CHAPTER

2

NETWORK AND INTERNET CONCEPTS

Objective of Learning

- 2.1 *Introduction to Network*
- 2.2 *Classification of Network (LAN, MAN, WAN, PAN)*
- 2.3 *Difference between Networks*
- 2.4 *Introduction to Internet*
- 2.5 *History of Internet*
- 2.6 *Types of Web Browsers – Internet explorer, Google Chrome, Opera, Mozilla, Firefox*
- 2.7 *Browsing internet through various search engines such as Google, Yahoo, Bing etc.*
- 2.8 *E-Mail*

2.1 INTRODUCTION TO NETWORK

This is the era of fast moving electronic world. Internet becomes the necessary part of everyone. So dynamic world today needs fast communication channels to move data frequently from one place to another, so data transmission over distances has become essential, To move the data quickly from one place to another, the concept of networking has been introduced. In networking the

computers from different parts of the world are connected to each other to share data with each other.

A network is the group of two or more computers that are linked in order to share resources, exchange files, or allow communications. Any computer on a network may be linked through cables, telephone lines, radio waves, satellites, or infrared light beams. Network is capable of sharing Software and Hardware resources between many users

It is to note that a computer that is not connected to a network is known as a stand alone computer.

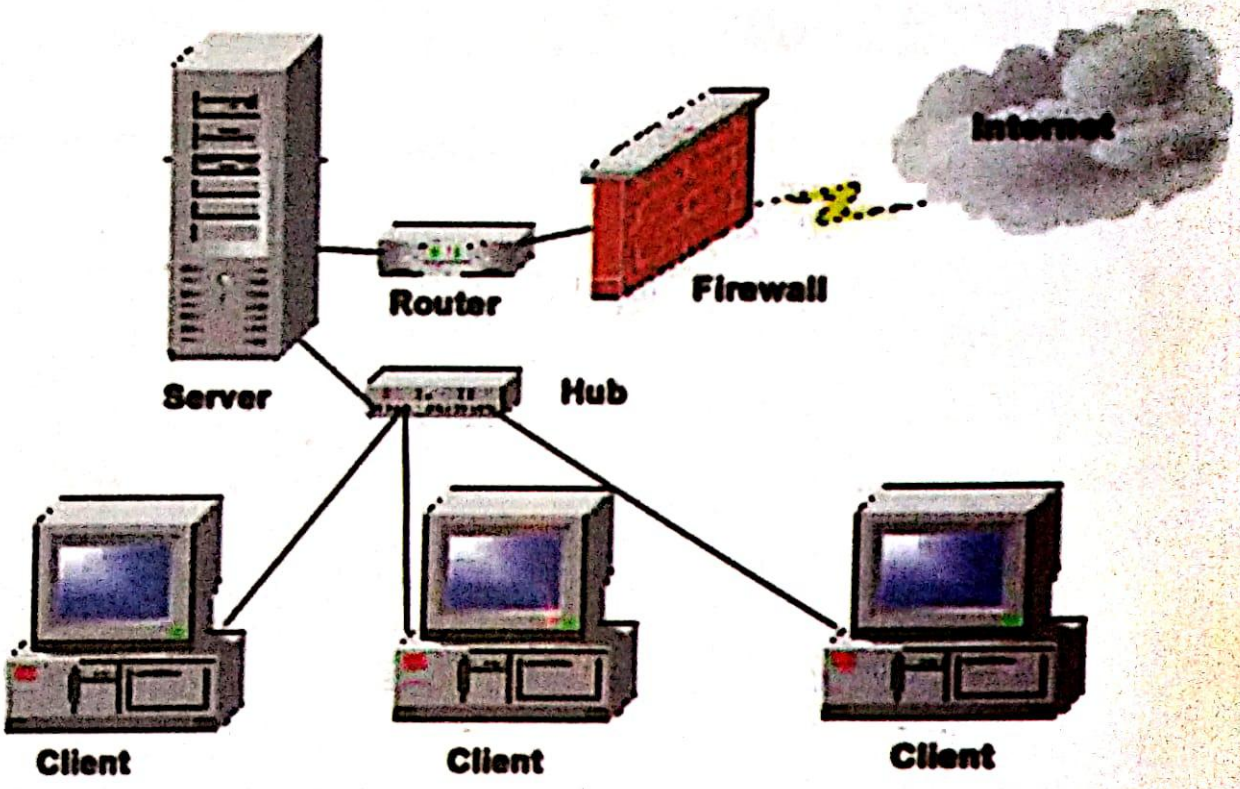


Fig. Networking

2.2 CLASSIFICATION OF NETWORK (LAN, MAN, WAN, PAN)

The size of a network can be expressed by the geographic area they occupy and the number of computers that are part of the network. Networks can cover anything from a handful of devices within a single room to millions of devices spread across the entire globe.

Network may be small or large based on it size, complexity and Distribution area. On the basis of its area of distribution, network is divided into following four parts :

(*i*) LAN (Local Area Network)

(*ii*) MAN (Metropolitan Area Network)

(*iii*) WAN (Wide Area Network)

(*iv*) PAN (Personal Area Network)

(i) Local Area Network (LAN)

Local Area Network (LAN) is a network that is used for communicating among computer devices, usually within an office building or home. It enables us the sharing of resources such as files or hardware devices that may be needed by multiple users. It is limited in size, typically spanning a few hundred meters, and not more than a mile. It is fast, with speeds from 10 MBPS to 10 GBPS. Little wiring is required, typically a single cable connecting to each device. It's cost is lower as compared to MAN's or WAN's. LAN's can be either wired or wireless. Twisted pair, co-axial or fiber optics cable can be used in wired LAN's. It is suitable to bus, ring or star topology.

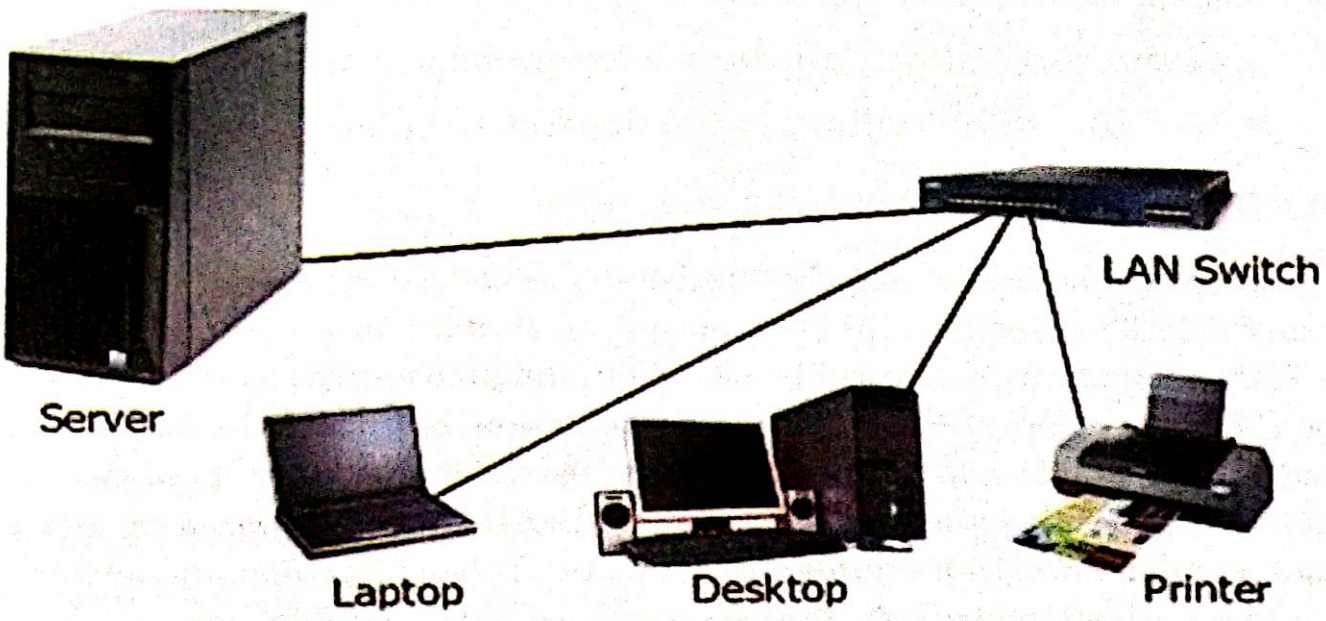


Fig. LAN

Advantages :

1. Messages can be sent to people working at other computers on the network which can save time and paper.

2. Central back-up can take place automatically at regular interval. A user will usually be able to retrieve work that has been deleted by mistake.

3. Data can be shared because database files stored in the server are available to users around the network; data from CD-ROMs can also be shared across the network.

4. All the users work can be stored in a central place so a user can access their work through any computer on the network.

