

## Unit 8: Applications

### Introduction

This unit consisting of five lessons covering numerous application of computers and impact of computerization on society. Some basic considerations concerning applications of computers are presented in the Lesson. Computers are employed to solve problems of different nature, Routine applications of computers in offices, use of computers in managing commercial organizations, and application of computers in science, engineering and research are discussed in Lesson 2.

The role of computers in modern society is a complex issue. Lesson 3 presents the scope and influence of computerization in modern society. It identifies controversial issues and challenges for the future. Lesson 4 presents the tasks for the routine maintenance of microcomputers. Selection of computers requires selection of different components of computers and Lesson 5 presents the criteria for selection a microcomputer.

### Lesson 1: Basic Considerations

#### 1.1 Learning Objectives

On completion of this lesson you will be able to

- know the criteria for justification of computer systems
- learn the information systems and their classification
- know the steps for analysis and design of computer based systems
- know the reasons for the failure of computer systems.

#### Criteria for using Computers

##### *Criteria for using computers*

The following are the criteria which may be used to justify the use of computers:

**Volume of data :** The computer is suited to handling large volume of data.

**Accuracy :** High degree of accuracy is ensured by computers and their consistency is reliable.

## Computer Basics

**Repetitiveness** : Processing cycles that repeat time and time again are ideally suited to computers. Once a computer is programmed it goes on automatically performing the task as many times as required.

**Complexity** : Computers perform complex calculations. A computer provides the required answers after running the program for complex calculations.

**Speed** : Computers work at very high speeds. This enables them to respond quickly to a given situation.

**Common data** : One item of data can be used for different computer procedures.

Usually a combination of two or more of the above criteria justifies the use of computers. These criteria are used to carry out the preliminary survey to judge the suitability of applications for computerization. Technological innovations in the recent past have increased the range of technically feasible applications and they have also provide cost-effective solutions to a range of problems.

*Important questions for computerization*

If the general criteria justify that a particular application may be suitable for computerization, then the following questions should be satisfactory answered before any decision to computerize is taken.

- Is the use of a computer technically feasible?
- Would it be cost effective?
- Would it be socially acceptable?

## Information

An information system comprises of a set of people, procedures and equipment. It is used for the management and better control of an organization. The function of an information system is to collect store, process and present data to manage the business of the organization. Processing of data is an integral part of an information system. Such systems may be classified as :

*Types of Information Systems.*

- Deterministic
- Probabilistic, and
- Adaptive

**Deterministic or mechanistic** : The output from this system uniquely determined, (example: evaluating formula).

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**Probabilistic or stochastic** : A degree of uncertainty exists so that the output is specified in terms of averages or distributions (example: random number simulations).

**Adaptive or cybernetic** : A system adapts itself to changes in environment (example: a stock control problem where the re-order strategy depends on changes in demand).

In real life few systems are truly deterministic. However deterministic models are often created for systems which are stochastic or even adaptive. Modeling is used for designing a computer system to represent a real system; the computer system may be studied for analysis, control and processing of various activities of the real system.

## System Analysis

*System*

System analysis involves analysis and design of computer implementation of a problem. The speed, power and independent operation of a computer demands a clear analysis and complete specification than that associated with manual systems.

*System Analysis*

A system analyst in a computer department is responsible for liaison with users. A system analyst designs a set of procedures to fit requirements of the users and this design includes specifications of the programs to be developed. These specifications are implemented by programmers. A system analyst is to perform the following tasks :

- Identification
- Feasibility study
- Investigation
- Analysis
- Design
- Implementation
- Review
- Maintenance.

**Identification** is deciding on an application which may require further study for computerization.

*System Analysis Tasks*

**Feasibility** study is the preliminary investigation into the system to evaluate the possibility of a computer system and estimation of costs and benefits. It should also suggest most effective method of solution.

**Investigation** is the fact-finding exercise. Through investigation the system analyst determines the requirements of the system and studies methods and procedures for the system.

**Analysis** is the review of the results of the investigation. This brings together the finding of the investigation in the form of a document.

**Design** is the creation of the specifications for the computer programs and manual procedures to be carried out with the computer system. This involves the design of flowcharts or pseudocodes.

**Implementation** may be divided into two parts: firstly supervising the programmers in coding and testing of the programs and secondly the supervision of the introduction of the system. The second part concerns instructing the users for their responsibilities.

**Review** is the evaluation of the system after it has been implemented. This is to ensure that it is being applied in the manner specified by the analyst and that it meets the intended objectives.

**Maintenance** is required if it is found that the system has flaws, fails to meet requirements or the requirements change for some reasons.

### **Reasons for the Failure of Computer Systems**

It is important to study the major causes of the failure of a computer system. Despite all the techniques and practices, many systems are considered failures. Some of the reasons for this could be :

#### *Reasons for the Failure of Computer Systems*

- Inadequate feasibility study causing a poor design.
- Inefficient costing of the hardware, media, staffing or development.
- Lack of acceptance by the users.
- Poor quality of documentation.
- Inflexibility to match existing procedures and practices.
- Unrealistic estimates of the time scale for design and implementation.

