Comprehensive

INTRODUCTION TO COMPUTERS

A Basic Guide

What is a Computer?

It is an electronic device that performs tasks, such as mathematical calculations or electronic communication, under the control of a set of instructions called a program.

Characteristics of a Computer.

Speed: The computer is a very high speed electronic device. The operations on the data inside the computer are performed through electronic circuits according to the given instructions.

Arithmetical and Logical Operations: A computer can perform arithmetical and logical operations. In arithmetic operations, it performs the addition, subtraction, multiplication and division on the numeric data. In logical operation it compares the numerical data as well as alphabetical data.

Accuracy: In addition to being very fast, computer is also very accurate device. it gives accurate output result provided that the correct input data and set of instructions are given to the computer. It means that output is totally depended on the given instructions and input data. If input data is in-correct then the resulting output will be in-correct. In computer terminology it is known as garbage-in garbage-out.

Reliability: The electronic components in modern computer have very low failure rate. The modern computer can perform very complicated calculations without creating any problem and produces consistent (reliable) results.

Storage: A computer has internal storage (memory) as well as external or secondary storage. In secondary storage, a large amount of data and programs (set of instructions) can be stored for future use.

Retrieving data and programs: The data and program stored on the storage media can be retrieved very quickly for further processing.

Automation: A computer can automatically perform operations without interfering the user during the operations. It controls automatically different devices attached with the computer. It executes automatically the program instructions one by one.

Versatility: Versatile means flexible. Modern computer can perform different kind of tasks one by one of simultaneously. It is the most important feature of computer. At one moment your are playing game on computer, the next moment you are composing and sending emails.

Communications: Today computer is mostly used to exchange messages or data through computer networks all over the world.

Diligence: A computer can continually work for hours without creating any error. It does not get tired while working after hours of work it performs the operations with the same accuracy as well as speed as the first one.

No Feelings: Computer is an electronic machine. It has no feelings. It detects objects on the basis of instructions given to it. Based on our feelings, taste, knowledge and experience: we can make certain decisions and judgments in our daily life. On the other hand, computer can not make such judgments on their own. Their judgments are totally based on instructions given to them.

Consistency: People often have difficulty to repeat their instructions again and again. For example, a lecturer feels difficulty to repeat a same lecture in a class room again and again. Computer can repeat actions consistently (again and again) without loosing its concentration.

Precision: Computers are not only fast and consistent but they also perform operations very accurately and precisely. For example, in manual calculations and rounding fractional values (That is value with decimal point can change the actual result). In computer however, you can keep the accuracy and precision up to the level, you desire. The length calculations remain always accurate.

Components of a Computer.

Input Devices: The devices that are used to enter data and instructions into the computer are called input devices or units. In old computers the punched card readers, paper tape readers were used as input devices. Now-a-days the most commonly used input devices are Keyboard and Mouse.

Output Devices: The computer processes the given input data and gives the output. The devices that are used to get output from a computer in readable from are called output devices. A number of output devices are available. Some commonly used output devices are video display units (VDU) and printers.

Central Processing Unit: Central Processing Unit is simply called as CPU. It is the main components of the computer and it is also called the Processor.

Types of Computers.

Analog Computers: The word "Analog" means continuously varying in quantity. The analog computers accept input data in continuous form and output is obtained in the form of graphs. It means that these computers accept input and give output in the form of analog signals. The output is measured on a scale. The voltage, current, sound, speed, temperature, pressure etc. values are examples of analog data. These values continuously increase and decrease. The analog computers are used to measure the

continuous values. The thermometer is an example of analog device because it measures continuously the length of a mercury column.

Digital Computers: The word "Digital" means discrete. It refers to binary system, which consists of only two digits, i.e. 0 and 1. Digital data consists of binary data represented by OFF (low) and ON (high) electrical pulses. These pulses are increased and decreased in discontinuous form rather than in continuous form.

