

GENERAL INFORMATICS

B Com/BBA

2011 Admission onwards

III Semester

COMMON COURSE



UNIVERSITY OF CALICUT

SCHOOL OF DISTANCE EDUCATION

CALICUT UNIVERSITY.P.O., MALAPPURAM, KERALA, INDIA - 673 635

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STUDY MATERIAL

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GENERAL INFORMATICS

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MODULE 1

COMPUTERS AND OPERATING SYSTEM

INTRODUCTION

Man developed computers so that he could perform intricate operations such as calculation and data processing or simply for entertainment. Today, computers are everywhere-in our offices, homes, appliances, automobiles- the list is endless. Much of the world runs on computers, and computers have profoundly changed our lives, mostly for the better. Let us discuss some of the characteristics of a computer, which make them an essential part of every emerging technology and such a desirable tool in human development.

Features of New Generation Personal Computers

- **Speed:** The computers process data at an extremely fast rate. In a few seconds, computers can perform such a huge task that a normal human being may take days or even years to complete. The speed of a computer is calculated in MHz (Megahertz) or Giga hertz (GHz). Different computers have different speed. For example a Micro Computer can execute millions of instructions per second over and over again without any mistake. As the power of the computers increases, the speed also increases. For example, super computers can operate at speeds measured in nanoseconds and even in picoseconds-one thousand to one million times faster than microcomputers.
- **Accuracy:** Besides the efficiency, the computers are also very accurate. The level of accuracy depends on the instructions and the type of machines being used. Since we know that the computer is capable of doing only what it is instructed to do, faulty instructions for processing the data automatically lead to faulty results. This is known as GIGO, that is garbage in garbage out. Errors may occur in the results, but due to increased efficiency of error-detecting techniques, they can be minimized. Thus, the probability of errors in a computer is negligible.
- **Reliability:** Generally, reliability is the measurement of the performance of a computer, which is measured against some predetermined standard for operation without any failure. The major reason behind the reliability of the computers is that, at hardware level, it does not require any human intervention between its processing operations. Moreover, computers have the built in diagnostic capabilities, which help in continuous monitoring of the system.
- **Storage capability:** Computers can store large amounts of data and it can recall the required information almost instantaneously. The memory of the computer is relatively small and it can hold only a certain amount of information, therefore, the data is stored on storage devices such as magnetic tape or disks. Small sections of the data can be assessed very quickly and brought into the storage devices, as and when required, for processing. In order to explain the idea of storage capacity, we can take an example of CD-ROM and a hard disk. A single CD-ROM can store up to 700 MB of data while a hard disk can have a capacity of around 80 GB (1GB = 1024 MB).

- **Versatility:** Computers are quite versatile in nature. They can perform multiple tasks simultaneously with equal ease. For example, at one moment it can be used to prepare a letter, the other moment it can be used to play music and in between you can print a document as well. All this work is possible by changing the program (sequence of instructions for computers). In brief, we can say that a computer can perform various tasks by reducing the task to a series of logical tests.
- **Diligence:** Computer, being a machine, does not suffer from the human traits of tiredness and lack of concentration. If four million calculations have to be performed, then the computer will perform the last four millionth calculations with the same accuracy and speed as the first calculation.

Computers have certain limitations too. As a machine, a computer can only perform what is programmed to do, nothing more nothing less. It can only process the data that is provided to it and communicate the results. That is why in the field of computer science we use the phrase ‘Garbage in, garbage out’ (GIGO).

Limitations of Computers

Computers possess some limitations that are strengths of human beings

- Lack of decision making power
- Zero I.Q (Intelligent Quotient)

Peripherals

A computer can do amazing things, but they are really very simple machines made up of software and hardware. Let us look at the computer’s **hardware** or the parts you can actually touch. Hardware components of a computer consists of the **system unit**, the box that contains the central electronic components of the computer, and **peripheral devices**, those devices such as monitors and printers that are connected to the computer.

INPUT DEVICES

An input device helps you to enter data (text, images and sounds) and instructions into the computer. There are lots of input devices but the most common are keyboards, mouse, pointing devices, scanners, speech recognition devices.

Text input devices:

Keyboards – keyboards are used to enter data by typing it in manually. Most desktop and notebook computers come with a standard keyboard, which uses the QWERTY keyboard layout. There are other keyboard layouts like the **Dvorak keyboard** which is designed to reduce the distance your fingers travel for most keystrokes, increasing typing speed. To increase portability, recent development efforts have focused on reducing the size and weight of keyboards. The **virtual laser keyboard** is about the size of a cellular phone. It projects the image of keyboard on any surface and sensors detect the motion of your fingers as you type on a desk. There are also **gaming keyboards** for hardcore gamers that are optimized for playing specific video games.

Mice and other pointing devices – We are mostly familiar with the optical mouse. The optical mouse uses an internal sensor or laser to detect the mouse’s movement. The sensor sends signals to the computer, telling it where to move the pointer on the screen. You may be also familiar with a mouse that has a roller ball on the bottom, which moves when you drag the mouse across a mouse pad.

Now days we also get wireless keyboards and wireless mice, both optical and trackball.

Notebooks are very popular with the young generation on the go. Notebooks do not come with mice. Instead, they have integrated pointing devices such as a **touchpad**. A touchpad is a small, touch sensitive area at the base of the keyboard. To use touchpad you simply move your finger across the pad.

There are other types of input devices like the digital pen. The EPOS **Digital Pen** works in conjunction with a flash drive (a portable electronic storage device that connects to a port on a computer). You can write with the pen on any conventional paper, and your writing is captured and then wirelessly transmitted and stored in the flash drive. When the flash drive is connected to a computer, you can use software to translate your writing into digital text.

Image input devices:

Digital cameras, camcorders, and webcams are the most common devices for capturing pictures and video. Digital cameras and camcorders can be used to capture images in remote areas and later downloaded to a computer. Webcams are small cameras on top of your computer monitor or are built into your notebook computer. It helps in videoconferencing or to call with video phones.

Sound input devices:

A microphone is a device that helps you to capture sound waves and transfer them to digital format on your computer. Close-talk microphones which are usually attached to a headset are useful in situations such as using speech- recognition software, videoconferencing, or making telephone calls. Handheld microphones are convenient for recording podcasts. Clip on microphones are useful when you are presenting at a meeting.

Other input devices: Bar code scanners read bar codes. Bar codes are made up of bars of different widths and spacing that convey alphabetic and numeric information about products or addresses. The bar code scanners are accurate, fast and inexpensive which has made it popular at supermarket checkout counters, where the billing employee uses them to read the bar code labels on cans, boxes and bags. These supermarket scanners are connected to a computer that registers the name and price of the product at the counter. The information collected by the computer and scanner helps not only in billing but also to keep track of the inventory in the store. This provides instant feedback to the managers about what products are selling and which are not and the effect of various discounts and rebates.

Cyberware's **whole body scanner** is another input device that can scan an entire human body in 17 seconds. This high resolution 3D color model that it creates can be used for perfectly tailored clothes or for special effect in the movies.

OUTPUT DEVICES

An output device helps us to send processed data out of our computer. This can take the form of text, pictures, sounds and video.

Monitor: The most common output device is the monitor which displays text, graphics and video. There are two types of monitors: CRTs (Cathode-ray tube) and LCDs (Liquid crystal display). CRTs are fast becoming legacy technology as it is heavy and not portable. LCDs are more popular due to its sleek style and energy efficiency.

Data Projectors: Projectors are commonly used in business and education in conference rooms and classrooms. These projectors are becoming smaller and lighter and also cheaper making them ideal for businessmen and families to own.

Printers: Another common output device is the printer, which creates tangible or hard copies of text. There are mainly two categories of printers: impact and nonimpact printers. Impact printers have tiny hammer like keys that strike the paper through an inked ribbon, thus making a mark on the paper. The most common impact printer is the dot-matrix printer. In contrast the nonimpact printers spray ink or use laser beams to transfer marks on to the paper as in inkjet printers and the laser printers respectively.

Now there are infrared-compatible or wireless printers which allow you to print from your handheld device, notebook, or camera. Most of these printers work using Bluetooth technology.

Speakers and earphones are obviously the output devices for sound. They enable you to participate in videoconferencing or phone calls made over the internet.

COMPUTER NETWORKS

We use computer networks all the time without realizing it. Every time we use the internet, we are actually using the world's largest network. So what is a network? a computer network is simply two or more computers that are connected via software and hardware so that they can communicate with each other. Communication network are formed from the interconnection of a number of different locations through communication facilities. Devices connected to a network are called nodes. A node can be a computer, a peripheral (printer), or a communication device (modem).

Some of the common computer networks are Local Area Network (LAN), Wide Area Network (WAN), Metropolitan Area Network (MAN), Virtual Private Network (VPN), Intranet and Internet.

The main function for most networks is to facilitate information sharing, but networks also allow users to share peripherals, broadband internet connection etc.

TYPES OF NETWORK

Depending on the size and coverage area of the network, it can be classified into the following:-

1. Local Area Network (LAN)

LAN is a computer network that spans a relatively small area. Most LANs are confined to a single building or group of buildings area such as office building, manufacturing plant, educational institutions etc. Hence most LANs connect workstations and personal computers. Each computer in a LAN has its own CPU with which it executes programs, but it is also able to access data and devices anywhere on the LAN. This means many users can share expensive devices, such as laser printers, as well as data. Users can also use the LAN to communicate with each other, by sending e-mail or engaging in chat sessions.

LANs are capable of transmitting data at very fast rates, much faster than what can be transmitted over a telephone line, but the distances are limited, and there is also a limit on the number of computers that can be attached to a single LAN.

2. Wide Area Network (WAN)

A WAN is a computer network that spans a relatively large geographical area. When one LAN is connected to other LANs via telephone lines and radio waves (satellites), it is called a wide-area network (WAN). A WAN may sometimes be restricted to a country but may also extend beyond political boundaries of a nation. The largest WAN in existence is the Internet. Thus the main difference between LAN and WAN is the geographical area covered by the network.

3. Metropolitan Area Network (MAN)

Metropolitan Area Networks are the networks spread over a city. They are large computer networks usually spreading over a campus or city. Usually MAN includes one or more LANs, covering larger geographical area than LAN but a smaller area than a Wide Area Network (WAN). Thus a university or college may have a MAN that joins together many of their LANs situated around several hectares site.

Cable TV networks that are spread over a city or town can also be called as Metropolitan Area Network. The main objective of MAN is to share the hardware and software resources among its users.

4. Personal Area Network (PAN)

Personal Area Network is a computer network used for communication among computer devices (including telephones and personal digital assistants) close to one person. The devices may or may not belong to the person in question. The reach of a PAN is typically a few meters. PANs can be used for communication among the personal devices themselves (intrapersonal communication), or for connecting to a higher level network and the internet.

5. Virtual Private Network (VPN)

A Virtual Private Network (VPN) is private data network that makes use of the public telecommunication infrastructure. It is also a WAN but it is private and only company people have access to it. It maintains the data privacy through the use of security procedures. The idea of the VPN is to give the company the capabilities of full access at much lower cost by using the shared public infrastructure like public telephone lines or internet, rather than their own.

COMPONENTS OF NETWORK

A communication network is any arrangement where a sender transmits a message to a receiver over a channel consisting of some type of medium. A network system consists of the following five basic components.

1. Terminals

Terminals include video display terminals and other end user workstations. Any output, input device that uses a network to transmit or receive data is a terminal.

2. Communication Processor

Telecommunication Processors are devices that convert data from digital to analog and back, code and decode data and control the flow of data between computers and terminals with maximum efficiency. Examples are modems, multiplexers and front-end processors.

3. Communication channels and media

Telecommunication channels are the media (data highways) used to transmit and receive messages. Copper wires, coaxial cables, microwaves, optical fibers and satellites are channels used for connecting networks.

4. Computer

All types of computers can be used in a network for sending and receiving messages. A mainframe computer may be installed as host computer in a large network and minicomputers can be used as a server for small networks. Microcomputers are generally installed at the desktop of the end user.

5. Networking software

Networking software is a phrase for software that is designed to help setup, manage, and/or monitor computer networks. Networking software applications are available to manage and monitor networks of all sizes from the smallest home networks to the largest enterprises networks.

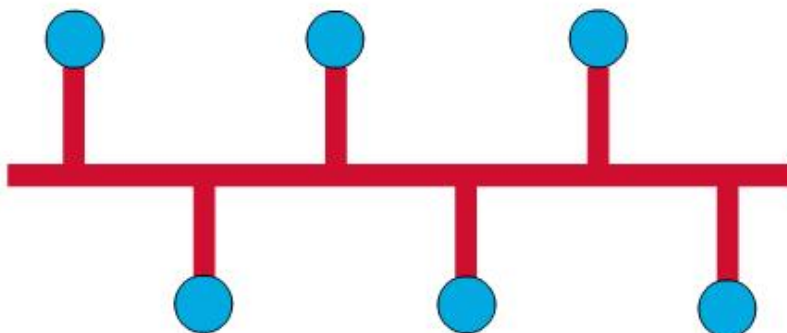
6. Network Adapters

Network adapters are devices connected in network nodes to communicate with each other and to access the network. Network adapters are printed circuit board that plugs into the bus of both user machines (clients) and servers in a LAN.

TOPOLOGY

There are different topologies in which computer can be connected to one another. The network topology defines the way in which computers, printers, and other devices are connected. A network topology describes the layout of the wire and devices as well as the paths used by data transmissions.

1. Bus topology



Commonly referred to as a linear bus, all the devices on a bus topology are connected by one single cable. The main problem faced in implementing this topology is the fact that only one communication channel exists to serve the entire network. As a result, if this channel fails, the whole network will go out of operation,

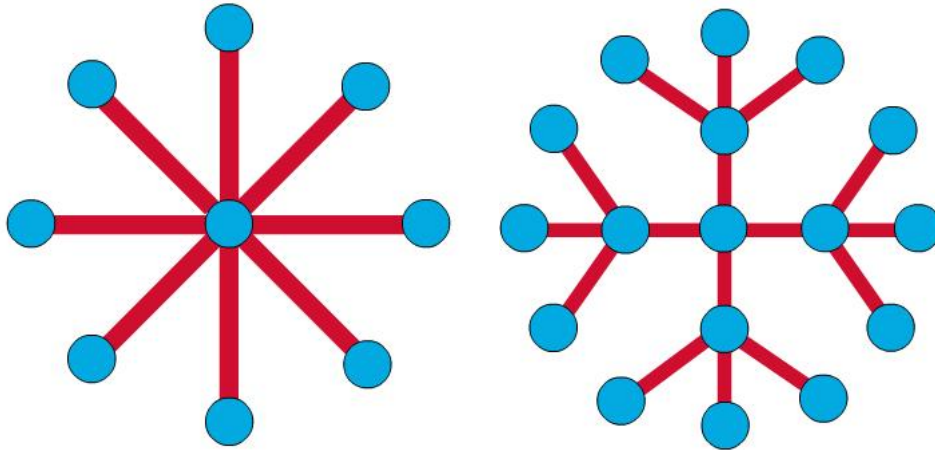
Advantages

1. It is easy to handle and implement.
2. It is best suited for small networks.
3. Easy to connect a computer or peripheral to a linear bus
4. Requires less cable length than mesh or star topologies.
5. It is cheaper than any other topologies

Disadvantages

1. The cable length is limited. This limits the number of stations that can be connected.
2. This network topology can perform well only for a limited number of nodes
3. If the network cable breaks, the entire network will be down.
4. Terminators are required at both ends of the backbone cable.
5. Difficult to identify the problem if the entire network shuts down.
6. Not meant to be used as a stand-alone solution in a large building.
7. Include difficult reconnection and fault isolation.
8. The managing cost of network is too high.
9. Addition of new devices requires modification or replacement of the backbone.

2. Star and Tree Topology



The star topology is the most commonly used architecture in Ethernet LANs. Larger networks use the extended star topology also called tree topology. When used with network devices that filter frames or packets, like bridges, switches, and routers, this topology significantly reduces the traffic on the wires by sending packets only to the wires of the destination host.

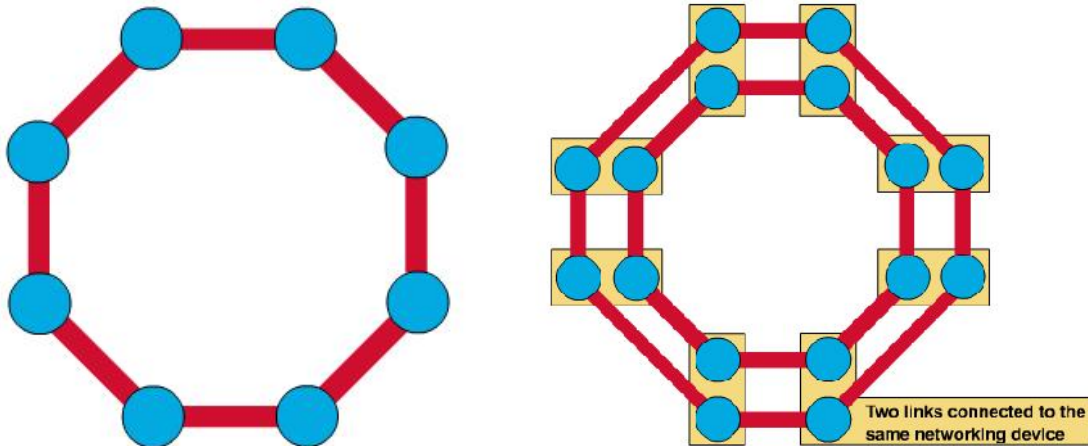
Advantages

1. Due to its centralized nature, the topology offers simplicity of operation.
2. It also achieves an isolation of each device in the network.
3. Easy to install and reconfigure.
4. No disruptions to the network when connecting or removing devices.
5. Easy to detect faults and to remove parts.
6. Less expensive.
7. Includes robustness, that is, if one link fails, only that link is affected, other links remain active.
8. Easy to install and reconfigure.
9. No disruptions to the network when connecting or removing devices.
10. Easy to detect faults and to remove parts.
11. Less expensive.
12. Includes robustness, that is, if one link fails, only that link is affected, other links remain active.

Disadvantages

1. The network operation depends on the functioning of the central hub. Hence, the failure of the central hub leads to the failure of the entire network.
2. If the hub, switch, or concentrator fails, nodes attached are disabled.
3. Requires more cable length than a bus topology.
4. More expensive than bus topologies because of the cost of the hubs, etc.

3. Ring Topology



In local area networks where the ring topology is used, each computer is connected to the network in a closed loop or ring. The signal passes through each machine or computer connected to the ring in one direction, from device to device, until it reaches its destination. Each machines or computers connected to the ring act as signal boosters or repeaters. When a device receives a signal intended for another device, its repeater regenerates the bits and passes them along.

Two types of ring topology can be found.

- Single ring – All the devices on the network share a single cable (e.g Token ring)
- Dual ring – The dual ring topology allows data to be sent in both directions (eg, FDDI). Redundant path provides fault tolerance

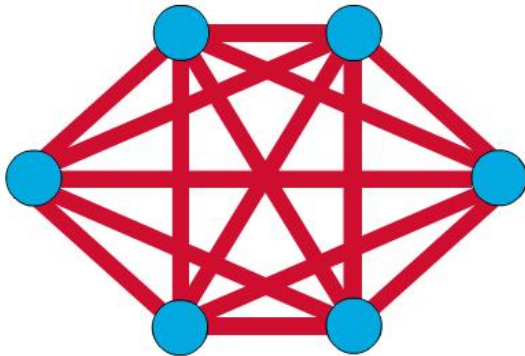
Advantages

1. It is relatively easy to install and reconfigure.
2. Easy to identify the problem if the entire network shuts down.
3. The data being transmitted between two nodes passes through all the intermediate nodes. A central server is not required for the management of this topology.

Disadvantages

1. The failure of a single node of the network can cause the entire network to fail.
2. The movement or changes made to network nodes affects the performance of the entire network.
3. Only one machine can transmit on the network at a time.

4. Mesh Topology



The mesh topology connects all devices (nodes) to each other for redundancy and fault tolerance. It is used in WANs to interconnect LANs and for mission critical networks like those used by banks and financial institutions. Implementing the mesh topology is expensive and difficult.

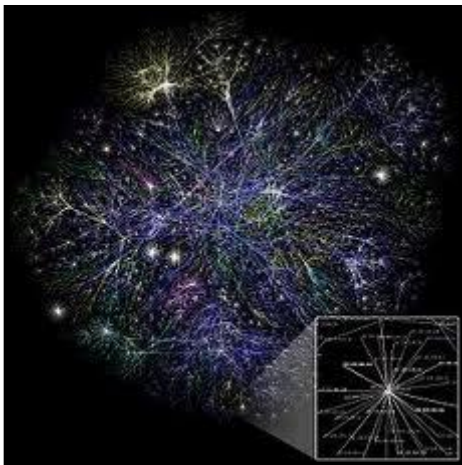
Advantages

1. The arrangement of the network nodes is such that it is possible to transmit data from one node to many other nodes at the same time.
2. Eliminates traffic problems in links sharing.
3. If one link becomes unusable, it does not incapacitate the entire system. Thus, act as robust.
4. It has privacy and security.
5. Point-to-point link make fault identification and fault isolation easy

Disadvantages

1. Installation and reconnection are difficult.
2. The hardware required to connect each link (I/O ports and cable) is expensive.
3. It is generally too costly and complex for practical networks.
4. The arrangement wherein every network node is connected to every other node of the network, many of the connections serve no major purpose. This leads to the redundancy of many of the network connections.

THE INTERNET



The Internet, or *the Net* is the large group of millions of computers around the world that are all connected to one another. These computers are connected by phone lines, fibre optic lines, coaxial cable, satellites, and wireless connections.

When you log on to the Internet you are given access to many of the other computers that are connected around the world.

The Internet was conceived by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1969 and was first known as the ARPANet. The original aim was to create a network that would allow users of a research computer at one university to be able to "talk to" research computers at other universities.

Father of Internet is **Vinteur Surf**.

Today, the Internet is a public, cooperative, and self-sustaining facility accessible to hundreds of millions of people worldwide. For many Internet users, electronic mail (e-mail) has practically replaced the Postal Service for short written transactions. Electronic mail is the most widely used application on the Net. You can also carry on live "conversations" with other computer users, using Internet Relay Chat (IRC) and more recently with Internet telephony.

HTML

HTML, which stands for Hyper Text Markup Language, is the predominant markup language for web pages. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. It allows images and objects to be embedded and can be used to create interactive forms. It is written in the form of HTML elements consisting of "tags" surrounded by angle brackets within the web page content. It can embed scripts in languages such as JavaScript which affect the behavior of HTML web pages. HTML can also be used to include Cascading Style Sheets (CSS) to define the appearance and layout of text and other material. The W3C, maintainer of both HTML and CSS standards, encourages the use of CSS over explicit presentational markup.

Websites



A web site is a collection of information about a particular topic or subject. Web site design is defined as the arrangement and creation of web pages that in turn make up a web site. A web page consists of information for which the website is designed and developed. For example, a web site might be compared to a book, where each page of the book is a web page.

Blogs

A blog is also known as Weblog. It is a personal online diary or a journal which allows one to share thoughts and ideas. In a blog, one can add video, pictures and music. One can also read comments that a visitor leaves on the blog. The best part is that one does not have to be computer literate. People who create blog are called bloggers. Blog is a very cheap medium on the Internet through which one can express feelings and write according to one's wish about anything that one likes.

A blog gives us the freedom of writing articles. Users can give their views about the article and you can know your mistakes. Specially those people who has no website but wants to give information to others about themselves, and want to share his/her opinion about others, can use this to their advantage.

