Unit 1

Computer Network and Internet

Introduction

Network allows computers to communicate with each other and to share resources and information.Through this unit some of the basic aspects of computer networks and Internet is presented. In lesson 1 the historical background of computer networks is presented. Then different type of networks on the basis of scale is considered. Lesson 2 presents the important concepts of topology. In lesson 3 we discussed about network devices with their functionalities. Internet is a collection of networks or network of networks that connect computers all over the world.

Lesson 1.1

Introduction to Computer Network

Outcomes

Upon completion of this unit you will be able to:

Define Computer Networks.

State the evolution of Computer Networks.

Classify different types of Computer Networks.

Explain difference between LAN and WAN

Define Personal Area Network

Computer Network

Figure 1.1 computer network

In simple terms network means an interconnected set of some objects. We are familiar with the Radio, Television, Railway, Bank, Mobile and other

types of networks. In recent years, the network that is making significant impact in our day-to-day life is the Computer network. Computer network is a collection of autonomous computers and devices connected to each other. The computers can be geographically located anywhere. The term autonomous implies that the computers can function independently of others. However, the network allows computers to communicate with each other and to share resources and information. In a short period of time computer networks have become an indispensable part of business, industry, entertainment as well as all aspects of our daily life. The computer that provides resources to other computers on a network is known as server. In the network the individual computers, which access shared network resources, are known as workstations or nodes. Important benefits of computer networks are:

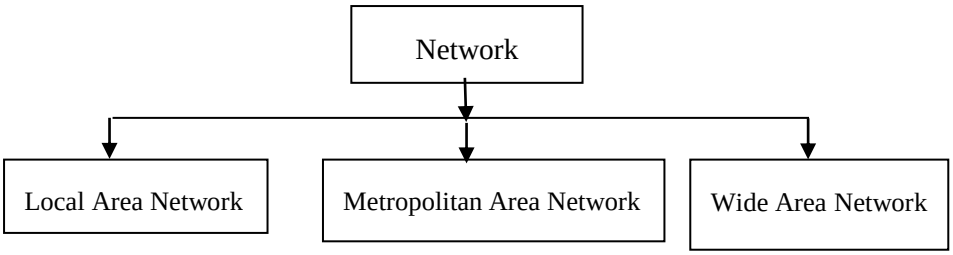
- **Resource sharing –** sharing program, data, peripheral devices like printers, scanners, CD-ROM etc.
- **Powerful communication system –** Computer network provides a powerful communication system (e-mail, teleconferencing, and video conferencing) among widely separated people.
- **Scalability** – Computer network provides ability to increase system performance gradually as workload grows just by adding more processor in the network.
- **Security –** Security starts with the login procedure to ensure that a user accesses the network using his or her own user account.
- **Lower cost.**
- **Higher reliability.**
- **Higher flexibility.**

Evolution of Computer Networks

Initially, computer network was developed for defense purpose, to have a secure communication network that can even withstand a nuclear attack. After a decade or so, companies, in various fields, started using computer networks for keeping track of inventories, monitor productivity, communication between their different branches offices located at different locations. For example, Railways started using computer networks by connecting their nationwide reservation counters to provide the facility of reservation and enquiry from anywhere across the country. And now after almost two decades, computer networks have entered a new dimension; they are now an integral part of the society and people. In 1990s, computer network started delivering services to private individuals at home. Some of the services are access to remote information, person-person communication, and interactive entertainment.

Different types of Computer Network

There are three types of computer networks based on geographical area



(i) LOCAL AREA NETWORK (LAN)

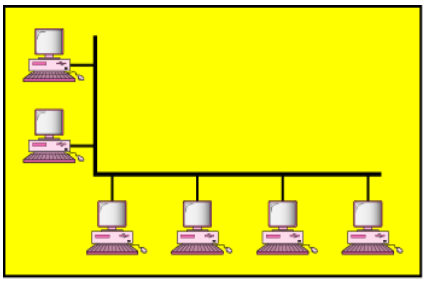


Figure 1.2 Single Building LAN

Local Area Network, generally called LANs, is privately owned network within a single building, or inside buildings close to each other. This usually spans about 0 to 5 kilometers and is generally a private network owned by an organization. For example: Office LAN, Hospital LAN, Campus-wide LAN, etc.

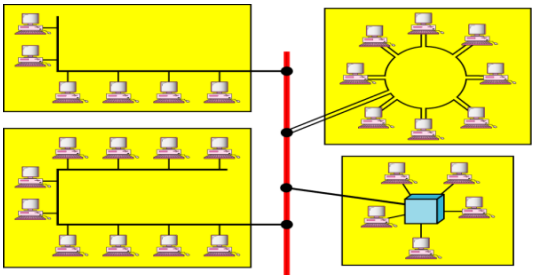


Figure 1.3 Multiple Building LAN

Advantages

- The reliability of network is high because the failure of one computer in the network does not affect the functioning of other computers.
- High speed and error free data transmission is possible - 10 Mbps to 1000 Mbps and more.
- Peripheral devices like magnetic disk and printer can be shared by other computers.
- Addition of new computer to network is easy.
- Lower cost.

Note it!

LAN is data communication system that allows number of independent computers to communicate directly with each other in a limited geographic area.

(ii) METROPOLITAN AREA NETWORK (MAN)

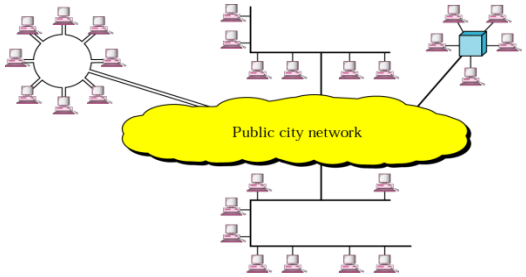


Figure 1.4 Metropolitan Area Network

A Metropolitan Area Network, or MAN, is basically a bigger version of a LAN and normally uses similar technologies. This usually spans 5-50 kilometers of range. It might cover a group of nearby corporate offices or a complete city and might be either private or public. Speed is about 10 MBPS standard. Its reliability is moderate.

Note it!

MAN is a network designed to extend over as entire city.

(iii)WIDE AREA NETWORK (WAN)

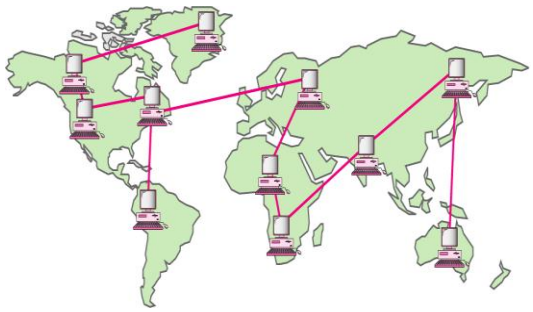


Figure 1.5 Wide Area Network

A Wide Area Network, or WAN, spans a large geographical area (unlimited), often a country or continent. WAN is more sophisticated and Expensive technology. Data transfer rate is low (few KBPS to 10 MBPS) and error rate is much higher.

