COMPUTER/COMMUNICATION NETWORKS

A Computer network is the interconnection of two or more computers and other devices for purposes of sharing information and resources.

.The computers on a network must be linked by a medium such as cables, a wireless device or a telecommunications system in order to exchange data.

.The network may be limited to a group of users in a local area local area network, or to a wide area network covering several cities or regions, or the entire world in case of the Internet.

Reasons for Computer networks instead of standalone computers?

.To Allow users to share information,

.To enable sharing of software,

.To enable sharing of hardware.

.To enable communication between computer users through tools like e-mail.

.To enable data communication. i.e. transmission of electronic content over a given medium.

.To ensure security of data by putting in place administrative controls over the network.

.To share databases

Advantages of a computer network

.It Facilitates easy communications e.g. through Electronic mail

.It Reduces on cost by sharing hardware like printers and sharing software among network users since one device is jointly used on the network instead of installing devices to each computer.

.it allows for tight control over who has access to data in the system

.It enables sharing of data and information stored on any other computer on the network.

.It enables online learning and collaborative research

.It allows access to free common databases and databanks like free software and ATM services.

.Software is easily upgraded on the network since it is done at ago on the server.

.Computer networks enable centralized administration, control and monitoring of individual users on the network.

.Computer networks enable workgroup Computing. Workgroup software allows many users to work on a document or project concurrently.

.Networks provide a very rapid method for sharing and transferring files instead of using time consuming method of using movable disks to transfer data from one computer to the other.

.It enables flexible access. Users can log on and access their work from any workstation on the network.

The disadvantages of Networks

.high Initial cost of installing a network on Cables, network cards, network equipment and software, and the installation may require the services of a technician.

.High costs on network administration and maintenance of a network.

.Time can be wasted on social networks instead of doing meaningful work.

.The entire network fails if the server crashes, when this happens, the entire organization loses access to necessary programs and files.

.High risk of data corruption, since many users will be using the system to access the same documents, some of whom may be careless or deliberately tamper with it.

.Increased exposure to hackers which puts private data at risk

.There is a greater risk from viruses, because they are easily spread between the computers share a network.

.A break in the communication channel can stop the entire network.

.Information theft

.Change of file names by hackers and crackers

.abuse of data e.g. malicious deletion of Data

The Components of a computer network

These are elements that make up a computer network:

.Network interface card

.Terminal nodes e.g. Computers and Printers

.Communication (Network) media/Channels e.g. Ethernet cables and access point

.Network software e.g. network operating system.

.Switches or hubs.

The Network hardware devices include:

.Hubs/concentrators

.MODEM

.Switches

.Repeaters

.Bridges

.Routers

.Network Interface Cards (NICs)

.etc.

Network Interface Cards (NICs)/network adaptor

.A network interface card is an electronic communication device that connects a computer to a local area network.

.Some NICs are built on the motherboard while others built on a circuit board fitting into an expansion slot inside the computer.

.The type of NIC determines the speed and performance of a network.

.There are three common NICs:

Ethernet cards,

Local Talk connectors,

Token Ring cards

MAC address

.A Media Access Control address (MAC address or physical address) is a unique identifier assigned to network interfaces

Hubs/Concentrators

.A hub is a device that connects multiple devices to the network and its function is to send and receive signals along the network between the devices connected to it by broadcasting the data to all the devices/computers.

.It serves as a central meeting place for cables from computers, servers and peripherals on the network.

.The entire network shuts down if there is a problem on a hub

Repeaters

.A repeater is a device that is used to regenerate and amplifies signals along a communication channel to create long-distance networks by placing it between two segments of the network channel to overcome distance limitations.

Bridges

.A Bridge is a device that links two local area networks that use the same address method or protocol.

.It accepts all packets from each network addressed to devices on the other, buffers them, and retransmits them to the other network.

Switches

.A switch is a high-speed device that sends the data packets only to the destined computer keeping track of which hardware addresses are located on which network segment

.It maps the IP address with the MAC address of the LAN card.

.Switches are used in the LAN, MAN and WAN.

Router

.A router is a device that links one network to other physically and logically separate networks.

.The main function of the router is to sort and send data packets to their destinations based on their IP addresses.

Gateway

A gateway is a device that connects the LAN with the internet.

A gateway interconnects networks with different network protocol technologies by performing the required protocol conversions.

MODEM

.A modem modulates outgoing digital signals from a computer or other digital device to analog signals for a telephone line and demodulates the incoming analog signal and converts it to a digital signal for the digital device.

Fax modem

A fax modem is a device that enables a computer to transmit and receive documents as faxes.

Communication media/channels

Also known as communication links or Data links

.a communication channel is a medium over which Data travels/is transmitted from one computer (device) to another.

Forms of Data communication

.Data transmission, digital transmission, or digital communications is the physical transfer of data (a digital bit stream) over a point-to-point or point-to-multipoint communication channel.

Examples of such channels are copper wires, optical fibres, wireless communication channels, and computer buses.

The data is represented as an electromagnetic signal, such as an electrical voltage, radio wave, microwave, or infrared signal

.Data is transmitted over networks using signals, which are transformed, or encoded, by computers into the voice, video, graphics, and/or the print we see on our computer screens.

.The signals used by computers to transmit data are either digital or analog

.Analog signals are continuous signals that vary in strength. Sound is an example of an analog signal.

.Digital signals are discrete/discontinuous.

Either there is a signal or there isn't a signal, therefore they are represented by on (1) and off (0) pulses.

Modulation and Demodulation of Signal

.Modulation refers to the process of converting digital signals into analog form so that data can be sent over the phone line.

.Demodulation is the process of converting the analog signals back into digital form so that they can be processed by the receiving computer.

.The hardware that performs modulation and demodulation processes is called a MODEM.

Serial transmission

.Serial transmission is the sequential transmission of one bit of signal at a time sent over a single wire. Low data transfer rates are possible, but can be used to transfer data over longer distances.

Parallel transmission

.Parallel transmission is the simultaneous transmission of the signal elements of a character or other entity of data over two or more separate paths.

.Multiple electrical wires are used which can transmit multiple bits simultaneously, which allows for higher data transfer rates than can be achieved with serial transmission

Asynchronous Data transmission

.Transmission where each group of digital or analog signals making up the code for one character is separated and individually wrapped with a start BIT and a stop BIT and an error check BIT.

.Asynchronous transmission is relatively slow because of the extra bits that must be sent with the data bits for each character.

Synchronous Data transmission

.This is the transmission where characters are sent as blocks of signals with header and trailer bytes at the beginning and end of the block.

.Synchronous transmission is faster because characters are sent as blocks; it is therefore used to transmit large volume of data at high speed.

Duplex transmission

.A duplex communication system is a point-to-point system composed of two connected parties or devices that can communicate with one another in both directions. An example of a duplex device is a telephone.

Full-Duplex (FDX) transmission

.A full-duplex (FDX) system, sometimes called double-duplex, allows communication in both directions simultaneously. E.g. Land-line and Cell telephone networks are full-duplex, since they allow both callers to speak and be heard at the same time.

Half-Duplex (HDX) transmission

.A half-duplex (HDX) system provides communication in both directions, but only one direction at a time (not simultaneously).

.An example of a half-duplex system is a two-party system such as a walkie-talkie.

Simplex

.Simplex is a communication that occurs in only one direction. For example, Radio and Television broadcast, communication between a mouse and computer

Point to point transmission

A point-to-point connection refers to a communications connection between two nodes or endpoints.

Multi-Drop transmission

A transmission bus in which all components are connected to the electrical circuit. A process of arbitration determines which device sends information at any point. The other devices listen for the data they are intended to receive.

.There are both physical (cable or wired) media, and wireless media.

Transmission media

Common transmission media include the following:

.Twisted pair cables

.Coaxial cables

.Fiber optic cables

.Terrestrial Microwave

.Radio

.Satellite

Twisted pair cables

A twisted pair cable consists of eight insulated copper wires twisted in pairs and arranged in a regular spiral pattern to minimize the electromagnetic interference between adjacent pairs

There are two types of twisted pair cables;

Shielded twisted pair (STP) and unshielded twisted pair (UTP)

Shielded twisted pair (STP)

Each pair is twisted to decrease interference.

Advantages of twisted pair cables

They are relatively cheap to use because its cost per unit length is low.

They are convenient to use because they are small in size.

They are easy to install because of their flexibility it is easily strung around the room or wall.

Shielded twisted pair has a foil shielding to help provide a more reliable data communication.

Because UTP is small, it does not quickly fill up wiring ducts

TP is easy to terminate

The Disadvantages of twisted pair cables

.Used over a short distance, usually less than 100 meters

.Twisted pair's susceptibility (prone) to the electromagnetic interference which leads to signal loss.

.They are easily damaged. Especial the UTP.

.They are low frequency cables. So they are not suitable for transmission of very high frequency signals like cable TV, TV antenna and radio antenna signals

Coaxial cables

.A coaxial cable is one that consists of two conductors that share a common axis hence the name "co-axial". The inner conductor is a straight wire, and the outer conductor is a shield that might be braided or a foil. The two conductors are separated by a nonconductive element.

Features of coaxial cable

.both conductors share a common center axial, hence the term "co-axial"

.It has a high bandwidth

.It is highly resistant to signal interference

.It is used for long distance (300-600 meters)

.It is quite bulky and sometimes difficult to install

.the most common type of connector used with coaxial cables is the BNC connector

.It has higher installation costs

.Coaxial is prone to lightning strikes which damage the cables or equipment on which it is connected.

.It is more expensive than twisted pair cables

.It is not flexible

The Fiber Optic cables

.Fiber Optic Cable is a transmission medium, which is made up of hundreds to thousands of fine, light-conducting filaments made up of glass or plastic.