Hybrid Computers: The hybrid computers have best features of both analog and digital computers. These computers contain both the digital and analog components. In hybrid computers, the users can process both the continuous (analog) and discrete (digital) data. These are special purpose computers. These are very fast and accurate. These are used in scientific fields. In hospitals, these are used to watch patient's health condition in ICU (Intensive Care Unit). These are also used in telemetry, spaceships, missiles etc.

Classification of Computers.

Supercomputer is the most powerful and fastest, and also very expensive.

Mainframe computer are large-scale computers but supercomputers are larger than mainframe.

Mini computer are smaller in size, have lower processing speed and also have lower cost than mainframe

Microcomputers are known as personal computers or simply PCs.

What is Input and Output Devices?

Input and output devices are the hardware components that allow the user to input data and instructions into the computer and to receive the processed data. The data and instructions are given to the computer through input device. The computer processes the data according to the given instructions and output is received onto the output device or it is stored permanently on the storage device.

What is Output and Output Devices?

Output it's the processed input data into a useful form while an output device is a hardware component used to get output from the computer

Difference between Analog and Digital Computers.

Analog accept input data in continuous form and output is measured on a scale while **Digital** accept input data in **Digital** form and output is received in digital form.

Analog it may have some errors in output while **Digital** output is accurate.

Analog have low internal memory while **Digital** have large internal memory.

Analog have fewer functions while **Digital** have large number of functions.

Analog it is used only in scientific, industrial and medical fields while it is general purpose in use.

Analog it is costly while **Digital** it is low in cost.

How is the input entered into the computer?

Through keyboard (by typing characters).

By selecting commands (icons) on the screen and then clicking with mouse.

By pressing finger on a touch screen.

By speaking into a microphone.

By sending image through digital camera.

By scanning data printed on paper through scanner.

What is a Storage Device?

A storage device is a computer hardware component that writes and reads data to and from storage media. Writing data means recording data from memory to a storage medium. Reading or retrieving data means transferring data from storage medium into the computer's memory for use by the operating system or application program.

Levels of Data Processing.

Manual Data Processing: In manual data processing, data is processed manually without using any machine or tool to get required result. In manual data processing, all the calculations and logical operations are manually performed on the data. Similarly, data is manually transferred from one place to another. This method of data processing is very slow and errors may occur in the output.

Mechanical Data Processing: In mechanical data processing, data is processed by using different tools like calculators or other mechanical devices. This method of data processing is faster and more accurate than manual data processing.

Electronic Data Processing: It is the modern technique to process data. The data is processed through computer. Data and set of instructions are given to the computer as input and the computer automatically processes the data according to the given set of instructions. The computer is also known as electronic data processing machine. This method of processing data is very fast and accurate. Now-a-days, the data is processed and analyzed through computers. For example, the results of students are prepared through computer; in banks accounts of customers are processed through computers etc.

Functions of Operating System.

Booting a Computer: The operating system consists of a supervisor portion and a set of system programs. When the computer is switched on, the supervisor portion of the operating system (known as kernel) is loaded in the RAM from the disk. This process to start or restart a computer is called booting process.

User-interface: User interface means how the user interacts with the computer to perform various tasks. User runs the application programs, opens the document, enters the data, prints the output reports.

Running Programs: The operating system also provides the interface between the programs and the user. Through program, the user accesses other computer resources such as printer, backing storages or another application programs.

Managing Files: The data and programs are stored permanently on the disk for future use.

Memory Management: The memory unit has very important role for data processing. The processor takes data and program instructions from RAM during processing. The data and programs are loaded from disk into RAM.

Scheduling Jobs: A job is an activity or operation that a processor performs. It may be receiving data from input device, sending output to output device or loading data from disk into RAM.

Configuring Devices: The functions of devices attached. With the computer are controlled by the special system software called device drivers. The device driver tells the operating system how to communicate with a device.

Establishing Internet Connection: The operating system also provides means to establish a connection between your computer and the ISP (Internet Service Provider) Server. Some operating systems also have built-in browser program used to access the information on Internet.

