Subject: Genetics and plant breeding CBCS Pattern Practical Examination

M.Sc (Ag.) II Semester Course: Computers and Bioinformatics

PART I

Unit -1 Introduction to computers:
Unit-2 Brief idea of operating systems:
Unit -3 Introduction to networking:

Unit -1 Introduction to computers:

INTRODUCTION

Computer as a revolution left no area of life untouched in the present world. It is of tremendous help in all field of life. Hence, the knowledge of computer is a necessity for existence of everybody in this global village. The invention of computer has transformed our simple manual works to sophisticated life of automated works to meet the global demand for the higher productivity and increased efficiency with high precision.

Computer is increasingly becoming compulsory in nearly all fields of studies, not because of anything but its accuracy and versatility in processing data. Many tasks at home or office are being automated rapidly with computer. Thus it is becoming apparent that in whatever discipline or working sector, the computer is now a very vital tool for efficiency improvement and precision of job or task execution. This is designed to meet the prerequisite need of everybody that are interested and wish to know about computers science and computing in general.

A computer is an electronic device, operating under the control of instructions stored in its own memory. These instructions tell the machine what to do. The computer is capable of accepting data (input), processing data arithmetically and logically, producing output from the processing, and storing the results for future use. Most computers that sit on a desktop are called Personal Computers (PCs).

The "computer" is an ensemble of different machines that you will be using to get your job done. A computer is primarily made of the Central Processing Unit (usually referred to as the computer), the monitor, the keyboard, and the mouse. Other pieces of hardware are commonly referred to as peripherals.

In everyday life activities, we process data or encounter cases of data processing. A typical example of data processing is the generation of statement of student result from the marks score in an examination and continuous assessment. It is essential to know that information is as good as the data from which it is derived, and the transformation process which they are subjected to. Meaningless data or inappropriate processing produces wrong information. Thus computer gives you results corresponding to what data you supply and how you process it (i.e. *.gabbage- in, gabbage-out.)*.

Summarily, the intelligent performance of a computer depends on correctness of input data and the intelligence performance of the human being that drives it.

USES OF COMPUTERS

People use computers in many ways; **business**, computers are used to track inventories with bar codes and scanners, check the credit status of customers, and transfer funds electronically, **homes**, tiny computers embedded in the electronic circuitry of most appliances control the indoor temperature, operate home security systems, tell the time, and turn video cassette recorders (VCRs) on and off, **automobiles** regulate the flow fuel, thereby increasing gas mileage, they also **entertain**, creating digitized sound on stereo systems or computer-animated features from a digitally encoded laser disc.

Computer programs, or applications, exist to aid every level of education, from programs that teach simple addition or sentence construction to programs that teach advanced calculus. Educators use computers to track grades and communicate with students; with computer-controlled projection units, they can add graphics, sound, and animation to their communications. Computers are used extensively in scientific research to solve mathematical problems, investigate complicated data, or model systems that are too costly or impractical to build, such as testing the air flow around the next generation of aircraft. The military employs computers in sophisticated communications to encode and unscramble messages, and to keep track of personnel and supplies.

HISTORY OF COMPUTING

Since the creation of man, a significant amount of human activities has been ascribed to organizing and processing information so that it could be more easily presented for easy comprehension. Many devices have been used in the past before the advert of computer. It is then necessary to vividly look into their evolution.

Early computing machines:

1. Abacus (-2500BC): This is a hand- held device made of beads stung on rods in a frame. The rods correspond to positions of the digits while the beads correspond to the digits.
2. Napier.s Bone (2500BC): This was invented by John Napier.s (1550 - 1617). This consists of small rods with appropriate markings on them. It is a mechanical aid to computation that consists of nine such rods (called bones) with one for each digit 1 through 9. He also invented logarithms which made possible to do division and multiplication by performing addition and subtraction.
3. Slide Rule (1600AD) by William Oughtred (1575 - 660): He invented it in 1622 but announced it in 1632 this consist of rules on which markings represent logarithms of numbers and also permits calculation involving exponents, trigonometric functions, etc.
4. Pascal mechanical calculator (1600) or Numerical wheel calculator:-Blaise Pascal (1623 - 1664) in 1642 invented the first adding machine called Pascaline. The brass rectangular box used eight moveable dials to add and sum up of eight figures long using base 10. It can perform all the four arithmetic operation with previous unheard speed.
5. Leibnitz mechanical multiplier (1600): In 1694 Gottfried Wilhem Von Leibnitz (1646 - 1716) improved upon the pascaline by creating a machine that can also multiply using a system of dials and gear.
6 Colmar.s Calculator (1820) by Charles Xavier Thomas de Colmar: This presented a more practical approach to computing.
7 Punched-Card machine (Jacquard.s loom) (1801): Joseph Marie Jacquard.

8 Mechanical computer: Charles Gabbage (1792-1871) Father of the computer. Difference engine powered by steam and large as locomotive the machine has a stored program and could perform calculations and print the result automatically. We also have Analytical engine credited to him.
9 Hermann Hollerith (1860-1929)

- Hollerith.s system punch-card reader machine:-for counting census result in 1890 in US.
- formed tabulating machine company in 1896(TMC)
- Automatic Tabulating Machine (ATM)-1900
- TMC was renamed to International Business Machines Corporation (IBM) in 1924 after series of mergers.