Difference between LAN and WAN

- LAN is restricted to limited geographical area of few kilometers, but WAN covers long distance even worldwide.
- In LAN, the computers are connected with wires and coaxial cables but in WAN communication are done through telephone lines and satellite links.
- Cost of data transmission in LAN is less because the transmission medium is owned by a single organization. In the case of WAN the cost of data transmission is very high because the transmission medium used is hired either telephone lines or satellite links.
- Few data transmission errors occur in LAN compared to WAN.
- In LAN the speed of data transmission (0.1 to 100 megabyte per second) is much higher than WAN (1800 to 9600 byte per second).

Hardware Requirements for Network (Wired LAN)

- Two or more computers
- Switch or Hub
- LAN card with each computer
- Cable and Connector
- Operating System

Figure 1.6 Switch

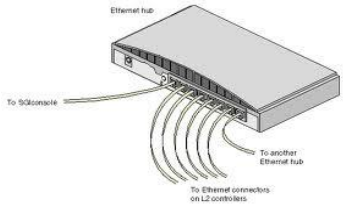


Figure 1.7 Hub

Network switch, hub both are networking device that join multiple computers together with in LAN.

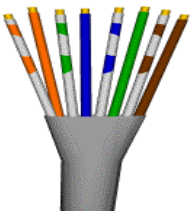


Figure 1.8 Cables

Figure 1.9 Connectors

Figure 1.10 LAN card

Hardware Requirements for Network (Wireless LAN)

- Two or more computers
- Server
- Wireless LAN card (for every PC)
- Network operation system (For server)

Figure 1.11 Wireless LAN Card

Figure 1. 12 Server

Personal Area Network (PAN)

Personal Area Network is an ad hoc type network operable over a small area such as a room. Bluetooth wireless technology which is a short range radio technology is developed for Personal Area Network (PAN). Bluetooth wireless technology makes it possible to transmit signals over short distances between telephones, computers and other devices and thereby simplify communication and synchronization between devices.

Unit summary

Summary

In this lesson we have covered computer network, types of computer network - LAN, MAN and WAN. We also got idea what are the hardware's we need to set up Local Area Network. Moreover we have learnt about Personal Area Network.

Activity

1. Assume ABC is a large Company, headquarter is in Dhaka and branch offices throughout Asia, Europe and America. Which network is applicable for the above conditions and states the reasons?

2. Which one of the following is an example of typical wireless LAN card?

Figure-1

Figure-2

Assessment

Assessment

Fill in the blanks

1. Three main categories of networks are _____, _____ and _____.

State whether the following statements are true or false

1. Initially, computer network was developed for defense purpose.

2. The speed of data transmission is much higher in LAN than in WAN.

3. Personal Area Network is an ad hoc type network.

Multiple Choice questions

1. A network that connect computers in a building is known as

a) LAN

b) MAN

a) WAN
b) PAN

2. Bluetooth wireless technology is used for

a) LAN
b) MAN
c) WAN
d) PAN

3. Metropolitan Area Network (MAN) is a version of

a) LAN
b) PAN
c) WAN
d) None of above

Exercises

1. Define computer network.
2. Mention benefits of computer network.
3. Cost of data transmission in LAN is less. State the reason.
4. Classify computer networks based on their scale.
5. Write short notes on Personal Area Network.

Lesson 1.2

Network Topology

Outcomes

Upon completion of this unit you will be able to:

Define topology.

Classify different Network topologies.

Explain the characteristics of different topologies.

Topology

Topology refers to the way in which the network of computers is connected. Topology can also be defined as the physical layout of computers, cables, switch etc. or logical arrangement of links in a network. Two or more devices connected to a link then the links form a topology. The topology in a network is the geometric representation of the relationship of all the links and linking devices to each other. Each topology is suited to specific tasks and has its own advantages and disadvantages. The word "topology" comes from topos, which is Greek for "place." Various commonly used topologies are discussed in the following sections:

- Mesh topology
- Star topology
- Tree topology
- Bus topology
- Ring topology

The Choice of topology to design a network depends on:

- Size,
- Architecture and
- Cost

Mesh Topology

In mesh topology every devices has a dedicated point to point link to every other devices. Two nodes are connected by dedicated point-point links between them. So the total number of links to connect n nodes = n (n-1)/2. Media used for the connection can be twisted pair, co-axial cable or optical fiber.

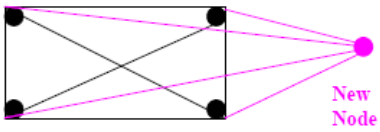


Figure 2.1 Mesh Topology

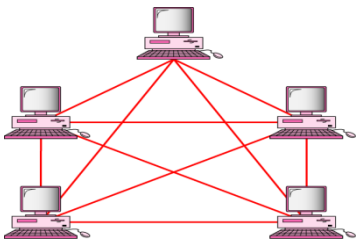


Figure 2.2 adding a new node in Mesh Topology

Advantage- A mesh topology has several advantages over the other network and these are

- Mesh topology is robust– Highly reliable.
- If one link becomes unusable it does not affect the entire system.
- Use of dedicated links each connection carry its own data, thus eliminating the traffic problems that occur when links must be shared by multiple devices.
- Fault identification and fault isolation is easy.
- Another advantage is privacy or security because of dedicated line only the intended recipient receives the data.

Disadvantage

- The main disadvantage of mesh topology is cost of cabling will be very high for a larger area (expensive) – need more cable and I/O ports.
- Mesh Topology is not flexible and has a poor expandability.

Note it!

In mesh topology total number of links to connect n nodes is = n (n-1)/2

Star topology

In star topology all stations are attached to a central device (HUB). Here each device has dedicated point to point link only to the central HUB, the devices are not directly linked to each other.

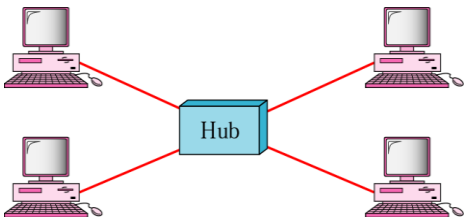


Figure 2.3 Star Topology

Star topology does not allow direct traffic between devices. If one device wants to send data to another device, it sends the data to the central HUB (acts as an exchange), and then the HUB relays the data to the other connected device. This topology is the easiest to maintain, among the other topologies. This mode of operation can be compared with the working of a telephone exchange, where the caller party is connected to a single called party and each pair of subscriber who needs to talk have a different connection.

Advantage

- Star topology is less expensive than a mesh topology.
- High Speeds of data transfer (higher bandwidth) for small number of devices.
- Very Flexible to add or delete station.
- High Reliability.
- High Maintainability.
- If one link fails only that link is affected all other links remain active.

Disadvantage

- Failure of the central HUB disables communication throughout the whole network.

Note it!

Star topology provides high reliability, more flexible and higher bandwidth.

Tree Topology

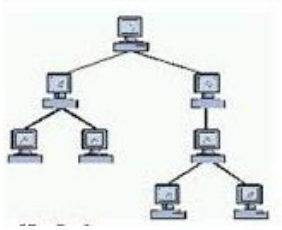


Figure 2.4 Tree Topology

Tree topology is an extension of star topology with more than one level. A good example of tree topology is cable TV technology. Here the main cable from the main office is divided into main branches and each branch is divided into smaller branches and so on. This tree topology is very good in an organization as incremental expansion can be done in this way.

Advantage

- Main features of this topology are scalability and flexibility. This is because, when the need arises for more stations that can be

accomplished easily without affecting the already established network.