Some of the best blogging sites are given below.

www.blogger.com

www.blogspot.com

www.wordpress.org

Search engine



A program that searches documents for specified keywords and returns a list of the documents where the keywords were found is a search engine. Although search engine is really a general class of programs, the term is often used to specifically describe systems like Google, Alta Vista and Excite that enable users to search for documents on the World Wide Web and USENET newsgroups.

Typically, a search engine works by sending out a spider to fetch as many documents as possible. Another program, called an indexer, then reads these documents and creates an index based on the words

contained in each document. Each search engine uses a proprietary algorithm to create its indices such that, ideally, only meaningful results are returned for each query.

e-mail

E-mail is the shortened form for electronic mail, the transmission of messages over communications networks. These messages can be notes entered from the keyboard or attachments from a computer. They enable users to send electronic mail anywhere in the world. E-mails are fast, flexible, and reliable.

An email address is usually made by the user in order to communicate.

Chat



Chat is live online communication between two users via computer. Once a chat has been initiated, either user can enter text by typing on the keyboard and the entered text will appear on the other user's monitor.

A chat room is a Web site or part of a Web site that provides a venue for communities of users with a common interest to communicate in real time.

Because chat room messages are spontaneous and instantly visible, there is a potential for abuse,

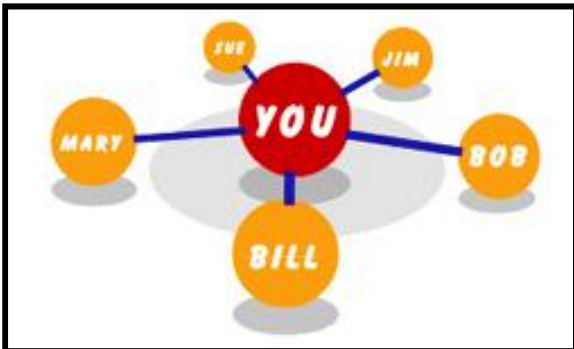
which may or may not be intentional. Chat rooms can be found that focus on virtually any aspect of human endeavour or interest.

Social networking



Social networking is the communication of choice between modern youths of today. Social network can be termed as a small community found in a workplace, university or college. Imagine a million individuals who are ready to meet other people, share first-hand information and experiences about any topic under the sun.

Social networking is advantageous in a sense because it creates diversity. One can make friends with another person in another part of the continent and share 'culinary secrets'



The flip side that social networking sites attract viruses and thieves who try to con you.

There are many social networking sites including Orkut, friendfinder, classmates...

USES OF INTERNET

Since the internet has become popular, it is being used for many purposes. Through the help of the World Wide Web and websites, the internet has become very useful in many ways for the common man. Today internet has brought a globe in a single room. Right from news across the corner of the world, wealth of knowledge to shopping, purchasing the tickets of your favorite movie-everything is at your fingertips.

Here is the list of some common uses of internet

1) Email: By using internet now we can communicate in a fraction of seconds with a person who is sitting in the other part of the world. Today for better communication, we can avail the facilities of e-mail. We can chat for hours with our loved ones. There are plenty messenger services and email services offering this service for free. With help of such services, it has become very easy to establish a kind of global friendship where you can share your thoughts, can explore other cultures of different ethnicity.

2) Information: The biggest advantage that internet offering is information. The internet and the World Wide Web has made it easy for anyone to access information, and it can be of any type, as the internet is flooded with information. The internet and the World Wide Web have made it easy for anyone to access information, and it can be of any type. Any kind of information on any topic is available on the Internet.

3) Business: World trade has seen a big boom with the help of the internet, as it has become easier for buyers and sellers to communicate and also to advertise their sites. Now a day's most of the people are using online classified sites to buy or sell or advertising their products or services. Classified sites saves you lot of money and time so this is chosen as medium by most of people to advertise their products. We have many classified sites on the web like craigslist, Adsglobe.com, Kijiji etc.

4) Social Networking: Today social networking sites have become an important part of the online community. Almost all users are members and use it for personal and business purposes. It is an awesome place to network with many entrepreneurs who come here to begin building their own personal and business brand. For eg:- Facebook, twitter, google+, my space etc.

5) Shopping: In today's busy life most of us are interested to shop online. Now a day's almost anything can be bought with the use of the internet. In countries like USA most of consumers prefer to shop from home. We have many shopping sites on internet like amazon.com, Dealsglobe.com etc. People also use the internet to auction goods. There are many auction sites online, where anything can be sold.

6) Entertainment: On internet we can find all forms of entertainment from watching films to playing games online. Almost anyone can find the right kind of entertainment for themselves. When people surf the Web, there are numerous things that can be found. Music, hobbies, news and more can be found and shared on the Internet. There are numerous games that may be downloaded from the Internet for free.

7) E-Commerce: Ecommerce is the concept used for any type of commercial maneuvering, or business deals that involves the transfer of information across the globe via internet. It has become a phenomenon associated with any kind of shopping, almost anything. It has got a real amazing and range of products from household needs, technology to entertainment.

8) Services: Many services are now provided on the internet such as online banking, job seeking, purchasing tickets for your favorite movies, and guidance services on array of topics in the every aspect of life, and hotel reservations and bills paying. Often these services are not available off-line and can cost you more.

9) Job Search: Internet makes life easy for both employers and job seekers as there are plenty of job sites which connect employers and job seekers.

10) Dating/Personals: People are connecting with others through internet and finding their life partners. Internet not only helps to find the right person but also to continue the relationship.

INTRODUCTION TO SOFTWARE

A simple question: "What is software?" A very simple answer is: Hardware you can touch, software you can't. But that is too simple indeed.

But when talking about software you talk about programming and programming languages. Using the programming languages, software are produced and then sold.

History of software development

There are over 300 different ("common") computer languages in existence, apart from the various dialects stemming from one of them. Most of them can be classified in definable groups, but others don't belong anywhere. This is because some are rather new or it is used by small group of specialized professionals or scientists requiring these dialects. This is often the case with a specific language that was designed for just one purpose, e.g. telecommunication or supercomputing. Some languages are even dead languages, some others are revived and expanded upon again, and there are ones that are constantly renewed. In the latter case a programmer is sometimes wondering whether he or she is not just upgrading to a newer version but instead learning a complete new language.

How It All Started

The creation of software also went in large but distinguishable steps. Sometimes certain software which already existed was reintroduced as new because the invention was not published earlier or even prohibited to be made public (due to war, secrecy acts etc.) or two parties came out with the same software at the same time and they solved their disputes by legal means.

The development of software depended on the problems faced by different groups of people. Whenever a problem needed to be solved, a machine was built. And when some sort of instruction was needed it was designed or written. This became programming.

The development of software can be listed briefly as follows.

1. The earliest practical form of programming was probably done by Jacquard (1804, France). He designed a loom that performed predefined tasks through feeding punched cards into a reading contraption. This new technology allowed carpets and tissues to be manufactured with lower skills and even with fewer people.

The technology of punched cards was later adapted by (IBM's) Recording and Tabulating Company to process data.

2. Then Ada Lovelace wrote a rudimentary program (1843) for the Analytical Machine, designed by Charles Babbage in 1827, but the machine never came into operation.
3. Then there was George Boole (1815-1864), a British mathematician, who proved the relation between mathematics and logic with his algebra of logic (BOOLEAN algebra or binary logic) in 1847.
4. Then John Von Neumann developed two important concepts that directly affected the path of computer programming languages. The first concept was known as “shared program technique”. The second concept was “conditional control transfer”. (www.softlord.com).
5. It took Claude Shannon (1916-2001) who wrote a thesis (*A Mathematical Theory of Communication* in the *Bell System Technical Journal* -1948) on how binary logic could be used in computing to complete the software concept of modern computing (http://www.princeton.edu/~ferguson/adw/programming_languages.shtml)

The major languages developed since 1957, were FORTRAN, COBOL, LISP, ALGOL, Pascal, C, C++, and Java.

Types of Software

A computer cannot do work without getting instructions from the user. The set of instructions which helps it in doing various operations is called software. All the programs are thus called software. Software programs are made available on the storage devices. Software makes the hardware to work.

There are two types of software:

- 1) System software
- 2) Application software

System software

System software makes the computer ready to interact with the user. Without system software a computer cannot work.

All operating systems are called system software. System software is put in the computer by the manufacturer.

An operation system is software that controls the operation of a computer. It directs the input and output of data, keeps track of files, and controls the processing of computer programs. Its roles include managing the functioning of the computer hardware, running the applications programs, serving as an interface between the computer and the user, and allocating computer resources to various functions. When several jobs reside in the computer simultaneously and share resources (multitasking), the OS allocates fixed amounts of CPU time and memory in turn. Through a

process called time-sharing, a large computer can handle interaction with hundreds of users simultaneously, giving each the perception of being the sole user. Modern computer operating systems are becoming increasingly machine-independent, capable of running on any hardware platform.

Thus the system software performs the following functions:

- It manages the processor, or central processing unit (CPU).
- The memory and storage.
- It also manages the computer hardware and peripheral devices
- It provides a consistent means for software applications to work with the CPU.

One of the most widely used operating system is developed by Microsoft. Most of today's personal computers run on Microsoft's Windows operating system, which grew out of and eventually replaced MS-DOS.

Types of operating system

1. Single-user, multitask operating system

A personal computer, desktop, notebook or even a tablet PC is handled by only one person at a time, but can perform a variety of tasks at a time, hence it uses a single-user, multitask operating system. The Microsoft Windows operating system and Macintosh operating system (Mac OS) are most commonly used single-user multitask operating systems.

2. Multiuser operating system

A multiuser operating system enables more than one user to access the computer system at one time by efficiently handling and prioritizing all the requests from multiple user. Networks require a multiuser operating system because many users access the server computer at the same time and share resources such as printers. Examples of network operating systems include Linux, UNIX, Novell Netware and Windows Server.

Large corporations with hundreds of employees use computers known as mainframes. Mainframe operating systems are multiuser and examples are UNIX and IBM'S OS/2 and z/OS.

Scientists and engineers use super computers to solve complex problems or to perform massive computations. It also uses multiuser operating systems.

Some popular operating systems are as follows:-

Windows and its versions



Windows is a family of software products developed by Microsoft corp., mainly for personal computers and workstations, which began as a graphical user interface and developed into an operation system.

Version 1.0 (1985)



Version 1.0 (1985) provided a graphical user interface, multitasking, and virtual memory management; it ran on top of MS-DOS and was supported on Intel- based personal computers. Version 3.1 (1992) sold over 3 million copies in its first two months and helped establish Microsoft's dominance of the operating system market for microcomputers.

Windows 95 and Windows 98



Windows 95 and Windows 98 continued its success. Windows NT (1993), which can run on RISC-based computers as well as traditional Intel-based systems, is a high-end version of Windows intended for more powerful personal computers, workstations, and servers.

Windows CE(1996)



Windows CE (1996) is an embedded operating system for palm PCs and other handheld devices. Microsoft continues to release new versions of its operating system: Windows 2000 for corporate-oriented computers, Windows Me (2000) for consumer-oriented computers, and in 2001 a version for both environments, Windows XP.

Today Windows runs on more than 90% of all personal computers.

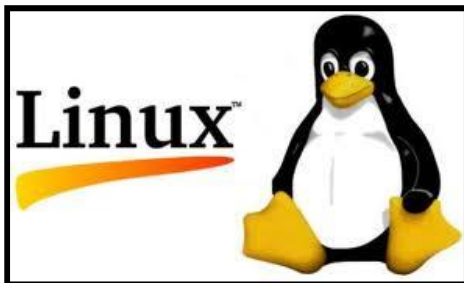
Windows 7



Microsoft released a new version of Windows in 2010 based on the needs of its users. Windows 7 is designed to do the following:

- Work the way consumers want – **with** special attention to performance, reliability, security, compatibility and battery life.
- Make everyday tasks faster and easier - Jumplists, Previews and the new Taskbar make it easier to operate PCs.
- Offer a better entertainment experience-easier streaming of music, video and photos. Windows 7 will enable people with touch-screen monitors to use multiple fingers to interact with their PC screens in a more intuitive way. Windows Media Center, available in some editions of Windows 7, with a TV tuner and improved user interface, makes recording TV free and easy.

Linux



Linux is the non-proprietary operation system (OS) for digital computers. In 1991 Linus Torvalds of Finland began asking for volunteer programmers over the internet to collaborate on the development of a UNIX-like OS for personal computers; the “1.0” release of Linux was in 1994. A true multiuser, multitasking system, Linux contained features (e.g., virtual memory, shared libraries, memory management, and TCP/IP networking) formerly only found

on mainframe computers. With its source code freely available, thousands of volunteers, as well as several companies that sell pre-packaged Linux products, have contributed to the OS. A reliable, fast-performing system with good security features, Linux is popular for corporate computer network and Web servers

UNIX

UNIX is a computer operating system (or OS) used most commonly in servers and workstations. UNIX was originally released by Bell Labs to various government and educational institutions. This popularity led to the adaptation of UNIX by many new up companies; as a result, UNIX helped fuel the growth of the internet in the 1990s.

Application software

Application software includes programs that enable you to perform various specific tasks generally required in home, school and business. Application software needs system software to run. Examples of application software are:- word processing programs like MS Word, Open Office, spreadsheet programs like MS-Excel, Lotus etc.

Categories of Software (on basis of Proprietary Issues)

LICENCE SOFTWARE

A **software license** is a legal instrument (usually by way of contract law) governing the usage or redistribution of software. All software is copyright protected, except material in the public domain. Licensed software allows an individual or group to use a piece of software on certain terms and conditions. There are a variety of types of software licenses. Some allow a fixed number of users to use the program while others allow you to use the program in fixed number of computers. Most software licenses allow the program to run on one machine only and copies can be made only for backup purposes.

FREE SOFTWARE

Software that can be easily run and distributed on a computer without much time-consuming installation process is known as Free software. Free software can also be copied, changed and improved upon. Free software license is a matter of users' freedom to **run, copy, distribute, study, change** and **improve** the software. More precisely, the freedom to run the program, for any purpose, any kind of person or organization, any kind of computer system for any kind of job, without being required to notify any specific entity. We have the freedom to study how the program works, and adapt it to your needs and make modifications and use them privately. For all this you need access to source code.

Free software means:

- The freedom to run the program for any purpose.
- The freedom to study how the program works, and change it to make it do what you wish. Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help the public.
- The freedom to distribute copies of your modified versions to others. By doing this you can give the whole community a chance to benefit from your changes.

- People can convert the program into proprietary software.

OPEN SOURCE SOFTWARE

Open source definition is less restrictive than free software definition. Free software is open source.

Though most open source licenses satisfy the free software definition, some are not as free as in "free software".

1. Free Redistribution
2. Shall not restrict any party from selling or giving away the software
3. Source Code
4. Must allow distribution in source code as well as compiled form.
5. Derived Works
6. Must allow modifications and derived works.
7. Integrity of The Author's Source Code
8. Distinguished changes from the base source.
9. No Discrimination against Persons or Groups.
10. No Discrimination against Fields of Endeavor.
11. Distribution of License
12. No need for execution of an additional license.

Sample software with open source licenses: Eclipse, Apache, Mozilla, etc...

Some of the Open Source Businesses are : IBM (Apache bundled with webspeher), Red Hat Software sells RH Linux, HP, Sun, Sharp, etc.

MAJOR APPLICATION SOFTWARES

Word Processing Programs

A Word Processing programs enables us to create a document, store it electronically on a disk, display it on a screen, modify it and print it. Microsoft Word and Corel Word Perfect are popular word processing programs. Word processing software has a key advantage over its ancestral counterpart, the typewriter: you can make revisions and corrections without having to retype an entire document. We can also quickly and easily insert, delete and move pieces of text. Similarly you can remove and insert text from one document into another seamlessly. Using the latest version of *Word 2007 or Word 2010*, a user can bold, *italicize*, and underline characters. A letter or document can have different character styles and images can be inserted anywhere in the document.

Spread Sheet Software

A *spreadsheet* is similar to an accounting worksheet. It has a number of cells that make a grid consisting of rows and columns. These cells can be used to calculate data. *MS Excel* software can easily recalculate an entire spreadsheet after a small change has been made in one of the cells. It can also insert charts, pictures and do complex scientific calculations

Examples of spreadsheets are Microsoft Excel, Lotus 1-2-3 etc

Presentation Programs

Presentation Programs are those programs which enable a user to create a slideshow and present his topics in the form of slides. Presentation programs are used in businesses and schools to help discuss a topic or teach others. Examples of presentation programs are Microsoft Power Point, Office Impress, iWork Keynote etc.

MODULE II

BASICS OF IT: INFORMATION

INFORMATION AGE

The Information Age, also commonly known as the Computer Age or Digital Age, is an idea that the current age will be characterized by the ability of individuals to transfer information freely, and to have instant access to information that would have been difficult or impossible to find previously. The idea is linked to the concept of a digital age or digital revolution, and carries the ramifications of a shift from traditional industry that the industrial revolution brought through industrialization, to an economy based on the manipulation of information, i.e., an information society.

The Information Age formed by capitalizing on the computer microminiaturization advances, with a transition spanning from the advent of the personal computer in the late 1970s to the internet's reaching a critical mass in the early 1990s, and the adoption of such technology by the public in the two decades after 1990. Bringing about a fast evolution of technology in daily life, as well as of educational life style, the Information Age has allowed rapid global communications and networking to shape modern society.

Data and information

Data are plain facts in unprocessed form. The word data is plural for datum. When data are processed organized, structured or presented in a given context so as to make them useful, they are called information.

It is not enough to have data. Raw data is not of much use. But when it is interpreted and processed to determine its true meaning, they become useful and can be called information.

Prerequisites and needs

Information need refers to an individual or group's desire to locate and obtain information to satisfy a conscious or unconscious need. The 'information' and 'need' in 'information need' are inseparably connected. Needs and interests are satisfied with information. Information needs and information requirements are related to each other but are different. For example, information need is like hunger and information requirement is food.

Information needs depend on the following factors:

- a. Work activity
- b. Discipline/Field/Area of Interest
- c. Availability of facilities
- d. Hierarchical position of individuals
- e. Motivation factors for information needs
- f. Need to take a decision
- g. Need to seek new ideas
- h. Need to validate the correct ones
- i. Need to make professional contributions
- j. Need to establish priority for discovery etc

A step by step procedure which can be adopted to study the information needs of a majority of users is given below.

1. Study of subjects of interest to organization/users
2. Study of the organization and its environment
3. Study of the immediate environment of the users
4. Study of the users
5. Formal interview
6. Identification and recording of information needs
7. Analysis and refinement of the identified information needs.

INFORMATION TECHNOLOGY AND ITS COMPONENTS

The term “Information Technology” in English is derived from the French word ‘*Informatique*’ and “*Informatika*” in Russian means information handling. IT is a new science of collecting, storing, processing and transmitting information.

The word “Information Technology” is a combination of two words. One is information and other is technology. Information means knowledge, it can be a bit or a para or a page. IT is science of information handling, particularly using computers to support the communication of knowledge in technical, economic and social fields.

According to ALA Glossary, Information Technology is the application of computers & other technologies to the acquisition, organisation, storage, retrieval & dissemination.

According to UNESCO, IT is scientific, technological and engineering disciplines and management techniques used in information handling and processing their applications, computers and their interaction with man and machines or associated social, economic and cultural matters.

Components of Information Technology

Technological change is becoming a driving force in our society. Information technology is a generic term used for a group of technologies. James William (1982) has identified the following six major new technologies as most relevant in modern library and information system.

- Processor, memory and input/output channels,
- Micro. Mini and Large scale computers,
- Mass storage technologies,
- Data communication, networking and distributed processing,
- Data entry, display respond, and
- Software

These technologies can also be grouped into three major areas:

- Computer Technology,
- Communication Technology and
- Reprographic, Micrographic and Printing Technologies

A. Computer Technology

The wide spread use of computer technology has made dramatic developments in the information transmission process in very field of human life. Highly sophisticated information services ranging from elaborate abstracting and indexing services to computerized data bases in almost all scientific disciplines are in wide use all over the world. The current developments in computer technology include mini computers, microcomputers, personnel computers, portable computers, super computers, speaking computer with IQS, microchip technology, artificial intelligence, software developments, C-ROM technology, machine-readable database, etc.

B. Communication Technology

1 Audio Technology

Due to tremendous improvements and inventions, older gramophone records are now dwindling and much sophisticated cassettes and tape records are emerging. The outmoded AM (Amplitude Modulated) radio receivers are being replaced by the modern FM (Frequency Modulation) receivers. Thus, the new audio technology can be used in libraries and information centers for a wide variety of, recreation, etc.

2 Audio-Visual Technology

Motion pictures, Television, Videodisc are the main contributions of this technology. Videodisc is a new medium containing prerecorded information, which allows the user to reproduce this information in the form of images on the screen of a television receiver at, will. Videodisc technology offers high quality storage, image stability and speed of recall.

3 Facsimile Transmissions (Fax)

Facsimile transmission has been boosted by the adoption of methods of data compression made possible by compact, reliable and inexpensive electronics. During the initial stages, the average speed of facsimile transmission was found to be 3.4 minutes per page. This technology was slow and it was replaced by micro facsimile. Satellite communication and fiber optics have increased the potential of facsimile transmission.

4 Electronic Mail

E-mail is the electronic transmission and receiving of messages, information, data files, letters or documents by means of point-to-point systems or computer-based messages system.

C. Reprographic, Micrographic and Printing Technologies

The technology of reprography made a big impact on the document delivery system. Most of the research libraries have reprographic machines and provide photocopy of any document on demand. Using reprographic and micrographic techniques, we can condense the bulky archives and newspapers and solve the storage problems. They also serve the purpose of preservation. They help in resource sharing and save the time of users.

1 Micro Forms

Microforms is a term for all type of micro-documents whether they are transparent or opaque or in roll or sheet form. The varieties of microforms are microfilm, microfiche, ultra fiche, micro opaque, cards, computer about microfiche / micro film (COM).

2 Roll-film (microfilm)

It is a continuous strip of film with images arranged in sequence. It is available in 100 feet roll with 35mm width.

3 Microfiche

It is flat film having large number of images arranged in rows and columns. Standard sized microfiche of 4x6 inches accommodated 98 pages.

4 Printing Technology

Thousands of years ago, people recognized the necessity of keeping records of their daily activities. Paper was invented and the art of writing and record keeping came to be defined. At present, lasers and computers have entered the field of printing. Computer printers are three categories; line printers, dot matrix printer, and laser printers. Laser printers are popular today.

IT AND INTERNET

Internet has transformed our lives and the way we communicate, how we learn, how we work and spend free time. In essence it has more or less changed every aspect of human society one can think of. The significance of the Internet and Information Technology in both nosiness and private field has grown considerably in the last few years, with exponential growth of Internet users and services offered.

The internet is a global system of interconnected computer networks that interchange data by packet switching using the standardized Internet Protocol Suite (TCP/IP). It is a “network of networks” that consists of millions of private and public academic, business, and government networks of local to global scope that are linked by copper wires, fiber-optic cables, wireless connections, and other technologies. The Internet carries various information resources and services, such as electronic mail, online chat, file transfer and file sharing, online gaming, and the inter-linked hypertext documents and other resources of the World Wide Web (WWW). The WWW is the graphical Internet service that provides a network of interactive documents and the software to access them. It is based on documents called pages that combine text, pictures, forms, sound, animation and hypertext links called hyperlinks.

Internet is accessed using a browser, which is a piece of software that acts as an interface between the user and the inner-workings of the internet specifically the WWW.

Internet is the cheapest and fastest means to get, provide and compile information.