.Data is changed into pulses of light, which are sent down these glass or plastic fibers at very high speed over long distances.

.Fiber optic cable consists of a center glass core surrounded by several layers of protective materials

.It has protection against environmental interference

.It has high data carrying capacity (bandwidth of up to 2 Gbps)

.It can be used over greater distances due to the low loss, high bandwidth properties.

It can be used for 2km without the use of a repeater

.Fiber optic networks operate at high speeds -up into the gigabits

.Greater resistance to electromagnetic noise such as radios, motors or other nearby cables.

.Fiber optic cables cost much less to maintain.

.They are light weight and small in size, which makes them ideal for applications where running copper wires would be impractical .

.It is difficult to tap data over a fiber optic without being noticed due to difficulty of connecting new nodes when others are switched on.

.They are poor conductors of electricity which eliminates the possibility of electrical shocks.

.Fiber optics are expensive compared to the other types of cables.

.They are difficult to install and modify, therefore require skilled installers

.It is difficult to add additional nodes on the network.

.It is much more costly than other cables to install

Wireless media

Wireless communication technology, is one where the transfer of information over a distance is done without the use of cables (wires) as a medium.

Wireless technology is applied in Local area networks (WLANs), extended local area network, and connecting a network to another network.

.Wireless technology overcomes the inconvenience of using too many wires for communication.

.Wireless is appropriate to use in places where cabling is practically impossible.

.Wireless increases flexibility and mobility at the work place because workers can sit anywhere with their computers without being limited by the extent of cable connections.

Types of wireless media

.Radio

.Microwave

.Infrared

.Blue tooth

Microwave transmission

.Microwave transmission refers to the technology of conveying information or energy by the use of radio waves whose wavelengths between one meter and one millimeter.

.Microwave transmission requires line of sight in order to work properly because it is a point-to-point connection.

.This means microwave must be transmitted in a straight line (with no obstacles such as buildings or hills in the line of sight between the microwave stations).

.The distance covered by microwave signals is based upon the height of the antenna.

.Microwave communication can take two forms: terrestrial (ground) links and satellite links.

.Terrestrial microwaves use Earth-based transmitters and receivers, sending data from one microwave station to another.

Earth-based transmitters

.Microwave antennas are usually placed on top of buildings, towers, hills, and mountain peaks to avoid obstructions.

.Microwave transmissions use parabolic antenna and dishes that produce a narrow, highly directional signal.

Limitations of Microwave

.microwave signals are highly subjected to atmospheric interference.

.microwave can be exposed to electronic eavesdropping.

Communications Satellites

.Satellites are communication devices stationed in space and use microwave radio as their telecommunications medium to communicate with the earth based communication facilities.

.Satellites are capable of receiving and relaying voice, data, and TV signals to and from earth based communication facilities (earth stations) that use parabolic antennas (satellite dishes) to communicate with the satellites.

.Satellite microwave communication is flexible and possible with most remote sites and with mobile devices, because no cables are required, which enables transmission with ships at sea and motor vehicles.

Radio transmission

.Radio is the transmission of signals, by converting them into electromagnetic waves.

.The electromagnetic waves are transmitted in space towards the destination.

.Electromagnetic waves are intercepted by the receiving Antenna. The signal power is collected at the receiving antenna.

.Radio waves are not a line of sight transmission, therefore not affected by presence of objects between the transmitter and receiver.

Infrared transmission

.Infrared (IR) light is electromagnetic radiation with longer wavelengths than those of visible light.

.Infrared signal is usually transmitted across relatively short distances to transmit data between personal devices for example, between a computer and a cell phone.

.Infrared can be either beamed between two points or broadcast from one point to many receivers.

Bluetooth

.Bluetooth is a short range wireless technology which Operates at approximately 1Mbps with range from 10 to 100 meters. Bluetooth is an open wireless protocol for data exchange over short distances.

Wireless local area network (WLAN)

.A WLAN is a network that provides wireless network communication in a small geographical area using high frequency radio signals or infrared light beams or microwave or Bluetooth to communicate between the workstations and other devices.

.Clients communicate with the access point using a wireless network adapter similar in function to a traditional Ethernet adapter.

.A wireless local area network (WLAN) links two or more devices using a wireless distribution method (spread-spectrum).

.Most modern WLANs are based on IEEE 802.11 standards, marketed under the Wi-Fi brand name.

.The WAP usually connects to a wired network, and can relay data between wireless devices and

wired devices.

.Wireless LANs use spread spectrum technology to enable communication between multiple devices in a limited area. An example of open-standards wireless radio-wave technology is IEEE 802.11b.

The wireless LAN network devices

Wireless network adaptors, wireless access points, wireless bridges, wireless routers, and antennae.

Wireless access point

.A wireless access point (WAP or AP) is a device that connects wireless communication devices together to form a wireless network.

.To be able to communicate with a wireless device, the computer must have a wireless network adaptor.

WLAN adaptor/card

.This is a device that provides an interface between the network operating system and an antenna to create a wireless connection to the network

Access point (AP)

.AP is the wireless equivalent of a LAN hub. It receives buffers, and transmits data by means of a wireless antenna between WLAN and a wired network

.An outdoor LAN Bridge is a device used to connect LANS in different buildings.

WLAN can be built with either of the following topologies:

.Peer-to –Peer (Ad hoc) topology

.Access Point –based topology

.Point –to–Multipoint bridge topology

Peer –to-Peer (ad hoc) topology

.In the ad hoc topology devices are configured to communicate directly to each other.

Access point –based topology

.This is where access point(s) are used to enable a wireless device to communicate with any other wired or wireless device on the network.

.Access points are used to bridge traffic onto a wired or wireless backbone, or where network devices are interconnected using access points.

Point –to –multipoint bridge topology

.This is where a wireless bridge is configured to connect a LAN in one building to a LAN in another building even if the buildings are not close together but within a clear line of sight.

Wireless Wide Area Network (WWAN)

This is a wireless network over a wide area in which separate areas of coverage are connected wirelessly.

Wireless Wide Area Networks equipment

Long distance wireless equipment include:

.Satellite

.Microwave dishes

.Microwave antennae

The Wireless Web

The wireless web refers to the use of the World Wide Web through equipment like cellular phones, Pagers, PDAs, and other portable communications devices that offers anytime/anywhere connection.

Wireless application Protocol (WAP)

The Wireless Application Protocol (WAP) refers to a group of related technologies and protocols widely used as a standard protocol in providing Internet access to mobile phones or other small mobile devices.

WAP protocol involves a website transmitting scaled-down versions of normal web pages specifically optimized for use by wireless telecommunications devices such as smartphones.

Advantages of a wireless network

.Cost reduces because there is no need to buy and lay cables.

.Work is reduced for setting up the network because there are no cables involved.

.It enables usage of a variety of devices on network such as personal digital assistants (PDA), blackberry devices, and other cell phones.

.It enhances mobility and flexibility of a network due to ability to move devices without the restriction of cables for example, mobile phones and laptops.

.Fast data transfer rates are possible where there are no environmental obstacles.

.It also allows an organization to offer visitors

.Wireless technology makes it easy to set up temporary network installations. These situations include any temporary department set up for a specific purpose that soon will be torn down or relocated.

.Wireless technology is becoming cheaper and affordable over time

Disadvantages of a wireless network

.Poor security of data on a wireless network, outsiders can easily log on an unsecured wireless network.

.They are slower than LANs using cabling

.They are prone to electrical interference from lights and radios

.They are Subject to obstructions such as walls.

.Wireless access points and WI-FI technology in general have a limited spectrum/range. Signal strength decreases as the range increases.

Network software

Network software are Communication programs that are used in combination with network devices to enable transmission of data between network terminals.

They have features such as Dialing, file transfer, internet access and others.

Categories of network software

.Network operating system (NOS)

.Network protocols

Network Operating System (NOS)

A network operating system is a supervisory software program that resides on the server and controls a network by;

(i) Defining who can use the network

(ii) Determining how information is shared

(iii) Controlling access by multiple users to network resources such as files and hard ware,

(iv) Providing for certain administrative functions, including security.

Examples of common NOS;

.Novell Netware, Microsoft Windows NT, windows server*, AppleShare, UNIX, Linux

NOS carries out administration activities which include:

1. Managing the Security of the network by providing Security features such as authentication, authorization, logon restrictions and access control.

2. File management.

3. Providing basic operating system features such as support for processors, protocols, and automatic hardware detection and supporting multi-processing of applications.

4. Providing name and directory services.

5. Coordinates the activities of multiple computers across a network.

6. Providing file, print, web services, and back-up and replication services.

Network protocols

A protocol is a set of rules and procedure (standard) for connection and data transfer between devices on a network. Protocols control all aspects of data exchange, which include the following:

.How the physical network is built.

.How devices connect to the network.

.How the data is formatted for transmission.

.How that data is sent/transmitted.

.How to deal with errors in data transfer.

The Protocols are created and maintained by a number of different organizations and

Committees including:

.Institute of Electrical and Electronic Engineers (IEEE),

.American National Standards Institute (ANSI),

.Telecommunications Industry Association (TIA),

.Electronic Industries Alliance (EIA)

.International Telecommunications Union (ITU).

Commonly used protocols

.TCP/IP-transmission control protocol/Internet protocol.

.HTTP-Hypertext transfer protocol

.FTP-file transfer protocol.

.POP-post office protocol

.SMTP-Simple mail transfer protocol

.IPX/SPX-stands for Internetwork Packet

Exchange/Sequenced

Packet Exchange. IPX and SPX are networking protocols used primarily on networks using the

Novell NetWare operating systems

.NETBEUI-(NetBIOS Extended User Interface) is a new, extended version of NetBIOS, the program that lets computers communicate within a local area network. it does not support the routing of messages to other networks,

Telnet (TELecommunication NETwork) for Remote access between computers

.IMAP; Internet Message Access Protocol.

