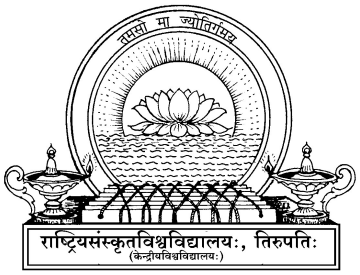
Computer Application

Prak-Sastri 1st Year
Course/Paper.5

INTRODUCTION TO COMPUTERS



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Unit – I Introduction to Computers

Structure

Objective

The objective of this unit is to clearly know about what computer is, its history, classification of computers and applications.

1.1 Introduction to Computers

Early Computers were mostly used for mathematical purposes. Today Computers are used to forecast the weather, to operate machines, go guide spacecraft to the moon and for a host of applications. They are also used in diagnosing diseases and to find out whether a hospital bed is available for a particular patient. Companies use them for accounting, invoicing, stock control and pay rolls.

We see that computers act upon information. This information or data comes in all shapes and sizes, from a mathematical equation to the required details about a company's work force necessary to produce a pay roll or produce the data required.

1.2 History of Computers

Before the evolution of electronic computers, the results to the mathematical problems were provided by mechanical means. In the early nineteenth century, Charles Babbage invented his Difference Engine in 1822. In 1833, Babbage started working on his Analytical Engine. It was capable of performing the basic arithmetical functions for any mathematical problem and it was to do at a speed of 60 additions a minute. The machine consisted of five parts.

(i) A storing unit to hold the numbers.

(ii) An arithmetic unit called the 'mill'.

(iii) A control unit for seeing that the machine performed the desired operations in the correct sequence.

(iv) An input device to pass into the machine both numbers and instructions.

(v) An out put device to display the results.

COMPUTERS AND THEIR IMPORTANCE:

The computers have their own special characteristics and abilities. The computers are capable of:

(a) Storing large amount of data.

(b) Performing scientific and arithmetic calculations at a very fast speed and very accurately.

(c) Plotting of figures and graphs.

(d) Self-checking the correctness of the program.

(e) Helping in taking decisions.

These outstanding features made the computer the most accepted and most widely used device in today's society. They are being increasingly used in office automation and in process control industries. The advances in

computer sciences and engineering and the reducing trend of cost of the computers have helped a host of general users like engineers, business community, scientists, executives, administrators, teachers, students and decision makers.

DIGITAL COMPUTERS:

The computers can be broadly classified as Analog computers and Digital computers. Analog computer computes in physical magnitude itself. Examples of this type of computation is pressure, temperature, voltage, acceleration, velocity etc. These are widely used in scientific and engineering applications because these deal with quantities which are continuously variable.

The digital computers operate by essentially counting numbers. Thus the information or data is processed in discrete form. All quantities are expressed as discrete digits or numbers. These operate directly on numbers expressed as digits in the familiar decimal system. These digital computers are much faster accurate that the analog computers.

The hybrid computer combines the features of both the analog and digital computers. These are used for special analytical applications.

The present day computers are classified depending on the application as:

1. Special purpose computers.
2. General purpose computers.

1.3 GENERATIONS OF COMPUTERS:

The simultaneous exciting developments in the field of electronics had a great impact on the development of computers. The developments carried out in this field are expressed in terms of generations.

First Generation: The magnetic relays of the very first computer were replaced by vacuum tubes. The computers which were made of these vacuum tubes came to be known as the first generation computers. The ENIAC computer made use of 18,000 vacuum tubes and relays. It was capable of performing 5,000 additions in one second. It was bulky in size and needed heavy air conditioning.

Second Generation: The transistor was invented in 1948 at the bell laboratories and was capable of performing all the functions of a vacuum tube at a much faster rate. It consumed little energy and generated less heat. The computers which were working with transistors came to be known as the second generation computers. These computers were much smaller, consumed less power and generated little heat and were more reliable. These had the capability of performing 20,000 to 50,000 additions per second.

Third Generation: The new techniques of Large Scale Integration (LSI) and Very Large Scale Integration (VLSI) led to the evolution of integrated Circuit. As many as few hundred transistors can be housed on a single Integrated circuits. This chip can be as small as 4 to 8 square centimeters in the area and weighs few grams. It consumes very little power and its cost is very low. The computers using the integrated circuits came to be known as third generation computers. The first computer came from IBM and it called as IBM 360. These computers were smaller in size and greater in capacity and performed as many as tem million additions per second.

Fourth Generation: The beginning of 1970's saw a totally new face in the computer industry with the introduction of microprocessors. These microprocessors comprised of many VLSI circuits having all elements to process the data These microprocessors have thousands of transistors in them. The computers making use of these microprocessors are known as Fourth generation computers.

Firth Generation: The fifth generation computers have a new technology called Artificial Intelligence incorporated in them. These

computers require new architecture, new memory organizations and new programming languages. These will be the computers that can learn, make inferences and make decisions.

Generation	Period	Circuit Elements	Computer name
First	1946-1956	Vacuum Tubes	Mark 1
Second	1957-1964	Transistors	ATLAS, B5000, IBM 1401, ICL 1901,
Third	1965-1970	Integrated Circuits	IBM 360, HP 2100 A, HP 9810 IBMS/370, UNIVAC 1100
Fourth	1971-1980	Large scale integration (LSI) and very large scale integration (VLSI).	ICL 2900 HP 9845 A VAX 11/780
Fifth	1980	Under development	Under development

Data and Information are used interchangeably, but there is a lot of difference between data and information. Data means collection of facts and information means processed data.

1.4 Basic Structure of a Computer

A computer is a data processing machine consisting of a system of integrated electronic units that accept and store data, perform specified arithmetic and logical (Decision making) operations on the data and produce

output results from these operations. Basically a computer performs the functions of data input, processing and output. A computer system manipulates data and solves problems automatically under the direction of a program stored in the memory unit. The program is a sequence of instructions that directs the computer in solving a specific problem by using the various units. Each unit is constructed from integrated circuits and various electronic components. The CPU consists of

(i) The control unit used for controlling and directing the operations of a computer.

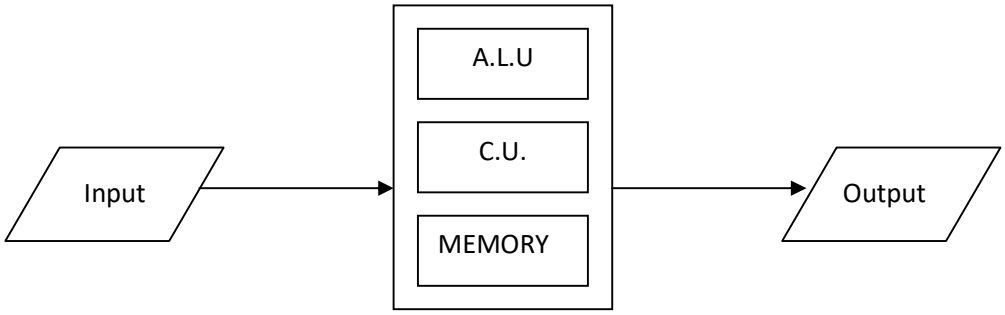
(ii) The arithmetic logic unit used for performing the calculations and decision-making operations.

(iii) The memory unit is used for storing computer instructions and data for processing.

The input units are used to read data from an input device and transfer it to the primary memory unit.

The output units are used to take data from primary memory and write it on some output device.

Peripheral devices such as video display terminals, printers, magnetic tape drives and magnetic units are connected to the CPU. The term peripheral comes from the location of these devices in respect to the computer console since they are placed in a periphery around the computer operator console for easy access. These devices form the input units, output units and secondary storage units. These peripheral units are connected to the CPU to form a group of units called a computer system or simply a computer. The collection of various physical units and equipment is referred to as hardware.



(a) Control Unit:

It controls operations and directs the operations of all other units. The second function of the control unit is to fetch, decode and execute each of the instructions supplied for a problem solution. The control unit uses electronic components known as 'registers' to do these operations.

(b) Arithmetic logic unit:

The Arithmetic logic unit (ALU) performs the basic arithmetic operations of adding, subtracting, multiplying and dividing. This unit also performs the logical and decision makingoperations such as comparing two values and determining the result. For example the conditions are as equal to, less than or greater than. The values to be manipulated in this unit are brought from memory and the result of manipulation is sent back to the memory unit .

(c) Memory Unit:

The memory unit allows a computer to store the date keyed in by the input devices or items calculated in a program. Input data must be transferred to the memory unit before the computer can process it. The memory unit is often referred to as primary or internal memory since the data is immediately accessible to the control unit. The memory unit also holds the program instructions that the control unit uses to determine the required operations.

The memory units has many individual locations with unique addresses. Each memory location can store one unit of information at a time. The information stored at a particular memory location is called the contents

of that location. A new data item may be stored in that or any other location by destroying the old data stored in that location.

Each storage location in memory has an address by which the location may be referred. A programmer can refer to a location by a name or a symbolic address. Computer uses this address to obtain the contents of that particular location.

(d) Input Units:

An input unit reads program instructions and loads them in the memory unit for execution when the computer is told to execute a program. These devices also read the data items that the program uses. There are many types of input devices available today. The devices chosen depend largely upon the application and processing environment

(e) Output Units:

Once the data has been manipulated in various ways, such as computing, arranging or summarizing, the results are to be displayed. An output command causes the computer to transfer data from the memory unit to an output device that records or displays the data.

Terminals may be used as both input and output devices since they are capable of transmitting information to a computer and also displaying the results output by a computer. Thus terminals are very popular input/output devices in a student environment.

The printer is a well-known and frequently used output device. The printer prints program listings and outputs results on a paper sheet in a readable form. Most printers have the ability to print 132 characters of data per line and 60 or more lines per page. One many computers you can enter your program and data over a terminal and direct the program listing and results as output on a line printer.

A microcomputer uses small magnetic disks in a self contained envelope known as floppy diskette. A floppy disk is available in sizes 5 ¾ inches and 3 ½ inches.

The input/output and secondary storage devices attached to a computer vary from one installation to another. The number and type of each auxiliary unit are normally dictated by the processing needs of an installation.

1.5 CLASSIFICATION OF COMPUTERS

1. Types of Computers:

Computers can be classified as General purpose and Special purpose. The general purpose computers are used to solve a wide variety of problems. They are used for many applications in business and science. Special purpose computers are designed to solve one particular kind of problem such as controlling air traffic or metal working machines.

There are two types of computers classified on the form of data being processed. Analog computers process data that occur in a continuous form such as temperature, voltage or pressure. The output from analog computers is often displayed on a cathode ray tube or plotting device to help monitor the results analog computers are used in engineering and scientific applications where the input data is a continuous signal. Some of the analog devices are the thermometer, the fuel meter in a car and a thermo stat.

Digital computers operate on discrete quantities represented by numbers or letters. Digital computers are useful in business applications where quantities such as account number, payment receipt and so forth are processed. The scientific, engineering and mathematical fields are digital computers for numerical manipulations. The main advantages of digital computers are

(i) High speed of operation
(ii) Accuracy
(iii) Reliability
(iv) Economy

However they have their limitations. They are

(i) No intelligence – it has to be told every step.

(ii) Limited language capability – can not communicate in English and can work in few programming languages.

(iii) Subject to failure – high failure rate of components.

