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INFORMATICS

Informatics is the study, design, development, implementation, support or management of computer based information systems. It is often used synonymous with Information Technology.

OUTLINE HISTORY OF THE DEVELOPMENT OF COMPUTERS

The beginning:

In the very ancient times information was stored in memory and orally transmitted from region to region, culture to culture, and from generation to generation. In 100 A D the use of paper came into existence. Later in 1450 the movable press was invented and still later the binary system for machine storage and processing of information triggered off new developments in the field of communication. These developments made communication more transparent and flexible.

The print format was a great shift in the technique of storing data. Documenting on dry leaves, stones, tablets and cave walls ceased to exist. Printed material became widely used. But there were limitations for the print format as well. The most important of the limitations of print format was the problem of retrieving a required piece of information from a large collection. Another one is the barrier of space and time. The third was storage space.

It was Charles Babbage who, during the 1820s, conceived the idea that information could be processed using a machine. He developed two machines – the difference engine and analytical engine – which are considered as the prototypes of information processing machines. Charles Babbage was thinking far ahead of his time and so he could not materialize what he had proposed. But Babbage is considered as the father of modern computer   technology.

The great mathematician Claud Shannon developed a system of symbolic language that could be used for storing information in machines. He found out that the on and off position of an electric switch could be used to represent two values such as true or false, right or wrong, and present or absent . He defined the on position as 1(one) and the off position as 0 (zero). By combining a number of switches we can multiply zeros and ones. Definite number of zeros and ones could represent a specified value system and characters in an alphabet. Thus a language was developed for storing information in machines. As this language used only two characters one and zero, it was called binary language. Digital and binary are synonymous. Each digit in the binary system either 0 or 1 is called a bit. A unit of 8 bits (binary digits) is called a byte (bits by eight). A byte is used to represent characters and digits. For example, the letter A in the English alphabet is represented by the byte '01000001' and B is represented by the byte '01000011'. Similarly, the number 1 is represented by the byte '11110001'   and   the   number   2   by   '11110010'.

In this manner every bit of information can be represented digitally. There are international standards, which specify binary equivalent of letters, digits and other units of information. The two international standards, which specify 8 bit equivalent of letters and digits, are 'EBCDIC' (Extended Binary Coded Decimal Interchange) and ASCII (American Standards Code for Information Interchange)

The first electronic computer which could store information was developed by Presper Eckert and John Mauchly, engineers of Pennsylvania University, in the year 1946. It was called ENIAC (Electronic Numeric Integrator and Calculator).In ENIAC vacuum tubes or valves

were used as electronic circuits. It was a huge computer, which used 18000 valves and 6000 cables. It weighed about 30 tons, occupied a very large hall and consumed about 150000 watts of electricity.

With the creation of ENIAC the first electronic computer was born. Early computers were used only for computing or mathematical operations. That was why the machines that handled binary digits were called computers. Great development has occurred in the field of computers during the past sixty years. The size of computers has decreased but the efficiency has increased. The reason for the reduction in size and increase in power and speed are attributed to the discovery of transistors and their integration into microprocessors.

The first generation computers (1949-55):
Vacuum tubes are the switching hardware component used in first generation computers. These computers are programmed using hand-coded binary language instructions. The computers in this generation are huge in size and slow in performance. No operating systems are used in this generation. ENIAC or Electronic Numerical Integrator and Calculator, was the first electronic computer developed in 1946 by a team led by Prof. Eckert and Mauchly in U.S.A. A large number of vacuum tubes were used in this machine. It had a small memory; it took 2800 micro seconds for completing a multiplication process and 200 micro seconds for completing an addition process. This machine was widely used for calculating the time and direction of missiles. The first generation computers developed after ENIAC were EDVAC, EDSAC and UNIVAC-I. Al are based on Newman's stored program concept and only used in scientific applications. Huge size, low memory, lower speed, high power consumption, heat production, etc. are considered as the major limitations of first generation computers.

Second   generation   computers   (1956-65):
The invention of transistors created a drastic change in the hardware structure of computers. Transistors are more reliable and les space –consuming. They produce less heat compared to vacuum tubes. Computer memory also was restructured by the invention of magnetic cores. The core consists of tiny ferite rings that can store 0 or1 in two spin directions. Cores are widely used for constructing RAM. Secondary storage also enhanced with the invention of magnetic disk. Operating systems were introduced as batch monitors. High level languages like FORTRAN and COBOL reduced the complexity of programming. Rapid growth in the commercial applications like payroll, inventory control, marketing etc. increased the growth of computer technology in society. Some examples of second generation computers are IBM-1401, IBM-7094, CDC-3600, and UNIVAC-1108.

Advantages of second generation computers:
1. Smaller in size then first generation computers.
2. More reliable.
3. Lower power consumption and hence reduced running cost.
4. Higher operating speed. Computational time reduced from
milliseconds to microseconds.
5. Les prone to failures.
6. Better portability.
7. Reduced manufacturing cost and hence wider commercial use.
Disadvantages:
1. Air-conditioning was required.
2. Frequent maintenance was required.
3. Manual integration of individual components into functioning

units was required.
4. Commercial production was difficult and costly.

Third generation computers (1966-1975):
The invention of integrated circuits is a mile stone in the development of computers. Small Scale Integration (SI) can hold 10-10 transistors per chip. The size of the computers is further reduced. At the same time, memory capacity and processing speed increased a lot. In 1960 the Digital Equipment Corporation introduced the Programmed Data Procesor-1 (PDP-1), which can be called the first minicomputer due to its relatively small size. Even though it was made before 1965, it was called third generation because of the way it was built. The PDP-1 was also the computer that ran the first video game, called Space war (written in1962). The software industry came into existence in mid 1970's as companies started to write programs that would satisfy the increasing number of computers. Computers were being used in business, government, military and educational environments. Since these target markets required accounting and statistical programs such items were provided by companies. The first set of computing standards was also created during this period to ensure compatibility between systems.

Advantages:
1. Smaller in size than the previous generations.
2. More reliable than second generation computers.
3. Lesser heat generated.
4. Computational time reduced from microseconds to
nanoseconds.
5. Maintenance cost low because hardware failures are rare.
6. Easily portable.
7. Less power requirement.
8. Manual integration not required.
9. Commercial production was easier and cheaper.

Disadvantages:
1. Air-conditioning required in many cases.
2. Higher sophisticated technology required for the manufacture
of IC Chips (Integrated Circuit Chips).
Some examples for third generation computers are IBM-360,
ICL-190 series and CDC-170.

Fourth generation computers:
In this generation SI was replaced by LSI and later by VLSI (Very Large Scale Integration). This increased the power of microcomputer. Magnetic core memory was replaced with semiconductor memory. The first microcomputer was ALTAIR 80. Many people consider ALTAIR 80 as the computer that sparked the modern computer revolution, especially since Bill Gates and Paul Allen founded Microsoft with a programming language called Altair-Basic, made specifically for the 80. Now the computers could fit on the table and so became very common. A small company called Apple Computers Inc. was established in 1976. Steve Wozniak and Steve Jobs began to sell their Apple-I computer that same year. It came with a Keyboard and only needed a monitor to be plugged into the back of the system. The Apple-I was released the next year and was the first mas produced microcomputer to be commercially sold. This ushered in the era of personal computing.

