

Primary Memory: The main memory of a computer, in which small amounts of data that will be used immediately are stored.

Interrupt: Any state or signal causing disturbance in the normal execution of CPU.

Random Access Memory (RAM): The part of primary storage that holds a software program and small amount of data when they are brought from secondary storage.

Read Only Memory (ROM): A type of primary storage where certain critical instructions are safeguarded because the storage is non-volatile and the instructions can be read only by the computer and not changed by the user.

Flash Memory: A form of read only memory on a silicon computer chip that is compact, portable, has limited capacity, and requires little energy.

Cache Memory: A type of primary memory, closer to the CPU than RAM, where the computer can temporarily store blocks of data used more often.

PROM: Programmable ROM, whose contents are decided by the user.

EPROM: Erasable PROM, whose contents can be erased by exposing it to high intensity short wave ultraviolet light for about 20 minutes.

EEPROM: Electrically erasable PROM, whose contents can be erased and reprogrammed on the board easily on a byte basis.

Source Document: Document which records transaction data and are the starting point for capturing input data.

Impact Printer: In these printers, there is mechanical contact between the print head and paper.

Non-impact Printer: In these printers, there is no mechanical contact between the print head and paper.

Plotter: Output device that uses computer-directed pens to create complex, high-quality images.

6.10 QUESTIONS FOR DISCUSSION

1. Describe various components of a computer system. Discuss in detail the components of the central processing unit and give the functions performed by each.
2. Discuss memory of storage unit in a computer system. Also explain the various types of memories available.
3. Describe input/output device in a computer system. Give two example of each type of device.
4. What is a 'bus'? How many different kinds of buses are there?
5. How does a CPU execute its instructions?
6. Explain how the laser printer works.
7. Why do we need buffers? Explain.
8. Distinguish between character printer and line printer.
9. How does a dot matrix printer work? Can it generate carbon copies?

Check Your Progress: Modal Answers

1. (a) Monitor (b) Processor
(c) RAM (d) Keyboard
(e) Monitor
2. (a) False (b) True
(c) True

6.11 SUGGESTED READINGS

Bhatnagar, S.C. and K.V. Ramani, *Computers and Information Management*, Prentice Hall of India Private Ltd., New Delhi, 1991.

Goyal D.P., *Management Information Systems (MIS)*, Deep & Deep Publications, New Delhi, 1994.

O'Brien, James A., *Management Information Systems*, Galgotia Publications (P) Ltd., New Delhi, 1991.

Scott, George M., *Principles of Management Information Systems*, McGraw-Hill Book Company, Singapore, 2003.

Post, Gerald V., *Management Information Systems: Solving Business Problems with Information Technology*, 3rd Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2003.

Davis, Gordon B. and Margrethe H. Olsen, *Management Information Systems*, McGraw-Hill Book Company, Singapore, 1985.

Kenneth C Laudon and Jane P Laudon, *Management Information Systems – Managing the Digital Firm*, 9th Edition, Pearson Education Asia, New Delhi, 2007.

Deepak Bharihoke, *Fundamentals of Information Technology*, Excel Books.

Turban, Rainer, Potter, *Introduction to Information Technology*, John Wiley & Sons, Inc.

Effy Oz, *Management Information Systems*, 5th Edition, Thomson Learning Indian Edition, New Delhi, 2007.

UNIT IV

LESSON

7

COMPUTER SOFTWARE

CONTENTS

- 7.0 Aims and Objectives
- 7.1 Introduction
- 7.2 Concept of Programming
 - 7.2.1 Procedure Oriented Programming
 - 7.2.2 Paradigm Shift to Object Oriented Programming
- 7.3 Types of Computer Languages
 - 7.3.1 Low-level Languages
 - 7.3.2 High-level Languages
 - 7.3.3 User-friendly Languages
 - 7.3.4 Object-oriented Languages
- 7.4 Operating Systems
 - 7.4.1 Types of Operating Systems
 - 7.4.2 Operating System Techniques
- 7.5 Artificial Intelligence
- 7.6 Real World Cases on Programming Intelligence
- 7.7 Let us Sum up
- 7.8 Keywords
- 7.9 Questions for Discussion
- 7.10 Suggested Readings

7.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Understand the concept of system and application software
- Discuss operating system
- Discuss types of software
- Understand artificial intelligence

7.1 INTRODUCTION

Software are broadly classified into following two types:

- System Software
- Application Software

System Software

Software, which are required to control the working of hardware and aid in effective execution of a general user's applications are called system software. These software perform a variety of functions like file editing, storage management, resource accounting, I/O management, database management, etc. Some of the examples of system software are DOS (Disk Operating System), Windows, BASIC, COBOL and PC TOOLS. These software are developed by System Programmers.

Types of System Software

System software can be further categorized into following three types:

1. System Management Software
(Operating Systems, DBMS, Operating Environments)
2. System Development Software
(Language Translators, Application Generators, CASE Tools)
3. System Software Utilities

Application Software

Software which are required for general and special purpose applications like database management, word processing, accounting etc. are called as application software. Some of the examples of application software are dBASE, Word Star, Tally etc. Application software are developed using system software by Application Programmers.