Since 1950 tremendous human and physical resources have been directed toward the design and development of faster and less expensive computers.

The generations of computers along with their type of electronic components and speed are presented below.

2. Categories of Computers:

Circuit elements refer to the main components used for memory and the CPU. Access time refers to the speed at which a data item can be obtained from memory. Computers are generally placed in three categories according to capability and throughput. Throughput is the amount of processing that a computer can perform with in a given time period. These three categories are

1. Super computers
2. main frame computers
3. mini computers
4. micro computers

(a) Super Computer:

Super computers are used to support engineering and scientific work that is not feasible for humans to attempt. Super computer applications may include performance simulation for nuclear reactors or aircraft, the damage assessment of an atomic explosion or the vibration response of a building to an earthquake.

(b) Main frame computer:

Main frame computers are used in business to read and process millions of data records each day. Super and main frame computers support

applications that require billions upon millions of numeric calculations or that maintain and process fast amounts of data.

Main frame computers normally cost several million rupees.

(c) Mini computer:

Minicomputers or minis have become very popular because of their size, cost and reliability. Small businesses today now can afford minicomputer in their daily operation where as large mainframe computers would be cost prohibitive. Small business computers are formed from a mini computer or a super micro computer. These systems usually have a fixed disk unit or floppy diskettes for secondary storage of data. the relatively low cost combined with powerful capabilities, provides small business organizations with computer resources that they might not other wise be able to afford.

(d) Micro computer:

Micro computers are known as home computers, personal computers, desktop computers and also small business computers. These small computers were widely accepted in our homes and schools as well as in business organizations. Most people refer to these computers simply as micros

1.6 APPLICATIONS OF COMPUTERS

Computers can be used in Scientific Research, Business Applications, Office Automation, Desktop Publishing, Medicine, Engineering, Banking, Insurance etc.,

1.Scientific research:

The advent of computers has helped science research in calculations which were previously beyond contemplation. This has greatly accelerated and expanded research in sciences such as Physics, Chemistry, Astronomy and Genetics. There is an increasing use of computers for research and data analysis in medicine, social sciences. Computers are now being used widely in Universities and research laboratories and are linked through networking.

Particle physics and molecular biology are some fields where spectacular progress has been achieved by the use of computers.

2.Business Applications:

Business applications are the non-scientific applications of computers. Office automation is one of the areas of the applications. Computing procedures for clerical duties were relatively simple to develop since they were already well defined.

Computer applications to business and commerce date from the middle of the 1950's. Most of the large and medium companies depend on their computers for administrative functions.

3. Office Automation:

Office automation can be understood as the application of present day technology to the office practice. The present day office automation uses word processors, personal computers, work stations, terminals, various peripheral equipment, networks and FAX systems. It also comprises of document preparation, desktop publishing, electronic mail, document storage and retrieval, data and voice communication business package, information management and graphics.

4.Word processing:

Word Processors are useful for preparing reports that may need revisions for producing standard letters and documents. The software provides the capability to insert or delete words, lines or paragraphs and print out drafts.

5. Desktop Publishing:

Desktop publishing means the process of producing any published material in an office environment from the creation of the text through page layout and design. The advantage of this system is that anyone involved in producing published material is in complete control of the operation. The

whole process of publication has become very much faster. Desktop publishing reduces the cost of publication considerably.

6.Banking:

In the past book keeping was handled manually. With the present day banking business a large human force in needed for the massive volume of book keeping. Computers are provided for on line accounting facility and enable them to connect to a central system for information such as current balances, deposits, overdrafts, interest charges, shares and other needed information. Computers also provide each branch with access to information from wider financial world.

Online world wide information retrieval service facilitates to get the updated news on foreign currency.

7. Insurance:

Insurance companies also use computers. Here the requirements are similar to those in banking. Large amounts of information have to be retained and updated, interest rates and bonuses have to be calculated, policy statements and renewal notices are prepared and payments made. In the buying and selling of stocks and shares, various calculations have to be made and contract notes amended.

The stock exchanges have changed rapidly. The exchange is now a market place dependent on computers with share prices and share dealings maintained on data bases.

8. Engineering

Computers can help in calculating all parts of a proposed design as well as assisting in the design.

Computers are increasingly used in the design of motorways, shipbuilding and other industries. Computers also help graphical display, the creation of drawings and schematic diagrams. It facilitates to see a design

from all angles while it is still on the drawing board and then to be able to modify it quickly. Example is Computer Aided Design (CAD)

9. Space technology

Computers are used to design the space ships and also for flight control. Computers help in determining he routes and to keep surveillance during the flight and process information relayed space from vehicles.

They also help in collection of information from outer space. This information is of interest in scientific research and is of immense value in meteorology.

10. Medicine:

Computers are increasingly used in hospital administration and for tasks such as maintaining inventories of drugs, surgical equipment and linen, hospital accounting and for bed allocation. Information on the condition of patients, details of tests and clinical reports are stored in the computers.

Computers are used to monitor patient's conditions in the intensive care units. Instruments attached to the patient are linked to the computer system and the changes monitored. Sometimes the computer itself may take corrective action if some parameter exceeds their critical limits.

Computers are used to collect information before the patients see the doctor. Computers assist in medical diagnosis like ECG analysis. They can prescribe the correct dosage of drug.

Computers can be used to store huge amounts of medical information and can aid in teaching doctors and nursing staff. Models can be constructed in the computer system to simulate the behavior of various parts of the body.

11. Libraries and museums:

Libraries and museums are using computers in their organizations. Lists of borrowed books are maintained by the system and remainders for those which are overdue can be generated by computer output. The contents of the

library may be referenced in a number of ways. libraries can be linked to other libraries to obtain more information. The photo copies of some rare documents can be faxed over a wide area.

1.7 Summary

- Charles Babbage is the father of Computers
- The computers have their own special characteristics and abilities like:

a) Storing large amount of data.
b) Performing scientific and arithmetic calculations at a very fast speed and very accurately.
c) Plotting of figures and graphs.
d) Self-checking the correctness of the program.
e) Helping in taking decisions.

- There are five generations of computer.
- In first generation vaccum tubes where used.
- In second generation Transistors were used.
- IC(Integrated Circuits) were introduced.
- Large Scale Integration (LSI) and Very Large Scale Integration(VLSI) where introduced.
- Fifth generation starts from 1980 which is under development.

1.8 SAQ

1. Define Computer?
2. Explain generations of Computer with examples?
3. Draw the block diagram of computer model and explain briefly?
4. List applications of Computers?

Unit – II Computer Peripherals

2.0 Structure

- 2.1 Objective
- 2.2 Introduction
- 2.3 Computer Peripherals
  - 2.3.1 Input Devices
    - A. Key Board
    - B. Mouse
    - C. Digitizer
    - D. Light pen
    - E. Joy stick
    - F. Mark and character recognition
      - a) OMR
      - b) MICR
      - c) OCR
    - G. VDU
  - 2.3.2 Output Devices
    - A. Printers
    - B. Serial printers
    - C. Line printers
    - D. Laser printers
    - E. plotters
- 2.4 Summary
- 2.5 SAQ

2.0 Objective

2.1 Introduction

A peripheral device is an ancillary device used to put information into and get information out of the computer. There are three categories of peripheral devices exist based on their relationship with the computer such as an input device – which sends data or instructions to the computer for example key board, mouse etc. An output device which provides output from the computer, such as a computer monitor, projector, printer etc. And the third one an input

and output device performs both input and output functions such as a computer data storage device which includes disk drive, USB etc.

2.3 Computer Peripherals

Computer peripherals are electronic equipment connected by cable to the CPU of a compute such as input and output devices.

2.3.1 Input devices

In computing, an input device is a piece of computer hardware equipment used to provide data and control signals to an information processing system such as a computer o information appliance. The following are the list of input put devices used in computer hardware.

A) Key Board
B) Mouse
C) Digitizer
D) Light pen
E) Joy stick
F) Mark and character recognition
    a) OMR
    b) MICR
    c) OCR
G) VDU

A) Key Board:

Key board is one of the most friendly peripheral devices. Program and data can both be entered through it. Most of the commands to software can be given from the key board. It is almost impossible to use a computer without a key board.

A key board consists of a set of key switches. There is one key switch for each letter, number, symbol etc. When the key is pressed, the key switch is activated. The key board has an electronic circuit to determine which key has pressed. Then a standard 8 bit code is generated and sent to the computer.

Detecting which key is pressed and generating the corresponding code is known as encoding. There are two types of key boards. A serial key board

sends the data bit by bit in a serial fashion and the computers converts the data into parallel byte. A parallel key board sends the data as a byte in parallel form. All the bits are sent simultaneously on different lines.

(a) Key board functions:

The functions of a key board are

1. Sensing a key code are
2. Encoding.
3. Sending the code to the computer.

The key switches are connected in a matrix of rows and columns. Each key switch has a fixed set of coordinates i.e. row number and column number. The rows are used as inputs to the matrix. The keyboard electronics sends signals to the matrix through the rows. The columns are used as outputs from the matrix. The column lines are sensed by the electronic circuit. Some of the common types of switches are

1. Membrane switches.
2. Capacitive switches.
3. Hall effect switches.

(i) Membrane key switches:

The membrane key switches are a special type of mechanical switches. They consist of a three layer plastic or rubber sandwich. The top layer has a conductive line of silver ink running under each row of keys. The middle layer has a hole under each key position. The bottom layer has a conductive line of silver ink running under each column of keys. When you press a key you push the top ink line through the hole to contact the bottom ink line. The advantage of membrane keyboards is that they can be made as very thin sealed units. They are very often used on cash registers in fast food restaurants, on medical instruments and in other messy applications. The life time of membrane key boards varies over a wide range.

(ii) Capacitive key switch:

A capacitive key switch has two small metal plates on the printed circuit board and another metal plate on the bottom of a piece of foam. When you press the key, the movable plate is pushed closer to the fixed plate. This changes the capacitance between the fixed plates. This change in capacitance is detected and amplified. A logic level signal is produced indicating that a key has been pressed. The greatest advantage of a capacitive switch is that is has no mechanical contacts to become oxidized or dirty. The disadvantage is that the specialized circuitry is needed to detect the change in capacitance. The capacitive key switches have a life time of about 20 million key strokes.

(iii) Hall effect key switches:

This is another type of switch having no mechanical contacts. This switch takes the advantage of the deflection of a moving charge by a magnetic field. A reference current is passed through a semiconductor crystal between two opposing faces. When a key is pressed, the crystal is moved through a magnetic field which has its flux lines perpendicular to the direction of the current flow in the crystal. Moving the crystal through the magnetic field cruses small voltage to be developed between two of the other opposing faces of the crystal. This voltage is amplified and used to indicate that a key is pressed. Hall effect key boards are more expensive because of the more complex switch mechanisms, but they are very dependable. They have a rated life time of 100 million or more key strokes.

Key Board Layout:

The keyboard of the computer is the most important device for communication between the operator and the computer. Your keyboard has got the following displays and controls.

Displays

Num Lock Indicator – Lights when numeric keypad is in numeric mode.

Caps Lock Indicator – Lights when keyboard is in Caps Lock mode.

Scroll Lock Indicator – Lights when keyboard is in Scroll Lock mode.