Controlling Network: Some Operating systems are specially developed, for networking. These operating systems are called the network operating systems or NOSs. A network operating system organizes and co-ordinates multiple users and makes it possible to access and share resources on network.

Task Management: A computer can perform many tasks at a time. For example, in word processing it accepts input data, stores data on the disk and prints out a document simultaneously.

Types of Data Transmission Modes.

Parallel Transmission: In parallel transmission, bits of data flow concurrently through separate communication lines. Parallel transmission is

shown in figure below. The automobile traffic on a multi-lane highway is an example of parallel transmission. Inside the computer binary data flows from one unit to another using parallel mode. If the computer uses 32-bk internal structure, all the 32-bits of data are transferred simultaneously on 32-lane connections. Similarly, parallel transmission is commonly used to transfer data from computer to printer. The printer is connected to the parallel port of computer and parallel cable that has many wires is used to connect the printer to computer. It is very fast data transmission mode.

Serial Transmission: In serial data transmission, bits of data flow in sequential order through single communication line. Serial data & transmission is shown in figure below. The flow of traffic on one-lane residential street is an example of serial data transmission mode. Serial transmission is typically slower than parallel transmission, because data is sent sequentially in a bit-by-bit fashion. Serial mouse uses serial transmission mode in computer.

Types of Data.

Numeric: Numeric data consists of digits from 0 to 9, + (positive) or - (negative) signs and decimal points. It can be of integer type or real type data.

Text: A text consists of words,: sentences, paragraphs etc.

Image: Image data consists of charts, graphs, pictures and freehand drawings. Image data is also represented by bit patterns, but to represent image data, different mechanism is used. The simplest method to represent image, is to divide the image into matrix of pixels (picture element). A pixel represents a smallest dot of the image. The size of the pixel depends on the resolution of the image

Audio: Audio is a representation of sound. It is continuous and not discrete. The audio data is in the form of continuous signal. It is converted to digital form before to enter into the computer.

Video: Video consists of full-motion images that create actions and movements. It can be produced by a video camera.

What is a Local Area Network?

A Local Area Network (LAN) is a network system in which computers interconnected in a limited geographical area, such as network of computers college computer laboratory or network of computers in office building etc. LANs designed to allow resources (such as printers and application programs, secondary storage etc.) to be shared between personal computers or workstations. The size LAN is limited to a few kilometers (typically it is 1 km).

Advantages of LAN.

The resources can be shared among different users. For example, many users on the network can use a single printer. Similarly, storage media and software located in central server can be shared between all users on the networks.

LAN is not very expensive and the small businesses, firms and educational institutes can afford and easily design the LAN.

Users can share messages and communicate with each other through e-mails and chatting.

All the data is stored and updated on the central server through nodes. So it becomes very easy to take backup of database at regular interval.

Multiple users can access the Internet using a single Internet connection. The Internet connection is established at central sewer. In this way, all the users can access the Internet.

Data security can be implemented very easily, because users are granted data access rights. The authorized users can connect to the server and can access specific portion of the data.

States the four disadvantages of LAN.

If central server is infected by virus, then the important data stored on server may be corrupted and the entire network may also be held.

All nodes depends on the central computer (or Hub), if any component of the server fails, then entire network will stop working.

A trained and competent network manager is required to run the LAN, so handsome salary has to be paid to him. Therefore, it becomes very expensive to run the LAN.

Mostly in a LAN, one or two printers are shared among several users. In this way, lengthy print queues are created, so the users have to wait for a long period of time to take print on the printer.

What is a Wide Area Network?

A Wide Area Network (WAN) is a network system that covers a large (wide) geographical area such as different cities of country or different countries of the world. Most telephone companies are WANs. A WAN that is wholly owned and used by a single company is often referred to as enterprise network.

What is a Data Communication Protocol?

Rules to send and receive data are called protocols. These rules are defined in the network software. Eg which is communicated, how it is communicated, when it is communicated?

