

Chapter 1

Computer & Its Applications

The inventions like Fire, Wheel, Agriculture, Television & Mobile Phones are some of the examples that have changed the face of the world. The each upcoming invention changed the philosophy of life to some extent. The impact & extent of these inventions covered the entire facet of Human Life.

The invention of computer is latest event in this context. Now new generation feels that how their ancestors were living their lives without the use of computers. Computer education is now part of the Basic primary education. The top management People who had crossed the age of fifty are also very much inclined & interested to learn more & more about computers. The general feeling among the common public is that if you want to excel in the society, the computer skills must be part of your skill set. The time has already come when it is becoming difficult to survive in a business or an organization without the computer related skills.

Every educational institution starting from the primary school to the university level are including more & more subjects related to Computer Science & Information technology in their curriculum. The nations are now competing against each other for making their populace more equipped with computer skills.

Defining a Computer

Many definitions are available in the market for 'Computer'. Some of them are suitable for a particular area of Application & others use the fancy terms to describe a computer.

A Computer is an electronic device, which takes some input from an input device, processes the input to some useful information, stores the information & sends the output to an output device.

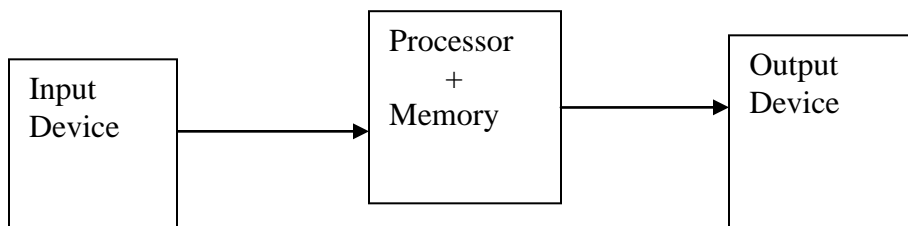


Fig. 1.1 Block Diagram of A computer

Let us take the example of a calculator, in which all the three parts are unified as one. The keys of the calculator are acting as Input Device, the display of the screen of the calculator is acting as output device & the circuitry inside the calculator is acting as a processor. We give some input to the calculator in the form of numbers; it calculates (processes) the data & displays it on the

display screen of the calculator. The Calculator also has small storage capacity (memory) & i.e. why we can retrieve the previous numbers or results. So Calculator can be thought of as a prototype of a computer.

Another example is that of a old typing machine, in which keys of the typewriter are for input to the typewriter, paper in the typewriter is acting as a output device & the key which we press is typed onto the paper by some mechanical process acting as a processor. There is no storage capacity in the traditional typing Machine. Electronic typewriters have small storage capacity.

The most common input device of a typical computer is keyboard. The other input devices are mouse, joystick, scanner, magnetic ink character reader, voice input systems, digital cameras, light pen, and touch screen etc. (For details of input devices see Chapter 5)

The most common output device of a typical computer is Monitor. Other output devices are printer, television, speakers, multimedia projector etc. (For details of output devices see Chapter 6)

Storage devices are those devices that store data for later use. Most common devices are floppy, CD, hard disk, magnetic tape, magnetic drum and DVD etc. (For details of storage devices see Chapter 4).

The Processor is similar to the brain of the human mind. It has many components for its working.

Computer & Society

The Computer has changed the values, ethos & definition of the society. For solving or performing any work in every field concerning the society the computers are being used.

It starts from our homes & covers the entire spectrum of the establishments like schools, colleges & universities, banks, hospitals, industry, biotechnology, research & development, defense, airlines & railways. Now we see the world in a different way. The formulas & calculations that may have taken years to solve, can be solved in seconds.

The information is becoming the power. The countries that are behind in this technology are also lower in the overall development index. The countries that are ahead in this information race are better placed among the nations of the world. The reason is that timely information that is correct will lead to better decisions that in turn will lead to better results.