Controls

The key board (controls) is divided into following four sections:

Alphanumeric keys
Numeric key pad/cursor movement keys
Special keys
Function keys.

(i) Space bar:

(The longest key in the last row of the key board) shifts the cursor one position to the right. If any character exists at the current cursor position when the space bar is pressed, that character is erased after pressing the **Ins** (Insert) key, however, that character will be shifted to the right when the space bar is pressed.

(ii) Alphanumeric keys:

The keys have alphanumeric characters (a combination of the words, alphabet and numeric), which have functions identical to those of an ordinary typewriter.

When the right or left **Shift** key is pressed, any simultaneously pressed alphabetic key, symbol key or numeric keypad key is switched from lowercase letters mode to uppercase letters mode.

When the **Caps Lock** key is locked, the alphanumeric keys are locked into the uppercase mode but other keys remain unaffected. Unlike a standard typewriter, while the **Caps Lock key** is locked, the **shift keys** convert uppercase letters to lowercase.

Pressing the **Caps Lock** key causes the **Caps Lock Status Indicator** to light up, showing that the **keyboard is in Caps Lock** mode. This mode is cancelled by pressing the **Caps Lock** key again.

(iii) Numeric key pad/cursor movement keys:

These keys, which are arranged like a calculator, have two different functions according to the status of the **Num Lock** key. While the **Num Lock** key is not locked, these keys are used for controlling cursor movement or as edit keys. There is a separate set of Cursor Movement Keys also which are independent of status of **Num Lock** key.

When the **Num Lock** key is locked, these keys serve to input numbers to the computer and the **Shift** keys work in reverse. Pressing the **Num Lock** key cause the **Num Lock Status Indicator** to light up, showing that the keyboard is in **Num Lock** mode. This mode is cancelled by pressing the **Num Lock** key again.

The functions of the numeric key pad/cursor movement keys are described below:

Cursor movement keys move the cursor in space units in the horizontal direction and in line units in the vertical direction.

Home Key Shifts the cursor to the topmost left corner (home position) of the screen.

End key shifts the cursor to the right of the last character on the same line.

Pg Up (Page-Up) **Key** moves the cursor to the identical screen position within the preceding page.

PgDn (Page-Down) **Key** moves the cursor to the identical screen position within the following page.

Ins (Insert) **Key** when pressed once, switches the key board from Replace mode to insert mode, and the cursor changes to a blinking block, permitting characters to be inserted into the desired portion of any line. Pressing this key again, switches the keyboard back to the Replace mode, restores the cursor to its original form.

Del (Delete) **Key** deletes a character at the current cursor position on the screen, and all following data to the right of the position are shifted to left by one position.

(iv) Special keys:

These keys may have different functions depending on the software that is being use.

Alt (Alternate) **Key** allows the input of key words in BASIC mode without requiring the typing of their full spelling. Refer to your respective software manual for more details.

Back Space Key back spaces the cursor one position to the left and erases the character in the new position.

Ctrl (Control) **Key** is pressed in combination with other keys to enter special multi-key commands or functions.

Enter key operates like a carriage return by shifting the cursor to the beginning of the next line and can also be used to enter a command.

Esc (Escape) **Key** cancels the current line indicated with the flashing cursor.

Shift Keys shift the lowercase letters to uppercase or vice versa depending on the current mode.

Tab Key moves the cursor to the next tab stop on the right, when pressed together with the **Shift** key; the cursor is moved to the next tab stop on the left. At system initialization, default tab stops are set at every eight columns.

PrtScrn(Print Screen) **Key** prints out all the information currently appearing on the screen of the display monitor on to the printer, when pressed together with the Shift key.

Sys Req (System Request) **Key** is defined in the manual for your operation system of application program.

Caps Lock (Capitals Lock) **key** converts alphabetic characters from lowercase to uppercase, but does not affect non-alphabetic keys. The **Caps Lock Status** indicator is lit during the Caps Lock mode.

-(Minus) and +(Plus) **Keys** usually these keys are used to perform calculations or arithmetic operations. they simply input minus or plus signs, the their functions are not affected by other special keys such as the **Shift** or the **Num Lock** key.

Num Lock Key Converts the numeric keypad for use as a calculator. The Num Lock Status indicator is lit during the Num Lock mode.

Scroll Lock Key moves the text vertically in line units after this key is pressed once. It can also be used as a BREAK key in combination with the **Ctrl** (control) key. Refer to the manual for your operating system or application program for more details. The **Scroll Lock Status Indicator** is lit during the Scroll Lock mode. To cancel this mode, press the moves the cursor to the next tab stop on the right, when pressed together with the **Shift** key, the cursor is moved to the next tab stop on the left. At system initialization, default tab stops are set at every eight columns.

Scroll Lock key once more.

(v) Function keys:

These keys are programmed to perform special functions. The functions of the keys are different in MS-DOS and other application program. Refer to your application program manuals for more details.

Key definitions in MS-Dos Mode.

F1 Recalls the previously entered line a character at a time, each time this key is pressed.

F2 When a character is pressed after F2 is pressed, the previously entered line is displayed up to that specified character.

F3 Recalls the entire previous line at one time.

F4 When a character is pressed after F4 is pressed, all characters are erased from the screen up to that specified character. When F3 is pressed, the remainder of line is displayed.

F5 Shifts the cursor from the currently displayed line to the following line for further editing or retyping.

F6 Places a CONTROL – Z (1 AH) end – of – file character in the new template.

B) Mouse:

Mouse is an alternative to keyboard entry. It is a hand held pointing device that is moved around in any direction on a flat surface. This movement produces a corresponding movement of an electronic pointer or cursor on the screen of the VDU. When the cursor is at the desired position the required action is done by pressing the button on the mouse. The movements and actions triggered by the mouse are directly related to the software in use.

The mouse is an input device. Its technical term is puck and term mouse is used because of its shape. There are two methods by which a mouse is connected to a microcomputer. Serial interface and parallel interface.

The software of DOS includes two mouse drivers – MOUSE. COM and MOUSE. SYS. MOUSE. COM is a standard mouse driver and is recommended for most systems. MOUSE. SYS is the alternate device driver. It is useful when you use dedicated mouse based applications that need a minimum of user control. With the software one can specify how the mouse works with the computer. Some of them are adjusting the mouse cursor motion for extra precision or speed and enhance the appearance of the mouse cursor for easy visibility. Some of the options under DOS are Acceleration, Mouse speed and Button swapping.

C) Digitizer:

A digitizer consists of a flat surface like a drawing pad. It is also known as graphics tablet. A sketch can be transferred to computer point by point. The same sketch can be redrawn on computer with the help of the digitized data.

Conversion of a line sketch to point-by-point information is called digitizing. Digitizing is done on an X-Y line coordinate system. The pointing devices used with the digitizer are many a stylus or pen, a push button cursor or puck, a power module or a console and a menu. A grid pattern of horizontal and vertical lines is present below the flat surface of the digitizer. These lines detect electrical pulses at X-Y co-ordinate locations where a stylus or puck points. The digitizer is a popular input device in CAD applications.

D) Light Pen:

Light pen is often used as a pointing device with a digitizer. It is often used as an input device in CAD applications. While using the light pen, the user indicates the current active position under his consideration, to the computer program. The light pen contains a photo sensor to detect the presence of light. When the tip of the light pen touches a spot on the CRT monitor screen, the light pen is activated. Its senses light and a signal are sent to the microcomputer. The computer which controls the scanning of the electron beam immediately notes down the position of the spot (the coordinates) where the light pen is touched. The light pen is connected to microcomputer through a cable.

E) Joy Stick:

The joystick is an input device used in simple applications where high accuracy is not required. It is used while playing games with computer. It is used for creating figures of simple shapes. The joystick has a lever protruding vertically through the top of the unit. The lever can be tilted at different

angles. The joystick is used to control the cursor on the CRT screen, which provides a visual indication to the user. The cursor can be positioned at the desired location using the joystick. The tilt of the joystick lever determines the direction of the cursor movement.

F) Mark and character recognition:

In business applications of computers it is often required to recognize marks or characters e.g. from work documents, cheques, sales order entry forms and even printed text. There are three types of recognition.

a) Optical mark reading (OMR)

b) Magnetic ink character recognition. (MICR)

c) Optical character recognition. (OCR).

The common feature of these forms of recognition is that they facilitate the direct transfer of data from source document to the electronic form in which the information is stored in a computer. They eliminate the need for the laborious key entry of data that is associated with terminal and key – to – disk and key- to – tape systems.

(a) Optical mark reading (OMR):

Optical marking is used in forms and cards for special purposes. The mark is made in a specified position. For example 'Yes' or 'No' in a market survey or a combinations of positions to indicate different characters or numbers. Such as electricity meter reading.

Optical mark readers are now available to scan forms filled using pen or pencil. The forms or cards are passed under a light source and the presence of a mark is detected by measuring very accurately the infrared light levels. A mark reader can also detect colored marks. It can be designed to be insensitive to certain colors so that these colors may be used else where in the form. A well-designed form provides an efficient means of collecting data. One of the greatest advantages of OMR is that no specialist skills are required to collect and input data.

Another form of mark reading relies on the conductivity of graphite marks. In this method only soft pencil has to be used and non-graphite pen or printed marks are not acceptable. It is known as mark sense reading. Today OMR is widely preferred to mark sense reading.

(b) Magnetic ink character recognition:

Mark recognition turned the possibility of reading character. First successful character recognition was in the area of MICR. This system uses highly stylized character shapes printed in ink containing magnetized particles. In 1966 two standard MICR fonts were accepted by the International Standards Organization. One known as E 13 B consists of the numerals 0-9 and four special characters. This is used mainly for bank cheques.

(c) Optical character recognition:

OCR readers, or scanners as they are sometimes called, typically examine each character as if it were made up of a collection of minute spots. Once the hole character has been scanned, the pattern detected is matched against a set of patterns stored in the computer. Whichever pattern it matches, or nearly matches, is considered to be the character read. Patterns which cannot be identified are rejected.

There is now an extensive range of OCR equipment on the market from scanners that plug into humble personal computers to sophisticated data entry machines that utilize quite powerful minicomputer systems. The more powerful devices can handle many different character fonts in various point (character) sizes, and they can also generally operate in a 'teach mode' which enables them to learn any specific font that is required.

A powerful data entry system is capable of reading multi font text i.e. printed books and typewritten manuscripts. This kind of system is designed to learn all about the shapes of the characters of the various fonts specific to the document that needs to be read. The training process is carried under manual

supervision and involves the operator answering a menu of questions about the type face in question. Such OCR device may be able to convert texts in both machine readable form and can operate in data entry mode at 300 or more words per minute. Speed of reading is relatively low because of the need for accuracy, but it is considerably faster than key board entry which OCR readers are designed to replace. Whatever the level of sophistication of the device the quality of reading depends directly on the quality of the text which is being scanned. It is possible that a computer could be programmed to accept same signatures but it is unlikely it could ever be programmed to accept every type of signature. Devices have been developed which can read neat hand printing in black ink with sufficient accuracy for this to become a visible form of input.