1. General Purpose Application Software
(Database Management Packages, Word Processors, Spreadsheets, Office Automation Packages)
2. Special Purpose Application Software
(Desktop Publishing, Multimedia, Business Applications)

7.2 CONCEPT OF PROGRAMMING

We have discussed that computer has no intelligence of its own and each and every instruction should be given to it for performing certain tasks. The set of instructions given to computer to process the data or perform certain task is called a Program. Programming is the technique for writing the programs. Programming is required at all levels from manufacturing of the computer to its operation by the user. Programming, which is done at systems level for developing system software, is known as Systems Programming (Systems Development). Systems Programs are written in low level languages (we will discuss about types of language later on) like Machine/Assembly Language, C/C++ etc. Programming, which is done at the user level, for development of application software, is known as

Applications Programming (Applications Development) or simply Programming. Application Software are generally developed using high level languages, DBMS or Front End Tools (we will also discuss about these in subsequent sections).

There are two approaches used in programming – a traditional approach, Procedure Oriented Programming and a latest approach, Object Oriented Programming. Managers must be aware of the advantages and disadvantages of both approaches of programming.

7.2.1 Procedure Oriented Programming

Procedure oriented programming is the traditional way of programming, where an application problem is viewed as a sequence of things to be done (algorithms). As per the algorithm, the problem is broken down into many modules (functions) such as data entry, reporting, querying modules etc. There are two types of data, which are associated with these modules one is global and another local data. Global data items are defined in main program, whereas local data within associated functions. Many of the functions share global data, as this kind of data is available to all functions. Procedure-oriented programming is the conventional approach of programming for developing application software. High level languages like COBOL, Pascal, BASIC, Fortran, C etc. are based on procedure oriented approach, and hence are also called procedural languages.

Advantages of Procedure Oriented Programming

- It is the most easiest way of writing programs for simple applications, which normally do not require further modifications and additions.
- It is easier to learn procedure oriented programming than new ways of programming.

Disadvantages of Procedure Oriented Programming

Although procedure oriented programming is the conventional approach of programming, it has certain drawbacks. The main disadvantages of this approach are:

- As most of the functions share global data, this data is freely available to all functions. Although this freely available data is easily accessed by any function, it can create certain problems. When a new function is written for analysing this data in different way, it is possible that data may be changed accidentally or deliberately. Therefore, there is no security of data in procedure oriented programs.
- Procedure oriented programming does not model the real world problem.

7.2.2 Paradigm Shift to Object Oriented Programming

Object oriented programming is the latest approach of programming. It attempts to eliminate most of the drawbacks of procedure oriented programming by incorporating new concepts. It is a new way of organising programs, which is not dependent upon any particular language. In object oriented programming, a problem is viewed not as a sequence of things to be done, but as a collection of different units (called objects) that model the real world things. The 'Object Oriented' concept can be better understood by discussing about the definitions of an object and its related terms.

Advantages of Object Oriented Programming

- Reusability of the code is the major benefit of object oriented programming. Redundant code can be eliminated through inheritance feature of OOP. The generation of windows, menus, dialog boxes etc. are few examples of programming codes that can be reused. So, a lot of time of programmers is saved during development of an application software.
- In object oriented programming, as the emphasis is on data rather than algorithms, a program can easily be broken down into objects, which model truly the real world objects.
- The programs and data are more secure due to data hiding feature of OOP.
- New data types can be easily created through data abstraction feature of OOP.

7.3 TYPES OF COMPUTER LANGUAGES

One man communicates with another in a language, which another man can understand. Similarly, man communicates with computer in a language, which machine can understand. This language which consists of a set of commands, understandable by computer directly or after translating, is known as Computer Programming Language. There are many types of computer languages, which can be categorized into following four types:

1. Low-level Languages (First and Second Generation Languages);
2. High-level Languages (Third Generation Languages);
3. User-Friendly Languages (Fourth Generation Languages);
4. Object Oriented Languages (Fifth Generation Languages).

7.3.1 Low-level Languages

In early days of computers, only those languages were used for programming, which could be directly executed on computer. Languages, which computer can understand directly and are machine dependent, are called low-level languages. For example, Machine Language and Assembly Language are two important low-level languages. Machine language is the oldest and most difficult of all the languages. It is also known as First Generation Language. In machine language, all the instructions are given to computer in binary digits, and hence are directly understood by the computer. On the other hand, assembly language is easier than machine language, and is known as Second Generation Language. In assembly language, instructions are given using mnemonic operation codes (such as ADD, MUL etc.) instead of binary digits.

7.3.2 High-level Languages

Development of applications using low level languages requires a deep understanding of the hardware. In order to facilitate the programmers to write programs without knowing the internal details of computer components, many languages were developed. These languages use common English words and are translated into low-level languages before processing by the computer. These languages which computer cannot understand directly and are not machine dependent, are called High-level Languages (HLL). These languages are also known as Third Generation Languages. Some of the common high-level languages are:

- BASIC (Beginners All Purpose Symbolic Instruction Code);
- (COBOL (Common Business Oriented Language);

- FORTRAN (Formula Translator);
- PASCAL (Name of a Scientist);
- C (it does not stand for anything).

These languages were widely used for applications development, but most of them are outdated now-a-days due to popularization of 4GLs.