Bus topology

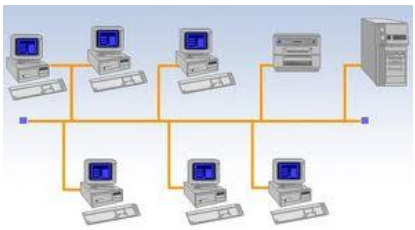


Figure 2.5 Bus Topology

In bus topology all the computers are connected by a single cable with a terminator at each end or use a series of cable segments that are connected linearly. Information sent from a node travels along the backbone until it reaches its destination node. The bus topology is the simplest and the most widely used topology for LANs. Here one long cable acts as a backbone to link all the devices in the network.

Advantage

- Easy to set up.
- It is very flexible.
- It is very cost effective because only a single cable required.
- Moderate reliability.
- Easy to expand, add any new station or delete any station easily with-out affecting other station.

Disadvantage

- Difficult to fault isolation.
- A single loose connection can bring down the entire LAN.
- Addition of more computers (nodes) slows down the network performance.

Ring topology

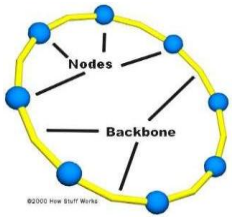


Figure 2.6 Ring Topology

In ring topology the device are connected in a ring. Each device on the ring receives the data from the previous device, regenerate it and forward

it to the next device until the data reaches its destination. Thus, data circulate around the ring in one direction (clockwise).

Advantage

- Ring topology is easy to install and reconfigure.
- Data insertion, data reception and data removal can be provided by repeater.
- To add or delete a device requires moving only two connections.
- moderate cost

Disadvantage

- This topology is not very reliable; if one link fails the entire network is broken.
- If the network is long the speed is slow.
- The repeater introduces a delay.
- Direct link not provided.
- It provides complex management.

Note it!

Data circulate around the ring topology in one direction i.e. clockwise.

Unit summary

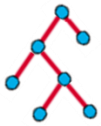
Summary

This is the second lesson of this unit. In this lesson we gain knowledge of network topology with specific tasks of different type's topology.

Activity

1. Assume, Bangladesh Open University has a mesh network consisting 10 devices. Calculate how many numbers of cables are needed?

2. Define the type of topology in the following figure.



Assessment

Assessment

Exercises

1. Define topology.
2. Briefly describe different types of topology used in LAN.
3. Why star topology is commonly preferred?
4. List out the advantages and drawbacks of bus topology.
5. List out the advantages and drawbacks of ring topology
6. Briefly discuss the consequences if a connection fails for the following four networks
    a) Five devices arranged in a mesh topology.
    b) Five devices arranged in a star topology
    c) Five devices arranged in a ring topology
    d) Five devices arranged in a bus topology

6. A network contains four computers. If there are only four lengths of cable, which topology is used? Briefly explain

Lesson 1.3

Network Devices

Upon completion of this unit you will be able to:

Outcomes

Define different devices of Computer Network.

Describe the function of Network devices.

Compare between Hub and Switch.

Network Interface Card (NIC)

Figure 3.1 NIC Card

To connect a computer to a network, a network interface card (NIC) is essential. A network interface card or a LAN card plugs into a slot on motherboard to connect it to the LAN. For any computer, a network interface card (NIC) performs two crucial tasks and these are:

- Establishes the physical connection between the computer and a network and then manages that link.
- Translates digital computer data into signals (appropriate for the networking medium) for outgoing messages, and translates signals into digital computer data for incoming messages.

Modem

Internal modem

- A modem card in your computer that is integrated within the system.
- Less expensive than external modems.
- Disadvantage is that you need to access inside the computer to replace the modem.

External modem

- A device that connects externally to your computer through a serial port.
- External power supply does not drain power from the computer.
- Modem activity can easily be observed.
- More expensive than an internal modem.

Hub

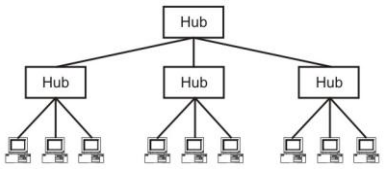


Figure 3.3 Hub

Hub is a generic term, but commonly refers to a multiport repeater. A hub is the place where data converges from one or more directions and is forwarded out in one or more directions**.** A hub is typically the least expensive, least intelligent, and least complicated. Its job is very simple: anything that comes in one port is sent out to the others. Every computer connected to the hub "sees" everything that every other computer on the hub sees. It can be used to create multiple levels of hierarchy of stations. The stations connect to the hub with RJ-45 connector having maximum segment length is 100 meters. This type of interconnected set of stations is easy to maintain and diagnose. The following figure shows how several hubs can be connected in a hierarchical manner to realize a single LAN of bigger size with a large number of nodes. Hub shares the total bandwidth among all users so traffic more.

Note it!

Hub is the place where data converges from one or more directions and is forwarded out in one or more directions.

Switch

A network switch is a computer networking device (hardware) that joins multiple computers together within one local area network (LAN). Switch works at the Data link layer (layer 2) of the OSI model. A switch does essentially what a hub does but more efficiently. A switch gives a dedicated full bandwidth between every two devices communicating with each other. A switch is more expensive and a network built with switch is faster than one built with hub.

Note it!

Switch is a computer networking device (hardware) that joins multiple computers together within one local area network (LAN).

Comparison between switch and hub

Although a hub and a switch apparently look similar, they have significant differences. Both can be used to realize physical star topology, the hubs works like a logical bus, because the same signal is repeated on all the ports. On the other hand, a switch functions like a logical star with the possibility of the communication of separate signals between any pair of port lines. As a consequence, all the ports of a hub belong to the same collision domain and in case of a switch each port operates on separate collision domain. Moreover, in case of a hub, the bandwidth is shared by all the stations connected to all the ports. On the other hand, in case of a switch, each port has dedicated bandwidth. Therefore, switches can be used to increase the bandwidth of a hub-based network by replacing the hubs by switches.

Tip

Switch does essentially what a hub does but more efficiently. Switch can be used to increase the bandwidth of a hub-based network by replacing the hubs by switches.

Bridge

The device that can be used to interconnect two LANs (same logical link control protocol but may use different medium access control protocols) is known as a bridge. It is commonly used to connect two similar or dissimilar LANs designed to store and forward frames, it is protocol independent and transparent to the end stations. Bridge operates at the data link layer of the OSI model, which means the bridge cannot read IP addresses, but only the outermost hardware address of the packet. Use of bridges offers a number of advantages, such as higher reliability, performance, security, convenience and larger geographic coverage.

