprise software. They are cheap because you do not have to invest in hardware and software, or to spend money for the configuration andmaintenance of complex layers of technology or to finance facilities to run them. And they are morescalable, more secure and reliable than most applications. In addition, upgrades are supported, so that your applications automatically benefit from all the improvements of safety and performance available, as well as new features.

Advantages and Disadvantages

The advantage of cloud computing is twofold. It is a file backup shape. It also allows working on the same document for several jobs (one person or a nomad traveling) of various types (or PC, tab orsmartphone).

Cloud computing simplifies usage by allowing overcoming the constraints of traditional computer tools (installation and updating of software, storage, data portability ...). Cloud computing also provides more elasticity and agility because it allows faster access to IT resources (server, storage or bandwidth) via a simple web portal and thus without investing in additional hardware.

NIST counts three service models:

Cloud Software as a Service (SaaS): the user has the possibility to use the service provider'sapplications over the network. These applications are accessed via different interfaces, thin client, Web browser, mobile devices ... The customer manages and does not control the underlying cloudinfrastructure including network, servers, operating systems, databases , storage, but can possibly benefit from access to restricted configurations, specific to user categories.

Cloud Platform as a Service (PaaS): the consumer can deploy cloud infrastructure on its own applications. The user manages and does not control the underlying cloud infrastructure (network,servers, operating systems, databases, storage), but has control over the deployed applications and the ability to configure the environment of application hosting.

Cloud Infrastructure as a Service (IaaS): the client can rent storage, processing power, network and other computing resources. The user manages and does not control the underlying cloud infrastructure but has control over databases , operating systems, and applications deployed.

According to corporate approaches, there are several deployment models for cloud services:

Public cloud: This type of infrastructure is accessible to a wide audience and belongs to a provider of"cloud services."

Private cloud: The cloud infrastructure works for one organization. It can be managed by thecompany itself (internal Private Cloud). In the latter case, the infrastructure is dedicated to the company and accessible via secure VPN-type networks.
The Cloud Community: The infrastructure is shared by several organizations that have common interests (e.g safety requirements, compliance ...). As private cloud, it can be managed by the organizations themselves or by third parties.
Hybrid cloud: Infrastructure consists of two or more clouds (private, Community or Public), which remain unique entities but are bound together by standardized or proprietary technology, enabling data portability or applications.

Cloud Computing Benefits and Limitations

The Benefits ofCloud Computing (Cloud Computing)

Cost Reduction: Cloud computing is seen as an incremental investment, companies can save money in the long term by obtaining resources.

Storage increase: instead of purchasing large amounts of storage before the need, organizations can increase storage incrementally, requesting additional disk space on the service provider when the need is recognized.

Resource pooling: in the IT industry, this feature is also known as Multi-tenancy, where many users / clients share a type and varied level of resources.

Highly automated: As the software and hardware requirements are hosted on a cloud provider, IT departments sites no longer have to worry about keeping the things-to-date and available.

Greater mobility: Once the information is stored in the cloud, access it is quite simple, just you have an Internet connection, regardless of where they are located.
Change the IT focus: Once the responsibility of the computing environment has, essentially shifted to the cloud provider, IT departments can now focus more on the organization's needs and the development of strategic applications and tactics and not on operational needs of the day-to-day.

Towards Green IT: By releasing the physical space, virtualization of applications and servers contributes to the reduction of equipment as well as the need for air conditioning, consequently, less energy waste.

Keep updated things: Similar to change the IT focus, this benefit is because of the new demands of providers cloud services, ie, the focus of providers is to monitor and maintain the most recent tools and techniques for the contractor.

Quick elasticity: this characteristic has to do with the fundamental aspects of Cloud flexibility and elasticity. For example, the web shops carry a standard amount of transactions during the

year, but it is necessary to increase near Christmas time. And of course these stores do not want to pay for that capacity at peak during the rest of the year. Measurement service: which means services monitored, controlled and reported. This feature allows a model of pay-per-use service, or pay for use. It has similarities with the concept of telephone service packages where you pay a standard signature to basic levels, and paid extra for the additional service, without changing the contract.

