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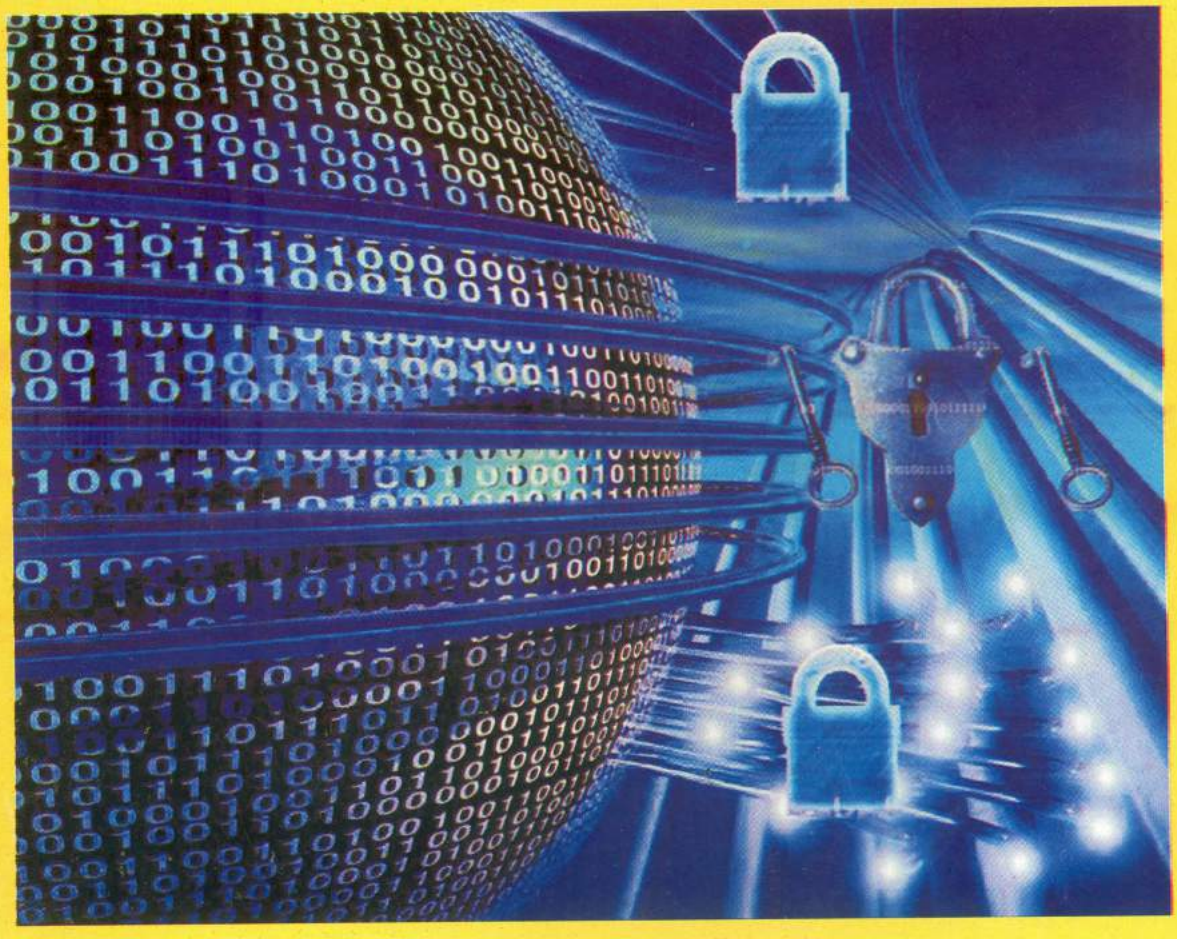

Internet Technology

4

"शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतंत्रा की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्गगत विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।"

- इन्दिरा गाँधी

"Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances."

- Indira Gandhi

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INTERNET TECHNOLOGY

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BLOCK INTRODUCTION

Internet technology covers the different aspects of internet working. Internet is the name for a vast, worldwide system consisting of people, information and computers. It is the abbreviation of internetwork system. It is a global collection of interconnected networks. Internet may be defined as a network of networks that are interconnected physically, capable of communicating and sharing data with each other and able to act together as single networks. Internet technology mainly deals with computer, modem, linkage medium and service provider for its proper working. Internet technology is very useful in various fields of education, publishing, shopping, advertising, financial services, social networking, searching data and so on. Internet technology allows a global collection of computers linked together by cables and telephone lines making communication possible among them in a common language. It raises the issues of security and privacy which need to be tackled properly and carefully. This block comprises of four units and is designed in the following way;

The **Unit One** deals with the architectural design of the Internet. The Internet's architecture is based in the very specification of the standard *TCP/IP* protocol, designed to connect any two networks which may be very different in internal hardware, software, and technical design. Once two networks are interconnected, communication with TCP/IP is enabled end-to-end, so that any node on the Internet has the near magical ability to communicate with any other no matter where they are. This openness of design has enabled the Internet architecture to grow to a global scale.

The **Unit two** describes the 'Social networking". Social networking is the grouping of individuals into specific groups, like small rural communities or a neighborhood subdivision. Depending on the website in question, many of online community members share common interests in hobbies, religion, or politics. Such networking helps in the development of public opinion and is the most common method of sharing or exchanging views.