G) Visual Display Unit: (VDU)

A visual display device uses a cathode ray tube (CRT) to display information. VDU is a type of terminal with a keyboard for manual input of characters to the computers and a screen for character display of the input or output. It is the most widely used type of terminal. The screen displays information as it is keyed in enabling a visual check before the input is transferred to the computer. The VDU is extensively used for keyboard entry of data. Information is displayed very much more quickly that other terminals. However it does not provide a hard copy of the output. But it is possible to add a printing device and get a print out of the information. VDU's are particularly suited where the display provides information on which action can be taken immediately.

The most common display method is to generate characters from a 'dot matrix'. A selected pattern of dots is illuminated to form a character. Screen sizes of 12" and 14" are common. A maximum display is typically 24 lines of 80 characters with sometimes an optional display of 132 characters per line. These are used in situations where information if required quickly for example in airline seat reservations where speed in the essence in handling

customer enquiries. VDU's are now widely used for general data entry and retrieval of stored information. Present day VDU's are intelligent terminals incorporating microprocessors and able to carry out some computing functions. The special key's provided in the key board can be programmed to perform tasks at a single keystroke. These so called programmable functions keys can make the terminal easier to use by reducing the number of keystrokes for common tasks.

Video screen display white characters on a black background but amber or green displays are also common. VDU's can operate with color monitors. Present day VDU's have graphics capability or this feature can be added by the addition of a graphics board.

The cathode ray tube display is widely used visual display unit (VDU) for the past several years. The CRT display is also called CRT monitor. The CRT monitor receives video signals from the computer and displays the video information at dots on the CRT screen. A CRT controller circuit works in synchronization with a CRT monitor. The main unit in the CRT is called a picture tube. The CRT is an evacuated glass tube with a fluorescent coating on the inner front surface called screen. An electron gun at one end emits an electron beam. When the beam strikes the screen, the phosphor coating on the screen produces illumination at the spot where the electron beam strikes. The electron beam is deflected by an electro magnetic deflection in order to produce illumination at various spots on the screen. Horizontal deflection coils deflect the beam in the horizontal direction and the vertical deflection coils deflect the beam in the vertical direction. In order to create permanent image on the screen, it is necessary to cause illuminations repeatedly. The common method of scanning is called Raster scanning. There are two types of images on CRT displays. Alphanumeric displays and graphics. The alphanumeric display system generally follow the dot matrix scheme for each character generation.

2.3.2 Output Devices

An output device is any peripheral that receives data from a computer, usually for display, projection, or physical reproduction. For example, the image shows an inkjet printer, an output device that can make a hard copy of any information shown on your monitor, which is another example of an output device. The following are the output devices:

A. Printers
B. Serial printers
C. Line printers
D. Laser printers
E. plotters

A) Printers:

Printers can be classified as

(ii) those which output one character at a time called serial printers.

(iii) Those which output a complete line at a time called line and page printers. Printers can also be categorized on the printing technique.

Printers can also be categorized on the printing technique.

(i) those that strike a ribbon to deposit ink or carbon on to paper called impact printers.

(ii) Those that do not strike called non impact printers.

B) Serial Printers:

Serial printers are those that output one character at a time. These printers can be operated using continuous stationery or separate sheets. These printers are slower and cheaper.

A daisywheel printer uses a daisy shaped disk made of metal or plastic which holds 96 characters. The print heads are physically interchangeable enabling the use of different character fonts. A typical line has 132

characters and printing speeds vary from 25 to 60 characters per second. Daisy wheel printers are noted for their high print quality.

Dot matrix printer is the most common type of serial printer used. This is because of its speed and ruggedness. The print head comprises a matrix of tiny needles which hammers out characters in the form of tiny dots. The printing speeds range from 50 to 480 characters per second. These printers can operate in draft mode (200 – 480 cps) near letter quality mode (upto 180cps) and letter quality mode (50 – 75 cps). Some printers also output colour graphics.

Non-impact printers use thermal techniques. Thermal matrix printers use heated sensitive paper. These printers offer high print resolution and hence are very slow. Creation of number of copies is not possible.

Serial printers are slow and hence can be used for low volume output. They are used with small system and personal computers.

C) Line Printer:

Line printers give high volume output. Rows of character sets are wrapped around a drum or fixed to a chain. The drum or chain revolves across the path of a series of hammers each of which corresponds to a print position.

Line printers receive 132 characters of eight bit parallel EBCIDIC code before printing. Some printers use ASCII code. The printing drum contains the complete character set in raised letters in each of the 132 columns. Each column having its own hammer and solenoid. The drum revolves at a constant speed and when the correct letter is under the print hammer, the solenoid energies causing the hammer to hit the paper printing a character. A complete line is printed at a time. Normally 132 characters can be printed per line. Characters vary in size. The speeds range from 300 to 2500 lines per minute.

D) Laser Printers:

Laser printers use a combination of laser and photocopier technology and convert the computer output into print. Laser printers produce high quality images and offer a wide selection of character fonts. The printing is very fast and quiet. These printers can produce outputs of eight pages per minute.

Various types of laser printers are available with different speeds. Printers which can produce 120 to 300 pages per minute with as many as 80 fonts are available. On the other hand printers as slow as 8 to 36 pages per minute are also available.

The laser printer operates like a photo copying machine. A laser is used to create an image on a photosensitive drum. For this purpose, the laser is turned on and off, when it sweeps back and forth across the drum. The image is inked by applying a toner to the image on the drum. Then the image is electro statically transferred from the drum to the paper. Subsequently heating is done to fuse the inked image on the paper.

- **Daisy wheel printer:**

A daisy wheel printer consists of a circular wheel as the print head. There are 96 spokes or character arms on the wheel. Each spoke has a raised character embossed at the tip. When printing is done, the wheel is rotated until the petal carrying the desired character is in front of the print space on the paper. Then the solenoid driven hammer strikes the petal, thus striking the ribbon and paper. After printing, the print head is moved to the next character. The quality of printing is good. Number of print fronts can be obtained by this printer.

- **Dot matrix printer:**

Dot matrix printer prints each character formed by small dots. It does not print the whole character at a time. The matrix is usually formed by 7 rows and 5 columns of dots. There are used to create the character pattern of dots.

The print head consists of pins arranged in a vertical column. There is a solenoid corresponding to each pin. The character to be printed has dots in certain positions of the matrix. The head moves column by column in the matrix. When the head is in one of the columns of the matrix, all the required dots for that column are formed by striking appropriate pins. The head then moves to the next column in the matrix and the process repeats. When all the columns in the matrix are covered, one character pattern is complete. By using greater number of pins viz 9,14, 18, or 24. The quality of printing can be improved. By printing a line twice with a slight offset for the dots in the second printing letter quality printing is achieved.

The dot matrix printer can be used to print graphics i.e. figure or a pattern. Color printing may be done by using different color ribbons. The speed of dot matrix printers in the draft mode varies from 100 to 300 cps. While in letter quality mode the speed varies from 25 to 50 cps.

E) Plotters:

Plotters are devices that can plot graphs, diagrams and in fact any thing that can be generated using computers. Plotters are available in various sizes and with various capabilities. There are single sheet plotters with one pen to continuous sheet plotters with number of pens. Various colours can be selected in a multi pen plotter. The standard sizes of papers for single sheet plotters are A1, A2, A3, and A4. The plot area is less that the paper size.

The A1 paper size is 59.4 x 84.1 cm. The plot area in this paper is 54.6 x 81.3 cm.

The A2 paper size is 42 x 59.4 cm. The plot area is 36.8 x 54.6 cm.

C Size architectural 18 x 24 Inches.

D Size architectural 24 x 36 Inches.

The resolution of some of the printers is 0.025 mm to o.1 mm. The plotting speeds is 16 inches per second (40.6 cm/sec) in axial direction and

may go up to 22 inches per second (55.9 cm/sec) in diagonal direction. Some plotters have constant velocity in all direction.

With high resolution plotters, one can produce clean, precise A1 and A2 size drawings on paper, vellum or polyester film. For a media of matte film or tracing paper the tungsten tip and drafting pen are used. Most of the plotters have a selectable pen acceleration of 0.5 G to 4G. The pen up down delay is 0 to 70 milli seconds.

- **Inkjet Plotters:**

Inkjet plotters give you fast performance at a low price. These can produce fine quality drawing in less than 5 minutes. The same drawing can take as much as 45 minutes by a pen plotter. The draft copies can be obtained in half the time. They can also produce fine quality color drawings. The color plotters can give number of brilliant colors and shades. The monochrome plotters will give solid black lines and a selection of the widths and shades. The resolution is as high as 300 dpi. These plotters give you finer lines than pen plotter as fine as 0.13 mm. These plotters are ideal solutions for applications that require color filling and solid modeling.

The maintenance is easy because there is no more changing pens to get different line widths and the whole plotting is less noisy. The avoid pen clogging, drying which result in loss of the plot.

2.4 Summary

- A **computer peripheral** is a device that is connected to a computer but is not part of the core computer architecture.
- There are many different peripheral devices, but they fall into three general categories:
    - **Input devices**, such as a mouse and a keyboard
    - **Output devices**, such as a monitor and a printer
    - **Storage devices**, such as a hard drive or flash drive

- In computing, an input device is a piece of computer hardware equipment used to provide data and control signals to an information processing system such as a computer o information appliance. The following are the list of input put devices used in computer hardware. Some of input devices are Key Board, Mouse etc.
- An output device is any peripheral that receives data from a computer, usually for display, projection, or physical reproduction. For example, the image shows an inkjet printer.
- An output device that can make a hard copy of any information shown on your monitor.

2.5 SAQ

Unit – III Computer Memory

Structure

3.0 Objective

Memory management plays vital role in computer for processing. In this unit we will learn about computer memory in detail.

3.1 Introduction

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored. The memory is divided into large number of small parts called cells. Each location or cell has a unique address, which varies from zero to memory size minus one. For example, if the computer has 64k words, then this memory unit has 64 *

1024 = 65536 memory locations. The address of these locations varies from 0 to 65535.

3.2 Computer Memory

The Central Processing units are designed to operate in conjunction with external memory devices that store the programs and date required by the processors. Different memory technologies are used which very greatly in cost and performance. Usually the cost of a memory device increases rapidly with the speed of operation required. The memory part of the computers system can be divided into two major sub systems.

(i) Primary memory or main memory consisting of fast storage devices connected directly to and controlled by the CPU

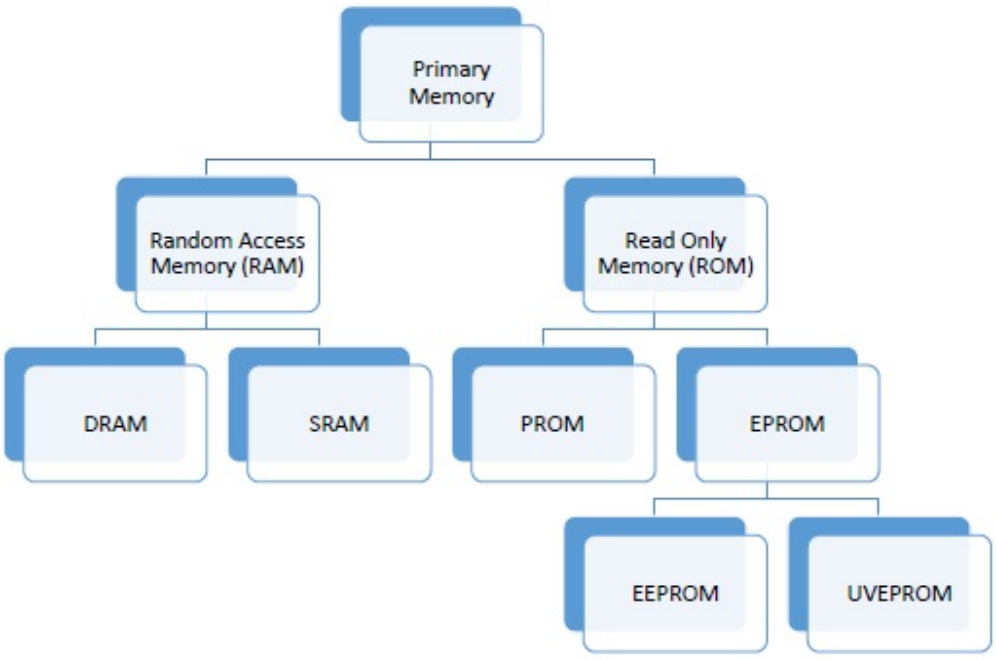
(ii) Secondary memory consisting of slower and less expensive devices that communicates indirectly with the CPU via main memory.