The limitations of Cloud Computing (Cloud Computing)

The various problem areas for cloud computing environments are:

Security: As the data are no longer in their own organization, security becomes a major issue and questions must be answered, such as: Data is protected as adequate? There is a hacker-proof system? Can you meet the requirements regulations and government for privacy? How do you discover the leak information? Note also that corporate governance is always very concerned about the data that is stored outside the organization. Location and Data Privacy: Where the data is stored? How data is stored? The provider has adequate security for data in places where they are stored? Internet addiction: Since the cloud features are not available on the local network, you have to worry about the availability of the Internet. If you lose access to the Internet out, what that happens to your cloud computing environment? If your service provider increasing period unavailability, what you do with your employees and customers? What do you do in case of increased latency or delays the answers?

Levels of availability and service: Most organizations are familiar with the agreements service levels. The service level agreement specifies the amount of service capacity that someone has to provide, along with the penalties for not providing this level of service. How you can be sure that the cloud service provider has sufficient resources to maintain a service level agreement you signed with them?

Impact of Computers on Society

During the last decade computers have become an integral part of our daily lives. There is hardly any activity which does not make use of computers at some stage or the other. Even when someone on a holiday wishes to call a friend using his/her cell phone, he/she is using computers indirectly as messages are handled and directed by them. Similarly, on any given day, even if we are not directly working on computers on our desks, we make use of computers many times while using a mobile or a land line phone, purchasing from a modem outlet, and other such activities. Facilities such as e-mail and web have become the life-line of our modem society as well as of the world of business.

Almost all the normal activities in present day society are controlled by computers including the functioning of offices, factories, research and development laboratories, along with development in the fields of teaching, sports, telecommunication, entertainment, etc. Activities that are closely linked with the developments in computer systems include weather forecasts, developments in science and technology, outer-space exploration, breakthroughs in medical sciences, and so on.

The term 'computer system' includes both the hardware and software. The *hardware* of a system consists of the physical components that are connected together to function as a computer. The working and functioning of a computer is governed by the *software.* All computers operate by carrying out the instructions contained in operating systems and other programs which comprise the software. The last decade has seen rapid development in computer hardware as well as software systems. As a result, the speed with which the present-day computers carry out instructions has increased tremendously. For instance, super computers are capable of carrying out trillions of instructions per second. At the same time, the costs of operations have reduced to a large extent. This has made it possible for a common man to possess a computer at home or office or shop in the form of a desktop or carry with him/her in the form of a laptop or a notebook while traveling. Modem desktops and laptops which a common person can now afford are much more powerful than the dream computers of a few top scientists of the world visualized just two decades ago.

Due to widespread applications and facilities associated with computers, everyone wants to possess them. Besides the computational facilities that a computer provides, one can also avail facilities such as reservation

for train and air travel, payment of bills and taxes, filing of tax returns, watching a movie using a DVD or on the internet, chatting with your friends using video chat, conducting a conference between people sitting thousands of miles apart, ordering an essential drug, grocery or fore-shopping and e-selling, etc. Students can make use of internet knowledge sources such as e-tutorials and other e-leaming devices such as CDs and DVDs, and e-libraries, which greatly aid in garnering useful information and gathering study material. Because of these advantages computer has become an extremely essential tool for every student and is not necessarily restricted to students of computer science.

What's the difference between 32-bit and 64-bit?

The term "bit" is short for "binary digit," which can be a 1 or 0. In this context, the number of bits refers to how many 1's and 0's the computer's processor can use to communicate instructions and assign memory addresses. When dealing with instructions, 64-bit software offers increased performance over 32-bit programs, because the processor will be able to deliver more information each time it issues a command. When dealing with memory address, a 32-bit string is limited to a little over 4 million bytes of memory, or 4GB. That means the computer cannot store data to RAM beyond 4GB, so installing more than 4GB on a computer that runs a 32-bit version of WINDOWS is a waste.