The **Unit three** covers search engines. It helps in locating the things or information which you are looking for in the virtual world i.e. WWW. The information may consist of web pages, images, information and other types of files. Some search engines also mine data available in databases or open directories. Unlike web directories, which are maintained by human editors, search engines operate algorithmically or are a mixture of algorithmic and human input.

Unit four explains Web 2.0. It is about revolutionary new ways of creating, collaborating, editing and sharing user-generated content online. It's also about ease of use. There's no need to download, and teachers and students can master many of these tools in minutes. Web 2.0 is a category of new Internet tools and technologies created around the idea that the people who consume media, access the Internet, and use the Web shouldn't passively absorb what's available; rather, they should be active contributors, helping customize media and technology for their own purposes, as well as those of their communities.

Hope you benefit from this block.

ACKNOWLEDGEMENT

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UNIT 1 INTERNET ARCHITECTURE

Structure

1.0 INTRODUCTION

This unit explores the architectural design of the Internet and provides you with an introduction to the technical and organizational structure of the Internet. First, using simple examples, you will be introduced to client-server architecture, the way it works, the processes involved in keeping it running, and the entities that have put it all together and continue to do so. The Internet is essentially a network for transporting digital data (i.e., bit streams) between computer processes. In the most abstract form, a network simply consists of nodes connected by links. In the Internet setting, the nodes are computers and the links are connections between computers. Examining its architecture is foremost about looking beyond the low-level system components and protocols and identifying the set of core functionalities that make it tick. In this section, we study the major building blocks of the Internet architecture.

1.1 OBJECTIVES

After studying this unit, you should be able to:

- Understand the evolution of the client server architecture;
- Identify how the Internet works;
- Recognize different entities involved in Internet Architecture; and
- Elucidate the purpose of various protocols used in Internet.

1.2 CLIENT SERVER ARCHITECTURE

A protocol is a set of rules for exchanging messages between computers.

The Internet revolves around the client-server architecture. Your computer runs software called the client and it interacts with software known as the server located at a remote computer. The client is usually a browser such as Internet Explorer, Netscape Navigator or Mozilla. Browsers interact with the server using a set of instructions called protocols. These protocols help in the accurate transfer of data through requests from a browser and responses from the server. There are many protocols available on the Internet. The World Wide Web, which is a part of the Internet, brings all these protocols under one roof. You can, thus, use HTTP, FTP, Telnet, e-mail etc. from one platform - your web browser. Let us discuss about how client server model relates to the Internet.

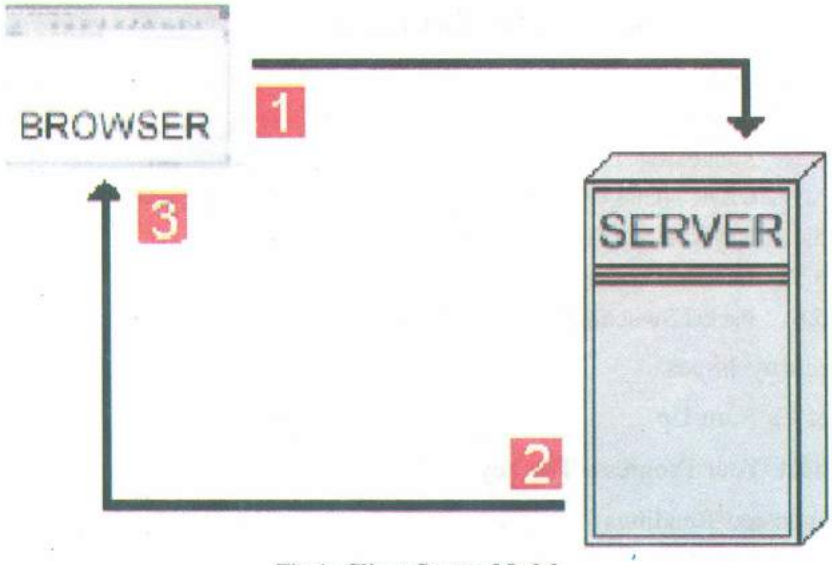

Fig.1: Client Server Model

1) The client (browser) requests for an HTML file stored on the remote machine through the server software.

2) The server locates this file and passes it to the client.

3) The client then displays this file on your machine.

Most of the internet applications use the Client Server architecture. These terms refer to the two processes or two applications which will be communicating with each other to exchange some information. One of the two processes acts as a client process and another process acts as a server.

Client Process: This is the process which typically makes a request for information. After getting the response this process may terminate or may do some other processing. For example: Internet Browser works as a client application which sends a request to Web Server to get one HTML web page.

Server Process: This is the process which takes a request from the clients. After getting a request from the client, this process will do required processing and will gather requested information and will send it to the requestor client. Once done, it becomes ready to serve another client. Server process is always alert and ready to serve incoming requests. For example: Web Server keeps waiting for requests from Internet Browsers and as soon as it gets any request from a browser, it picks up a requested HTML page and sends it back to that Browser.

There are two types of client server architectures: 2-tier and 3-tier architectures

1.2.1 Two-Tier Architecture

In this architecture, client directly interacts with the server. Two-tier architecture is used to describe client/server systems where the client requests resources and the server responds directly to the request, using its own resources. This means that the server does not call on another application in order to provide part of the service. Internet Explorer and Web Server works on two tier architecture.Interaction of the WWW could be represented using a two tier model.