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### 1.2 Exercise

#### 1. Questions for short answers

- a. Explain the term “Information technology”.
- b. List the criterion of using computer for solving problem.
- c. List the stages of the system life cycle.
- d. What are the tasks that must a systems analyst perform?

#### 2. Analytical questions

- a. What is an information system? List the different types of information systems and give their characteristics.
- b. List and explain the stages of system analysis.
- c. What is the feasibility study? Explain its purpose.
- d. Explain the responsibilities of a system analyst in a computer department.
- e. Discuss briefly the main reasons for failure of computer systems.

## Lesson 2: Application Areas

### 2.2 Learning Objective

On completion of this lesson you will be able to

- know the areas where computers are employed
- identify the routine applications of computers
- know the use of computers in management
- identify scientific, industrial, medical applications of computers
- understand the importance of packages for common applications.

### 2.2 Main Areas of Applications

#### *Areas of application*

The aim of this lesson is to focus attention on the major areas where computers can be employed. Computer applications can be divided into following broad are :

- Office automation
- Management applications
- Scientific, engineering and research applications.

#### *Office automation*

**Office automation :** These applications include the use of computers for clerical activities in public and private organizations. Office automation involves the use of computers, in conjunction with other electronic equipment, to automate the basic secretarial and clerical tasks of the office. The routine nature of office work makes office procedures suitable for automation. Reduced equipment costs now makes it cost effective. Word processing is the basic job in on office.

Some office automation systems go far beyond the function of word processing on networks. PCs or workstations are connected to a network which provides access to a wide variety functions including.

- Word processing
- Spreadsheet analysis
- Drawing diagrams
- Database applications
- Electronic mail facilities
- Access to other network etc.

#### *Applications through computer networks*

There may be a number of file servers and print servers connected to a network. Popular example is a client-server arrangement. In most client-server arrangements an application program (the client) runs on a PC or

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workstation and communicates through the network with the server program which runs on another computer. The server machines are usually more powerful and are popularly dedicated to provide access to :

- A printer
- Electronic mail
- Database
- Other systems etc.

## Management Applications

A commercial organization often needs information on which to base decisions concerning the current operations and future plans. This information should be timely and accurate. Examples of the use of computers for management and control are given below.

### *Stock control*

**Stock control :** A computer can process data quickly and thereby make available information on stock levels. A computer can be used to link widely separated warehouses, thus treating them as one vast stock control system. Customer orders can be served from an alternative warehouse if an item is not available in the local one. Thus the computer enables stock holdings to be kept to a minimum and thereby reduce cash requirement for the business.

### *Production control*

**Production control :** It is an extremely complex area especially in factor automation. Production should respond quickly to changes in demand and other circumstances. This requires accurate up-to-date information which should also be timely. On-line systems help to get data quickly enough to influence current events. A computer can make machine loading, materials control, machine utilization etc. A computer is more efficient because of its ability to make complex calculations and shift data quickly and accurately.

### *Labour control*

**Labour control :** Some of the information used in the control of labour can be obtained from the payroll and personnel records. An analysis of labour hours for idle time, sickness and absence, can aid forecasting future requirements. Results of analysis help to highlight these problems accurately and actual performance can be measured quickly against planned performance. Reports for the shop-floor manager aid control of routine operations and can help better utilization of manpower.

### *Network analysis*

**Network analysis :** Network analysis is used for planning and control of complex projects. Examples are the building of a factory, the installation of new plant and the manufacture of an aircraft or ship. A model is used to show each stage in the project and its dependence on other stages. When the necessary data have been supplied the program produces a

plan for the management. The plan can be quickly modified by the program in the light of actual progress, and revised plans produced at a short notice. The program also indicates the interdependent activities that take longest time to complete and could hold up the project.

*Linear programming*

**Linear programming :** This is used to find the optimum solution which maximizes profits or minimizes costs. A considerable amount of data are supplied to construct a computer model. The computer has the storage, capacity and the speed to calculate and evaluate every feasible solution and thus to find the best one. A manager, dependent on human resources, cannot do this as the time required for calculations would be prohibitive.

*Financial modeling*

**Financial modeling :** A model is constructed for the company's finances comprising of its resources, income and expenditure. The model is used to simulate the effects of different policies. An example is the forecast of the results of different investment policies. It is possible by a series of computer runs, with variations of the basic assumptions to obtain a forecast of the likely effects of alternative policies. The usefulness of the computer lies in its high speed, which enables it to execute instructions quickly.

**Scientific, Engineering and Research Applications**

These applications include the use of computer for complex mathematical calculations, analysis of data of various nature, design analysis and control of physical systems etc. Here the main emphasis of data processing is research and development for scientific, engineering and industries applications. Few areas are described below.

*Weather-forecasting system analysis*

**Weather-forecasting :** Weather-forecasting demands vast computational powers. This is an area which requires the super-computers.

*Mathematical and statistical analysis*

**Mathematical and statistical analysis :** These analysis require large calculations and solutions of mathematical and statistical problems. The applications include research in physics, chemistry, geology, archaeology, medicine, astronomy, social science etc. Some commercial problems have mathematical bias, and require mathematical analysis to determine the optimum use of resources.