Disadvantages :

1. Access to shared devices can be slow as compared to dedicated resource like printing.

2. A virus can spread more easily.

3. Due to data sharing there is a greater need for security.

4. If the server fails, all the workstations are affected.

5. The cost of installing the equipment is high.

(ii) Metropolitan Area Network (MAN)

MAN is distributed to a city, university or college campus or large area just like Cable TV network. A MAN is optimized for a larger geographical area than a LAN, ranging from several blocks of buildings to entire cities. A MAN might be owned and operated by a single organization, but it usually will be used by many individuals and organizations. It also acts as a high speed network to allow sharing of regional resources. It typically covers an area of between 5 and 50 km diameter. Examples of MAN are : Telephone company network that provides a high speed DSL to customers and cable TV network.

Advantages :

1. It provides a good back bone for a large network and provides greater access to WANs.

2. A MAN usually encompasses several blocks of a city or an entire city.

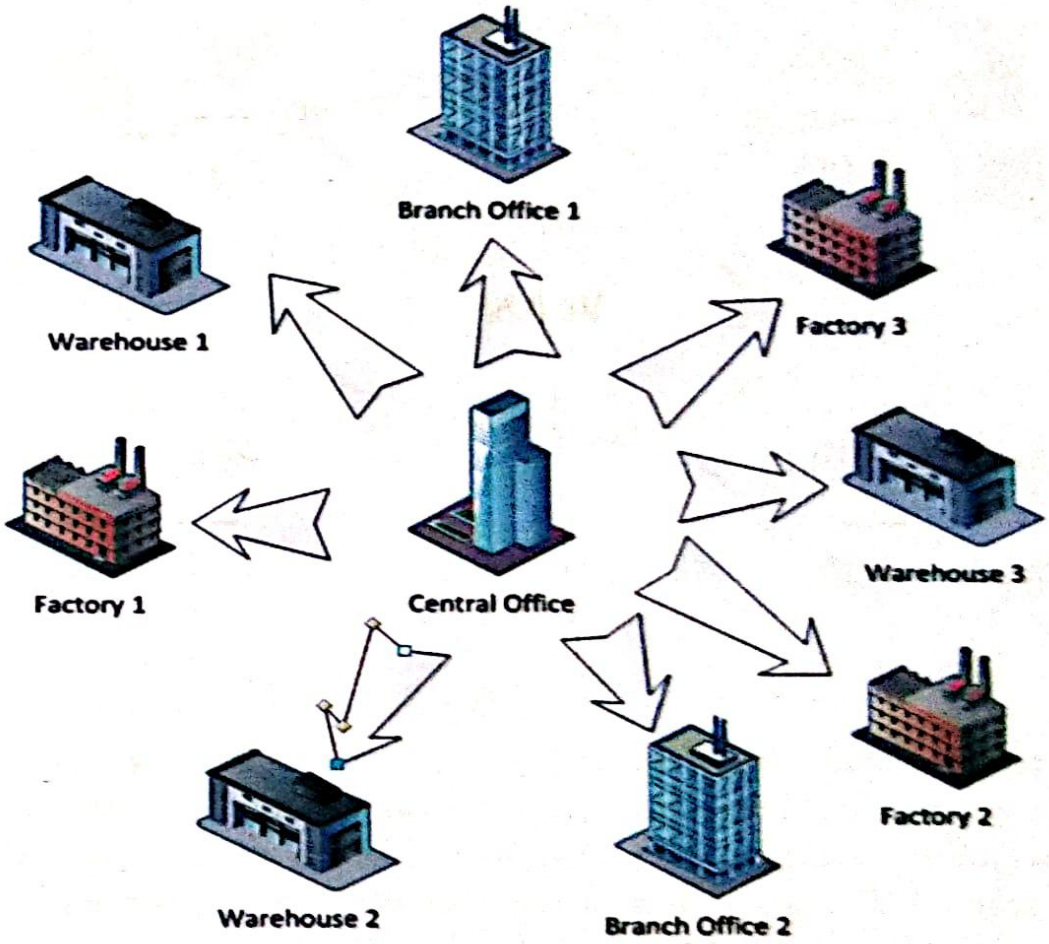


Fig. MAN

Disadvantage :

1. It can be costly as compared to LAN.
2. More cable required for a MAN connection from one place to another.
3. The larger network becomes difficult to manage.
4. It is difficult to make the system secure from hackers.

(iii) Wide Area Network (WAN)

When a network is located over wide area such as cities, states, countries or even continents, it is called Wide Area Network (WAN) e.g. WAN can contain multiple

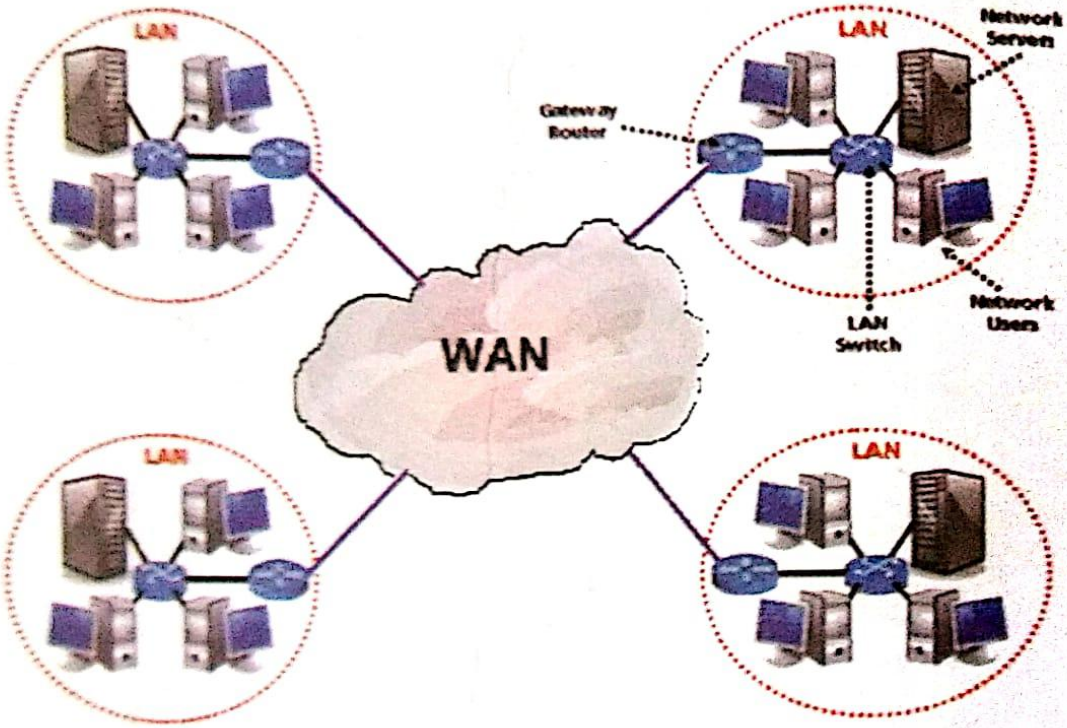


Fig. WAN

smaller networks, such as LANs or MANs. In this network telephone lines satellite, microwave etc. media are used. These transmission media are linked with Router. Router is a device which determines the route of information from sender to receiver. The world's most popular WAN is the Internet.

(iv) Personal Area Network (PAN)

A PAN or Personal Area Network is a computer network organized around an individual person within a single building. This could be inside a small residence or office. Personal networks can be constructed with wires or be wireless (Wi-fi). It refers to the interconnection of information technology devices or gadgets (include laptop computers, PDAs, cellphones, printers) within the environment of an individual user (about within 10 meters or 30 feets).

Fig. PAN

2.2.1 Components of Computer Networks :

Computer networks allow users to connect over long distances. It is also used for file sharing, hardware sharing and instant communication, making them a convenient tool for the home and a necessity for offices and organizations like universities. Several components makes a computer network each of which is important to making the network function properly.

Components of computer network contains the major parts that are needed to install a network both at the office and home level. Before using the installation process, you should know about your network system.

(a) **Computer :** The main purpose of a network is to join computers together. For this to work the first step in setting up a network is to identify computers and users who may wish to participate in the network. The computers will also need to include software that enables them to connect to the network.

The following are two types of computers which are used for networking :

(i) Client or Node

Client/Node is the normal computer system which is connected to network for sharing of resources.

(*ii*) Server

Server is a **powerful** computer. It helps us in sharing of resources or information. It controls all other nodes. In this we connect more than one device.