The huge storage capacity & quick retrieval has made it possible to store huge data on the Storage devices. Now the big libraries around the world had stored their content in digital form that takes negligible space. It is very easy to find the required data with one key press of the keyboard. We are moving towards the paperless society.

The world has become very small & better place to live with the help of computers. The boundaries of countries, language, cast, creed, sex has been broken resulting in more freedom in the lives of the people. The best resources can be chosen & used with the help of computers.

Now we will discuss the applications of computer science in each field of society in detail.

a. Homes

The coming of computers has brought a complete change in various homes. The computer is now a necessity of every household. It can be used for entertainment like for playing games or seeing movies. It can also be used for educational purposes like seeing educational CDs, studying through some distance education Program.

The scope of the computers in your daily life can cover your entire routine of the day. Starting from the morning alarm that can be set automatically by checking your appointment diary Schedule. The alarm for working days & holidays can be set accordingly. A voice system can also speak your day's schedule in the morning.

After this if you enter your kitchen, then you can get the eatables according to the already set menu. Electronic Oven, Toaster, food processor or stove can cook or process the various items with the pre-defined criteria. All these equipments contain one or more microprocessors (also called chips sometimes) for performing the operations according to the user choice.

Your electronic devices in your bathroom can set the water temperature according to the prevailing temperature outside. The automatic washing machine can wash & dry the clothes according to the preset timings.

b. Schools

CAI (Computer Aided Instruction) has become the buzzword. Every School is now making the use of computers in their school as the marketing point. Apart from having the fundamentals of computer as a subject, the schools are using the computers as a tool for providing the education. In Some schools teacher use the single computer to teach its students while in others the computer has been provided at every child's desk.

The computer is thought as tool for learning for all the disciplines. This approach has given entirely new range of applications. The students learn with enthusiasm & interest. The intelligent students can be given more challenging problems apart from the traditional problems.

There are applications that help teachers in tracking student attendance, student's grades & performance, preparing reports. In school administration also like collection of fees, giving the salaries, preparing the timetable, Accounting work can be done with the help of computers.

c. Colleges & Universities

The examinations of the students are now taken on the computers. It can be solving or analyzing a problem given by the computer. It helps in preventing the unethical behavior in examinations. The results can be prepared immediately.

All the project & research work is now done using the computer as a tool for solving the particular research problem or the project work. Analyzing the data, preparing graphical charts, preparing reports, simulating the data are all done with the help of computers.

d. Banks

According to the latest banking practices the use of computers is encouraged for transacting any transaction in the banks. The banks are now having nice looking computers in place of the huge stacks of files. The retrieval of information has become instantaneous. The scope for errors & mistakes has been removed. The banks are using integrated software for all their operations related to deposits, withdrawals, Loan processing, Clearance of cheques & drafts.

With the advent of distributed computing Global networks has been put in place that felicitated the concept of doing banking transactions from any part of the world. Even if I had opened my account in New Delhi, I can do all the operations from Mumbai or London because a computer network connects all the branches of the Bank & they share their data through a central server.

The Reports are prepared automatically at the end of the day & a copy of the data is stored on storage devices for future retrievals. Machines have been installed for counting the currency.

Automated Teller Machines (ATMs) has changed the way of Banking. Now user can perform the banking operations anytime, anywhere.

e. Hospitals

This is another field where computer technology has brought a revolution. First of all the applications were made that handled the records of the patients. These applications contain the data like details of the disease, diagnosis & the treatment apart from the details of the Doctor who handled the patient at different times. This was a breakthrough. Now it was possible to check the history of the disease. It was also helpful to new doctors to examine the old case.

Expert systems are being put in place for specific area of diseases. Now we have fair amount of data about medical science. So these systems are acting as an assistant for the doctors in doing the treatment of the patient. These are being continuously updated with the help of medical experts of that area.

Computers are playing important role in administration works, Keeping Inventory of medicines, billing the customer, registration of new patients besides others.