.The Point-to-Point Protocol (PPP) which is a data link protocol commonly used in establishing a direct connection between two networking nodes.

TCP/IP configuration

TCP/IP configuration is the setting involves assigning of IP addresses. This Configuration is either Static or dynamic.

Static IP configuration

.Static networks are setup such that each node always has the same IP address. Static

IP addresses are fixed addresses that only change manually.

Dynamic configuration

.Dynamic networks are setup in such a way that the IP addresses for the computer are controlled by the DHCP server.

.DHCP (or Dynamic Host Configuration Protocol), is a means by which an IP address may be assigned to a computer on boot.

When the DHCP client boots, it puts out a request on the Local Area Network for a DHCP server to assign it an IP address.

Domain Name system

.The Domain Name System (DNS) translates the easily memorized domain names (e.g.

www.google.com) to the numerical IP addresses needed for the purpose of locating computer services and devices worldwide.

The Domain Name System is an essential component of the functionality of the Internet.

TYPES OF NETWORKS

.LOCAL AREA networks (LANs)

.WIDE AREA networks (WANs)

.Metropolitan networks (MAN)

.International network (Internet)

Local Area Network (LAN)

A LAN is a group of computers, printers and other devices interconnected within a small geographical area such as a room or a building.

.The devices must be interconnected using a medium such as cables or a wireless medium.

.LANs allow individual users to locally share computer files and hardware such as printers and disks.

Metropolitan networks (MAN)

A MAN is a computer network larger than a LAN but smaller than a WAN connecting

Computers and LANs which are geographically separated but in same city.

Wide area Networks (WANs)

A WAN is a number of computers and peripherals connected together over a large geographical distance such as across districts, cities or regions (10 KM and more).

WANs make use of a wider variety of communication media compared to LANs including

Telephone lines, Microwave links (wireless), Satellite connections and fiber optic cables.

Components of a LAN

A LAN is made up of the following components:

.Workstations

.Network interface cards

.Peripheral devices

.Networking media

.Networking devices

.Network server

TYPES OF LANs

.Peer to Peer network

.Client-server

Peer to peer

This is an interconnected group of equal computers where there is no hierarchy among them, each computer acts as both a client and a server to others on the network. Each computer has resources it shares with others on the network.

Merits of Peer-to-Peer Network

.It’s very easy to set up.

.It’s appropriate in case of a small network (few computers)

.Inexpensive to set up and maintain.

.Enables easy sharing of devices such as CDs and printer.

.Its flexible

Demerits of Peer-to-peer Network

.It lacks security due to absence of a server.

.There is no central administration

.It’s not appropriate for big networks (cannot be used for big networks).

Client server network

A network that consists of a central computer (the server) on which other computers (clients) are connected. The central computer providing services to client computers.

NETWORK SERVER

.A server (Network server) is a computer on a network that controls and manages the network resources, making them available to its clients (computers connected to it).

Client Computer

.Client computer is one that is connected to the Network server to receive services from the server

Advantages of Client-server network

.It offers a reliable centralized storage and sharing of files.

.It ensures high security of the network through access controls installed on the server.

.It is easy to monitor the network performance on the server

.It is easy to solve network problems.

.It’s cheap to install software which can be done on the server alone instead of all computers on the network.

Disadvantages of client-server network

.It’s expensive to setup.

.Extra expenses on buying a server computer

.Extra expenses on hiring a network administrator

.The server is one point of failure. In case the server fails to work, the whole network comes to a standstill.

TYPES OF NETWORK SERVERS

.File server: One that stores various files and making them available to network users

.Application servers: stores application software packages run directly on it and made for users on the network.

.Printer server: a central computer that manages a networked printer from a single location.

.Web server: It allows users to access outside networks, also providing web content/web pages to users.

TYPES OF NETWORK SERVERS

.Mail server: Manages mail by receiving, moving and storing mail on the network.

.Proxy server: A computer placed between a LAN and an external server or networks (Internet), to filter requests and restrict access to data.

A proxy server receives a request for an Internet service from a user. If the request passes filtering requirements, looks in its local cache of previously downloaded Web pages. If it finds the page, it returns it to the user without needing to forward the request to the Internet.

If the page is not in the cache, the proxy server, acting as a client on behalf of the user, uses its own IP addresses to request the page from the server out on the Internet. When the page is returned, the proxy server forwards it on to the user.

Network topology

.Topology is the physical and logical arrangement of a local area network. Hence physical topology and logical topology.

.The physical topology of a network refers to the physical arrangement of cables, computers, and other peripheral devices in relation to each other on a network.

.logical topology is the method used to pass information between workstations on a network.

Types of physical Network topologies

.Bus network topology

.Ring network topology

.Star network topology

.hierarchical network topology

.Mesh network topology

.Hybrid topology

.Tree topology

.Point-to-Point

Bus topology or linear bus topology

.Bus network topology is one that consists of a main, central cable known as the backbone with a terminator at each end of it, on cable all devices on the network are connected to the main/central cable.

Advantages of Bus topology

.It is less expensive than a star topology due to less footage of cabling, only needs one main cable and no network hubs

.It is good for smaller networks not requiring higher speeds

.It has a high transmission speed if coaxial cable is used.

.It is easy to add new workstations on the network.

.Multiple servers can be used.

.Easy to connect a computer or peripheral to a bus.

.Requires less cable length than a star topology.

Disadvantages of Bus network

.It is Limited in size and speed

.The Entire network shuts down if there is a break in the main cable.

.Difficult to troubleshoot. It is difficult to identify the problem if the entire network shuts down

.It is less secure since all data is transmitted down one main cable.

.Transmission slows down as more work stations are added.

.If the main cable fails, then all workstations are affected.

Ring topology

.This is an arrangement where each device on the network is directly connected to one another in the shape of a closed loop or ring.

Each data packet is sent around the ring until it reaches its final destination.

Advantages of ring topology

.It is Cheaper to install since there is less equipment required.

.High speed can be achieved as each workstation can boast the signal.

.Signal flow is one direction which avoids the danger of data collision.

.Where a double ring is involved data flow is continuous even in cases where one ring brakes down.

Disadvantages of a Ring network

.Moves, additions and changes of devices affects the entire network.

.High expense since it requires fixing two network cards on a single computer.

.If a connection in a single ring is broken the entire network stops working.

.Having no central server makes data very insecure.

.Fairly slow as data pass through a number of workstations before reaching its destination.

Star topology

.A star is a topology designed with each device on the network connected directly to a central network hub or switch such that Data from a device passes through the hub or switch before continuing to its destination.

Extended Star topology

.This is a network where more than one star network topology are connected together to form a big/extended local area network.

.At the center of the star is a hub or a switch.

Advantages of Star topology

.It is suited for large networks

.It is easy to expand the network without negatively affecting it.

.If one cable or station fails, the entire network is not affected

.It is easy to install, maintain and troubleshoot because the problem usually isolates itself. That is, its easy to detect faults and to remove parts.

.Cabling types can be mixed to maximize efficiency.

.High speed transmission is possible since each station has a dedicated cable.

.Greater security as connection from one station to server is unique.

.No disruptions to the network when connecting or removing devices.

Disadvantages of Star topology

.breakdown of the switch/Hub becomes a single point of network failure

.It’s expensive to set up due to increased cabling costs and the need for a switch or hub.

.mass of cables around in case of a large network.

.If the cable fails the workstation cannot receive data via any other route.

.The server can get congested as all communication must pass through it

.Requires more cable length than a bus topology.

.If the hub or switch fails, nodes attached are disabled.

Hierarchical topology

.It is like the extended star topology, except a computer controls traffic instead of a hub or a switch.

Hybrid Topology

Hybrid Topology is a network that has two or more different types of physical topologies connected to each other to form a complete network. There are many different combinations that can be created such as bus plus Star (tree).

A hybrid topology is easier to connect to other computers than some other topologies.

The hybrid topology has a faster connection.

Tree topology

.This is a network that combines characteristics of bus and star topologies; It consists of groups of star connected workstations connected to a bus backbone cable. Tree topologies allow for the expansion of an existing network, and enable organizations to configure a network to meet their needs

Advantages of Tree topology

.Allows for Point-to-point wiring for individual segments.

.Supported by (compatible with) several hardware and software.

Disadvantages Tree topology

.Overall length of each segment is limited by the type of cabling used.

.If the backbone line breaks, the entire segment goes down.

.More difficult to configure and wire than other topologies.

Mesh topology

.This is a network where each device has its own direct link to each of all the other devices on the network.

.It provides each device with a point-to-point connection to every other device in the network.

.A mesh topology is implemented to provide as much protection as possible from interruption of service

.damage of one or a few cables or computers may not have vital impact except the involved

Computers. Data can be routed through any other computer connected to the network.

.It is the most expensive and difficult to maintain topology because each device has a

Point-to-point connection to every other device.

Point-to-Point Topology

.Point-to-point (PTP) topology connects two nodes directly together. The following examples

are pure point to point links:

.Two computers communicating via modems.

.A mainframe terminal communicating with a front end processor.

.A workstation communicating along a parallel cable to a printer.

Considerations When Choosing a Topology/network to have:

.Cost of installation. A linear bus network may be the least expensive way to install a network; you do not have to purchase concentrators.

.Number of computers and other devices to connect/size of the organisation

.The architecture of the building to be used.

.The purpose of the network

.Distance of connectivity

.Safety provisions of the network

.Personnel provisions/technicalities involved

.Ease in accessing the network

.Length of cable needed. The linear bus network uses shorter lengths of cable.

.Future growth. With a star topology, expanding a network is easily done by adding another concentrator.

.Cable type to use. The most common cable in schools is unshielded twisted pair, which is most often used with star topologies.