In summary, the history of computing began with an analog machine. In 1623 German scientist Wilhelm Schikard invented a machine that could add, and with the aid of logarithm tables, multiply and divide. Since then the development has pass through a lot of stages such as the invention of **punched cards** to program patterns to create woven fabrics by Joseph-Marie Jacquard a French inventor in 19th century. Another early mechanical computer was the **Difference Engine**, designed in the early 1820s by British mathematician and scientist Charles Babbage. In the 1930s American mathematician Howard Aiken developed the **Mark I** calculating machine, which was built by IBM. This electronic calculating machine used relays and electromagnetic components to replace mechanical components. To be sincere, the world has left the era of hearing stories about computer. We are now in the world of what you can use it for to serve its desired purposes.

GENERATIONS OF COMPUTERS

The history of computer development is often referred to in reference to the different generations of computing devices. Each generation of computer is characterized by a major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful, efficient and reliable devices.

First Generation - 1940-1956: Vacuum Tubes
The first computers used vacuum tubes for circuitry and *magnetic drums for memory*, and were often enormous, taking up entire rooms. They were very expensive to operate and in addition to using a great deal of electricity, generated a lot of heat, which was often the cause of malfunctions. First generation computers relied on ***machine language*** to perform operations, and they could only solve one problem at a time. Input was based on punched cards and paper tape, and output was displayed on printouts. The UNIVAC and *ENIAC* computers are examples of first-generation computing devices. The UNIVAC was the first commercial computer delivered to a business client. It was used in the 1951U.S. Bureau Census.

Second Generation - 1956-1963: Transistors
Transistors replaced vacuum tubes and ushered in the second generation of computers. The transistor was invented in 1947 but did not see widespread use in computers until the late

50s. The transistor was a vast improvement over the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy efficient and more reliable than their first-generation predecessors. Second-generation computers still relied on punched cards for input and printouts for output. Second-generation computers moved from cryptic binary
machine language to symbolic, or assembly, languages, which allowed programmers to specify instructions in words. High-level programming languages were also being developed at this time, such as early versions of COBOL and FORTRAN. These were also the first computers that stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology. The first computers of this generation were developed for the atomic energy industry.

Third Generation - 1964-1971: Integrated Circuits

The development of the integrated circuit was the hallmark of the third generation of computers. Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers. Instead of punched cards and printouts, users interacted with third generation computers through keyboards and monitors and interfaced with an operating system, which allowed the device to run many different applications at one time with a central program that monitored the memory.
Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.

Fourth Generation - 1971-Present:Microprocessors

The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. What in the first generation filled an entire room could now fit in the palm of the hand. In 1981 IBM introduced its first computer for the home user, and in 1984 Apple introduced the Macintosh. Microprocessors also moved out of the realm of desktop computers and into many areas of life as more and more everyday products began to use microprocessors. As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the
Internet. Fourth generation computers also saw the development of GUIs, the mouse and handheld devices.

Fifth Generation - Present and Beyond: Artificial Intelligence

Fifth generation computing devices, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today. The use of parallel processing and superconductors is helping to make artificial intelligence a reality. Quantum computation and molecular and nanotechnology will radically change the face of computers in years to come. The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self organization.

SOFTWARE AND HARDWARE

Hardware is the term given to the physical components of a computer: e.g. keyboard, monitor, system box or floppy disk drive. Software, on the other hand, is electronic information: files, operating system, graphics, computer programs are all example of

software. The difference between hardware and software reflects the duality between the physical and mental worlds: for example, your brain is hardware, whereas your mind is software. Software is the stuff that makes your computer do things for you. The computer without software would be like a home entertainment system with no tapes, CD.s, or movies - you have the machine, but there is nothing to play on it. Software is continually developed. Each time the software maker (Microsoft, Adobe, Corel, etc) develops a new version of their software they assign it a version number. Before Microsoft Word 7, there was Microsoft Word 6.0.1, and before that Word 6.0. The larger the developments made to the software, the larger the version number changes. Usually a large change will result in a whole number upgrade; a small change may result in a tenth of a decimal place. Hardware are those components or physical pieces (things you can touch) that make up the computer.

The different pieces of the computer's hardware are monitor, speakers, mouse, CDROM, floppy drive, hard drive, keyboard, CPU, RAM, Processor, etc. Each piece plays a role in the operation of a computer.

DIFFERENT PARTS OF A COMPUTER AND THEIR USES

The standard computer consists of a monitor, a keyboard, a mouse and the system unit. One can attach accessories such as printers and scanners by means of ports. Increasingly in the workplace, computers are connected to printers and other computers by means of a network.

Figure 1: Computer System Hardware

The monitor

This is the Visual Display Unit (VDU). There are various technologies for the display unit, cathode ray tube (CRT) or Liquid Crystal Display (LCD) or electro luminescent screens or the projector. The monitor or screen displays your work. Facing it down reduces reflected glare from room lights. This reflection may affect your sight. Monitors come in different sizes. The (most important) size of the monitor is measured diagonally on the screen (in inches). Based on this, the monitors range in sizes of 12", 14", 15", 17", 19", 21", 29", etc. Monitors are also characterized by the flatness of their screen. The flatter and the wider screens are usually the better.

The system box or computer console

The system box is where all the computations that the computer performs take place. Inside are the CPU processor, the motherboard, the hard disk, any network or sound cards, memory chips (RAM), printer ports (at the back) and the drive bays for floppy disks, Zip disks or CDs. Outside the casings are the power buttons (ON/OFF and Restart) with some additional facilities like the casing USB ports,Webcams, etc.