Medical equipments have been completely transformed. The use of computers in medical equipments can be gauged from the fact that many universities have started Diploma courses to teach the students to work on the computerized medical equipments. X-Ray machines, CAT Scan (Computerized Axial Tomography), Computerized machines for Eye testing & Eye Operations, Tomography, Computerized machines for dentists are some of the sophisticated machines used by the doctors. All the equipments used for various pathological tests have been digitized. Now with one sample of blood we can do various tests.

In medical colleges simulations are performed with the help of computers to help the medical students understand the intricacies of surgery. Before actually doing it on the real patients they try it out in the simulated environment.

Computers are also helpful for the disabled people. Electronic artificial limbs are being used which have microchips installed in them. Robotic arms & robotic legs have been developed. Artificial eyes with microprocessor are in the advanced stage of development.

f. Industry

Automation is the buzzword for the Industry. They are automating their production process, manufacturing process, financial transactions, sales & marketing. There are many products now being manufactured without any human intervention. In textile industry, pharmaceutical industry, chemical industry, food processing units, electronic industry, paper industry, oil & natural gas sector, power sector, computer industry, mechanical workshops etc the computerized machines are widely being used. A computerized machine can automatically measure & control the temperature, pressure, time, frequency, stress, voltage, force, water, raw material, deflection required for a particular operation on a product depending upon the requirement. Process Cycles has shortened with the advent of computers.

Microprocessor based machines are fault tolerant & error free. It is also easy to locate the error or do the maintenance. Users can do the changes in the design of the product through a computer terminal. The flexibility inherent in computer machines is very good factor which revolutionized the manufacturing process. Single process lines are coming up where we get the final product in one go.

The use of computers in Industry is causing unemployment in many countries that is an area of concern. Because of automation less & less workforce is needed to the same work. There is a demand of highly skilled people in the Industry. The persons with flexible skills are widely appreciated.

g. Biotechnology

The recent advances in biotechnology were not possible without the help of computers. To keep the information about the bio diversity is near to impossible without computer-aided tools. There are millions of different kinds of plants, bacteria and species. Now with the help of computers the area of biotechnology has revolutionized. The biotechnologists are analyzing the samples through computerized equipments. With the help of latest software it has become possible to check the various characteristics of the sample under research.

The map of Human DNA has become only possible with the help of computers. It is equivalent to about 10 Lac pages of information. Causes for various diseases have been found with the help of biotechnology. The research is going on in the field of Ageing, mortality, childbirth that will further boost the progress of human civilization. Some of the inventions like cloning have also created some ethical questions. Many countries are making the laws to stop human cloning. Every achievement in science brings some improvement in the quality of life but it can be disastrous also if misused. The threat of Biotechnical weapons is also threatening the existence of the world.

h. Research & development

Do we have any R & D facility around the globe without computers? The answer is No. The answer is enough to demonstrate the importance of computer in Research & development activities. The basic things in R&D are collection, analysis, synthesis, correlating & producing the data. Every step now is done with the involvement of computers. The processing speed of the computers has made it possible to do the complex & lengthy calculations in a short time. The calculations that must have taken days now can be done in seconds & the calculations that may have taken years to do manually can now be done in minutes. So now more data can be analyzed in a short time. This is also the reason for the fast pace of development of research activities. The progress human kind has made in last forty years has not been made in last 40,000 years. In this the contribution of computers cannot be questioned. The tasks that need to be done repeatedly are now performed with computer without any errors. High-end graphics & advances in simulation have made it possible to conduct the testing & application of new products on computers.

i. Defense

Now not the numbers of soldiers, horses, tanks or missiles are determining the military strength of a country but the optimum use of computers in defense is determining the superiority of a country. The computer technology is being used in the fields like air defense systems, Radars, Gathering intelligence, Strategy Planning, Operation research etc. The training for the new weapon systems are now given in simulated environments saving a lot of resources & reducing the risk involved in it. Due to the advancement in technology the enemy's missiles are detected & immediately anti missile systems target that missile with anti missile weaponry & make the missile attack ineffective. The data gathered by intelligence inputs is so vast that it is not easy to analyze & quickly derive the important conclusions but with the data mining & warehousing techniques it has become very easy with computers.