Types of bridge

- Transparent Bridges
- Source routing bridges

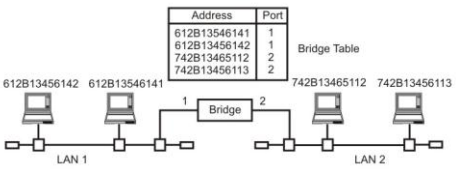


Figure 3.4 Bridge connecting two separate LANs

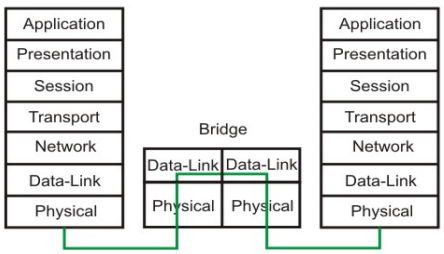


Figure3.5information flow through a bridge

Router

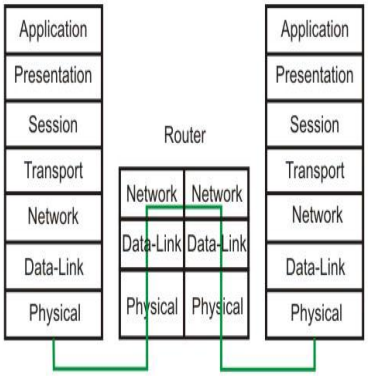


Figure 3.6 Router

A router is a network device which is used to communicate two or more networks with each other (similar networks, similar protocols) and forwards packets from one network to another network. All routers include some kind of user interface for configuring how the router will treat traffic. A simple way to think of a router is as a computer that can be programmed to understand, possibly manipulate, and route the data it's being asked to handle. Once a router has identified the best route for a packet to travel, it passes the packet along the appropriate network to another router. A router operates in the physical, data link and the network layer of the OSI model .It can be used to link two dissimilar LANs**.** A router isolates LANs into subnets to manage and control network traffic. However, unlike bridges it is not transparent to end stations. A schematic diagram of the router is shown in the following figure. A router has four basic components: Input ports, output ports, the routing processor and the switching fabric.

Note it!

Routers include some kind of user interface for configuring how the router will treat traffic.

Gateway

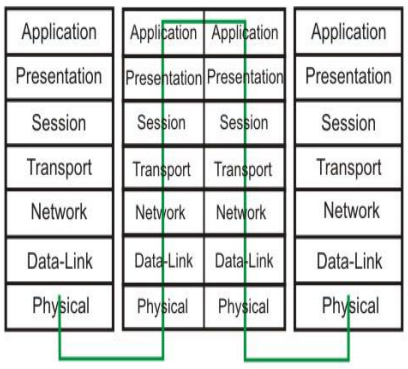


Figure 3.7 Gateway

A device used to connect two separate networks that use different communication protocols (dissimilar Protocol). A gateway can translate information between different network architectures so we can say that a gateway acts as a protocol converter. It can convert TCP/IP to AppleTalk so a gate way formatted in protocol TCP/IP can communicate with AppleTalk protocol. Most gateways operate at the application layer, but can operate at the network or session layer of the OSI model.

Note it!

Gateway can translate information between different network architectures.

Unit summary

Summary

In this unit you learned about different networking devices and functions of these devices.

Assessment

Assessment

Fill in the blanks

1. Routers include some kind of _____ for configuring how the router will treat traffic.

2. A gateway can translate information between different network architectures.

3. Bridge function in the _____ layer.

State whether the following statements are true or false

1. Modem converts digital signal into analog and analog signal into digital

2. Hub is expensive than switch.

3. Internal modem is less expensive than external modem.

Multiple Choice questions

1. Which one of the following is used to connect two separate networks that use different communication protocol?

a) gateway

b) switch

c) hub

d) bridge

2. Compare to hub, switch is (In terms of speed).

a) fast

b) slow

c) similar

d) none of the above

Exercises

1. What is network interface card and mention its characteristics.

2. Briefly explain the terms switch, hub, bridge, router, and gateway.

3. State the reasons why switch works efficiently than hub.

4. Write the functions of a gateway.

Lesson 1.4

Introduction to Internet

Upon completion of this unit you will be able to:

Outcomes

Define Internet.

Evolution of Internet.

Describe the advantages of Internet.

Access Internet.

Internet

Figure 4.1 Gateway

Internet is a collection of networks or network of networks that connect computers all over the world. A common form of Internet is a collection of LANs connected by a WAN through suitable hardware and software to work in a seamless manner. Internet provides various applications such as e-mail; file transfer, remote log-in, World Wide Web, Multimedia, etc run across the internet. It is evolving into the information superhighway of the future. Using internet, organizations can exchange data, people can communicate with each other in a faster and effective way all over the world. With the help of video conferencing over the internet, it has become possible that people can even see each other while they are communicating. Even one can purchase all his shopping sitting back at home. He does not bother to visit crowded market place for wasting his valuable time. Gradually, shopkeepers are also interested to go for electronic commerce which provides them greater reach, faster and better ways to do business over the internet.

Tip

Dear learners do not confuse the term internet (lowercase i) with the Internet (uppercase I.) internet is an interconnection of individual networks on the other hand Internet is the name of a specific worldwide network.

Note it!

The basic difference between WAN and Internet is that WAN is owned by a single organization while internet is not so.

History of Internet

The foundation of the Internet began in 1969, when the US Department of Defense created ARPANET (Advanced Research Projects Administration Network), with one computer at California and three at Utah. ARPANET was a project to allow military personnel to communicate with each other in an emergency. ARPANET was developed with a view to enable academic and researchers to communicate by e-mail and to share data. ARPANET quickly grew to encompass the entire American continent and became a huge success. Every institution in the country wanted to become a part of ARPANET. So the network was broken into two smaller parts one is MILNET for managing military sites and the other one ARPANET (smaller) for managing non-military sites. Around 1980, NSFNET (National Science Foundation Network) was created. With the advancement of modern communication facilities, other computers were also allowed to be linked up with any computer of NSFNET. The early Internet was used by computer experts, engineers, scientists, and librarians. There was nothing user friendly about it. The Internet is not owned by a single authority and it has no headquarter. Finally in 1980 Internet was available for use by the general public. After that The Internet is expanding very fast. By 2011, the number of Internet users worldwide reached 2 billion over one quarter of the world's population.

Advantages of Internet

The Internet makes it possible for us to communicate in various ways and enables exchange of information. The most common things that we can see around us today are as follows are:

Information Resources

Information is the biggest advantage that Internet offers. You can get information on almost any subject by searching the web. The search engines like Google, Yahoo are at your service on the Internet. There is a huge amount of information available on the Internet for just about every subject known to man, ranging from government law and services, trade fairs and conferences, market information, new ideas and technical support, the list is simply endless.

Faster Communication

The foremost target of Internet has always been speedy communication and it has excelled way beyond the expectations. Now, you can communicate in a fraction of second with a person who is sitting in the other part of the world. For more personal and interactive communication, you can avail the facilities of chat services, video conferencing and so on. Electronic mail is the most widely used computer network application.

Online Services

Internet has made life very convenient. With numerous online services you can now perform all your transactions online. You can buy or sell products, reserve tickets, hotel reservations, transfer funds, pay utility bills, taxes etc. and right from your home.

Marketing and sales

Computer networks are used extensively in both marketing and sales organizations. Marketing professionals use them to collect, exchange, and analyze data related to customer needs and product development cycles. Sales application includes teleshopping, online-reservation services for hotels, airlines and so on.

Financial services

Today's financial services are totally depended on computer networks. Application includes credit history searches, foreign exchange and investment services, and electronic fund transfer, which allow user to transfer money without going into a bank (an automated teller machine is an example of electronic fund transfer, automatic pay-check is another).

Teleconferencing

Teleconferencing allows conference to occur without the participants being in the same place. Different types of equipment's are used for video conferencing depending on what quality of the motion you want to capture (whether you want just to see the face of other fellow participants or do you want to see the exact facial expression).

Voice over IP

Computer networks are also used to provide voice communication. This kind of voice communication is pretty cheap as compared to the normal telephonic conversation.