7.3.3 User-friendly Languages

Although high-level languages are simpler to codify than low-level languages, they still require a lot of time to learn their programming syntax. Hence, these languages are beyond the reach of many computer users (including MIS professionals), who do not want expertise in programming. Therefore, a new category of languages have been developed which are user-friendly, very easy to codify and simplest to learn. These languages are called as User-friendly Languages and popularly known as 4GLs (Fourth Generation Languages). Some of the common 4GLs are dBASE, Foxbase, Foxpro, MS Access, Oracle, Sybase and Ingres. The uses of different 4GLs are summarized in Table 7.1.

Table 7.1: Uses of 4GLs (Fourth Generation Languages)

Language	Uses
dBASE	Used for development of mainly single user DOS based database applications.
Foxbase	Used for development of both single and multiuser DOS based database applications.
Foxpro	Used for development of both DOS and Windows based database applications.
Oracle	Used for development of relational database applications on any operating environment.
Sybase	Mainly used for development of on-line applications such as Decision Support Systems and Transaction Processing.
Ingres	Used for development of relational database applications of VAX/UNIX operating system.

7.3.4 Object-oriented Languages

We have discussed that the object-oriented programming is the latest approach in programming. The languages which are based on Object-oriented Programming (OOP) approach, are called as Object Oriented Languages. They may be classified into Fifth Generation Languages. Object Oriented Languages are specially useful for development of GUI (Graphical User Interface) applications. These languages also offer a unique feature of Reusable Code. Some of the popular object-oriented languages are Smalltalk, C++ and Object COBOL, Object Pascal, Simula, Eiffel, Java & Visual J++. C++ and Visual J++ are widely used nowadays for development of windows-based applications.

7.4 OPERATING SYSTEMS

An Operating System is the most essential system software, that manages the operation of a computer. Without an operating system, it is not possible to use the computer. We know that the computer is a hardware and is useless until it is provided an essential software, which makes it ready to use. An operating system is that software which makes the computer ready to use by a process, called booting. Before discussing the types of operating system, let us first see what exactly is meant by booting.

Bootting: When we switch on the computer, the instructions stored in ROM are automatically executed. These instructions help the computer to load the operating system from external storage device (disk) to internal storage (RAM). This process of loading of operating system from disk to RAM is called bootting. The term 'bootting' comes from the word - 'bootstrap' as bootstrap help us to get our boots on, similarly bootting helps the computer to get ready. The process of bootting is illustrated in Figure below.

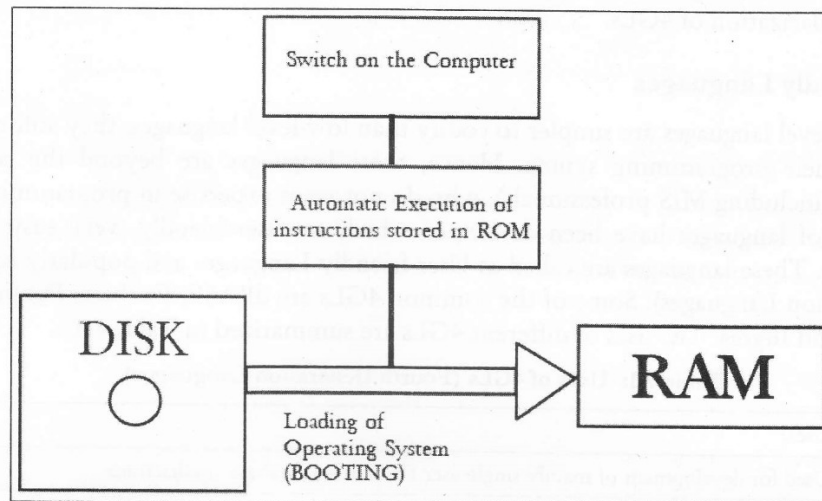


Figure 7.1: Process of Booting

7.4.1 Types of Operating Systems

Many types of operating systems are available for computers. These are divided into following two types:

1. **Single-user Operating Systems:** These operating systems are used for those computers (mainly microcomputers) which have only one terminal (stand-alone PC). MS DOS (Microsoft Disk Operating System) and PC DOS (Personal Computer Disk Operating System) are the two important single-user operating systems. Both systems are almost identical and are simply called DOS.
2. **Multi-user Operating Systems:** These operating systems are used for those computers (micro to mainframe) which have many terminals (multi-user systems). The popular operating systems used for multi-user systems are:
 - (i) **UNIX:** UNIX was initially developed by AT&T at Bell Laboratories in 1969. UNIX is a highly successful operating system for multi-user systems. Actually, it is more popular among scientific and engineering users rather than business users. In 1980, Microsoft developed its own version of UNIX for 286s and higher PCs which is called as XENIX. UNIX System V Release 4 is the latest version of UNIX.
 - (ii) **NetWare:** NetWare is a group of network operating system developed by Novell, Inc., that provides multi-user capabilities. The detailed discussion about this is given in chapter- 5 on 'Communication Concepts and Networking'.
 - (iii) **OS/2:** OS/2 is a multi-user, multi-tasking operating system, developed jointly by IBM and Microsoft. It provides a unique feature of multi-tasking, where several programmes can be run simultaneously. It was the first operating system that provided users with a Graphical User Interface (GUI).