j. Agriculture

The farmers now are not the uneducated & ill-informed persons. Most of the farmers in developed countries are using computer systems that help them in their agriculture business. Many countries have developed the national databases related to different crops in the country so that others can benefit from the existing data. Anyone can find the best procedures & methods for getting the better harvest in a specific environmental condition. Now the farmers know better that which seeds, fertilizers & other equipment to use for better profitability.

k. Publishing

With the advent of DTP (Desk Top Publishing) the face of publishing Business has taken a new look. The quality of the print has risen to new heights. Now it is easy to organize, analyze & present the information in a better way because of the latest Word processing & publishing software like MS-Word, Ms-Excel, Corel Draw, Paint Shop pro etc.

Multiple Choice Questions

1. The inventions that have changed the face of the world are.
a) Fire b) Wheel
c) Telephone d) Computer
e) All of the above
2. The computer is a _____ device.
a) Chemical b) Electronic
c) Biological d) Mechanical
3. The brain of the computer is called
a) Mouse b) Keyboard
c) CPU d) Printer
4. Calculations are now done in _____ time with the help of computers as compared to manual work.
a) More b) less
c) Very less d) same
5. In Schools Computers are useful for.
a) Students b) teachers
c) Both a & b d) none of these
6. Banks are using computers for
a) Anywhere banking b) Anytime Banking
c) both a & b d) none of these
7. The current developments in biotechnology may not be possible without
a) Television b) Satellites
c) Computers d) Pizzas
8. Which of the following is not functionality of computers.
a) calculation b) analysis
c) graphical display d) creativity
9. Computers in the hospitals can
a) Replace the doctors' b) assist the doctors
c) both of these d) none of these
10. Memory of the computers is
a) Limited b) unlimited
c) Same in all computers d) same as humans
11. In hospitals the computers are used for
a) Doing all pathological tests b) making the patient records
c) Billing the patient d) All of the above

12. In defense computers can not be used for
 - a) Military intelligence
 - b) detecting the missiles of the enemy
 - c) Crossing a river
 - d) targeting the targets with Tanks
13. In homes computers can not be used for
 - a) Playing games
 - b) learning new things
 - c) Sending e mail
 - d) sleeping
14. In agriculture computer can be used for
 - a) Getting information about crops
 - b) recording data of crops
 - c) Making database of problems faced
 - d) all of the above
15. Computers are helpful for
 - a) Scientists
 - b) Teachers
 - c) Businessmen
 - d) All of the above
16. The advances in computers can
 - a) Never be misused
 - b) should be misused
 - c) Are not misused
 - d) none of the above
17. Online Examination by computers
 - a) Gives immediate result
 - b) prevents unethical behaviour
 - b) Generates random questions
 - d) all of the above
18. The input device out of the following is _____.
 - a) Printer
 - b) Keyboard
 - c) CPU
 - d) Monitor
19. The output device out of the following is _____.
 - a) Printer
 - b) Keyboard
 - c) CPU
 - d) Mouse
20. The storage device out of the following is
 - a) Hard Disk
 - b) Scanner
 - c) Web Camera
 - d) Joystick

Review Questions

1. What is computer? Make the block Diagram of computer.
2. What are the uses of computer in Medical field?
3. List down the application of computers in Education.
4. In the times of War how a country uses the computer systems in defense.
5. How “the way we do Banking” has changed with computers.

Discussion Questions

1. What features of the computers made them so much popular in the world.
2. What are the ethical issues involved with the use & spread of information technology.
3. What can be the future applications of computer science in different fields?

Answers for multiple-choice questions.

1. e
2. b
3. c
4. c
5. c
6. c
7. c
8. d
9. b
10. a
11. d
12. c
13. d
14. d
15. d
16. d
17. d
18. b
19. a
20. a