*Design work*

**Design work :** Computers can be used as a design tool in engineering and other disciplines. CAD (Computer Aided Design) is used in electronic, electrical, mechanical, aeronautical, civil engineering, architecture and many other disciplines.



## Applications

**Medical applications :** There are numerous applications of computers in medicine. Some examples are discussed below.

### *Medical application*

Computer can be used as an aid to medical research by analyzing data produced from experiments and to diagnosis. The computer acts as a large bank of data about known medical conditions. Once a computer systems has been set up by medical experts an ordinary doctor can be taken through a question and answer session by the computer until a correct diagnosis is made.

Computers can be used to hold details of the patients. Microcomputer systems are now used for this purpose in increasing numbers. Computerized health records can be used by medical officers, health visitors, and researchers.

### *Education*

**Education :** Computers are used extensively as a part of study in computer science itself. They are used as way of aiding the understanding of a wide variety of other subject. The computer can provide instructions and ask questions. This kind of activity is called computer-aided Learning (CAL) or computer-aided Instructions (CSI). Computers are also used for a number of other applications in education; examples are: marking of multiple choice examination papers and processing examination results.

### *Manufacturing*

**Manufacturing :** Some examples of use of computers in manufacturing are: stock and production control, engineering design etc. The industrial design, manufacturing and testing processes are becoming increasingly computerized. The terms CAD, CAM (Computer-Aided Manufacture) and CADMAT (Computer-Aided Design Manufacture and Testing) are familiar words in industries now.

### *Robots*

**Robots :** The word "robot" comes from a Czech word whose meaning is "to labour". For many years the term "robot" was associated with science fiction rather than science fact. That association has changed now.

The basic difference between industrial robots and other automated machines is that a robot can be programmed to carry out a complex task and be reprogrammed to carry out another complex task. A complex task is a series of actions involving mechanical manipulations.

The majority of robots in current use, are "blind" and lack a "sense of touch". It is hoped that the next generation of robots will be able to find and locate objects or detect their presence by touch and vision.

## 2.3 Other Applications

Computers are used for a variety of applications and there are some applications that do not fall into either of the applications mentioned above. Some of these applications are discussed below.

### Expert Systems

#### *Expert systems*

An expert system is a program package that can perform the function of a human expert. Some of the initial expert systems were used for medical diagnosis. A medical consultant, assisted by his staff, takes part in a lengthy exercise in which both the knowledge and the decision-making procedures are transferred to the computer. As a result the computer can ask questions and draw conclusions from the answers and a junior doctor, aided by the computer, could be as expert as the consultant.

There are many applications for expert systems company law, investment, finance and personnel management etc. Expert systems normally have the following features :

#### *Features of expert systems*

- An organized base of knowledge in the form of a database.
- A user interface to support diagnostic discussions with the user.
- A facility to hold details of the consultation.
- An inference engine, that is a software, which can use the knowledge base and current consultation to formulate further questions or draw conclusions from actions.
- A knowledge acquisition system, to update the knowledge base.

Although the basic components of an expert system are bound to vary from one discipline to another the basic structure is the same. Therefore, an established method for developing an expert system is to build the system from a standard non-application-specific basic system called a shell. It is possible to purchase a complete expert system or merely a shell from which an expert system can be created.

The user of the expert system sits before a PC or and takes part in a question and answer session in which data about the problem is typed in. At various stages during the session, or at the end, the system makes an assessment of the problem and recommends actions.

Expert system package are not confined to large computers. Several are available now for personal computers.

## Applications

### **Intelligent Knowledge-Based Systems (IKBS)**

*Intelligent Knowledge-Based Systems (IKBS)*

These systems appeared on the market recently. They are intended to provide an expert consultative service to management and are also called "expert systems".

A typical system interactive and contains a large database. The system is programmed with a decision-making strategy developed by careful consultation with experts in the field. The user takes part in a question and answer session in which data about the problem is through the keyboard. At the end of the session the system makes an assessment of the problem and suggests actions.

### **Application Packages**

*Application Packages*

It use of an application package is an alternative to developing of programs. Many small organizations cannot afford to employ a programmer, and individual users, are not capable of writing programs. As an alternative, many firms and individuals purchase programs. An application package generally include a full description of the operation of the program, user instructions and documents. There are many large organizations which find it more economic to purchase application packages rather than writing their own applications. Some advantages connected with the use of applications packages are :

- No need to employ a programmer for program development.
- The program is ready immediately.
- The developer of the application package employ skilled programmers.
- It is possible to get help or share experience with other users of the package.

There are, however, some disadvantage in the use of application packages as compared with program development. The most important are :

- The programs may be too general and not readily matched to the needs of the user.
- It may be difficult to adapt the program to the changing needs and growth of the user's application.

## **2.4 Exercise**

### **1. Questions for short answers**

- a. Mention the common areas of applications of computers.
- b. List the operations incorporating office automation.
- c. Explain the terms : CAD, CAL, IKBS, ROBOT, E-mail and applications package.
- d. Give the advantages of using applications packages.