In 1981, Microsoft Disk Operating System (MS-DOS) was released to run on the Intel 8086 microprocessor. Over the next few years MS-DOS became the most popular operating system in the world, eventually leading to Microsoft Windows1.0 being released in1985. In 1984 Apple introduced their MAC OS, which was the first operating system to be completely graphical. Both MAC OS and Windows used pull down menus, icons and window to make computing more user-friendly. Computers were now being controlled with a mouse as well as a keyboard. The first mouse was developed in 1981 by Xerox. Software became much more common and diverse during this period with the development of spreadsheets, databases, and drawing programs. Computer networks and e-mail became much
more prevalent.

The first truly portable computer called the Osborne-I, was released in 1981. Super computers were sold to Companies, Universities, and the Military. An example of one such computer is CRAY-I, which was released in 1976 by Cray Research. This generation was also important for the development of the embedded systems. These are special systems, usually very tiny, that have computers inside to control their operation. These embedded systems were put into things like cars, thermostats, microwave ovens, wrist watches, and more.

Advantages:
1. Smallest in size because of high density of components in a
single chip.
2. More reliable.
3. Heat generated is negligible.
4. Air conditioning was not required in many cases.
5. Much faster in computation.
6. Hardware failure is negligible and so minimal maintenance
cost.
7. Easily portable because of the small size.
8. Totally general purpose.
9. Minimal cost involved at assembly stage.
10. Cheapest among all generations.

Disadvantage:
1. Highly sophisticated technology is required for the manufacture of VLSI Chips.

Fifth generation computers
The developments in the field of artificial intelligence explored a new path in the field of computers. The aim is to develop an autonomous intelligent system that can be controlled by human beings. The expert system in this generation can communicate with people in their natural language. The invention of magnetic bubble memories is a milestone in memory research. Robots with self-computing capacity and decision making power are the ultimate aim of the fifth generation. Computer processor companies have increased and are offering all kinds of programs for almost anything in this world. Microsoft dominates the scene. Windows 95 raised them to a level of dominance. Now new versions of the same are available. Linux Kernel introduced by Linus Torvalds in 191 has provided countless open source operating systems and open source software. Computers have become more and more online oriented with the development of the World Wide Web. Popular companies like Google and Yahoo! were started because of internet. In 2008 the IBM Roadrunner was introduced as the fastest computer in the world at 1.025 PFLOPS (Peta Flops). Fast super computers aid in the production of movie special effects and the making of computer animated movies.

TYPES OF COMPUTERS:

The technology applied, the power and the size are the parameters used to classify computers. Technology has changed and al computers use microprocessors as their CPU. Thus classification is possible only on the basis of the mode of use. On this basis computers can be classified as Palms, Laptop PCs, Desktop PCs and Workstations. Based on inter-connected computers, they can be classified as distributed computers and parallel computers

Palm   PCs:

Palm PCs are computers that can be held in a palm. They are small in size with high density pack of transistors on a chip. They have the capabilities of a PC. Palms accept handwritten inputs using an electronic pen, which can be used to write on a Palm's screen (besides a tiny key board). It has small disk storage and can be connected to wirelesss network. One has to train the system on the user's handwriting before it can be used A Palm computer also has facilities to be used as a mobile phone, fax and e-mail machine. A version of the MS operating system called Windows – CE is available for Palm.

Simputers:

It is an Indian initiative to meet the need of the rural population of developing countries. This is a mobile handled computer with inputs through icons on a touch-sensitive overlay on the LCD display panel. A unique feature of the Simputers is the use of free open source OS called GNU/Linux. The cost of ownership is thus low as there is no software cost for OS. Another unique feature is a smart card reader/writer, which enhances the functioning of the Simputer including the possibility of personalization of a single Simputer for several users.

Personal Computers (PCs)

A personal computer is a general purpose computer whose size, capabilities and original sales price make it useful for individuals. It is intended to be operated directly by an end user, with no intervening computer operator. A personal computer may be a desktop computer, a laptop, a tablet PC or a hand held PC (also called palmtop). The most common microprocessors in personal computers are X86 – compatible CPUs. Software application for PCs include word processing, spread sheets, data bases, web browsers and e-mail clients, games and myriad personal productivity and special- purpose software. Modern PCs often have high-speed or dial-up connection to the Internet, allowing aces to the World Wide Web and a wide range of other   resources.

A PC may be used at home or an office. It can be connected to a Local Area Network (LAN) either by a cable or by wirelesss. Earlier the users had to write their own programs but now a wide range of commercial and non-commercial software is available in ready-to-run form. Since the 1980s, Microsoft and Intel have dominated much of the personal computer market. Now PCs are available in different shapes and sizes and provides multifarious functions beneficial for human beings.

Workstations

Workstations are desktop machines. They are more powerful providing processor speeds about ten times that of PCs. Most workstations have a large color display unit, often 19-inch monitors. They have main memory ranging from 512 MB to 5GB and hard disk ranging from 80G to 500G. A workstation is designed for technical or scientific applications.

MOBILE COMPUTER DEVICES

(1) Laptop (2) Notebook computer (3) Tablet computer (4) PDAs (5) Smart phones (6) E-book readers, and (7) Portable data terminals.

Mobile – The most widely accepted term for a computer device that is both portable and wirelesss is a 'mobile computer device'. But the term mobile is sometimes limited to devices that can be used while moving, as opposed to portable computers, which are only practical for use while in a stationary position. A cellular telephone is not a mobile computer device unless it includes a web browser and has the capacity to download and manipulate files.

Drawbacks of mobile computing devices:

1. Most such devices can be used only for a few hours before recharging.
2. The reliance on wirelesss network means that they are less secure than desktop machines that use electric grid and wired networks.
3. Screens are much smaller than those used with desktop computers.
4. The lack of full-size keyboards slows down data entry.

Various types of Mobile Computer Devices:

There are 6 major types of MCDs: laptop computers, notebooks, tablet, PDAs, smart phones and portable data terminals. The first three are often called 'portable' computers and the others are often called "handheld" computers.

Laptop Computers

1) Sometimes called "desktop replacement PCs" that offers desktop PC performance in mobile   environments.
2) Widely available in North America since 202.
3) Typical one has 14 to 17 inch screen.
4) Internal DVD – RDM or DVD – RW drive
5) Large full-featured keyboard
6) Integrated modem, network, Bluetooth, & Wi-Fi capabilities
7) High quality integrated audio speaker system
8) Three or more hours of battery life
9) Low battery consumption
10) Capability to be upgraded

In addition to in-built keyboard most of them have touchpad or pointing stick for input. A mouse can also be attached. In spite of the advantages, Desktops are more popular because of its durability and low cost compared to that of laptops.

Notebook Computers

1) Light weight computers having thin profile.
2) They have 12 to 14-inch screen.
3) No DVD or CD system, no internal floppy drive.
4) Limited graphic capabilities.
5) Integrated modem and network connection.
6) Small keyboard.
7) Less power consumption.
8) Four or more hours of battery life.
9) Upgradability is limited.
10) Usually, it weighs from 1.5 to 3 pounds,

11) Smaller than laptop.

Tablet PCs

1) Slate-shaped mobile computers equipped with a touch screen or a graphics tablet/ screen hybrid.

2) This helps the user to use the computer with a stylus, digital pen or fingertip instead of a keyboard or a mouse.