7.4.2 Operating System Techniques

There are several techniques used in multi-user operating systems for enabling many users to concurrently share the single or multiple CPU (e.g. Multiprogramming and Multiprocessing). Some techniques are used in single-user operating system to handle multiple tasks (Multi-tasking). The common techniques used in different operating systems are defined as follows:

- **Multiprogramming:** It is a process by which single CPU works on two or more programme concurrently.
- **Time-sharing:** It is a technique that allows a CPU to simultaneously support the activities of several users by allocating fixed time slots (in milliseconds).
- **Multiprocessing:** It refers to the use of two or more CPUs to perform a coordinated task simultaneously.
- **Multi-tasking:** It refers to the ability of an operating system to execute two or more tasks concurrently.
- **Multithreading:** It refers to the concurrent processing of several threads (sub-processes) inside the same programme.

Examples of operating systems that support multiprogramming are OS/2, UNIX and Macintosh System 7. MVS, VMS and Windows NT support multiprocessing. Windows NT and OS/2 operating systems use multi-tasking technique.

7.5 ARTIFICIAL INTELLIGENCE

The IT industry is growing very rapidly and many new technologies are coming day by day. There are certain technologies which are still under research and development process. Artificial Intelligence and Virtual Reality are major emerging technologies.

A computer has no intelligence in itself. It performs tasks by getting instructions from the human beings. Scientists are trying to impart certain abilities to computer, which can enable them to perform tasks intelligently, just like human beings.

Artificial Intelligence (AI) is a capability in computer to carry out the tasks that require intelligence if carried out by human beings.

The term 'Artificial Intelligence', which was coined in 1956 by John McCarthy at Dartmouth College, connotes a futuristic world. Artificial Intelligence is still under research and development program across the world. Though we are not discussing this vast field of emerging technology in detail, we are presenting below a brief outline of main areas of AI.

Applications of Artificial Intelligence

There are five main application areas of AI research, which are:

Expert System: Expert systems are programs that are like human experts which possess extensive background knowledge in their specialized field. They are needed because human expert manpower is scarce and expensive. Today, expert systems are available for most of the business applications like finance, marketing, manufacturing etc. besides technical and medical fields. For example, PlanMan, Financial Advisor and Plan Power and some expert systems for financial planning areas. MYCIN was the first expert system project for medical applications. After MYCIN project, new systems like

EMYCIN (empty MYCIN) were developed, which were without knowledge base. The expert systems without knowledge base are called as expert system shell. Guru and VP Expert are other examples of expert system shell.

- **Robotics:** Robotics is the major field of artificial intelligence. It is concerned with design, manufacturing and implementation of computer controlled devices, called Robots. Robots are widely used in many industries like car manufacturing, coal mining, chemical industries etc.
- **Natural Language Processing (NLP):** NLP is that field of artificial intelligence that allows computer to communicate with users in natural languages like English, French etc. HAL is the popular natural language interface for Lotus 1-2-3. Guru is another example of NLP software with capabilities of database management, word processing, spreadsheets and graphics.
- **Computer Vision:** This field of artificial intelligence enables computers to recognise shapes and patterns through a technique called Pattern Recognition.
- **Neural Networks:** Neural networks are knowledge based computer systems that are designed to learn by observation and repetition just like human beings.

Virtual Reality

Virtual reality is a concept that projects the users into a three dimensional space generated by computer. Users wear a helmet-like device that completely covers both eyes and ears to create an artificial computer-simulated reality. Users can move and manipulate illusory objects in their view. They can select and organise information with hand and body movements. However, several companies are developing business applications for this emerging technology. For instance, a major electronics firm in Japan is developing an application for a 'Virtual Showroom'.

..The role of AI routines in decision support is significant as these systems pinpoint why the business lapse or deviation in anticipated results occurred after inspecting the actual results in comparison to forecasts through knowledge based attributes. For instance the intelligent DSS can suggest that the net profits for a particular period decreased owing to an abnormal increase in price of raw materials or mismanagement of cash handling or inappropriate tax planning. DSS generator IFPS/plus is endowed with such Artificial intelligence routine features.

7.6 REAL WORLD CASES ON PROGRAMMING INTELLIGENCE

Real-world programming is also known as real-time programming. It is a programming that is related with the "real world" of daily life. Earlier, real-time systems were dedicated to very rare applications, such as rocket guidance systems. Now, real-time systems play a role in daily routines of life. That is it is confined to almost every aspect of life, *for example,*

- The brakes in our car are controlled by real time systems,
- Also the workings of video games are fully handled by the real time systems,
- Automatic bank tellers work through real time system,
- The disk drive in your computer is another example of real time system.

Deadlines have been provided to Real-world applications. All tasks are done according to their deadlines. Deadlines are to be followed; otherwise it could affect the system in a negative manner. *For example:*

- If the brake processor in your car doesn't meet a deadline, your car will not stop;
- If your video game doesn't meet a deadline, you will not be able to play the game in an organized manner;
- If your ATM doesn't meet a deadline, you may start looking for another bank.

Let us see some more examples of how programming is relevant in our day-to-day lives and keeps things working. One of the examples is an elevator - someone has to program the logic of that... Some elevators are "smart" and some of them are quite backwards and foolish depending on their programming.

- Another example, we can say is traffic lights which are based on the real time system.
- Providing a calculator to perform calculations on a stuff rather than providing a pen and paper.