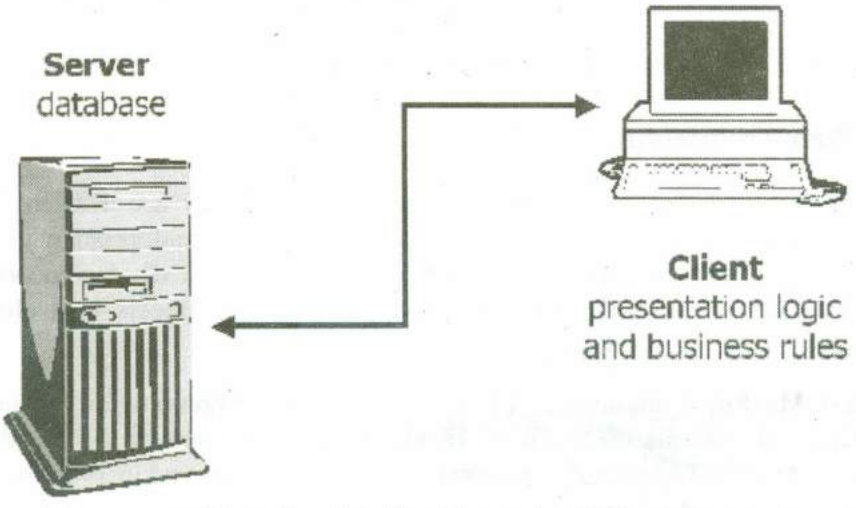

Fig. 2: Two-Tier Client-Server Architecture

There is a client tier which contains user interfaces. There is also a server tier which provides processing management and database management. Applications in the server tier provide the business logic and the storage. A simple example in the WWW of two tier architecture in action is a web browser in the client tier asking for a page and a web server in the server tier delivering that page.

1.2.2 Three-Tier Architecture

The two tier model allowed people to create applications such as shopping, financial account management, and management information services on the Internet. Two tier architectures work well where management and operations of the system are not complex and processing rules do not change very often. The more complex the database server, the greater the problems with scalability and interoperability. These limitations led to the addition of an extra tier to separate business logic from data and to link applications to other enterprise systems.

In 3-tier architecture, there is an intermediary level, meaning the architecture is generally split up between:

1) A client tier, i.e. the computer, which requests the resources, equipped with a user interface (usually a web browser) for presentation purposes.
2) The application tier (also called **middle tier/Business logic tier**), whose task it is to provide the requested resources, but by calling on another server.
3) The data tier, which provides the application tier with the data it requires.

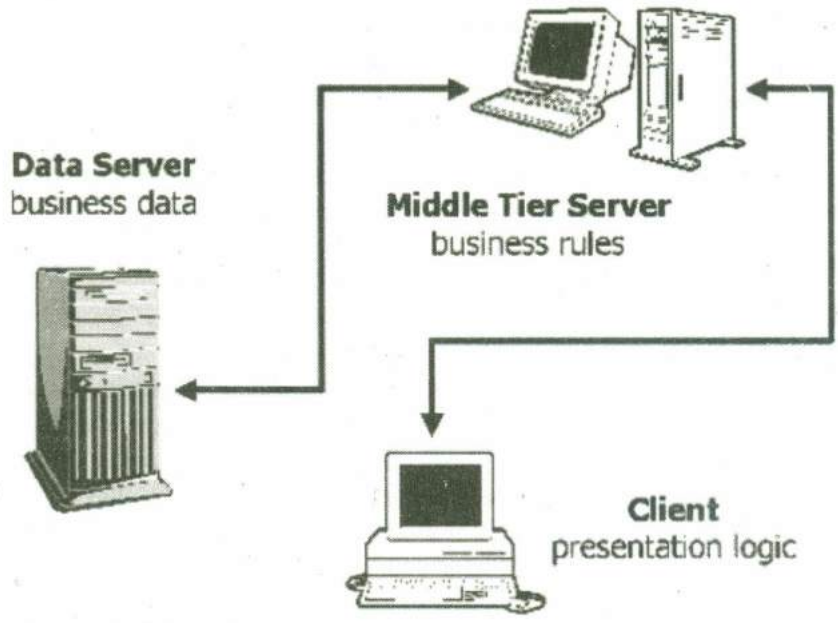

Fig. 3: Three-Tier Architecture

1.2.3 Web Architecture

The basic web architecture is two-tiered and characterized by a web client that displays information content and a web server that transfers information to the client. This architecture depends on three key standards: HTML for encoding document content, URLs for naming remote information objects in a global namespace, and HTTP for staging the transfer.

Hypertext Markup Language (HTML) - the common representation language for hypertext documents on the Web. HTML is an application of the Standard generalized Markup Language, an international standard approved in 1986, which specifies a formal meta-language for defining document markup systems HTML consists of embedded content separated by hierarchical case sensitive start and end tag names which may contain embedded *element attributes* in the start tag. HTML files are viewed using a WWW client *browser* (software), the primary user interface to the Web. HTML allows for embedding of images, sounds, video streams, form fields and simple text formatting.