3.2.1 Primary memory:

Primary memory is computer memory that is accessed directly by the CPU. This includes several types of memory, such as the processor cache and system ROM. However, in most cases, primary memory refers to system RAM.

Primary memory or main memory in most cases is a word organized addressable random access memory (RAM). This means that information can be accessed. i.e.. Read from or written into the memory one word at a time. Each storage location has a unique address by which it can be identified. To access a particular word in main memory, the CPU sends its address and appropriate control signals to the memory. In a write operation, the CPU places the word to be written into memory on the main memory data bus, from which it is transferred into the addressed location. In a read operation, the contents of the addressed location are transferred to the memory data bus and then to the CPU.

The term random access comes from the fact that the access time for every location is the same. This is contrast to serial access memories where access time varies with the location being accessed. Serial access memories are generally slower and less expensive then RAM's.



a)ROM:

Read Only Memory (ROM) will hold its contents permanently. Personal computers use ROM to store programs that are essential to the operation of the computer. The programs stored in the ROM are often called 'firm ware'. The ROM is used to store programs 'boot strap loader' and 'BIOS'.

Boot strap loader is a start up program that tarts the disk drive and loads the computer's operating systems.

New data cannot be written into ROM. Data to be stored into ROM is written during the manufacturing phase itself. They contain data that does not need to be altered, like booting sequence of a computer or algorithmic tables for mathematical applications. ROM is slower and hence cheaper than RAM. It retains its data even when power is switched off, i.e. it is non-volatile. ROM cannot be altered the way RAM. Technologies are available to program these types of ROMs −

Programmable ROM(PROM):

PROM can be programmed using a special hardware device called PROM programmer or PROM burner.

Erasable Programmable ROM(EPROM):

EPROM can be erased and then programmed using special electrical signals or UV rays. EPROMs that can be erased using UV rays are called UVEPROM and those that can be erased using electrical signals are called EEPROM. However, handling electric signals is easier and safer than UV rays.

Erasable Programmable ROM is further divided into EEPROM and UVEPROM.

Electrically Erasable Programmable Read Only Memory(EEPROM):

It is also referred as Double EPROM or E2PROM. It is the chip that can be programmed using a standard programming device and can be erased by the proper signal being applied to the erase pin. This is primarily used as non-volatile backup for the user program RAM. If the user program in RAM is lost or erased, a copy of the program stored on an EEPROM chip can be downloaded in RAM. It is common on some PLCs for the processor to load the program for E@PROM chip into RAM memory. Each time the processor is powered up or after a power failure.

Ultraviolet Programmable Read Only Memory (UVPROM): UVPROM is ideally suited when program storage is to be semi – permanent or additional security is needed to prevent unauthorized program change.

b) RAM:

Random Access Memory is of two types. Dynamic RAM and static RAM. Dynamic RAM is the memory available inside the computers main memory. The user or the programmer is allocated certain portion of the main memory. Once the power is switched off the contents of the memory are lost.

RAM stands for **Random Access Memory**. The processor accesses all memory addresses directly, irrespective of word length, making storage and retrieval fast. RAM is the fastest memory available and hence most expensive. These two factors imply that RAM is available in very small quantities of up to 1GB. RAM is volatile but may be of any of these two types such Dynamic RAM(DRAM) and Static RAM(SRAM).

Dynamic RAM(DRAM):

Each memory cell in a DRAM is made of one transistor and one capacitor, which store one bit of data. However, this cell starts losing its charge and hence data stored in less than thousandth of a second. So it needs to be refreshed thousand times a second, which takes up processor time. However, due to small size of each cell, one DRAM can have large number of cells. Primary memory of most of the personal computers is made of DRAM.

Static RAM(SRAM):

Each cell in SRAM is made of a flip flop that stores one bit. It retains its bit till the power supply is on and doesn't need to be refreshed like DRAM. It also has shorter read-write cycles as compared to DRAM. SRAM is used in specialized applications.

Cache Memory :Cache memory is a very high speed semiconductor memory which can speed up the CPU. It acts as a buffer between the CPU

and the main memory. It is used to hold those parts of data and program which are most frequently used by the CPU. The parts of data and programs are transferred from the disk to cache memory by the operating system, from where the CPU can access them.

Advantages

The advantages of cache memory are as follows −

- Cache memory is faster than main memory.
- It consumes less access time as compared to main memory.
- It stores the program that can be executed within a short period of time.
- It stores data for temporary use.

Disadvantages

The disadvantages of cache memory are as follows −

- Cache memory has limited capacity.
- It is very expensive.

3.2.2 Secondary memory

Secondary memory devices such as magnetic tape and disk units are used for storing large amounts of information needed relatively infrequently by the CPU. They are often controlled by special purpose processors. Secondary memory devices are considered to be part of a computer's input output system. The secondary memory devices use serial access mode. The manner in which the stored information is organized in secondary memories is more complex then the simple word organization in the main memory. The following are the examples of Secondary

memory. Secondary memory is cheaper and permanent memory. Characters of secondary memory are:

- It is non-volatile, i.e. it retains data when power is switched off
- It is large capacities to the tune of terabytes
- It is cheaper as compared to primary memory

a) Magnetic Disk
b) Magnetic Tapes
c) Floppy Disk
d) Optical Storage Device

a) Magnetic Disk

This device allows direct access but can also be used in serial mode if required. In shape, a disk resembles an LP record. A disk pack consists of a number of these disks, six or more, mounted about half an inch apart on a central hub which rotates, spinning the disks at speeds of 60 or more revolutions a second. Information is recorded on both sides of each disk as a series of magnetized or non- magnetized spots.

Information is stored on tracks arranged in concentric circles, with each character represented by a pattern of bits in sequence on one track. Although varying in length, each track contains the same number of characters, which means that tracks on the outer reaches of the disk are less densely packed with characters than those towards the centre. Each track is normally subdivided into sectors and information is accessed by track and sector address (76; 5, that is 76^{th} track and 5^{th} sector.)

The diameter of a standard sized disk is 14 in and there may be several hundred tracks per surface (typically 400 to 1600) each with a storage capacity of thousands of characters. Disk packs are potentially very high

capacity storage devices typically in the range 20 to 1000 megabytes (M bytes).

The disk pack on some disk storage devices is permanently fixed in position, whilst on others the pack can be removed and replaced by another in a matter of seconds. Not all disks are stacked in packs. A single removable disk is generally known as a cartridge disk. The facility to change packs or cartridges means that storage space can be increased without the heavy expense buying another complete device.

> The are two types of read/write head units for magnetic disk devices, a moving – head unit and a fixed-lead unit. In the moving – head unit, the head moves horizontally across the surface of the disk so that it is able to access each track individually. There is a head for each surface and all the heads move in unison. Information stored on the tracks which constitute a cylindrical shape through the disk pack are therefore accessed simultaneously, a significant factor in storage arrangements. Exchangeable disk packs are only associated with moving head units. In the case of the fixed head unit, there is one read/write head for each track, as a result of which, no head movement is needed and information is therefore traced more quickly. The heads do not have direct contact with the surface but 'rest' on a cushion of air. The air movement caused by the revolving disk forces the head to 'fly' about 1/400th of an inch from the surface. However, dust particles can be a serious problem – even causing physical damage as well as data corruption.

The time taken to access information on these direct, or random, devices varies considerably, but the fixed – head device is quicker than the moving – head device. As with magnetic tape, information on magnetic disk can be accessed again and again. When fresh data is recorded it simply replaces the existing information.

b) Magnetic Tape:

Magnetic tape provides serial access and can be referenced many times. The information can be erased by recording new information in its place. The tape has a ferromagnetic coating on a plastic base and is similar to the tape used in tape recorders. The standard width is ½ inch and comes in reels of 2400 feet. The information is retained on the tape in the form of magnetized and non magnetized spots which are arranged in tracks, usually nine along the length of the tape.

The information recorded on magnetic tape is stored in varying densities. The density varies from 1600 characters per inch to as dense as 6250 characters per inch. The capacity of a tape depends on recording density, length of real and proportion of the tape that is actually used for recording.

The tape runs from a supply reel to a pick up reel via two vacuum channels. The tape passes through a set of read/write heads. The two vacuum channels are designed to take up slack tape acting as buffers to prevent the tape from snapping or stretching when starting from a stationary position or slowing down from full speed. The read/write heads are present either to access information or to place information the tape.

Another type of drive is the cartridge tape drive. It is small in comparison with the conventional drive often no bigger than a video recorder. Tape size is ¼ inch. Reels are normally 300 to 600 feet. The information can be accessed only serially. Often it is necessary to copy the information and to retain it in the same order for use on another occasion. It is a convenient way of carrying information from one place to another. Tapes are widely used to back – up – information. It is used both as an input and

output medium. Information is input to the computers from the tape for processing and information is output to tape.

c) Floppy disk:

The floppy disk was developed in the early 1970s as a cheap and fast alternative to storage on magnetic tape. It is a small, random access disk which, like all secondary storage devices, can be used both for input and output operations. The disk is made of flexible plastic and coated in magnetic oxide. For protection, it is normally contained within a plastic or cardboard sleeve, often referred to as a cartridge. The cartridge is readily loaded into, and unloaded from, a drive unit. Unlike the moving – head read/write mechanism on conventional disk drives, the heads on a floppy disk unit make contact with the disk surface, when reading or writing, and disks therefore get worn with constant use.

There are two recognized standard sizes, 8 in and 5 ¼ in, frequently referred to as **diskette** and **mini - floppy** respectively. A more recent development is the 3 ½ in size. Storage capacity is small compared with other conventional disk devices but quite impressive for size. The capacity of an 8 in diskette is typically between 250 K bytes and 1.5 M bytes and the capacity of a 5 ¼ in mini – floppy is between 125 K bytes and 500 K bytes, depending on density. The floppy disk is a low – cost device particularly suited to supporting personal computer systems and for use with small business and word processing systems.

d. Optical Storage Device:

Optical storage is data storage media written on and read with laser technology. The three most common optical media are CD, DVD and Blu-ray. CDs store about 300,000 pages of text or roughly 700 MB. DVDs are

commonly used for movies and hold around 4.7 GB of memory. Blu-ray has five times the storage of DVD and is used for high-definition (HD) movies. On a single-layer disc, Blu-ray can hold 25GB of data, and a dual-layer disc can hold 9 hours of an HD movie or about 50GB of data. The expectation over time is for Blu-ray to replace DVD as the preferred optical media.