3) An external keyboard or a mouse can be attached.

4) The stylus can also be used to type on a pen-based key layout.

5) Some have voice recognition capability.

6) Usually small screen – 8 inches.

Disadvantage

- Provides only half the processor speed and memory of notebook computers.

Advantage

- Weight is only half of that of laptop computers.

PDA

1. Personal Digital Assistant.

2. Hand held mobile computers; popular since 2000.

3. Initially used for track of schedules, maintaining directories of names and addresses, and accessing e-mail.

4. Since 2003, processor speeds and memories increased and it became capable of including web browser, cellular telephone and fax capabilities. This eliminates the need to carry a separate cell phone. Cell phone manufacturers have responded with "smart phones", devices that include a web browser.

Features:

1. Touch screen for entering data.

2. A memory card slot for data storage.

3. Bluetooth and/or Wi-Fi support.

4. Data entry usually done using a virtual keyboard, where a keyboard is shown on the touch screen so that input can be done by taping the letters with a finger nail or stylus. RIM's popular Blackberry PDA has not only a touch screen, but a full keyboard and scroll wheels to facilitate data entry and navigation. The Palm Treo is also a PDA.

The term "Pocket PC" is given to PDAs that use the Microsoft Windows mobile operating system.

Smart phones

Smart phone is a compromise between a cell phone and a PDA, with a focus on the cellular phone part. It allows a user to install programs, store information, and undertake e-mail; but web access is limited. There are no industry standards for defining what a smart phone is. Apple's I phone and Google's 3G have so many features similar to those of PDA's that some reviews have classified them as PDA's. If the exponential growth of computer memory continues, a smart phone (3G phone) will have 50G of storage memory in 2020. IPod Brand of portable media players designed and marketed by Apple computers launched in 2001. Devices in the iPod are primarily music players. The full-sized device stores media on an internal hard drive. The IPod nano and IPod shuffle use flash memory. IPod nano is the fifth generation, video-capable form. The iPod shuffle is display-les.

E-book Readers

An e-book reader is also called an e-book device or e-reader. It is used to display e-books.

Advantages: portability, readability of their screens in bright sunlight, long battery life. Any PDA capable of displaying text on a screen is also capable of being an e-book reader, but without he advantage of electronic ink display. Amazon.com, Sony and several companies manufacture e-book readers. The e-book reader provided by Amazon is called Kindle.

IT AND THE INTERNET:

The internet is a global system of interconnected computer networks that use the standardized Internet Protocol Suite to serve billions of users worldwide. It is a network of networks that consists of a number of private and public, academic, business and government networks of global scope. They are connected by copper wires, fiber-optic cables, wireless connections, and other technologies.

The internet is a global data communications system. It is a hardware and software infrastructure that provides connectivity between computers. But the Web is one of the interfaces of the internet. It is a collection of interconnected documents and other resources, linked by hyperlinks and URLs. During the early 1960s the US department of Defense pioneered the establishment of a wide area network. This resulted in the ARPANET which is the forerunner of Internet. The opening of the network to commercial interest began in 198. The ability of TCP/IP to work over any pre-existing communication networks alowed the fast growth of the Internet. Further it gained a public face by the 190s.

Uses of INTERNET

The Internet is allowing greater flexibility in working hours and location, especially with the spread of unmetered high-speed connections and web applications. The Internet can be accessed from anywhere by numerous means, especially through mobile Internet devices. Mobile phones, data cards, handheld game consoles and celular routers allow users to get connected to the Internet from anywhere, where there is a wireless network supporting that device's technology.

The Internet has also become a large market for companies. Many companies have grown by taking advantage of the efficient nature of low-cost advertising and commerce through the Internet. This is also known as e-commerce. The Internet has also facilitated personalized marketing which allows a company to market a product o a specific person or a group more easily than any other advertising medium. The low cost and the speed in sharing ideas, knowledge, and skills has made collaborative work very much easier.

The Internet allows computer users to remotely access other computers and information stores easily, wherever they may be across the world. This is encouraging new ways of working from home, collaboration and information sharing in many industries. Software products that can aces the resources of a web are often called user agents. In normal use, web browsers like Internet Explorer, Firefox, Opera, Apple Safari, and Google Chrome let users navigate from one webpage to the other through hyperlinks. Through keyword- driven Internet search using engines like Yahoo! And Google, users worldwide have easy, instant access to a wide ranging source of information. It has provided a sudden and extreme decentralization of information and data.

E-mail is an important service available on the Internet. Another important service made possible is Internet telephony. The idea began with walkie-talkie-like voice applications for personal computers. Through file-sharing large amounts of data can be transferred across the Internet. Common methods of Internet aces in homes include dial-up, landline broadband,

Wi-Fi, satellite, and 3G technology cell phones. Libraries and Internet cafes are aces points for Internet.

Other public places like airport halls and coffee shops also provide this facility for the public. Many people use the World Wide Web to aces news, weather and sports reports, to plan and book holidays and more. They also use chat, messaging, and e-mail facilities to maintain contact between friends and relatives. Social networking websites like MySpace and Facebook also support this venture.

HARDWARE

CATHODE - RAY TUBE (CRT)

The CRT is a vacuum tube used as a display screen .Traditionally CRT monitors were bowl-shaped, but flat screen CRT have become the standard on account of their low power consumption, low radiation and space-saving qualities.

ADVANTAGES OF CRT
· Excellent viewing angle
· Distortion minimal
· No input lag
· Low radiation

DISADVANTAGES OF CRT
· Large size and weight
· Geometric distortion in non-flat CRTs
· Older CRTs are prone to screen burn-in

LIQUID CRYSTAL DISPLAY (LCD)

A display technology that uses rod-shaped molecules that flow like liquid and bend light. Without being energized, the crystals direct light through two polarizing filters, allowing a natural background color to show. When energized, they redirect the light to be absorbed in one of the polarizers, causing the dark appearance of crossed polarizers to show. The more the molecules are twisted, the better the contrast and viewing angle.

ADVANTAGES OF LCD MONITORS
· Very compact and light
· Low power consumption
· No geometric distortion
· Little or no flicker depending on backlight technology

DISADVANTAGES OF LCD MONITORS
· Limited viewing angle
· Slow response times, which cause smearing and ghosting. Input lag

CENTRAL PROCESING UNIT (CPU)

CPU is the brain of any computer system. It is the computing part of the computer and is also called the "processor". In a computer system, all calculations and comparisons are made inside the CPU. It is also responsible for activating and controlling the operations of other units of a computer system. CPU is made up the Control Unit and ALU. The CPU is also called microprocessor or central processor. The CPU usually performs 4 steps in most of its operations. They are fetch, decode, execute and write back. The first step fetch involves retrieving an instruction(which is represented by a number or sequence of numbers) from program to memory. In the decode step, the instruction is broken up into parts that have significance to other portions of CPU. After fetch and decode steps, the execute step is performed.

During this performance, the connected portions of the CPU enact he desired operation. The final step write back, simply 'writes back' the results of the execute step to some form of memory.