Getting information on the internet

The amount of information available through the Internet is staggering. To make all of it more easily available to users, programs such as the gopher were developed to help present material in some logical fashion. The most recent and very successful attempt at presenting information over the internet is the World Wide Web (WWW). You could get information about people, products, organizations, research data, electronic versions of the printed media, etc. from the internet.

Providing Information on the Internet

The best and most inexpensive way to let people know who you are, what you are doing/ have done, and how, is through the Internet. For an organization or an institution, setting up a home page is a good way to let the world know what its products and services are. In addition to advertising, the other critical functions that relate to provision of information are

- **Publishing** including full text articles, abstracts, computer programs and demonstrations.
- **Blogging**, which is a form of self-publishing. A blog (or Web log) is a website, usually maintained by an individual with regular entries of commentary, descriptions of events, or other material such as graphics or video.
- **Extension**, in which some of the delays associated with the printed media, may be reduced.
- **Teaching**, the possibilities here include both distance learning and assistance for students.

Compiling Information from the Internet

We can also get information from the internet and moreover, we can search for specialized information from the web. For instance, if you wanted to poll the readership for a magazine or conduct a survey to detect the pulse of a selected community, the web provides you with the ideal platform and opportunity. Using forms, e-mails etc., you can conduct surveys and get opinion of people across the world. There are hundreds of discussion groups and LISTERVs, where one can post a question and get it answered by hundreds of people who participate in these discussions.

IT Applications

IT can be effectively applied in numerous fields. Some of the important areas of IT application are e-governance, health care, business, commerce and resource management.

E-GOVERNANCE

The emergence of Information and Communications Technology (ICT) has provided means for faster and better communication, efficient storage, retrieval and processing of data and exchange and utilization of information to its users. With growing computerization and increasing internet connectivity, this process has presently reached a stage where more and more users are motivated to modifying their ways of doing things in order to get the advantages provided by ICT.

India has been harnessing the benefits provided by the Information and Communication Technologies (ICT) to provide integrated governance, reach to the citizens faster, provide efficient services and citizen empowerment through access to information. The aim is to redefine governance in the ICT age to provide SMART GOVERNANCE. Several significant initiatives have been taken at the center and the state level in this direction. The government of India has drawn up a 'Minimum Agenda of E-Governance'. Further Ministries and Departments have provision of 2 to 3 percent of their annual budgets to be spent on IT related activities. The government has enacted IT Act 2000 which provides legal status to the information and transactions carried on the net. A list of some significant e-governance projects implemented are project Bhoomi in Karnataka, E-Seva in Andhra Pradesh, Gyandoot in Madhya Pradesh, Warana in Maharashtra, RajNidhi & Raj-SWIFT – Rajasthan etc.

Some of the ongoing projects in Kerala state are FRIENDS, AkshySa, IT @ School, Dr. SMS, IDEAS etc.

E-Governance would generally involve the use of ICTs by the government agencies for any or all of the following reasons.

1. Exchange of information with citizens, businesses or other government departments.
2. Speedier and more efficient delivery of public services.
3. Improving internal efficiency
4. Reducing costs/increasing revenue
5. Re-structuring of administrative processes and
6. Improving quality of services.

Defining e-Governance: 'E-Government' (or Digital Government) is defined as 'The employment of the Internet and the world-wide-web for delivering government information and services to the citizens. (United Nations, 2006; AOEMA, 2005).

'Electronic Government' (or in short 'e-Government') essentially refers to 'The utilization of IT, ICTs, and other web-based telecommunication technologies to improve and/or enhance on the efficiency and effectiveness of service delivery in the public sector.' (Jeong, 2007).

E-government describes the use of technologies to facilitate the operation of government and the disbursement of government information and services. E-government, short for electronic government, deals heavily with Internet and non-internet applications to aid in governments. E-government includes the use of electronics in government as large-scale as the use of telephones and fax machines, as well as surveillance systems, tracking systems such as RFID tags, and even the use of television and radios to provide government-related information and services to the citizens

Disadvantages

The main disadvantages concerning e-government is the lack of equality in public access to the internet, reliability of information on the web, and hidden agendas of government groups that could influence and bias public opinions.

There are many considerations and potential implications of implementing and designing e-government, including disintermediation of the government and its citizens, impacts on economic, social, and political factors, vulnerability to cyber attacks, and disturbances to the *status quo* in these areas.¹

Hyper-surveillance

Increased contact between government and its citizens goes both ways. Once e-government begins to develop and become more sophisticated, citizens will be forced to interact electronically with the government on a larger scale. This could potentially lead to a lack of privacy for civilians as their government obtains more and more information on them. In a worst case scenario, with so much information being passed electronically between government and civilians, a totalitarian-like system could develop. When the government has easy access to countless information on its citizens, personal privacy is lost.

Cost

Although "a prodigious amount of money has been spent" on the development and implementation of e-government, some say it has yielded only a mediocre product. The outcomes and effects of trial Internet-based governments are often difficult to gauge or unsatisfactory. According to Gartner, Worldwide IT spending is estimated to total \$3.6 trillion in 2011 which is 5.1% increase from the year 2010 (\$3.4 trillion).

Inaccessibility/ Digital divide

An e-government site that provides web access and support often does not offer the "potential to reach many users including those who live in remote areas, are homebound, have low literacy levels, exist on poverty line incomes."

False sense of transparency and accountability

Opponents of e-government argue that online governmental transparency is dubious because it is maintained by the governments themselves. Information can be added or removed from the public eye. To this day, very few organizations monitor and provide accountability for these modifications. Even the governments themselves do not always keep track of the information they insert and delete.

Benefits of e-Governance

E-Governance ushers in multiple advantages:

- It greatly simplifies the process of information accumulation for citizens and businesses.
- It empowers people to gather information regarding any department of government and get involved in the process of decision making.
- E-Governance strengthens the very fabric of democracy by ensuring greater citizen participation at all levels of governance
- E-Governance leads to automation of services, ensuring that information regarding every work of public welfare is easily available to all citizens, eliminating corruption.
- This revolutionizes the way governments function, ensuring much more transparency in the functioning, thereby eliminating corruption.
- Since the information regarding every activity of government is easily available, it would make every government department responsible as they know that every action of theirs is closely monitored.
- Proper implementation of e-Governance practices make it possible for people to get their work done online thereby sparing themselves of unnecessary hassles of travelling to the respective offices.
- Successful implementation of e-Governance practices offer better delivery of services to citizens, improved interactions with business and industry, citizen empowerment through access to information, better management, greater convenience, revenue growth, cost reductions etc.
- Furthermore, introduction of e-Governance brings governments closer to citizens. So much so that today it becomes extremely convenient to get in touch with a government agency. Indeed, citizen service centres are located closer to the citizens now. Such centres may consist of an unattended kiosk in the government agency, a service kiosk located close to the client, or the use of a personal computer in the home or office.
- E-Governance practices help business access information that might be important for them at a click

Although internet-based governmental programs have been criticized for lack of reliable privacy policies, studies have shown that people value prosecution of offenders over personal confidentiality. Ninety percent of United States adults approve of Internet tracking systems of criminals, and 57% are willing to forgo some of their personal internet privacy if it leads to the prosecution of criminals or terrorists.

Types of Interactions in E-governance

E-Governance facilitates interaction between different stake holders in governance. These interactions may be described as follows:

1. G2C (Government to Citizens)

In this case, an interface is created between the government and citizens which enables the citizens to benefit from efficient delivery of a large range of public services. This expands the availability and accessibility of public services on the one hand and improves the quality of services on the other. It gives the citizens the choice of when to interact with the government (eg:- 24 hours a day, 7days a week), from where to interact with the government (eg. Service center, unattended kiosk or from one's home/workplace), and how to interact with the government (eg. through internet, fax, telephone, email, face-to-face, etc.) the primary purpose is to make government, citizen-friendly.

2. G2B (Government to Businesses)

Here, e-governance tools are used to aid the business community-providers of goods and services- to seamlessly interact with the government. The objective is to cut red tape, save time, reduce operational costs and to create a more transparent business environment when dealing with the government. The G2B initiatives can be transactional, such as in licensing, permits, procurement and revenue collection. They can also be promotional and facilitative, such as in trade, tourism and investment. These measures help to provide a congenial environment to businesses to enable them to perform more efficiently.

3. G2E (Government to Employees)

Government is by far the biggest employer and like any organisation, it has to interact with its employees on a regular basis. This interaction is a two-way process between the organisation and the employee which helps in fast and efficient service on one hand and increase satisfaction levels of employees on the other.

4. G2G (Government to Governments)

In this case, Information and Communications Technology is used to increase the flow of information and services within and between different entities of the government. This kind of interaction is only within the sphere of government and can be both horizontal and vertical. Horizontal interaction means between different government agencies, as well as between different functional areas within an organization, and vertical interaction means between national, state and local government agencies, or different levels within an organization. The primary objective is to increase efficiency, performance and output of the government

IT FOR NATIONAL INTEGRATION

India has many races, nationalities, castes, subs castes and communities but so far the heart of India is concerned it is one. It is true that societies that have been integrated into bonds of unity have always enjoyed peace, stability, prosperity and permanence. The national integration is the process of uniting different people from all walks of life into a single whole. The most serious problem being faced by India in present circumstances is, how to develop an atmosphere of national consciousness among so varied a people.

This consciousness of oneness among the population will be achieved only by development and economic upliftment of the downtrodden. There should be equal distribution of income among the population. For this all should get equal opportunities in life.

Information technology is an important and extremely effective tool through which development and progress can take place with the help of the co-operation of all strata of society including government and the public. The government should recognize the need to harness the growing power of IT for the betterment of the life of the citizens.

Dealing with government is usually complicated, slow and confusing. Government is usually associated with red-tapism, elaborate procedures and slow decision making. Public access to government services is uncoordinated, cumbersome and paper based, which is further compounded in case more than one agency is involved. IT together with, greater transparency, will improve the image of government and simpler procedures can help tackle some of the maladies of Government resulting in speedier and better decisions.

The vision of the government is to create a knowledge-based society through extensive use of Information Technology. Administration should envisage a scenario wherein every citizen shall be able to access the benefits of Information Technology. The ultimate goal is to use IT as a medium for effective interaction between the Administration and the public so that exchange of information and access to government departments is speedy and easy leading to a better quality of life.

When there is economic progress and transparency in governance, it will be easy to bring about national integration.

IT APPLICATIONS IN HEALTH CARE

Information technology (IT) has the potential to improve the quality, safety, and efficiency of health care. The use of IT in health care is generally low. Barriers include the cost and complexity of IT implementation, which often necessitates significant work process and cultural changes. Given IT's potential, both the private and public sectors have engaged in numerous efforts to promote its use within and across health care settings. Additional steps could include financial incentives (e.g., payment policy or loans) and expanded efforts to standardize records formats, nomenclature, and communication protocols to enhance interoperability.

Delivering quality health care requires providers and patients to integrate complex information from many different sources. Thus, increasing the ability of physicians, nurses, clinical technicians, and others to readily access and use the right information about their patients should improve care. The ability for patients to obtain information to better manage their condition and to communicate with the health system could also improve the efficiency and quality of care.

In general, IT allows health care providers to collect, store, retrieve, and transfer information electronically.

IT Applications are used in the health sector for the administrative and financial systems, clinical systems and infrastructure that support the administrative and clinical system.

The following technologies and terms are often included in discussions of information technology in health care:

- **Electronic health record (EHR)**

EHRs were originally envisioned as an electronic file cabinets for patient data from various sources (eventually integrating text, voice, images, handwritten notes, etc.). Now they are generally viewed as part of an automated order-entry and patient-tracking system providing real-time access to patient data, as well as a continuous longitudinal record of their care.

- **Computerized provider order entry (CPOE)**

CPOE in its basic form is typically a medication ordering and fulfillment system. More advanced. CPOE will also include lab orders, radiology studies, procedures, discharges, transfers, and referrals.

- **Clinical decision support system (CDSS)**

CDSS provides physicians and nurses with real-time diagnostic and treatment recommendations. The term covers a variety of technologies ranging from simple alerts and prescription drug interaction warnings to full clinical pathways and protocols. CDSS may be used as part of CPOE and EHR.

- **Picture archiving and communications system (PACS)**

This technology captures and integrates diagnostic and radiological images from various devices (e.g., x-ray, MRI, computed tomographyscan), stores them, and disseminates them to a medical record, a clinical data repository, or other points of care.

- **Bar coding**

Bar coding in a health care environment is similar to bar-code scanning in other environments: An optical scanner is used to electronically capture information encoded on a product. Initially, it will be used for medication (for example, matching drugs to patients by using barcodes on both the medications and patients' arm bracelets), but other applications may be pursued, such as medical devices, lab, and radiology.

- **Radio frequency identification (RFID)**

This technology tracks patients throughout the hospital, and links lab and medication tracking through a wireless communications system. It is neither mature nor widely available, but may be an alternative to bar coding.

- **Automated dispensing machines (ADMs)**

This technology distributes medication doses.

- **Electronic materials management (EMM)**

Healthcare organizations use EMM to track and manage inventory of medical supplies, pharmaceuticals, and other materials. This technology is similar to enterprise resource planning systems used outside of health care.

- **Interoperability**

This concept refers to electronic communication among organizations so that the data in one IT system can be incorporated into another. Discussions of interoperability focus on development of standards for content and messaging, among other areas, and development of adequate security and privacy safeguards.

IT APPLICATIONS IN BUSINESS, COMMERCE AND RESOURCE MANAGEMENT

Information technology is widely used in business, commerce and other related areas. Its main application areas are:

Stock control

EDI (Electronic Data Interchange) facilitates exchange of orders between different businesses and allows Just In Time stock ordering. Also with computerized stock control, businesses should be able to check stock levels almost on a real-time basis.

CAD/CAM-Computer Aided Design/Computer Aided Manufacture

CAD and CAM are two systems that tend to work together. CAD helps design products on computers, rather than having to create endless drawings. The system can create realistic 3D images of the finished product

EMERGING TRENDS IN IT

Electronic Data Interchange (EDI) is the structured transmission of data between organizations by electronic means. It is used to transfer electronic documents or business data from one computer system to another computer system, i.e. from one trading partner to another trading partner without human intervention.^[1] It is more than mere e-mail; for instance, organizations might replace bills of lading and even cheques with appropriate EDI messages.

In 1996, the National Institute of Standards and Technology defined electronic data interchange as "the computer-to-computer interchange of strictly formatted messages that represent documents other than monetary instruments. EDI implies a sequence of messages between two parties, either of whom may serve as originator or recipient. The formatted data representing the documents may be transmitted from originator to recipient via telecommunications or physically transported on electronic storage media." It distinguishes mere electronic communication or data exchange, specifying that "in EDI, the usual processing of received messages is by computer only. Human intervention in the processing of a received message is typically intended only for error conditions, for quality review, and for special situations. For example, the transmission of binary or textual data is not EDI as defined here unless the data are treated as one or more data elements of an EDI message and are not normally intended for human interpretation as part of online data processing."

Benefits of using EDI

- The system eliminates the need to use paper. This saves money and helps preserve the environment. This also reduces the odds of errors appearing in the documents.
- Information sharing becomes quicker and more effectual.
- The end result is increased productivity.
- Response times get quicker and management of information is simplified.

Mobile Computing

Mobile computing is "taking a computer and all necessary files and software out into the field."

"Mobile computing: being able to use a computing device even when being mobile and therefore changing location. Portability is one aspect of mobile computing."

"Mobile computing is the ability to use computing capability without a pre-defined location and/or connection to a network to publish and/or subscribe to information." Mobile Computing is a variety of wireless devices that has the mobility to allow people to connect to the internet, providing wireless transmission to access data and information from where ever location they may be.

Mobile Computing is a modified and new way of interacting with the computer device and to facilitate the other computing capabilities being present at different mobile locations.

Devices

Many types of mobile computers have been introduced since the 1990s including the:

- Personal digital assistant/enterprise digital assistant
- Smartphone
- Tablet computer
- Ultra-Mobile PC
- Wearable computer

Mobile Computing Advantages

The advantages of mobile computing are tremendous and manifold. While it allows us to carry our virtual world with us wherever we ourselves choose to be, it does so with the same, sometimes better, ease and smoothness, given the ever advancing communications and computing technologies, as done by the fixed computing counterparts.

- **Locational Flexibility:** You no longer need to stay plugged in (literally!) to a specific location for performing computing activities. Mobile computing allows you unprecedented flexibility to move about and perform computing activities at the same time. This is, indeed, the chief among all other benefits of portable computing. Mobile computing enables you to connect with near and dear ones while you're in transit.
- **Saves Time:** Mobile computing technology can be used to get our work done during travel. It also allows to instantly connecting with your family anywhere and anytime.
- **Enhanced Productivity:** Increased work flexibility is directly proportionate to enhanced work productivity - the fact that you can do your work from any place you want, without waiting for, and making efforts to, get access to computing facility translates into people being able to do more work with greater flexibility. This is the reason why most companies these days offer home-computing access to employees. Suppose a national emergency is declared or any natural calamity occurs (or any other reason) due to which offices stay closed, work can still go on as people are no longer dependent upon office computing systems to get their work done.
- **Ease of Research:** Mobile computing and the flexibility offered by it enable students as well as professionals to conduct in-depth research on just about any topic or subject even when on the go!
- **Entertainment:** As discussed previously, nowadays, with the advent and advance of mobile communication technology, no time is wasted. Getting bored is so last-decade now what with zillions of entertainment options available on mobile communication and computing devices these days - games, movies, music, videos etc.

These are some of the most prominent advantages of mobile computing. With the arrival of coming-of-age devices such as PDAs, Smart phones, etc., mobile computing is here to stay. While it allows us to carry our virtual world with us wherever we ourselves choose to be, it does so with the same, sometimes better, ease and smoothness, given the ever advancing communications and computing technologies, as done by the fixed computing counterparts.

Limitations

- **Insufficient bandwidth:** Mobile Internet access is generally slower than direct cable connections, using technologies such as GPRS and EDGE, and more recently HSDPA and HSUPA3G networks. These networks are usually available within range of commercial cell phone towers. Higher speed wireless LANs are inexpensive but have very limited range.
- **Security standards:** When working mobile, one is dependent on public networks, requiring careful use of VPN. Security is a major concern while concerning the mobile computing standards on the fleet. One can easily attack the VPN through a huge number of networks interconnected through the line.
- **Power consumption:** When a power outlet or portable generator is not available, mobile computers must rely entirely on battery power. Combined with the compact size of many mobile devices, this often means unusually expensive batteries must be used to obtain the necessary battery life.
- **Transmission interferences:** Weather, terrain, and the range from the nearest signal point can all interfere with signal reception. Reception in tunnels, some buildings, and rural areas is often poor.
- **Potential health hazards:** People who use mobile devices while driving are often distracted from driving and are thus assumed more likely to be involved in traffic accidents.(While this may seem obvious, there is considerable discussion about whether banning mobile device use while driving reduces accidents or not.). Cell phones may interfere with sensitive medical devices. Questions concerning mobile phone radiation and health have been raised.
- **Human interface with device:** Screens and keyboards tend to be small, which may make them hard to use. Alternate input methods such as speech or handwriting recognition require training

SMS& MMS

Text messaging, or texting, is the exchange of brief written text messages between two or more mobile phones or fixed or portable devices over a phone network. While the original term was derived from referring to messages sent using the Short Message Service (SMS) originated from Radio Telegraphy, it has since been extended to include messages containing image, video, and sound content (known as MMS messages).

Text messages can be used to interact with automated systems such as ordering products and services for mobile phones or participating in contests. Advertisers and service providers use direct text marketing to notify mobile phone users about promotions, payment due dates and other notifications that can usually be sent by post, e-mail or voicemail.

Uses

1. Text messaging is most often used between private mobile phone users, as a substitute for voice calls in situations where voice communication is impossible or undesirable.
2. Some text messages such as SMS can also be used for the remote controlling of appliances. It is widely used in domotics systems.
3. A Flash SMS is a type of text message that appears directly on the main screen without user interaction and is not automatically stored in the inbox. It can be useful in cases such as an emergency (e.g. fire alarm) or confidentiality (e.g. one-time password).
4. Text messaging has become so popular that advertising agencies and advertisers are now jumping into the text messaging business. Services that provide bulk text message sending are also becoming a popular way for clubs, associations, and advertisers to reach a group of opt-in subscribers quickly.

5. Micro Blogging

Out of many texting trends, a system known as Micro Blogging has surfaced, the system consists of a miniaturized blog, inspired mainly by peoples' tendency to jot down babble and post it. They consists of sites like [Twitter](#) equivalent [Weibo](#).

6. Emergency services

In some countries, text messages can be used to contact the emergency services. In the UK, text messages can be used to call the emergency services after registering with the emergency SMS service. This service is primarily aimed at people who, by reason of disability, are unable to make a voice call, but has recently been promoted as a means for walkers and climbers to call emergency services from areas where a voice call is not possible due to low signal strength.

7. Reminders of hospital appointments

SMS messages are used in some countries as reminders of hospital appointments.

8. SMS is widely used for delivering digital content, such as news alerts, financial information, logos and ringtones.
9. The use of text messaging for business purposes has grown significantly during the mid-2000s. Some practical uses of text messaging include the use of SMS for confirming delivery or other tasks, for instant communication between a service provider and a client (e.g., stock broker and investor), and for sending alerts.
10. Several universities have implemented a system of texting students and faculty's campus alerts.

WIRELESS APPLICATIONS

During the past 15 years, mobile services have evolved from basic voice communication to mobile-broadband multimedia services. The mobile-broadband applications and services commercially available around the world owe their existence to the evolution of wireless-technology advancements of yesterday and today.

The technology advancements achieved through airlink-performance enhancements—higher data rates, optimized quality of service (QoS), reduced latency and increased network capacity—have led to new and enhanced service offerings for mobile operators.

BLUE TOOTH

Bluetooth is the name of a wireless technology that is standard for connecting devices without cables. Bluetooth works by using radio signals to transmit information over short distances that are generally 33 feet or less. Thus Bluetooth is a technology that allows for short distance wireless data transmission. It is used most commonly in phones for peripheral devices like headsets.

Created by telecoms vendor [Ericsson](#) in 1994,^[1] it was originally conceived as a wireless alternative to [RS-232](#) data cables. It can connect several devices, overcoming problems of synchronization.

Bluetooth provides a secure way to connect and exchange information between devices such as faxes, mobile phones, telephones, laptops, personal computers, printers, Global Positioning System (GPS) receivers, digital cameras, and video game consoles.

List of applications (Uses)



A typical Bluetooth mobile phone headset.

- Wireless control of and communication between a mobile phone and a hands free headset. This was one of the earliest applications to become popular.
- Wireless control of and communication between a mobile phone and a Bluetooth compatible car stereo system
- Wireless Bluetooth headset and Intercom.
- Wireless networking between PCs in a confined space and where little bandwidth is required.
- Wireless communication with PC input and output devices, the most common being the mouse, keyboard and printer.
- Transfer of files, contact details, calendar appointments, and reminders between devices with OBEX.
- Replacement of previous wired RS-232 serial communications in test equipment, GPS receivers, medical equipment, bar code scanners, and traffic control devices.
- For controls where infrared was often used.
- For low bandwidth applications where higher USB bandwidth is not required and cable-free connection desired.