Logical topology (Media Access Method)

Logical topology is how computing devices access the network and send data over the network. The logical topology of a network determines how the devices communicate across the medium.

There are four commonly used media access methods:

Ethernet, Token Ring, Local Talk, and FDDI.

Ethernet

.Ethernet is a type of local area network technology that uses coaxial cable or special grades of twisted pair wires. Ethernet is also used in wireless LANs.

.The most commonly installed Ethernet systems are called 10BASE-T; (Baseband transmission)

Technology of speeds up to 10 Mbps and more using twisted pair cables.

Token Ring

.A network topology in which computers access the network through token-passing.

.A Token is a special packet that contains data and acts as a messenger/carrier between each computer and device on a ring topology.

.Each computer must wait for the token to stop at its node before it can send data over the network so as to avoid collision of data packets on the network.

FDDI (Fiber Distributed Data Interface)

FDDIis a network topology that is used primarily to interconnect two or more local area networks, often over large distances.

.It uses fiber optics for speeds of up to 100 Mbps

Packet switching

.This is a data transmission technique which involves transmitting and routing of messages by dividing the electronic message/data into packet segments and sending them sequentially over a network channel which are then reassembled into the original message at their destination.

Circuit switching

.A method of communicating in which a dedicated communications path referred to as a circuit or channel is established between two devices through one or more intermediate switching nodes before communication between the devices takes place.

.digital data is sent as a continuous stream of bits on a circuit.

.Each circuit that is dedicated cannot be used by others on the network until the circuit is released and a new connection is set up.

.The telephone system uses circuit switching.

NETWORK and Data SECURITY

.Network and data security consists of the provisions made on computer network and policies adopted by the network administrator to protect the network and the network-accessible resources from unauthorized access to data, as well as guarding against Data loss and the effectiveness (or lack) of these measures combined together.

Solutions to network security problems

.Backing up of all important data

.Lock and Key to ensure physical security

.Combination Locking Mechanisms

.Card Readers and Proximity Readers. They work by reading a magnetic signature off an access card or token.

.File encryption-Encryption involves converting data into a form that cannot be easily understood by others.

.Biometrics. This is a form of identity access management and access control which uses measurable physical and behavioral characteristics of individuals as a way of identifying them as the authentic users.

Examples of biometrics that might be used to authenticate a user include fingerprints, retinal patterns, or speech/voice.

.Install a firewall-The key defense against Internet attackers is an Internet firewall. A firewall is specialized software, hardware, or a combination of the two. The purpose of an Internet firewall is to prevent unwanted or malicious IP packets from reaching a secure network.

.Install an Anti-virus and other malware software programs to detect, report and (sometimes) disinfect viruses

.making backups of all software on a regular basis to avoid data loss. And create a recovery disk for the operating system

.Update the Anti-Virus Software on a Regular Basis -Keep your anti-virus software up to date.

Do this at least weekly and more often if there are news reports of a new virus threat.

.Beware of E-Mail Attachments from Unknown Sources .Do not open them.

.Avoid booting computers from infected storage medium.

.Avoid downloading programs from unknown/unlicensed sources.

Common computer Network problems and troubleshooting

.IP address conflicts. Two computers are assigned the same IP address erroneously

Solution: change the IP address for one of the computers.

.Absence of connectivity

Solution: checking the physical connections and connection devices. And the distance between devices in case of wireless network.

.Check the router or hub to see if some machine is disconnected, or if it a case of is a faulty cable.

In this case: a good connection is shown by a green light.

.Ensure that TCP/IP is configured.

.Ensure all the computers on the network are within the same subnet with individual IP addresses.

.check if the file and printer sharing option is installed and functioning, and also define network shares on each computer.

.Slow connectivity

This can be due to:

i) Collisions, which the network is incapable of handling.

ii) Heavy file transfers bring down the speed tremendously.

iii) The network card may also be overloaded.

.The Solution: i) zip bulky files while transferring, which lowers the pressure on the network.

.Firewall settings can interfere with file sharing on connected computers. It is true that disabling security features can make your system vulnerable to attacks, but lowering security levels should not cause too much trouble.

.The Solution: Rigid Firewall settings need to be adjusted to allow networked computers to share data. You may consider disabling the security settings temporarily, after having thoroughly considered all security related threats.

INTERNET

.Internet is an International/global interconnection of computer networks.

.It is described as a network of networks; it is a global network where all LANs (both big and small) worldwide are connected together in many different ways to form the Internet.

History of the Internet

.The Internet was originally developed in the late 1960's by the US government department of defense to improve secure communication between its military computers and enhance the sharing of information and collaboration on military and scientific projects in four locations; universities of California, Los Angeles, Santa Barbara, Utah and Stanford research institute.

.This internet was known as ARPANET (Advanced Research Projects agency Network).

Characteristics of the Internet

.It is made up of numerous networks worldwide.

.There is No organization that has a direct control over the Internet.

.It is dynamic; ever changing.

.It offers very many services

.The Internet size and technology grow at a very fast rate.

.It is not owned by any single organization (has no central control.

Requirements/infrastructure for Internet connection

.Host computer

.Communication hardware such as Modem and router.

.Communication Software such as a Web browser and internet protocols

.Communication media such as VSAT, wireless antenna or telephone line.

.Internet Service provider (ISP)

The Internet Service providers (ISP)

ISP is a company which provides services for accessing and using the Internet at a fee.

Task

.Give some examples of ISPs in Uganda

.There are many ISPs on the market in Uganda to choose from such as AFSAT, UTL, and MTN etc.

Which services ISPs offer?

The services offered by the ISP

.Offer connection to the Internet

.They do system analysis and consultancy

.Network servicing and maintenance

.Provide network security

.Domain name registration

.Website hosting

.Hiring storage space to small organizations.

.Electronic mail services

The Factors to consider when choosing an ISP

.Setup costs

.Experience for both ISP and client.

.Auxiliary/additional services offered by the ISP e.g. E –Mail/telephone SMS facility.

.Availability of online help.

.Compatibility of ISP software with yours e.g. windows Vs Linux Vs Wang.

.Efficiency/Effectiveness of ISP devices e.g. speeds of ISP modem, Bandwidth etc. cabling architecture, Bit–Bus architecture for devices etc.

.Available technology. For example, In case you intend to hire a dial-up service, you need to consider the availability of a local phone number or toll-free number for access, this would help to reduce cost of acquiring totally new technology or equipment.

.the Technology offered by the ISP. Some technologies are older and less efficient than others. The ISP should be able to offer the latest and most efficient technology.

.Technical support. What kinds of support services can the ISP provide?

Are there any additional charges for support?

.The terms of service. Whether they meet your expectations or not.

.Other services offered by the ISP that you can have on top of internet connection. E.g. web hosting and domain services.

.The fee charged for the services.

.The size of the ISP's Client base. ISP capacity is usually limited, the bigger the client base the less reliable is the ISP.

.Coverage. Does the ISP coverage reach your location or not?

Internet connection technologies

Dial-up (DUN)

.This is a connection method where the client must request for a connection to the ISP server each time he wishes to access the Internet. This method requires the use of a

MODEM and a telephone line and the fee depends on the amount of time spend on-line.

Leased line

.This is where there is a permanent connection between the user and the ISP at a fixed fee.

BANDWIDTH

.Bandwidth is the amount of Data (bits) that can be transmitted along a communication channel in a given time (per second) which is measured in bits per second or bps e.g. 32 bps. The larger the range of frequencies the greater the amount of data that can be transmitted.

BIT RATE

Bit rate is the speed at which a particular transmission is taking place. It is measured in bits per second (bit/s or bps) and represents the actual speed of transfer of data.

Determinants of internet access speed

.The amount of bandwidth allocated by ones ISP.

.Connection technology used; telephone lines are much slower than newer technology such as ISDN and ADSL.

.The volume of traffic. The more the number of people logged on the internet the slower the internet speed.

.Adapter or modem speed used.

.The processing speed and amount of RAM of the host computer

.Type of data/files being downloaded or uploaded.

Internet services

1. E-commerce

2. Provision of information. e.g, on weather, and finance.

3. E-banking

4. Research

5. On-line training

6. Downloading and uploading files

7. Sending or receiving messages.

8. Real-time communication e.g. video conferencing and chat.

9. On-line news

10. On-line booking/reservation

11. Virtual classes

12. Entertainment services such as online games.

Advantages/benefits/positive implications of the Internet to society

.The internet eases sharing and transfer of large amount of data using different file transfer services.

.Encourages collaborative work.

.Easy access to databases on remote computers.

.The internet promotes internet-based education via virtual classes and e-learning.

.Different skills such as typing, use of web browsers, problem solving, and e-mail are developed through the use of the Internet.

.Shopping for item such as books is made easy and less expensive.

.Instant or timely communication is done over the internet using different systems such as the E-mail system.

.Companies are able to promote their businesses over the internet.

.Social media such as face book is popularized over the Internet.

.Eases publication of information to a very large audience at minimal cost.

.The Internet is a rich source of information for researchers and students and any one on all kinds of topics and subjects.

.the internet provides a number of entertainment options.

.It promotes medical care through online health care and medication.

.It promotes and eases banking and finance through online banking.

Advantages of the internet in schools

.A lot of information is obtained which is not available in a single textbook.

.Updated or current information is obtained since internet is dynamic.

.Learning is fun and easy as internet is exciting due to the multimedia content used.

.It offers different sources of information hence a variety of opinions on a topic.

.It is a quick way of getting information where internet connection is good.

Disadvantages of the Internet

.No Information control over the Internet such that all sorts of bad information is accessed.

.There is no privacy of information and information piracy is common.

.Indecent material is published on the Internet.

.It’s not readily available to most people.

.High costs due to costs on connectivity.

.Time is lost where Internet speed is low due to poor links, hardware and congestion.