Functions of Communication Protocol.

Data Sequencing - The function of a protocol to divide the long message into smaller packets of fixed size that are to be transmitted for error free data transmission, called Data Sequencing.

Data Routing - The function of a protocol to find the most efficient path or route between the sender and the receiver before sending the data is called Data Routing.

Flow Control - The function of a protocol to control the rate of data transmission from the sender to the receiver is called Flow Control. It regulates the process of sending data between fast sender and slow receiver.

Error Control - The function of a protocol to detect and recover errors for successful data communication between the sender and the receiver is called Error Control. Successful data communication means that data is transmitted without any error.

What is a Metropolitan Area and Virtual Private Network?

A Metropolitan Area Network (MAN) is a network system that covers area of a single city. Usually, MAN connects more than one LANS in a city or town and covers a smaller geographical area than a WAN

Advantages of Internet.

Sharing Information: You can share information with other people around the world. The scientist or researchers can interact with each other to share knowledge and to get guidance etc. Sharing information through Internet is very easy, cheap and fast method.

Collection of Information: A lot of information of different types is stored on the web server on the Internet. It means that billions websites contain different information in the form of text and pictures. You can easily collect information on every topic of the world. For this purpose, special websites, called search engines are available on the Internet to search information of every topic of the world. The most popular search engines are altavista.com, search.com, yahoo.com, ask.com etc. The scientists, writers, engineers and many other people use these search engines to collect latest information for different purposes. Usually, the information on the Internet is free of cost. The information on the Internet is available 24 hours a day.

News: You can get latest news of the world on the Internet. Most of the newspapers of the world are also available on the Internet. They have their websites from where you can get the latest news about the events happening in the world. These websites are periodically updated or they are immediately updated with latest news when any event happens around the world.

Searching Jobs: You can search different types of jobs all over the world, Most of the organizations/departments around the world, advertise their

vacant vacancies on the Internet. The search engines are also used to search the jobs on Internet. You can apply for the required job through Internet.

Advertisement: Today, most of the commercial organizations advertise their product through Internet. It is very cheap and efficient way for the advertising of products. The products can be presented with attractive and beautiful way to the people around the world.

Communication: You can communicate with other through Internet around the world. You can talk by watching to one another; just you are talking with your friends in your drawing room. For this purpose, different services are provided on the Internet such as; Chatting, Video conferencing, E-mail, Internet telephony etc.

Entertainment: Internet also provides different type of entertainments to the people. You can play games with other people in any part of the world. Similarly, you can see movies, listen music etc. You can also make new friends on the Internet for enjoyment.

Online Education: Internet provides the facility to get online education. Many websites of different universities provide lectures and tutorials on different subjects or topics. You can also download these lectures or tutorials into your own computer. You can listen these lectures repeatedly and get a lot of knowledge. It is very cheap and easy way to get education.

Online Results: Today, most of the universities and education boards provide results on the Internet. The students can watch their results from any part of country or world.

Online Airlines and Railway Schedules: Many Airline companies and Pakistan Railway provide their schedules of flights and trains respectively on the Internet.

Online Medical Advice: Many websites are also available on the Internet to get information about different diseases. You can consult a panel of online doctors to get advice about any medical problem. In addition, a lot of material is also available on the Internet for research in medical field.

Disadvantages of Internet.

Viruses: Today, Internet is the most popular source of spreading viruses. Most of the viruses transfer from one computer to another through e-mail or when information is downloaded on the Internet. These viruses create different problems in your computer. For example, they can affect the performance of your computer and damage valuable data and software stored in your computer.

Security Problems: The valuable websites can be damaged by hackers and your valuable data may be deleted. Similarly, confidential data may be accessed by unauthorized persons.

Immorality: Some websites contains immoral materials in the form of text, pictures or movies etc. These websites damage the character of new generation.

Filtration of Information: When a keyword is given to a search engine to search information of a specific topic, a large number of related links a displayed. In this case, it becomes difficult to filter out the required information.