### **2. Analytical questions**

- a. What do you understand by office automation? Discuss the common jobs for office automation.
- b. Discuss, with examples, the importance of computer for management applications.
- c. Discuss scientific, engineering and research applications of computers.
- d. What is an expert system? Explain its characteristics.

## **Lesson 3: Impact of Computers on Society**

### **3.1 Learning Objectives**

On completion of this lesson you will be able to

- understand the interaction between computers and society
- define information technology
- name the major causes of dependency on computers
- appreciate scope and influence of computers
- identify future computer applications
- identify illegal and controversial computer-related issues
- understand the challenge for the future computer applications.

### **3.2 Computers and Society**

The role of computer in society is a complex issue and this lesson highlights some important ones only. Modern society relies on automation and on automated handling, storing and processing of information. Efficiency of production of wealth depends heavily on various kinds of automation and computers are used to automate methods for processing information. Apart from information processing, computers play important role in many other areas of industry.

Storage, processing and dissemination of information play a very important role in modern society. Computers telecommunications, data and computer communications contribute tremendously for these activities. Computers and electronic communications are getting closer and closer every day. Computers, electronic communications and other technologies associated with automation come under the general term of information technology. Information technology influences our lives and its impact on individuals organizations and society is increasing day by day.

Major technological innovations generally affect the lines of individuals. New inventions lead people and society to view world through new eyes and to accept new values. Apart from benefits, many technological advances have harmful effects in society. This lesson fugues on the values of technological advances of computers and information technology ion society.

## Causes of Dependence on Computers

Present society is heavily dependent on computers and their applications. Among others, the two major causes for this dependence are :

- Ability to calculate and computer
- Handling and processing of information.

Computer can perform calculations at a speed beyond human ability and with accuracy and consistency which people can not match. Some of the knowledge we process today would be unknown without the fast computational ability of computers. The rapid social, economic cultural and technological changes cannot be imagined without the fast computational speed of preset day computers.

*Causes of Dependence on computers*

Ability to record and store information, process that information at high speed, and reproduce the information in a variety of ways makes the computers indispensable for modern society. Information is generated in such a volume that it is impossible to handle information by conventional methods.

Present world is so much dependent on computers that if they could be swept away overnight, the airlines communication and financial operations of most part of the world would collapse. These are many more examples like these. It is not possible for average persons to appreciate the direct and indirect impact of computers in society. But it is true that computers have penetrated human society for more deeply than the overage persons can realize.

## Impact of Computer

Commerce, industry, education, administration, transportation, communication etc. and many other organization, professions and individuals depend on one way or another on computers and their applications directly or indirectly. Impact of computer on few important areas of human activities are discussed briefly.

*Impact of computer*

**Commerce :** Banking, insurance, credit companies, airlines shopping centres and many business concerns need computers for their daily operations. They form the majority users of computers. Financial world cannot survive in the existing form without assistance from computers. Commerce needs quick communication and pouch day businesses depend much on computer communications, computer bulletin boards, e-mail and the Internet. Impact of such items can only increase in the future. Financial success of a nation cannot be imagined without the successful use of computers in business activities.

## Applications

**Industry :** Many industries such as the steel, chemical and oil companies rely on computers for the actual control of plant processes. This trend can only increase, in the future. Microprocessors are used in harsh environments: in extremes of cold and in dirty and noisy atmospheres. Many of the tasks involved in assembly work as in the motor-car, washing machine and television industries are undertaken by processes controlled by microcomputers.

Many sophisticated industrial, control and manufacturing processes cannot be imagined without microcomputer boards, embedded microprocessors and robots. Computer aided designing (CAD), computer aided manufacturing (CAM) and computer aided design manufacture and testing (CADMAT) and popular for many industries.

### *Impact of Education*

**Education :** In future much of the traditional teaching will be performed with the help of computers. This form of teaching is known as computer-assisted instruction (CAI) and computer-assisted learning (CAL). Technically this is possible and indeed exists in a some countries. In the institutions of higher education the computer has become an indispensable tool for undergraduates and postgraduates for arts, science, business, technology etc. Many of the current projects undertaken by postgraduates would be impractical without computers.

### *Virtual institutions learning*

Future institution of learning will have facilities to select programs, courses and mentors from leading institutions, libraries, museums and technical institutions throughout the world. In future interactive multimedia, electronic libraries and the information superhighway will play a major role in providing a range of interactive courses and services. Thus the future educational institutions should provide virtual learning environment, besides a physical campus. Such institution of the future may be termed as virtual institutions of learning.

### *Administration*

**Administration :** Many of the administration tasks are profaned by computers. Word-processing, spreadsheet analysis, database management, pay roll, automatic order processing are some examples. Interpersonal and inter-office messaging, which is popularly known as electronic mail, is essential for quick and effective way of communication for administrative. Videoconferencing is a common place for official and administrative activities in some nations. Automatic offices of the future will be dependent on computers, electronic communications and computer networking.