The keyboard (Pressing)

This is the basic input device. It is one of the ways you can tell the computer what to do. It consists of the standard typewriter keys as well as a numeric keypad and function keys. You can use it to give the computer commands, name folders and files, and type text in word processing documents. The keyboard is made of three main categories of keys with each used for a different purpose.

i. Character Keys: These comprise of letters, numbers and the symbols. They are used to insert/display readable characters on the screen which is equivalent to the keystroke pressed.
Letters a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, v, w, x, y, z

ii. Action Keys: These are not used to type anything, instead they cause an action. Escape, Tab, Caps Lock, Shift, Control, Alt, Backspace, Enter, Windows,Win Menu, Print Screen, Scroll Lock, Pause Break, Number Lock, Insert, Home, Page Up, Delete, End, Page Down, Power, Sleep,Wake up, Up Arrow, Left Arrow, Right Arrow, Down Arrow, and Space Bar.

iii. Application-Dependant Keys: These are called function keys. They are F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, and F12. Although the F1 key is usually used to get help while working in Microsoft Windows, the use of the other keys varies from one applic ation to another. Eventually, the application you use will give you instructions on what to do and how to use the function keys.

Key Combinations

Some keys can be combined to produce uppercase letters or to access the upper symbols of some keys (i.e. the Shift and Control keys). Keys are also combined for many other reasons. In some situations, you have to press keys simultaneously, which means that you may be expected to press two or more keys at the same time, or almost at the same time. In some other situations, you may have to press and release one key, followed by another.

Shortcuts

A shortcut is a quick action you ask a program to perform when you press one particular key or a combination of keys. Some shortcuts are universal or almost, that is, the computer responds regardless of what application is running. Some other shortcuts depend on what you

have on your screen. Some shortcuts are already known to the computer (as part of the operating system). Most other shortcuts are set by the programmer of the particular application you are using. Yet some applications allow you to create your own shortcuts. Some shortcuts are readily obvious and can be seen from the main menu of the application. Some other shortcuts are either part of Microsoft Windows (and can be applied in your program) or are not easily displayed, you might have to search the Help documentation of the program you are using.

The Mouse (Clicking and Dragging)

This is another input device used to move a small white arrow pointer-the Cursor (but the shape will change depending on the context in which the mouse is being used) on the screen. By pointing and clicking you can carry out commands. The computer may ask you to verify that you are sure to rename a file, by clicking on the .Ok. button. A mouse is primarily made of three parts: the buttons, the handling area, and the sensor (rolling object or light). There are either one, two or three mouse buttons. By default, a mouse has two buttons: left and right. Most mice nowadays are also equipped with a wheel on top of the middle button called the Scroll Button.

To use the mouse, the first decision you make is to know which of your two hands you will be using to handle the mouse. By default, the mouse is configured to work for the right hand. If you are left-handed, the settings can be changed to suit your needs: Start Control Panel Double-click Mouse on the Buttons Tab, Check the Switch Primary and Secondary Buttons check box.
You can also change the cursor from the default Up-Left Pointing to another but you should know that this is best determined by the computer as this varies from program to program. To change, click the Pointer's Tab.
Also click the other tabs to review the different properties.

The tip of the mouse pointer must be positioned on the item you want to use (**Pointing**). To select an item, point to the item and click once (**Selection . Left Clicking**). **Double-clicking (left button)** on an icon invokes a command or launches an application. **Dragging** an item (icon or other object) from one location to another, position the mouse pointer on the item, click and hold the mouse buttons (left, right) down, and move the item to the new location. **Right Clicking** (right button) invokes a shortcut (contextual) menu that contains all the actions that are related to the item. Some applications, namely programs used to manipulate text (they are called word processors), allow you to **triple-click**. On Windows machines, there is a left and right mouse button. Most time you use the left mouse button (if you are right-handed). On some newer Macs, the same feature can be used with their single mouse button by holding down the Control key as you click an item on the screen.

The Peripherals

All the parts we have reviewed so far are usually required for the computer to function. Some other parts, not required, can also be connected to the computer to complement it. A peripheral is an object attached to the computer to help it perform some necessary assignments none of the other parts can handle. In most scenarios, no peripheral is required but nowadays, it is unusual for a computer not to have any peripheral at all. The most used peripherals are the printer, a digital camera, a scanner, a projector, an external drive (such as an external CD burner for an old computer), etc.

Disk Size Conversion Chart (Bits, Bytes, Kilobytes, Megabytes and Gigabytes)

Bit- Binary digit:-a single elements in the computer memory that can store either 1 or 0 Word. 1Byte, 2Byte or 4Byte depending on the machine. Generally computer word length is giving in bits; hence we have 8bit, 18bit or 32bit microprocessor computer.

Table 1: Computer Storage Devices Unit Conversion Unit Equivalent to

1Byte = 8 Bits
1kilobyte (kB) =1,024Byte
1MB 1,024KB = 1,024,000Byte
1GB 1,024MB = 1,024,000,000Byte

TYPES OF COMPUTERS

Analog computer

These systems were the first type to be produced. It is an electronic machine capable of performing arithmetic functions on numbers which are represented by some physical quantities such as temperature, pressure, voltage, etc. Analog refers to circuits or numerical values that have a continuous range. Popular analog computer used in the 20th century was the slide rule.