A 64-bit system reaches a memory address limit at 18.45 exabytes—a number that's around 4 billion times larger 4GB. It's wise to go with a 64-bit operating system, as it's backward compatible with almost any popular 32-bit application. Those with 64-bit versions of Windows, whether it be Vista, Windows 7, or Windows 8, should opt for 64-bit applications (if a choice is available), because the program will (all else being equal) run faster than a 32-bit counterpart. Note that if you run a 32-bit version of Windows 7 and opt for an Upgrade Assistant installation to Windows 8, you'll end up with a 32-bit version of Win8. To "upgrade" to a 64-bit edition of Windows 8, you'll need to buy a full version of Windows 8 and perform a Clean Install.

List some of the important features of Mice & Keyboards

The mouse and keyboard are your PC's eyes and ears; without them you could not execute commands or input text. In this article we'll highlight some of theirIMPORTANT features.

All About Mice

As input devices go, the mouse has changed very little since Microsoft used it to launch its hardware business in 1983. It had a cord, right and left buttons, and a palm-sized body. Many modern mice are wireless and use lasers, but newer devices are still perfectly recognizable as mice and are used in the same fashion as a 1980s-era mouse.

Tracking Technology

The most basic miceFOR SALE today let users manipulate the position of the pointer onscreen by mechanical means. A rubberized sphere inside the mouse body contacts a pair of rollers that drive gears, moving the mouse across a surface rotates the gears and the mouse's driver translates the movement to appear onscreen. These mice are very inexpensive, but they tend to get clogged and require occasional cleaning. In 1999, Microsoft launched an optical mouse that used an LED and photodiodes to translate the mouse movements into the cursor position. Later optical mice used tiny low-resolution image sensors to track movement, enabling these modern optical mice to work on most surfaces. Laser mice use infrared laser diodes to provide very precise movement data, making it ideal for graphics professionals, engineers, and gamers. GLASS has been one of the few surfaces on which modern mice still have trouble tracking, but with the introduction of dual-laser and glass laser mice, reflective and transparent surfaces are no longer a problem.

All About Keyboards

Computer keyboards can trace their heritage back to keypunch devices and typewriters from the late 1800s and early 1900s. In the context of computing, keyboards have changed very little, as well.

Layout Types

The standard keyboard offers roughly 100 characters for letters, punctuation, numbers, and function keys. Laptops tend to have scaled-down keyboards, combining characters and actions that users can access as if using standalone function keys. Smartphones and handheld devices combine even more functions and use very small keys, suitable for thumbing. Most keyboards feature the QWERTY layout, which refers to the first six letters of the top row on the left side of the keyboard. This layout traces its roots back to the 1870s, when E. Remington And Sons, manufacturers of firearms and typewriters, sought to avoid placing letters often typed together near one another, which significantly reduced the frequency of jams on Remington's mechanical typewriters.

Switch Types

There are several different mechanisms used to register keystrokes. Common switch types include full-travel membrane and dome-switch keyboards that consist of plastic keys over a layer of rubber domes. Some keyboards add springs to the rubber domes for more rapid feedback. These keyboards are known for being relatively quiet and having a smooth response. Mechanical switch and buckling spring-style keyboards have a rapid response and tend to generate an audible "clack" when keys are pressed. These keyboards have a very different feel to them, compared to rubber dome-style keyboards. To determine which type you prefer, go to a local retailer and try out a few.

A Word About Wireless

Both keyboards and mice come in wired and wireless models. If cutting cord clutter matters to you, consider that wireless mice and keyboards require batteries to operate. They also require either a wireless dongle or a receiver at the end of a USB cord. The latter does add to your wiring, but at least these units can be tucked out of sight.

Input Essentials

You have a host of options when shopping for new input devices. Considering them carefully is the key to ending up with something that can make using your computer comfortable, satisfying, and even fun.