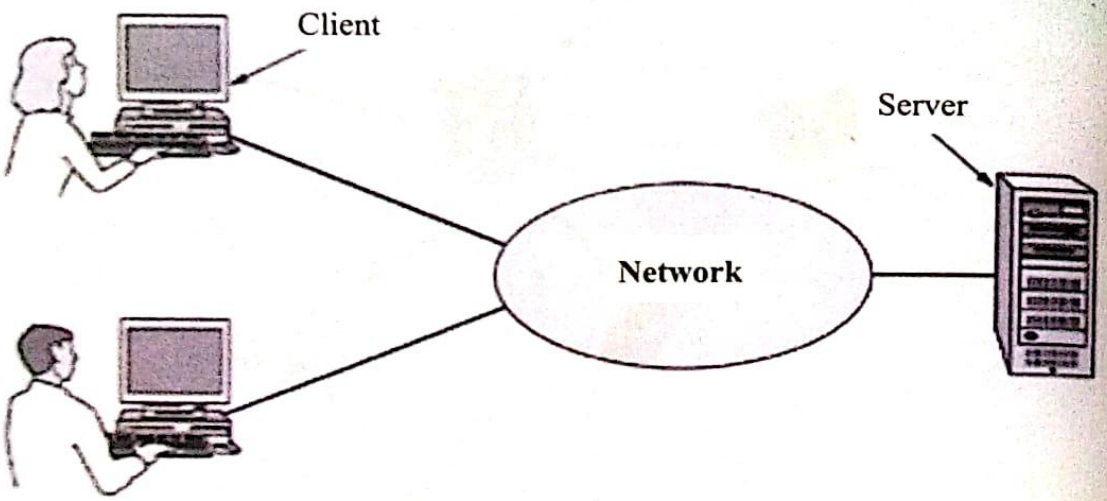


Fig. *Client/Server*

(*b*) Network Interface Card

A network interface card (*NIC*) is a small computer circuit board or card that is installed in a computer so that it can be connected to a network. This card should be fitted in each computer known as client and server computer. Basically it develops relationship between card, server and client. Every client linked to network interface card has its own specific number is called node address.

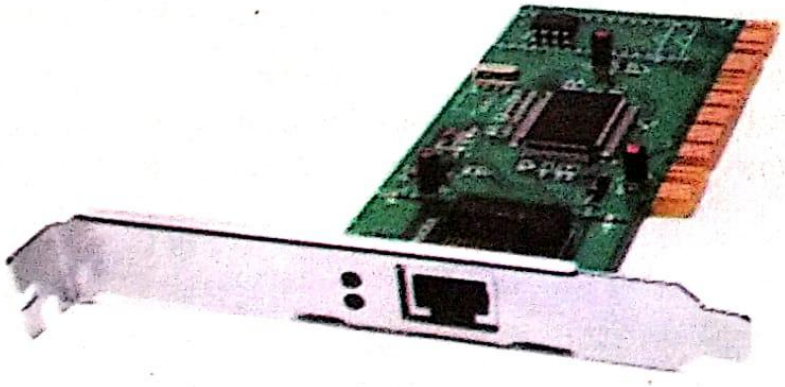


Fig. Network Interface Card

There are **two types of network cards : wired and wireless.** The wired NIC uses cables and connection as a medium to transfer data, whereas in the wireless card, the connection is made using antenna that employs radio wave technology.

(c) HUB/Switch

Hub/Switch is a device that allows you to connect multiple computers to a single network device. In its simplest form a hub works by duplicating the data packets received via one port and making it available to all ports. Therefore it allows data sharing between all devices connected to hub.

Fig. Hub

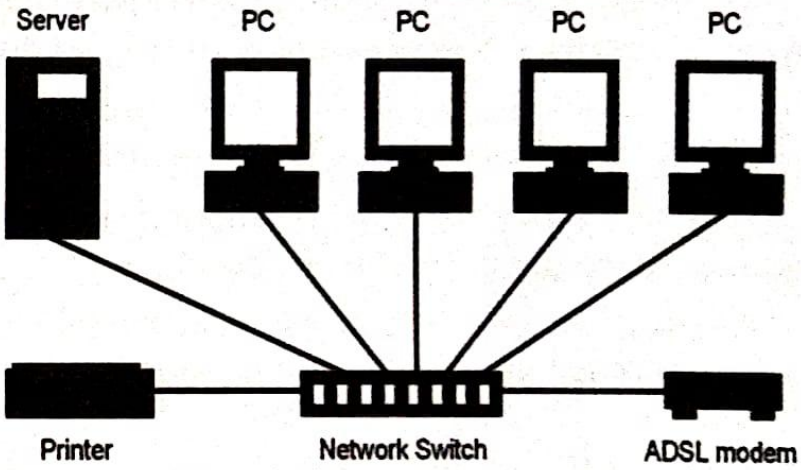


Fig. Switch

(d) Router

Router is hardware device which is designed to receive, analyze and forward incoming data within a network or to another network.

Fig. Router

Advantages of Network :

Following are the advantages of Network :

(*i*) **Sharing files, data and information :** You can share program and different resources with it. It becomes possible because all the files are stored on server.

(*ii*) **Sharing Hardware and Software :** You can share hardware and software within network easily. e.g., a printer can be shared among the users in a network so that there is no need to have individual printers for each and every computer in the company.

(*iii*) **File Integrity :** File integrity remains continuous due to network. It saves much time. Network helps in fast media in different offices.

(*iv*) **Communication Media :** Network provides a very fast communication media e.g. E-mail is used as a fast media in different offices.

(*v*) **Flexibility :** It provides more flexibility because there is a possibility of connecting devices of different user's.

(*vi*) **Reliability :** Network ensures use of many resource to us e.g. when hardware fails, information can be recovered from other computer with the help of network.

(*vii*) **Cost effective :** We can share costly input and output devices like printer with single network. It reduces the cost of system.

(*viii*) **Security :** Network provides security to us.

(*ix*) **Speed :** Sharing and transferring files within networks is very rapid, depending on the type of network. This will save time while maintaining the integrity of files.

(*x*) **Backup :** It is difficult to get back up of a file from different computers. But it is easy to take backup from server if we are linked with network.

Disadvantages of Network :

Following are the disadvantages of Network:

(*i*) **Network Failure :** All the central facilities may fail due to network failure.

(*ii*) **Management** : The management of whole network is tough.

(*iii*) **Security** : Danger of security is always present on network. Data can be misused on network by haking the information.

(*iv*) **Expensive to Build** : Building a network is a serious business in many occasions.

(*v*) **Large scale organizations** : Cables and other hardware are very costly to buy and replace in large organizations.

2.3 DIFFERENCE BETWEEN NETWORKS

BASIS OF COMPARISON	LAN	MAN	WAN
Expands to	Local Area Network	Metropolitan Area Network	Wide Area Network
Meaning	A network that connects a group of computers in a small geographical area.	It covers relatively large region such as cities, towns.	It spans large locality and connects countries together. e.g. Internet.
Ownership of Network	Private	Private or Public	Private or Public
Design and maintenance	Easy	Difficult	Difficult
Propagation Delay	Short	Moderate	Long
Speed	High	Moderate	Low
Fault Tolerance	More Tolerant	Less Tolerant	Less Tolerant
Congestion	Less	More	More
Used for	College, School, Hospital.	Small towns, City.	Country/Continent.

2.4 INTRODUCTION OF INTERNET

The term internet is a short form of the internetworking. It is actually a group of several networks such as LAN, MAN and WAN connections through appropriate hardware and software to work in a persistent manner. It functions by employing the TCP/IP protocol suite and IP as the addressing protocol. Internet communication has become a crucial part of our lives. The world wide web carries information relating to various distinct fields such as stock prices, atmospheric and climatic condition of a particular place, crop production, airline traffic and so on. An internet is a source of enormous amount of information.

Advantages of Internet :

1. Faster communication : Internet provides faster communication. New innovations are only going to make it faster and more reliable. User can communicate in a fraction of second with a person who is sitting in the other part of the world.

2. Information Resources : Information is probably the biggest advantage that internet offers. Internet is a virtual treasure of information. There is a huge amount of information available on the Internet.

3. Entertainment : Entertainment is another popular reason why many people prefer to surf the internet. Downloading games, music or just surfing the websites are some of the uses people have discovered.

Disadvantages of Internet :

1. Theft of Personal information : If you use the internet for online banking, social networking or other services, you may rise a theft to your personal information.

2. Virus Threat : Internet users often suffer from virus attacks on their systems. Computers connected to the Internet are very prone to target virus attacks and may end up crashing.

2.5 HISTORY OF INTERNET

In the year 1969, a team of defense engineers at the University of Los Angeles-California (UCLA) sent the first-ever instant message via computer to another team thousands of miles away at Stanford University.

The Internet is a large computer network linking smaller networks to one another. Tim Berners-Lee, founder of the WWW Consortium, has a simple description of the Internet: "it's a bit like a postcard with a simple address on it. If you put the right address on a packet, and gave it to any computer which is connected as part of the Net, each computer would figure out which cable to send it down next so that it would get to its destination. That's what the Internet does. It delivers packets—anywhere in the world, normally well under a second."

Internet is a world wide collection of computer network operating with each other to exchange data using a common software standard. Internet allows us to use many service like Internet Banking, Online Shopping, Online Tickets Booking, Online Bill Payment, E-mail etc. Internet provide concept of electronic commerce that allows the business deals to be conducted as electronic system.