Check Your Progress

1. What is system software?
2. What is application software?

7.7 LET US SUM UP

Software are the programs required to operate a computer. They are broadly classified into System and Application software. System software include mainly operating systems (e.g. DOS, UNIX etc.), operating environments (e.g. Windows), DBMS (Data Base Management Systems), language translators (Assemblers, Interpreters and Compilers), applications generators, CASE tools and various software utilities. Application software are further classified into General Purpose and Special Purpose application software. Programming is a technique for giving instructions to the computer by using a computer language. There are mainly four types of programming languages - (i) Low-level; (ii) High-level; (iii) User-friendly and (iv) Object oriented languages. Low-level languages include Machine Language (1st generation language) and Assembly Language (2nd generation language). BASIC, COBOL, FORTRAN, PASCAL and C (3rd generation languages) are the common high level languages. User-friendly languages include mainly dBASE, Foxbase, Foxpro, MS Access, Oracle, Sybase and Ingress (4th generation languages). Smalltalk, Visual C++, Visual J++ and Object Pascal are some of the popular object oriented languages. Application generators generate the program code according to the specifications given by the programmer. System software utilities support the operation of computer by providing many features like file management, data compression, diagnostic routines, virus detection and removal, text editing, performance monitoring and spooling. Artificial Intelligence and Virtual Reality are the emerging information technologies. Although computers provide numerous benefits to the man, they cannot replace human beings at all.

7.8 KEYWORDS

System Software: Software, which are required to control the working of hardware and aid in effective execution of a general user's applications are called system software.

Application Software: Software which are required for general and special purpose applications like database management, word processing, accounting etc. are called as application software.

Operating System: An Operating System is the most essential system software, that manages the operation of a computer. Without an operating system, it is not possible to use the computer.

Multiprogramming: It is a process by which single CPU works on two or more programme concurrently.

Time-sharing: It is a technique that allows a CPU to simultaneously support the activities of several users by allocating fixed time slots (in milliseconds).

Multiprocessing: It refers to the use of two or more CPUs to perform a coordinated task simultaneously.

Multi-tasking: It refers to the ability of an operating system to execute two or more tasks concurrently.

Multithreading: It refers to the concurrent processing of several threads (sub-processes) inside the same programme.

7.9 QUESTIONS FOR DISCUSSION

1. Differentiate between system and application software. Give Four examples of each.
2. What is an operating system? Describe its basic functions.
3. What is booting? Explain it with suitable illustration.
4. Classify the following operating systems into Single-user (S) or Multi-user (M):
5. (i) MS DOS (ii) OS/2 (iii) UNIX (iv) Windows NT
(v) OS/400 (vi) PC DOS (vii) Linux (viii) MVS
6. Explain with examples the difference between multiprogramming, multiprocessing and multi-tasking.
7. Which is the traditional approach of programming? What are its major disadvantages?
8. What is OOP? Describe its advantages over procedure oriented programming. Why is it not as widely used as the latter?
9. Discuss the role of programmer and systems analyst in development of a software.
10. Describe with examples five generations of languages. Which generation of language is most suitable for development of GUI applications and why?

Check Your Progress: Modal Answers

1. Software, which are required to control the working of hardware and aid in effective execution of a general user's applications are called system software.
2. Software which are required for general and special purpose applications like database management, word processing, accounting etc. are called as application software.

7.10 SUGGESTED READINGS

Deepak Bharihoke, *Fundamentals of Information Technology*, Excel Books.

Turban, Rainer, Potter, *Introduction to Information Technology*, John Wiley & Sons, Inc.

UNIT V

LESSON

8

TELECOMMUNICATIONS

CONTENTS

- 8.0 Aims and Objectives
- 8.1 Introduction
- 8.2 Telecommunication
- 8.3 Communication Technologies in Business
 - 8.3.1 Videoconferencing
 - 8.3.2 Wireless Payments
- 8.4 Telecommunications Standards and Policy
- 8.5 Information Systems Planning
- 8.6 Business Processes v/s Information Systems
- 8.7 Let us Sum up
- 8.8 Keywords
- 8.9 Questions for discussions
- 8.10 Suggested Readings

8.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Understand Telecommunication concepts
- Discuss telecommunications in business
- Discuss information system planning
- Discuss strategic alignment of business and IT

8.1 INTRODUCTION

We are in the world of advanced Information Technology where things are moving in such a fast phase. The availability of information becomes cheaper and faster and the facilities existing to exchange the information among users all across the world has become more simpler due to the evolving of Information Super Highway. The internet provides fast and inexpensive communication channels that range from messages posted on bulletin boards to complex exchanges among many organizations. It also includes information transfer (among computers) and information processing. E-mail, chat groups, and newsgroups are examples of major communication media.

Data communication, in general, refers to the transmission of data from one location to another and now-a-days it is referred to as transmission of computerized data. Communication is essentially a perceptual process. The sender must encode, intended meaning to create messages. The receiver then decodes message to obtain perceived meaning. Effective communication depends on the sender and receiver sharing an understanding of the rules used to encode meaning into messages.