Access to Internet

Internet access refers to the means by which users connect to the Internet. The Common methods of internet access include dial-up, landline (over coaxial cable, fiber optic or copper wires), Broadband wireless access, T-lines, Wi-Fi, satellite and cell phones.

There are five types of internet connections which are as follows:

(i) Dial up Connection

(ii) Leased Connection

(iii) DSL connection

(iv) Cable Modem Connection

(iv) VSAT

Dial up connection

Dial-up connection is established using a modem. The modem connects

computer to standard phone lines that serve as the data transfer medium. When a user initiates a dial-up connection, the modem dials a phone number of an Internet Service Provider (ISP) that is designated to receive dial-up calls. The ISP then establishes the connection, which usually takes about ten seconds and is accompanied by several bee pings and a buzzing sound. After the dial-up connection has been established, it is active until the user disconnects from the ISP. Usually, this is done by selecting the "Disconnect" option using the ISP's software or a modem utility program. However, if a dial-up connection is interrupted by an incoming phone call or someone picking up a phone, the service may also be disconnected.

Advantages

- Low Price.
- Offered in rural areas – need a phone line.

Disadvantages

- Slow speed.
- Busy signals for users.

Note it!

Typically dial up is a home user connection.

Leased Connection

Leased connection is a permanent telephone connection between two points set up by a telecommunications transporter. Typically, leased lines are used by businesses to connect geographically distant offices. Unlike normal dial-up connections, a leased line is always active. The fee for the connection is a fixed monthly rate. The primary factors considering the monthly fee are distance between end points and the speed of the circuit. Because the connection doesn't carry anybody else's communications, the carrier can assure a given level of quality. For example, a T-1 channel is a type of leased line that provides a maximum transmission speed of 1.544 Mbps. You can divide the connection into different lines for data and voice communication or use the channel for one high speed data circuit. Increasingly, leased lines are being used by companies, and even individuals, for Internet access because they afford faster data transfer rates and are cost-effective if the Internet is used heavily.

Advantage

- Secure and private-dedicated exclusively to the customer.
- Line is always active.
- Speed-symmetrical and direct.
- Reliable.

Disadvantages

- Leased lines can be expensive to install and rent.
- Not suitable for home workers or single user.
- Faster data transfer rates.

Note it!

Unlike normal dial-up connections, a leased line is always active.

DSL (Digital Subscriber Line)

Digital Subscriber Line (DSL) is a technology that provides digital data transmission (data, voice, and video) using existing telecommunication network. DSL is a high-speed data service that works over conventional telephone lines and is typically offered by telephone companies. It does not occupy the phone line-you can still talk on the phone. Speed is much higher than regular modem.

The data bit rate of consumer DSL services typically ranges from 256 Kbit/s to 40 Mbit/s in the direction to the customer, depending on DSL technology, line conditions and service-level implementation.

Advantages

- Cheap line charges from the phone company.
- High bandwidth

Cable Modem Connection

Cable modem transmits and receives data as digital packets, meaning they provide high-speed Internet access. This makes cable modem connections much faster than traditional dial-up connections. Cable modems have the potential to receive data from their cable provider at speeds greater than 30 megabits per second.

The cable TV company runs a coaxial cable into the building to deliver their Internet service. Although fed from the same coax that provides cable TV service, most companies place a splitter outside of the building and runs two cables in, rather than using a splitter at the set-top box.

Advantages

- Always Connected: A cable modem connection is always connected to the Internet.

Tip

Dear learners Dial-up modems are generally only capable of a maximum bit rate of 56 Kbit/s (kilobits per second) and require the full use of a telephone line whereas broadband technologies supply at least double this speed and generally without disrupting telephone use.

VSAT

Very Small Aperture Terminal, an earthbound station used in satellite communications of data, voice and video signals, excluding broadcast television. A VSAT consists of two parts, a transceiver that is placed outdoors in direct line of sight to the satellite and a device that is placed indoors to interface the transceiver with the end user's communications device, such as a PC. The transceiver receives or sends a signal to a satellite transponder in the sky. The satellite sends and receives signals from a ground station computer that acts as a hub for the system. Each end user is interconnected with the hub station via the satellite, forming a star topology. The hub controls the entire operation of the network. For one end user to communicate with another, each transmission has to first go to the hub station that then retransmits it via the satellite to the other end user's VSAT.

Advantages

- Costs Insensitive to Distance
- Single Platform service delivery (one-stop-shop)
- Flexibility
- Upgradeable
- Low incremental costs per unit

Disadvantages

- High start-up costs (hubs and basic elements must be in place before the services can be provided)

Unit summary

Summary

After completing this unit you become skilled at Internet; its importance and different types of internet connections has also been discussed.

Assessment

Assessment

Write the difference between Leased connection and Dialup connection.

_____

_____

_____

Fill in the blanks

1. DSL does not occupy the phone line user can still _____ on the phone and _____ is much higher than regular modem.

State whether the following statements are true or false

1. Cable connection has slower speed than dial up connection.
2. With DSL, user can make and receive telephone calls while connected simultaneously to Internet.

Multiple Choice questions

1. ISP stands for

a) Internet Service Provider
b) Internet Service Protocol
c) Internet Server Provider
d) Information Service Provider.

Exercises

1. What is Internet? What are its advantages?
2. Differentiate between internet and Internet.
3. Discuss the role of Internet in the globalization of business
4. Explain in brief the working principle of Dial up connection.
5. Explain in brief different types of internet connection.

Lesson 1.5

Internet Terminologies

Upon completion of this unit you will be able to:

Outcomes

Define World Wide.

State Common terminologies associated with Internet.

World Wide Web (WWW)

WWW is the acronym for the World Wide Web. The WWW is hypertext based information retrieval tool. The World Wide Web "WWW" is a collection of electronic documents (web pages) and these documents are stored on computers called server. Information organized such a way that the reader can control over the order in which the information is presented.

Web Page

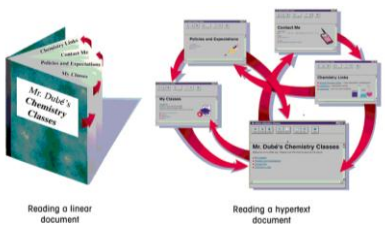


Figure 5.1 Book and Web page

A web page is an electronic document written in Hypertext Markup Language (HTML). A web page can contain text, image, audio, and video and even contains interactive features. Hypertext documents allow their users to easily navigate from one topic to another topic.
Dear learners look, when you read a book, you follow a linear progression, reading one page after another. With hypertext, you progress through pages in whatever way is best suited to you and your objectives. Hypertext lets you skip from one topic to another topic.

Following are some principles about web page designing which will help you to design an effective web page.

- Present your web page in such a way that the user gets impressed within the first few seconds of visit.

- Keep on updating web pages on regular basis by providing fresh and latest information.
- Keep your web pages focused. Don't show everything on one page, use separate pages for separate topics.
- Make sure that the features used in the web site are compatible to all browsers.
- Ensure that buttons and links in the web site behave as expected.
- Use compressed images so that web page gets quickly loaded.

Note it!

Hypertext documents allow their users to easily navigate from one topic to another topic.