2.6 TYPES OF WEB BROWSERS

A web browser is a software application for retrieving, presenting and traversing information resources on the World Wide Web. The method of accessing a particular page or content is achieved by entering its address, known as a Uniform Resource Locator or URL. This may be a web page, image, video, or other piece of content. Hyperlinks present in resources enable users easily to navigate their browsers to related resources. A web browser can also be defined as an application software or program designed to enable users to access, retrieve and view documents and other resources on the Internet.

Fig. Different types of web browsers

There are following types of web browsers :

1. INTERNET EXPLORER

Internet Explorer (IE); formerly known as Microsoft Internet Explorer and Windows Internet Explorer, has a series of graphical web browsers developed by Microsoft. It was included as part of the Microsoft Windows operating system, starting in 1995. It was first released as part of the add-on package Microsoft Plus for Windows 95, that year. Later versions were available as free downloads, or in service packs, and included in releases of Windows 95 and later versions of Windows.

Advantages of Internet Explorer :

1. It is pre installed on computer.
2. Faster with Windows computers because it is integrated
3. Universal
4. Some applications are optimized for IE

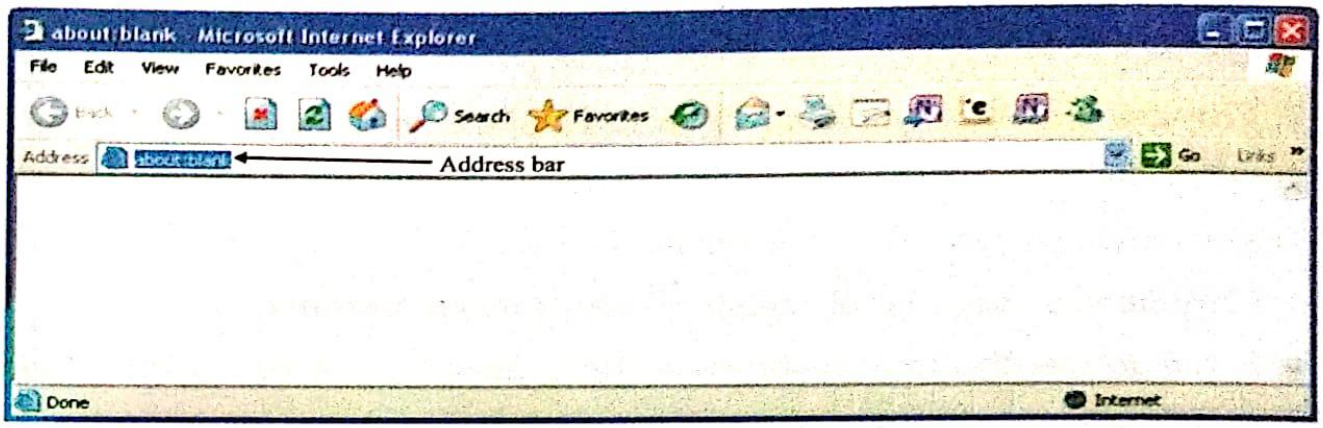
Disadvantages of Internet Explorer :

1. No add-on support
2. Slows down with newer versions, such as IE7

3. May be less secure than other browsers

4. Becomes buggy easily

5. Targeted by hackers



2. GOOGLE CHROME

The Google Chrome Web browser is based on the open source Chromium project. Google released Chrome in 2008 and issues several updates a year. It is available for Windows, Mac OS X, Linux, Android and iOS operating systems. The Google Chrome browser takes a sandboxing-based approach to Web security. Each open website runs as its own process, which helps prevent malicious code on one page from affecting others (or the computer operating system at large). The browser also supports Web standards such as HTML5 and cascading style sheets (CSS).

Advantages of Google Chrome :

1. Chrome is an extremely fast web browser; it loads and displays pages very quickly.

2. Google Chrome has a very basic, simple design, making it easy to use.

3. The start-up page lists the most frequent pages you've visited and allows you to click and access them with ease.

4. Chrome automatically translates pages into a language you understand for your convenience.

5. You can search the internet through your address bar at any time.

6. If a site crashes on one of your tabs, other open tabs will not be affected.

7. You may browse the internet without being logged using Chrome's new private feature: Incognito.

8. Unlike Firefox and Safari, you can alter the colour and theme of the browser.

9. Chrome is faster than Explorer and FireFox.

10. Chrome takes only seconds to install.

Disadvantages of Google Chrome :

1. Chrome uses up a lot of memory (RAM) when running it.

2. If you accidently close the browser, Chrome will close all the tabs opened without warning.

3. OPERA BROWSER

Opera is a Web browser that provides some advantages over other browsers from Mozilla or Microsoft. Much smaller in size, Opera is known for being fast and stable. Opera is available for a number of operating systems, including BeOS, Symbian OS, Linux, Mac OS, OS/2, Solaris, and Windows. It offers the same capabilities of the more popular browsers including integrated searches

and instant messaging, support for JavaScript, cascading style sheets and e-mail. Because Opera is so compact, it has been promoted for use in hand-held Internet devices, including smartphones that use the Windows Mobile operating system.

Advantages of Opera Browser :

1. Fast web page downloading
2. Quick link page
3. Visual tabs
4. Secure browsing
5. Sharing center by Opera unite
6. Website compression for fast load Saves time.

Disadvantages of Opera Browser :

1. It is not compatible with all webpages
2. No add-ons

4. MOZILLA FIREFOX

Firefox is a Web browser that is smaller, faster, and in some ways more secure than the Mozilla browser from which much of its code was originally derived. Compared to Internet Explorer, the most popular Web browser, Firefox gives users a cleaner interface and faster download speeds.

Advantages of Mozilla Firefox :

1. Speed. Firefox is reported to be the fastest browser when it comes to download speed. Not only do programs and files download faster, but you get a record of all your downloads in the form of a table, so you can erase or move them at your convenience.

2. Security. Firefox has some advanced security measures that protect your computer from spyware and even certain viruses. Firefox also comes with a state-of-the-art popup blocker that stops almost 100 percent of popups.

3. Tabbed browsing and other advanced features. Tabbed browsing allows you to open an unlimited number of pages in a single window, thus

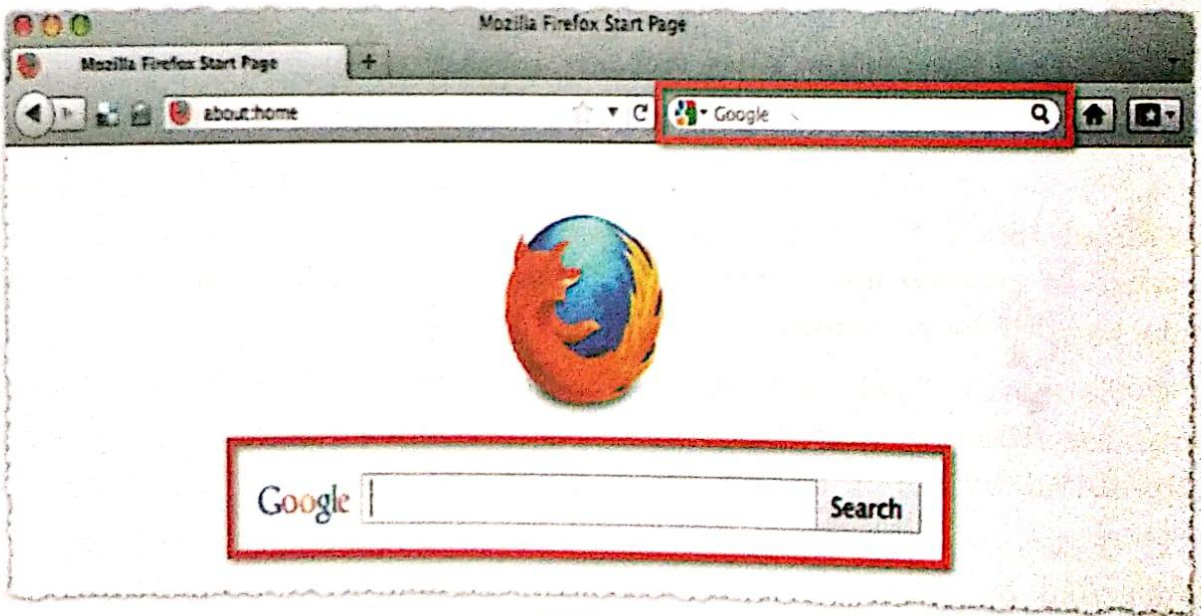
helping you organize your browsing. Firefox also has an embedded memory, which means that if your computer is turned off by mistake, Firefox will remember which Internet pages you had open and offer to get them back for you.