Accuracy of Information: A lot of information about a particular topic is stored on the websites. Some information may be incorrect or not authentic. So, it becomes difficult to select the correct information. Sometimes you may be confused.

Wastage of times: A lot of time is wasted to collect the information on the Internet. Some people waste a lot of time in chatting or to play games. At home and offices, most of the people use Internet without any positive purpose.

English language problems: Most of the information on the Internet is available in English language. So, some people cannot avail the facility of Internet.

What is RAM?

RAM stands for Random Access Memory. Actually the main memory or primary storage is referred to as RAM. It consists of memory chips that can be read from and written to by the processor. When the computer is powered on, certain operating system files load into RAM from the storage device such as a hard disk. Then operating system remains in RAM as long as the computer has continuous power.

What is ROM?

ROM stands for Read Only Memory. The ROM contains instructions that are permanently stored by the manufacturers when they manufacture the chips. In fact recording data and instructions permanently into this kind of memory is called "burning in the data". The instructions stored in ROM can only be read but cannot be modified. This is the reason why it is called Read Only Memory.

What is E Commerce?

E-Commerce stands for electronic commerce. E-Commerce means to carryout financial and business dealings using Internet. People can buy and sell good on Internet. Even payments can be made using Credit Card numbers.

Types of E-Commerce.

Business-to-consumer: Business-to-consumer or B2C e-commerce consists of the sale of goods and services to the general public. In this type, customers

or consumer can visit the website and purchase goods online. It is done by an electronic storefront that contains product details, graphics and shopping cart. Shopping cart is used to collect the purchases. Online shopping is normally performed using a secure Internet connection.

Consumer-to- consumer: Consumer-to-consumer or C2C e-commerce takes place between two consumers. For example, one consumer sells an item through online auction. The other consumer purchases the item by offering highest bid. Many websites provide the facility of online auction where C2C e-commerce occurs.

Business-to-business: Business-to-business or B2B e- commerce takes place between two businesses. One business provides services to other business. Online advertisement, recruiting, sales, marketing, technical support and training are some examples of B2B e-commerce.

Roles of E-Commerce.

Online Education: Online education is becoming very popular. Different types of interactive tutorials are available on the Internet. The students can browse these online books and tutorials or can download them after purchasing. Some websites provide online lectures for the students.

Electronic Banking: Many banks are now introducing electronic banking. Using your computer, you can connect to the bank's computer system via the Internet and control your daily financial dealing from home. It reduces the staff and building of banks. Many customers pay their bills from their bank accounts using this facility.

Electronic Shopping: It has become very easy for the people to shop from home using Internet. Different manufacturers present their products on the Internet. People can browse the website, place an order and even make a payment using credit card. It has made shopping very easy

Job Search: Internet is used to search different types of jobs all over the world. Many websites are developed that provide information to the people about job vacancies. Job seekers can also apply for the job using Internet.

Conducting Auctions: Many websites provide the facility of auction. People participate in the auction to purchase a product. They can also pay the price using their credit cards etc. A popular website that provides this facility is eBay.

Collaboration with Partners: Businessmen can collaborate with their partners using the Internet. They can discuss ideas, exchange views and make strategies in collaboration with all of their business partners in the world.

Marketing and Advertising: E-commerce is playing an important part to market and advertise products all over the world. The use of popular websites can be an effective way of introducing a product to the customers.

Providing Customer Services: Businessmen can interact with their customers using the Internet. They can discuss different issues about their products. They can also deal with their complaints and provide different services to them.

Online Travel Reservations: Online travel reservation is a popular use of e-commerce. People can reserve seats in airline flights, hotels or car using the Internet.

Online Trading: Online trading is a process of conducting business using the Internet. The stockbrokers can do all trading activities electronically. They can submit and receive bids using computers. They can also interconnect with computer display screens where brokers match the buyers with sellers. It reduces the cost as no paper or special building is required to conduct these activities.

Advantages of E-commerce.