Web Site

A website is a collection of one or more web pages belonging to particular organizations. We can also say that an entire collection of linked documents is referred to as a Web site**.** In a website the first page is known as home page. There are two types of website, Static Website and Dynamic Website. In static website contents are not expected to change frequently whereas in dynamic website contents are changing frequently.

Hyperlinks

Hyperlinks (or links) are the elements in a hypertext document that allow you to jump from one location to another location. A link may point to another section of the same document or to another document entirely, to play an audio and video file, to download a file and to link to other internet resources on the World Wide Web. Hyperlink usually appears as underlined text and in a different color, may also appear as image or as buttons to click.

For example, this is a link. It will open a web page in a new window, and you can close it to come back to this page. A link may lead to another web page, or it could lead to a document, video, or any other type of file. If you're not sure if something's a link, move the mouse over it. The pointer should change to a hand symbol**.**

Note it!

Hyperlink usually appears as underlined text and in a different color, may also appear as image or as buttons to click.

URL

A string of characters (address) that identifies a page on the World Wide Web is known as Uniform Resource Locator (URL).

IP addresses

Each computer on the Internet is called a host computer or just host. Each host computer on the internet has unique number called IP address, generally written in xxx.xxx.xxx.xxx format where xxx is a 3 digit number that varies between 0 and 255. For example 192.168.0.147.

Telnet

Terminal Network or simply Telnet is a general purpose client server application program that provides a remote log-in capability, which enables a user to log on to a remote computer and behaves as if it is directly connected to it.

File Transfer Protocol (FTP)

File Transfer Protocol (FTP) is a TCP/IP client-server application that transfer files between two remote machines through internet. A TCP connection is set up before file transfer and it persists throughout the session. It is possible to send more than one file before disconnecting the link.

Web browser

A web browser is a software application that enables a user to display and interact with text, images, videos, music and other information typically located on a Web page at a website on the World Wide Web or a local area network. Web browsers communicate with Web servers primarily using HTTP (hypertext transfer protocol) to fetch WebPages. Pages are located by means of a URL (uniform resource locator), which is treated as an address, beginning with *http:* for HTTP access. The process of using browser to view information on Internet is known as Browsing.
Today, Internet Explorer is the most popular web browser. Other browsers include Firefox**,** Chrome**,** Safari**,** Netscape and Opera**.** Each one has its own look and feel, but they have the same goal: to display web pages correctly. For most web pages, any well-known browser will work.

Figure 5.2 Internet Explorer

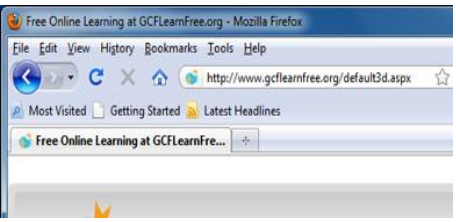


Figure 5.3 Firefox

Note it

The process of using browser to view information on Internet is known as browsing.

Web Server

A Web page is stored on a Web server, which in turn makes it available to the network. A Web server accepts, processes, and responds to Hyper Text Transfer Protocol (HTTP) requests. These requests are sent by Web browsers, which are used by client computers to communicate, send, and receive information on the Internet. The relationship between a Web server and a Web client is called a client/server relationship. Role of a Web Server

- Access control.
- Server-side page processing/parsing.
- Log maintenance.
- CGI script and custom API program execution.

Downloading Files

Downloading is retrieving a file or data from a remote site. Dear learners we already know that browser can display many different types of documents, media, and other files. But there are times when you'll want to access a file outside your browser. Downloading enables you to do this by putting the file on your computer in a place where you can access it. For example, suppose you needed to complete and print a form that you found online. You could download it to your desktop, then open it with the appropriate program (such as Microsoft Word) to edit it.

How to Download a File

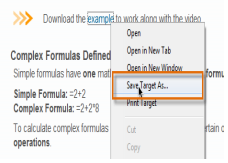


Figure 5.4 downloading a file

If you click on a link to a file, it may download automatically, but sometimes it just opens within your browser instead of downloading. To prevent it from opening in the browser, you can right-click the link and select Save Target As... (Different browsers may use slightly different wording). You'll be able to choose the folder where the file is saved.

Note it!

Downloading is retrieving a file or data from a remote site.

Upload

Upload means sending a file or data to a remote site.

Bookmarks

You can easily create a shortcut to your favorite web pages. If you've found a page you'd like to go back to later, you can add it to your Bookmarks (sometimes called Favorites). Bookmarks make it easier to find a page later on. Instead of having to remember the exact web address, you can just scroll through your bookmarks until you see the name of the page.

In Internet Explorer, you can add a bookmark by clicking Favorites and then Add to Favorites. Other browsers are similar, but they may use different wording.

Figure 5.5 Bookmark

Note it!

Instead of having to remember the exact web address Bookmarks allow user to find a page later on.

Unit summary

Summary

In this unit you learned about hyperlinks, how to download and upload files nee of bookmarks.

Assessment

Assessment

1. Differentiate between internet and Internet.

_____

_____

_____

Fill in the blanks

1. A web page is an _____ document written in _____.

2. Contents of _____website are expected to change frequently.

State whether the following statements are true or false

1. WWW is the acronym for the World Wide Web.

2. Upload is sending a file or data to a remote site.

Multiple Choice questions

1. A web page can contain?

a) text

b) audio

c) video

d) all of the above.

2. Which of the following allow user to jump from one location to another location?

a) hyperlinks.
b) bookmarks
c) telnet
d) ISP

Exercises

1. Define Internet

3. Discuss the role of Internet in the globalization of business.

Lesson 1.6

Web Applications

Outcomes

Upon completion of this unit you will be able to:

Define Web search engine.

Explain Features e-mail communication.

Describe E governance.

Web search engine

The Internet is a tremendous resource. It contains hundreds of web sites dedicated to thousands of topics. There are some web sites, which are used to search information on the web. There are more than 2,500 search services presently on the Web. Most search engines take one or more words entered by the user, search the contents of every Web page stored in their databases and display the result. Once done, certain keywords associated with those sites can be used for searching the directory's data banks to find Web sites of interest some popular search engineers are:-

- Google- http://www.google.com
- Yahoo! – http://www.yahoo.com

To find the information that you seek on the Internet is a function of how precise your queries are and how effectively you use search services. Poor queries return poor results; good queries return great results.

Improving Your Searches

As you gain experience with search engines, you'll be able to do better and better searches, which means it will become quicker and easier to find what you are looking for. Here are a few tips for improving your searches:

- Take suggestions. As you're typing your search terms, the search engine will try to guess what you're searching for, and it will show a list of search suggestions (which are similar to related searches, except they happen while you are typing). These can give you ideas for search terms that you may not have thought of.

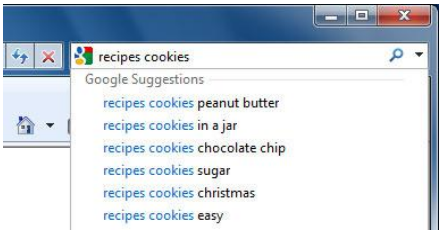


Figure 6.1 Searching

- Search phrases. Set quotes around a phrase so each word in the phrase isn't searched for separately. For example, if you put

quotes around "Bangladesh Open University" the search engine searches for that entire phrase in a web page. However, if you simply type Bangladesh Open University, the search engine searches for each of the words individually which may not give you the results you desire.