Disadvantages of Mozilla Firefox:

1. Compatibility issues. The main disadvantage of Firefox is compatibility. Some websites do not show properly in Firefox, and require you to view them with IE. This includes pages with ActiveX and VBScript, both of which are not supported by Firefox.

2. Memory. Firefox takes a lot of memory to run. Even with an up-to-date computer, you may find that it becomes hard to run Firefox along with a couple of programs. Firefox also tends to freeze and close when too many tabs are open simultaneously, which is why Firefox invested heavily in creating the recovery memory feature.

3. Interrupted service. Another disadvantage of Firefox is that downloads cannot be resumed if interrupted. This may not be a big deal if you have DSL service, but those on a dial-up connection may have a lot of trouble with this. Firefox was actually designed for people using high-speed Internet, which means dial-up users can run into many problems along the way.



2.7 BROWSING INTERNET THROUGH VARIOUS SEARCH ENGINES SUCH AS :

1. GOOGLE

Google is a search engine that can be employed to find a variety of information such as websites, pictures, maps or even just the answer to the crossword clue that's been driving. Google uses a computer program called a 'web crawler' that looks at the billions of websites available on the World Wide Web and examines their content to find 'keywords'. Then it indexes these to make the websites easier for the search engine to find. So if you type the word 'holidays' in the search box, for instance, Google will then show you all the websites with holiday information.

Following are the steps to browse internet through Google search engine:

1. Select a search engine. At the top of any page on your browser (the window that you open to use the internet), type the phrase "search engines" into the Search Bar to attain access to several different internet sites that specifically aid in searching.

2. After typing in whatever you want to search, press the Enter key on the keyboard of your computer.

3. Choose a few of the most specific or relevant keywords or phrases to describe your topic. Utilize synonyms. Type your choice of words into the Search Bar offered by your chosen search engine.

(i) Generally, capitalization and punctuation are not needed.

(ii) Search engines usually disregard minor words such as "the, and, to, etc."

4. Click Search or press the Enter key on your keyboard.

2. YAHOO

Yahoo is one the most popular email providers and holds the fourth place in search with 3.90% market share.

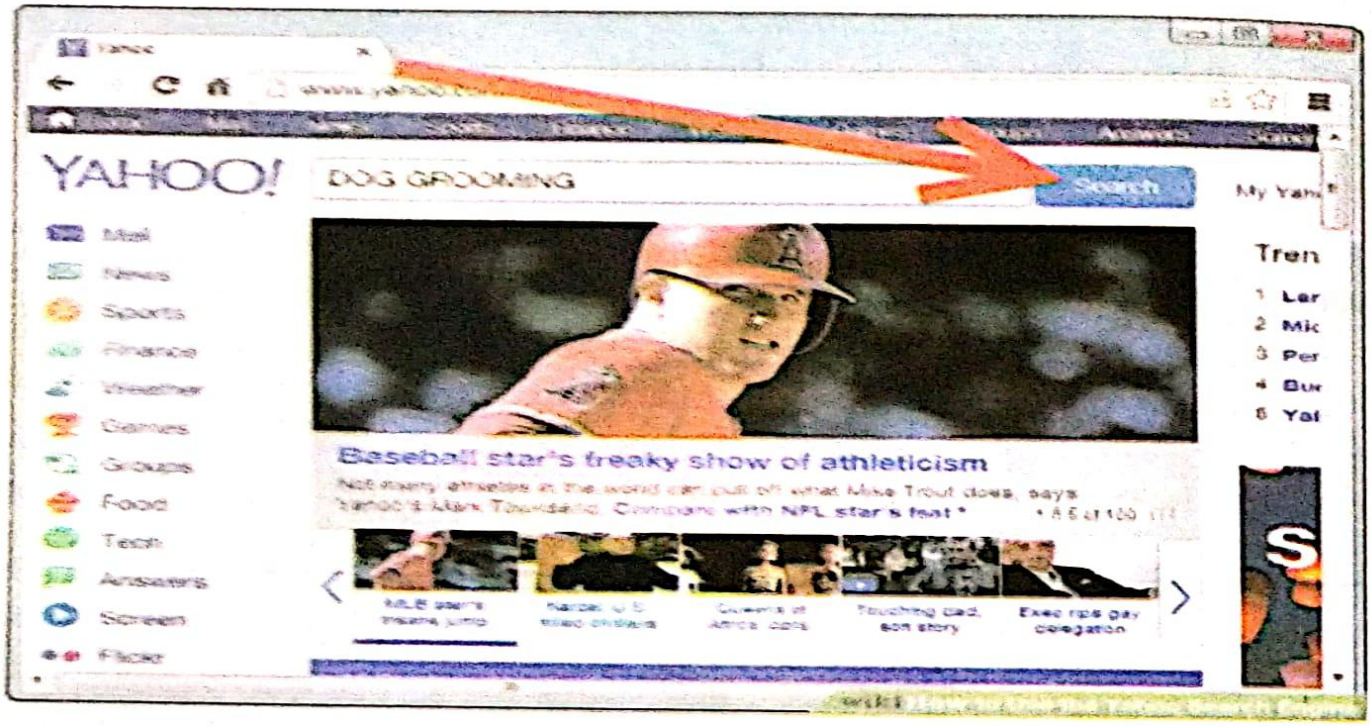
From October 2011 to October 2015, Yahoo search was powered exclusively by Bing. Since October 2015 Yahoo agreed with Google to provide search-related services and since then the results of Yahoo are powered both by Google and

Bing. Yahoo is also the default search engine for Firefox browsers in the United States (since 2014).

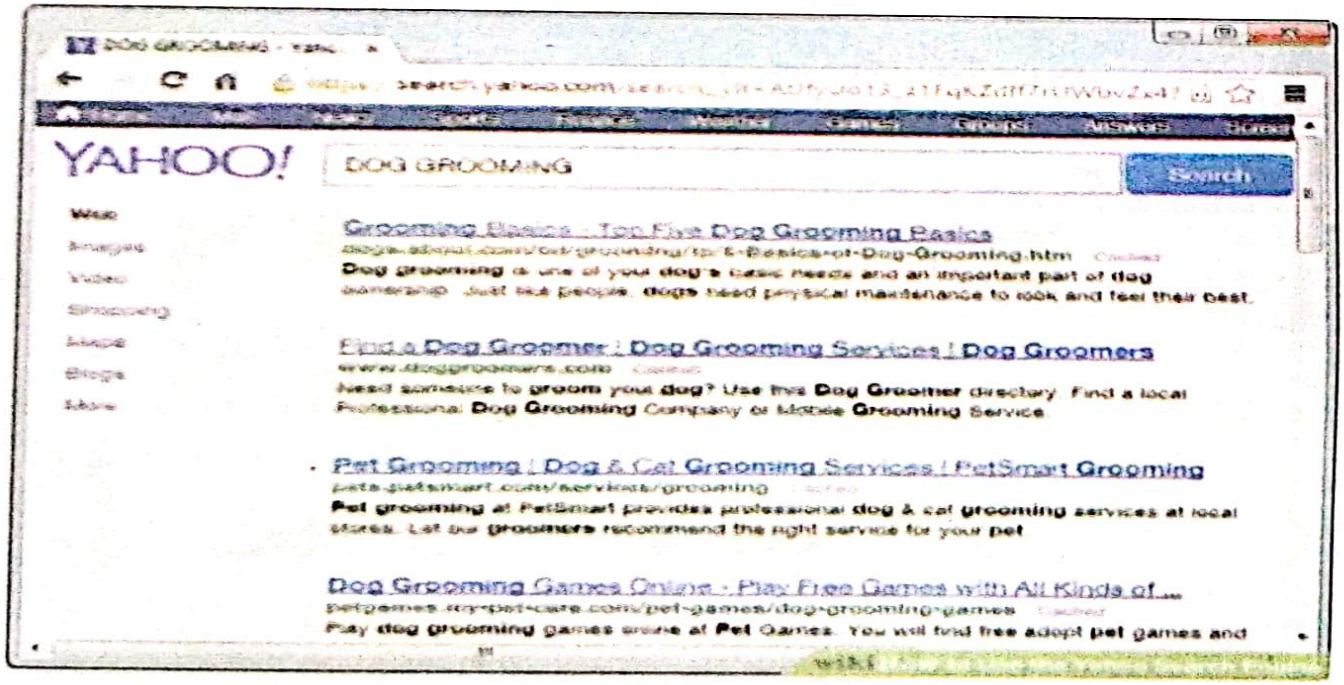
Following are the steps to browse internet through Yahoo search

1. Visit the "Yahoo" website provided to you in the Sources section of this article.

nter search terms into the "Search" box for that related to the content
a you want to find.



ick on the "Search" button to begin your search.



4. Review your search results. Yahoo will provide you with a list of relevant websites and articles that match the keywords you entered into the search box.

3. BING

Bing is Microsoft's attempt to challenge Google in search, but despite their efforts they still did not manage to convince users that their search engine can produce better results than Google.