Digital Computers

Virtually all modern computers are digital. Digital refers to the processes in computers that manipulate binary numbers (0s or 1s), which represent switches that are turned on or off by electrical current. A bit can have the value 0 or the value 1, but nothing in between 0 and 1. A desk lamp can serve as an example of the difference between analog and digital. If the lamp has a simple on/off switch, then the lamp system is digital, because the lamp either produces light at a given moment or it does not. If a dimmer replaces the on/off switch, then the lamp is digital, because the amount of light can vary continuously from on to off and all intensities in between. Digital computers are more common in use and it will be our focus of discussion.

Hybrid Computer

This is when a computer make is of both analog and digital components and techniques. Such computer require analog to digital and digital to analog converter which will make analog and digital data palatable to it. The basic classification nowadays uses the following.

1. The Desktop

A computer is referred to as "desktop" when it is relatively small enough to be positioned on top of a table where a person is working. Such a computer can also be placed on the floor or somewhere under, or aside of, the table, in which case the monitor would be placed on top of the table. This is the most common type of computers used in the office or at home. A desktop computer is made of different parts that are connected with cables.

2. The Laptop

A computer is called laptop when it combines the CPU, the monitor, the keyboard, and the mouse in one unit to be so small that you can carry it on your laps when traveling or commuting. A laptop is also called a notebook. Other parts, such as an external mouse, an external keyboard, or peripherals such as a printer or a projector, can be connected to the laptop. A laptop is only physically smaller than a desktop but, everything considered, it can do anything that a desktop can do.

3. The Server

A server is a computer that holds information that other computers, called workstations, can retrieve. Such workstations are connected to the server using various means. This means that

they could be connected using cable, wireless connection, etc. Only computers that maintain a type of connection with the server can get the information that is stored in the server.
Normally, although not particularly recommended, any computer, including a desktop or even a laptop can be used as a server, as long as it can do the job required. A server is more defined by the program (called an operating system) that is installed in it, not how the machine looks. Any type of computer, including a desktop, a laptop, a CD or DVD machine, etc can be connected to a server. The person who sets up a server also defines the types of connections it is made for.

4. The Mainframe

A mainframe is a computer, usually physically big, that does almost all the jobs for other types of computers that are connected to it. This is a broad definition but other aspects are involved. Like a server, the program (operating system) that runs in the mainframe defines its role.

ANATOMY OF COMPUTER SYSTEM

A typical computer system irrespective of its size, class or type consists of hardware and software, integrated and harmonized together to perform computational work (scientific or military) or data processing.

COMPUTER HARDWARE

Hardware system: Computer hardware consists of the components that can be physically handled. It refers to the physical units or machine of functional units, which makes up the computer configuration which is done to suit the goals and objectives of the user. The function of these components is typically divided into three main categories: input, output, and storage. Components in these categories connect to microprocessors, specifically, the computer.s central processing unit (CPU), the electronic circuitry that provides the computational ability and control of the computer, via wires or circuitry called a bus. Hardware may be classified into Central Processing Units (CPU) and the peripherals. The CPU entails Control Unit (CU), Arithmetic and Logic Unit (ALU) and the Internal Memory Unit (IMU) or main memory. The peripherals consist of the input, output and Auxiliary Storage Units.

Strictly speaking, computer is made up of five district elements to include:

1. A central processing unit (ALU and CU)
2. Input unit
3. Output unit
4. Storage unit (Internal and Auxiliary)
5. The communication network; 'Bus' that links all the elements of the system, and connects the
6. External world. (Cables and Cords)

MOTHERBOARD: The motherboard is a printed circuit board that connects other components through the use of traces, or electrical pathways. The motherboard is indispensable to the computer and provides the main computing capability. Personal computers normally have one central processing unit (CPU) on the motherboard.

THE CENTRAL PROCESSING UNIT (CPU)

This is the main brain of the computer that accepts data, performs operations on the data and sends out the result.Information from an input device or from the computer's memory is communicated via the bus to the Central Processing Unit (CPU), which is the part of the computer that translates commands and runs programs. It consists of ALU and CU, and a single chip or series of chips that performs arithmetic and logical calculations and controls the operations of the other elements of the system.

Most CPU chips are composed of four functional sections:

1. ALU: Calculating ability either arithmetical or logical operations.
2. Registers: Temporary storage areas that hold data, keep tracks of instruction, and hold the location and results of these operations.
3. Control section: Times and regulates the operation of the entire computer system, by using its instruction decoder to read patterns of data in a designated register and translate the patterns into activities, such as addition or comparison. It also uses its interrupt input to indicate the order in which individual operations uses the CPU and regulates the amount of CPU time allotted to each operation.
4. Internal Bus: Network of communication lines that connects the internal elements of the processor and also leads to external connectors that links the processor to the other element of the computer.

The main functions of the microprocessor (CPU clips) includes the following.

a. Control use of the main storage in storing data and instructions (i.e the ROM).
b. Control the sequence of operations.
c. Give commands to all parts of the computer system.
d. Carry out processing.

INPUT DEVICES

Input unit consists of external devices.that is, components outside the computer.s CPU. It provides or fetches information and instructions to the computer. These include keyboard, mouse (mechanical/ optomechanical/ opticals), light pen, joystick, scanner, microphones (voice recognition modules), Optical Character Reader (OCR), Magnetic Ink Character Reader Recognition (MICR), bar code reader, badge reader, digitizer, touch screen and optical mark reader (OMR).