.Time wasting occurs when workers easily stray into non-essential materials.

.Computer viruses are easily spread over the Internet.

.High possibility of hacking

.Cybercrime is easily committed over the internet. Examples of such crimes include fraud, phishing, impersonation, child pornography and cyber bullying.

Possible solutions to Internet issues

.Use of firewalls against illegal access to networks

.Use of updated antivirus software against viruses

.Use of anti-spyware against hackers.

.Carefully choosing an ISP who will provide the best service within your means.

.Installing filters against pornographic and other undesirable content.

.Use of encryption software to protect sensitive information and prevent fraud.

.Use of complicated passwords to restrict access to.

.Use of digital certificates. This is a means of authenticating that an organization is genuine and that any transaction undertaken with it will be honored. The certificate contains the name of the organization and a serial number registered with a Certification authority who issues the certificate.

Use of the Internet as a learning tool

.Used to search for information using search engines and directories

.E-mail system is used in collaborative learning.

.Enables distance learning for those who are unable to attend collage/school physically.

.Discussions over educational chat rooms.

.Enables downloading of relevant documents.

.Using computer assisted assessments (CAA) for online exams.

.Use of electronic libraries and textbooks.

.Development of skills of research and communication by the students.

.Assignment are received, done and sent across the network by the students.

.Video conferencing is used to share views and ideas among students and teachers.

The World Wide Web (WWW)

This is the global collection of web sites and web pages which are hyperlinked containing text, and multimedia content. There are virtually no regulations regarding the content of the WWW, so any one with appropriate software and hardware can create a web site on any topic.

Consequently there are millions and millions of pages of information covering every conceivable topic.

Multimedia

.The integration of text, graphics, animations, audio and video, normally using a computer application.

.A website (or Web site) is a collection of related hyperlinked web pages hosted on a particular web Server on the World Wide Web.

.Web pages are HTML documents.

.Hyperlinks are built-in links to other related documents, allowing users to quickly navigate from one document to another when clicked.

.Each Web site may contain one or more web pages. Each site has a home page, this is the first

Document/page users see when they enter a site.

The site might also contain additional documents and files which must be hyperlinked.

.Each site is owned and managed by an individual, company or organization.

.A Web page is a document, typically written in HTML, which is accessible via HTTP, a protocol that transfers information from the Web server to display in the user's Web browser.

.A Webpage contains hyperlinks to other pages or sites.

.A hyperlink, is a reference or navigation element in a document to another section of the same document or to another document that may be on a different website.

.Web pages are written in HTML (Hypertext Markup Language)

The web server

.This is a dedicated computer which accepts file uploads, downloads, distribution and storage of these files over the Internet upon the requests of the World Wide Web users.

Characteristics of the web server

.Very high storage plus memory capabilities.

.Very strong multiprocessor e.g. Motorola G4, G3.

.High capacity RAM –DIMMs.

.Improved Network through-put (Enhanced NIC).

.Expansion capabilities for upgrades to be effected

Website publishing

Web publishing is the process involved in making information available on the World-Wide

Web.

Web publishing process

This involves;

.Web designing

.Web site hosting

.Web site content management.

Web designing

.This is the initial process of web publishing through which a web page is created.

.It’s about organizing web content so that it can be easily found and easily read and is attractive to visitors.

Web authoring

.Web authoring refers to designing and creation of a Web site, ranging from writing the site's underlying code to writing the text to managing the site's upkeep. This can be done directly by writing the html code, or using html tools that operate in the background to create the code while the author is using a WYSIWYG interface.

Webmasters

.A webmaster is a person who creates and manages the information content (words and pictures) and organization of a website, or manages the computer server and technical programming aspects of a website, or does both.

Website hosting

Website hosting is a service that allows individuals and organizations to have their own websites accommodated on a particular web server from which they are accessed by others on the World Wide Web. Website hosts are companies that provide space (web hosting) on a server they own for use by their clients. Some web hosts provide free services while others charge a fee.

Uses of web sites

.To Share of knowledge or information.

.to Present information of interest.

.to Enhance communication and collaborator.

.To provide Skills building e.g. writing, editing etc. designing

.For Trade purposes.

.It give the owner Pride/improved image.

.For storage of Data and information.

.To enable Research.

.For Entertainment and leisure in cases of E-Zoos plus E-museums, etc.

Communication software requirements for WWW

.Web browser

.TCP/IP protocol

.HTTP

Hypertext transfer protocol (HTTP)

.HTTP is the set of rules that govern how web pages and multimedia files are transmitted over the Internet. The content of the WWW contains text, sound, video so HTTP ensures that they are all transmitted as a webpage in a common format.

.Examples of plug-ins include Shockwave and Quick time, Adobe acrobat reader, flash player, Real time player and DirectX, must be installed and configured to run on the computer.

Web browsers/Web client

.A Web browser is a communication software designed to allow the user to access and view

web pages on the Internet's World Wide Web.

.The browser is designed to interpret hypertext Markup (HTML) language.

.HTML is a code in which web pages are written, therefore it requires a web browser which is

specialised software to able to retrieve and display text, and multi-media in HTML.

.Commonly used web browsers include; internet explorer, Opera, AOL Mozilla Fire fox Google chrome, etc

.Web browsers also use Plug-in applications to display other content, such as videos and animations that the browser is unable to directly display;

.A plug in is a small application that is installed to add special capability to a major application such as a web browser.

Modern Web browsers are also referred to as internet suites because of their ability to display a variety of applications, multimedia, and files created with other programming languages such as Java and ActiveX, scripting languages such as JavaScript, and techniques such as AJAX, and the like which have other file.

The Functions of a Web browser

.It is used to request for webpages from a web server when the user types in the uniform resource locator

.The web browser accesses information from the web server using the HTTP protocol over a network to communicate with the web server.

.It displays webpages on the screen. The coding in the HTML files tells the browser how to display the text, graphics, links, and multimedia files.

.It is used for streaming video content over the internet.

.Displays multimedia content

Features of a web browser (Web browser Interface)

.A menu bar that has items like file, edit, View, History, bookmarks or favourites, tools, help

and others depending on the browser type and version.

.A standard tool bar

.An address bar to type in the desired Uniform Resource Locator (URL).

.Navigation buttons to move forwards or backwards between pages and a home button to go to a start-up page.

.A print button. This enables you to print a webpage or a section of it.

.A favourites section where you can bookmark (store) the URLs that you wish to revisit.

.A history folder containing a list of previously visited sites.

.A built in search engine.

.A link to e-mail.

.A link to one or more search engines.

.Using a browser, you can do some or all of the following;

.View hundreds of millions of webpages.

.Use mail clients to Send and receive e-mail.

.Download games, music and computer software.

.Chat

.Shop on line

.See and hear recorded broadcasts

.Participate in virtual conferences

.View channels, a channel is a website that automatically transmits information to your computer at the time you specify.

Common web browser error messages (Study)

You may request the browser to fetch and display a web page, but instead of doing that, it displays an error message or HTTP status code. Some of the browser error messages are;

.Request Timeout (error 408)

The server was unable to process the browser request within the allotted timeframe. This may necessitate refreshing the page.

.File Not Found (error 400)

The browser may have failed to properly load the page file, or the page does not exist anymore, or the server containing the page is currently down.

.Internal Error (error 500)

This error comes about when the web form malfunctions.

.Unable to Connect to Remote Host This implies that the web browser is unable to connect to a remote host on which the page is hosted.

This may mean that the server is down, or there is no Internet connection, or the web address was misspelt firstly,

.401 Unauthorized or 403 Forbidden

In case the browser displays either of these error messages, it implies that you are attempting to access a website that allows only subscribed members who must use usernames and passwords, and it site has blocked you from accessing it.

Domain Name

A domain name is the representation an IP address of a computer on the network. It identifies the name of the organization or group that owns the site and type of web site.

An example; www.bbc.co.uk

The domain is separated into parts just like the IP address.

A user normally finds it easier to use a domain name instead of an IP address to access the a web page/web site

Task

.Write at least five domain names you know

Parts of the domain name

.The hierarchy of domains descends from the right to the left label in the domain.

Each label specifies a sub domain of the domain to the right.

.For example, given the domain name

www.bbc.co.uk

..bbc is the subdomain of co.uk, while .co is the subdomain of .uk

Top-level domain (TLD), is the last part of an Internet domain name, that is, the

group of letters that follow the final/last dot of a domain name.

Examples of top level

.org, .gov, .com, .net

Commonly used Top level domain names

.com indicates that the organisation is a commercial one ie business

.gov indicates that it is for a government department

.ac is for an academic organisation

.org is for a noncommercial or non-business organisation

.sc is for a school organisation

.net is for a company that provides internet services

Each country has been assigned a two letter code

Such as;

.au for Australia

.de for German(Deutschland)

.it for Italy

.es for Spain (espania)

.ug for Uganda

Second level domain (SLD)

The second-level domain is the label directly to the left of the top level domain.

e.g. www.cnn.com

cnn is the second level domain

Third level domain

.This is the part of the domain name that is immediately to the left of the second level

domain.For example;

.www.bbc.co.uk

.bbc is the third level domain

Uniform resource locator (URL)

.A URL is the full address used to find particular files or web pages on the World Wide Web. For example

.http://www.awebsite.co.uk/index.html

.http://www.nypl.org/sitemap/index.html

Parts of a URL

i. The protocol being used, which could be http or ftp
ii. The domain name which is the location that contains the file of web page
iii. The path to a web page which may contain a folder name and document file name both of these separated by forward slashes

iv. The query string, or parameters. These are optional but show information about the page/file

.URLs don’t contain capital letters or spaces, but contains dots and forward slashes.

.The Forward slashes specify the path to the location of the file needed.