**Transportation :** Sea and air transportations of today relay on computers and computer communications. Many road transport companies in advanced countries use cellular and satellite communications to prepare optimized routes for the vehicles and for

*Transportation*

sending instructions to the drivers and operators. Computer controlled traffic systems provide efficient management of traffic in some major cities of the world. Without computers air traffic control would be virtually impossible at the busy airports. Ships in the congested shipping lanes (such as the English channel) are regulated by computer communication through satellites.

*Networks and Communications*

**Networks and Communications :** Information networks provide services to end users through communication links between microcomputers. The major components of computer networks are the central computer, database, the communication links and microcomputers. The end users desiring services can access the database in the central computer. The databases contain data and screens of information that are presented to the users. A great variety of wide area networks and databases already exists for end users. The Internet which is the network of networks wrap around the world and it is the biggest source of information and the most popular means of communication for education, research, business, entertainment and many other social and cultural activities. The future telephone will be incorporated into the microcomputer and one will not only hear but also see the person on other end of the line. The users will be able to pass data and information back and forth as if they were sitting at the same table.

*Other Professions*

**Other Professions :** Law, medicine, libraries, armed forces and many other professions and working environments make use of computers and therefore depend upon computers. A good percentage of children at school will be working directly or indirectly with computers after they leave school. This emphasizes computer literacy and computer education in the society.

*Individuals*

**Individuals :** Even if we are not directly concerned with computing in our everyday work, as individuals we are affected by them in one way or other. Air passengers, hospital patients, the shoppers in large store are some of the people for whom computers process information. Tax, electricity, telephone or gas bills are processed by computers and salaries are calculated by computers. Indeed, it is difficult to find anyone who in some way or another does not depend on computers.

*Controversies*

**Controversies**

Society depends very much upon the computational and information processing skills of computers. The benefits of using computers are obvious and have been discussed above. However computer revolution has generated intense controversies. Some of these heated controversies are listed below :



## Applications

- Privacy and misuse of personal information
- Monitoring data on job activities
- Electronic fund transfer and cashless society
- Effect of automation on job
- Computer crimes.

**Privacy :** A great deal of data about individuals are stored in computers, and the trend to store such data is increasing. Some of the data are of personal or private nature and there is a natural concern that they should not be misused. Some countries have passed or are about to pass the data protection act and create data protection authority stoop the misuse of personal data and to cheek violation of privacy.

**Computer Monitoring :** In computer monitoring, computer continuously gather and assimilate data on job activities to measure performance of the employees. Computer monitoring has proved itself a useful tool for increasing productivity. However, workers usually complain that being constantly observed and analyzed by a computer automatically add unnecessary stress to them.

*Privacy  
Computer Monitoring  
Cashless Society*

**Cashless Society :** In electronic fund transfer (EFT) money is transferred electronically from bank to bank and from account to account by computers. Use of automatic teller machines (ATM) and payroll transfer systems is increasing. Some banks offer home banking services through their computers. Money may be eliminated in future remitting in a cashless society! It has some advantages, but the critical issue is the misuse of personal information as the system needs every thing from a person's life style to his or her location to be monitored.

**Jobs and Unemployment Issues :** Computers usually affect the work of staff within the organization. As a result some jobs may be created and some may be lost. This creates a demand for training and retraining. Loss of jobs due to computerization gives rise to alarm. However, only a very small proportion of the unemployment is directly caused by new technology. In certain applications jobs likely to be lost are: some office and factory jobs.

Whether job losses result in permanent unemployment is another matter. It depends on the process of reemployment and retraining of the affected labour.

**Computer Crimes :** There are many types of computer crimes. However, three aspects computer crime are often reported and deserve attention because of their social importance. They are :

- Hacking and Computer fraud
- Computer viruses
- Copyright piracy.

*Jabs and Unemployment  
Issues*

*Computer Crimes*

## Hacking

The term "hacker" identifies a programmer who worked in an skillful but illegal way. The name has become associated with individuals who make a hobby of making unauthorized access to computer systems. This antisocial behavior often leads to loss and inconvenience to the individuals. Legislation has been passed in many countries to make hacking illegal. The technique used by hackers to bypass system security are similar to those used by individuals concerned in computer fraud. Computer systems should be made as safe and secure as possible against hacking, fraud and viruses.

## Computer Virus

A computer virus is a program which attaches itself to another program on a system. It replicates itself and causes undesirable effect on the programs it becomes attached to. To parallels with the way in which a biological virus affects other organisms. Computer viruses usually infect system by disks which have been infected. When a virus infected program is run the virus, modified its host, and also replicate itself. Some viruses are merely annoying. Others cause data to be corrupted or deleted. There are many virus detection and protection packages in use. Today Kaspersky, Norton, Quick Heal are the popular antivirus software

*Computer Virus*

## Copyright

Software piracy is the use of unauthorized copies of software. It is like any other breach of copyright and the individuals responsible can face stiff penalties. Many countries passed regulation to prevent software copy right piracy.

*Future Challenge*

**Future Challenge :** The outlook for innovative and beneficial computer applications is very bright. The area application that are socially, economically and technologically feasible is expanding steadily. Use and expansion of computer networks and on-line database will tremendously influence communications, office automation, manufacturing, retail and financial services, publishing, transportation, health care, government and administration, education, entertainment etc. Neural networks and artificial intelligence will eventually revolutionize computing. The fifth generation computers possessing artificial intelligence may be available by the end of the twentieth century.