- Sending small advertisements from Bluetooth-enabled advertising hoardings to other, discoverable, Bluetooth devices.
- Wireless bridge between two Industrial Ethernet (e.g., PROFINET) networks.
- Three seventh-generation game consoles, Nintendo's Wii and Sony's PlayStation 3 and PSP Go, use Bluetooth for their respective wireless controllers.
- Dial-up internet access on personal computers or PDAs(Personal Digital Assistants) using a data-capable mobile phone as a wireless modem.
- Short range transmission of health sensor data from medical devices to mobile phone, set-top box or dedicated tele-health devices.
- Allowing a DECT phone to ring and answer calls on behalf of a nearby mobile phone
- Real-time location systems (RTLS), are used to track and identify the location of objects in real-time using “Nodes” or “tags” attached to, or embedded in the objects tracked, and “Readers” that receive and process the wireless signals from these tags to determine their locations.
- Personal security application on mobile phones for prevention of theft or loss of items. The protected item has a Bluetooth marker (e.g. a tag) that is in constant communication with the phone. If the connection is broken (the marker is out of range of the phone) then an alarm is raised. This can also be used as a man overboard alarm. A product using this technology has been available since 2009.

Bluetooth exists in many products, such as the iPod Touch, Lego Mindstorms NXT, Play Station 3, PSP Go, telephones, the Nintendo Wii, and some high definition headsets, modems, and watches. The technology is useful when transferring information between two or more devices that are near each other in low-bandwidth situations. Bluetooth is commonly used to transfer sound data with telephones (i.e., with a Bluetooth headset) or byte data with hand-held computers (transferring files).

Global Positioning System



Artist's conception of GPS Block II-F satellite Automotive navigation system in a taxicab. in Earth orbit.

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver.

The GPS program provides critical capabilities to military, civil and commercial users around the world. In addition, GPS is the backbone for modernizing the global air traffic system.

The GPS project was developed in 1973 to overcome the limitations of previous navigation systems, integrating ideas from several predecessors, including a number of classified engineering design studies from the 1960s. GPS was created and realized by the U.S. Department of Defense (DoD) and was originally run with 24 satellites. It became fully operational in 1994.

While originally a military project, GPS is considered a *dual-use* technology, meaning it has significant military and civilian applications.

GPS has become a widely deployed and useful tool for commerce, scientific uses, tracking, and surveillance. GPS's accurate time facilitates everyday activities such as banking, mobile phone operations, and even the control of power grids by allowing well synchronized hand-off switching.

USES

Many civilian applications use one or more of GPS's three basic components: absolute location, relative movement, and time transfer. GPS is used for the following civilian purposes:

- GPS/Cellular position detection for emergency mobile calls to 911.
- Vehicle tracking systems, person tracking systems, and pet tracking systems use GPS to locate a vehicle, person, or pet. These devices are attached to the vehicle, person, or to the target leave a designated area.
- GPS is used for geotagging ie, applying location coordinates to digital objects such as photographs and other documents for creating map overlays.
- GPS is used for Aircraft Tracking.
- **GPS tours:** Location determines what content to display; for instance, information about an approaching point of interest.
- **Map-making:** Both civilian and military cartographers use GPS extensively.
- **Navigation:** Navigators value digitally precise velocity and orientation measurements.
- **Robotics:** Self-navigating, autonomous robots using a GPS sensors, which calculate latitude, longitude, time, speed, and heading.
- **Recreation:** For example, geocaching, geodashing, GPS drawing and waymarking.
- **Surveying:** Surveyors use absolute locations to make maps and determine property boundaries.
- **Tectonics:** GPS enables direct fault motion measurement in earthquakes.
- **Telematics:** GPS technology integrated with computers and mobile communications technology in automotive navigation systems
- **Fleet Tracking:** The use of GPS technology to identify, locate and maintain contact reports with one or more fleet vehicles in real-time.

GPS is used for the following military purposes.

- Navigation: GPS allows soldiers to find objectives, even in the dark or in unfamiliar territory, and to coordinate troop and supply movement.
- Target tracking: Various military weapons systems use GPS to track potential ground and air targets before flagging them as hostile.
- Missile and projectile guidance: GPS allows accurate targeting of various military weapons including ICBMs, cruise missiles, precision-guided munitions and Artillery projectiles.
- Search and Rescue: Downed pilots can be located faster if their position is known.
- Reconnaissance: Patrol movement can be managed more closely.

INIFRA RED COMMUNICATIONS

Infrared is an energy similar to visible light, but with a longer wavelength. Infrared energy is invisible to the human eye, however, while visible light energy is emitted by objects only at a very high temperature; infrared energy is emitted by all objects at ordinary temperatures. Since thermal imager's sense infrared energy which varies with the temperature of objects in a scene, the image generated provides a thermal signature of the scene. This image can be displayed on a standard video monitor. Infrared energy from objects in a scene are focused by optics onto an infrared detector. The infrared information is then passed to sensor electronics for image processing. The signal processing circuitry translates the infrared detector data into an image that can be viewed on a standard video monitor

In infrared communication an LED transmits the infrared signal as bursts of non-visible light. At the receiving end a photodiode or photoreceptor detects and captures the light pulses, which are then processed to retrieve the information they contain.

Uses of Infrared technology

Infrared light is used in industrial, scientific, and medical applications. Night-vision devices using infrared illumination allow people or animals to be observed without the observer being detected. In astronomy, imaging at infrared wavelengths allows observation of objects obscured by interstellar dust. Infrared imaging cameras are used to detect heat loss in insulated systems, observe changing blood flow in the skin, and overheating of electrical apparatus

Some common applications of infrared technology are listed below.

1. Augmentative communication devices
2. Car locking systems
3. Computers
 - a. Mouse
 - b. Keyboards
 - c. Floppy disk drives
 - d. Printers

4. Emergency response systems
5. Environmental control systems
 - a. Windows
 - b. Doors
 - c. Lights
 - d. Curtains
 - e. Beds
 - f. Radios
6. Headphones
7. Home security systems
8. Navigation systems
9. Signage
10. Telephones
11. TVs, VCRs, CD players, stereos. Infrared is the most common way for remote controls to command appliances.
12. Toys

Infrared Advantages:

Infrared technology offers several important advantages as a form of wireless communication

1. Low power requirements: therefore ideal for laptops, telephones, personal digital assistants
2. Low costs for the coding/decoding circuitry.
3. Simple circuitry: no special or proprietary hardware is required, can be incorporated into the integrated circuit of a product
4. Higher security: directionality of the beam helps ensure that data isn't leaked or spilled to nearby devices as it's transmitted
5. Portable
6. Few international regulatory constraints: IrDA (Infrared Data Association) functional devices will ideally be usable by international travelers, no matter where they may be.
7. High noise immunity: not as likely to have interference from signals from other devices.

Infrared Disadvantages:

1. Line of sight: transmitters and receivers must be almost directly aligned (i.e. able to see each other) to communicate
2. Blocked by common materials: people, walls, plants, etc. can block transmission
3. Short range: performance drops off with longer distances
4. Light, weather sensitive: direct sunlight, rain, fog, dust, pollution can affect transmission
5. Speed: data rate transmission is lower than typical wired transmission

SMART CARD

A smart card, chip card, or integrated circuit card (ICC) is any pocket-sized card with embedded integrated circuits. Smart cards are made of plastic, generally polyvinyl chloride, but sometimes acrylonitrile butadiene styrene or polycarbonate.

Smart cards can provide identification, authentication, data storage and application processing. Smart cards may provide strong security authentication for single sign-on (SSO) within large organizations.

Smart cards serve as credit or ATM cards, fuel cards, mobile phone SIMs, authorization cards for pay television, household utility pre-payment cards, high-security identification and access-control cards, and public transport and public phone payment cards.

Smart cards may also be used as electronic wallets. The smart card chip can be "loaded" with funds to pay parking meters and vending machines or at various merchants. Cryptographic protocols protect the exchange of money between the smart card and the accepting machine. No connection to the issuing bank is necessary, so the holder of the card can use it even if not the owner.

Smart health cards can improve the security and privacy of patient information, provide a secure carrier for portable medical records, reduce health care fraud, support new processes for portable medical records, provide secure access to emergency medical information, enable compliance with government initiatives (e.g., organ donation) and mandates, and provide the platform to implement other applications as needed by the health care organization

DNA COMPUTING

Microprocessors made of silicon will eventually reach their limits of speed and miniaturization. So scientists are turning to our own DNA (deoxyribonucleic acid) molecules, the material our genes are made of, which have the potential to perform calculations many times faster than the world's most powerful human-built computers.

Leonard Adleman of the University of Southern California is the Father of DNA Computing.

A DNA computer, as the name implies, uses DNA strands to store information and taps the Re-combinative properties of DNA to perform operations. A small test tube of DNA strands suspended in a solution could yield millions to billions of simultaneous interactions at speeds — in theory— faster than today's fastest supercomputers. DNA computer uses the re-combinative property of DNA to perform operations. The main benefit of using DNA computers to solve complex problems is that different possible solutions are created all at once. This is known as parallel processing. Humans and most electronic computers attempt to solve the problem one process at a time (linear processing). DNA itself provides the added benefits of being a cheap, energy-efficient resource.

In a different perspective, more than 10 trillion DNA molecules can fit into an area no larger than 1 cubic centimeter. With this, a DNA computer could hold 10 terabytes of data and perform 10 trillion calculations at a time.

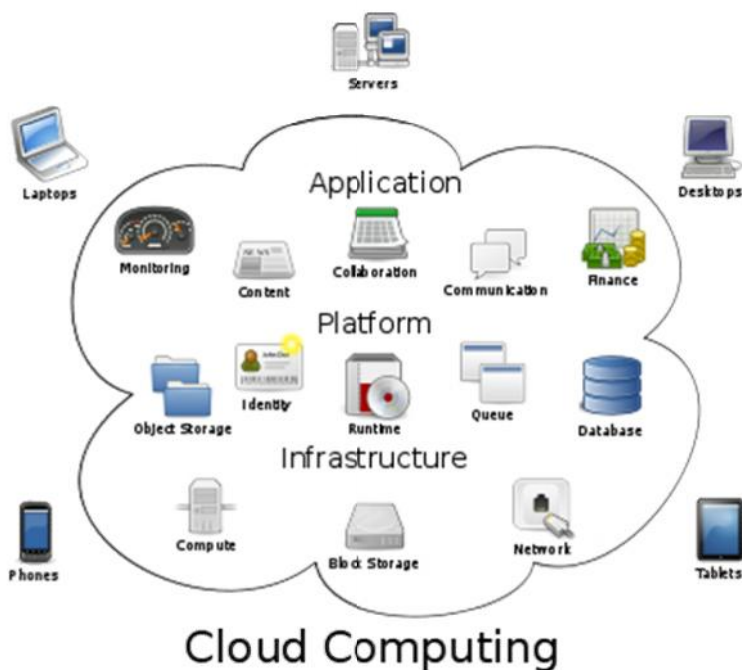
In a traditional computer, data are represented by and stored as strings of zeros and ones. With a DNA computer, a sequence of its four basic nucleotides — adenine, cytosine, guanine, and thymine — is used to represent and store data on a strand of DNA. Calculations in a traditional computer are performed by moving data into a processing unit where binary operations are performed. Essentially, the operations turn miniaturized circuits off or on corresponding to the zeros and ones that represent the string of data.

Is DNA Computer a Reality?

The amount of information gathered on the molecular biology of DNA over the last 40 years is almost overwhelming in scope. But still a lot needs to be done for a DNA Computer to become a reality for common people like us.

The technology is still evolving and so DNA computers will not be sold in the immediate future at our computer show rooms. It exists only in a few specialized labs used by scientists and it will take years to develop a workable DNA computer. But when it is built, scientists say that it will be more compact, accurate and efficient than conventional computers. The current applications of DNA chips are restricted to the field of medicine. Affymetrix Inc pioneered the research in the field of DNA medicine. However now many companies such as Motorola and Corning and the Hewlett-Packard spinoff Agilent Technologies have joined this rapidly growing technology.

CLOUD COMPUTING



Cloud computing is the delivery of computing and storage capacity as a service to a community of end-recipients. The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts services with a user's data, software and computation over a network.

There are three types of cloud computing:

- Infrastructure as a Service (IaaS),
- Platform as a Service (PaaS), and
- Software as a Service (SaaS).

Using Infrastructure as a Service, users rent use of servers (as many as needed during the rental period) provided by one or more cloud providers. Using Platform as a Service, users rent use of servers and the system software to use in them. Using Software as a Service, users also rent application software and databases. The cloud providers manage the infrastructure and platforms on which the applications run.

End users access cloud-based applications through a web browser or a light-weight desktop or mobile app while the business software and user's data are stored on servers at a remote location. Users of cloud computing claim that it allows enterprises to get their applications up and running faster, with improved manageability and less maintenance.

Cloud computing relies on sharing of resources to achieve coherence and economies of scale similar to a utility (like the electricity grid) over a network (typically the Internet). At the foundation of cloud computing is the broader concept of converged infrastructure and shared services.

MODULE III

KNOWLEDGE SKILLS FOR HIGHER EDUCATION

DATA, INFORMATION AND KNOWLEDGE REPOSITORY

All of us have some knowledge about computers. But do we know how it works and how it is useful for academic purposes? A computer connected to internet opens up a whole new world for us and we can enhance our knowledge. You can have any information on your fingertips as you can search for them using a search engine. You can search content, images, videos etc. using a search engine by simply typing the keywords in the search bar. Also academic learning gets a boost by the existence of online encyclopedias like Wikipedia. Using email, instant messaging, online forums and groups, learning and transfer of knowledge is possible. This section deals with the uses of computer in knowledge management and higher education.

Data, Information and Knowledge

People often use the terms data and information interchangeably but there is a distinction when we use them with reference to computers.

Data is a collection of facts, or an idea. Data can be a number, a word, a picture, or even a recording of sound. For example 04933239230 is a number and the names Saji and Khan are pieces of data. But they are of no use to anyone. When we are presented with a contact list that shows Saji Khan and his phone number as 04933239230, then it is useful. This is information.

Thus Information is data that has been organized or presented in a meaningful fashion.

Knowledge is what we know.

Information allows us to expand our knowledge beyond the range of our senses. We can **capture data in information**, and then move it about so that other people can access it at different times.

Knowledge is like the map of the World we build inside our brains. Like a physical map, it helps us know *where* things are – but it contains more than that. It also contains our beliefs and expectations. “If I do this, I will probably get that.” The brain links all these things together into a giant network of ideas, memories, predictions, beliefs, etc. Our brains constantly update this map from the signals coming through our eyes, ears, nose, mouth and skin.

Brain connects all knowledge. Everything is inter-connected in the brain. Brain uses two sources to build this knowledge - information and data. Computers are artificial brains. They don't understand what they are processing, and can't take independent decisions.

Knowledge Management

This is information age. To survive in this information age organizations should use information efficiently and effectively.

Knowledge management includes identifying and mapping intellectual assets within the organization, generating new knowledge for competitive advantage within the organization, making vast amounts of corporate information accessible, sharing the best practices, and technology that enables all of the above including groupware and intranets.

A comprehensive definition on knowledge management is “Knowledge Management caters to the critical issues of organizational adaptation, survival and competence in face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings.”

INTERNET AS A KNOWLEDGE REPOSITORY

In the information age, lifelong learning and collaboration are essential aspects of most innovative work. Information technology is not only transforming our workplace but also our educational system. The information revolution is having a profound and permanent effect on the way we learn. Fortunately, the computer technology which drives the information explosion also has the potential to help individuals and teams to learn much of what they need to know on demand. In particular, computer-based systems on the Internet can be designed to capture knowledge as it is generated within a community of practice and to deliver relevant knowledge when it is useful.

In this internet world, we can search any kind of information. Just type the keyword in search engine and you can find a lot of information about it. The internet is recognized as a rich source of information, which can be easily tapped by any person who has the skills to use the internet. More than ever before online databases are easily accessible to all learners who have a computer and a telephone line.

The rapid development of Information and Communication Technology has yielded an almost unlimited variety of databases and multimedia platforms that are able to supply multifarious needs, including knowledge, edutainment, entertainment, leisure activities, consumer facilities, interpersonal interaction etc. there are many knowledge centers in the net like which can be accessed and used by all. There are virtual library and also on-line discussion boards which are useful tools for academic exchanges. Thus the use of internet by students and teachers is perceived as a vehicle to increase knowledge and skills necessary for successful negotiation of tasks presented by 21st century.

Knowledge repository means a place to store knowledge and retrieve knowledge. Hence internet is truly a knowledge repository.

ACADEMIC SEARCH TECHNIQUES

As the largest interconnection of computers and computer networks, the World Wide Web makes information widely accessible, but information integrity and management remain key issues for individuals and firms using this platform. The Internet can provide a wealth of information, but the credibility and accuracy depend entirely on the source, and finding credible information can be time-consuming, requiring hours of sorting through largely irrelevant sites. These difficulties often arise because search engines -while widely used – are often not wisely used. For many people, arriving at the information desired, rather than at thousands of irrelevant hyperlinks, remains more an art form than a science.

The computers are just a tool which helps you to get the information from the net. It cannot think for you. It cannot impart knowledge to you. In this situation, Search Engines are like the index in the back of a book. It helps you to search for specific words and topics.

Some of the examples of search engines are: Google, Alta Vista, Excite, Hotbot, Infoseek etc.

GOOGLE

- Google is a **full-text search engine**, which uses computerized "spiders" to index millions, sometimes billions, of pages, allowing for much narrower searches than searchable subject index, which searches only the titles and descriptions of sites, and doesn't search individual pages
- Google is **case-insensitive**. If you search for Three, tHRee, THREE, or even THREE, you get the same results.
- **Singular is different from plural**. Searches for apple and apples turn up different pages
- **The order of words matters**. Google considers the first word most important, the second word next, and so on.
- Google **ignores most little words**, including include "I," "where," "how," "the," "of," "an," "for," "from," "how," "it," "in," and "is,,". Google **ignores most punctuation**, except apostrophes, hyphens, and quote marks
- Google returns pages that match your search terms exactly
- Google **search word limit is 32**

Some of the academic search techniques in the context of Google search engine are as follows.

1. Phrase Searches

- Enter key words search techniques. Google will find matches where the keywords appear anywhere on the page
- If you want Google to find you matches where the keywords appear together as a phrase, surround them with quotes, like this "search techniques".

2. Basic Boolean

- Google's Boolean default is AND, which means that if you enter query words without modifiers, Google will search for all your query words
- If you prefer to specify that any one word or phrase is acceptable, put an OR (in capital letter), lower case or won't work correctly. For example: enter Yahoo OR Google.
- A computer programming character | can work like OR (e.g. Yahoo | Google)
- If you want to search for a particular term along with two or more other terms, group the other terms within parentheses, like so "search techniques" (Yahoo OR Google).

3. Negation

- If you want to specify that a query item must *not* appear in your results, prep end a (minus sign or dash): "search techniques" –Google. This will search the pages that contain "search techniques", but *not* the word Google
- Note that the symbol must appear directly before the word or phrase that you don't want. If there's space between, as in the following query, it won't work as expected "search techniques" – Google

4. Explicit Inclusion

- Google will search for all the keywords and phrases that you specify, however, there are certain words that Google will ignore because they are considered too common to be of any use in the search (e.g. "a", "the", "of", etc.)
- You can force Google to take a stop word into account by prep ending a + (plus) character, as in +the "search techniques".

5. Synonyms

- The Google synonym operator, the ~ (tilde) character, prep ended to any number of keywords in your query, asks Google to include not only exact matches, but also what it thinks are synonyms for each of the keywords. Searching for: ~ape turns up results for monkey, gorilla, chimpanzee, and others (both singular and plural forms) of the ape or related family, as if you'd searched for: monkey gorilla chimpanzee (Synonyms are bolded along with exact keyword matches on the results page, so they're easy to spot)

6. Number Range

- The number range operator, .. (two periods), looks for results that fall inside your specified numeric range (e.g. digital camera 3..5 megapixel \$800..\$1000)
- You can also use the number range syntax with just one number, making it the minimum or maximum of your query (e.g. digital camera ..5 megapixel \$800..)

7. Simple Searching and Feeling Lucky

- The I'm Feeling Lucky™ button is a thing of beauty. Rather than giving you a list of search results from which to choose, you're whisked away to what Google believes is the most relevant page given your search (i.e., the first result in the list). Entering Washington Post and clicking the I'm Feeling Lucky button takes you directly to <http://www.washingtonpost.com>.

Searching Within Your Results help you narrow down your results to find the really relevant pages within your results pages

BASIC CONCEPTS OF IPR

Intellectual property rights are a bundle of exclusive rights over creations of the mind, both artistic and commercial. The former is covered by copy rightlaws, which protect creative works, such as books, movies, music, paintings, photographs, and software, and give the copyright holder exclusive right to control reproduction or adaptation of such works for a certain period of time.

Intellectual property rights includes

- **Patents** - A patent is a set of exclusive rights granted by a state to an inventor or his assignee for a limited period of time in exchange for a disclosure of an invention. Only non obvious ideas can be patented.
- **Copyrights** -Copyright gives the author of an original work exclusive right for a certain time period in relation to that work, including its publication, distribution and adaptation, after which time the work is said to enter the public domain. The work for which copy rights are given are poems, theses, plays, other literary works, movies, dances, musical compositions, audio recordings, paintings, drawings, sculptures, photographs, software, radio and television and broadcasts.

Copyright does not cover ideas and information

- **Trademarks** -is a distinctive sign or indicator used by an individual, business organization, or other legal entity to identify that the products or services to consumers with which the trademark appears originate from a unique source, and to distinguish its products or services from those of competitors.

Criticism

The major criticisms against IPR are as follows.

- It creates intellectual monopolies
- It prevents progress as it remains in the hands of an individual or a firm.
- It leads to concentration of wealth in the hands of a few and is detrimental to the masses.

INTRODUCTION TO USE OF IT IN TEACHING AND LEARNING

Need for Use of IT in Education

In order to remain competitive in Education Sector globally and to attain excellence in teaching, we have to guide and equip our students and teachers with satisfactory level of technical knowledge and skills. This is a competitive and career oriented world and hence we have to think globally and act locally. There should be a shift in learning pedagogy from conventional methods to modern methods, improve teaching quality, establish technology as a strategic resource for faculty, staff and students.

A Perspective on IT in Education

- New technologies can stimulate the development of intellectual skills
- New technologies can contribute to the ways of learning knowledge, skills and attitudes, although this is dependent on previously acquired knowledge and the type of learning activity
- New technologies can spur spontaneous interest more than traditional approaches

Need of ICT

- Students using new technologies concentrate more than students in traditional settings
- Clearer understanding of and insights into the practices.

IT Tools in Education

1) Multimedia and Animation Tools

Enables better understanding of concepts, effective and more productive learning experience.

2) E-Community Resources

Continuous and fruitful communication of students with experts and teachers from different parts of the world is possible.

3) Individualized instruction

4) Audio and Video Based Instructional Tools

Audio and Video Conferences, short animations, virtual reality, simulations, Video CDs, NPTEL (This channel provides technical lectures from all seven Indian Institutes of Technology and Indian Institute of Science, Bangalore), e Gyankosh (is a National Digital Repository to store, index, preserve, distribute and share the digital learning resources developed by the Open and Distance Learning Institutions in the country) etc. are used in teaching.

5) Digital devices

- a) Digital Blackboards, electronic pens, touch screens etc.

6) LCD Presentations

- a) Improves learning experience using visualization tools

- 7) Personal Digital Assistants(PDA)
 - a) Wireless devices like PDA are used extensively in e-learning enabling the learners access information anywhere, anytime. Also, a shift from e-learning to m-learning observed.
- 8) Online materials
 - a) Databases, e-Journals (IEEE, ACM etc)
- 9) Software Libraries / Digital Libraries
- 10) Interaction Patterns
 - a) Teacher-Parent, Teacher-Teacher and Teacher-Student interactions can be improved.
- 11) Online Tests and
- 12) College Websites

Factors Affecting the Use of IT in Education

- Leadership & Attitudinal Change
- Time Consuming
- Lack of sufficient Infrastructural facilities.