A data communication channel is a path through a medium that data can take to accomplish communication task channels and they are called 'data highways', carrying signals, from the sending stations to receiving stations along predefined routes. It is broadly categorized into three types, (a) Digital Data Transmission and (b) Analog Digital and (c) Analog Data Transmission. Most computers transfer data signals internally using digital data transmission. Analog Digital Transmission uses continuous form of representations such as sound waves or micro-waves. Digital data is hampered by three problems, if data is transmitted over long distances and they are attenuation, higher power requirement and the introduction of spurious signals. Modems are helpful to overcome these problems.

Let us see the major components of Electronic Communication System as follows.

8.2 TELECOMMUNICATION

Telecommunication implies the transmission of information from one point to another through a communication medium. In today's dynamic business environment, people, in order to perform their work activities and to compete successfully, need to communicate electronically within and outside the organization. As a result, telecommunication takes on a significant role in an organization. Sometimes, the term data communication, which is a narrow term and refers to the transmission of data, is also used and thus data communication is a more specific term.

A telecommunication system may be represented by way of a simple conceptual model as shown in Figure 8.1.

The data source is to originator of information while data transmission is the receiver of information. The channel is the path through which the information is transmitted to the destination from the source. Before an information is sent through the communication channel it is converted into coded symbols by transmitted encoder, only to be decoded at the receiver's end by receivers decoder. The encoded data is transmitted through the channel by an electronic signal or waveform.

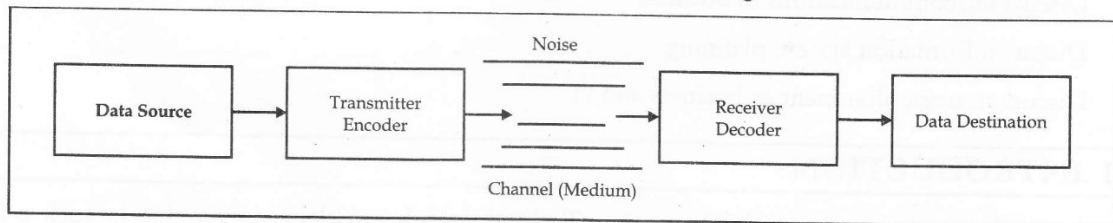


Figure 8.1: Conceptual Model of Communication System

Tele-communication refers to the transmission of information of any type using the telephone system. Most telephone connections in residences and offices offer analog service.

1. **PSTN (Public Switched Telephone Network):** PSTN is the oldest telephone service. The first telephone exchange opened in New Haven Corporation in the year 1878 and connected 21 subscribers. Today's telephone system uses advanced switching technology to create an end-to-end circuit between any two telephones in the world.

2. **LEC's (Local Exchange Carriers):** Local exchange carriers – are providers of Telephone service (or Telcos). They provide directly wired services within a residential society. This is the earlier type of communication system, which is now used to cover short distances.
3. **LATA (Local Access and Transport Area):** The area covered under LEC's is called Local Access and Transport Area. This system uses analog transmission mode. Here listed below are some of the transmission media devices:
 - ❖ Long-distance Transmission Media
 - ❖ Copper Wire
 - ❖ Fibre Optic Cable
 - ❖ Micro-waves
 - ❖ Satellites
4. **Private Branch Exchange (PBX):** If the organization has several departments at long distances, this PBX system is useful to have internal and external communication through telephones. One operator looks after the incoming calls and outgoing calls. Inter-com i.e. internal communication among managers of departments can be established through PBX.
5. **Cellular Phones (Wireless Communication):** Cellular communication system utilises all the benefits of technological advancements. Through wireless instrument, voice, messages or pictures can be transmitted through satellite disks arranged by cellular service providers like BSNL, AIR-TEL, TATA, RELIANCE etc. The inter-link between these satellite towers is useful in getting connected from cellular phones to land-phones, cell to cell phones or cell to a computer which is having internet facility.
6. **Bandwidth:** Bandwidth is the rate at which the network can deliver data from a sender to the destination host.

Functions

- Communication among users of computer systems.
- Communication among applications being executed on different systems.
- Sharing computer resources.
- Distribution of computer applications among computers in different locations.

8.3 COMMUNICATION TECHNOLOGIES IN BUSINESS

Most traditional business communications rely on telephone and paper-based processes. These resources do not readily support the level of productive interaction that growing businesses need to excel, and can be easily overwhelmed in periods of rapid growth.

"Organizations are looking to increase productivity by focusing on the interactions between colleagues, partners, and customers, says John Chambers, Cisco Chairman and CEO. "Productive interactions also help improve profitability and customer satisfaction, and they create new opportunities for corporate growth and success."

Today, successful companies around the world achieve that efficiency with network-based communications tools such as e-mail and a Web presence. These tools support the high levels of productivity and customer support that growing companies need to compete in larger and more lucrative markets. A sound network foundation will also support the new technologies and applications necessary to sustain ongoing competitiveness.

Every successful business needs to have the best communication equipment available on the market. It's just a simple fact. If you can't properly communicate with your different branches, then your efficiency will take a big hit. Communicating isn't that hard though. There have been many advances in the past few years that grant great advantages to your efforts.