Computers can improve the quality of lives and contribute to improve our economy. The challenge is to harness the power of computers and direct it to the benefit of society. The poor countries find it difficult to invest money for expanding computer education and computerization.

## Applications

However, careful steps are essential to use computers to improve productivity and socio-economic condition of our society.

### 3.3 Exercise

#### 1. Questions for short answers

- a. What are the main components of information technology?
- b. Briefly discuss the influence of computers on (i) education, (ii) communication, (iii) commerce, and (iv) industry.
- c. Briefly discuss the influence of computer networks on society.
- d. Explain the term cashless society and virtual institution of learning.
- e. List some heated controversies of wide-spread use of computers.
- f. What is a computer crimes? List common computer crime.
- g. Write short notes on (i) computer virus, (ii) hacking and (iii) copyright piracy.

#### 2. Analytical questions

- a. Discuss the future influence of information technology in society.
- b. Discuss critically : Computers are both asset and a danger to the society.
- c. What developments are likely to occur in computer technology in the foreseeable future? How will such developments influence Bangladesh society?
- d. Discuss how the nature of jobs should change by the influence of information technology.
- e. Discuss critically how computers are changing activities in the field of (i) education, (ii) commerce, (iii) industry, (iv) communication, and (v) transportation.
- f. Write a short essay on computer crimes.
- g. Explain virtual learning environment and virtual institution of learning.

## Lesson 4: General Maintenance

### 4.1 Learning Objective

On completion of this lesson you will be able to

- avoid repair by preventive maintenance
- know different factors which affect computer
- diagnose general and common problems
- take precaution against virus
- maintain general protection.

### 4.2 Factors Affecting Computer

Common physical factors affecting computers are heat, dust, water, corrosive agents, power line problems and magnetism. Each of them may cause the breakdown of the computer system. Effect of these are given below.

*Factors Affecting Computer*

#### Heat

It is one of the most destructive factor that damages computers. An electronic device disciples about 50% of its power as heat energy. Heat should be removed as quickly as it is produced. Heat can be checked by installing fan and running the computer in a safe temperature range. Ambient temperature range for computers should be between 60<sup>0</sup>F and 85 <sup>0</sup>F. Another source of heat is rays of sun. A computer should be installed in a cool place away from sun rays.

*Heat and Dust*

#### Dust

Dust acts as a thermal insulation on the board. It prevents heat to radiate from inside the computer. A blower with compressed air can be used to remove dust. A dust free cloth wetted with water should not be used to clean the circuit board. Moreover, dust can clog air intake area to power supply or hard disk drive and space between the floppy disk drive head and the disk. To audio these problems a dust cover should be used when the machine is not used. Smoking should always be avoided near computers. The printers should be periodically cleaned by blowing out paper dusts.

## Water

Water or liquid should not be allowed near computers and drinking should be avoided near computers. In case of accidental spilling of water or liquid on the computer or keyboard, the computer should be disassembled, cleaned, dried and the reassembled.

*Water*  
*Corrosive liquid*  
*Powerline problems*

## Corrosive Liquids

Salt in sweat and cleaning fluids are very corrosive. Oxidation of circuit contacts is another problem. When a connector becomes oxidized, it does not function properly. Tea and coffee contain tannic acids, carbonated liquids have carbonic acid. Drinking tea or coffee should be avoided near computers.

## Powerline Problems

Good and clean power supply is the most important environmental factor for a computer. Common power line problems are : brownouts, blackouts, transients and noise. Brownouts are sags for lower voltages, blackouts are the total loss of line voltage, transients are large potentially damaging spikes of voltages or current and noise is any unwanted electrical disturbance in the power line. There are two kinds of approaches to remove powerline problems. They are : condition the power being supplied and providing an auxiliary or backup power source. Voltage stabilizers are normally used to condition electrical power against brownouts, transients and noise. The uninterrupted power supply (UPS) stores energy when the line voltage is present and then delivers power to the computer when a blackout occurs. The UPS should be used when it is important to save data and files against total loss of power.

*Brownouts, Blackouts,*  
*Transients and Noise*

## Magnetism

Magnetism causes permanent loss of data on hard or floppy disks. Magnetic field is present around phones, electric motors, stereo speakers, cathode ray tubes (CRT) etc. Stray electromagnetic interference (EMI), power line noise (due to overvoltage, undervoltage, transient spikes and surges) and electrostatic discharges can cause problems for computer.

*Electromagnetic Interference*  
*(EMI)*

## Computer Virus

### *Computer Virus*

A computer virus is a piece of software which infects data or disks and has multiplication capability of itself. They affects computers by deleting files, corrupting screen displays, corrupting data, slowing down operation of a system, displaying unwanted messages etc. A sophisticated virus can spread undetected for a long time. A boot virus attires boot sector of a disk. Viruses affects files with extension EXE, COM, SYS, DRV, OVR, OVI, BIN, Some common viruses are C Barium, Jerusalem, Stone (Marijuana), Dhaka virus, Vienna, April First, Norton, Quick Heal, Kaspersky.