MOUSE

A mouse is a device that is rolled about on a desktop and directs a pointer on the computer's display screen. The mouse pointer is the symbol that indicates the position of the mouse on the display screen. The mouse is connected to the computer with the help of a cable attached to a special port of the CPU. The tail like cord and the rounded head of the device earned its name 'mouse'. There are 3 types of mice(plural of mouse):

1. Mechanical mouse - the movement of a rubber ball causes a pair of wheels to spin that sensors detect to send data signals to the PC.
2. Opto-mechanical Mouse – Uses light- emitting diodes(LEDs) to sense mouse movements.
3. Optical mouse- eliminates the use of mechanical devices such as balls, rollers and wheels and uses optical scanning to detect the movement of the mouse.

Most commonly used clicks of the mouse button:

1. Single left button click known as left click
2. Two clicks of the left button in quick succession called the double click
3. Clicking the left button three times in quick succession known as triple click.
4. Clicking right hand button once known as Right click

KEYBOARD

Keyboard is an integral component of the computer used not only for data input but also for data output. The computer keyboards are designed on the basis of the typewriter keyboard, but it also has additional keys for performing specific functions. In Pcs, the keyboards are attached to the computer with the help of a cable. There are also wireless keyboards which work with the help of infrared signals.

The first six letters on the left hand side of the upper row reads QWERTY. Keyboards beginning with QWERTY on the upper row are called QWERTY keyboards.

Important keys on the computer keyboard are:

Enter key, Cursor key, Control Up arrow, Numeric lock, Home and End keys, Page up/Page down keys, Function keys, Backspace key, Delete key, Insert keys, Escape key, Control, Alt, command and option keys

PROCESSOR TYPES

Since the processor handles all kinds of information, choosing the right processor is probably the most important thing when buying a computer.

INTEL COMPUTER PROCESOR

Designed exclusively by Intel. Latest and most popular models include Intel Pentium4 processor, Intel Pentium 4 processor with HT technology and Intel Celeron processor. The first can handle applications such as DVD authoring and 3D gaming while the second can run multiple applications simultaneously with a fast and efficient response.

PORTS

A Port serves as an interface between the computer and other computers or peripheral (external) devices. A Port is a specialized outlet on a piece of equipment to which a plug or cable connects.

USB

Universal Serial Bus is a standard connection method to connect different computer peripherals to the computer with an intention to replace many varieties of serial and parallel ports to connect different devices.

There are many USB versions - USB 1.0, USB 1.1, USB 2.0 and USB 3.0 USB 2.0 was introduced in 201. Has a hi-speed rate of 480 Mbit/s. Are capable of falling back to full speed operation if necesary; they are backward compatible.

INPUT-OUTPUT DEVICES

An input device is any peripheral (external device) used to provide data and control signals to a computer. Some of the commonly used input devices are keyboards, pointing devices such as mouse, trackball, touchpad, graphics tablet, touch screen, joystick, pointing stick etc,

A number of pointing devices are used for inputting data. Some of them are mentioned above and they allow the user to control and provide data to the computer using physical gestures like pointing, clicking and dragging.

GRAPHICS TABLET

Also known as digitizing tablet or graphics pad or drawing Tablet. It is a computer input device that allows one to hand draw images and graphics, similar to the way one draws images with a pencil and paper. It consists of a flat surface upon which the user may

'draw' an image using an attached stylus, a pen-like drawing apparatus. The image does not generally appear on the tablet itself, but rather is displayed on the computer screen.

SCANNER

A scanner is a device that optically scans images, printed text, handwriting, or an object, and converts it to a digital image. Scanners use laser beams and reflected light to translate images. The images can be processed by a computer, displayed n a monitor, stored on a storage device, or communicated to another computer. Scanning devices include readers for barcodes. Scanners are very essential for creating digital libraries from older and rare documents. It is practically impossible to type the text of old documents for creating the digital library of older documents. Some of the commonly available types of scanners are

Drum scanners, Flatbed scanners and Hand scanners There are three types of scanning devices that sense marks or recognize characters. They are:

1. Magnetic-ink Character Recognition (MICR)
2. Optical Mark Recognition (OMR)
3. Optical Character Recognition (OCR)

OUTPUT DEVICES

An output device is any piece of computer hardware equipment used to communicate the results of data processing carried out by a computer to the outside world. The most common output devices are the monitor and speakers. Headphones, printers, projectors, lighting control systems, audio recording devices and robotic machines.

SPEAKER

Computer speakers or multimedia speakers, are speakers external to a computer that disable the lower fidelity built-in speaker. The computer speakers typically packaged with computer systems are small plastic boxes with mediocre sound quality. Better computer speakers have equalization features such as bas and treble controls. Some computer displays have built-in speakers. Laptops come with integrated speakers. Unfortunately, the tight restriction on space inevitable in laptops means these speakers produce low-quality sound.

Common Features
· An LED power indicator
· A 3.5 mm headphone jack
· Controls for volume, and sometimes bas and treble
· A remote volume control

PRINTERS

There are a number of devices for obtaining hardcopy output from the computer. The most important hardcopy output device is the printer. Many printers are primarily used as local peripherals, and are attached by a printer cable or USB cable to a computer which serves as document source. Some printers, commonly known as network printers, have built-in network interfaces and can serve as a hardcopy device for any user on the network. Printers are classified on the basis of the print technology they employ.
1. Impact printers: A printer that uses a printing mechanism that bangs the character image into the ribbon and onto the paper.
2. Non-impact printers: A printer that prints without banging a ribbon onto paper.
Laser, LED, ink jet, solid ink, thermal wax transfer, and dye sublimation printers are examples.

THUMB DRIVE

Pen drive or Thumb drive or Flash drive is a memory chip that can be rewritten and can hold its content without power. It is also called a "flash RAM" or "flash ROM" chip and is widely used for digital camera and as storage for many consumer and industrial applications. Flash drives are resistant to scratches and dust and are more efficient than the previous forms of portable storage, such as compact discs and floppy discs. This makes them ideal for transporting personal data or work files from one location to another. They are smaller, faster and have thousands of times more capacity and are more durable and reliable because of their lack of moving parts. Most flash drives draw power from the USB connection and do not require a battery.

USES
· Personal data transport
· System administration
· Booting operating systems
· Audio players
· Music storage
· Brand and product promotion

MODEMS

Modem (modulator-demodulator) is a device that modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information. Some of the most common and popularly used modems are discussed below:
Internal   modem:
a device installed inside a desktop or laptop computer, allowing the computer to communicate over a network with other connected computers. They are integrated into the computer system and hence do not need any special attention. Internal modems are of two types – Dial-up and WiFi. Dial-up modems operate over a telephone line and require a network aces phone number and logon credentials to make a connection. WiFi can connect wirelessly.

External   **modem**:
a small box that uses other kinds of interfaces to be connected to the computer. They are easy to install as you don't have to open the computer. Some important types of external modems are
DSL (Digital Subscriber Line) modem
ADSL (Asymmetric Digital subscriber Line) modem
SDSL (Symmetric Digital Subscriber Line) modem
Cable modem
Satellite modem (SatModem)

DIGITAL CAMERA

A Digital Camera is a camera that takes video or still photographs, or both, digitally by recording images via an electronic image sensor. Digital cameras can do things film cameras cannot: displaying images on a screen immediately after they are recorded, storing thousands of images on a single small memory device, recording video with sound, and deleting images to free storage space. Digital cameras are incorporated into many devices like mobile phones.