One of the easiest would be in the form of a simple teleconference through something like the polycom sound station. You probably already know what this is. It's basically just one big conference, except you don't need to pack everyone into one board room. There are a number of advantages to this setup. The first is that you are in a perfect position to take full advantage of telecommuting. Any of your remote workers can just press a few buttons and log into the conference from their home phone. This also works for any remote branches who want to be involved. There are nearly countless benefits to having one installed. You will have greater function in your meetings and you'll be able to include everyone without annoying travel plans. There is also the usual ability to tape the conference for better archiving. Avaya IP office phones will work in this capacity to make everything function a bit better.

It is important that you take the time to setup the connection properly though. There is no reason to buy an inferior product for your teleconference. If you go cheap and don't have it professionally installed, then the static and poor pickup will effectively ruin any good conference. The good news is that you have a lot of options. The Polycot system works to give you a large microphone range which should be able to handle any small or medium room. There are other options though. Just a basic search online will show a number of companies who want your business.

You could go with a phone system through Avaya partner ACS. They offer similar setups for your conference needs. It's really just about getting what you want from a reputable company. Check to see who has local branches and then see whether one of their products fits your capacity needs better. It's hard to tell you what's the best without understanding your exact situation. These two companies should be a good place to start though. Just one phone call could let you start having teleconferences that make everything run smoother and more efficiently.

The main communication technologies in business are:

1. Videoconferencing
2. Wireless Payments

8.3.1 Videoconferencing

A videoconference is a live connection between people in separate locations for the purpose of communication, usually involving audio and often text as well as video. At its simplest, videoconferencing provides transmission of static images and text between two locations. At its most sophisticated, it provides transmission of full-motion video images and high-quality audio between multiple locations.

Videoconferencing software is quickly becoming standard computer equipment. For example, Microsoft's NetMeeting is included in Windows 2000 and is also available for free download from the NetMeeting homepage. For personal use, free or inexpensive videoconference software and a digital camera afford the user easy – and cheap – live connections to distant friends and family. Although the audio and video quality of such a minimal setup is not high, the combined benefits of a video link and long-distance savings may be quite persuasive.

The tangible benefits for businesses using videoconferencing include lower travel costs and profits gained from offering videoconferencing as an aspect of customer service. The intangible benefits include the facilitation of group work among geographically distant teammates and a stronger sense of community among business contacts, both within and between companies. In terms of group work, users can chat, transfer files, share programs, send and receive graphic data, and operate computers from remote locations. On a more personal level, the face-to-face connection adds non-verbal communication to the exchange and allows participants to develop a stronger sense of familiarity with individuals they may never actually meet in the same place.

A videoconference can be thought of as a phone call with pictures – Microsoft refers to that aspect of its NetMeeting package as a "web phone" – and indications suggest that videoconferencing will some day become the primary mode of distance communication.

What is Videoconferencing?

In videoconferencing technology, two or more people at different locations can see and hear each other at the same time, sometimes even sharing computer applications for collaboration. Videoconferencing offers possibilities for schools, colleges, and libraries to use these systems for a variety of purposes, including formal instruction (courses, lessons, and tutoring), connection with guest speakers and experts, multi-school project collaboration, professional activities, and community events.

Placing a video call is a lot like placing a telephone call. After you connect, you see the other person in color video on a TV screen and may be able to transfer files or collaborate via options such as document sharing or white boarding.

Basic Videoconferencing Technology

Compressed video systems allow a larger audience to experience the benefits of high-quality videoconferencing at a reasonable cost. A videoconferencing system requires the audiovisual equipment, which includes a monitor, camera, microphone, and speaker, and a means of transmission.

Rather than an Internet-based connection, such as that used by webcams, which have to share bandwidth with other Internet data, a compressed video system on a dedicated bandwidth provides smooth audio and video.

The compressed videoconferencing may be transmitted via an ISDN (Integrated Services Digital Network) line or over IP (Internet Protocol) lines. It is an economical solution for high-quality videoconferencing.

8.3.2 Wireless Payments

Payment system refers to a service to pay the charges using credit card, debit card or mileage when we purchase service and product on and off lines. The processing procedure of the payment system is

generally divided into customer security, payment at POS, imposition and request of payment and liquidation between payment service provider and consumer. Most of the payment systems take similar procedure regardless of its technical method. The small sum payment system, an early model of payment system, can be said to be the method to purchase products using wired internet and mobile device. In the small sum payment system, we choose a product on wired internet and the payment method as the small sum payment, and input user information like the number of the device and residence registration number, then it transfers after confirmation the authentication number to the mobile device, which is input again on wired internet to finish the authentication procedure. Figure above shows this procedure.

Wireless Payment System

The wireless payment system has two methods for payment, which is based on card (hardware type) or not on card (software type). The method based on card is equipped with a smart card having various financial applications saved in, such as credit card, debit card or mileage, for processing authentication and payment, and it can be classified according to the number of the equipped cards within the mobile device. The types are dual-slot type, dual-chip type and one-chip type. The dual-slot type is equipped with a separate smart card reader slot inside of the mobile device in order to process the payment with own smart card inserted. The dual-chip type is to have IC chip saving the payment application inside of the mobile device separately from SIM card. The one-chip type combines the member authentication function of SIM card with the financial application of IC chip in order to save in one SIM card. The method based not on card is to associate real-time authentication with payment system through the mobile communication wireless network without separate smart card to save inside the personal financial information, which is classified as cellular phone integrated charge method and mobile wallet method. The cellular phone integrated charge method is a method to pay the charges later with integrated payment bill for mobile communication at the next month. The mobile wallet method is to input user information in the server of a bank or a credit card firm, to which the user logs on through the mobile device.