Types of web sites

.Personal websites

.Affiliate websites

.Search websites

.Portals

.Blogs

.Wikis

.Commercial

.Company websites

.Etc.

Search engines

.A search engine is a software system that is designed to search for web pages on the WWW

using a search query provided by the user.

.A search query is a request for information in form of a word or phrase or sentence.

.For example, you might specify that you want to search for information about "Polar Bears",

in which case the search engine would return all the URL's where the search query words

appear.

.The search engine ranks the search results based on a computer algorithm (specification) not by subject category.

.It ranks first those URLs that register most occurrence of the key word(s) in the search query.

.Usually more accurate pages are listed before those that include unreliable and erroneous material.

How to evaluate search results

Not all that is published over the internet is good or accurate. So the need to evaluate what one finds. The following are the guidelines;

.The author’s authority on the subject.

.Accuracy of information.

.Objectivity or intention of the author.

.How current is the information presented.

.The extent of coverage of the topic.

.Who the publisher is.

.The publisher's reputation.

.Do the authors properly list their sources, references or citations with dates, page numbers or web addresses, etc.?

.The search content of result pages is not evaluated.

.The objective of the site.

.Whether the information up to date or valid.

.When was the site was last updated

.The relevance of the information to the research topic.

.the intended audience of the site.

.Is the material presented at an appropriate level?

How to effectively use a search engine.

.link more than one keyword and linking them with AND, OR or NOT (Boolean's logic) in case of complex searches.

.Use specific queries. Avoid redundant words. e.g. if one wants to search about Ugandan wildlife, the search query should be "Ugandan wildlife" not just "wildlife"

.Using the symbols + or -the plus symbol lets you find pages that have all the words in the query eg to get pages that refer to both john and Tomon the same page, use +john+Tom

.Example 2 +computer +studies+schools gives pages on computer studies in schools

.Use the –symbol to eliminate charactors from the search.

.Use parentheses to sequence operators and group words. Example; always group words joined by OR with parentheses.

.Narrow the search query to avoid irrelevant results.

Subject Directories

A subject directory is a software that contains a lists of links to different subjects or topics

already sorted by subject or topic category.

.Examples include; dir.yahoo.com, infomine.ucr.edu, academicinfo.net, about.com' lii.org howstuffworks.com, etc.

Characteristics of Subject Directories

.They are built by human selection not based on automated systems.

.The sites/pages are organised into subject categories

.The sites/pages are evaluated. Only most relevant web pages are availed.

Web PORTALS

.A portal is a web site which brings information together from various sources in a uniform way. Usually, each information source gets its dedicated area on the page for displaying information, it also offers a variety of services like search, e-mail, online shopping and others. Examples Yahoo, MSN, AOL etc.

File transfer

.Internet enables transfer of files over the internet by use of FTP. FTP sites contain books, articles, software games images sound multimedia etc. all of which can be transferred with or without the use of special download software.

Usenet

.This is a service on the Internet on which one can post and read electronic messages. The messages are stored on usenet servers and organised by topic into newsgroups.

Electronic commerce sites

.e-commerce is business that is done over a communication network where the buying and selling of products or services is conducted over electronic systems such as the Internet and other computer networks, involving the exchange of data to facilitate the financing and payment of business transactions.

An electronic commerce website is one that is managed by the business to display what the business deals in to give an opportunity to potential buyers to make their choices and makes orders

Example of e-commerce site addresses include;

http://www.shopsonthenet.co.uk

http://www.ukshops.co.uk/enter.shtml

http://bookshop.co.uk

http://www.amazon.com

Merits of e-commerce

.Reduced Overheads since there is no need for retail premises and fewer employees.

.Customers/clients for the business are attracted through the Internet.

.Customers have access to information all the time increasing the chances of making sales

.Safety is increased since payment is done through electronic fund transfer (EFT)

.Market research is easily done over the internet, because information about potential buyers.

.Ecommerce reduces travel time and costs for the customers since they do not need to visit the shops

.Prices are reduced as the business can offer lower prices due to lower overheads.

.The customer is able to sample the products on-line, for example view movie clips or listen to music before buying.

Disadvantages of on-line businesses

.Businesses incur costs of Internet operation.

.Sales may be reduced if customers are unable to try products before they can buy.

.The e-commerce may be hacked leading to loss of money fraudulently.

.Conmen can easily trick unsuspecting customers leading to loss of money when they get access to customer's credit card numbers.

WIKIS

.A Wiki is a collaborative work website that allows individuals to add, modify, or delete

content in collaboration with others.

Blogs (web log)

A blog is a web site maintained by an individual who makes regular posts such as descriptions of events, or other material such as graphics or video on an ongoing basis, allowing visitors to the site to make their comments or link to it or email you. or not.

PODCASTS (Netcasts)

.Podcasts are digital media files consisting of an episodic series of audio, video, PDF, or ePub files subscribed to and downloaded or streamed online onto a computer or mobile device.

.Podcasting means making digital audio or video files available on the internet in such a way that others can set their computers to automatically download new episodes in a series as you post them.

Webcasts

.A Webcast is the delivery of live or delayed sound or video broadcasts over the internet using streaming media technology. The sound or video is captured by the conventional video or audio systems, then digitized and streamed. Eg News broadcast, Radio and TV programs

Webinars (Web conferencing/online workshops)

.A Webinars is short for web based seminar. It refers to conducting a seminar or lecture via the internet using graphics, text and live sound, unlike web casting, the audience is able to interact with the presenter such as asking questions by sending an instant message.

.A webinar allows real-time point-to-point communications as well as multicast communications from one sender to many receivers.

.It offers data streams of text-based messages, voice and video chat to be shared simultaneously, across geographically dispersed locations.

.Applications for web conferencing include meetings, training events, lectures, or short presentations from any computer.

Cloud computing

.This is Internet-based computing that relies on sharing computing resources over the Internet where remote servers are networked to allow centralized data storage rather than having local servers or personal devices to handle applications.

.The word cloud is used in reference to internet

.Cloud computing allocate individual users a specific storage capacity on the virtual server.

.It provides all needed Application programs interfaces for users that enable users to migrate their work to the virtual server.

Intranets

.An Intranet is a private internal network of an organisation using internet protocols and

accessible using a web browser. It contains information specific to that organisation and only accessible to authourised users within the organisation or members of the organisation.

It is therefore closed to outsiders.

.It is hosted on the server of the organisation.

.Intranet is used to avail information to members of an organisation

.Intranet may have an e-mail system with a mail server to route the mail to the members mail

boxes.

.It only contains relevant information to the users so they don't suffer with or waste time on

irrelevant information.

.Access to information is faster than an internet connection

.Information is much more secure than on the Internet because outsiders don't have access to it.

.However the scale of information is limited as compared to the internet

.It is costly to build and maintain and keep up-to-date.

Extranets

.An extranet is a private network that uses internet protocols to share data of a particular organisation with selected outside users such as the clients of the company or subsidiaries of a company.

Differences between an Intranet and Internet

.Intranet is private while Internet is public.

.Intranet has geographical boundaries while internet has no boundaries.

.Intranet only shares company information while Internet has all sorts of information

.Intranet is a single source information while Internet is a multisource information.

.Intranet is controlled by an organisation while there is no control over the Internet.

Terminal emulation

.This is an Internet resource/service that allows remote access to computers connected on the internet using a virtual terminal connection. This means that using one computer, one can access another computer on the LAN or Internet and all the information and resources on that computer as if one was sitting at that other computer.

E-mail

.E-mail or electronic mail is primarily text-based electronic message that is sent from one computer or other ICT devices to others. In order to send or receive an e-mail, one must have a computer connected to the Internet, E-mail software, and an e-mail account.

.When mail is received on a computer system, it is usually stored in an electronic mailbox for the recipient to read later.

.Messages can be replied to or forwarded with speed and ease.

E-mail software (e-mail client)

.E-mail software is an application software which allows individuals to create an e-mail accounts and be able create, send and receive, store, and forward e-mail using **SMTP and POP.**

.Examples Microsoft outlook express, Yahoo, Eudora light, Gmail, Opera mail, etc.

Mail servers

.A mail server is a dedicated computer on the Internet that receives incoming messages, store them and delivers outgoing messages.

.It allocates a certain amount of storage space referred to as mail box to hold mail to registered users. The user can receive mail by supplying the username and password through the mail client.

The Features of an E-mail software

.Email address. All email software require the user to have an email address, username and Password which are unique to ensure security of the users emails.

.An email address has two parts separated with the @ sign for example yourname@yahoo.co.uk

.The first part of the address is the e-mail name made up of the username of the email account while the second/last part indicates domain name of the company that provides the email facility.

From: indicates the address of the one sending the message

To: This is where the address of the mail recipient is typed

Cc: (carbon copy) This is where other addresses to receive copies of the same message are indicated in addition to the main recipient.

Bcc: (blind carbon copy) this enables copies of the e-mail message to be sent to a third party without acknowledging/showing any other recipients (if any)

Subject: refers to the theme/topic of the email. It is where the theme of the message is indicated.

Compose: This is where one types the actual message.

Attachments: an attachment is the added file or files that are sent with the message. Such files are usually too large to be sent as a simple message.

Such files are known as MIME (multimedia internet mail extension) attachments.

.One advantage of this is that large files are conveniently sent.

Address book: is an area that stores email addresses for future use or mailing lists

Inbox: this where all incoming messages are stored and can be viewed, it shows the name of the sender of the message, the date it was sent and the subject of the message.

Outbox/sent messages: Stores copies of any messages that have been sent at stated dates. This is useful for future reference.

Handling ones mails

.Creating document folders in which to store mails.

.Checking and reading mail in the inbox

.Transfer messages form the inbox to a specific folder or storage file either by the drag and drop facility or right click and move.