Digital cameras are made in a wide range of sizes, prices and capabilities. The photographic images in the digital form can be fed to a computer for viewing and printing. First, the impressions are recorded or stored in the camera. The picture can then be downloaded to a computer by removable disc or by parallel port connection.

MICROPHONE

A microphone is an acoustic-to-electric transducer or sensor that converts sound into an electric signal. Microphones are used in many applications such as telephones, tape recorders, hearing aids, motion picture production, in radio and television broadcasting and in computers for recording voice. Microphones can be used for the input of sound which is then digitized by the computer. Speech recognition programs have given microphones a new arena for development- they can even replace the mouse or the keyboard as the system is programmed to respond to voice inputs.

Desktop computer microphones are not very effective for recording purposes as they pick up sound in all directions. Headset computer microphones come in two version- non USB and USB versions. They can pick up the sound very clearly and hence recording quality will be better. Moreover, they let the speaker to gesture, stand up, or move around for better voice projection and better voice quality.

BLUETOOTH DEVICES

Bluetooth is an open wireless technology standard for exchanging data over short distances using short length radio waves, from fixed and mobile devices. Invented by telecoms vendor Ericson in 194, Bluetooth is an Anglicized version of Danish Blatand, The epithet of the tenth century king Harald I of Demark. 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 etc.
A personal computer must have Bluetooth adapter or "dongle" in order to communicate with Bluetooth devices such as mobile phones, mice and keyboards. Bluetooth protocols simplify the discovery and set up of services between devices. Bluetooth devices can advertise al of the services they provide. This makes using services easier because more of the security, network address and permission configuration can be automated than with many other network types.

SOFTWARE

Software is a set of instructions for the computer. It is also called a program. A series of instructions that performs a particular task is called a "program".Two major categories of software are: - System software. -Application software.

System software is also called operating system – It is made up of control programs like the operating system and database management system (DBMS).

Application Software – Any program that process data for the user (inventory, payroll, spreadsheet, word processor, etc. constitute application software.

Operating System (OS) or System Software: It is the master control program that runs the computer. It is the first program loaded when the computer is turned on, its main part, the "kernel", is in memory always. It is the operating system that sets the standard for all applications and programs that are run in the computer. The Utility Programs and Language Translators are included under the operating software. The application interacts with the operating system for al user interfaces and file management operations.

Common OSs:

Commonly used operating systems are the many versions of windows (95, 98, NT, 2000, XP, Windows Vista, Windows 2008 Etc.) and the many versions of UNIX (Solaris, Linux etc.)

Windows

Windows is one of the most widely used operating systems. – It provides geographical user interface and desktop environment, in which applications are displayed in re-sizable, movable windows on screen. - It contains built-in networking, which allows users to share files and applications with each other if their PCs are connected to a network.

Advantages:

- Huge wealth of application programs that have been written for it. - It is the standard for desktop and laptop computers worldwide with hundreds of millions of users. - It is supported by Microsoft, the largest software company in the world.

Disadvantages:

- Windows 95, 98, ME, NT, 200 and XP are complicated working environments. - Certain combinations of hardware and software running together can cause problems. - Each new version of Windows has interface changes, that constantly confuse the

users.

Versions:

(1) Windows 1.0 – 1985 – Provided graphical interface under DOS. It displayed tiled windows (side by side) and was never popular.

(2) Windows 2.0 – 1987 – An upgrade to Windows 1.0.

(3) Windows 3.0 – 1990 – Widely supported because of its improved interface and ability to manage large amounts of memory.

(4) Windows 3.1 – 1992 – it added support to multimedia. It ran 16-bit windows and DOS applications.

(5) Windows 3.1 – 1993 – An upgrade to and the final release of Windows 3.1.

(6) Windows 95 – 1995 –

(7) Windows 98 – June 1998 – Major update to 95. Removed bugs and improved performance. Supports more hardware, including the USB.

(8) Windows 98SE – September 1998 – Upgrade to Windows 98. It incorporates W. 98 Service Pack 1 with Internet Explorer 5, Outlook Express 5, Net Meting 3 and Media Player 6.1 bundled.

(9) Windows ME – May 2000 – Upgrade to W.98 (Millennium Edition.) It adds more support for digital cameras, multiplayer games on the internet and home net-working.
(10) Windows NT {New Technology} – 2000 – A 32-bit OS for PC networking.
(11) Windows 2000 – Feb 2000 – Also known as Win2K and W2K. A major upgrade to W.NT.4.
(12) Windows XP – 2001 – Upgrade client version of W 2000.
(13) Windows 2003 – 2003 – Reversed version of Windows server 200.
(14) Windows Vista – 2007 – Revised version of XP.
(15) Windows 2008 – 2008 – Most of the functions can be selected from the menu. Improved version of 2003.

LINUX
It is a version of UNIX that runs on a variety of hardware platforms including X86 PCs, Alpha, Power PC and IBM's product line. It is open source software which is freely available. Technical support is often provided by Red Hat Software. It is stable and has the capacity to host web servers. IBM is supporting Linux for all of its hardware platforms in order to have a common OS for all product lines.

In 1990, a Finnish (Finland) computer science student, Linus Torvalds turned Minix, a popular classroom teaching tool, into Linux. Torvalds created the kernel and most of the supporting applications came from the GNU project and the FSF.

FREE SOFTWARE
The first formal definition of free software was published by FSF (Free Software Foundation) in February 1986. The free software definition, written by Richard Stallman and published by FSF, defines free software, as a matter of liberty, not price. The four freedoms for those who receive a copy of this software are:
1   The   freedom   to   run   the   program   for   any   purposes.
2 The freedom to study how the program works, and to change it to make it do what you wish.
3 The freedom to redistribute copies so you can help your neighbors.
4 The freedom to improve the program, and release your improvements (and modified version in general) to the public, so that the whole
Examples of free software: - Linux kernel, BSU and GNU/Linux operating systems, the GNU compiler collection and C Library.

Free Software Licenses
Al free software licenses must grant people all the freedoms as mentioned earlier. The majority of re software uses a small set of licenses. The most popular of these licenses are:
1.   The   GNU   General   Public   license.
2. The GNU Lesser General Public license.
3. The BSC license.
4. The Mozilla Public license.
5. The MIT license.
6. The Apache license.
The FSF and Open Source Initiative publish lists of licenses they find to comply with their own definition of re software and open software.

The FSF list is not prescriptive. Free software not in the FSF list is also possible. The OSI list only provides the list of licenses that have been submitted, considered and approved. All open source licenses must met open source definition.

There are three licenses approved by FSF:
1) Public domain software.
2) Permissive licenses, also called BSD.
3) Copyleft licenses, the GNU general public license being prominent.

COMPUTER VIRUS

A computer virus is a program that can copy itself and infect computer. There are other functions like malware, adware and spyware programs which do not have the reproductive ability. A true virus can only spread from one computer to another. It is often carried on a removable medium such as a floppy disk, CD, DVD or USB drive. Antivirus software is used to prevent, detect and remove malware including computer viruses, worms and Trojans horses. Some known antivirus software's are Avast, Avira, Mc Afe etc.