CASE STUDY OF EDUCATIONAL SOFTWARES

Educational Software

Mainly there are two categories of Educational Software

- a) To facilitate Education/Learning/Training
 - i) Teaching/ Self-learning/Training Kits
Examples of children's learning software are ClickN KIDS, Disney Interactive learning titles based on characters such as Winne-the-Pooh, Aladdin, The Jungle Book and Mickey Mouse.
 - ii) Mainly for students/teachers to have/facilitate training on the subjects
Educational institutions like MIT have web-based publication of virtually all course contents offered by them. Eg; MIT OpenCourse Ware(ocw.mit.edu), Georgetown University Law Centre(www.law.georgetown.edu/faculty) etc.
- b) To manage Learning Process
 - i) Learning Management Systems
A learning management system (LMS) is a software application for the administration, documentation, tracking, and reporting of training programs, classroom and online events, e-learning programs, and training content.
 - ii) Provide Collaborative Learning and Evaluation experience.

Educational Software Examples

For children

- ClueFinders titles
- GCompris - free software (GPL)
- JumpStart titles
- KidPix
- Reader Rabbit titles
- Tux Paint - free software (GPL)
- Zoombinis titles

List of LMS -EXAMPLES

- Alphastudy learning and knowledge portals, free web-based
- ATutor (GPL)
- Blackboard Inc.
- Chamilo
- Claroline
- eCollege
- eFront (CPAL)
- Dokeos (GPL)
- Fle3 (GPL)
- GCompris (GPL)
- ILIAS (GPL)
- JoomlaLMS
- LON-CAPA - free software (GPL)
- Moodle - free software (GPL)
- OLAT - free software
- Renaissance Place
- Sakai Project - free software
- SharePointLMS
- WebAssign

Objectives of Educational S/w

1. Strengthening subject matter competence
2. Providing drill and practice activities
3. Enhancing logical thinking and problem-solving skills
4. Enriching research and writing skills
5. Simulating complex or dangerous processes that enable students to change variables and visualize how processes are changed; and
6. Providing opportunities for students to extend learning beyond the scope of classroom activity.

Effectiveness/Success of an Educational Software depends on– its Value, Viability and Success

DICTIONARY & LIBRARY

ENCYCLOPEDIAS

An encyclopedia is a book or series of books that contain articles on a wide range of subjects or on various aspects of a particular field.



The word "encyclopedia" comes from the Greek *enkyklios paideia*, a "circle of learning." Originally meaning a general education, it has come to signify a reference work containing information on all branches of knowledge, either in general or in a specialized field.

An encyclopedia is often confused with a dictionary. A dictionary provides definition of words, while an encyclopedia explores topics in depth with illustrations,

maps, and photographs. Encyclopedias are now available online, with no print version. One of the most important advantages of online encyclopedias is that they can be edited frequently, so they are up to date. Traditionally, an encyclopedia was written by a single writer or as a collaborative effort, but new works are being put together by a team of writers who often have no face to face contact whatsoever with each other.

With the introduction of personal computers, CD-ROMs, and the World Wide Web, many encyclopedias are now being published in CD-ROM form, with the most notable example being Microsoft's *Encarta*.

LIBRARIES

A traditional library is a collection of books. Today's libraries are repositories and access points for print, audio, and visual materials in numerous formats including maps, prints, documents, microfilms, audio tapes, CDs, cassettes, videotapes, DVDs, video games, e-books, e-audio books and many other electronic resources. Libraries often provide public facilities to access to their electronic resources and the Internet.



e-brary is a platform that provides desktop access to online books. e-books are electronic versions of printed books and are an exact duplication of the printed book. Online books can be viewed online from any PC connected to the Internet, browsed for quick research and reference. Most universities have e-braries that provide books for reference and research, in its vicinity.

One such site is by UGC – www.inflibnet.ac.in

BOOKSITES



Book sites are the online book stores that allow you to buy books and sometimes even on a reduced rate. They offer a wide range of collection. Book sites provide an enjoyable shopping experience. They also ensure a safe shopping by protecting you while you shop so that you never have to worry about credit card safety.

Amazon is the clear leader in the online book market.

www.books.google.co.in www.gigapedia.com

You can get free e-books from www.free-ebooks.net, www.getfreebooks.com, www.gutenberg.org, ebookdirectory.com, www.4shared.com, etc.

JOURNALS



A journal contains scholarly articles. It disseminates current information on research and development in a particular subject field. E-Journals, or electronic journals, are the electronic equivalent of paper journals. E-Journals provide access to 'full text versions'(full content) of articles which you can read on-screen, print out or save to disc. In some cases you will be limited to viewing a description of the article – an abstract or summary.

Scholarly Journals are journals which are respected for the research and information they provide about the topic they cover. They are written for and by people who have rich experience in a particular discipline or field. The research is often refereed, meaning that it is reviewed by other researchers who are knowledgeable about the serious look than most popular magazines. They may contain graphs and charts but do not usually have many pictures. Scholarly journals cite their sources using footnotes or bibliographies.

Some of the online journals are dir.yahoo.com

CONTENT REPOSITORIES

Content Repositories are large storage facilities for storing content. Repositories give answers to any type of query. There can also be articles, comments, news about different matters. It is possible to define a single content repository table that is flexible enough to store everything in one place.

ONLINE EDUCATION

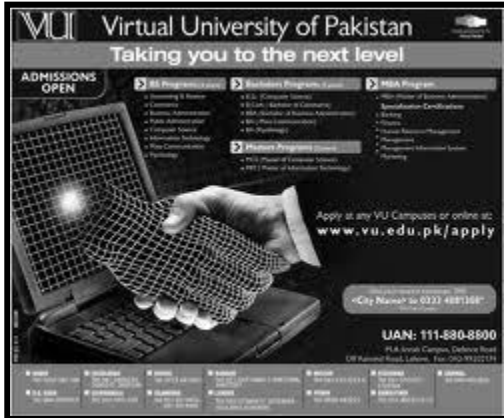


Online education is a classroom without walls. It is engaging in assisted, self-directed learning. Online education is also known as distance learning or e-learning. It differs from traditional education because students are not required to visit an actual classroom and listen to an instructor face-to-face.

Online education is truly about student convenience. Students can check in, work on assignments, and turn them in when their schedules permit, not when the college doors are open.

Students begin their course studies by logging onto the Internet. Once they are in their classroom, they will learn by reading assignments, asking questions, and receiving instructor feedback. Some courses even offer forums and/or chat rooms where students can gather, with or without the instructor, to discuss assignments. Finally, students are graded on homework assignments, final projects, and test scores.

ONLINE COURSES AND VIRTUAL UNIVERSITIES



A virtual university provides higher education programs through electronic media, especially the Internet. Some institutions provide online learning as part of their extended university courses while others provide courses only online.

Virtual universities function in many ways: some combine with universities, institutes or departments providing a number of courses over the Internet, television or other media; others have a legal framework, yet named virtual because they exist only on the Internet, without a physical location; and other virtual universities have specific or multiple physical

locations, to receive program delivery through technological media that is broadcast from another location, where real professors give televised lectures.

The goal of virtual universities is to provide access to students who live too far from a physical campus to attend regular classes and to those students who need the flexibility to study at home.

Students taking the so-called “virtual” courses do “real” work to get their degrees and educators preparing and teaching those courses spend plenty of “real” time in doing so. Students meet rigorous academic learning outcomes and evaluations through programs constructed by credible academics conforming to university criteria. These degrees are recognized around the world.

A good example of a Virtual University is Tamil Virtual Academy (www.tamilvu.org)

ACADEMIC SERVICE

INFLIBNET

Is an Autonomous Inter-University Centre (IUC) of University Grants Commission, Government of India. It is involved in creating infrastructure for sharing of library and information resources and services among Academic and Research Institutions. INFLIBNET (Information and Library Network) works collaboratively with Indian university libraries to shape the future of the academic libraries in the evolving information environment.

PRIMARY OBJECTIVES OF INFLIBNET

1. To promote and establish communication facilities to improve capability in information transfer and access to knowledge, that provide support to scholarship, learning, research and academic pursuit through cooperation and involvement of agencies concerned.
2. To establish INFLIBNET: Information and Library Network a computer communication network for linking libraries and information centres in universities, deemed to be universities, colleges, UGC information centres, institutions of national importance and R & D institutions, etc. avoiding duplication of efforts.
3. Promote and implement computerisation of operations and services in the libraries and information centres of the country.

4. Evolve standards and uniform guidelines in techniques, methods, procedures, computer hardware and software, services and promote their adoption in actual practice by all libraries, in order to facilitate pooling, sharing and exchange of information towards optimal use of resources and facilities.
5. Evolved a national network, interconnecting various libraries and information centres in the country, to improve capability in information handling and service.
6. Provide reliable access to document collection of libraries by creating on-line union catalogue of serials, theses/dissertations, books, monographs and non-book materials (manuscripts, audio-visuals, computer data, multimedia, etc.) in various libraries in India.
7. Provide access to bibliographic information sources with citations, abstracts etc. through indigenously created databases of the Sectoral Information Centres of NISSAT, UGC Information Centres, City Networks and such others and by establishing gateways for on-line accessing of national and international databases held by national and international information networks and centres respectively.
8. Develop new methods and techniques for archival of valuable information available as manuscripts and information documents in different Indian Languages, in the form of digital images using high density storage media.
9. Enable the users dispersed all over the country, irrespective of location and distance, to have access to information regarding serials, theses/dissertations, books, monographs and non-book materials by locating the sources wherefrom available and to obtain it through the facilities of INFLIBNET and union catalogue of documents.
10. Create databases of projects, institutions, specialists, etc. for providing on-line information service.
11. Create databases of projects, institutions, specialists, etc. for providing on-line information service.
12. Encourage co-operation among libraries, documentation centres and information centres in the country, so that the resources can be pooled for the benefit of helping the weaker resource centres by stronger ones.
13. Train and develop human resources in the field of computerised library operations and networking to establish, manage and sustain INFLIBNET.
14. Facilitate academic communication amongst scientists, engineers, social scientists, academics, faculties, researchers and students through electronic mail, file transfer, computer/audio/video conferencing, etc.
15. Collaborate with institutions, libraries, information centres and other organisations in India and abroad in the field relevant to the objectives of the Centre.

NICENET

NICENET is an organisation of internet professionals, founded in 1995 with the objective to make electronic communication tools and resources accessible for education community. NICENET provides one of the most popular “Learning Management System”.

Advantages and features of NICENET are;

1. Internet Classroom Assistant (ICA2), a sophisticated communication tool that brings powerful World-Wide-Web based conferencing, personal messaging, document sharing, scheduling and link/resource sharing to a variety of learning environments.
2. The ICA2 incorporates many new features and responds to requests received from users. Nicenet provides the ICA free of charge with no advertising.

3. Anyone can set up a class in minutes and allow others to join. After login, users are presented with a "heads-up" display of class resources.
4. **Conferencing:** Create your own private, threaded conferencing on topics you make for the class or opt to allow students to create their own topics.
5. **Scheduling:** Put the class schedule on-line. With a seven day advance view on your class homepage, students will have a heads-up display of upcoming assignments and class events.
6. **Document sharing:** Students and professors have the ability to publish their documents on the site using simple web-based
7. No knowledge of HTML is needed. Automatically integrated with scheduling, students are one click away from turning in their assignments on-line, giving their peers feedback on published papers and receiving professors comments.
8. **Personal Messaging:** Similar to traditional email but fully integrated with document sharing and conferencing, personal messaging is a great way communicate with and between individuals in your class, comment privately on conferencing postings or give private feedback on published papers.
9. **Link Sharing:** Share links to pertinent Internet resources sorted by topics that you create.

BRNET

Bio-Resource Network (BRNet) is a prototype portal site for biological information. An initiative of Japan Science and Technology (JST) Corporation, BRNET is basically meant to bring together biological information resources scattered over different networks for optimum utilization.

BRNET categorizes the information resources in such a manner that the end user can easily search the desired information. Furthermore, it also allows the users to create their own bio-resources database.

MODULE IV

SOCIAL INFORMATICS

IT & SOCIETY

Information Technology (IT) is a broad term which covers all aspects of the use of computer technology. It includes not only hardware and software, but also communication technology applied to linking computer systems, software engineering, and the administration and use of computer systems. Modern information technology (IT) has been affecting the way people live and work since at least the 1850s. Telegraph lines strung within and between cities created the first electronic “Internet.” Suddenly, news, memos, personal communications, command and control directives, and monetary transactions could connect people thousands of miles apart. In addition to vastly enhanced capabilities to transact business, coordinate troops and the like, the ability to transmit personal messages revolutionized people’s ability to conquer time and distance. By the end of WWI, the telephone had become ubiquitous in business and was rapidly becoming common place in homes. Shortly thereafter, the rapid development and dissemination of radio receivers created yet another IT revolution; and, after WWII, pictures were added to sound with the development of television. The Internet now joins this long list of significant technological innovations.

Research has shown that that almost a third of our waking day is spent with devices like telephone and internet, and for most working adults, more than half of their leisure time is spent with electronic media that did not even exist a century ago. Any set of technologies, tools or toys that reshapes so much of our time must have a profound impact on our daily lives. If who we are with, and what we do each day, defines a large part of who we are, IT obviously qualifies as a major agent of social change.

ISSUES AND CONCERNS

DIGITAL DIVIDE

The term digital divide refers to the gap between people with effective access to digital and information technology and those with very limited or no access at all. It includes the imbalances in physical access to technology as well as the imbalances in resources and skills needed to effectively participate as a digital citizen.

In other words, it is the unequal access by some members of society to information and communication technology, and the unequal acquisition of related skills. The term is closely related to the knowledge divide as the lack of technology causes lack of useful information and knowledge. The digital divide may be classified based on gender, income, and race groups, and by locations. The term global digital divide refers to differences in technological accessibility between countries or the whole world.

FREE SOFTWARE MOVEMENT

The free software movement (abbreviated FSM) is a social movement which aims to promote user’s rights to access and modify software. The alternative terms "software libre", "open source", and "FOSS" are associated with the free software movement. Although drawing on traditions and philosophies among members of the 1970s hacker culture, Richard Stallman is widely credited with launching the movement in 1983 by founding the GNU Project. Stallman founded the Free Software Foundation in 1985 to support the movement.

The philosophy of the movement is to give freedom to computer users by replacing proprietary software under restrictive licensing terms with free software, with the ultimate goal of liberating everyone "in cyberspace" that is, every computer user. Members of the free software movement believe that all users of software should have the freedoms listed in the free software definition. Many hold that it is immoral to prohibit or prevent people from exercising these freedoms and that these freedoms are required to create a decent society where software users can help each other, and to have control over their computers.

Some adherents to the free software movement do not believe that proprietary software is strictly immoral. They argue freedom is valuable (both socially and pragmatically) as a property of software in its own right, separate from technical quality in a narrow sense. The Free Software Foundation also believes all software needs free documentation (in particular because conscientious programmers should be able to update manuals to reflect modification that they made to the software), but deems the freedom to modify less important for other types of written works. Within the free software movement, the Floss manuals foundation specializes on the goal of providing such documentation.

Members of the free software movement advocate that works which serve a practical purpose should also be free. The initial work of the free software movement focused on software development. The free software movement also rejects proprietary software, refusing to install software that does not give them the freedoms of free software. According to Stallman, "The only thing in the software field that is worse than an unauthorized copy of a proprietary program, is an authorized copy of the proprietary program because this does the same harm to its whole community of users, and in addition, usually the developer, the perpetrator of this evil, profits from it."

Some free software advocates use the term Free and Open Source Software(FOSS) as an inclusive compromise, drawing on both philosophies to bring both free software advocates and open source software advocates together to work on projects with more cohesion. Some users believe that a compromise term encompassing both aspects is ideal, to promote both the user's freedom with the software and also to promote the perceived superiority of an open source development model.

CYBER CRIMES

Generally computer crimes can be categorized into three

1. The computer as a target - attacking the computers of others (spreading viruses is an example).
2. The computer as a weapon - using a computer to commit "traditional crime" that we see in the physical world (such as fraud or illegal gambling).
3. The computer as accessory - using a computer as a "fancy filing cabinet" to store illegal or stolen information.

Reports of alleged computer crime have been a hot news item of late. Especially alarming is the realization that many of the masterminds behind these criminal acts are mere kids. In fact, children no longer need to be highly skilled in order to execute cyber-crimes. "Hacker tools" are easily available on the Net and, once downloaded, can be used by even novice computer users. This greatly expands the population of possible wrongdoers. Children (and in some cases - their parents) often think that shutting down or defacing Web sites or releasing network viruses are amusing pranks. Kids might not even realize that what they are doing is illegal. Still other kids might find themselves hanging out online with skilled hackers who share hacking tools with them and encourage them to do inappropriate things online. Unfortunately, some of these kids don't realize that they are committing crimes until it is too late. Even more distressing and difficult to combat is the fact that some in the media portray the computer criminal as a modern day Robin Hood. Nothing could be further from the truth.

Cyber-crime generally refers to criminal activity where a computer or network is the source, tool, target, or place of a crime.

HACKING



Computer hacking is the practice of modifying computer hardware and software to accomplish a goal outside of the creator's original purpose. People who engage in computer hacking activities are often called hackers. Thus a **hacker** is a person who breaks into computers, usually by gaining access to administrative controls. Since the word "hack" has long been used to describe someone who is incompetent at his/her profession, some hackers claim this term is offensive and fails to give appropriate recognition to their skills.

TYPES OF HACKERS

White hat- A white hat hacker breaks security for non-malicious reasons, for instance testing their own security system

Grey hat - A grey hat hacker is a hacker of ambiguous ethics and/or borderline legality, often frankly admit

Black hat -A black hat hacker is someone who breaks computer security without authorization or uses technology (usually a computer, phone system or network) for vandalism, credit card fraud, identity theft, piracy, or other types of illegal activity.

PHISHING

Phishing is the criminally fraudulent process of attempting to acquire sensitive information such as usernames, passwords and credit card details by masquerading as a trustworthy entity in an electronic communication.

Phishing is typically carried out by e-mail or instant messaging. The scammers use social engineering techniques to fool users. Social engineering refers to a group of activities that essentially trick users into divulging sensitive information through ordinary communication means such as conversations and e-mail. The scammers send e-mail messages that look like they are from a legitimate business the recipient deals with, such as an online bank. They ask you to update your account information and provides a link that, when clicked, sends the recipient to a Web site. Once the e-mail recipient confirms his or her personal information, the scammers capture it and can begin using it.

PHARMING

Pharming is a hacker's attack intended to redirect a website's traffic to another, bogus site. Pharming can be conducted either by changing the hosts file on a victim's computer or by exploitation of a vulnerability in DNS server software. DNS servers are computers responsible for resolving Internet names into their real IP addresses. Compromised DNS servers are sometimes referred to as "poisoned". Pharming requires unprotected access to target a computer, such as altering a customer's home computer, rather than a corporate business server.

Pharming has become of major concern to businesses hosting ecommerce and online banking websites. Sophisticated measures known as anti-pharming are required to protect against this serious threat. Antivirus software and spyware removal software cannot protect against pharming.

How to tackle Phishing and Pharming

1. Do not disclose passwords, pin numbers, net banking user-id & pass words.
2. No bank will request for passwords thru e-mail
3. Never click the link
4. Enter the URL in the address bar
5. Check the status bar of the browser for actual address
6. Use anti-pharming, anti virus, anti-spyware& update regularly
7. Change online passwords periodically
8. Check bank statements regularly
9. Online shopping only with known & reputable merchants
10. Read privacy policies before you agree

SECURITY ISSUES

Security issues for computers have become very important because we rely so much on technology these days. One major security issue is how valuable data can be protected and preserved, in their both theoretical and practical aspects.

Computer Security is a definite branch of study which was introduced in the 1970's. Computer Security is a branch of Computer Science Risk Management. It is also regarded as a form of Security Engineering as because it adequately addresses security issues of Computer. Computer Security's purpose is to secure a particular computer system from any kind of cyber-crime. Computer Security, therefore, aims at securing data, keeping them intact and also providing uninterrupted services.

Importance of Computer Security Issues

We cannot deny the fact that we always feel threatened by the fact that any computer genius may use unknown techniques to know and may come to know important details about your financial status and might tamper with it. This is also true in the case of big organization. This is where computer security steps in. It aims to preserve the "integrity, availability and confidentiality" of vital information stored in computers.

Cyber criminals take the following methods to commit a crime.

VIRUS

A program or programming code that duplicates itself and infects the computer is termed a **Virus**. They can be transmitted as attachments to an e-mail note or in a downloaded file, or be present on a diskette or CD. The immediate source of the e-mail note, downloaded file, or disk you've received is usually unaware that it contains a virus.

Some viruses begin their destructive effect as soon as their code is executed; other viruses lie dormant until circumstances cause their code to be executed by the computer. Some viruses are harmless but they can be playful.

Viruses have strange and sometimes even fanciful names in order to catch the attention of the user. Armageddon, Burger, Happy Birthday, Ludwig are examples of certain viruses.

WORM

A virus that duplicates itself and sends itself as an e-mail attachment or as part of a network message is known as a **Worm**. Unlike a virus, it is self-contained and does not need to be part of another program to propagate itself. It is often designed to exploit computers' file transmission capabilities

TROJAN HORSE

It is a malicious program disguised as legitimate software. It cannot replicate itself, in contrast to some other types of "malware" like worms and viruses but they can be contained within a worm. Depending on their purpose, a Trojan can be destructive or a resource hog and is almost always considered a root compromise.

Example: Back Orifice, NetBus, SubSeven

LOGIC BOMB AND TIME BOMB

A logic bomb is a piece of code intentionally inserted into a software system that will set off a malicious function when specified conditions are met. For example, a programmer may hide a piece of code that starts deleting files (such as a salary database trigger), should they ever be terminated from the company.

Software that is inherently malicious, such as viruses and worms, often contain logic bombs that execute a certain payload at a pre-defined time or when some other condition is met. This technique can be used by a virus or worm to gain momentum and spread before being noticed. Many viruses attack their host systems on specific dates, such as Friday the 13th or April Fool's Day. Trojans that activate on certain dates are often called "time bombs".

SPAM

Email spam, also known as junk email or unsolicited bulk email (UBE), is a subset of electronic spam involving nearly identical messages sent to numerous recipients by email. Clicking on links in spam email may send users to phishing web sites or sites that are hosting malware. Spam email may also include malware as scripts or other executable file attachments. Definitions of spam usually include the aspects that email is unsolicited and sent in bulk.

COOKIES

A cookie, also known as an HTTP cookie, web cookie, or browser cookie, is usually a small piece of data sent from a website and stored in a user's web browser while a user is browsing a website. When the user browses the same website in the future, the data stored in the cookie can

be retrieved by the website to notify the website of the user's previous activity. Cookies were designed to be a reliable mechanism for websites to remember the state of the website or activity the user had taken in the past. This can include clicking particular buttons, logging in, or a record of which pages were visited by the user even months or years ago. Other kinds of cookies are the authentication cookies, which is used by web servers to know whether the user is logged in or not, and which account they are logged in under. Without such a mechanism, the site would not know whether to send a page containing sensitive information, or require the user to authenticate himself by logging-in.

Although cookies cannot carry viruses, and cannot install malware on the host computer, tracking cookies and especially third-party tracking cookies are commonly used as ways to compile long-term records of individuals' browsing histories — a major privacy concern that has prompted many governments to take action.