.Deleting a message. This can be done by right click then delete or delete on the tool bar

.Sorting messages.

.Drafting or composing a new message

Handling ones mails

.Inserting an attachment/file to your message. To insert and attachment, click on insert file attachment or attach file, then browse the hard disk or any other disks to find the file you want. Repeat the operation as many times as you need.

.Adding new contacts in your address book.

.Filtering messages received to avoid spam in your mail box.

.Sending messages.

Sending an Email to Multiple

.Use Cc and Bcc to send an email to more than one person easily and fast

."Cc" is short for "carbon copy". Enables one to send the same e-mail to two (or more) people without the task of having to write it more than once.

.The message you compose is sent to the person in the To: field, but a copy of exactly the same message is also sent to all the addresses listed in the Cc: field.

.To enter more than one address in the Cc: field, separate them with commas.

The Shortcomings of Cc:

.All recipient of the message get to know the email addresses of all the persons that received your message. This is usually not desirable. Nobody likes their email address exposed in public.

.Full Cc: fields also don't look all that good.

They can become quite long and grow big on the screen. There will be lots of email addresses and little message text.

BCC

.Bcc is stands for "blind carbon copy".

.The Bcc: field helps you deal with the problems created by Cc: a copy of the message goes to every single email address appearing in the Bcc: field. The difference is that neither the Bcc: field itself nor the email addresses in it appear in any of the copies.

The only recipient address that will be visible to all recipients is the one in the To: field.

What to consider when using email

.Email can be junk mail. So avoid unnecessary proliferation of messages.

.Email takes up computer space, so delete messages you no longer need.

.The integrity of an email message cannot be guaranteed. If a received message seems out of character for the sender, double-check before taking it seriously.

.Take care opening attachments. Treat any attachment you receive with suspicion unless you expect.

Benefits/advantages of using email

.Its quick; e mail takes seconds to send compared to snail mail.

.It’s cheap. Compared to posting or faxing messages

.The same message can easily be sent to many recipients at once by use of a mailing list.

.Messages can be replied to or forwarded with speed and ease because the software automatically inputs the address of the sender.

.Other files can be sent as attachments which has increased the popularity of email in business.

.it is convenient because a message can be sent anywhere in the world without having to leave one’s desk.

.E-mail can be used by businessmen to send advertisements to potential customers.

.It is possible to send multimedia content as e-mail.

.The sender is informed in case the email is not sent so that is able to find other ways of delivering the message.

.A copy of the message is kept

Disadvantages of e-mail

.The sender and receiver both need internet access and e-mail accounts-most people in Uganda do not have access to e-mail.

.The hardware needed is expensive

.Email will not be delivered if there is a small error in the address.

.Some people are not keen on checking their mail boxes. So an urgent message may not be read in time.

.There is a large volume of unsolicited e-mail known as ‘spam’ that tends to fill up mailboxes.

.E-mail tends to take peoples valuable time at the expense of work or study.

.Parcels cannot be delivered via e-mail which limits its usability.

.Most viruses are spread via email.

.The privacy of an email message cannot be guaranteed. So confidential messages ought not sent via email.

Mailing lists

.This is an e-mailing facility which distributes the same messages to the electronic mailboxes of all subscribers to the mailing list. The automated list manager assembles all the messages and sends them to the subscribers which enables email discussion among the subscribers of a particular mailing list. One can subscribe to or unsubscribe from a mailing list.

.An example of a mailing list are listservs.

.To find mailing lists, use your web browser to visit;

.http://www.liszt.com

.http://www.paml.net

Internet Relay Chat (IRC)

.IRC is a text based communication system that allows the user to “enter” virtual chat rooms in which there are many participants at the same time. Within these rooms one sends and receives instant messages to and from anyone else in the same chat room.

Instant messaging (IM service)

.This is a one-to-one chat service that requires an instant messaging software (messenger) which must be installed on the computer that allows the user to build a list of internet-connected friends from which one selects who to chat with at a particular time in case they are on-line.

Video conferencing

.Videoconferencing is the conduct of a session/discussion using a set of telecommunication technologies which allow two or more locations to communicate by simultaneous two-way real time video and audio transmissions.

.videoconferencing is mostly used in business, education, medicine and media.

.It reduces the need to travel to bring people together.

Netiquette

.This is the etiquette guidelines that govern behaviour when communicating over the

Internet. i.e. The dos and don'ts of online communication.

The Netiquette rules

.Identify your self

.Include a subject line

.Avoid sarcasm so that you are not misinterpreted

.Respect other user’s privacy

.Acknowledge and return messages promptly

.Copy with caution

.No spam/junk mail

.Be concise

.Use appropriate language

.Avoid flaming (online screaming)

.Only use common acronym. E.g. LOL for laugh

.Use words in brackets, such as (grin) to express your mind

.Use asterisks surrounding words to indicate italics used for emphasis (*at last*)

Web designing

.This is the initial process of web publishing through which a web page is created.

.It’s about organizing web content so that it can be easily found and easily read and is attractive to visitors.

Web authoring

.Web authoring refers to designing and creation of a Web site, ranging from writing the site's underlying code to writing the text to managing the site's upkeep. This can be done directly by writing the html code, or using html tools that operate in the background to create the code while the author is using a WYSIWYG interface.

Web authoring software

A category of software that is used to design web pages, it may not require one to have any knowledge of HTML coding because it offers Web page design wizards and different web page design templates for the user to pick from and simply insert content. The software will generate the required HTML coding for the

layout of the Web pages in the background based on what the user designs. Examples of commonly used authoring software include Dreamweaver, and Microsoft desktop publisher

Content management system

A content management system (CMS) is a system that provides a WYSIWYG interface to manage the content of a website. Which involves adding new content, editing, or modifying existing content and removal of unwanted or expired content. It allows the content manager or author, who may not know Hypertext Markup Language (HTML), to manage the creation, modification or removal of content from a website without needing the expertise of a webmaster. Examples of CMS include Joomla, Drupal and Wordpress.

HTML codes, also referred to as HTML tags, are enclosed by the lesser than (<) and greater than (>) brackets and may be written in capital or lower case letters.

.The opening bracket is followed by an element, which is a browser command, and ends with the closing bracket.

<font size=2>

An element may also be followed by attributes, which are words describing the properties of the element, and further instruct the browser.

<font size=2>

.Attributes are only contained in the opening HTML tags to the right of the element and are separated by a space and followed by an equal (=) sign.

The value follows the equal sign and is enclosed in quotes.

<font size=2>

Examples of Basic HTML tags

.For each attribute, there is an opening and a closing tag;

Example of basic document structure:

<HTML>

<HEAD>

<TITLE>your document title goes here</TITLE>

</HEAD>

<BODY>

Your document text goes here

</BODY>

</HTML>

The very first tag in your document: <HTML> and the very last: </HTML>

.HEAD

The second tag in your document. Enclosed within the beginning tag: <HEAD> and the ending tag: </HEAD> is information about the document that will not display in the body of the document.

.TITLE

The document title, which is enclosed with a begin title tag: <TITLE> and an end title tag: </TITLE>, all of which is enclosed with the HEAD tags above.

The title does not display as part of the document itself, but appears in the browser window title. It is also what is used to name your document in a bookmark list.

.BODY

The complete text of your document is wrapped by a begin body tag: <BODY> and an end body tag:

</BODY>.

HTML EDITORS

.There are many HTML Editors for purchase or download. Recent versions of Word and

WordPerfect have HTML Editors, or you can choose to use a dedicated HTML editor such as

FrontPage or Dreamweaver.

.When using a word processing application to create an HTML file, open the word processed document, then select the menu option FILE:

Save As HTML or choose to use the MsWordweb page wizard.

What to consider when designing a web page

.The target or primary audience of the web site.

.The impression you wish the site to create to your visitors.

.The purpose of the website. Whether personal, commercial or educational. This helps to determine the design for it.

.The browser types or version likely to be used by your primary audience to determine the nature of materials to use in the website

.How to organize the site links and web pages to enable easy navigation through the site by visitors.

.To obtain the relevant content to include in your page.

.Obtaining permission to use other people's copyrighted content or to link to other people's sites this protects you from any possible legal problems concerning copyright violation.

Characteristics of a good web site

.It should be easy to navigate with well arranged, easy to see navigation buttons.

.Simple and clear layout of sections and content which makes it user friendly ie find content easily.

.It must be pleasing to the eye to encourage visitors to the site.

.It should load quickly to avoid disappointing potential visitors to the site.

.It should have readable font web safe eye pleasing colors so that visitors can read the content easily.

.It should be interactive with contact information, possibility of e-mail, online communication forum and chats. Message boards etc.

.Should have active links which enable visitors to access other references.

.Should be frequently updated and must have a dated of last update.

.The web pages must have web page titles and brief summaries about the page or site

Uses/functions of a Web site

.It Enables Publicity or exposure to the public of a business or school. Businesses consider their website to be their most important face to the public.

.It is a Communication tool for information exchange between an organization and the public or a group of people.

.Provides a convenient and cheap base of operation for individuals and businesses.

.Useful in Marketing of products. Explaining the products and services offered, providing background and general contact information and online transactions.

.They are a source of income to advertisers and web site developers. Space can also be hired for advertisements.

Relevance of websites to schools in Uganda

.It is used for communication purposes. The school can reach out to a wider audience worldwide, for example, in school recruitment.

.Used for mobilization of resources. The website can be used for resource mobilization as it can reach out to a wide supporting audience.

.For advertising purposes. The website can provide general information about the school.

.The website can provide a forum for discussion of issues concerning the school using blogs.

.It can be used for teaching and learning in the following ways:

1. The website can provide subject content notes to students.
2. The website can present an opportunity for developing web designing technology skills for students directly involved.
3. The school community can collaborate with other students worldwide for project based learning.

