AIMS AND OBJECTIVES OF THE COURSE

The aims and objectives of this course include the following:

1. to understand fundamentally the general scope of the computer system
2. to interact effectively with the computer
3. to know the uses of the basic components of the computer
4. to manage the system to some extent before involving an expert
5. to know some basic things about the computer and the world

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 of

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's 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

Numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Symbols

Accent	`	Dash/Minus	-	Equal	=	Opening Square Bracket	[	Closing Square Bracket	]
Backslash	\	Semi-Colon	;	Single-Quote	'	Pipe	|	Greater than	>
Less than	<	Comma	,	Period	.	Forward Slash	/	Question mark	?
Tilde	~	Exclamation Mark	!	At	@	Pound	#	Dollar	$
Dollar	$	Percent	%	Caret	^	Ampersand	&	Asterisk	*
Asterisk	*	Opening Parenthesis	(	Closing Parenthesis	)	Underscore	_	Plus	+
Opening Curly Bracket	{	Closing Curly Bracket	}	Colon	:				

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 application 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.

Note: The expression "by default" means "if everything is not (yet) changed from the original or normal settings".

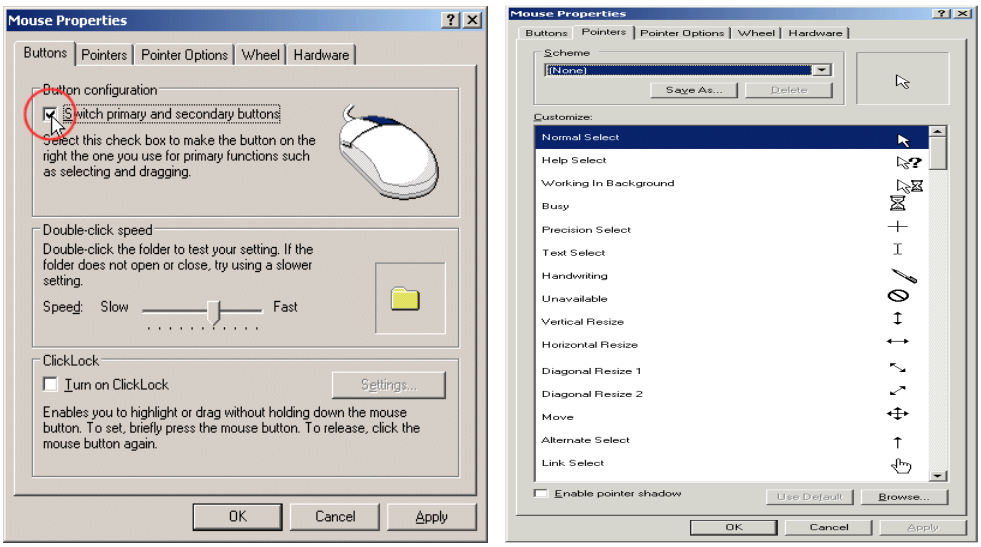

Figure 2: Mouse Properties Dialog Box

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.

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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/ opto-mechanical/ 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.

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

- In the left frame, click the drive and click the parent folder. In the right frame, right-click the parent folder, position the mouse on New and click Folder, then give it a name

You can also create a folder when saving a file. To do this, in the dialog box that comes up, click the Create New Folder button and give it a name.

Naming a Folder

There are some suggestions you should follow and various rules you must observe when naming a folder:

- The name of a folder can be a single letter or a digit
- The name of a folder can also be a single special character except the following: | > / : \ < ? * and "
- The name of a folder can be a combination of letters, digits, and some special characters

As a suggestion, you should use a name that indicates what is stored in the folder. This makes it easy to find information.

Archive

Archives are files that contain other files. Typically the files in an archive are compressed. Archives usually have file names ending with ZIP, LZH, ARJ, or ARC, depending on how they were created. Archives make it easy to group files and make transporting and copying these files faster.

Typical Uses of Archives

- Most files available on the Internet and on electronic services like America Online are distributed as archives. Two benefits of using archives for electronic file distribution are that only one file transfer operation ("download") is required to obtain all related files, and file transfer time is minimized because the files in an archive are compressed.
- It is often useful to send a group of related files to an associate. Rather than distributing individual files it is often easier to distribute the files as an archive to benefit from the file grouping and compression.
- Some files are important but not used often. To save disk space simply compress these files into an archive when they are not used, and decompress them only when needed.