ADWARE

Adware, or advertising-supported software, is any software package which automatically renders advertisements. These advertisements can be in the form of a pop-up. They may also be in the user interface of the software or on a screen presented to the user during the installation process. The object of the Adware is to generate revenue for its author.

Adware, by itself, is harmless; however, some adware may come with integrated spyware such as key loggers and other privacy-invasive software. Adware has been criticized because it usually includes code that tracks a user's personal information and passes it on to third parties, without the user's authorization or knowledge.

SPYWARE

Spyware is a type of malware (malicious software) installed on computers that collects information about users without their knowledge. The presence of spyware is typically hidden from the user and can be difficult to detect. Some spyware, such as keyloggers, may be installed by the owner of a shared, corporate, or public computer intentionally in order to monitor users.

While the term spyware suggests software that monitors a user's computing, the functions of spyware can extend beyond simple monitoring. Spyware can collect almost any type of data, including personal information like Internet surfing habits, user logins, and bank or credit account information. Spyware can also interfere with user control of a computer by installing additional software or redirecting Web browsers. Some spyware can change computer settings, which can result in slow Internet connection speeds, un-authorized changes in browser settings, or changes to software settings

MALWARE

Malware, short for malicious software, is software used or created by hackers to disrupt computer operation, gather sensitive information, or gain access to private computer systems. While it is often software, it can also appear in the form of scripts or code.[1] 'Malware' is a general term used to refer to a variety of forms of hostile, intrusive, or annoying software.[2]

Malware includes computer viruses, worms, trojan horses, spyware, adware, most rootkits, and other malicious programs

How to tackle computer viruses

1. Do not disclose passwords, pin numbers, net banking user-id & pass words.
2. No bank will request for passwords thru e-mail
3. Never click the link
4. Enter the URL in the address bar
5. Check the status bar of the browser for actual address
6. Use anti-pharming, anti virus, anti-spyware & update regularly
7. Change online passwords periodically
8. Check bank statements regularly
9. Online shopping only with known & reputable merchants
10. Read privacy policies before you agree.

ANTIVIRUS TOOLS

Viruses and Worms can be removed using Antivirus Software. As soon as an infection is detected, it must be eliminated. Otherwise it will cause great harm to your data. Your data might get corrupted or even eliminated.

Antivirus tools can be purchase from the market. They are also provided free of cost by certain companies. Most of them provide the user with an antivirus scanner for 30 days. Afterwards, the customer has to pay. Other companies provide antivirus tools to eliminate a certain number of viruses. In order to remove malicious viruses, the customer will have to pay.

CYBER ETHICS

An old adage tells us "Character is what you do when no one is watching." So it is with the Internet. Online, people can feel invisible and capable of doing things they normally wouldn't do in person or in public - things that they know might be wrong. As the Internet becomes an indispensable tool for everyday life, it is more important than ever to dust off the concept of "citizenship" and apply it to the online world. Relatively new terms, "cyber citizenship", "cyber ethics", and "netiquette" refer to responsible cyber social behavior. These terms refer to what people do online when no one else is looking. As kids go online in increasing numbers, cyber ethics is a critical lesson, especially since poor e-habits can start at an early age. Unfortunately, we are learning all too well that children armed with computers can be dangerous and cause serious damage and harm, regardless of whether they are being mischievous or trying to intentionally commit cyber-crimes.

What is cyber ethics? And how do you teach it to your children? Simply put, cyber ethics is a code of behavior for using the Internet. One easy way to think about cyber ethics and to address the subject with children is this: acceptable behavior on the Internet is very much the same as acceptable behavior in everyday life. For instance, at an early age, children learn what it means to be honest, and to respect the rights and property of others. They are taught to not take what does not belong to them, and to be considerate of others. On the Internet, the same basic rules apply. The 'Dos and don'ts' or the difference between using and abusing the Internet have to be taught to them.

Here are some helpful dos and don'ts pertaining to situations that children are likely to encounter.

1. Do use the Internet to help you do your schoolwork. The Internet is the world's largest library. You can find information on almost any subject from science, math and technology to language, art, history, current events and more. When you use information, photos and other materials that you find on the Internet in your homework or research projects, make sure that you identify the sources of the information in footnotes.

2. Don't copy information from the Internet and call it your own. It is sometimes tempting to copy information from the Internet into your schoolwork, and to present it as your own work. That is dishonest, just like taking someone else's jacket and calling it your own. And it might be illegal, too. Much of the information, pictures and other materials on the Internet is copyrighted, which means it belongs to someone else. If you take it without permission, or without identifying the source in a footnote, you are breaking the law. Music, video, games and copyrights.
3. Do use the Internet to learn about music, video and games. There are many websites where you can learn about music by listening to sample tracks, preview movie videos, and learn about new computer games.
4. Don't use the Internet to download or share copyrighted material. When something is copyrighted, it means that someone else owns it, and you cannot copy or distribute it without their permission. It is dishonest and illegal to download copyrighted music, video, games or other materials. It is also dishonest and illegal to share copyrighted music, video, games or other materials over the Internet. When you see this symbol—©—it means that the material is copyrighted.
5. Do use the Internet to communicate with friends and family. Email and instant messaging (IM) are good, fun ways to communicate with your friends and your family. Always make sure that you know the people with whom you exchange email and IM.
6. Don't use the Internet to communicate with strangers. Do not use email or IM to talk to strangers. They may not be who they say they are, and if they are not, they are not nice people. Don't give out your email or IM address to people you don't know, either online or in person. Don't open email or email attachments from people you don't know. Unsolicited email may contain viruses that will damage your computer and the information on it.
7. Don't pretend to be someone else. Just as you don't want others to hide their true identity when they email or IM you, don't pretend to be someone else when you're online.
8. Don't be rude or use bad language. When you use email or IM, be considerate of others. Don't be rude, mean or use bad language. You wouldn't do that in real life, and you shouldn't do it on the Internet either.
9. Don't give anyone personal information or passwords. Don't tell people, especially strangers, more about yourself than you would if you met them in person. Don't tell them what you look like, your age, where you live, your phone number, what school you go to, or any passwords that protect your computer or your private information.
10. Don't leave your children unsupervised. Make sure you know what sites your children visit when they're on the internet, and with whom they're communicating. Look over their shoulder. Keep track of the websites they visit. There are websites and programs available that direct children to sites that are fun, interesting and appropriate. And there are others that restrict their browsing to appropriate websites. The best control, however, is parental involvement. Make sure they understand acceptable behavior on the Internet. And make sure they follow the rules.
11. Do encourage your children to use the Internet. The Internet has a lot good things to offer children. When used wisely, it is a great tool for information gathering and learning.

CYBER LAWS

India is a signatory to the Model Law and is under an obligation to revise its laws as per the Model Law. Keeping in view the urgent need to bring urgent amendments to the existing laws to facilitate electronic commerce and with a view to facilitate electronic governance, the Information Technology Bill (IT Bill) was passed by Indian Parliament on May 17, 2000. The Information Technology Act (IT Act) came into effect on 17th October, 2000.

The main objective of the Act is to provide legal recognition for transactions carried out by means of electronic data interchange and other means of electronic communication and storage of information to facilitate electronic filing of documents with the government agencies. The Act has extra-territorial jurisdiction to cover any offence or contraventions committed outside the country by any person. It also involves legal provisions relating to piracy, defamation, advertising, taxation, digital signatures, copy rights and trade secrets in the cyber world. This bill intends to facilitate E-commerce by removing legal uncertainties created by the information technology. Some important provisions of Information Technology Act 2000 are reproduced below.

The IT Act shall extend to the whole of India and applies also to any offence or contraventions committed outside the country by any person. As regard the applicability of the Act to offences and contraventions, the nationality of the accused is irrelevant if the act or conduct constituting the offence or contravention involve a computer, computer system or computer network located in India. Some of the major provision contained in the act are as follows.

1. Electronic contracts will be legally valid.
2. Legal recognition of digital signatures.
3. Security procedure of electronic records and digital signatures.
4. Appointment of certifying authorities and controller of certifying authorities, including recognition of foreign certifying authorities.
5. Various kinds of computer crimes defined and stringent penalties provided under the act.
6. Establishment of Cyber Appellate Tribunal under the Act.
7. Act to apply for offences or contraventions committed outside India.
8. Power of police officers and other officers to enter into any public place and search and arrest without warrant.
9. Constitution of Cyber Regulations and Advisory Committee who will advise the Central Government and Controller.

INFORMATION TECHNOLOGY (AMENDMENT) ACT, 2008

Rapid increase in the use of computer and Internet has given rise to new forms of crimes like, sending offensive emails and multimedia messages, child pornography, cyber terrorism, publishing sexually explicit materials in electronic form, video voyeurism, breach of confidentiality and leakage of data by intermediary, e-commerce frauds like cheating by personating-commonly known as phishing, identity theft, frauds on online auction sites, etc. So, penal provisions were required to be included in the Information Technology Act, 2000. Also, the act needed to be technology-neutral to provide for alternative technology of electronic signature for bringing harmonization with Model Law on Electronic. Signatures adopted by United Nations Commission on International Trade Law (UNCITRAL).

Keeping in view the above, Government had introduced the Information Technology (Amendment) Bill, 2006 in Lok Sabha on 15 of December 2006. Both the houses of Parliament passed the Bill on 23rd December 2008. Subsequently the Information Technology (Amendment) Act, 2008 received the assent of President on 5th February 2009 and was notified in the Gazette of India.

Under the IT Act, sections 65 to 78 did provide for offences and penalties, but were limited in their scope dealing with tampering with computer source code documents, hacking systems and publishing and disseminating obscene information in electronic form or for fraudulent purposes. The amendment provides for eight different types of offences, which range from using computer resource code or communication device to disseminating and composing information which is false, offensive or menacing in nature, fraudulent, dishonest use of electronic signatures, password or other identification features to any computer source or communication device in capturing, publishing or transmitting any form of obscene images and visuals, as being crimes affecting individuals, or other persons. Cyber cafes have been brought in the net, increasing accountability of intermediaries, thereby including search engines, service providers, online markets, without clarity on how to trap the fox. These provisions structured in a diffused manner with unrelated aspects such as cyber terrorism clauses juxtaposed in between. Somewhere along the line the concept of hacking of the 2000 act has been dropped, dumping the accepted trade definition, replacing it by section 66, the detailed language of which could prove inherently restrictive in interpretation.

Prevention is always better than cure. It is always better to take precaution while operating the net. The 5P mantra for online security are : Precaution, Prevention, Protection, Preservation and Perseverance. A netizen should keep in mind the following things.

1. To prevent cyber stalking avoid disclosing any information pertaining to oneself. This is as good as disclosing your identity to strangers in public place.
2. Always avoid sending any photograph online particularly to strangers and chat friends as there have been incidents of misuse of the photographs.
3. Always use latest and update antivirus software to guard against virus attacks.
4. Always keep back up volumes so that one may not suffer data loss in case of virus contamination.
5. Never send your credit card number to any site that is not secured, to guard against fraud.
6. Always keep a watch on the sites your children are accessing to prevent any kind of harassment or deprecation in children.
7. It is better to use a security program that gives control over the cookies that send information back to the site as leaving the cookies unguarded might prove fatal.
8. Web site owners should watch traffic and check any irregularity on the site. Putting host based intrusion detection on servers may do the trick.
9. Use of firewalls may be beneficial.
10. Web servers running public sites must be physically separated and protected from internal corporate network.

CYBER ADDICTIONS

The Internet helps us to connect with literally hundreds of people on social networking sites like My Space, Face book, or Twitter. Email, online chat and message boards allow for both public and anonymous communication about almost any topic imaginable, down to the smallest detail. We all enjoy the benefits of the internet, and for many it is an indispensable tool for work as well.

The concept of compulsive internet use is relatively new and is not yet formally recognized as a psychological disorder, although research is underway in this area. However, there is increasing evidence that for some people, compulsive internet use interferes with daily life, work and relationships.

So what is healthy and unhealthy internet use? There is no easy answer because each person's internet use is so different. Spending a lot of time online is not necessarily a problem. But if we are neglecting our relationships, our work or other important things in our life, then we may have a problem with internet addiction.

Signs and symptoms of cyber addiction

Signs and symptoms of compulsive Internet use may vary from person to person. But there are some general warning signs that your Internet use has become a problem.

1. Losing track of time online.

If a person frequently finds himself on the Internet longer than he wishes or his Internet use of a few minutes turns into a few hours or he finds himself running late to appointments, college or work because of too much time spent online are some of the clear indications of cyber addiction.

2. Having trouble completing tasks at work or home

If a person faces the problem of working late more and more because he can't complete his work on time—then staying even longer when everyone else has gone home is also a sign of internet addiction.

3. Isolation from family and friends

Social life may suffer because of all the time one may spend online. They even neglect their family and feel like there are no one in his real life.

4. Feeling guilty or defensive about your Internet use

Feeling guilty or defensive about internet use is another sign of internet addiction. Are you sick of your spouse irritating you to get off the computer and spend some time together? Do you hide your internet use or lie about how much time you spend online?

Risk factors for Internet addiction

There are some risk factors that have been identified with Internet addiction

1. Anxiety

One may use the internet to divert himself from his worries and fears. An anxiety disorder like obsessive-compulsive disorder may also contribute to excessive email checking and compulsive internet use.

2. Depression

The internet can be an escape from feelings of depression, but too much time online can make things worse. Internet addiction further contributes to isolation and depression.

3. Other addictions

Many internet addicts suffer from other addictions like drugs, alcohol, gambling and sex.

4. Lack of social support

Internet addicts often use chat rooms, online messaging, or gaming as a safe way of establishing new relationships and more confidently relate to others.

5. Teenagers

Teenagers may feel that internet is a wonder world and it might feel more comfortable than real life friends.

Managing Internet Addiction

The following are some tools to get your Internet use under control. While you can put many of these in place yourself, make sure you get some outside support as well.

1. Identify any underlying reasons that need treatment.

Do you have any problems of depression, anxiety, problems with alcohol, drugs etc? this will lead to cyber addiction and has to be treated.

2. Increase your coping skills

Sometimes spending a lot of time on the Internet is a method of managing stress or angry feelings. A person may have trouble relating to others, or feeling excessively shy or feeling that he can never understand people in real life. Building communication skills and interpersonal skills will help such a person to remove stress and strains from his daily life.

3. Strengthen the relationships

Use of Internet for social interaction can be reduced by building strong relationship in real life. Keep aside little time each week for spouse or other family. If you are shy, try finding common interest groups such as an exercise class or book reading club. This allows you to interact with others in a non-threatening way and allows relationships to naturally develop.

Helping a child or teen with an Internet addiction

If a child or teen is showing signs of Internet addiction, there are many things that you as a parent can do to help.

1. Encourage other interests and social activities
2. Monitor computer use and set clear limits
3. Talk to your child about underlying issues

INFORMATION OVERLOAD

Information overload refers to the addiction towards unlimited information available on the internet. The addict in this case finds a craving for searching and reading information of his interest on the internet. It often results in stress and anxiety related disorders. The term information overload was first coined by the great futurist and writer Alvin Toffler in his book future shock. According to Alvin Toffler, future shock is too much change in too short a period of time. The concept of future shock revolves around the changes that are taking place with regard to individuals and society. In this book, Toffler projects the concept of information overload as a psychological disorder caused due to abundance of information availability.

The amount of information on the internet has been growing in leaps and bounds. Such a great magnitude of information development and that too at such a rapid pace has led to an information explosion of sorts. More and more number of internet users are becoming victims of information overload as there are flooded with information sourced from a large numbers of web sites, e-mails, blogs, reviews, messages, social networking sites etc. the consumption of such a huge volume of information is increasingly becoming difficult for the users and thus causing anxiety, irritation and stress. One of the best precautionary measures for protecting oneself from information overload is to consume the information in a systematic and precise manner instead of bulk consumption.

HEALTH ISSUES

We sit in front of the computer looking into the screen without taking a break and blinking eyelid. This hurts many parts of our body. Before the problems go out of hand and we may have to say goodbye to using this machine, let us deal with it.

Problem Area: Lower back Pain

- **Causes:** Wrong type of chair or desk, Right chair an desk but wrong posture, Sitting on the edge of the chair, sitting with all the weight on one buttock by sitting cross legged.
Corrective Measures: Always go for a chair that has a mechanism for lowering and raising the height of the backrest. Never buy a computer chair that has arms rest.

Problem Area: Neck Pain

- **Causes:** While typing when one is moving the neck up and down, left and right too much it causes neck pain. Use of wrong type of glasses (like bifocals), Height of screen. It may sound strange to some of you but some people sit on the computer with mouthpiece of phone hanging around their neck. This casual attitude is not cool at all!
Corrective Measures: A document holder is a must to restrict neck movement. Take opticians advice and go for special glasses that you can use while in front of the computer. Screen's height should be adjusted parallel to eyesight – not too high and not too low.

Problem Area: Pain In Wrists & Fingers

- **Causes:** Height of the chair not adjusted properly. If you have bought the right chair you might a well make use of it! Striking the keys too hard. Mouse is not close to the body.
Corrective Measures: Height of the chair should make a perfect L between the shoulder, elbow and wrist. This ensures fingers and keys or mouse are at a perfect horizontal. Clicking finger is also horizontal for that perfect wrist support. Mouse should be placed right in front of the shoulder, close to our body.

Problem Area: Strain In the Eyes

- **Causes:** Glare from monitor, sun glare directly coming in straight on to the monitor from windows, lighting arrangement of the room are some causes that put strain on the eyes.
Corrective Measures: The correct thing to do is to place the computer table between lights and not directly under them. The best alternative is to switch off the overhead light and switch on the angle poise lamp. Ask your optician to put slight tint coat on your glasses. Adjust monitor's contrast and brightness. Make sure the distance is right. Opt for a 17inch SVGA or XGA screen.

Some Important Tips & Reminders

- Wrong chair or a chair not adjusted properly can result into knee, buttocks and shoulder pain also. Get to know about posture breaks and wrist exercise. Room temperature also plays an important part. Pain in the muscles may result into spasm if temperature of the room you are working in is very low. To avoid dehydration work in a room with fewer computers and people and avoid endless rounds of tea and coffee. Take to water. It won't turn you into fish! Keep everything you need like stationery, CDs etc at a distance that you can reach without overstretching yourself each time. Drawers also should be easily reachable and smooth to open.

GUIDELINES FOR PROPER USAGE OF COMPUTERS AND INTERNET

E-WASTE AND GREEN COMPUTING

There is no generally accepted definition of e-waste. But we can say that unwanted, obsolete or unusable electronic products such as computers, computer peripherals, televisions, VCRs, DVD Players, stereo equipment, hand cell phones are commonly referred to as 'electronic waste'.

Management and disposal of e-waste has become a serious problem among states nationwide. The problem of electronic waste (e-waste) is growing at an unsustainable rate. E-waste is now the fastest growing, and most toxic, component of municipal garbage. Local governments are facing huge costs to handle e-waste, and even greater costs if they do not capture this toxic stream and handle it in an appropriate manner.

E-Waste contains hazardous materials like lead which pose a potential long term human health and environmental impacts. Ground Water especially is more likely to be polluted (note, more than half the country reliant on ground water resources). Lead in the e-waste is a toxic substance which may and cause lead poisoning and can be especially harmful for young children.

The piling up of E-waste is not only due to the electronic goods used in India but the developed nations of the world export illegally their e-waste to India and other Asian countries.

These wastes are disposed of by uncontrolled burning and burying which are causing environmental problems. The toxicity of some of the substance, eg mercury, cadmium also pose grievous health problems.

Management and disposal options

- Due to increased public, regulatory and commercial scrutiny and also a commensurate entrepreneur interest, there has been a diversion from energy intensive down cycling processes to more mature processing systems.
- This has been largely achieved through reuse and refurbishing
- The government should strictly monitor and punish illegal importing of E-Waste to the country.

Reuse

- Preventing waste in the first place is the preferred management option.
- This can be achieved through repairing, upgrading used electrical equipment.
- Example- adding memory to a computer, upgrading software.

Recycle

- Make use of take back programs
- Through recycling units are either reused or dismantled for recycling.
- The silver, gold, lead and other heavy metal are recyclable

Dispose

- The least preferred option is to landfill electronic waste.
- This should only come as a last option but care should be taken to consult with state regulations on disposal of any hazardous waste.

Benefits of reuse (social and environmental)

- Diminished demand for new products and their commensurate requirement for virgin raw material
- There is lessened need for water and energy for the associated manufacturing
- Less packaging per unit
- Availability of technology to wider swaths of society due to greater affordability of products
- Saved landfill space

Each one of us has a role to play!

- Need for a e-waste policy and legislation
- Encourage and facilitate organized recycling systems
- Should subsidize recycling and disposal industries
- Collect fee from manufacturer/consumers for the disposal of toxic material
- Incentive schemes for garbage collectors and general public for collecting and handling over e-waste
- Awareness programme on e-waste for school children and general public
- Transparency and accountability to the public Handling large amounts of e-waste poses risks of toxic contamination to workers and surrounding communities if conducted carelessly.
- Thus, the most basic criterion that employees and citizens should rightfully expect from any recycling operation is that it be open to public inspection.
- General compliance with occupational health and safety standards Observance of health and safety standards in the workplace is important for protecting workers from exposure to toxics whilst handling e-waste
- Well-trained workers, who are fully protected by the law to seek advice and take action to protect their health and the environment without fear of reprisal from their employer, are the most effective environmental protection.
- it is important that we create a national framework for the environmentally sound management of e-waste including wide public awareness and education
- Conduct detailed inventories of e-waste
- Initiate pilot schemes on collection and sorting of e-wastes, including take back schemes and schemes for repair refurbishment and recycling

GREEN COMPUTING

Green computing is the study and practice of using computing resources efficiently. Some of the key approaches that are followed as part of green computing are:

Efficient algorithm: A large algorithm would obviously require large memory space and more time for execution; thus in a way leading to energy and resource wastage. Thus it is always advisable to keep the algorithm efficient from the point of view of time and space tradeoff.

Virtualization of computer system: It involves creating multiple virtual computer systems serving each of its own individualistic functions on a single physical hardware system. The entire virtualization concept is based on the approach of 'optimum utilization of available resources'.

Power management: It involves managing the power in such a way as to minimize its wastage. This approach makes use of software controlled power management applications to eliminate power wastage. Some of its examples includes, screen savers, automatic standby etc.

Power generation:

All computers require electrical power to operate. One of the goals of green computing is to use power generated from sources that are more environmentally friendly than coal-fired power stations

Recycling e-waste: This approach focuses on recycling of e-waste (old, broken or useless electrical or electronic devices).

UNICODE

Fundamentally computers just deal with numbers. They store letters and other characters by assigning a number for each one. Before Unicode was invented, there were hundreds of different encoding systems for assigning these numbers. No single encoding could contain enough characters: for example, the European Union alone requires several different encodings to cover all its languages. Even for a single language like English no single encoding was adequate for all the letters, punctuations and technical symbols in common use.

The name 'Unicode' is intended to suggest a unique, unified, universal encoding.

These encoding systems also conflict with one another. That is two encodings can use the same number for two different characters or use different numbers for the same character. Any given computer needs to support many different encodings; yet whenever data is passed between different encodings or platforms, that data always runs the risk of corruption.

UNICODE standard is the universal character encoding standard, used for representation of text for computer processing. UNICODE standard provides the capacity to encode all of the characters used for the written languages of the world. The UNICODE standards provide information about the character and their use. UNICODE standards are very useful for computer users who deal with multilingual text, business people, linguists, researchers, scientists, mathematicians, and technicians. UNICODE uses a 16 bit encoding that provides code point for more than 65000 characters (65536). UNICODE standards assigns each character a unique numeric value and name.