There are many antivirus programs which detect clean and prevent virus. Some antivirus programs are : Norton Antivirus (NAV), Norton, Quebec heal, Kaspersky Central Point Antis Virus (CPAV), Toolkit etc. For virus prevention, virus reporting disk with a copy of antivirus program is used to reboot a system to disinfect viruses. CD, Pen drives, other disks should not be used unless they are checked or reformatted. Backups of data should be maintained against virus attacks.

## Repair and Maintenance

To avoid servicing cost one should perform the preventive or routine maintenance of the computers. But in case of complicated failures of computers the experienced engineers or the suppliers should be contacted.

### *Routine and Maintenance*

Common factors affecting computers are : heat, dust, water, power-line problems, magnetism, corrosive liquids etc. Temperature of the computer room should be between 65 °F and 85 °F. The room should be dust free and drinking near computers should be avoided. A computer should be protected against static electricity and magnetism. Stabilizers or uninterruptable power supplies should be used against power-line problems. Antivirus programs should be used to scan, detect, clean and prevent computer uses.

### 4.3 Exercise

#### 1. Find True / False

- a. Blower is used to remove heat.
- b. Dust usually don't make any harm to computer.
- c. Salt in sweat helps to oxidize the connection in circuit board.
- d. Magnetic field can damage hard disk data.
- e. Antivirus programs can only prevent computer viruses.

#### 2. Questions for short answers

- a. List the Physical factors that affect the performance of a computer.
- b. Explain the terms blackout, brownout transient and EMT.
- c. Distinguish between a stabilizer and on UPS.
- d. Give advantages of preventive maintenance.

#### 3. Analytical questions

- a. Explain how dust affects the performance of computers. What precautions should be taken against dust?
- b. What is a computer Virus? How does it affect the computer systems? Discuss virus protection measures.
- c. Why clean supply of power is important for computers? Explain the power line problems that affect the computes.
- d. What measures should be adopted to prevent computers against power line problems?



## Lesson 5: Selection of Microcomputers

### 5.1 Learning Objective

On completion of this lesson you will be able to

- select component of a microcomputer
- select microprocessors for microcomputers
- choose secondary memory (hard disk and floppy disk, pen drive, CD)
- select monitors and cards for monitors
- choose operating system and application software.

### Components of Microcomputer

Selection of a microcomputer means selection of different components of a micro-computer. Most important components are: processor, memory (cache, hard disk and floppy disk, pen drive, CD) monitor, operating system and application software.

*Components of Micro-computer*

### Choosing a Processor

The microprocessor is the central component of a microcomputer and it determines its main features. It is also a major factor in determining the computer's price as the other components of the computer must be compatible to it.

An 8088 or 8086 processor was used in early XT computers. These are obsolete now. The past few years have seen the gradual development and uses of 80286, 80386, 80486 and upper series processors. At present the Pentium, Quad core, Dual core processors are common for most microcomputers. This processor provides very good performance and is usually required for network servers and CAD (Computer-Aided Design) workstation.

*Processor*

For selecting the PC, it is important to consider the role of the computer, both initially and in the longer term. It is always better to buy high configuration, high-performance, bare-bone systems having upgrade potential.

### Main Memory

Memory chips have become inexpensive in recent years and tendency of using larger programs are increasing. New versions of programs seem to grow exorbitantly requiring megabytes of disk space and large amounts of main memory. Thus the more main memory, the better. When buying a computer it is important to look out for sockets on the motherboard for

*Main Memory*

extra an expansion to RAM, otherwise adding memory later becomes relatively expensive.

Program manufactures usually give the minimum requirements for the programs. Below the specified limit, a program won't run. For satisfactory operation, considerably more memory is almost always necessary. However, determining the actual amount requires some experience with the particular program. It is better to check with the dealer, consult computer journals, or ask an experienced user.

In almost every PC, there is some facility to expand the main memory PC motherboard manufactures usually equip their products with special sockets and sell standard memory modules for memory expansion.

### **Selecting Hard Disk Drives**

As the data transfer rates have been standardized, the essential selection criterion should be the smallest possible average access time. IDE and EIDE disks were once hot sellers and are still quite popular. However, since there are better alternative now, the older type of disks should be bought for existing computer and controller.

#### *Selection of Hard Disks*

The special properties of the SCSI interface make it the model of choice now because of speed and higher disk capacity. Single-user computers may be equipped with an IDE disk. This disk combines high speed and advanced drive technology at a reasonable price. Attention should be paid to the average access time. Access times greater than 20 ms are no longer attractive. The controller and the hard disk must match.

The size for the hard disk depends on the software and the type of work to be done. The size should be minimum about 1GB. Sufficient space should be available for normal office applications at this capacity. Programs that use graphic interfaces often require large capacity.

### **Floppy Disk Drive**

#### *Floppy Disk Drive*

The 3.5-inch floppy disks are smaller convenient and robot and they have a higher storage capacity than 5.25-inch floppy disks. A computer with a single drive, should have a 3.5-inch with 1.44MB capacity. For a computer with a 5.25-inch drive, there is no problem finding software on this type of floppy disk. In a computer with an 80286 or higher processor, the drive should handle 1.2 MB floppy disks.