Self-Extracting Zip File

A self-extracting Zip file is an executable program file (.EXE file) that includes both a Zip file and software to extract or "unzip" the contents of the Zip file. Users can extract the contents of a self-extracting Zip file by simply running it. This is convenient, because the end user does not need an unzip program (like WinZip®) to extract files from these self-extracting archives.

WinZip Self-Extractor Personal Edition, included with WinZip, creates Windows self-extracting Zip files.

Archive formats:

- Zip files are the most common archive format. Zip files can span multiple disks, and provide both compression and file grouping. WinZip does not use external programs to work with Zip files.

- TAR, Z, GZ, TAZ, and TGZ files are often found on Unix-based Internet sites. TAR stands for "Tape ARchive". The TAR format does not provide compression; it is used only to group files. GZ and Z files are gzip files. GZ and Z files cannot contain multiple files. TAZ and TGZ files are TAR files compressed in the gzip format. Since almost all new archives are created in Zip format, WinZip does not provide facilities to add to or create files in these formats (however, all other WinZip functions are supported). WinZip does not use external programs when working with files in these formats.
- File formats such as UUencoded, XXencoded, BinHex, and MIME are used primarily to transfer binary files by Internet e-mail. If you encounter one of these files, you can open it and extract its contents with WinZip. You can UUencode an archive using the UUencode entry in the WinZip Actions pull-down menu. WinZip does not use external programs when working with files in these formats.
- WinZip also handles most files in the old Microsoft Compress format (also known as LZEXPAND format). However, there are several variations on this format, and Microsoft has not released documentation on these variations. WinZip issues an appropriate message if you attempt to decompress a file not supported by your version of Windows. Microsoft Compress files usually end with a trailing underscore, for example, "commdlg.dl_". Like Z and GZ files, Microsoft Compress format files contain only one file. This format is used for many files on the Windows 3.1 distribution disks and many older Microsoft products. Note that not all files ending with an underscore are Microsoft Compress format files. WinZip does not use external programs when working with files in these formats.
- The Microsoft CAB (short for Cabinet) format is used by most Microsoft setup programs, including those used to install Windows. CAB files provide both file compression and file grouping. You can use WinZip to open and extract the contents of CAB files. WinZip will handle most self-extracting CAB files. WinZip does not use external programs when working with CAB files.
- ARC, ARJ, and LZH are older formats that provide both grouping and compression, like Zip files. Unlike other supported file formats, WinZip's optional support for these formats requires external programs that are not included as part of the WinZip distribution.

Files

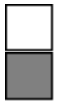
In our introductions, we defined a document as what you create in an application. In a word processor, the characters you type constitute a document. For a graphics application, the drawings you perform or the picture you manipulate is called a document. In order to keep such a document for later use, you must store it somewhere. A file is an object used to hold a document. Put it another way, in order to have a file, you must save a document. We have mentioned how to save a document. Like a folder, you must name a file when saving a document. The name of a file follows the same rules we defined for a folder.

FILE MANAGEMENT

Bits and Bytes

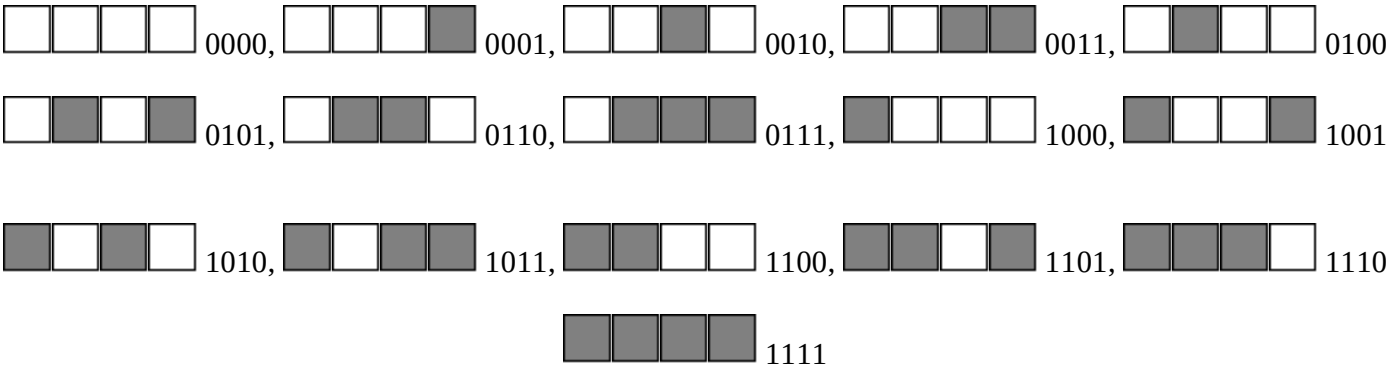
To hold information, a medium such as a hard disk uses a system that resembles a combination of small boxes. Let's illustrate it as follows:

This box can hold only a small piece of information. It can only be either 0 or 1. When the box is empty, it holds a value of 0. When it is full, it holds a value of 1:



0
1

You can represent a piece of information with one of two states. This box used to represent a value is called a binary digit; in its abbreviated form, it is called a **bit** (for ***bi***nary digi***t***).

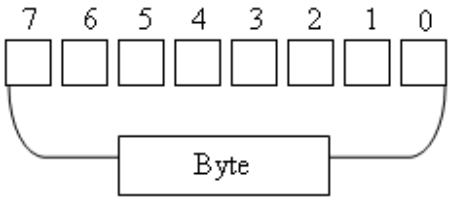


This produces the following binary combinations: 0000, 0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111 = 16 combinations. When using the decimal system, these combinations can be represented as 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15.

This combination is also a system that the computer uses to count bits internally. This technique is valuable and allows you to always identify a number as a divider of 4.

When all bits of a group of 4 are 0, the combination has the lowest value, which is 0000. Any of the other combinations has at least one 0 bit, except for the last one. When all bits are 1, this provides the highest value possible for a group of 4 bits. The lowest value, also considered the minimum value, can be represented as 0. The highest value, also considered the maximum, can be expressed in decimal value as 2^4 (2 represents the fact that there are two possible states: 0 and 1; 4 represents the fact that there are four possible combinations), which is 16. This produces 16 because $2^4 = 16$.

A combination of 8 consecutive bits is called a **byte**. The bits are counted from right to left starting at 0:



You can represent a byte using a combination of 0s and 1s. If you have the patience to create combinations of bits using the boxes as we did for the group of 4, you would find out that there are 256 possible combinations. Another way to find it out is by using the base 2 technique:

$2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$
$= 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1$
$= 255$

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Therefore, the maximum decimal value you can store in a byte is 255. Remember that the byte with all bits having a value of 0 has its value set to 0. Since this byte also holds a valid value, the number of combinations = 255 + 1 = 256.

The only type of information you can store in a byte is a character or symbol, such as a readable letter from the alphabet: a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, and Z. Besides these readable characters, a byte can also hold one digit: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. A byte can also hold a readable or non-readable symbols such as ` ~ ! @ # $ % ^ & * ( ) - _ = + [{] } \ | ; : ' < ? . / , > "

This means that a combination of 8 bits, called a byte, is enough to represent one symbol recognized in the English language. In this globalization word, a computer also needs to be able to store characters from other Latin-based languages such as letters from Français or Español. To make this possible, instead of 8 bits, the operating system must use 16 bits. A combination of 16 consecutive bits is also called a word.

A group of 1000 bytes is supposed to be called a kilobyte but, based on the way the computer calculates the bits, a group of 1024 bytes is called a kilobyte or KB. A group of 1,000,000 bytes is called a megabyte but actually it is a group of 1,024,000 bytes that is called a megabyte or MB. A group of 1,000,000,000 bytes or actually a group of 1,073,741,824 bytes is called a gigabyte or GB.

The Size of a Drive

Because a drive cannot have unlimited space, it is recognized for its size. The size of a drive can be measured by, or specified in, MB or GB. For example, a typical CD can hold 700MB of data. A regular DVD can hold information up to 4.7GB in size. The sizes of hard drives are very varied. To find the size of a hard drive in your computer, from either Windows Explorer or My Computer, you can right-click the drive letter and click Properties.

The Size of a File

In order to keep track of the various files in a computer, each file has a size. The size of a file can be measured in bytes, kilobytes, or megabytes. To know the size of a file, in either Windows Explorer or My Computer, you can right-click it and click Properties.