.The website can provide a forum for students and teachers to collaborate with others elsewhere.

.The site can provide a forum for parents and alumni feedback.

.It can work as a depository (store) where students' achievement data is posted for easy access by the stakeholders.

.It can help teachers to collaborate with other teachers worldwide.

.The site can be used to publish students and teachers work.

Web site hosting

.web hosting is a service of storing a website on a particular server that is connected to the WWW such that the site is accessible on the World Wide Web.

.Web hosting is necessary to enable individual access the website at any time.

.Web hosts are companies that provide space (web hosting) on a server they own for use by their clients.

.Some webhosts provide free services while others charge a fee. Free web hosting is advertisement-supported web hosting, and is often limited when compared to paid hosting.

.A web site can also be hosted on a home or private server in a home or local area network.

HTML EDITORS

.An HTML editor is a software application for creating web pages. Although the HTML markup of a web page can be written with any text editor such as word pad, specialized HTML editors can offer convenience and added functionality. For example, many HTML editors work not only with HTML, but also with related technologies such as CSS, XML and JavaScript or ECMA Script. In some cases they also manage communication with remote web servers via FTP and WebDAV, and version management systems such as CVS or Subversion

Project work on web designing

.You are required to design five web pages (use any web publishing software) for your school taking into considerations the properties of a good web site.

.Page one is the Home page which must include

(i) A welcome note and information on the schools location and motto

(ii) The schools email address

(iii) The web links to the other pages

(iv) The navigation bars

(v) Company logo

.Page two should show bullet list of departments available in the school. Add a link to the school website for further information.

.Page three should contain other facilities offered in the school e.g. swimming, school bus, and internet services.

.Page four should have a brief information on your dormitory/house and a simple definitions list stating the chorus of your house.

.A table indicating 5 names of your dormmates showing their Bio data (age, sex, home town/district

.Insert a relevant form control

.Page five should have photo gallery of at least five images

Network Security concerns

.Hacking/trespassing-secretly finding a way of looking or changing information of someone else's computer without their permission. a hacker may break into a system in order to explore it and expand their knowledge.

.Data loss through malice or human error

.Information theft

.illegal access to the network. i.e. computer intrusion where someone or program gains unauthorized access to a computer system

.Virus and worm attack

.A worm is a code that uses computer networks and security weakness to repeatedly copy itself into a computer memory until no more space is left.

.While a computer virus is a malicious and destructive program written to activate itself (executable) the moment it is introduced to a computer system and cause the system to malfunction

.Phishing -this is an attempt to steal Passwords and other private account information.

Phishers can set up fake web sites that look like those of trusted companies like Yahoo! to trick individuals into disclosing their user name and password.

.Cracking-This is breaking into computer systems or networks by bypassing passwords or licenses.

.Hardware malfunction

Solutions to network security problems

.Install an up to date antivirus software

.Separate the networks

.Use network password

.Putting in place a code of conduct. This is an acceptable use policy which tells the users what is acceptable and allowed on the company network. This can include things like acceptable websites to visit as well as what times are acceptable for browsing the Internet.

Computer malware risks

.Malware is software designed to infiltrate or damage a computer system without the owner's informed consent. It is a portmanteau/combination of the words malicious and software. Malware is a general term used by computer professionals to mean a variety of forms of hostile, intrusive, or annoying software/code.

.Malware includes computer viruses, worms, trojan horses, most rootkits, spyware, dishonest

Adware, and other malicious and unwanted software.

.A computer virus is a computer program that can copy itself and infect a computer without permission or knowledge of the user. Viruses attach themselves to executable files that may be part of legitimate programs. If a user tries to start an infected program, the virus' code is executed

first.

How computer viruses spread

.In order to infect a computer, a virus has to have the chance to execute its code. This occurs in any of the following ways;

(i) Booting a PC from an infected medium such as a floppy.

(ii) Executing an infected program.

(iii) Opening an infected file.

.A virus can only spread from one computer to another when its host is taken to the uninfected

computer, for instance by a user sending it over a network or the Internet, or by carrying it on a

removable medium such as a floppy disk, CD, or USB drive.

.viruses can spread to other computers over a network by infecting files on a network file system or a file system that is accessed by other computers.

.Viruses often travel via e-mail attachments.

E-mail messages by themselves do not carry viruses. Only .exe, .com or other types of executable files can carry a virus.

Effects of computer viruses

.Some viruses are programmed to damage the computer by damaging programs, deleting files, or

reformatting the hard disk. Others simply replicate themselves and perhaps make their presence known by presenting text, video, or audio messages.

.They take up computer memory used by legitimate programs.

.They can result in system crashes and data loss.

.They can prevent a computer from booting.

Symptoms of a computer virus attack

.The computer runs slower than usual.

.The computer stops responding, or it locks up frequently.

.The computer restarts on its own.

.Applications on the computer do not work correctly.

.Disks or disk drives are inaccessible.

.You see unusual or strange error messages.

.There is a double extension on an attachment that you recently opened, such as a .jpg, .vbs, .gif, or .exe. extension.

.An antivirus program is disabled for no reason. Additionally, the antivirus program cannot be restarted.

.An antivirus program cannot be installed on the computer, or the antivirus program will not run.

.New icons appear on the desktop that you did not put there, or the icons are not associated with any recently installed programs.

.Strange sounds or music plays from the speakers unexpectedly.

.A program disappears from the computer even though you did not intentionally uninstall it

.It shuts down unexpectedly or crashes frequently.

.It experiences memory problems or runs out of disc space.

.Unusual files or directories appear on your system.

Virus types

.Viruses can be divided into two types, on the basis of their behavior when they are executed;

the Nonresident viruses which immediately search for other hosts that can be infected, infect these targets, non-memory-resident viruses only are activated when an infected application runs.

.The Resident viruses which do not search for hosts when they are started. Instead, a resident virus loads itself into memory on execution.

It stays in memory after it executes and after its host program is terminated.

.The Resident virus stays active in the background and infects new hosts when those files are accessed by other programs or the operating system itself.

.Boot Virus

This type of virus affects the boot sector of a floppy or hard disk. This is a crucial part of a disk,

in which information on the disk itself is stored together with a program that makes it possible to

boot (start) the computer from the disk.

.Macro Virus. Macro viruses infect files that are created using certain applications or programs

that contain macros.

.These mini-programs make it possible to automate series of operations so that they are performed as a single action, thereby saving the user from having to carry them out one by one

FAT Virus.

The file allocation table or FAT is the part of a disk used to connect information and is a vital part of the normal functioning of the computer.

This type of virus attack can be especially dangerous, by preventing access to certain sections of the disk where important files are stored. Damage caused can result in information losses from individual files or even entire directories.

Logic Bombs

They are not considered viruses because they do not replicate. They are not even programs in their own right but rather camouflaged segments of other programs. Their objective is to destroy data on the computer once certain condition(s) is met.

File Infectors

This type of virus infects programs or executable files (files with an .EXE or .COM extension). When one of these programs is run, directly or indirectly, the virus is activated, producing the damaging effects it is programmed to carry out.

The majority of existing viruses belong to this category, and can be classified depending on the actions that they carry out.

Companion Viruses

Companion viruses can be considered file infector viruses like resident or direct action types. They are known as companion viruses because once they get into the system they "accompany" the other files that already exist. In other words, in order to carry out their infection routines, companion viruses can wait in memory until a program is run (resident viruses) or act immediately by making copies of themselves (direct action viruses)

Directory Virus

Directory viruses change the paths that indicate the location of a file. By executing a program (file with the extension .EXE or .COM) which has been infected by a virus, you are unknowingly running the virus program, while the original file and program have been previously moved by the virus.

Once infected it becomes impossible to locate the original files.

Polymorphic Virus

Polymorphic viruses encrypt or encode themselves in a different way (using different algorithms and encryption keys) every time they infect a system.

This makes it impossible for anti-viruses to find them using string or signature searches (because they are different in each encryption) and also enables them to create a large number of copies of themselves.

Resident Viruses
This type of virus is a permanent which dwells in the RAM memory. From there it can overcome and interrupt all of the operations executed by the system: corrupting files and programs that are opened, closed, copied, renamed etc.

Direct Action Viruses

The main purpose of this virus is to replicate and take action when it is executed. When a specific condition is met, the virus will go into action and infect files in the directory or folder that it is in and in directories that are specified in the AUTOEXEC.BAT file PATH.

This batch file is always located in the root directory of the hard disk and carries out certain operations when the computer is booted

Computer worms

.A computer worm is a self-replicating computer program. It uses a network to send copies of itself to other nodes (computer terminals on the network) without any user intervention. Unlike a virus, it does not need to attach itself to an existing program. Worms always cause harm to the network by consuming bandwidth and memory.

.A rootkit is a program (or combination of several programs) designed to take fundamental control (in Unix terms "root" access, in Windows terms "Administrator" access) of a computer system, without authorization by the system's owners and legitimate managers.

Trojan horses

.a Trojan horse, or simply Trojan, is a piece of software which appears to perform a certain legitimate action but in fact performs a malicious act.

Spyware

.Spyware is computer software that is installed stealthily on a personal computer to intercept or take partial control over the user's interaction with the computer, without the user's informed consent.

.Spyware programs can collect various types of a users personal information, such as Internet

surfing habit, sites that have been visited, but can also interfere with user control of the computer in other ways, such as installing additional software, redirecting Web browser activity, accessing websites blindly that will cause more harmful

.viruses, or diverting advertising revenue to a third party. Spyware can even change computer settings, resulting in slow connection speeds, different home pages, and loss of Internet or other programs.

Adware

.Adware or advertising-supported software is any software package which automatically plays, displays, or downloads advertising material to a computer after the software is installed on it or while the application is being used. Some types of adware are also spyware and can be classified as privacy-invasive software.