A. **Light pen:** This is a stylus with a light sensitive tip that is used to draw directly on a computer.s video screen or to select information on the screen by pressing a clip in the light pen or by pressing the light pen against the surface of the screen. The pen contains light sensors that identify which portion of the screen it is passed over. It is mostly used with Laptop.

B. **Mouse:** This is a pointing device designed to be gripped by one hand. It has a detection device (usually a ball) on the bottom that enables the user to control the motion of an on-screen pointer, or cursor, by moving the mouse on a flat surface. As the device moves across the surface, the cursor moves across the screen. To select items or choose commands on the screen, the user presses a button on the mouse.

C. Joystick is a pointing device composed of a lever that moves in multiple directions to navigate a cursor or other graphical object on a computer screen.

D. Keyboard: Keyboard is typewriter-like devices that allows the user to type in text, numeric and execute commands with the aid of the functional keys on the keyboard.

E. Optical Scanner: This is light-sensing equipment that converts images such as a picture or text into electronic signals that can be manipulated by a computer. For example, a photograph can be scanned into a computer and then included in a text document created on

that computer. The two most common scanner types are the flatbed scanner, which is similar to an office photocopier, and the handheld scanner, which is passed manually across the image to be processed.

F. Microphone: This is a device for converting sound into signals that can then be stored, manipulated, and played back by the computer. A **voice recognition** module is a device that converts spoken words into information that the computer can recognize and process.

G. Modem: It stands for **mo**dulator-**dem**odulator, is a device that connects a computer to a telephone line or cable television network and allows information to be transmitted to or received from another computer. Each computer that sends or receives information must be connected to a modem.

OUTPUT DEVICES

Output devices consists of hardware that transfer information from the computer.s CPU to the computer user. This includes the monitor, Printer, plotters, or speaker.

Video Graphic Adapter: This is a device that converts information generated by the computer into visual information called **Monitor**. It looks similar to a television set. Information from the CPU is displayed on the screen of the monitor.

Printers: Information and graphics processed or produced with the aid of computer are printed out as hardcopy with the aid of printer. There are different types of printers; Dot-matrix printers, Laser printers, Inkjet, etc.

Plotters: Computer output to microfilm or fiche (COM) which process information on rolls of film (drum plotter) or slide of film (flatbed plotter).

STORAGE DEVICES

Storage devices provide permanent storage of information and programs for retrieval by the computer. The two main types of storage devices are **disk drives and memory.** There are several types of disk drives: hard disk drive, floppy disk, magneto-optical, and compact disk.

Hard disk drives store information in magnetic particles embedded in a disk. Usually a permanent part of the computer, hard disk drives can store large amounts of information and retrieve that information very quickly. The disks are of different sizes such as 1G, 10G, 40G, etc.

Floppy disk drives also store information in magnetic particles embedded in removable disks. Floppy disks store less information than a hard disk drive and retrieve the information at a much slower rate. It is of 2 type 51/4 floppy disk and $3_{1/2}$ floppy disk.

Magneto-optical disc drives store information on removable discs that are sensitive to both laser light and magnetic fields. They can typically store as much information as hard disks, but they have slightly slower retrieval speeds.

Compact Disc Drives store information on pits burned into the surface of a disc of reflective material such as CD-ROM. CD-ROMs can store about as much information as a hard drive but have a slower rate of information retrieval.

Digital Video Disc (DVD): This is similar and works like a CD-ROM but can store more than 15times as much information.

Flash drives work as floppy disks but more sensitive as a hard disk that must be ejected logical before final removal from the computer system. It has more memory than floppy disks.

Memory Cards work as flash drive but with an additional device called the **card reader.** This is very effective and more durable than the flash drives. Some devices serve more than one purpose. For example, floppy disks may also be used as input devices if they contain

information to be used and processed by the computer user. In addition, they can be used as output devices if the user wants to store the results of computations on them.

SYSTEM MEMORY

Memory refers to the computer chips that store information for quick retrieval by the CPU. They are basically divided into two ROM and RAM.

Random Access Memory (RAM) is used to store information and instructions that operate the computer.s programs. Typically, programs are transferred from storage on a disk drive to RAM. RAM is also known as volatile memory because the information within the computer chips is lost when power to the computer is turned off or the computer hanged.

Read-Only Memory (ROM) contains critical information and software that must be permanently available for computer operation, such as the operating system that directs the computer.s actions from start up to shut down. ROM is called non-volatile memory because the memory chips do not lose their information when power to the computer is turned off.

HARDWARE CONNECTIONS

To function, hardware requires physical connections that allow components to communicate and interact. A bus provides a common interconnected system composed of a group of wires or circuitry that coordinates and moves information between the internal parts of a computer. A bus is characterized by two features: how much information it can manipulate at one time, called the bus width, and how quickly it can transfer these data.

A serial connection is a wire or set of wires used to transfer information from the CPU to an external device such as a mouse, keyboard, modem, scanner, and some types of printers. This type of connection transfers only one piece of data at a time, and is therefore slow. The advantage of using a serial connection is that it provides effective connections over long distances.