- Use OR to include either of two search words. For example, soup recipe tofu OR fish should return recipes for soup that contain tofu or fish (or both). You could also search for soup recipe tofu OR fish OR chicken OR beef.
- Exclude words. Use a hyphen (-) at the beginning of a word to exclude search results containing it. For example, macaroni -cheese. In many search engines the word NOT (in all caps) is used, as in macaroni NOT cheese.
- Get Help. Go to your search engine's Help page for more tips.

Email Communication

E-mail stands for electronic mail. This is probably one of the fastest and most convenient ways of communicating. It is also fast becoming the cheapest mode of communication. First e-mail message was sent in 1971 by an engineer named Ray Tomlinson. Tomlinson's breakthrough was the ability to send messages to other machines on the Internet, using the @ sign to designate the receiving machine.

Two ways to access e-mail

- Through browser by subscribing to free e-mail services like Gmail or Yahoo.
- Through Stand-alone clients like Microsoft Outlook, Outlook Express, Eudora.

Email Operation

Here we will see how to access your webmail account. Web mail allows you to open your email at home or at work or from any computer connected to the internet.

For web-based email first you type the URL (https://login.yahoo.com) in your browser window. The screenshot below shows the Yahoo mail web site.

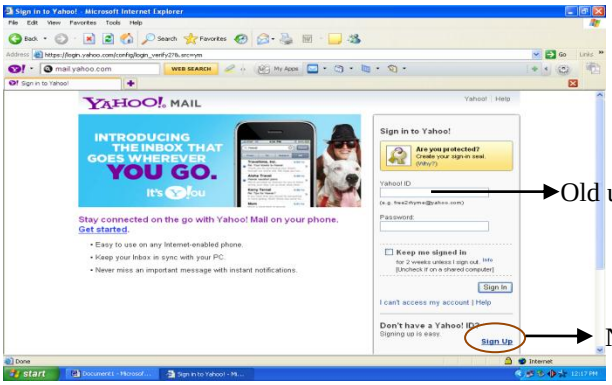


Figure 6.2 Yahoo mail web sites.

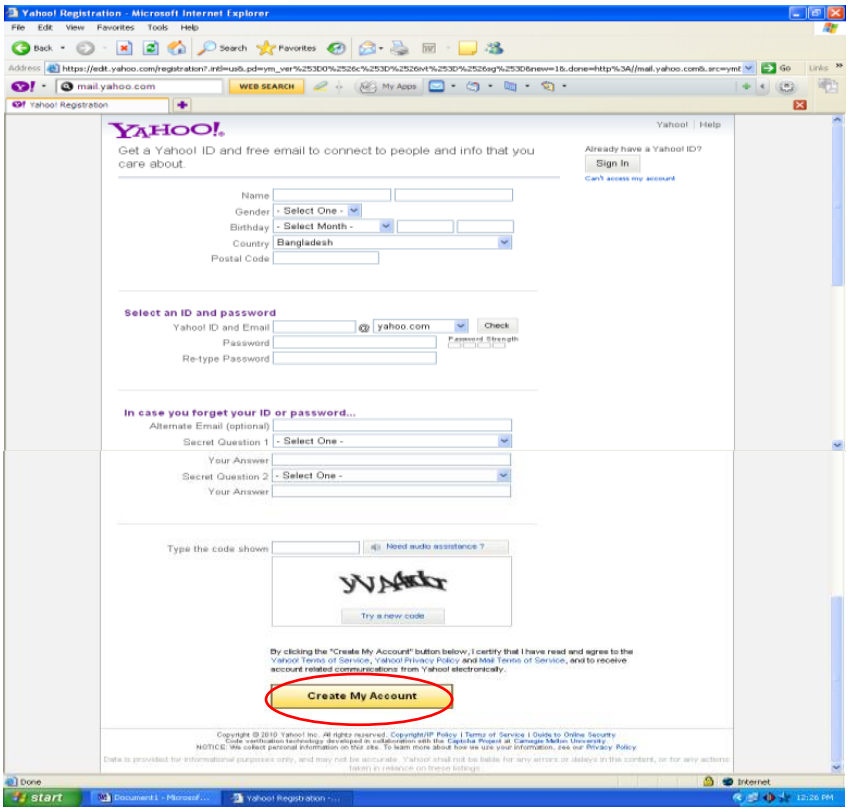


Figure 6.3 Creating new account

First fill up the form after that click on create my account then you will be notified that your account has been crated successfully. Now you are ready use your account.

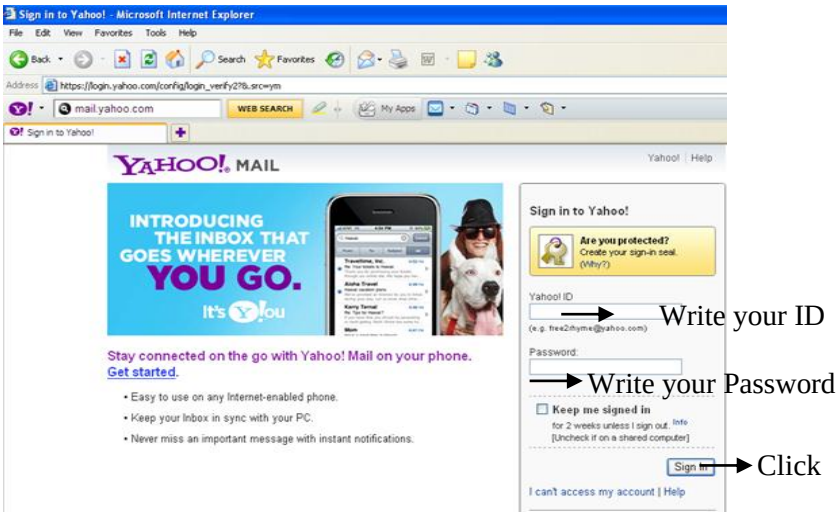


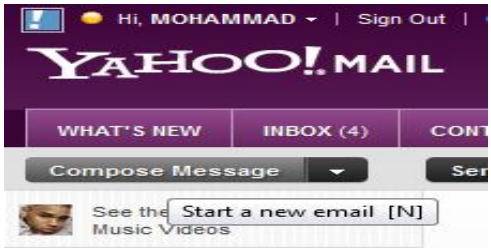
Figure 6.4 Sign in form

You have to provide Yahoo ID and password information to access your Yahoo email account. Then press Sign In button.

Terms and Actions for Composing an Email Message

Compose Message or New

To write a new email click on the command for Compose Message or New. A separate compose window will appear for you to create your email message.



Email Address

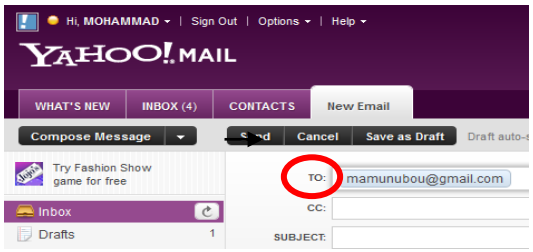
You must have an email address for the person you want to send an email to. All email address have a username, the @ (at) symbol and the email providers domain. They must be entered exactly as written in order for an email to be delivered correctly.