3.3 Summary

- Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored.
- The memory part of the computers system can be divided into two major sub systems.
- Primary memory or main memory consisting of fast storage devices connected directly to and controlled by the CPU
- Secondary memory consisting of slower and less expensive devices that communicates indirectly with the CPU via main memory.
- Read Only Memory (ROM) will hold its contents permanently.
- Randam Access Memory(RAM) will be volatile in nature.

3.3 SAQ

Unit – IV Introduction to Operating System

Structure

4.0 Objective

Operating System is an important part of the computer. What is Operating System, Types of Operating Systems, Dos Commands, GUI concepts are discussed in this unit.

4.1 Introduction

An operating system manages and coordinates the functions performed by the computer hardware, including the CPU, input/output devices, secondary storage devices, and communication and network equipment. Operating systems are the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.

The Operating system software must keep track of each hardware resource, determine who gets what, determine when the user will have access to the resource, allocate how much of the resource the user will be given, and terminate access at the end of the use period.

Operating systems vary in complexity from those that support single user microcomputers to those that handle multi-user mainframes. Their complexity depends on the computer system's size and scope, together with the type of performance provided to its users. A single stand-alone microcomputer will have a relatively simple operating system, whereas a mainframe that supports hundred of users accessing the system simultaneously will have one that is far more complex.

The primary purpose of an operating system is to maximize the productivity of a computer system by operating it in the most efficient manner and minimizing the amount of human intervention required. An operating system also simplifies the job of computer programmers, since it includes programs that perform common input/output and storage operations and other standard processing functions. If you have any hands-on experience on a computer, you know that the operating system must be loaded and activated before you can accomplish other tasks. This emphasizes that operating systems are the most indispensable component of the software interface between users and the hardware of their computer systems.

Many operating systems are designed as a collection of program modules, which can be organized in combination with various capabilities around a central module, or kernel. Such operating systems can be tailored to fit the processing power and memory capability of a computer system and the type of processing jobs that need to be done on it. For example, some operating system packages include a selected number of utility programs, language translator programs (compilers and interpreters), and even some application programs Examples of popular microcomputer operating systems

are Windows, DOS, OS/2 for PCs and Mac OS for Apple computers, etc. An example of an operating system for a mainframe is MVS.

4.2 FUNCTIONS OF AN OPERATING SYSTEM

Even the simplest operating system in a minicomputer or mainframe performs a number of resource management tasks or functions. These functions include job management, batch processing, on-line processing, data management, virtual storage, and input/output management.

- **Job Management**

Job management software manages the jobs waiting to be processed. It recognizes the jobs, identifies their priorities, determines whether the appropriate main memory and secondary storage capability they require is available, and schedules and finally runs each job at the appropriate moment.

- **Batch Processing**

System software is available to support the different methods of processing a job with batch processing; the most basic method, and data are accumulated and processed in groups. Payroll applications, for example, are often processed this way. Once in every week, hourly records are grouped and the payroll software is run.

- **On-line Processing**

In on-line processing, data are processed instantaneously. For example, a sales person may need to find out whether a particular item requested by a customer is in stock for immediate shipment. Using an on-line system the request for information will be taken to access the central database and return the requested information to the terminal from which the request was made. All of these steps take less than a few seconds, at the most. Most on-line operating systems have multi-user and multitasking capabilities.

- **Data Management**

In the process of managing the resources of the computer system, operating system software also manages the storage and retrieval of data. As the system software handles many of the details associated with this process, such details are not a primary concern for users or programmers writing application programs.

- **Virtual Storage**

Operating systems also manages the allocation of main memory to specific jobs. Some operating systems have a feature called virtual storage. With this software it is possible to increase the capacity of main memory without actually increasing its size. This is accomplished by breaking a job into sequences of instructions, called pages or segments, and keeping only a few of these in main memory at a time; the Reminder are kept on secondary storage devices. As a result, relatively large jobs can be processed by a CPU that in fact contains a relatively small memory.

- **Input/Output Management**

Operating systems also manage the input to and output from a computer system. This applies to the flow of data among computers, terminals, and other devices such as printers. Application programs use the operating system extensively to handle input and output devices as needed.

For large systems, the operating system has even greater responsibilities and powers. It is like a traffic policeman – it makes sure that different programs and users running at the same time do not interfere with each other. The operating system is also responsible for security, ensuring that unauthorized users do not access the system.

4.3 Classification of Operating System

Operating systems can be classified as follows:

- Multi-user

Multi-user operating systems allow two or more users to run programs at the same time. Some operating systems permit hundreds or even thousands of concurrent users. The operating systems of mainframes and minicomputer are multi-user systems. Examples are MVS, UNIX, etc. Another term for multi-user is time-sharing.

- Multiprocessing

Multiprocessing refers to a computer system's ability to support more than one process (program) at the same time. Multiprocessing operating systems enable several programs to run concurrently. MVS and UNIX are two of the most widely used multiprocessing systems, but there are many others, including OS/2 for high-end PCs. Multiprocessing systems are much more complicated than single-process systems, because the operating system must allocate resources to competing processes in a reasonable manner. Multiprocessing also refers to the utilization of multiple CPUs in a single computer system. This is also called parallel processing

- **Multitasking**

Multitasking allows more than one program to run concurrently. Multitasking is the ability to execute more than one task at the same time, a task being a program. The terms multitasking and multiprocessing are often used interchangeably, although multiprocessing sometimes implies that more than one CPU is involved. In multitasking, only one CPU is involved, but it switches from one program to another so quickly that it gives the appearance of executing all the programs at the same time. There are tow basic types of multitasking:

- Preemptive
- Cooperative

In preemptive multitasking, the operating system parcels out CPU time slices to each program. In cooperative multitasking, each program can control the CPU for as long as it needs it. If a program is not using the CPU, however, it can allow another program to use it temporarily. OS/2, Windows 95, Windows NT, the Amiga operating system and UNIKX use preemptive multitasking, whereas Microsoft Windows 3.x and the MultiFinder (for Macintosh computers) use cooperative multitasking.

- Multithreading

Multithreading allows different parts of a single program to run concurrently. Multithreading is the ability of an operating system to execute different parts of a program, called threads, simultaneously. The programmer must carefully design the program in such a way that all the threads can run at the same time without interfering with each other.

- **Real-time**

Real-time operating systems are systems that respond to input immediately. This category includes operating systems designed substantially for the purpose of controlling and monitoring external activities with timing constraints. They are used for such tasks as navigation, in which the computer must react to a steady flow of new information without interruption. Most general-purpose operating systems like DOS and UNIX are not real-time because they can take a few seconds, or even minutes, to react. Some examples of real-time operating systems are:

- Basic Real-time Monitor (Real-time OS for the Phillips P-855 and P-860)
- BLMX (Board-level multitasking executive for National Semiconductor 8080 and Z80 based CPU boards)
- BSO/RTOS (Small real-time OS for Z80, 6809, 8086, 68000. Boston Systems Office)

- C executive (Memory-based real-time UNIX-like executive for the PDP-11 or VAX)
- CCP (Communications Control Program. Limited OS for the IBM System/3)
- CTOS (Real-time, multitasking, multiprocessing OS for 8086 family)
- CTRON (Specification for a version of TRON for communication and network control)
- DES RT (Real-time, Unix-like OS for 16-bit microprocessor families and Micro-VAX, DGC MV series)
- DMERT (The Duplex Multiple Environment Real Time Operating System)
- FADOS (Operating System for the Fast Amsterdam Multiprocessor (FAMP). A distributed, Real-time OS based on a network of M68000s with a UNIX host)
- IRMX (Real-time multitasking executive for Intel 8086 family CPUs)

Operating systems provide a software platform on top of which other programs, called applications programs can run. The applications programs must be written to run on top of a particular operating system. Your choice of operating system, therefore determines to a great extent the applications you can run.

As a user, you normally interact with the operating system through a set of commands. For example, the DOS operating system contains commands such as COPY and RENAME for copying files and changing the names of files, respectively. The commands are accepted and executed by a part of the operating system called the command processor or command line interpreter.

Graphical User interfaces (GUIs) allow you to enter commands by pointing and clicking at objects that appears on the screen. Microsoft Windows is an Operating system, which uses a graphical user interface.

4.4 MS – DOS

Microsoft Disk Operating System, MS-DOS is a non-graphical command line operating system derived from 86-DOS that was created for IBM compatible computers. MS-DOS originally written by Tim Paterson and introduced by Microsoft in August 1981and was last updated in 1994 when MS-DOS 6.22 was released. MS-DOS allows the user to navigate, open, and otherwise manipulate files on their computer from a command line instead of a GUI(Graphical User Interface) like Windows.

Need For Operating System:

A fundamental characteristic of computer software is that the use is made of the resources of the host computer varies from program to program often in unpredictable ways. Resource requirements also change dynamically during the execution of a single program. For example most programs alternate between computations, which use the CPU and IO operations, which use IO processors devices and peripheral and do not require the CPU. If several independent programs are available for execution at the same time, then the computers performance as measured by overall through put can be improved by assigning one program to the CPU while other programs are assigned for execution by IO processors.

The Disk Operating System (DOS) is a collection of programs the permits a computer system to supervise its own operations. Operating systems consists of a three groups.

(i) Control programs

(ii) Processing programs

(iii) Data management programs

The control programs provide for an automatic or enhanced control of the resources of the computer. They also permit an efficient flow of jobs through the computer system.

The process programs are required by the control programs and consist of language processors such as compilers and interpreters these compile or interpret the source programs as well as service programs that perform linkage between programs.

Data management programs are used by the operating system to control the organization and access of data used by the application programs.

DOS Commands: There are two types of commands

- Internal Commands.
- External commands.

4.4.1 Internal commands: Internal commands are executed immediately after they are entered, since they reside in the memory. These commands are also referred to as resident commands.

DOS Commands (Internal)

COMMAND	ACTION	USAGE
BATCH	Executes commands in a specific file	Filename
BREAK	Instructs DOS to check for break	BREAK [ON/OFF]
CLS	Clears the display screen	CLS
COPY	Copies the files specified to the same or another diskette or fixed disk	COPY File d:file
DATE	Lets you store a date	DATE mm-dd-yy
DIR	Gives a list of files names on the diskette	DIR d:
ERASE	Deletes a specified file	ERASE file

PAUSE	Makes system to wait	PAUSE
PROMPT	Sets a new DOS prompt	PROMPT (New prompt)
REM	Displays remarks contained in a batch file	REM (remark)
RENAME	Allows you to change the name of a file or group of files	RENAME File, file name
TYPE	Displays the contents of the specified file	TYPE file
VER	Displays the version of the DOS	VER
VERIFY	Verifies data written onto a disk	VERIFY (ON/OFF)
VOL	Displays disk volume label of the specified drive	VOL d:

4.4.2 External Commands:

External commands reside on the DOS diskette as program files. When the external command is invoked, the program file must be read from the diskette before the command can be executed. Any file with a file name extension of COM or .EXE or .BAT is considered to be an external command. When you enter an external command the file name extension is not included.