The URN defines something's identity, while the URL provides a location

Universal Resource Identifier (URI) - an addressing protocol for objects in the WWW. There are two types of URI's, Universal Resource Names (URN) and the Universal Resource Locators (URL). URLs are location dependent and contain four distinct parts: the protocol type, the machine name, the directory path and the file name. There are several kinds of URLs: file URLs, FTP URLs, Gopher URLs, News URLs, and HTTP URLs.

Hypertext Transfer Protocol (HTTP) - an application-level network protocol for the WWW. In HTTP, commands (request *methods*) can be associated with particular types of network objects (files, documents, network services). Commands are provided for:

- establishing a TCP/IP *connection* to a WWW server,
- sending a *request* to the server
- returning a *response* from the server to the client
- *Closing* the connection.

This basic web architecture is fast evolving to serve a wider variety of needs beyond static document access and browsing. The Common Gateway Interface (CGI)

extends the architecture to three-tiers by adding a back-end server that provides services to the Web server on behalf of the Web client, permitting dynamic composition of web pages. Helpers or plug-ins and Java/JavaScript provide other interesting Web architecture extensions. The capabilities of the Internet have been enhanced and extended by using programming languages with HTML. These languages have been responsible for the dynamic and interactive nature of the Net. New languages and language extensions are being developed to increase the usability of the Internet.

Here we will look at some of the important languages that have shape the Internet over the years.

HTML – Hypertext Markup Language

HTML (Hypertext Markup Language) is the language used to develop web pages. **Hypertext** means that some text in the HTML document carries a link to a different location, which can be on the same page or another page. On clicking this 'hot spot', the viewer is transferred to that location. **Markup** means that specific portions of a document are marked up to indicate how they should be displayed in the browser.

HTML simply consists of tags that are placed around elements, which then changes the properties of these enclosed elements. There are hundreds of HTML tags and some of these are proprietary, which means that only some browsers recognize them.

CGI – Common Gateway Interface

The Common Gateway Interface (CGI) has been around for a long time. It allows the web server software to communicate with other programs running on the server. These external programs are called *CGI scripts* or *CGI programs* and are usually written in Perl or 'C'. CGI programs are executable programs that run on the Web server. They can be written in any scripting language (interpreted) or programming language (must be compiled first) available to be executed on a Web server, including C, C++, Fortran, PERL, TCL, Unix shells, Visual Basic, Applescript, and others. CGI programs are generally used to process information submitted by visitors via a form on a web page. For example, you might use the search form on a web site to look for 'cars'. When you submit your query, the server receives your request, passes it to the CGI program. The program then looks up the search query term in a database and responds with the appropriate result formatted in HTML code.

JavaScript/Jscript

JavaScript is a programming language that runs on a web browser. Jscript is Microsoft's' implementation of JavaScript for Internet Explorer. JavaScript runs on the browser (client) and does not require any server software. Thus, it is a client-side scripting language. Since all execution takes place on the browser, JavaScript is responsible for most of the interactivity on a web page. The language has also been widely used for basic form validation. JavaScript is commonly embedded inside the HTML page and is thus visible to the visitor. JavaScript can also be written to run on a server and this is based on the ASP model promoted by Microsoft.

Java

Developed by Sun Microsystems, Java is a very powerful, object-oriented language. A lot many platform dependency issues have been ironed out with the advent of Java. Thus, Java programs for UNIX can be made to run on Windows or the Mac system with little or no effort. Much development is taking place on the Java front

with new arrivals like Java Beans, Extended Java Beans, and Java applications for various databases and XML. Using Java servlets one can also develop dynamic Java Server Pages (JSP). Java can also be seen on the Internet in the form of applets embedded in an HTML page. Applets are small Java programs that run on a Java compatible browser.

VBScript

VBScript is a client-based language that runs only on the Internet Explorer and quite naturally, has been developed by Microsoft. Though, the browser market share of Internet Explorer has steadily risen and overtaken that of Netscape, it is still not advisable to use VBScript as a client side language for web pages. Many would prefer to use JavaScript (or JScript, if you like) as it runs on all popular web browsers – Netscape, Opera, Mozilla and the Internet Explorer. However, VBScript is very often used for developing Active Server Pages.

ASP - Active Server Pages

Active Server Pages is a technology promoted by Microsoft. The ASP utilizes some special tags, which can be embedded in the HTML code, to generate dynamic web pages. ASP scripts run on the server, typically, IIS on Windows NT. ASP pages carry the .asp extension that differentiates them from plain HTML pages and instructs the web server to pass the pages through the ASP interpreter. You can use VBScript, JavaScript/Jscript or a combination of the two to write ASP pages. The great advantage in using ASP is the ease of maintenance of the web site.

PHP

Open source, great development environment – PHP is a cult. This has been the answer of open source programmers to Microsoft's ASP. PHP not only carries all the goodness of ASP but also is more secure and handles databases more easily. It is a known fact that PHP on Apache Web server runs faster than ASP. PHP code is embedded inside the HTML page and can link to databases to generate dynamic HTML content. Furthermore, PHP scripts can be made to run on any operating system with little or no modification.