Geographic Reach: Organizations at distant places can interact with customers easily. Any person from any part of the world can be their customer.

Speed: interaction between buyer and seller takes place almost instantaneously.

Productivity: enables to search and obtain information, products and services online. It increases the productivity of individuals and organizations.

Information Sharing: digital information can be transmitted anywhere in the world easily. It is easier to do this than any traditional sharing method.

New Features: e-commerce participants are constantly identifying new product features and services that they can offer online. For example, the organizations can deliver digital music online.

Lower Costs: the cost of conducting business online is much lower as traditional physical resources are not needed.

Competitive Advantage: companies using e-commerce are more competitive because they can offer their products and services to more customers well in time.

Functions of E-commerce.

Catalog and content management: it is the information of a commercial Web site. It must be up-to-date at all times and easy to access for the customer.

Shopping and checkout: the site must allow the customer to identify multiple items they want to purchase as they shop then allow them to purchase all of them.

Back office processing: it deals with final steps of sale such as processing credit card payments, updating inventories and preparing to send items to customers.

Advertising: The Web site must work with search engines, ads on other sites, online marketing and email to advertise the product and services to online customers.

A computer virus.

It's a computer program that can copy itself and infect a computer. The term "virus" is also commonly but erroneously used to refer to other types of malware, adware, and spyware programs that do not have the reproductive ability. A true virus can only spread from one computer to another (in some form of executable codes) when its host is taken to the target computer; for instance because a user sent it over a network or the Internet, or carried it on a removable medium such as a floppy disk, CD, DVD, OR USB drive. Viruses can increase their chances of spreading to other computers by infecting files on a network file system or a file system that is accessed by another computer.

How to avoid Computer Viruses

1. Don't download anything from anyone you don't know or aren't expecting... EVER. For all you VAs, and publishers and whoever else out there is trading files back and forth with your clients... Stop and make sure that your client has a safe system before you start trading files with them. It's worth the time.

2. Turn off the autolaunch in your email client. I don't even auto-launch graphics. Furthermore, READ YOUR EMAIL ONLINE! Don't download the email until you're 100% sure it is safe.

3. If your email has an attachment, go into your headers and look at it. If it's got a pif or scr extension, chances are it's a virus. If it's any Microsoft program file, and you aren't expecting it, it in itself probably isn't a virus, but it could very easily have a virus embedded in it. The only things that hacker's haven't been able to embed viruses into, to my knowledge, are pictures. But just because it says it's a picture doesn't mean it is. Look at the attachment name. File names don't lie. If it's a .jpg.scr extension, it's a virus.

4. Antivirus protection programs are only ever as up to date as known viruses. They are also the first target of a virus, so don't trust the antivirus protection program alone. If you've used your eyes and don't believe it's a virus, scan it anyway. I use Yahoo, because they keep Norton up to date

and I don't have to run it on my system. Norton in and of itself is a great antivirus protection program, but it's not infallible.

5. Set your computer so it doesn't autolaunch files, updates, security checks, html pages, cookies, etc. without your permission!

6. Get a quality anti-spyware program - They're designed to get rid of programs on your system that send your data to the web and as such could be opening holes that you don't know about.

7. Set up a software firewall. If you don't have a software firewall built in, upgrade your OS. And make sure everyone on your LAN is set up with the same firewall.

8. Don't rely only on the software; set up a hardware firewall. It's called a router and it's easy to set up and maintain.

9. Take the time and make the effort to understand how viruses and worms get onto your computer and you can virtually stop them all in their tracks.

10. Once you've got all your holes closed, get someone who knows what they're doing to test it from the Internet side. If you don't have someone, I can refer someone.

11. Don't let kids on the 'Net on your system! I find it funny that businesses will spend billions of dollars on marketing and advertising, but they leave their computer systems open to hackers whose sole purpose in life is to take advantage of KNOWN cracks in the system. In my opinion, the only real hole is the User.

Teacher Daniel 2018