A parallel connection uses multiple sets of wires to transfer blocks of information simultaneously. Most scanners and printers use this type of connection. A parallel connection is much faster than a serial connection, but it is limited to distances of less than 3 m (10 ft) between the CPU and the external device.

Unit -2 Brief idea of operating systems:

COMPUTER SOFTWARE

Software is the set of instruction that tells the computer what to do and when to do it. The computer uses this instruction to manipulate data, and enhance the proper functioning of the hardware components. It is designed to exploit and provide the potential capabilities of the hardware to the user. It converts data into information and allows users to use the computer in different ways. Computer programs are written by human beings, like you. This means that the person who writes a program also decides on its functionality and behaviour; which explains why two programs that are supposed to do the same thing, don't do it the same way. This is why, regardless of your expertise, you need to be acquainted with a particular program in order to make better use of it. The fact that you don't know a particular program doesn't say anything about your intelligence or lack of it. It simply means that you are not familiar with that program. These programs are usually stored and transferred via the computer.s hardware to and from the CPU. Software also governs how the hardware is utilized; for example, how information is retrieved from a storage device. The interaction between the input and output devices is controlled by software called the Basic Input

Output System (BIOS) Software. Software as a whole can be divided into a number of categories based on the types of work done by programs. The two primary software categories are system software, and application software.

SYSTEM SOFTWARE

This refers to set of programs that facilitate the optional use of the hardware systems by coordinating them. It consists of programs that start up the computer and perform some utility functions such as checking and getting the computer ready for use. They are usually written to accomplish loading, execution, storage, and retrieval of files from/into the computer. They are basically operating system, utility software, and language

Operating System

An operating system is a program that acts as an intermediary between the application programs and the computer hardware.You cannot directly use computer applications (or programs) with computer hardware without a translation system between the hardware and the applications. This translation system is called the operating system (OS). The Windows or Mac OS works behind-the-scenes to run your computer (i.e. the software and the hardware). It tells the computer what to do when it starts up and keeps track of your documents, files, and other software. It also provides the standard user interface component (like menus and the desktop) that you see when you look at your computer screen. Both the Windows and the Mac OS operating systems use a graphical interface (pictures or icons instead of text) that allow you to immerse yourself in multitasking (accessing multiple applications and files simultaneously). You work with windows in this interface. These windows are a series of boxes, which can be opened and closed as needed. We shall be using Microsoft Windows Operating System as it is the most common on the personal computers. There are various types of Microsoft Windows. A type of Microsoft Windows is referred to as a version.

Examples of versions are
Microsoft Windows 3.3,
Microsoft Windows 95,
Microsoft Windows NT Workstation,
Microsoft Windows NT Server,
Microsoft Windows 98,
Microsoft Windows 98 Second Edition,
Microsoft Windows Millennium,
Microsoft Windows 2000 Professional,
Microsoft Windows 2000 Server,
Microsoft Windows XP Home Edition,
Microsoft Windows XP Professional, and
Microsoft Windows Server 2003
Microsoft Windows 2007
Microsoft Windows 2010

Operating System Components

- Process management
- Memory management
- File management

- Secondary storage management
- Networking
- System Protection
- Command-interpreter system

Operating System is the basic software that controls the major operation of the computer. It is the master control program, permanently stored in memory, which interprets users commands requesting various kinds of services such as display, print or copy a data files; list all files in a directory; or execute a particular program. It provides the link between the user, the application program and the computer hardware with a view to controlling and managing the operation of the computer. The operating system has four major functions: It coordinates and manipulates computer hardware, it organizes and manages files on a variety of storage media, it manages the function of processor, and it interfaces with user.

Function of the OS

- ✓ Resource sharing: manages resources by ensuring proper and effective use.
- ✓ Provision of virtual machine: Hidings the hardware details from the user.
- ✓ Memory management: It manages the effective usage of internal memory, RAM while running multiprograms.
- ✓ Protector and error handling.
- ✓ File management.
- ✓ Facilitates booting
- ✓ Manages multitasking: determines which application should run, in what order, and how much time should be allowed for each application before giving another application access to run.

Classification of OS

This could be done based on the number of program they can handle at the same time or the number of user(s) that can be accommodated on the system simultaneously. Hence we have single tasking and multitasking (for class1) and, single user and multi-user OS (for class 2).

Single user OS is multitasking but can only allow only one user at a time e.g. PC-DOS, MS-DOS, CP/M, OS/2. Multi-user OS is multitasking and at the same time multi-user. This is done when a number of computers (workstation) connect to a central computer so that all the other computers can use the work on the central computer e.g. UNIX, XENIX, PC-MOS, windows NT, Linux and Novell.

The Difference between Windows &Macs

The personal computer industry has generally sorted itself out along the lines of two major operating systems:Mac and Windows. The Mac OS runs on CPUs made by Apple Computer. The Windows OS, made by Microsoft, runs on CPUs made by many different companies, but not Apple. Some of these companies are: IBM, Dell, Compaq, Gateway, Fujitsu, Sony, etc. When people talk about the differences between Windows and Macs, in general, they are expressing a personal preference about which operating system or hardware they believe to be superior.

Utility Software

This program is produced by the manufacturers to provide useful facilities for performing common computing tasks of a routine nature to many computer system e.g. system generator, text editor, antivirus, dumping routine, housekeeping operations etc.

Language translator

The language the computer understand is machine language (Os and 1s) which is very tedious, time consuming, hard to write/read, or debug. Any program written in another

language than this needs language translator which carries out the translation to this machine language. The 3 main types of translators are Assemblers, Compilers and Interpreter.