Cryptography is another method of protecting information from being destroyed. It is the practice and study of hiding information. Cryptography is applied in ATM cards, computer passwords, electronic commerce etc. In colloquial use, the term "code" is often used to mean any method of encryption or concealment of meaning. The study of characteristics of languages which have some applications in cryptography i.e. frequency data, letter combinations, universal patterns etc. is called crypto linguistics. Cryptography has long been of interest to intelligence gathering and law enforcement agencies.

NETWORKING

A computer network is a collection of computers and devices connected by communication channels. It includes the network operating system in the client and server machines, the cables connecting them and al the supporting hardware in between such as bridges, routers and switches. In wireless systems antennas and towers are also part of the network.

Major benefits of the computer networks are:

1 Resource sharing is made possible as all data, program and equipment is available to anyone on the network irrespective of the physical location of the resources and the user.

2 Data replicated on other machines increase reliability and reduce risk.

3 The computer network has the ability to increase system performance gradually as the workload grows by adding more processors.

4 Increased storage capacity as more than one computer is available on the network. A standalone computer might fall short of storage memory, but when many computers are on the network, memory of different computers can be used in one case.

5 It is a very powerful communication medium. Using a network, it is easy for people who live apart to communicate with each other and even to work together.

Disadvantages of networking:

1 Security issues tend to arise in an environment where data sharing is done.

2 Rapid spread of computer viruses.

3 In case the main file server of the network breaks down, the system becomes useless

Computer networks can be classified into different types based on their scale of operation. They include:

LAN: A **local-area network** (**LAN**) is a computer network that spans a relatively small area. Most often, a **LAN** is confined to a single room, building or group of buildings, however, one **LAN** can be connected to other **LANs** over any distance via telephone lines and radio waves. Local Area Networks cover a small physical area, like a home, office, or a small

group   of   buildings,   such   as   a   school   or   airport.

WAN: A computer **network** that spans a relatively large geographical area, generally having a radius of more than 1 km. . Typically, a **WAN** consists of two or more local-area **networks** (LANs). Computers connected to a **wide-area network** are often connected through public **networks**, such as the telephone system. They can also be connected through leased lines or satellites.

MAN: A **metropolitan area network** (**MAN**) is a **network** that interconnects users with computer resources in a geographic area or region larger than that covered by even a large local area **network** (LAN) but smaller than the area covered by a wide area **network** (WAN).

SAN: SAN (**storage area network**) is a high-speed **network** of storage devices that also connects those storage devices with servers. It provides block-level storage that can be accessed by the applications running on any networked servers. Storage Area Networks help attach remote computer storage devices, such as disk arrays, tape libraries, and optical jukeboxes, to servers in such a manner that that they appear to be locally attached to the operating system.

CAN: A **Controller Area Network** (**CAN** bus) is a vehicle bus standard designed to allow microcontrollers and devices to communicate with each other in applications without a host computer.

PAN: A **personal area network** (**PAN**) is a computer **network** used for data transmission amongst devices such as computers, telephones, tablets, personal digital assistants, fax machines and printers, that are located close to a single user.

GAN: A global area network (GAN) is a network used for supporting mobile across an arbitrary number of wireless LANs, satellite coverage areas, etc.

FILE SHARING
The practice of sharing digitally stored information, such as computer programs, Audio-video programs, digital books etc. is termed file sharing.
The different modes of file sharing are:
1 Manual sharing using removable disc or USB
2 Peer to Peer networks
3 File hosting networks
Of these, Peer to Pere file sharing is a very popular option for file sharing on the internet. Users can use it search for shared files already connected to the network. When this software is used, the user's system also becomes part of the network and Information from the user's computer can be downloaded by others in the network.

File hosting services are an alternative to Peer to Peer software. They are used along with Internet collaboration tools like e mails, forums, blogs or any other medium in which links to direct downloads from file hosting services can be embedded. To ensure offences are not permitted in file sharing, copyright rules have been enacted. A copyright grants the owner of the material exclusive rights to the material and its distribution. By distributing this material without permission, a person distributing the material is violating copyright law and is subject to penalties under the law.

THE INTERNET

The internet is a communication system that comprises of a network of networks. It is made up of more than 450 million computers in more than 20 countries thus acting as a global carrier of information. It consists of millions of private, public, academic, business and government networks linked by a broad array of electronic and optical networking technologies. The internet was originally developed in the cold war period for the exclusive use of the US military force.

The Advanced Research Projects Agency (ARPA) funded a project to connect university scientists and engineers together via computers and telephone lines. The project called ARPANET allowed users to aces unpublished data and journals on a wide variety of subjects. The internet caries plenty of information resources and services , including the interlinked hypertext documents of the World Wide Web (www). Today, the internet has become commercialized into a worldwide information highway, providing information on every subject known to mankind. In addition to a number of online services, it also offers e-mail facilities. E-mail and file transfers via internet have become very popular.

a) The services offered by the internet are: Electronic mail (email) which helps to send and receive mail.
b) Telnet or emote login which permits one computer to log onto another computer.
c) WWW or The Web which is the largest and fastest growing activity on the net
d) FTP or File Transfer Protocol which allows computer to retrieve complex files from remote sources and to save them
e) Web browsing
f) Online Chatting
g) Newsgroups or internet discussion groups which are set up to receive and send articles and
h) Messages on specific topics.
i) Teleconferencing and videoconferencing
j) Multimedia resources and services
k) Multipoint conferencing
l) HTML services.

Requisites for an internet connection:
Ø A computer with good memory and fast processor.
Ø A modem
Ø A Browser software
Ø An internet service provider that connects the system to the internet.

HTML

HTML stands for Hypertext Markup Language. Markup language may not be visible to us and it is the information that is added to a document to convey information about the document's structure or presentation. HTML is a markup language that enables the web browsers how to structure and display web pages. HTML was created by Tim Berners Lee in 1989. HTML documents could be transmitted to any user on the internet and displayed by a browser.

WORLD WIDE WEB

It is an internet interface that facilitates all internet services attractive by incorporating hypermedia capabilities. We can retrieve documents, view images, animation and video, speak and hear voice etc. When we log on to the internet using a web browser like Internet

Explorer, Mozilla Firefox, Netscape etc. we can view documents on the World Wide Web. The WWW is a huge collection of web sites. Using the HTML, the author of a document can specially code sections of the document to point to other information resources. These sections are called hypertext links.

A browser is a computer program that enables you to use the computer to view WWW documents and aces the internet. It is a software application for retrieving, presenting and traversing information resources on the WWW. Although browsers are primarily used to aces the WWW, they can also be used to aces information provided by web servers in private networks or files in file systems.

SEARCH ENGINE

A web search engine is designed to search for information on the WWW, the results of which are presented in lists called hits. Web search engines work by storing information about many web pages, which they retrieve from the html itself. A search engine is a searchable database of internet files collected by a computer program. It consists of three components: Spider, Index and Search and retrieval mechanism.

Spider is a program that traverses the web from link to link, identifying and reading the pages. They are also called web wanderers, web crawlers and robots. They send back indexing information to the search engine. Index is a database containing searchable information about web page gathered by the spider. Search and retrieval mechanism is the technology that enables users to query the index and that returns in a schematic order. There are three major types of general search engines: Free Text search engine, Directory Type search engine and Meta search engine. In addition to these there are also subject specific search engines, directories, subject gateways and information portals. Some websites like yahoo.com function as search engines in additon to other functions. Most web search engines are commercial ventures supported by advertising revenue and some employ the practice of allowing advertisers to pay to have their listings ranked higher in search results.