Contacts

A contact is like an Address book. It contains the names and email address of the people you communicate with. It also allows you to include other contact information like home Address, Phone number if you desire. To Add New Contacts just select a new contact in the address book, enter the person's information

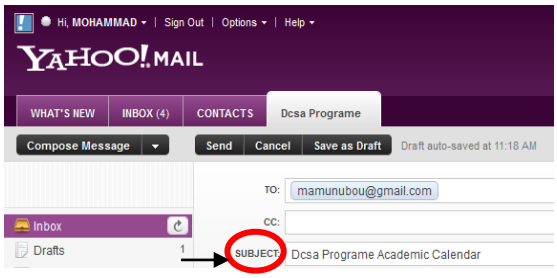
To: or Recipient

You will need to enter the email address of the person you want to email in the To: box. Once you have entered a person into your contacts their email will be conveniently appear as you start tying their name.



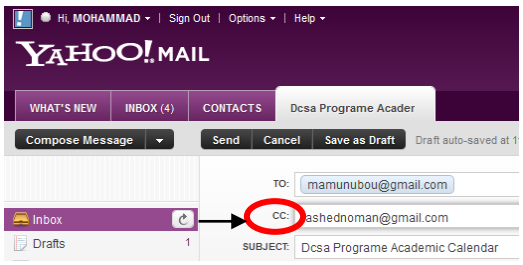
Subject

It's important to include a brief description of what your email is about in the Subject: box. This is a courtesy to the recipient and helps them to efficiently decide which email to read if their time is limited. It also makes an email easy to search for.



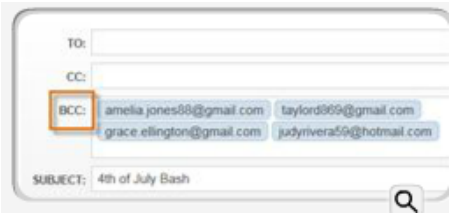
CC

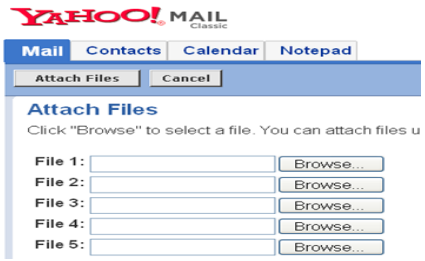
CC stands for Carbon Copy and often used in the workplace. You may want to include other people in an email message to keep them informed, even though they may not be the main recipient of the email. You can do this by entering their email address into the CC box.



BCC

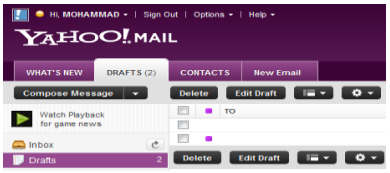
BCC stands for Blind Carbon Copy. Just like CC it will copy other recipients; however those recipients (their address) will not be visible. This is a good idea if you want to send a bulk email out to many people, but do not want all of your contacts email address to be visible to everyone.



Attachments or Uploads	
You can attach or upload digital files for documents, images, videos, presentations and more to your email message. These attachments can be opened and downloaded by the recipient. By clicking the Browse button, select the file(s) you want to attach and then select Attach files button.	
Emoticons	
Most email providers have graphic emoticons that you can add to your email message. Emoticons can display an expression or the writers' mood and can help convey tone in a message.	

Note it!

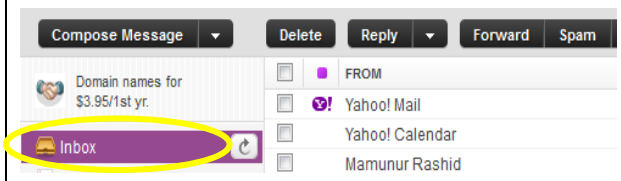
To attach file click the browse button and select the files that you want to attach.

Drafts	
Drafts contain email message that you have composed, but have not sent. When composing a message, you can click on save to save the message to your drafts folder until you are ready to finish or send it.	
Send	
When your email message is complete click on send to deliver it to the recipients.	

Terms and Actions for Responding to Emails

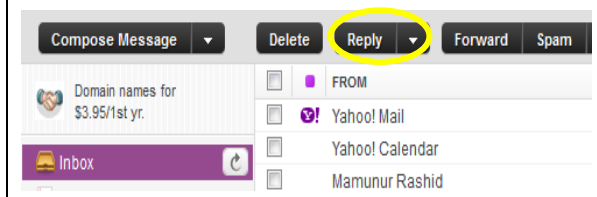
Inbox

Inbox window will show you all the incoming mail that you have received. Click on an email to read that email. Unread emails usually appear in bold text.



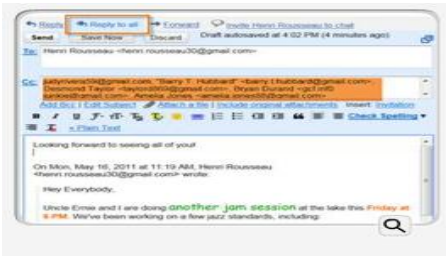
Reply

When you received an email message from someone you can click on reply to respond to the person. A new window will appear with the original message in the body. You can compose your message and then click send.



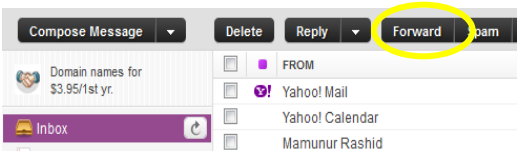
Reply All

Sometimes you may receive an email that has been sent to other people besides yourself. When you respond to those emails you will need to decide either you want to respond to just the sender or all the recipients. If you want the message to be sent to everyone you can click on reply all.



Forward

When you want to share an email message that you have received just click Forward to send it to another person. To forward a message, open the message first and then click the Forward button.



Note it!

To share a received email message just click forward.

Trash or Delete items.	
To delete a message simply put a checkmark next to the message(s) and click the Delete command. Some email providers allow you to retrieve deleted emails from Trash or Deleted items folders, if you do so right away.	
Sign Out	
If privacy is not a concern .then you may choose to stay signed into your email account throughout the day for the convenience. However, if you are checking your email from a computer that is not your own or other people have access to your computer then you should Sign Out, so that no one can get access to your account.	

E-governance

E-governance or digital governance or online governance is the use of information and communication technologies to improve the activities of public sector organizations.

Social Networking

One cannot imagine an online life without Face book or Twitter. Social networking has become so popular amongst youth that it might one day replace physical networking. It has evolved as a great medium to connect with millions of people with similar interests. Apart from finding long-lost friends, you can also look for job, business opportunities on forums, communities etc. Besides, there are chat rooms where users can meet new and interesting people. Some of them may even end up finding their life partners.

Assessment

Assessment

1. Compare CC with BCC

Fill in the blanks

1. A contact is like _____.
2. _____ can display an expression or the writers' mood and can help convey tone in a message.

State whether the following statements are true or false

1. E commerce can be possible if the seller and buyer are physically present.
2. All the incoming mail saves Inbox and outgoing message in the sent box.
3. BCC stands for Blank Carbon Copy.

Multiple Choice questions

1. Which of the following sign is used to designate email address?
a) $
b) #
c) @
d) &

2. To write a new e-mail, the option is?
a) compose
b) cc
c) bcc
d) draft.

Exercises

1. How does a search engine get the required information from the web? Write the names of 2 popular search engines.
2. Explain in brief the features of e-mail communication.