Design of Wireless Payment System

Configuration of System

The wireless payment system proposed in this paper is based on MobileC that is practicable on GVM based on the application download solution. The overall system is divided into a client as the mobile device and a server. The client plays a role to save user interface and fundamental user information, and the server takes the intermediary role between the client and the card firm and authentication organization and the save role of the certificates of each user.

The process of this system comprises of initialization process and transaction process

Initialization Process

The initialization process is a preparation process for operating the wireless payment system on a mobile device. Basically the mobile device does not have the wireless payment system equipped inside. Thus it requires a procedure to download and install from the server, the wireless payment system necessary for the mobile device, and requires initial configuration procedure to operate the wireless payment system installed in the device. This initialization has the following order for process.

1. Connecting GVM download server using the mobile device.
2. Downloading the wireless payment system from the GVM download server.

3. Inputting user's personal password for operating the wireless payment system.
4. Inputting card information to be used in the wireless payment system.
5. Transmitting the personal identification number and card information to the connection server in order to confirm the input information of card.
6. The connection server transmits the information from the mobile device to the server of card company or authentication organization and requests the certificate.
7. As the authentication process is normally over, it downloads the certificate of the card company or authentication organization to save in the connection server and transmits the authentication result to the mobile device.
8. The mobile device taking the authentication result saves the personal card information in the non-volatile memory of the mobile device.

This is the initialization procedure of the wireless payment system that requires only one performance. However, if it requires user's card replacement when the wireless payment system is used, the initialization is processed by stepping up from the 4th stage of the overall procedure.

Transaction Process

The transaction process is a procedure of payment for the purchases of products through user's mobile device on and off lines. The mobile device transmits card information, mobile device identification number (e.g. telephone number), unique identification number of the store where the product is purchased (e.g. store ID given in advance) and the amount to the connection server, which confirms the payment information transmitted from the mobile device to load the certificate corresponding to the card information and the mobile device identification number. And, using the encryption key of the loaded certificate, it enciphers the overall payment information before transmitting it to the authentication server. The authentication server verifies the overall payment information transmitted from the connection server. If the card information equals to that of the user, it transmits the admission number about the payment in question to the connection server and the store. The connection server transmits the admission number sent from the authentication server to the mobile device to finish the all the transaction procedure. The admission number transmitted to the store from the authentication server is receivable through the previously constructed card reader of the store.

8.4 TELECOMMUNICATIONS STANDARDS AND POLICY

Telecommunications standards are those which are based on the emerging Information Highway and the existing telephone system. It is necessary to use formal telecommunications standards to physically interwork. Wide-area voice and data communications would not be possible, without public agreements and the telecommunications standards that codify such agreements,

Formal standards are accredited by American National Standards Institute (ANSI) in the US:

- Standards committees should maintain their standards
- Intellectual Property Rights are identified during the standards creating process.

Telecommunications Policy involves changing roles of telecommunications in society. It includes a forum for research and debate amongst academics, policymakers, regulators, industry managers, consultants and other professionals. Its scope includes issues of telecom reform at national, regional and international levels.

8.5 INFORMATION SYSTEMS PLANNING

Planning

is the basic activity to all managerial functions. Planning acts as the basis of each activity in the management process because management process starts with it. This can be well understood with the help of a diagram which is shown in Figure below.

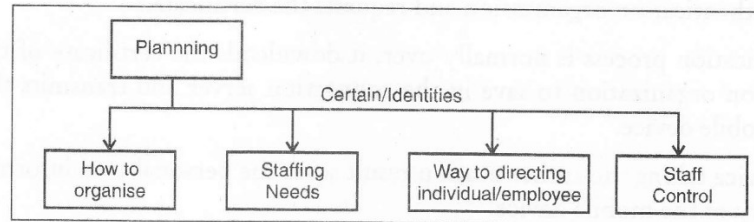


Figure 8.2: Primary Planning in Management Process

Planning refers to the determination of the future course of action to achieve the desired goals. It means that, planning is the answer of five "W's" and one "H", i.e.

- What to do;
- When to do;
- Where to do;
- Who is to do it;
- For whom it is done; and
- How to do it.

Plans can be of many types. It may be long-term planning, short-term planning and medium, strategic, corporate, operational, functional, business plans, etc.

Long-term planning refers to the process of planning for long-term goals. It defines the broad directions in which the organization seeks to steer its future. It is usually for a period of five years and more.

Medium planning covers a period of two to five years. They are more detailed and coordinative in nature because they are designed to implement long-term plans through the co-ordinated efforts of different departments of the enterprise.

Short-term planning covers the period of one year. They are more specific and detailed. They are designed to break the work done in long-term into specific action programme.

Corporate planning is the plan for the total enterprise. They are broad and general and, related to general policies, goals and objectives of an organization.

Divisional business planning is related to a particular department in an organization.

Functional or unit planning is the lowest level of planning. A feasible action plan is laid down to implement the divisional planning.

Strategic planning is done at higher level of management. It is for every functional area of an enterprise and related policy matter like expansion, diversification, growth and retention, etc.