APPLICATION SOFTWARE

Application Software is a computer program designed to help people perform a certain type of task. An application thus differs from an operating system (which runs a computer), a utility (which performs maintenance or general-purpose tasks), or a language translator (with which computer programs are created). Depending on the work for which it was designed, an application can manipulate text, numbers, graphics, or a combination of these elements. Some application packages offer considerable computing power by focusing on a single task, such as word processing, spreadsheet, graphics, and a database program.

Table 2: Different computer programs with their areas of application

Application Areas	**Package**
Word processing	NotePad (text editor), WordPad,Word perfect,WordStar, Microsoft word
Budgeting, accounting	Lotus 1-2-3, Microsoft excel,
Databases	Database 3,4 oracle, Microsoft excel, Corel Paradox, dBase, SQL, M-Access
Graphics	CorelDraw, Adobe Photoshop, Jasc Paint Shop Pro, Instant Artist, Print Artist
Spreadsheets	Microsoft Excel and Access, Corel Quattro Pro, Sun StarCalc
Book publishing	PageMaker, Microsoft publisher
Seminar presentation	PowerPoint
Engineering drawing	AutoCAD, ArchiCAD, electronic desktop
Statistical analysis	SPSS, SPLUS, statistical
Web design	crosoft FrontPage

CLASSIFICATION OF COMPUTERS ACCORDING TO SIZE

Computers exist in a wide range of sizes and power. The smallest are embedded within the circuitry of appliances, such as televisions and wristwatches. These computers are typically pre-programmed for a specific task, such as tuning to a particular television frequency, delivering doses of medicine, or keeping accurate time. They generally are hard-wired that is, their programs are represented as circuits that cannot be reprogrammed.

Mini Computers (Laptop, Notebook Computers and Desktop PCs**)** are typically used in businesses and at home to communicate on computer networks, for word processing, to track finances, and for entertainment. They are equipped with a keyboard; a mouse, trackball, or other devices; and a video display monitor or liquid crystal display (LCD) to display information. Laptop and notebook computers usually have similar hardware and software as PCs, but they are more compact and have flat, lightweight LCDs instead of television-like video display monitors. If equipped with a cellular phone, they can connect to worldwide computer networks to exchange information regardless of location.

Workstations are similar to personal computers but have greater memory and more extensive mathematical abilities, and they are connected to other workstations or personal computers to exchange data. They are typically found in scientific, industrial, and business environments.especially financial ones, such as stock exchanges.that require complex and fast computations.

Mainframe computers have more memory, speed, and capabilities than workstations and are usually shared by multiple users through a series of interconnected computers. The most powerful mainframe computers, called supercomputers, control businesses, industrial works,

scientific research and process complex and time-consuming calculations, such as those used to create weather predictions. Large businesses, scientific institutions, and the military use them. Some supercomputers have many sets of CPUs. These computers break a task into small pieces, and each CPU processes a portion of the task to increase overall speed and efficiency. Such computers are called parallel processors. As computers have increased in sophistication, the boundaries between the various types have become less rigid.

Unit -3 Introduction to networking:

Computer Network (Networking and Internetworking)

Until recently, getting a computer was mostly equivalent to getting a machine that would be used to perform office-related assignments and other calculations. This type of computer was commonly referred to as **standalone**. A **network** is a group of computers linked together so that they can share resources such as printers, software programs and documents. Computer network is the interconnectivity of autonomous computers. In order for two computers to share what they have, they must establish some type of communication. This is easily done using a cable and an appropriate object (a network card, also called NIC) inserted in each computer. This means that a cable would go from this object of one computer to the same type of object on the other computer. This is perfectly possible to connect two computers. If you have more than two computers, then you use a type of intermediary object whose job is to "direct traffic". This object is called a hub. For example, when one computer A requests to use or open a piece of text that is located in a computer B but to print it in a printer that is connected to a computer C, this intermediary object is able to know what computer has the text, what computer has the printer, and what computer needs these two services. For these reasons, most connections use this intermediary object: the hub
There are two types of networking relationship: computer workstations (clients) are connected to a number of central network servers, which allocate resources. In a peer-to-peer relationship, computer workstations serve each other: one workstation may have access to a printer and allocates this resource to others in the network; another may have access to file storage and allocates this to others (including the workstation with the printer).