DOS Commands (External)

COMMAND	ACTION	USAGE
ASSIGN	Routes Disk I/O requests from one drive to another.	: D ASSIGN X=Y
ATTRIB	Sets the attribute byte of a file to read only or display status.	D: ATTRIB [+/-R] D: filename
CHKDKS	Checks the specified disk and issues a status report.	CHKDSK d:
DISKCOMP	Compares diskettes	DISKCOMP d: d:
DISK COPY	Copies the contents of one diskette onto another	DISKCOPY d: d:
FIND	Searches for strings of text	FIND (/V) (/C) (/N) FILE NAME
FORMAT	Prepares a new diskette for use and optionally copies DOS	FORMAT D: (/S) (/V)
GRAPHICS	Permits the contents of a graphics display to be printed	GRAPHICS
LABEL	Creates, changes or deletes a volume label on a disk	LABEL d: volume Label
MODE	Sets the device	MODE [LPT #:, n, m, p MODE comb: baud, parity, data bits, stop bits
MORE	Sends one screen output to the output device	MORE
PRINT	Prints the list of files on	PRINT file spec.
RESTORE		RESTORE file name

SORT	the printer while you are doing other tasks	SORT (/R) (/+n)
SYS	Restores one or more files placed on the source disk by the BACK UP command	SYS d:
TIME	Sorts text data	TIME (hh:mm:ss:xx)
	Transfers the operating system files from the default drive to the specified drive	
	Lets you set the clock in the computer	

Files:

The file names in DOS can be up to eight characters in length and may be followed by a period and a file name extension. The following cannot be used in the file name.

" / \ ( ) : ! < > + X ; , .

The result of the DOS command to a specific physical device, you can do so by using the device name in place of the file name.

The following are the devices and its usage.

CON: Console key board/screen

AUX: or COMI: first asynchronous communication adapter port

LPT 1: or PRN: - Printer

LPT 2: or LPT 3: - second and their parallel printer ports

NUL: A dummy device

File Names

EXTENSION	FILE TYPE
◊ ASM	Assembly language program in store code
◊ BAK	Backup file
◊ BAS	Basic language program
◊ BAT	Bat processing program
◊ BIN	Binary coded file
◊ COM	Command or program executable by DOS
◊ DAT	Data file
◊ EXE	Executable file
◊ PIC	Screen image display
◊ TMP	Temporary file
◊ TXT	Text file

4.5 Introduction to Windows Operating System

Microsoft – Windows (MS) is a Software Program that makes your IBM PC easy to use. Windows replaces the difficult commands with meaningful pictures called icons. When you click on an icon with your mouse, windows will run the corresponding program within a framed region on your screen called a window.

Windows owes its name to the fact that it runs each program or document in its own separate Window. A Window is a box or frame on the screen. You can have numerous Windows on the screen at a time, each containing its own program and or document. You can then easily switch between programs without having to close one down and open the next.

A window is a framed region on your screen within which a program displays its output. When you work within Windows you will find two different types of windows: Application Windows, Document Windows.

Application Windows are those that contain a program that you are running and working with, such as Microsoft word, Excel, PC Paint brush, Word Perfect and so on. Some programs designed for windows applications will let you work on more than one document at a time. For example, MS-Word for Windows allows you to have multiple document Windows. Document Windows are sometimes called as child windows.

Window Elements

Now it's time to take a quick look at the individual elements of a window. Here we examine the Program Manager Window, but most other windows have similar features.

The Control Menu

The button for opening the control menu is located in the upper – left corner of every window. When you click the button, the control menu shown here appears.

The control menu has options for Moving, Sizing, Minimizing, Maximizing and closing windows.

The Menu Bar And Pull – Down Menus

When a window has a menu – bar at the top and you select an option from the bar, a Pull – down menu appears. Here is the File menu for the Program Manger.

Window Sizing Buttons

Click the button at the upper – right corner of a window to minimize it to an icon or maximize it to fill the whole screen.

Scroll Bars

They appear on a window when all of its contents can't fit within the window. The scroll bars may appear on the right border for scrolling vertically, on the bottom border for scrolling horizontally, or both. Scroll bars can only be used with the mouse.

Borders

Borders define the limits of a window and also provide some functions. Mouse users can click and drag any Window border or corner to resize the Window.

The Title Bar

This appears at the top of Window. Using the mouse, you can click on the title bar and move a window to another location. Just point to the title bar, and then click and drag the window.

Windows GUI

The User Interface

When you start an operating system, the on Screen items that we can see and interact with, are defined as the user interface. In the case of most Current operating systems, including Windows 95 and the Macintosh OS, the user interface looks like a collection of objects on a Colored background.

The Desktop

Software makers call the colored area that you see on screen the desktop. The pictures are called Icons.

Because you point at graphics on the Screen, Programmers Sometimes refer to the interface as a graphical user interface, because you use a mouse to point it on Screen objects and then click on them.

Icons

Icons represent the parts of the computer you work with – printer's fonts, document file folders, disk drives, etc. There are fairly consistent rules for using the mouse to interact with icons.

- You click once an icon to select it. That indicates you plan to look with it.
- You double – click on an icon to choose, or activate it.
- If you Click on an icon and hold down the mouse button, you can drag the mouse to move the icon to another location on the desktop.

The Taskbar and The Start Button

Whenever you start a Program in Windows, a button for it appears on the Taskbar – on area at the button of the Screen whose purpose is to hold and display the buttons for the Programs you are running.

When you have multiple Programs running, you can shift from one to the other by clicking on a program's button on the taskbar.

The Program in the foreground with the highlighted button in the Taskbar is called the active Program. The start button is a permanent feature of the Taskbar.

MS – DOS is Character user Interface (GUI) which is character oriented and windows is Graphical User Interface Picture Oriented. Instead of typing the commands as in DOS, Windows provides you with a facility of just clicking the Icons.

Your overall work area in Windows is called as Desktop. It's called the Desktop because windows uses your screen in a way that's analogous to the way you'd use the surface of a desk.

As you work in Windows, you move items around on the Desktop, retrieve and put away items, and perform your other day – to – day tasks. You do all of this using graphical representations of your work projects. Because of this graphical representation working with your programs it is often faster and easier than it would be with Dos.

Multitasking

Besides being able to run programs and share data across applications, windows and Macintosh Operating systems have joined OS/2 and UNIX in achieving a long sought goal of Personal Computers: Multitasking.

Multitasking Means much more than the ability to load multiple Programs into memory. It means being able to perform two or more Procedures at the same time – such as printing a multi page document, sending e-mail over the Internet and typing a letter – all simultaneously.

Software engineers use two methods to develop multitasking operating systems. The first requires Co – operation between the Operation system and the application programs. Programs that are Currently running will Periodically check the operating system to see whether any other programs need the CPU. If any do, the running program will relinquish control of the CPU to the next program. This method is called co-operative multitasking and is used by the Macintosh Operating system to allow such activities as printing while the user continues to type or use the mouse to input more data.

The second method is called preemptive multitasking. With this method, the operating system maintains a list of programs that runs and assigns a priority to each program in the list. The operating system can intervene and modify a program's priority status, rearranging the priority list. With preemptive multitasking, the operating system can preemptive program that is running and reassign the time to a higher priority task.

Windows allows you to load and run several applications at the same time. This capability is called multitasking. Most of the time you'll probably work with one application while others wait in background windows until you need them. However, windows also let's you have a background (non active) application working on one task while you are doing something else in the active window. For e.g., a background application can sort a mailing list or print a document as you write a letter in another window.

Multitasking lets your system use idle time by handling other tasks in the background. Every time you pause, windows jumps to the background application and continues processing. 386 enhanced mode is a multitasking mode that provides additional features for owners of Intel 80386 and 80486 Systems – such as Virtual memory, which treats disk storage as memory when you're running short of RAM. Multitasking runs applications simultaneously, giving each a share of computer processing time.

Format of a Window

Title Bar

The title bar displays the title associated with the window: indicates when the window is active and when it is inactive : and is the means for moving the window – when you point the mouse cursor, to the title bar and drag the mouse, you move the window. When a window cannot be moved, it has no title bar.

Frame

The frame surrounds the Window. When you point the mouse to one of the sides and drag the cursor. You can shrink and expand the window size horizontally. The top and bottom of the frame allow you to shrink and expand the window vertically. When a window cannot be resized, the frame appears as a single solid line.

Control Menu Box

The small box with the horizontal bar in the upper – left corner of the window is the control menu box. It allows you to pop down a control menu. Control menu can be selected by clicking the box with the mouse or by pressing Alt + Spacebar for program windows and Alt + Hyphen for document windows.

Menu Bar

The menu bar is the place on a window where the titles of pull – down menus appear. These titles will vary from application to application but certain standards have emerged.

Work Space

The workspace of a window is that portion that is inside the frame and under the title bar. This space is also called the "Client area". The window displays its data in the workspace.

Minimize/Maximize Boxes

A window can be in one of three conditions of display with respect to its size and placement. It can occupy a section of the desktop or a section of the parent window's workspace, it can also fill the desktop or parent window's workspace completely. Otherwise it can appear as an icon at the bottom of the desktop or at the bottom of the parent window's workspace.

Scroll Boxes and Scroll Buttons

Often the display of data in the window's workspace extends beyond the area covered by the window. A word processing document is usually much longer than the space displayed by the window. Graphic pictures and many text files can be wider than the window as well. To view the hidden data you must be able to scroll the window horizontally and vertically. The horizontal and vertical scroll boxes and buttons allow you to do this with the mouse.

Windows seems to work best when you have a mouse. A mouse is not an absolute requirement because almost everything you can do with the mouse can be done with the keyboard too. But using the mouse relieves you from having to remember the different keystrokes that issue the commands. The mouse allows you to point at a visual symbol on the screen and click the appropriate action. The symbol reminds you of their purposes. Even the mouse points will change its shape to indicate the different effects it can cause.

Icons

Icons are the basic elements of the Windows screen. At the bottom of the program Manager window we have several small symbols with names under them. These are called Icons.

Windows uses icons to represent documents and programs when they are not currently opened up in a window. They may be sitting on the Desktop waiting to be worked with, or they may be programs that are actually running but have temporarily been shrunk down to get them out of the way for the moment. A special class of icon, called a group icon, is used to represent a collection of programs that you decide to group together for convenience.

All windows can be temporarily removed from the screen when not in use by reducing them to icons on the desktop. This is called minimizing the window.

When a document window is minimized, it appears within the host application window. The main window's icons are all different while the program manager's icons are all the same. The Program Manger's icons represent groups of programs. All the icons are the same because each are

Selecting Icons

When an icon's title is white letters on a dark background, the icon is selected for some following action:

Selecting Icons with the Mouse

Move the mouse cursor to an icon in the Main window and click. Press and release the left button. The title of that icon will show that the icon is selected.

Selecting Icons with the Keyboard

Use the arrow keys on your keyboard to change the selected Icons in the Main Window. Press the Ctrl Key and the Tab Key at the same time. The active icon moves to on of those in program manager window and the main window becomes inactive.

Moving Icons with the Mouse

Move the Mouse cursor to one of the icons in the Main window. Hold the left button down and drag the icon around the window. The icon changes to a black – and white copy of itself without its title for as long as you drag it around. If you try to drag the icon outside of its windows, its shape will change to a slashed circle cursor to indicate that you are in a forbidden territory.