UNICODE provides a unique number for every character irrespective of the platform or the program or the language. The UNICODE standard has been adopted by such industry leaders as Apple, HP, IBM, JustSystems, Microsoft, Oracle, SAP, Sun, Sybase, Unisys and many others. Unicode's success at unifying character sets has led to its widespread and predominant use in the internationalization and localization of computer software. The standard has been implemented in many recent technologies, including XML, the Java programming language, the Microsoft .NET Framework, and modern operating systems. It is supported in many operating systems and in all modern browsers. The emergence of the Unicode Standard, and the availability of tools supporting it is among the most significant recent global software technology trends.

Incorporating Unicode into client-server or multi-tiered applications and web sites offers significant cost savings over the use of legacy character sets. Unicode enables a single software product or a single website to be targeted across multiple platforms, languages and countries without re-engineering. It allows data to be transported through many different systems without corruption.

The Unicode consortium is a nonprofit organization founded to develop, extend and promote use of the Unicode Standard, which specifies the representation of texts in modern software products and standards. The membership of the consortium represents a broad spectrum of corporations and organizations in the computer processing industry. The consortium is supported financially solely through membership dues.

IT AND REGIONAL LANGUAGES

In a large, geographically dispersed, demographic multilingual country like India, the common thread in implementing and achieving these basic objectives of governance has been the development and adoption of language computing tools and methodologies. The government officials in various provinces, the non-government functionaries across the country and the people, mostly use their own language in day to day work, be it in government administration at various levels, in business, in profession, in services or in school education. Thus, if the fruits of information technology revolution have to spread to all these participating members, in government and public, it is best done through the use of computers in their own languages.

The Center for Development of Advanced Computing (C-DAC) has made pioneering contributions in developing Indian language tools with natural language processing, and in evolving script and font standards through its GIST technology, to enable and spread use of computers in various languages. It accordingly took up the initiative of developing important e-governance solutions in Indian languages, which impact government and the citizens both. This initiative started in 1997 and has grown to a significant extent by the end of 2001.

Language localization

Language localization (from the English term *locale*, "a place where something happens or is set") is the second phase of a larger process of product translation and cultural adaptation (for specific countries, regions, or groups) to account for differences in distinct markets, a process known as internationalization and localization. Language localization is not merely a translation activity, because it involves a comprehensive study of the target culture in order to correctly adapt the product to local needs. Localization is sometimes referred to by the numeronym "L10N" (as in: "L", followed by ten more letters, and then "N").

The localization process is most generally related to the cultural adaptation and translation of software, video games, and websites, and less frequently to any written translation (which may also involve cultural adaptation processes). Localization can be done for regions or countries where people speak different languages, or where the same language is spoken: for instance, different dialects of Spanish, with different idioms, are spoken in Spain than are spoken in Latin America; likewise, word choices and idioms vary among countries where English is the official language (e.g., in the United States, the United Kingdom, and the Philippines).

Keyboards that are sourced from the Gulf incorporate Arabic letters above each key. Regional languages in India are also being introduced into keyboards as part of localization.

Using computers in the local language

Many organizations have been working to make the computers available in the different Indian languages. However, because of multiplicity of the languages (there are 18 languages recognized by the Constitution of India) the issue is quite complicated. There are only two essential components required to represent a language on computers - The language must have a Script, and it should be possible to represent the script on the computers. The computers understand English because they were developed by people who used English.

In the Bharatbhasha system, one can use computers in Indian languages without paying the extra cost for the hardware and software. Computer applications in Indian languages can be prepared by the people who know computer programming, therefore, this part of the work has to be taken up by those who know computers and also know Indian languages.

Nowadays there are virtual or “on-screen” keyboard that lets you type directly in your local language script in an easy and consistent manner, no matter where you are or what computer you’re using. Malayalam is also included.

Software tools for typing languages

Language in which a computer programmer writes instructions for a computer to execute is known as software.

NiLa, Varamozhi, Lipikaar are examples for Malayalam typing software. Lipikaar is a simple method for typing in Malayalam on an ordinary keyboard. It requires no learning, and within a few seconds you will be able to type in Malayalam any word that you can imagine. It works on all Windows Applications, MS Office, All Websites, Chat and E-mail.

Typing software is different from Transliteration software that is found in Gmail. Transliteration is a method in which you spell the pronunciation of the Malayalam word in English. The algorithm then converts the word into Malayalam script.

There are several problems with this approach:

1. **Ambiguous**
Transliteration is suitable for common words that can be spelled easily. However for words that are not part of our everyday conversation, figuring out the correct English spelling may not be as simple. Typing words accurately may require a trial and error approach and thus making it unsuitable for professional use.
2. **Fluency in English**
Transliteration requires users to have fluency in English so that they can spell the Malayalam word phonetically.
3. **Silent Characters**
There are many silent characters in languages like Malayalam, Tamil and other Indic scripts which may have different spellings but they are phonetically quite different. For an intelligent transliteration algorithm, it becomes difficult to interpret these words.
4. **Writing Names, Addresses and other non-dictionary words**
Since transliteration is based on a dictionary approach typing names, addresses and other non-dictionary or hybrid words becomes difficult.

Transliteration is more suitable for users who think in English and is meant for typing common words and few sentences.

TDIL (Technology Development for Indian Languages)

The Department of Information Technology initiated the TDIL (Technology Development for Indian Languages) with the objective of developing Information Processing Tools and Techniques to facilitate human-machine interaction without language barrier; creating and accessing multilingual knowledge resources; and integrating them to develop innovative user products and services. There are many issues that have to be tackled because of the diverse and complex language system in India.

Key issues include keyboard layout, IT localization, Vedic code set, Unicode for Indian scripts...

Indian Language Keyboard is categorized into three parts namely, Inscript, Phonetic and Typewriter keyboards. The Indian language alphabet table is divided into Vowels (Swar) and Consonants (Vyanjan). The INSCRIPT (Indian Script) keyboard was standardized by Department of Information Technology (DIT) and was declared as National Standard by Bureau of Indian Standard (BIS). Very recently a single solution was found out for the incorporation of a new

Rupee symbol



MODULE V

PROGRAMS FOR OFFICE MANAGEMENT

INTRODUCTION TO LINUX

Linux is an operating system that evolved from a kernel created by Linus Torvalds when he was a student at the University of Helsinki. Linux is an operating system that is meant to be used as an alternative to other operating systems like MS-DOS, the various versions of MS Windows, Mac OS, Solaris and others.

History of Linux and Unix

In the 1950s -60s computers were very big machines which created many practical difficulties for the users. In addition every computer had different operating systems. Software was customized to serve a specific purpose, and software for one system did not run on another system. Hence Computers were expensive and complicated to operate. Thus it was difficult both for users and system administrators.

Technologically the world was not quite advanced at that time. In 1969, a team of developers in the Bell Labs laboratories started working on a solution for the software problem, to address these compatibility issues. They developed a new operating system, which was

1. Simple and stylish.
2. Written in the C programming language instead of assembly code
3. Able to recycle code.

The Bell Lab developers named their project “UNIX”.

The code recycling features were very important. Until then, all the commercially available computer systems were written in a code specifically developed for one system. UNIX on the other hand needed only a small piece of that special code, which is now commonly named the kernel. This kernel is only one piece of code that needs to be adapted for every specific system and forms the base of the UNIX system. The operating system and all other functions were built around this kernel and written in a higher programming language, C. this language was especially developed for creating the UNIX system. Using this new technique, it was much easier to develop an operating system that could run on different types of hardware.

UNIX did a great effort to become compatible with different systems. The development of UNIX continued throughout the next couple of decades. More hardware and software vendors added support for UNIX to their products. UNIX was initially used only in very large environments with mainframes such as a university, the government or for large financial corporations.

Gradually smaller computers were being developed, and by the end of the 80s, many people had personal computers. By that time, there were several versions of UNIX available for the PC architecture, but none of them were truly free and also they were all very slow. This made people use MS DOS or Windows 3.1 on their home PCs.

How Linux was born.

By the beginning of the 90s home PCs were finally powerful enough to run UNIX. When Linus Torvalds was studying at the University of Helsinki, he was using a version of the UNIX operating system called 'Minix'. Linus thought it would be a good idea to have some sort of freely available academic version of UNIX, and promptly started to code. Linus and other users sent requests to the programmers and users all around the world for modifications and improvements to Minix. He started to ask questions, looking for answers and solutions that would help him get UNIX on his PC. Linus decided to create his own operating system that would take into account users' comments and suggestions for improvement. At the beginning, it was Linus' goal to have a free system that was completely compliant with the original UNIX.

In 1991, ideal conditions existed that would create Linux. In essence, Linus Torvalds had a kernel but no programs of his own, Richard Stallman and GNU had programs but no working kernel. So combining the necessary programs provided by GNU in Cambridge, Massachusetts and a kernel, developed by Linus Torvalds in Helsinki, Finland, Linux was born. Due to the physical distances involved, the means used to get Linus' kernel together with the GNU programs was the internet, then in infancy. We can say then that Linux is an operating system that came to life on the internet. The Internet would also be crucial in Linux's subsequent development as the means of coordinating the work of all the developers that have made Linux into what it is today.

Importance of Linux

Today, Linux is enjoying a favourable climate. This comes from the fact that Linux has proven to be a tremendously stable and versatile operating system, particularly as a network server. When Linux is deployed as a web server or in corporate networks, its down-time is almost negligible. There have been cases when Linux server have been running for more than a year without re-booting and then only taken down for a brief period for routine maintenance. Its cost effectiveness has sold it more than anything else. Linux can be installed on a home PC as well as a network server for a fraction of the cost of other companies' software packages.

On the server side, Linux is well-known as a stable and reliable platform, providing database and trading services for companies like Amazon, the well-known online bookshop, US Post Office, the German army and many others. Cluster of Linux machines are used in the creation of movies such as "Titanic", "Shrek" and others.

Modern Linux also runs on gadgets like PDA's, mobiles, a lot of embedded applications and also on experimental wristwatches. This makes Linux the only operating system in the world covering such a wide range of hardware.

Advantages of Linux

There are significant advantages of using Linux operating systems in a business or organization. They are as under.

1. Lower Total Cost of Ownership

Independent TCO surveys support Linux as the most cost effective operating system available on the market today. Lower TCO improves the bottom line.

2. Security

Linux provides industry-leading security to both desktops and servers with the fewest high-level security issues of any OS.

3. Highest Reliability

Linux provides renowned reliability to increase up time and improve worker productivity.

4. Avoiding Vendor Lock In

Linux prevents vendor lock in and promotes competition to lower software costs.

5. Ease of Migration

Linux allows migration paths suitable for each type of organization, whether migrating to mixed OS systems or moving an entire network of servers and desktops to Linux.

6. World Class Support

A wide variety of large and small technology companies such as IBM, HP, and Novell provide Linux support to every size of business.

7. Rapid Employee Training

The Linux desktop and applications appear remarkably similar to current standard desktops so employee down time due to retraining is minimal.

8. Inexpensive Standard Desktop Software

Standard desktop applications such as word processing, spreadsheets, and presentation software are available for free or at reasonable prices on Linux.

9. Improved Custom Applications

Numerous software development firms provide reliable and secure custom applications for business and organization systems.

10. Superior Network and Systems Management

Linux provides robust network and systems management capabilities to improve administration capabilities.

Disadvantages of Linux

1. Too many distributions

There are a large number of Linux distributions. It means that user faces the problem of selecting suitable releases. As all the releases contain more or less the same set of basic packages, there will be only superficial difference between them. So it means that everyone will find what he needs. The best strategy is to test a couple of distributions, but people won't get enough time for this.

2. Not user friendly and confusing for beginners

Linux is less user-friendly to use when compared to MS Windows and certainly more difficult than MacOS. In spite of that it is more popular and considerable effort has been made to make Linux user friendly for new users.

3. Trustworthiness

Another doubt raised by many users is how can something that is free, also be reliable? After long periods of testing, most Linux users come to the conclusion that Linux is not only as good, but in many cases better and faster than traditional solutions. Moreover if Linux were not trustworthy, it would have disappeared, and not be as popular as it is today.

LINUX SYSTEMS

The Open Source community, consisting largely of people who have been contributing for over half a decade, assures Linux position as an important player on the desktop market as well as in general IT application.

Linux is also unique from other operating systems as it has no single owner. Torvalds still manages the development of the Linux kernel, but commercial and private developers contribute other software to make the whole Linux operating system.

The parts of Linux operating system are:

The Kernel

All operating systems have kernels, built around the architectural metaphor that there must be a central set of instructions to direct device hardware, surrounded by various modular layers of functionality. The Linux kernel is unique and flexible because it is also modular because of which, developers can remove the parts of the kernel they don't need to use. Typically a smaller kernel is a faster kernel, because it is not running processes it does not need.

For example, if a device developer wants a version of Linux to run on a cell phone, he does not need the kernel functionality that deals with disc drives, Ethernet devices, or big monitor screens. He can pull out those pieces, leaving just the optimized kernel to use for the phone.

Modularity also effects stability and security of the operating system. If one piece of the kernel code happens to fail, the rest of the kernel will not crash. Similarly, an illicit attack on one part of the kernel might hamper that part of the code, but should not compromise the security of the whole device.

The Operating System

Developers need special tools like the compiler and command lines found in GNU to write applications that can talk to the kernel. They also need tools and applications to make it easy for outside applications to access the kernel after the application is written and installed.

This collective set of tools, combined with a kernel, is known as the operating system.

Like the kernel, the Linux operating system is also modular. Developers can pick and choose the operating tools to provide users and developers with a new flavour of Linux designed to meet specific tasks.

The Applications

Operating systems have two kinds of applications: those that are essential components of the operating system itself, and those that users will install later. Closed operating systems like Windows and OS X, will not let users (or developers) pick and choose the essential component applications they can use. Windows developers must use Microsoft's compiler, windowing system, and so on. Linux application developers have a larger set of choices to develop their application. This allows more flexibility to build an application.

The Future of Linux

Linux is very successfully being used in different kinds of devices and now it is moving towards new technological areas.

Linux is being installed on the BIOS(Basic Input Output System- boot firmware) of laptop and notebook computers, which will enable users to turn their devices on in a matter of seconds, bringing up a streamlined Linux environment. This will have Internet connectivity tools such as a web browser and an e-mail client, allowing users to work on the internet without have to boot all the way into their device's primary operating system-even if that OS is Windows.

The growth of cloud computing is a natural fit for Linux, which already runs many of the Internet's web servers. Linux enables could services such as Amazon's A3 to work with superior capability to deliver online applications and information to users.

Many of the popular Web 2.0 services on the Internet, such as Twitter, Linked In, You Tube, and Google all rely on Linux as their OS. As new web services arrive in the future, Linux will increasingly be the platform that drives these new technologies.(Web 2.0 site allows users to interact and collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community, in contrast to websites where users (consumers) are limited to the passive viewing of content that was created for them)

LINUX DISTRIBUTIONS

Linux is available in several formats called distributions. A Linux distribution is a set of packages that together make up the operating system. In order to install the OS the tools to perform the installation must be available in the correct order for the user. Various distributions will have the following:

1. Different tools and methods to set the system up.
2. Different choices with regard to setup.
3. Various choices of packages to install.

A Linux distribution is a member of the family of UNIX like software distributions built on top of the Linux kernel. It will have a collection of software applications such as word processors, spreadsheets, media players and database applications.

Components

A typical desktop Linux distribution comprises a Linux kernel, GNU tools and libraries, additional software, documentation, a window system manager, window manager, and a desktop environment. Most of the software is free software/open source software which is distributed by its maintainers both as compiled binaries and in source code form, allowing users to modify and compile the original source code if they wish. Other software included with some distributions may be proprietary and may not be available in source code form.

Types of Linux Distributions

Linux distributions are diverse due to technical, organizational and philosophical variation among the vendors and users. The permissive licensing of free software means that any user with sufficient knowledge and interest can customize an existing distribution or design one to suit his own needs.

Broadly, Linux distributions may be categorized on the basis of :-

1. Commercial or non-commercial- There are two types of Linux distributions namely commercially backed distributions and community driven distributions. Commercially backed distributions include distributions such as Fedora (Red Hat), Open SUSE (Novell), Ubuntu (Canonical Ltd),
2. Designed for enterprise users, power users, or for home users.
3. Supported on multiple types of hardware, or platform-specific, even to the extent of certification by the platform vendor,
4. Designed for servers, desktops, or embedded devices,
5. General purpose or highly specialized toward specific machine functionalities (eg- firewalls, network routers, and computer clusters),
6. Targeted at specific user groups, for example through language internationalization and localization, or through inclusion of many music production or scientific computing packages,
7. Built primarily for security, usability, portability, or comprehensiveness.

Popular Linux Distribution

1. Ubuntu

One of the most popular distributions is Ubuntu, the famous Debian based distribution. Ubuntu is stable, easy to use and widely distributed Linux OS. One of the distinguishing features of Ubuntu is its easy installation procedure. The distribution is community distribution, sponsored by Canonical. Ubuntu is most popular for desktop computer usage. It supports word processing, image editing and various other multimedia , Edubuntu, Xubuntu, Ubuntu Studio, Kubuntu, and Ubuntu Server Edition.

2. Open SUSE

SUSE is developed under the openSUSE project and sponsored by Novell. It is another popular Linux OS. SUSE is an easy-to-use and highly secure OS that comes in a variety of versions such as SUSE Linux Enterprise Desktop, SUSE Linux Enterprise Server, SUSE Linux Enterprise Thin Client, etc. SUSE Linux was a commercial version of Linux, which was developed in Europe. It supports various software components, which cannot be redistributed without proper permission.

3. Fedora

Developed and maintained as open source software, Fedora is sponsored by Red Hat under the Fedora Project. Fedora provides enhanced the utility applications built into Fedora include emacs editor, xv image viewer etc. it also comes with a full-fledged word processing program called Open Office.

SOFTWARE REPOSITORIES

A software repository is a storage location from which software packages may be retrieved and installed on a computer.

Software repositories have traditionally provided access to software resources for particular communities of users within specific domains. The growth of the World Wide Web has created new opportunities for expanding the scope of discipline-oriented repositories, for reaching a wider community of users, and for expanding the types of services offered.

Many software publishers and other organizations maintain servers on the internet for this purpose, either free of charge or for a subscription fee. Repositories may be solely for particular programs or for an entire operating system.

As software repositories are designed to include useful packages, major repositories are designed to be malware free. If a computer is configured to use a digitally signed repository from a reputable vendor, and is coupled with an appropriate permission system, this significantly reduces the threat of malware to these systems. Thus such systems do not require antivirus software.

THIRD PARTY LINUX REPOSITORIES

Software developers often maintain their own repositories, from which software packages can be downloaded and installed directly to your computer. Many of these third party repositories and software packages have never been reviewed by the Linux community and can present a security risk to your computer. Trojans, backdoors, and other malicious software can be present at any unregulated repository.

LINUX OFFICE AND DATABASE SOFTWARES

A desktop computer user will almost always need an office suite. A windows user has to spend a lot of money to buy and use office application programs like Microsoft Office. But a typical Linux user can just use the office suite that comes with their distro free of cost.

There are actually five known free and open source office suites that work best in Linux. They are:

1. Open Office.org

Open Office.org is the leading open-source suite for word processing, spreadsheets, presentations, graphics, databases and more. It is available in many languages and works on all common computers. It stores all your data in an international open standard format and can also read and write files from other common office software packages. It can be downloaded and used completely free of charge for any purpose.

2. GNOME Office

The GNOME desktop features a separate office suite. These programs are generally lighter and faster than the programs in the Open Office.org suite, and have fewer features as a result. But this may be exactly what you want. The Suite has excellent compatibility with other major Office Suite, such as Microsoft Office.

The GNOME Office Suite includes the following software:

- A word processor (Abiword)
- A spreadsheet(Gnumeric)
- A database management program(GNOME-DB)
- A diagram editor(Dia)
- Two graphics applications (Inkscape and The GIMP), and
- A project management application (Planner)

3. KOffice

KOffice project is an integrated office suite for KDE. KOffice features a full set of applications which work together seamlessly to provide the best user experience possible. KOffice like KDE, is a free project which is released under GPL-compatible open source licenses, eg;-GPL,LGPL and BSD. KOffice is continually being improved, based on reports from users

THE GNOME DESKTOP ENVIRONMENT

GNOME is a user-friendly desktop environment that enables users to easily use and configure their computers. GNOME includes a panel for starting applications and displaying status, a desktop where data and applications can be placed, a set of standard desktop tools and applications, and a set of conventions that make it easy for applications to cooperate and be consistent with each other.

GNOME offers an easy to understand desktop for GNU/Linux or UNIX computer. It is free software and part of the GNU project used by countless users, developers, government agencies, companies etc. GNOME is an acronym for the GNU Network Object Model Environment, so GNOME is a part of the larger GNU project.

The main features of GNOME are the following.

1. Usable

It is highly useable as it is easy for everyone to use.

2. Accessible

This is a free software and hence it allows software freedom for everyone to use.

3. International

GNOME is used, developed and documented in many of the languages, and we strive to ensure that every piece of GNOME software can be translated into all languages.

4. Developer friendly

Developers are not tied to a single language with GNOME. We can use C, C++, Python, Perl, Java even C#, to produce high-quality applications that integrate smoothly into the rest of our Unix or GNU/Linux desktop.

5. Organized

GNOME strives to be an organized community, with a foundation of several hundred members, usability, accessibility, and QA teams, and an elected board. GNOME releases are defined by the GNOME Release Team and are scheduled to occur frequently.

6. Supported

Beyond the worldwide GNOME Community, GNOME is supported by the leading companies in GNU/Linux and UNIX, including HP, IBM Mandriva, Novell, Red Hat, and Sun.

7. A Community

Perhaps more than anything else, GNOME is a worldwide community of volunteers who hack, translate, design, QA, and generally have fun together.

USING THE METACITY WINDOW MANAGER

In Unix and Linux, nearly all graphical applications use the 'X Window System' as the underlying software between the hardware and the "graphical user interface" (GUI). The window manager is the piece of software that controls the display window in the X Window System environment. The placement, borders, and decorations of any window are managed by the window manager. GNOME works with the window manager to display application windows on your screen.

GNOME is not dependent on any particular window manager. Metacity is a window manager used by default in the GNOME desktop environment. The development of Metacity was started by Havoc Pennington and it is released under the GNU General Public License.

Before introduction of Metacity in GNOME 2.2, GNOME used Enlightenment and then Sawfish as its window manager. Although Metacity is part of the GNOME project and designed to integrate into the GNOME desktop, it does not require GNOME to run, and GNOME can be used with different window managers.

Metacity's focus is on simplicity and usability rather than novelties. Due to its lack of configuration options, people in favour of Metacity say that GNOME is aimed at new computer users who do not need the extreme options and functionality of Enlightenment or Sawfish.

USING GNOME PANEL

The Panel is an area, often along the edge of the screen, which can contain program launchers, menus, the window list and notification area, and other applets.

GNOME by default has two panels on the desktop, one up the top of the screen and one down the bottom. The top panel contains some menus to the left, for Applications, Actions and Places, a notification area to the right, and a clock to the left of the notification area. The bottom panel contains a button on the left which hides all visible windows, displaying the desktop, a window list to the right of that, which contains buttons for all windows open on the desktop, and to the right of the panel a desktop pager.

Customizing Panels

Panels can be customized in a number of ways. It is possible to change their appearance slightly, to change their contents, and to change their position, size and behaviour.

Contents of Panels

The contents of panels are all applets, which can be added, moved and removed on the panel.

To move applets on the panel, right-clicking the applet in the appropriate area will open a context menu which contains options such as to Lock to Panel, Move and Remove from Panel.