XML – eXtensible Markup Language

The e**X**tensible **M**arkup Language is a web page developing language that enables programmers to create customized tags. These customized tags can provide the much-needed functionality not available with HTML. XML documents can be accessed using JSP, PHP etc. Current technology trends include Software as a Service (SAAS), a mode of software delivery that provides maintenance, daily operation and software support through Web-based servers and browsers. Other hot trends in technology include Java technology trends, service oriented architecture advancements and the promise and foundation within Microsoft Window's .NET framework for web services.

AJAX

Ajax (Asynchronous JavaScript and XML) is a group of interrelated web development techniques used on the client-side to create interactive web applications. With Ajax, web applications can retrieve data from the server asynchronously in the background without interfering with the display and behavior of the existing page. The use of Ajax techniques has led to an increase in interactive or dynamic interfaces on web pages. Ajax uses a combination of HTML and CSS to mark up and style information.

1.3 INTERNET ARCHITECTURE

Internet is made up of thousand and thousands of interconnected networks. Every computer connected to the Internet is capable of doing a few, very simple tasks very quickly. By linking millions of comparatively simple systems together, complex functionality is achieved.

1.3.1 How Internet Works?

This Section explains the underlying infrastructure and technologies that make the Internet work. To help you understand how the Internet works, we'll look at the things that happen when you do a typical Internet operation. Because the Internet is a global network of computers each computer connected to the Internet must have a unique address. Just like every house, every office, every location has an address, every page on the Internet has a unique address. This address is used get the web page for user from Internet. In order to work properly, the internet architecture required a global addressing mechanism (or Internet address) to enable computers on any network to reference and communicate with computers on any other network .Just as the address of a house or office is known as its postal address, the address on the Internet is known as URL (Uniform Resource Locator). A typical Internet address or URL would look like "http://www.ignou.ac.in".The URL locates a particular web Page, among all the computers connected to the Internet. The URL contains the components that specify the protocol, server, and pathname of an item. For simplicity's sake we will say that all computers on the internet can be divided into two categories: servers and browsers.

Servers are where most of the information on the internet "lives". These are specialized computers which store information, share information with other servers, and make this information available to the general public.

Browsers are what people use to access the World Wide Web from any standard computer (Netscape Navigator, Microsoft Internet Explorer etc.).When you connect your computer to the internet, you are connecting to a special type of server which is provided and operated by your Internet Service Provider (ISP). The job of this "ISP Server" is to provide the link between your browser and the rest of the internet. A single ISP server handles the internet connections of many individual browsers. The following figure shows a small "slice" of the internet with several home computers connected to a server:

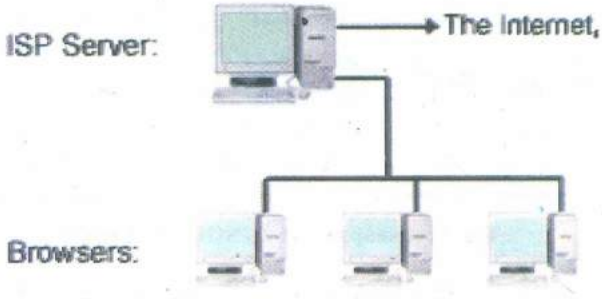

Fig. 4

ISP servers receive requests from browsers to view WebPages, check e-mail, etc. Of course each server can't hold all the information from the entire internet, so in order to provide browsers with the pages and files they ask for, ISP servers must connect to other internet servers. This brings us to the next common type of server: the "Host Server". Host servers are where websites "live". Every website in the world is located on a host server somewhere. The host server's job is to store information and make it available to other servers.

The figure below show a slightly larger slice of the internet:

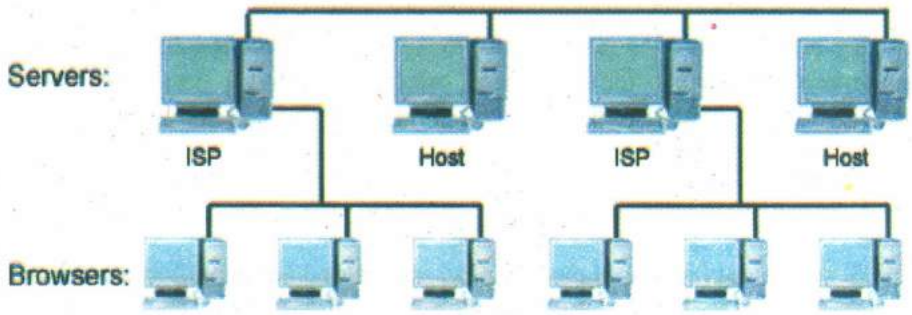

Fig. 5

To view a web page from your browser, the following sequence happens:

1) You either type an address (URL) into your "Address Bar" or click on a hyperlink.

2) Your browser sends a request to your ISP server asking for the page.

3) Your ISP server looks in a huge database of internet addresses and finds the exact host server which houses the website in question, then sends that host server a request for the page.

4) The host server sends the requested page to your ISP server.

5) Your ISP sends the page to your browser and you see it displayed on your screen.

Let us examine the URL http://www.ignou.ac.in by typing it in a firefox web browser.