Some of the top search engines are:
www.google.com, www.yahoo.com, www.bing.com, www.ask.com, www.msn.com, www.netscape.com

E-MAIL

It is one of the most commonly used services on the net, allowing people to send messages to one or more recipients. E-mail stands for electronic mail. Mail is send to a simulated mailbox in the network mail server or host computer until the recipient reads it. There are two ways of accessing e-mail on the internet- one by using a program like Microsoft Outlook Express e mail service or Netscape Messenger that is installed in the computer and the other is a mail service on the web like gmail and yahoo mail, which is accessible from any browser.
To receive and send web based email one has to type in the username and password. E- mail was invented by Ray Tomlinson in 1972. Web based e-mail was first started by MSN with the name hotmail. Others like redifmail, gmail and yahoo followed.

Advantages of E-mail
   a) It is inexpensive.
   b) E-mail is fast. It is routed through several servers until it reaches its destination. But it usually reaches the recipient fast.

c) Transmission is secure and reliable.
d) E-mail is flexible in that it does not depend on the type of computer or program you use.
e) The recipient does not have to present when the message is send.
f) It can be sent to multiple recipients at the cost of a single mail.
g) E- mail messages can be segregated and stored in folders
h) E-mail can be accessed from any location with an internet connection.
i) E-mail programs usually have spell check facilities.
j) Attachments are possible.
k) Notification of new e-mail is possible if the system is switched on.

BLOGS

A blog (web log) is a type of website usually maintained by an individual with regular entries of commentary, descriptions of events etc. It is usually a single page entry which archives older entries. A blog is organized in reverse chronological order, from most recent entry to least recent.

A blog is usually owned by a single person but can be viewed by the public. It could be read as an online journal or diary. Blogs are of different types: Personal blogs which resemble a diary entry and allow people to share thoughts, feelings and sentiments with others. Corporate and Organizational Blogs which are usually used for business purposes. This is usually used to enhance the communication and culture in a corporation or externally for marketing, branding or public relations. Other types like political blogs, travel blogs (also called travelogs), fashion blogs, project blogs, education blogs, music blogs, legal blogs, sketchblogs, photoblogs, videoblogs(Vlog) etc. exist.

CHAT

Online chat refers to any kind of communication over the internet, especially direct one-to-one chat or text-based group chat using tools like Instant Messengers and Internet Relay Chat(IRC). It is an exchange of typed-in messages requiring one site as the repository for the messages(Chat site). IRC was created by Jarko Oikarinen in 198and it was designed for group communication in discussion forums called channels. It is used as a virtual meeting place to discuss various topics of interest. Instant Messaging is a collection of technologies used for text- based communication between two or more participants over the internet, or other types of networks. IM allows immediate receipt of acknowledgement or reply. Users can see each other using webcams, or talk directly using microphone, headphone or loudspeaker. Text conversations can be saved for later reference.

SOCIAL NETWORK

A social network service focuses on building online communities of people who share interests and activities of others. They are web based and allow users to interact using e-mail and instant messaging services. It is a powerful means to communicate and share information. A social network is typically made up of individuals called nodes tie up by relations such as friendship, kinship, financial exchange, dislike, knowledge etc.

a) **Social networking helps you to:** Search for old friends or make new ones
b) Share music and video
c) Join communites based on interests
d) Find jobs
e) Increase business opportunities

Even though social networking sites are immensely popular, there are also several problems involved. Users receive friend applications even from strangers and an acceptance could give them aces to your personal information. Fake profiles allow children to enter these sites which often prove dangerous.

Financial irregularities have also been reported from such sites. Some well-known social networking sites are: Twitter, Orkut, Facebook, MySpace, LinkedIn, Flickr

KNOWLEDGE RESOURCES ON THE INTERNET

With the introduction of the internet, information gathering has become an easy job. The quantity of information available on the internet is growing at an exponential rate. Even the print media could be retrieved from the net. Books, journals, conference proceedings, study materials, video lectures etc. are available on the internet.

Digital publishing started in the 1990s and every year the digital content is increasing by 50%. This rapid growth of net resources has necessitated the introduction of various control measures. Indexing and cataloguing has become necessary. With the emergence of the internet and the availability of server computers in the net, the availability of online database is increasing at a very fast rate. Not only information specialists, academics and researchers, but the common man is also interested in online information resources.

ENCYCLOPEDIAS

An encyclopedia is a reference work, a storehouse of information either from all branches of knowledge or a particular branch of knowledge, The word has its origins from the Greek language where 'enkyklios' means 'well rounded, encircled' and 'paideia' means 'education'. While a dictionary provides limited information, analysis or background of the word defined, encyclopedias give information on a much larger scale. An encyclopedia article may include maps and illustrations as well as bibliography and statistics.

TYPES OF ENCYCLOPEDIAS

General encyclopedias .eg The New Encyclopedia Britanica
Subject encyclopedias eg., The Concise Encyclopedia of Archeology
Encyclopedias on CD ROM. Eg., Microsoft Encarta Encyclopedia
Online encyclopedias: online encyclopedias are acesible via www and are often the best choice when you are in a hurry. Some of the popular online encyclopedias are Encyclopedia Britanica, Columbia Encyclopedia, Wikipedia, Educypedia, Investopedia, Encyberpedia, Encyclopedia Mythica etc.

LIBRARIES

A library is a collection of sources, resources and services and the structure in which it is housed. By traditional professional divisions, libraries can be classified into Academic libraries, Public Libraries, Research libraries, School libraries and Special libraries. Based on the technology used, libraries are again divided into the following:
   a) Traditional libraries
   b) Automated libraries with machine-readable catalogue, computerized acquisition etc.
   c) Electronics libraries where LAN and CD ROM networking is done.
   d) Digital libraries where internet-based services and audio/video conferencing is possible.
   e) Hybrid libraries which are working in both digital as well as print environment

DIGITAL LIBRARIES

Most libraries today are switching into the digital mode due to the information explosion as well as the low cost of technology. The new generation prefers digital libraries as they find searching for books in traditional libraries quite difficult and time consuming. A digital library is a collection of resources usually accessible via the internet. It has links with other libraries or information services . There are hundreds of digital libraries accessible
through the internet.
Some of the advantages of digital libraries are:
1. Storage space is not a limitation as digital information requires very little space.
2. Maintenance cost is minimal as there is not much expenditure on staf, rent, book maintenance etc.
3. Digital conversion increases accessibility to users.
4. People don't have to access the library physically.
5. They can be accessed any time of the day.
6. Information retrieval is easier as these libraries provide user-friendly interfaces.
7. Preservation is easier.
Some of the disadvantages of digital libraries are:
1. Digital libraries often violate the copyright law.
2. With more computers in the network, speed of aces is affected
3. The infrastructure cost of digital library is very high initially.
4. High band width is essential
5. They cannot reproduce the ideal environment of the traditional library

Popular digital libraries
    a) Internet Library of Early Journals
    b) World Public Library
    c) The Internet Public Library
    d) National Science Digital Library
    e) Digital Library of India
    f) Feedbooks
    g) Fictionwise.com
    h) Dawsonera
    i) OCLC's NetLibrary

JOURNALS

An academic journal is a peer-reviewed periodical in which scholarship relating to a particular academic discipline is published. They serve as forums for the introduction and scrutiny of new research. Academic journal is an umbrella term used to include scientific journals, journals of social sciences, humanities etc.