Moving Icons with the Keyboard

Press Ctrl + Tab to cycle through the groups until you are at the group icon you want to move.

Selecting Moving and Sizing windows

The user can have several windows open at one time.

Two Document Windows

This display shows the Accessories window as the active window on top of the Main Window, which remains open but becomes inactive. Now choose the games icon you will get the games document window.

At present, there will be four windows on the screen namely the Program Manager Window, Main, Accessories, Games document Windows.

Selecting Document Windows with the Mouse

Move the mouse to any visible part of the Accessories window and click.

Selecting Document Windows with the Keyboard

Press Ctrl+ Tab repetitively until the Accessories window is on top. You select and then choose the group icons to turn them into open group windows. Each time you choose an icon, its window become the active one. The others stay open but become inactive.

Moving Windows

Move the mouse cursor to the title bar of the window, press and hold down the left button and drag the cursor in the direction you wish to move the window. An outline of the window will move along with the cursor. When the outline appears where you want the window to be, release the mouse button.

Moving Windows with the Keyboard

Press Alt + Space to open the control menu of any window. The control menu pops down. Press the M key. A four pronged arrow cursor appears. Use the arrow keys to move the window horizontally and vertically. As you press the keys, an outline of the window follows where the window movement will be. If you decide to leave the window where it was, press the Esc key.

Moving Document Windows

You can move a document window around inside the program window that owns it, but cannot move it outside the program window. Select the Accessories window by clicking somewhere inside its frame or by pressing Alt + Esc.

Sizing Frames

You can change the size of windows that have frames. The calculator does not have a frame and so its size is fixed. To resize a window, you must first make it active.

Resizing Windows with the Mouse

Move the mouse cursor to the right side of the Accessories Window's frame. The cursor will change to a right – left arrow. Hold the mouse button down and drag the cursor to the right and left. A rectangle will describe the new window – width. When the width is the way you want it, release the button and the window will display with its new size.

By pointing the cursor to one of the corners of the window, the cursor will change to a slanted, two – headed arrow and you can stretchy or compress the window on the two boxes at once.

Resizing windows with the Keyboard

Press Alt + Hyphen to display the control menu for the Accessories window. Press S key to choose the size command. The four headed arrow cursor appears in the middle of the window. Pres one of the four arrow keys to select whether you are going to move the top, bottom, or one of the sides. The right – left or up – down cursor will appear on the side of the frame you have selected.

Menus

A program that runs in the Windows environment will make extensive menus. The Windows menu architecture is consistent across applications and within the Windows program themselves. This consistency is part of the Windows common user interface.

The menu bar in the program manager window is typical of menu bars for most Windows programs. The program manger is a Windows program itself. It is the executive program that manages the execution of other programs, and because it is a program it uses the Windows conventions for a common user. Its menu bar contains four selections. These are the File, Options, Window and Help menus.

Most Windows applications will have the File menu. It contains the Commands to manage document files, print documents and exit the application. Many applications will have the help menu, too. It is the entry to the conventional Windows context sensitive help system used by both Windows and most Windows applications. Virtually every text editor and word processor that operates in the Windows environment includes an Edit menu. The Windows Note pad, Windows Write and the clipboard all have edit menus.

Selecting a Menu With The Mouse

Move the mouse cursor to the file label in the menu bar and click. This is a menu. It contains a list of commands and a menu selection cursor, which is a dark bar that extends the length of the selection's name on the menu. You can select any menu by moving the mouse cursor to its title on the menu bar and clicking. To deselect the menu, move the mouse cursor outside the menu itself and click.

Selecting A Menu With the Keyboard

Observe that each of the menu labels includes an underlined letter. These are the shortcut keys assigned to the menu names. Press Alt + F and you will select the File Menu.

Cascaded Menus

If a menu command shows a dark, right-pointing arrow head to the right of its title, the command will open a cascaded menu. A cascaded menu pops down along the side the current menu. The Cascaded menu aligns itself with the menu command that selects it.

Menu Command Types

A command on a menu can be one of three types: Simple, Context-Sensitive or Toggled.

Simple Menu Command

When you choose a Simple command, you execute the command's action immediately. L the Command is always the same regardless of the surrounding circumstances. Open the Window menu and choose the Arrange icons command. The command rearranges the icons into their original positions.

Context – Sensitive Menu Command

It depends on external variable circumstances. For Example, the Open, Delete and properties commands on the Program manger's File menu operate on the currently selected group icon or Window. Select the Accessories Icon as the current group and Select the File menu so that the display appears. Now choose the Delete command on the file menu. You walk see the Display. The dialog box asks if you want to delete the Accessories group.

Toggle Command

A toggle command has an on-off setting that affects the behavior of the program. You do not execute a program action when you choose the toggle command. Instead, you reverse the setting of the toggle. The program uses the toggle's setting to determine its subsequent behavior.

Help Menu

Contemporary computer systems employ online help systems that allow the user to view operating hints and instructions on the screen while the application runs. Windows not only provides such a system, it implements it as a general purpose help application that is available to other applications. This approach allows the developers of Windows applications to install online help information into their software with a minimum of effort.

Context Sensitive Help

A context-Sensitive help system is one where the content of the help information depends on what you are doing in the program at the time you run the help system.

The Help Menu

Most menu bars in Windows applications include a Help selection, usually the right-most command on the bar. The program manger's menu bar

is an example. The program manger's Help menu commands are typical of those found in most windows applications. The about command is worthy of mention because it provides more information than the about displays in most other applications. Usually an application's about command give you a static display that tells you the name of the program, its version, the copy right date and the names of the programmers.

The program Manager's about display tell you the current windows operating mode, the amount of free memory and the percent of system resources that re currently available.

The Help Index

DA well – organized Help database begins with an index. You can start with the one in the Program Manger by choosing contents from its Help Menu.

Cross Reference

Several of the lines are underlined. These underlined titles are cross-references items. You can select one of them by pointing the mouse cursor to it. The cursor changes from an arrow to a hand with a pointing figure. Click the topic which the finger is pointing to the topic you want.

Command Buttons

There are five command buttons across the top of the windows. When a button's display is dark, the button is available. When it is light, it is unavailable.

Contents Button

It returns you to the contents part of the Help database.

Back Button

Allows you to move backwards through the previous displays in the reverse sequence in which you viewed them.

History Button

Allows you to review a history of the help windows you have viewed. The windows Help History list box is a list of all the help windows you have viewed. You can choose an entry from the list to redisplay that window.

Search Button

Allows to search the Help database by specifying a key word or phrase. The search operation uses a Predefined list of key values from which you can select.

The Glossary

When a key word or phrase has a dotted underline rather than a solid one, you can read a description of the item from the Help Glossary.

Book Marks

You can insert book marks into a Help textual database. They allow you to go directly to a particular topic form anywhere else in the database without searching, browsing or using the cross-references.

Setting a Book mark

The Bookmark menu has only one command, the Define command.

Deleting a Bookmark

To delete a Bookmark, select the bookmark menu and choose define. You will see the Bookmark define dialog box, select the Arranging windows and icons entry in the lower list box. Then choose the Delete command button. The entry disappears from the list box and the bookmark no longer exists in the Help database.

Annotate

You can add your own notes to a Help topic. If you select the Edit menu you will see the display. Choose the Annotate menu command and observe the annotate dialog box.

The small vertical bar in the text box is a text cursor. You can type the content of your annotation into this box.

Printing a Topic

You can print the text of the current topic by selecting the print topic command from the Help window's file menu.

Copying a Topic

You can copy the contents of a topic into another application by using the copy command on the Help window's Edit menu.

When you mark the text and choose the copy command on the dialog box, the textual contents of the current topic are copied into the windows clipboard. You can subsequently use the paste command in another application to copy the clipboard's contents into the application's document.

Loading Other Help Files

Windows and its applications have many files in the Help database. You can load a different Help file if you need help with another application. Choose the Open command on the File menu of the Help window. You will see the open dialog box. Choose any of the HLP files from the dialog box to change the active help file.

Creating a Shortcut to the Desktop

Try as you may, you can't drag the Desktop icon from the Explorer's left pane and create a shortcut that way. But you can create a shortcut to the Desktop by following these steps:

Click the Windows folder in the Explorer.

In the right pane, right-click the Desktop folder and drag it to the Desktop. Again, you may have to adjust the window size. Also, you may have to select Show All Files under View -> Folder Options.

Release the right mouse button and select Create Shortcut(s) here.

When opened, this shortcut will contain all the folders and files and other icons on the Desktop—except the system-type folders like My Computer and Recycle Bin.

Recycle Bin

The Recycle Bin is a reserved space on your hard drive where files and folders you no longer want can be disposed of. When you delete a file or folder, or drag it to the Recycle Bin icon to delete it, the file or folder itself is mover to that reserved space. If you have more that one hart drive, each drive has its own reserved space (and as you will shortly read, you can adjust the "comfort level" for each of those spaces). If you chose to manage your drives independently, there's an icon representing the Recycle Bin on each drive—though the contents displayed when you click any icon will be the same as the Recycle Bin on any other drive. If you want a deleted file or folder back, you can click the Recycle Bin icon to open it and retrieve any file by resorting it.

Recycling a File, Folder, or Icon

By default, Windows 98 is set up to deposit all deleted files, folders, or icons in the Recycle Bin. When you right-click a file or folder and select Delete or highlight a file or folder and press the Delete key, you'll be asked to confirm if you want to send the file of folder to the Recycle Bin. After you click Yes, that's where the file or folder is moved to. (Deleted shortcuts are also sent to the Recycle Bin.)

Bypassing the Recycle Bin

If you've got a file that you know for sure you want to delete (forever) and that you don't want taking up space in the Recycle Bin, just hold down the Shift key when you select Delete. But be sure that's what you want to do

because there's no way in Windows 98 to recover a deleted file that's bypassed the Recycle Bin.

Recovering a Deleted File, Folder, or Icon

To retrieve a single file to its original location, right-click the file name and select Restore form the pop-up menu. You can also drag it from the Recycle Bin folder to any folder or to the Desktop. To recover more than one file at a time, hold down the Ctrl key while selecting file and folder names form the Recycle Bin. Then right-click one of the highlighted names and select Restore.

Emptying the Recycle Bin

To get rid of everything in the Recycle Bin, right-click the Recycle Bin icon and select Empty Recycle Bin. When the Recycle Bin is open, there's also an option to Empty Recycle Bin under the File menu.

Creating a New Folder On the Desktop

Folders are the equivalent of directories first used with DOS and then with Windows. Folders created in Windows 98 can contain shortcuts. These shortcuts can be to real folders in other locations, and can be placed right on the Desktop—a great improvement over earlier versions of Windows.

To create a new folder on the Desktop, right-click the Desktop in some unoccupied space and select New -> Folder. A Folder will appear with the cursor placed inside it, so all you have to do to name it is type the name you want.

This folder is also located on your hard drive in the Desktop folder inside the Windows folder, which you can examine using Windows Explorer.

Creating a New File on the Desktop

To create a new file on the Desktop, right-click on the Desktop in some unoccupied space and select New from the menu. Select the type of file you want to create. A file will appear with the cursor already placed for you to type in a name.

This file is located on your hard drive in the Desktop folder inside the Windows folder.

4.6 Summary