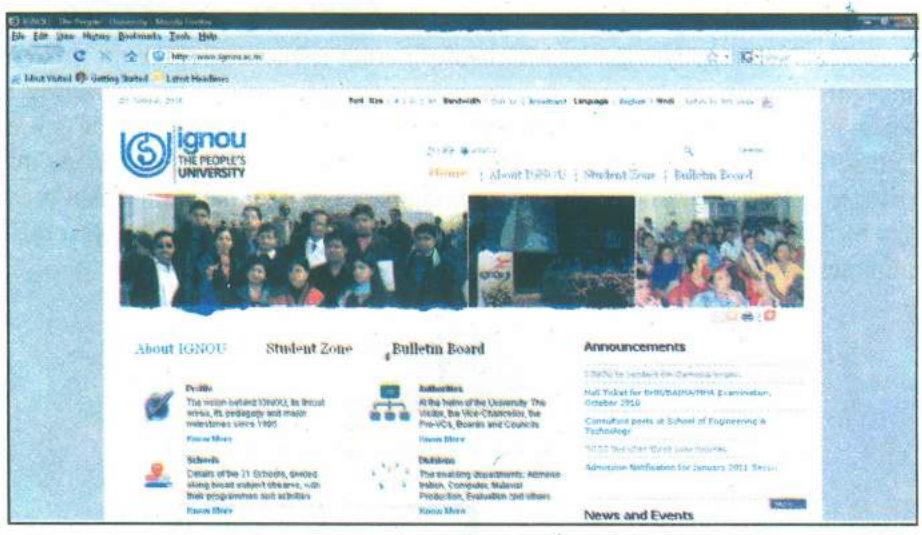

Fig. 6: A snapshot of IGNOU's homepage

The first component, the protocol, defines the manner for interpreting computer information. Many Internet pages use HTTP (Hypertext Transfer Protocol). Other common Internet protocols that one might come across are FTP (File Transfer Protocol), NEWS (Usenet news groups protocol), and GOPHER (an alternative transfer protocol).

The second component, the server domain (www.ignou.ac.in), identifies the computer system that stores the information you seek and is always preceded by two slashes. A server is a computer that has information stored on it and sends it to the client, when a request is made. Each server on the Internet has a unique address name whose text refers to the organization maintaining the server.

When you use the Web, you use a domain name to do it. For example, the Uniform Resource Locator (URL) "http://www.ignou.ac.in" contains the domain name ignou.ac.in. Every time you use a domain name, you use the Internet's DNS servers to translate the human-readable domain name into the machine-readable IP address. The Domain Name System (DNS) as a whole consists of a network of servers that map Internet domain names like www.ignou.ac.in to a local IP addresses.

The domain name system (DNS) is the way that Internet domain names are located and translated into Internet Protocol addresses.

Every computer on the Internet has a unique address called its "IP address" say for example 124.98.78.234.It is hard to remember everyone's IP address. The DNS makes it easier by allowing a familiar string of letters (the "domain name") to be used instead of the arcane IP address. So instead of typing IP Address, you can type www.ignou.ac.in.Translating the name into the IP address is called "resolving the domain name". The goal of the DNS is for any Internet user any place in the world to reach a specific website IP address by entering its domain name.

Internet domain names are organized by their levels, with the higher levels on the right. For example, for the domain "ignou.ac.in" the top-level domain is "in", the second-level domain is "ac.in", and the third-level domain is "ignou.ac.in".".in" is the Internet country code top-level domain (ccTLD) for India, ".ac" (short for academia) is a second level domain for academic establishments, such as universities, colleges and research institutes in a number of countries such as New Zealand (.ac.nz), the United Kingdom (.ac.uk), India (.ac.in), and many more. Many countries use .edu for the same purpose. For example in India we use .ac.in for Academic institutions and .edu.in for Educational institutions.

1.3.2 Behind the Scenes

First thing your browser has to do is to establish a network connection to the machine where the document lives. To do that, it first has to find the network location of the host www.ignou.ac.in. The corresponding location is actually a number called an IP address. To do this, your browser queries a program called a "name server". The name server may live on your machine, but it's more likely to run on a service machine that yours talks to. When you sign up with an ISP, part of your setup procedure will almost certainly involve telling your Internet software the IP address of a nameserver on the ISP's network. The whole network of programs and databases that cooperates to translate hostnames to IP addresses is called 'DNS' (Domain Name System). When you see references to a 'DNS server', that means what we just called a nameserver.

The name servers on different machines talk to each other, exchanging and keeping up to date all the information needed to resolve hostnames (map them to IP addresses). Your nameserver may query three or four different sites across the network in the process of resolving www.ignou.ac.in, but this usually happens very quickly (as in less than a second). The nameserver will tell your browser that www.ignou.ac.in's IP address is 220.227.168.115, knowing this; your machine will be able to exchange bits with www.ignou.ac.in directly.

Domain Name System

Internet hostnames are composed of parts separated by dots. A domain is a collection of machines that share a common name suffix. Domains can live inside other domains. For example, the machine www.ignou.ac.in lives in the .ac.in sub domain of the .in domain. The domains in the DNS system are arranged like a big inverted tree. At the top are the root servers. Everybody knows the IP addresses of the root servers; they're wired into your DNS software. The root servers know the IP addresses of the nameservers for the top-level domains like .com and .org, but not the addresses of machines inside those domains. Each top-level domain server knows where the nameservers for the domains directly beneath it are, and so forth.