Moving the Applet

To move the applet, select Move and the applet will follow your mouse as you move it along the panel, changing its position. You will notice when moving applets around, the applet will flip to other sides of other applets, or move those applets out of the way if necessary.

To Lock an Applet

By right-clicking an applet and selecting Lock to Panel, the applet will not move around for other applets, and will be locked in position on the panel. If you are unable to move an applet on the panel, it might be because it is locked to the panel. Clicking the option from the context menu will deselect this option, allowing you to move the applet.

To remove an Applet

The Remove from Panel option under the context menu for applets will remove the applet in question from the panel completely. It can be returned at any time. Sometimes however, preferences related to the applet can be lost when removing them from the panel.

To add an Applet

To add an applet to the panel, right-click on an empty space on the panel. Empty space might be hard to find sometimes i.e. the window list, when empty, looks like empty space, but is not, so watch out for this, and move / resize / remove applets if they get in your way. The context menu that appears will provide you with an option to Add to Panel. Selecting this will open a dialog which lists many applets that you can add, and their descriptions. They will be placed on the panel roughly where you right-clicked to open the context menu, and you can move them around and change them at will.

To change behavior and appearance of Applet

Sometimes when clicking on applets special options appear that are specific to that applet. These can provide options and preferences for that applet that you can change, for example, on their behaviour and appearance. You can experiment with some applets to see how you can customize them.

Preferences

GNOME is designed with good defaults in mind. However, it also allows configurability. Hence GNOME allows you to change your preferences. You can give your preferences for the following:-

- Desktop Background
- File Management
- Font Preferences
- Keyboard
- Keyboard shortcuts
- Menus and toolbars
- Mouse
- Network Proxy
- Screen Resolution
- Sound
- Theme
- Windows

DESKTOP PUBLISHING IN LINUX

Desktop publishing is easy, and it also can be fun. With OpenOffice.org you have a rich selection of tools to create high-quality documents for personal or business use.

Desktop publishing (DP for short) differs from word processing. In word processing, you type pages of characters and numbers to create documents. They might include graphics, such as tables and charts, to illustrate points made in the text, but the goal is to create a written document to convey information. In DP, you use graphics, along with text, to create a document with more visual appeal. Look at any printed advertising--the graphics in the document often are more important than the written word. We need not be a desktop publishing professional or a graphic artist to use DP.

Desktop Publishing Basics

Before we start using DP, we need to understand a few basics of DP.

Text is letters and numbers and special characters typed on a page. Text is put into a DP document exactly where you want it by placing text boxes on the page. You then type your text in the box (see Figure 1). Text boxes can be moved, rotated and resized. Clicking on the text box allows you either to type characters or to paste them in from another document. You can format text fonts and sizes and other attributes such as making it boldface, italicized or underlined.

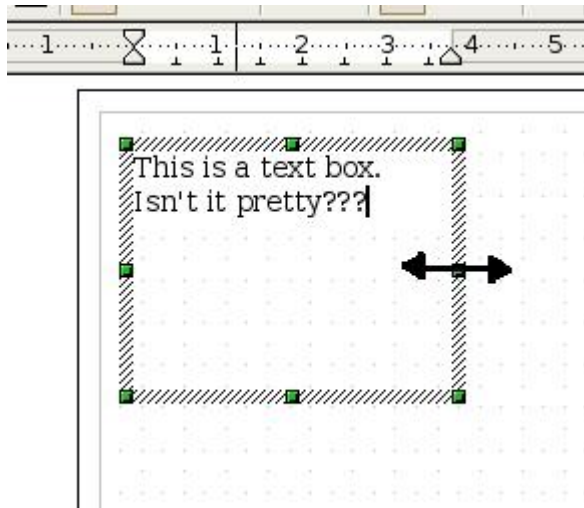


Figure 1. A simple text box in editing mode, indicated by the hatched border. The green squares are the "handles" used to resize the text box.

You must make sure your text fits into the box and does not overrun. You can reformat and resize the text (or edit it) to make it fit. You also can resize the text box, as we will see below.

Graphics and images are considered to be objects. These also are inserted into the document and moved to their desired location. With OpenOffice.org, you have a tremendous amount of control. You can precisely place your image and resize it by shrinking or stretching it or by resizing it and keeping the proportions in tact. You can rotate it and choose the axis of rotation, as well.

Graphics can include charts, tables, graphs, raster or vector graphics and images of any format including JPEGs, GIFs, TIFFs and PNGs.

Clicking on a text box or image object activates it by making it the active layer. You can see small green boxes at the corners of the object (including text boxes). These boxes are "handles" you can "grab" with your mouse pointer by clicking on them, holding down the left mouse button, and move by dragging the mouse. Figure 1 shows the mouse pointer changed to a double-arrowed line indicating the handle--and the side of the text box--can be moved to the left or right. Releasing the left mouse button sticks the handle in place. When you place your mouse pointer over the active object, you should see arrows indicating that you can move the object. A set of arrows in a cross formation indicates you can move the object in any direction. A diagonal, vertical or horizontal arrow set indicates you can move only that corner or handle to resize the entire object.

Figure 2 illustrates an object--our beloved Tux--being moved to a new location on the page. The shadowed Tux is at the original location and the full-color image with the handles is being moved to its new location.

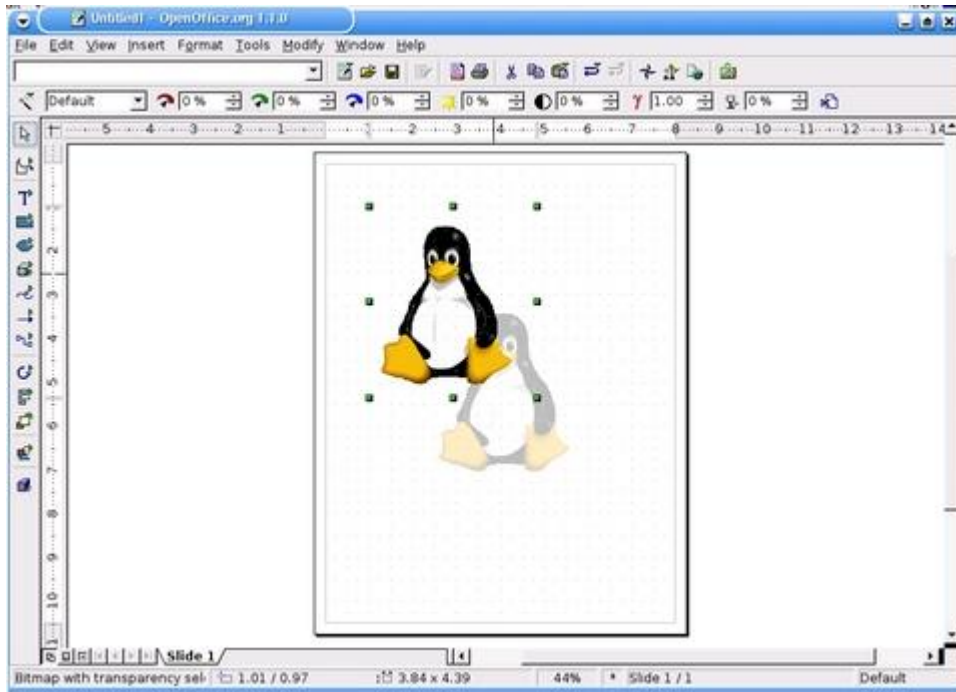


Figure 2. Graphics and text boxes can be moved on the workspace. Here we are moving Tux from his original location indicated by the shadowed Tux to his new location. The active layer is indicated by the visible object handles.

When you want to rotate an object, you have some interesting choices. You can choose a pre-determined rotation, such as 90 or 180-degrees, or you can custom rotate the object. When you choose to custom rotate, you can choose the axis of rotation and exact rotation of the object. When you drag the corner of the object to rotate it, and you see as in Figure 3 a semi-circle with arrows on it indicating rotation.

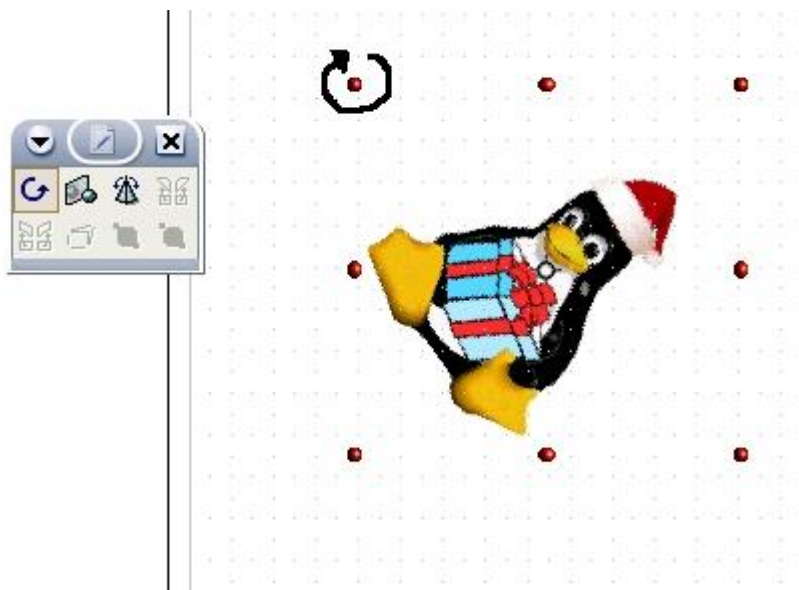


Figure 3. Objects can be custom rotated. Here Tux is being rotated clockwise. The object handles have turned to red, and the pointer turns into a visible semi-circle. The object rotation tear-off is visible.

Planning the Project

Before you sit down at your keyboard and open OO.o, you need to have a plan. The best way to do this is with old-fashioned pencil and paper. Get out a pad of paper and draw what you want to do. Where do you want the graphics to go? What about text? What orientation? What about logos and other artwork?

You should have a good idea about the text you plan to use. What font and size, and how long will the text be? It needs to fit into the text boxes you make, and it needs to be formatted so it makes the point you wish to convey in your document.

Once we have a rough layout and a good idea of how the document should look, it's time to start OO.o and get to work. Clicking on the OO.o icon on your desktop opens OO.o in writer mode, which is default.

Once open, you need to go to the drawing application, called Draw. Click on the File -> New -> Drawing. This opens a fresh OO.o workspace. Some distributions install a separate menu item on your programs menu for OO.o from which you can directly select the Draw application.

You can customize your view in OO.o. The default Draw view in Figure 4 shows the Main Toolbar on the left side of the workspace. This is where the drawing tools are located. The tools in the Main Toolbar change depending upon the OO.o application. At the top of the workspace we have the Function Bar with tools common across OO.o applications. The Object Bar has text formatting tools, such as underline, italics, font type, size and color. Tools here change depending on the OO.o application. These toolbars can be turned on and off by clicking on the View Pull-down menu or by right-clicking on the toolbars. They also can be customized, but that is beyond the scope of this article. Vertical and horizontal rulers also appear; we use them below.

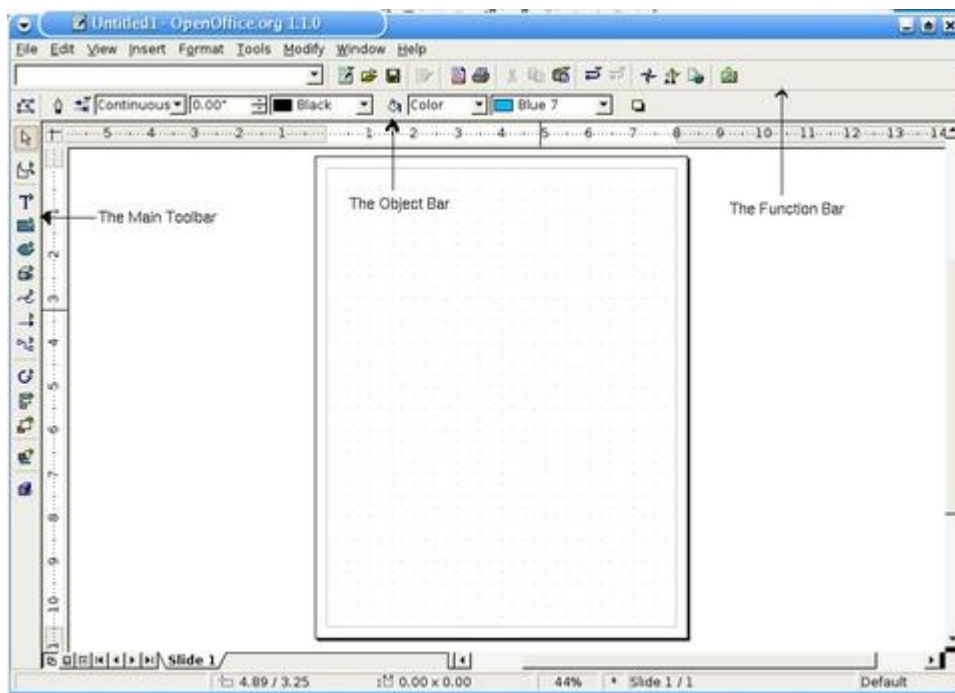
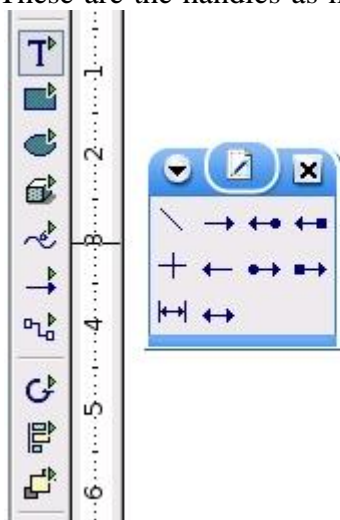


Figure 4. The Draw workspace, indicating location of the Main Toolbar, the Object Bar and the Function bar. The workspace is shown in Grid View mode.

OO.o is designed to be used around the world. So, you need to make sure the document size is appropriate. Clicking Format -> Page allows you to set the page size. This document is US Letter size, 8.5 x 11.0 inches in Portrait layout.

If we need to keep track of how we lay out items on the page, enable the grid view on the document workspace. Clicking View -> Grid -> visible grid makes the grid visible. Next, I needed to create lines defining the folds of my document. The lines can be removed later. Click and hold down the left-mouse button on the Line Tool on the Main Toolbar. A new box pops up, with several options for lines (see Figure 5). This box is called a Tear-off, as you can keep it open and available and move it around your workspace.

If you want a simple line without arrows on the ends, click the Line (without arrows), and change the pointer to a + (insertion point) with a \ indicating what type of line was activated. Then move the mouse pointer to the point you want to start the line at, guided by the ruler. Then click the left mouse button, hold it down and drag the pointer across the workspace until it is at the point where you want it to stop. Releasing the mouse button will result in two small green boxes at each end of the line. These are the handles as mentioned earlier. Move the line around to get a feel of



how this works.

Figure 5. The Line Tool tear-off. Other tool tear-offs are similar and can be placed anywhere on the workspace.

Make a second vertical line in the same way as the first. Now, the page is divided into quarters, along with the grid view, for guidance.

Inserting Text Boxes

Click the Text tool on the Main Toolbar and hold the mouse button down for a moment to allow the text tear-off to appear. Move the tear-off to a convenient place, as we are going to use it later.

If you are creating a complex document with different text formatting, using Styles greatly increases your productivity.

Click the large T in the tear-off and the pointer turns to a cross. Place the cross--the insertion point--at a point on the document where one corner of the text box should be. Then, hold down the left-mouse button and drag to the diagonal opposite point of the text box. Releasing the mouse button results in a blinking cursor on the box, object handles and a hatched-border of the box. The text box is shown back in Figure 1.

The Object Toolbar changes when you release the mouse button. Text formatting options are now displayed. You can change font, size, color and other attributes.

When done, the border disappears but the handles remain. The pointer has turned to a cross with arrows on the ends, indicating that we can move the text box around. Hold down the left mouse button and try it.

So, how do we change the font, size and color? In this mode we can't. You need to click on the T in the text tear-off again to return to text editing mode. The hatched border re-appears with the blinking cursor. Now you can highlight the text and change formatting. In Figure 6, we have changed the word quick to a blue color and italicized it and the word brown to a brown color and boldfaced it.

Saving Changes

With complex or important projects it is important to save changes to your work or be able to return to a defined edit point. Opening the Tools -> Options -> Load/Save dialog box lets you set various options for how often to save. Expanding the OpenOffice.org choice and selecting View allows you to set the level of undo steps and the amount of memory allocated to saved objects. But you really need to save changes at critical points yourself. Remember, you are smarter than the computer.

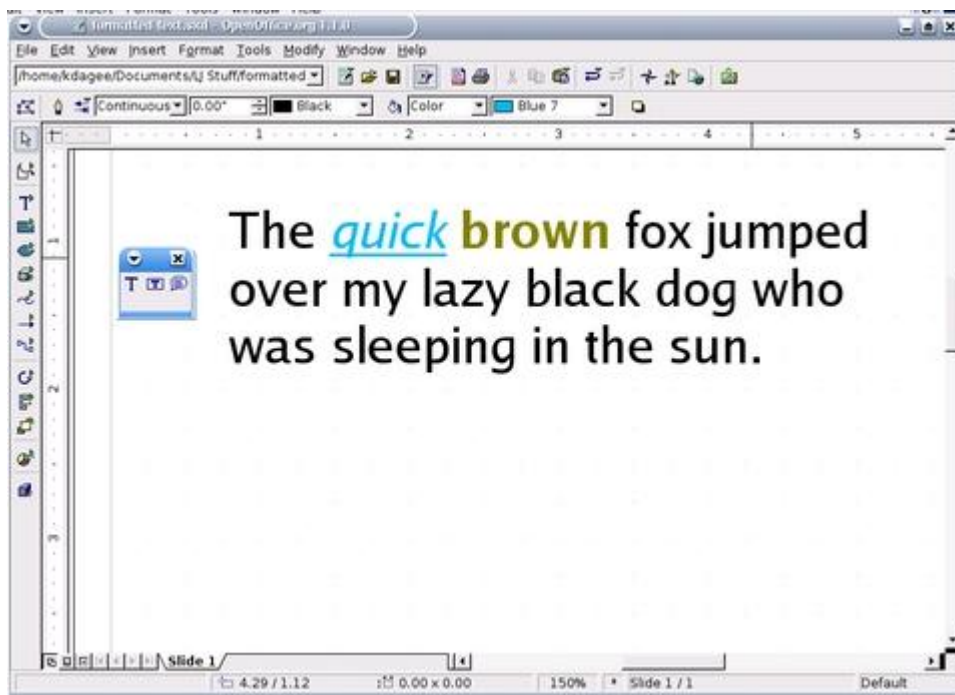


Figure 6. Some formatted text, showing color and other formatting attributes.

Inserting Graphics

Now, find and insert a graphic.

Once you've found the graphic you want to use, you need to insert it into your document. Either click Insert -> Graphics -> From File or open the Insert Tear-Off on the Main Toolbar and select Insert Graphic. Then navigate to the file and click Open. You should see the graphic placed in the center of your document.

Now, you need to place the graphic where you want it and resize it. Click on the graphic make it the active layer. Handles and a cross should appear, indicating you can resize and move the graphic. Hold down the left-mouse button and move the graphic into the planned position as we saw in Figure 2. Now, grab onto a handle and resize the graphic.

Rotating the Graphic

Now comes the fun part. We need to rotate the graphic into its proper orientation. This graphic will be rotated 180-degrees from its original position. OO.o gives you many ways to do this. First, click on the graphic to make sure it is active (the handles are visible). Then right-click on the graphic, select Flip -> Vertically. Then, flip it back.

Let's have some real fun. Open the Effects Tear-Off on the Main Toolbar. You should see a semi-circle icon with an arrow. A pop-up appears with the Rotate label. Click the Rotate icon, and if the resize (green) handles still are active, you should see them change to red dots (see Figure 3). Place the pointer on a corner dot, and it changes to a semi-circle with an arrow. Placing the pointer on a middle dot changes it to a "you can't do that" symbol. You also should see a small circle in the center of the image indicating a center point. Here's a hint: place the pointer over this center point icon. It changes to a hand pointer, as shown in Figure 7. You can change the Pivot Point by holding the left-mouse button and dragging this icon to the spot you want to set as the pivot point. Now, rotate the graphic and see what happens. Pretty cool, huh? You can return to the previous position by pressing CTL-Z, as before.



Figure 7. Tux shown with the pivot point. This is visible in custom rotation mode. When the pointer is placed over the pivot point, it turns to a "hand" pointer, indicating you can move the pivot point.

The defaults for the base point and the pivot point can be set by having the graphic set active (the green reposition handles appear) and choosing Format -> Position and Size. The dialog box has three tabs that allow you to set several attributes.

Let's put a text box above the graphic and then insert the text. We need to rotate the text box. With the text box active, showing the green position and size handles, select Rotate from the Effects Tear-Off (or, select Modify -> Rotate from the pull-down menu). The green handles change to red, and the Pivot Point icon appears. Grab one of the corner handles with your mouse and rotate the text box into position.

Now, make fine adjustments. Save your work and print it out. Review for changes, and make them.

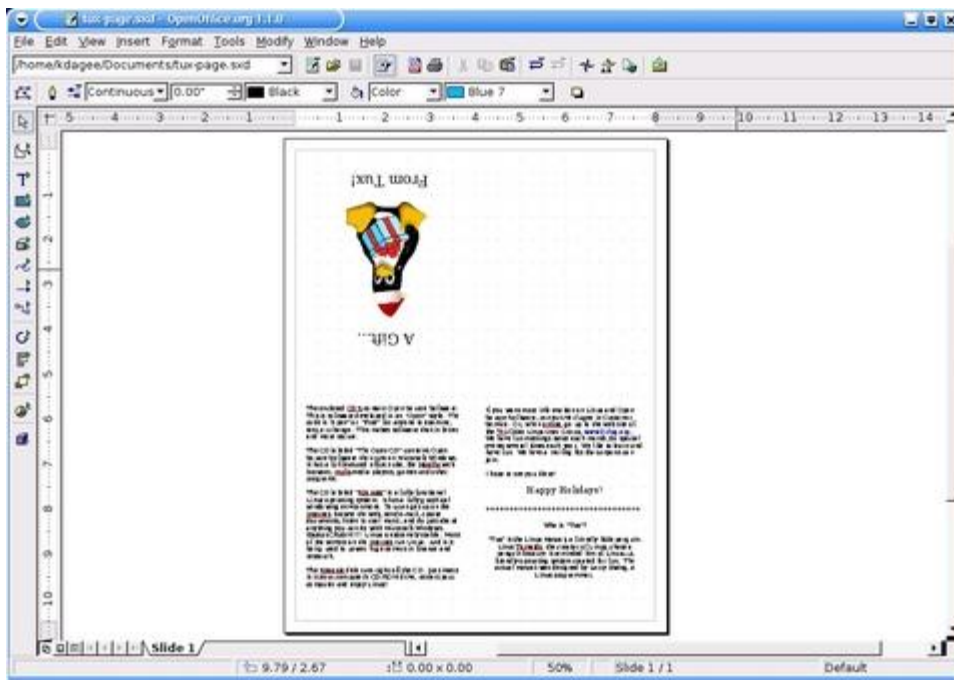


Figure 8. The Finished Product

Other OO.o Tools

OO.o offers other tools to help with DP or Word Processing. One of the cooler ones is the PDF export feature. When you are done with your document, simply click the PDF export button and you will have a nice PDF you can share with anyone on any platform that has Adobe Acrobat Reader.

OO.o's Help is also extremely useful. We can use it to create projects and in writing articles. It is easy to use and to find information.