With the arrival of the internet, the world of knowledge to changed and as such academic journals are available online to. As most scholarly journals are now published in the digital format several institutions can come together and subscribe to journals at a lower cost. UGC and CSIR have al developed consortia for accessing e- journal. In academic publishing, open access (OA) is digital, online, free of charge, and free of most copyright and licensing restrictions aces to literature and articles that have traditionally been published in scholarly journals.

BOOK SITES

Online book sites are very popular these days on the internet. Wholesale booksellers as well as retailers have websites for book sales. The ambience of a real book store cannot be recreated online, but these sites do have a lot of advantages

1. With the advent of search engines, new or rare books could be found.
2. Used books could be purchased at discounted rates.
3. The option of buying books at auction sites is open.
4. An online book store is open 24x 7 and as such it is more convenient for buyers.
5. Since there is no space constraint, innumerable books could be put up for sale.
6. Online book stores can offer books at better prices as maintenance cost is low.
7. Shoppers can post comments, reviews etc. in some sites that sell books.
8. E-books can be purchased and its delivery is immediate to the reading device or computer.

Some popular online bookstores are:

Amazon Barnes and Noble eBay AbeBooks Walmart Flipkart Half Price Books Book Finder

One limitation of online shopping is that you cannot browse through the books via the website. Moreover, there is always the risk of receiving damaged books when orders are placed online.

CONTENT REPOSITORIES

An online content repository functions as a web- based service that allows users to upload and share different types of content. The content can be in the form of digital images, photographs, video files, documents etc. Several companies provide storage and aces services for online content repositories. Some of them are Flickr, Youtube, Dailymotion etc.

ONLINE EDUCATION

Online education is a form of distance education that is aided by a personal computer. The internet as well as audio and video technologies are used in online education.

Popular   formats   include:
1 Adult online education: the stress here is on erasing illiteracy and teaching language skills.
2 Hybrid Education: Online classes are blended with on-campus sessions
3 Online continuing education: Offers classes for students who aim for additional knowledge in addition to the basic degree.
4 Online distance education: A student pursuing a traditional degree gets to take online courses and as such are flexible.
5 Online Higher education: Students who want a degree but are unable to attend institutions for the attainment of the same are benefited by this.

Some well-known online universites are:
The University of London
The University of South Africa
The University of Texas
Stanford University
In India online courses are offered by:
Nalanda Open University, AIMS, IGNOU, BITS, University of Mumbai

Advantages of Online education:
1. Students can access web based resources and students can request challenging assignments from the teachers.
2. Students can access educators and course material from anywhere at any time.

3. Online courses offer educational resources in multiple media formats like threaded discussion boards, newsgroups, chat rooms, webcasting etc.
4. You can continue the learning process while working at the same time. Access to more teachers and subject experts outside the student's limited geographical area possible.
Disadvantages of online education:
1. Online education requires a lot of self-discipline. Time management is very essential.
2. Only people who have access to a computer or the internet benefit from online education.
3. The cost of online education is usually very high.
4. Lack of interaction with teachers and other students is a serious disability.
5. Courses offered is limited.
6. Course content in online education is not as rigorous as in conventional educational systems.

VIRTUAL UNIVERSITY
A Virtual university is one which carries out much of its teaching at a distance from the learner. Virtual universities provide courses online over the internet. Some of these virtual universities are real institutes while others do not have the conventional building or set-up. Web pages, e-mail and other networked sources are employed by virtual universities. These universities can grant degrees that will be recognized all over the world. Many of them are accredited the way traditional universities are.

Mastering software tools is a must in virtual university education. Time management skills and aces to online academic resources is a must

OTHER INFORMATION SOURCES
Today the web has grown to encompass a wide variety of information sources such as e-journal, pre-prints, technical reports ,databases, library catalogues, educational materials and so on. Some of the primary information sources are: Conferences, Seminars, Workshops, Meetings, Exhibitions, Tradeshows, Fairs- Published/Forthcoming: Which sometimes even provide a virtual visit to these shows. Advance information is provided here. Courseware/Tutorials/guides/manuals : Provides distance learning facilities, and offers electronic classrooms. Directories: Most are available free on the internet and help in establishing contacts either for business or research purposes. Discussion forums: provide current awareness in a specific field of interest. Members can communicate through messages. FAQ sources: fundamental concepts on a specific field is
represented here. Electronic Journals: offers quicker access to desired articles and is economical too Patents: Patent databases offer information on patent laws and filing procedures of various patent offices.
Research Projects: includes list of projects underway.
Science news
Technical reports
Library catalogues
Equipment catalogues
Museum and archives
Maps
Employment sources
Matrimonial services
Funding/grants sources

INTERNET DIRECTORIES

Also called web directory or link directory is a directory on the world wide web. It is not a search engine but provides web sites by category and sub-category. Most directories are very general in scope and lists websites on a wide range of categories, regions and languages. Niche directories focus on restricted regions. Example for a niche directory would be the shopping directory. Some of the common features of directories are:

   a) Free   submission Reciprocal link
   b) Paid submission where a one-time fee is charged.
   c) Affiliate links where the directory earns commission for referred customers from listed   websites.

WEBSITES OF UNIVERSITIES AND RESEARCH INSTITUTIONS

Websites of a few top universities are provided below:
HARVARD UNIVERSITY http:/ www.harvard.edu/
STANFORD UNIVERSITY http;/www.stanford.edu/
UNIVERSITY OF CAMBRIDGE http;/www.cam.ac.uk/
MASACHUSETTS INSTITUTE OF TECHNOLOGY
http;/web.mit.edu/
COLUMBIA UNIVERSITY http;/www.columbia.edu/
UNIVERSITY OF CHICAGO http;/www.uchicago.edu/
UNIVERSITY OF OXFORD http;/ www.ox.ac.uk/
TOKYO UNIVERSITY http;/www.u-tokyo.ac.jp/
UNIVERSITY OF TORONTO http;/www.otoronto.ca/
UNIVERSITY OF DELHI http;/www.du.ac.in/
ANNA UNIVERSITY http;/www.anauniv.edu
JAWAHARLAL UNIVERSITY http;/www.jnu.ac.in
BANARAS HINDU UNIVERSITY http;/www.bhu.ac.in
ANNAMALAI UNIVERSITY http;/anamalaiuniversity.ac.in/
UNIVERSITY OF HYDERABAD http;/www.uohyd.ernet.in
UNIVERSITY OF MADRAS http;/www.unom.ac.in
OSMANIA UNIVERSITY http;/www.osmania.ac.in
BHARATHIAR UNIVERSITY http;/www.b-u.ac.in/
KANNUR UNIVERSITY www.kannuruniversity.ac.in
UNIVERSITY OF CALICUT www.universityofcalicut.info
ALIGARH MUSLIM UNIVERSITY http;/www.amu.ac.in

EDUSAT

Edusat is the satellite exclusively devoted to meet the demands of educational sector. It was launched on September 20, 2004 by Indian Space Research Organization (ISRO) to meet ever increasing demand for an interactive satellite-based distance education system for the country. It has revolutionized classroom teaching through IP based technology.

www.literariness.org