When you query for the IP address of www.ignou.ac.in, what actually happens is this: First, your nameserver asks a root server to tell it where it can find a nameserver for .in. Once it knows that, it then asks the .in server to tell it the IP address of .ac.in nameserver. Once it has that, it asks the .ac.in nameserver to tell it the address of the host www.ignou.ac.in. In an Internet address - such as ignou.ac.in - the ".in" part is known as a Top Level Domain, or TLD. The ".in" registry database, for example, contains the Internet whereabouts - or IP address - of ignou.ac.in. So in trying to find the Internet address of ignou.ac.in your computer must first find the ".in" registry database. How is this done?

At the heart of the DNS are special computers, called root servers. They are distributed around the world. All root servers contain the same vital information - this is to spread the workload and back each other up. The root servers contain the IP addresses of all the TLD registries - the global registries such as .com, .org, etc. and the country-specific registries such as .in (India), .fr(France,) .cn (China), etc. Scattered across the Internet are thousands of computers - called "Domain Name Resolver's" or just plain "resolvers" - that routinely cache the information they receive from queries to the root servers. They are used to respond to a user's request to resolve a domain name - that is, to find the corresponding IP address. User's request to reach ignou.ac.in is forwarded to a local resolver. The resolver splits the request into its component parts. It knows where to find the .in registry and forwards the request over to the .in registry to find the IP address of ignou.ac.in. This answer is forwarded back to the user's computer. The domain name ignou.ac.in has been "resolved"!

1.3.3 Internet Service Provider

An ISP (Internet service provider) is a company that provides individuals and other companies' access to the Internet and other related services such as Web site building and virtual hosting. An ISP has the equipment and the telecommunication line access required to have a point-of-presence on the Internet for the geographic area served. The larger ISPs have their own high-speed leased lines so that they are less dependent on the telecommunication providers and can provide better service to their customers.

The function of an Internet service provider is simply to provide Internet service to those who need Internet service. Internet service providers or ISP's may offer dial-up or broadband service to consumers. ISPs support one or more forms of Internet access, ranging from traditional modem dial-up to DSL and cable modem broadband service. More recently, wireless Internet service providers or WISPs have emerged that offer Internet access through wireless LAN or wireless broadband networks. In addition to basic connectivity, many ISPs also offer related Internet services like e-mail, Web hosting and access to software tools. Internet Service Providers in India include BSNL, Sify, Siti Cable Network, VSNL, Reliance ERNET India etc.

1.3.4 Network Access Point

Network access point (NAP) is one of several major Internet interconnection points that serve to tie all the Internet access providers together. a public network exchange facility where Internet Service Providers (ISPs) can connect with one another in peering arrangements. A network service provider (NSP) is a company that provides backbone services to an Internet service provider (ISP), the company that most Web users use for access to the Internet. Typically, an ISP connects at a point called an Internet Exchange (IX) to a regional ISP that in turn connects to an NSP backbone. NSPs build national or global networks and sell bandwidth to regional NSPs. Regional NSPs then resell bandwidth to local ISPs. Local ISPs sell and manage services to end users.

An Internet exchange point (IX or IXP) is a physical infrastructure that allows different Internet Service Providers (ISPs) to exchange Internet traffic between their networks (autonomous systems) by means of mutual peering agreements, which allow traffic to be exchanged without cost. An ISP can purchase a wholesale dial access service from an NSP, which provides dialup connectivity for their customers. Customers then dial into their ISP's network using a local access number, which in turn connects to the backbone of that Internet provider's NSP. The NSP routes all traffic and basically provides the infrastructure needed for Internet connectivity. The NSP builds, maintains, and expands their infrastructure as Internet traffic demands.

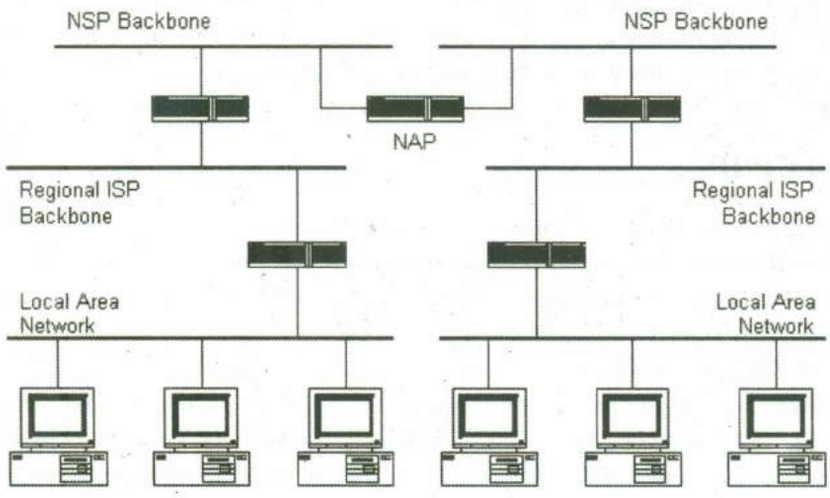

Fig. 7: Internet Architecture

1.3.5 Packets and Routers

Browser sends a command to the Web server on www.ignou.ac.in. The command is made into a packet, a block of bits like a telegram that is wrapped with three important things; the source address (the IP address of your machine), the destination address (IP address of the host), and a service number or port number that indicates that it's a World Wide Web request.