Their search engine market share is constantly below 10%, even though Bing is the default search engine on Windows PCs.

Following are the steps to browse internet through Bing search engine:

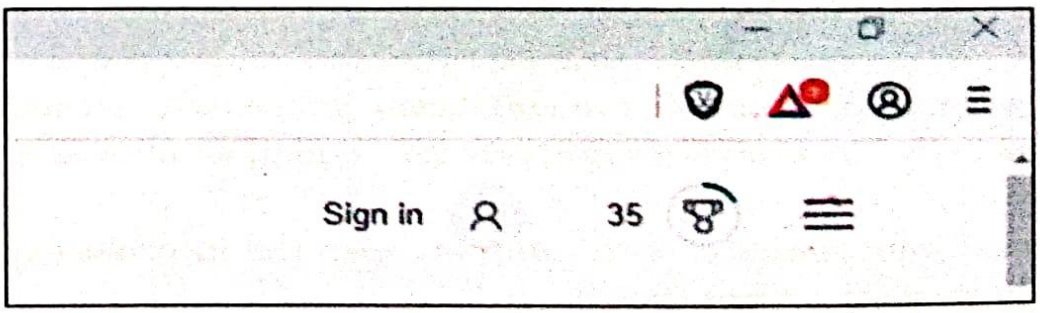
1. Open Bing. Go to https://www.bing.com/ in your computer's web browser.

2. Sign in if necessary. If you want to use your Microsoft account with Bing, click Sign in in the top-right side of the page and then enter your Microsoft email address and password. Signing into Bing has a few perks:

(i) You can view and edit your search history from both the current session and any other computer on which you're signed into Bing.

(ii) You can adjust settings for your Bing searches.

(iii) You can earn points toward Bing Rewards.



2.8 E-MAIL

Its full form is electronic mail. It is widely used features of the internet along with the web. It allows us to send and receive messages to and from anyone with an e-mail address, anywhere in the world.

Email uses multiple protocols within the TCP/IP suite. e.g., SMTP is used to send messages, while the POP or IMAP protocols are used to retrieve messages from a mail server. When we make a new e-mail account, we must define our email address, password and the mail servers used to send and receive messages. Most webmail services configure our account automatically, so we only need to enter our email address and password. Some of the webmail services are Gmail (Google Mail), Yahoo mail, Rediff mail, Hotmail etc.

Fig. Email icon

E-mail Address :

For sending and receiving e-mail you must have your e-mail address. E-mail address consists of two section. For example : username@host.

Here host means the e-mail service provider for example in ramulak48@yahoo.in; username is ramulak48 and the website providing e-mail service facility is yahoo.

Creating E-mail Account :

E-mail account can be created in gmail.com, yahoo.com, hotmail.com or rediffmail.com etc. The procedure to create new e-mail account is as follows :

(*i*) Connect your computer with internet, open the internet explorer, type website address in the address bar.

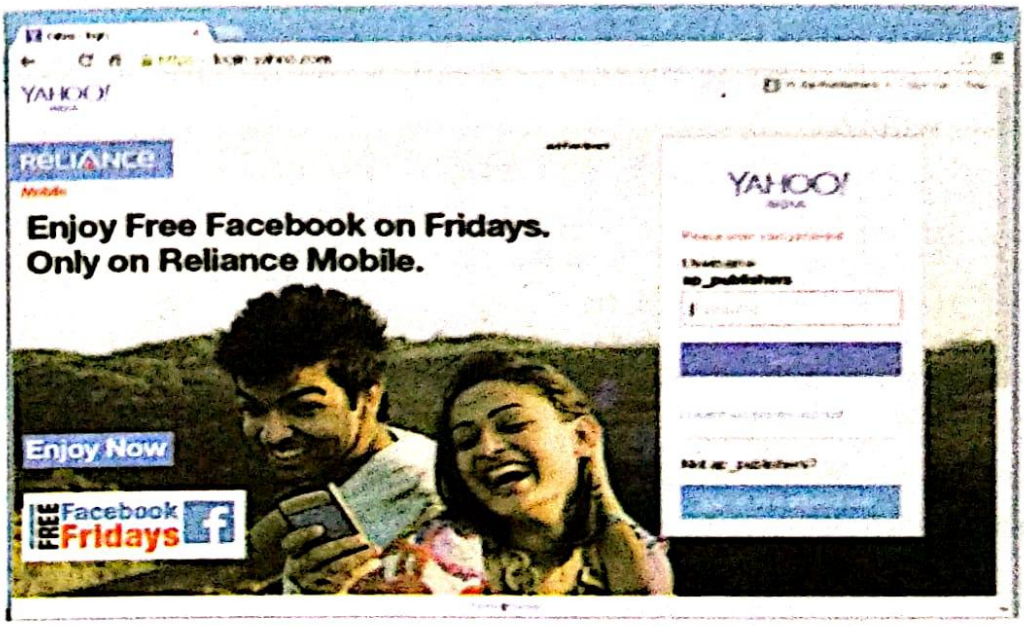


Fig. *Windows of yahoo mail*

(*ii*) Now click on the link "Sign-up".

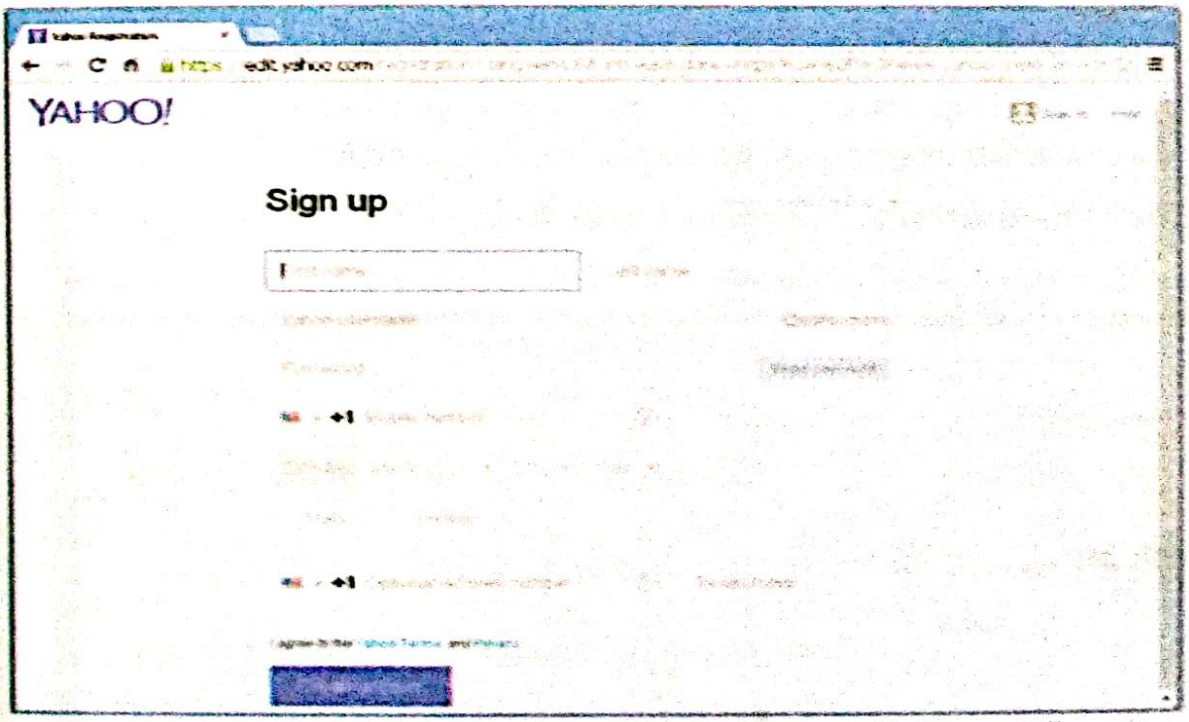


Fig. *Windows for creating yahoo mail account*

For this you have to open the site and sign up as new user. Service Provider will give you a form to fill. After filling-up form you will get E-mail ID. Some terms used in E-mail are Address Book, Forward, Reply, Attachments, CC, BCC, Bounced etc.

Advantages of sending E-mail

1. Cheap - Sending an email costs the same regardless of distance and the number of people you send it to

2. Fast - An email should reach to its recipient in minutes, or at the most within a few hours

3. Convenient - Your message will be stored until the recipient is ready to read it, and you can easily send the same message to a large number of people.

4. Permanent - You can keep a record of messages and replies, including details of when a message was received.

Sending an E-mail :

You proceed as below to send or receive an e-mail :

(*i*) Type URL (e.g. www.yahoo.com or www.rediff.com) of the website on internet explorer after getting connected to the internet.

(*ii*) Click the button Go or press Enter Key.