Difference can be observed between the 3.5-inch drives of various manufactures. The mechanism for ejecting the floppy disks is poorly designed in some disks. Inserting and ejecting a floppy disk should be tried before buying a disk drive. When the floppy disk drive is opened, the disk should come out just far enough to be removed easily. The

## Applications

loudness of the drive should also be checked. Some drives make noise particularly when formatting a floppy disk.

### USB Flash Drive

A USB flash drive is a small storage device shaped like a pen with built-in data storage that connects to a computer by a USB (Universal Serial Bus) port. USB flash drives also known as thumb drives, jump drives, pen drives, key drives or simply USB drives. Flash drives can be written and rewritten to an almost unlimited number of times similar to hard drives. Now, most flash drives have a storage capacity from 8 GB to 64 GB. The largest one is a USB 3.0 flash drive with 1TB (1024 GB) capacity. Flash drives have completely replaced floppy drives for portability, large storage capacity, inexpensiveness and life-long warranty.

*Pen Drive*

### Selecting Monitor

The video card and monitor form a unit and they must match. This applies not only to the type (a VGA card for a VGA monitor) but also for the technical characteristics.

Recommendations for monitors are similar to those for video cards. Basic equipment today should be at least a VGA monitor with a resolution of  $1024 \times 768$ , and a refresh rate greater than 60 Hz, in noninterlaced mode. Higher resolution are important for bigger monitors.

Applications dictate the need for colour or monochrome monitor. Color is usually not required for business programs and office applications. But graphics applications and games do require a colour monitor.

A multifrequency monitor can adapt to many horizontal frequencies, and can be connected to a video card with a different line frequency. However, a fixed-frequency monitor that is well matched to the corresponding video card is less expensive.

Monitor quality can be imagined by displaying dark letters against a light background. The display should not flicker. Attention should be paid to the lowercase letters e, s, and a. There should not be a ring around the individual letters.

It is good to have a demonstration of the monitor. Several hours of work at an unsuitable monitor can bring on a headache for the user.

The interaction between the video card and the screen or monitor is important. SVGA cards and their corresponding monitors have become

*What to Buy?*

inexpensive now and the older graphics standards should not be recommended. A SVGA card can operate both a monochrome and a colour screen. LCD monitor is new available and it is very popular for use.

Any video card should have a refresh rate of more than 60 Hz in graphics mode. The advanced graphics applications require refresh rates of 70 Hz.

### **Choosing Operating System**

#### *Operating System*

MS DOS is still used for PCs. With an 80286 or better processor, “Windows” has become popular now. Consequently there is no trouble finding suitable software, programs for Windows.

The multitasking properties of Windows cannot be used unless an 80386X processor is used. Additionally, less than 4Mb of main memory and a fast hard disk make working with Windows really a fun. Windows XP is also becoming popular now in our country, it requires 1 GB of RAM for comfortable operation.

### **Application Software**

#### *Application Software*

Current computer magazines should be consulted to gather information about a given program before buying it. There are special interest magazines dealing only with freeware and shareware program. Dealers and the forums of on-line services, if available, should be consulted for information. Application areas and the extent of use of the program should be considered when selecting software. Sometimes public domain or shareware products suffice for private use. For businesses, a commercial product is generally preferred, so that when problems do occur, it can be removed quickly. It is, of course, a great advantage if a knowledgeable dealer is there to help immediately. However, the software manufacturer is ultimately responsible for supporting its own product.

Some publishing houses produce market overviews of software programs. PC Magazine, PC World, and Info World and some Bengali computer magazines are good source of such information. In Some magazines short descriptions of the software and hardware the vendor’s addresses, and prices, all classified by type of applications are provided. Also some books are available for choosing the right program for an application.

## Applications

### Selection Chart

#### *Selection Chart*

In order to check the main features of a microcomputer or for selection a microcomputer simple chart can be designed. Filling the blanks in the chart with specifications provided for the computer can help to compare and select microcomputers.

Manufacture	
Brand	
Processor	
Mother board	
BUS speed	
RAM	
Optical storage	
Cache memory	
Bus Architecture	
CD-ROM	
Hard Disk	
Display Adapter	
Casing	
Monitor/ Display	
Network capability	
Other adapters	
Number of slots	
Operating System	
Keyboard	
Casing	

Fig.8.1 Microcomputer selection chart/ Specification.

Once software is selected several dealers should be asked about it. There are considerable price difference, up to 50 percent, in extreme cases.

### 4.3 Exercise

#### 1. Questions for short answers

- a. Which are the most widely used processors?
- b. How can you increase memory of your computer?
- c. What is the advantages of Windows over DOS?

#### 2. Analytical questions

- a. What are the considerations for selecting a hard disk?
- b. How can you purchase software?
- c. How will you select an operating system for your computer?
- d. Discuss the criteria for selecting a monitor and a printer.
- e. Discuss the importance of microcomputer selection chart or specification. Prepare a selection chart/Specification for purchasing a computer for office use.

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*What to Buy?*

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