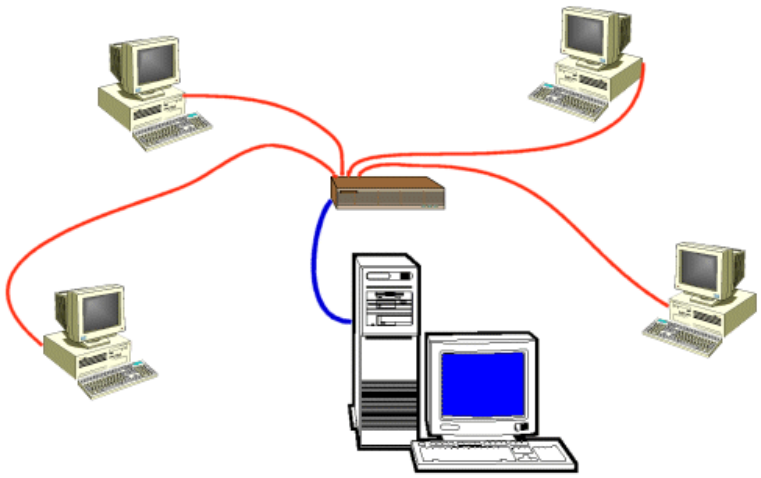

Figure 2: Connection of Computers using the Hub

Only computers that are connected can share what they have. A computer A that is connected to a computer B can access what computer B has. When two or more computers are connected, the idea is to let them share and exchange what they contain. If the computers are small, like regular desktop computers, they may become overwhelmed and they may not have enough to share. The next step is to have a "bigger" central computer that holds even more things that other small computers would need (the word big here doesn't necessarily mean that this computer is physically big; it implies that this computer can do more things, for example it can perform more and faster calculations, than the other small computers). Such a central computer is called a server, because its job is to serve other computers (these other small computers are then called workstations):

As information and resources (things to share) became more and more useful and in demand, servers of different companies started establishing types of connections among themselves, of course following some rules. In fact, in some situations, some big computers (servers) were made simply to provide information to other computers, without needing to know who owned these small computers, why these small computers needed this information, or what to do with them. The internet was born. The Internet is a group of big computers connected to share the information they hold. Some of thesecomputers belong to the government, schools (mostly universities), big companies (corporations), small companies and some to individuals. The computers that are connected may not have anything at all in common.

To make sure that this communication is possible, a few rules (called protocols) were established so that anybody who wants to make his or her information available to other people through the Internet must follow these rules, no matter what he or she does with the server or computer. The rules to make a server available on the Internet are numerous and complicated. Therefore, another type of computers was created that allows casual users to get on the internet without knowing, or being interested to know how these servers communicate. These new intermediate computers are held by companies called service providers (they are the middle man). When you have a computer and want to get on the internet, you use an Internet Service Provider (ISP) who will establish the connection for you and will make sure that your computer can get on the Internet. Based on this, the Internet can be illustrated as follows:

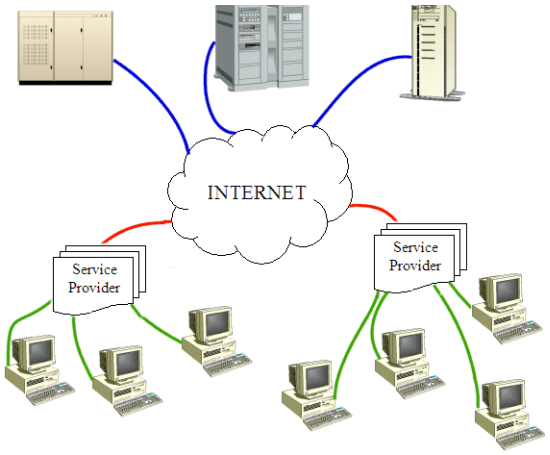

Figure 3: The internet

The advantages of using a network are:
a) Data and information sharing
b) Resources sharing such as a printer, even if they are not physically connected.
c) Reliability and security
d) You can use email
e) You can access the internet

TYPES OF NETWORKS

In describing the basics of networking technology, it will be helpful to explain the different types of networks in use.

Local Area Networks (LANS)

A net work is any collection of independent computers that exchange information with, each other over a shared communication medium. Local Area Networks or LANs are usually confined to a limited geographic area, such as a single building or a college campus. LANs can be small, linking as few as three computers, but can often link hundreds of computers used by thousands of people. The development of standard networking protocols and media has resulted in worldwide proliferation of LANs throughout business and educational organizations. There is another advance LAN called the Metropolitan Area Network (MAN), used when we consider the distance covered to be between 1 to 10km unlike the LAN that spans within 1km.

Wide Area Networks (WANS)

Often elements of a network are widely separated physically. Wide area networking combines multiple LANs that are geographically separate. This is accomplished by connecting the several LANs with dedicated leased lines such as a T1 or a T3, by dial-up phone lines (both synchronous and asynchronous), by satellite links and by data packet carrier services. WANs can be as simple as a modem and a remote access server for employeesto dial into, or it can be as complex as hundreds of branch offices globally linked. Special muting protocols and filters minimize the expense of sending data over vast distances.

Wireless Local Area Networks (WLANS)

Wireless LANs, or WLANs, use radio frequency (RF) technology to transmit and receive data over the air. This minimizes the need for wired connections. WLANs give users mobility as they allow connection to a local areanetwork without having to be physically connected by a cable. This freedom means users can access shared resources without looking for a place to plug in cables, provided that their terminals are mobile and within the designated network coverage area. With mobility, WLANs give flexibility and increased productivity,
appealing to both entrepreneurs and to home users. WLANs may also enable network administrators to connect devices that may be physically difficult to reach with a cable.

Intranet: A Secure Internet-Like Network for Organizations

With advancements in browser-based software for the Internet, many private organizations have implemented intranets. An intranet is a private network utilizing Internet-type tools, but available only within that organization. For large organizations, an intranet provides easy access to corporate information for designated employees.

Extranet: A Secure Means for Sharing Information with Partners

While an intranet is used to disseminate confidential information within a corporation, an extranet is commonly used by companies to share data in a secure fashion with their business partners. Internet-type tools are used by content providers to update the extranet. Encryption and user authentication means are provided to protect the information, and to ensure that designated people with the proper access privileges are allowed to view it.