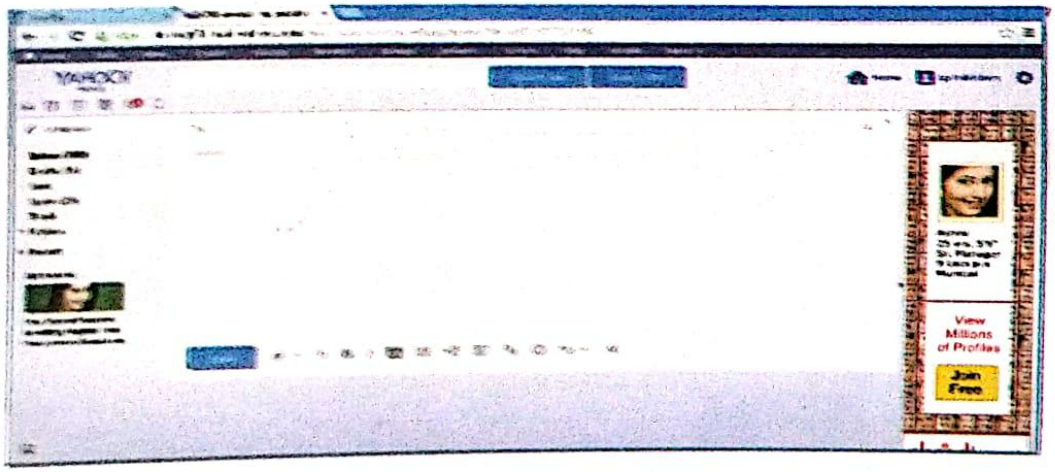


Fig. *Composing windows*

(*iii*) Click mail button. The mail window will be shown.

(*iv*) Then type mail Id and password.

(*v*) Click sign in button.

For Sending E-mail follow the following steps :

1. Click on Write Mail (in rediff mail) or Compose (in yahoo).
2. Write Receiver's address in box.
3. Write Title of the main Subject.
4. Now write the content of the Mail and click on Send to send your E-mail.

Receiving an E-mail :

(*i*) Click on check mail button on yahoo mail webpage.

Fig. *Yahoo mail webpage*

(*ii*) Yahoo mail webpage will be seen as shown in the figure.

(*iii*) Click on mail button and read the message in the mail box.

Create a personal account in gmail :

(*i*) Gmail :

'Gmail' or 'Google Mail' is a free email service provided by Google. In many ways, Gmail is like any other email service : You can send and receive emails, block spam, create an address book and perform other basic email tasks. But it also has some more unique features that help to make it one of the most popular email services on the Web.

(a) Creating New Account : Following are the step-by-step instructions to create a Gmail account.

(*i*) Open our internet browser (Use chrome).

(*ii*) Type your address.

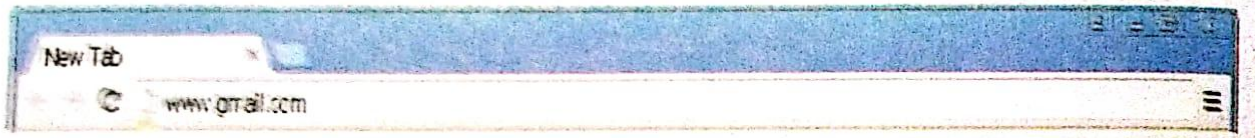


Fig. Gmail

Or click on "Gmail" link at the top right corner of the google home page.

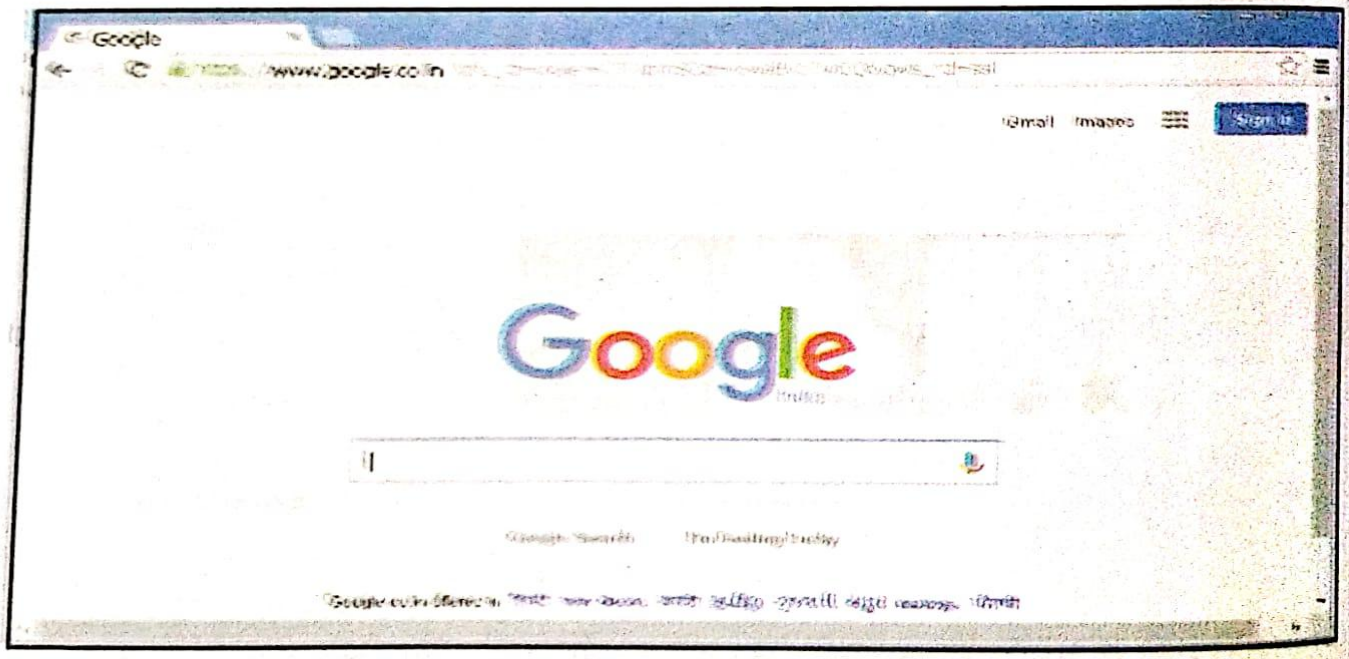


Fig. Google Home Page

Now we will in the "Sign in" section as shown in the figure.

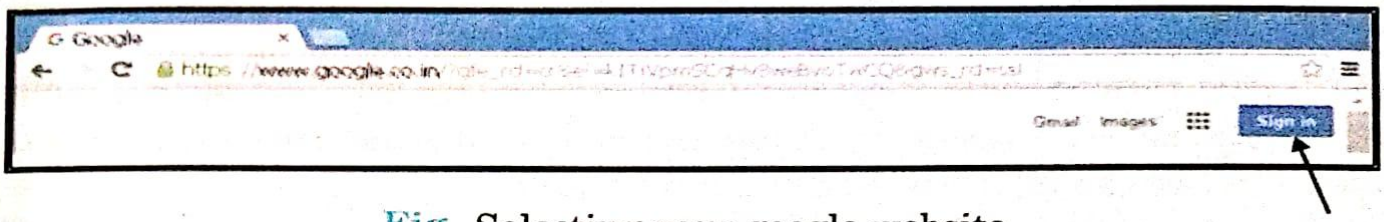


Fig. Selecting your google website

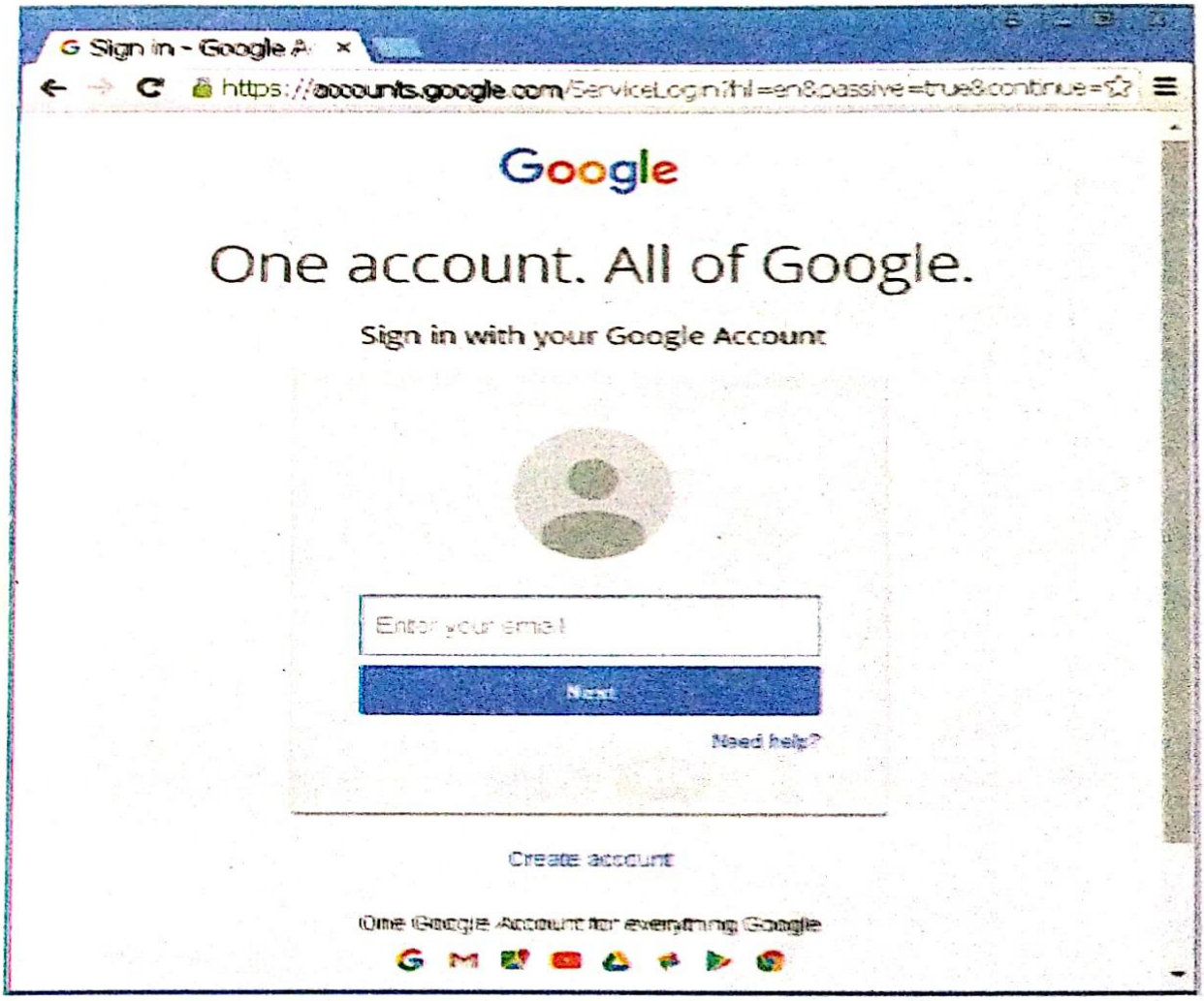


Fig. Create New account and Sign in

Click **Create an account** to create a new account in Google.

For setting up our new account, we have to fill up some information :

(*i*) Our first and last names.

(ii) 'Choose our username' is the unique email address that we wish to use, which will be placed before '@gmail.com'. Because it needs to be unique, Google may have to check the availability of any name that we decide on to make sure that no one already have it. Type an email name into the 'Choose our username' box. Finally we have selected our email address, it's a good idea to make a note of it so that we can refer to it until we remember it.

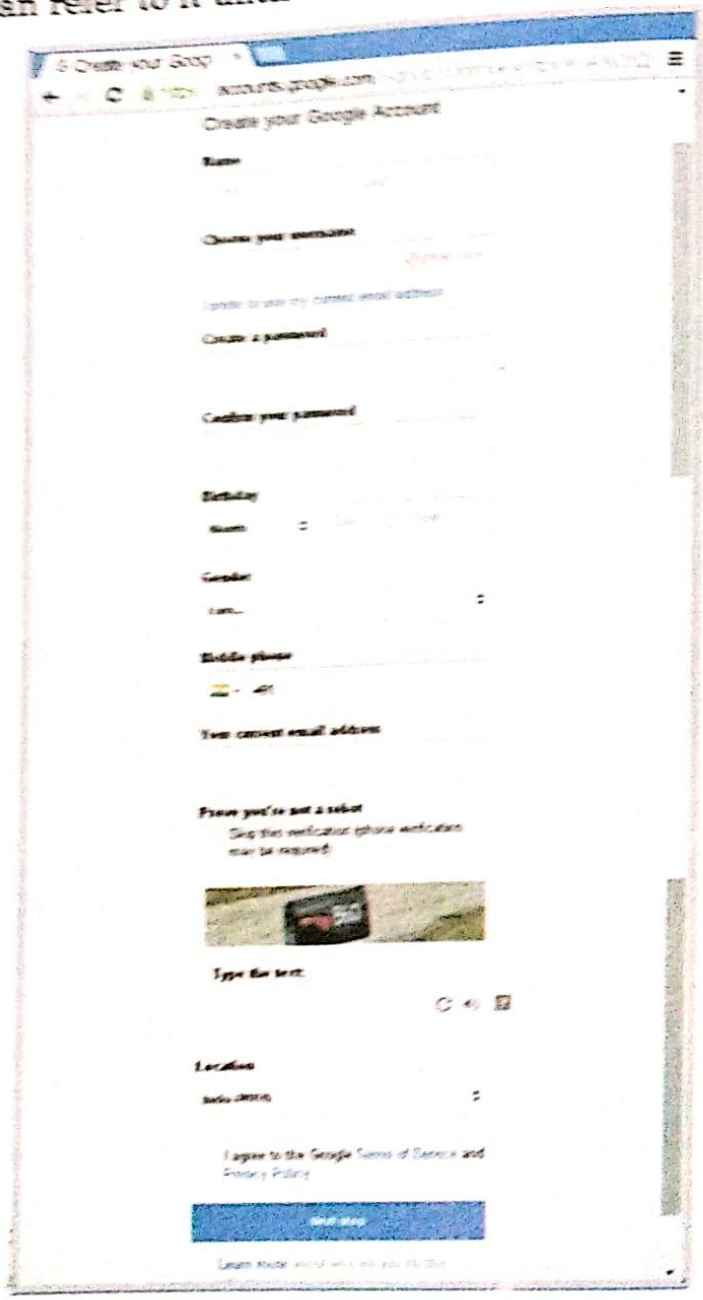


Fig. Set Up Our New Account

(iii) Now type a password so that we can log in securely to our account. Password may contain at least 8 character. Use letters and numbers to make the password more secure and difficult to guess. We will need to re-enter our password to ensure that we are choosing it and not a hacker's robot.

(*iv*) Now fill your birth date in the format [(Month, Day, Year) (MM/DD/YY)]

(*v*) Fill your Gender (Male/Female)

(*vi*) Mobile phone number and any other e-mail address (if you have already)

When you have completed this page fully, clicking New Step will take us to the next Page.

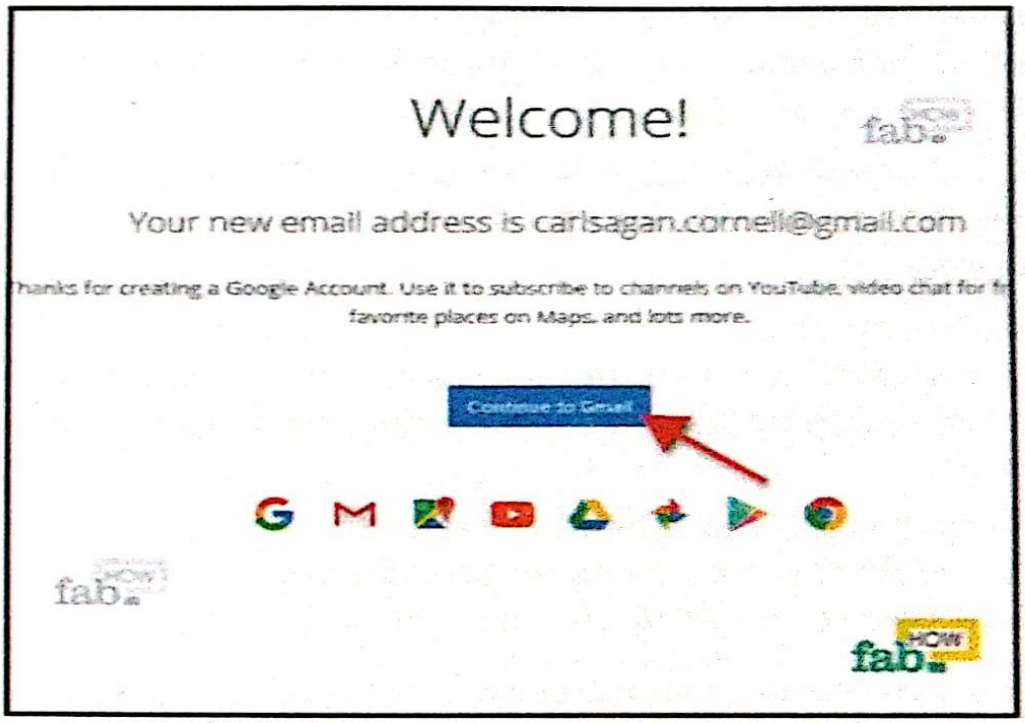


Fig. Continue to Gmail

Just Remember

1. A network is the group of two or more computers that are linked in order to share resources exchange files, or allow communications. Any computer on a network may be linked through cables, telephone lines, radio waves, satellites, or infrared light beams.