Your machine then ships the packet down the wire (your connection to your ISP, or local network) until it gets to a specialized machine called a router. The router has a map of the Internet in its memory - not always a complete one, but one that completely describes your network neighborhood and knows how to get to the routers for other neighborhoods on the Internet.

Your packet may pass through several routers on the way to its destination. Routers are smart. They watch how long it takes for other routers to acknowledge having received a packet. They also use that information to direct traffic over fast links. They use it to notice when another router (or a cable) have dropped off the network, and compensate if possible by finding another route.

Once your packet gets to its destination machine, that machine uses the service number to feed the packet to the web server. The web server can tell where to reply to by looking at the command packet's source IP address. When the web server returns this document, it will be broken up into a number of packets. The size of the packets will vary according to the transmission media in the network and the type of service.

The fundamental technology that makes the Internet work is called packet switching, a data network in which all components (i.e., hosts and switches) operate independently, eliminating single point-of-failure problems. The Internet is a packet-switching network with a distributed mesh topology. Information travels in packets across a network that consists of multiple paths to a destination. Networks are

interconnected with routers, which forward packets along paths to their destinations. The mesh topology provides redundant links. If a link fails, packets are routed around the link along different paths. A packet is a unit of data that is transmitted across a packet-switched network. A packet-switched network is an interconnected set of networks that are joined by routers or switching routers. The most common packet-switching technology is TCP/IP, and the Internet is the largest packet-switched network.

The concept of a packet-switched network is that any host connecting to the network can, in theory, send packets to any other hosts. The network is said to provide any-to-any service. The network typically consists of multiple paths to a destination that provide redundancy. Packets contain header information that includes a destination address. Routers in the network read this address and forward packets along the most appropriate path to that destination.

1.3.6 TCP/IP

The fundamental means of moving data around the Internet is controlled by a protocol called TCP/IP, or transmission control protocol/internet protocol. TCP/IP is also used on private networks, like your office LAN or home network. As the name suggests, TCP/IP is the combination of TCP and IP protocols working together. Under TCP/IP a file is broken into smaller parts called "packets" by the file server. Each packet is assigned an IP (Internet protocol) address of the computer it has to travel to. As the packet moves through the global network it is "switched" by a number of servers and routers along the way toward its destination i.e the requesting computer or "client" computer.

To understand how multiple-packet transmissions are handled, you need to know that the Internet actually uses two protocols, stacked one on top of the other. The lower level, IP (Internet Protocol), is responsible for labeling individual packets with the source address and destination address of two computers exchanging information over a network. For example, when you access http://www.ignou.ac.in, the packets you send will have your computer's IP address, such as 192.168.0.10, and the IP address of the www.ignou.ac.in computer, 220.227.168.115. These addresses work in much the same way that your home address works when someone sends you a letter. The post office can read the address and determine where you are and how best to route the letter to you, much like a router does for Internet traffic.

The upper level, TCP (Transmission Control Protocol), gives you reliability. When two machines negotiate a TCP connection (which they do using IP), the receiver knows to send acknowledgements of the packets it sees back to the sender. If the sender doesn't see an acknowledgement for a packet within some timeout period, it resends that packet. Furthermore, the sender gives each TCP packet a sequence number, which the receiver can use to reassemble packets in case they show up out of order. TCP/IP packets also contain a checksum to enable detection of data corrupted by bad links. The checksum is computed from the rest of the packet in such a way that if either the rest of the packet or the checksum is corrupted, redoing the computation and comparing is very likely to indicate an error.

Check Your Progress 1

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) Explain How Client Server Model relates to Internet.

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2) Explain the role of Internet Exchange Point (IXP).

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3) List out various parts of an URL

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4) What is the purpose of DNS?

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1.4 INTERNET PROTOCOL SUITE

The Internet is a collection of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP) to serve the users. The Internet Protocol Suite is the set of communications protocols used for the Internet and other similar networks. It is commonly also known as TCP/IP. To communicate using the Internet system, a host must implement the layered set of protocols comprising the Internet protocol suite. A host typically must implement at least one protocol from each layer. The protocol layers used in the Internet architecture are as follows:

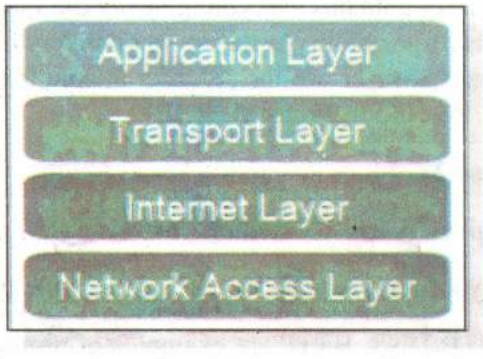

Fig. 8

1.4.1 Application Layer

The Application Layer is the top layer of the Internet protocol suite. The most common protocols are:

- FTP (file transfer protocol) is a protocol used to copy a file from one host to another over a TCP/IP based network.
- SMTP (Simple mail transfer Protocol) is a protocol for electronic mail (e-mail) transmission across Internet Protocol (IP) networks.

- HTTP(Hypertext Transfer protocol) is a protocol for transferring files (text, graphic images, sound, video, and other multimedia files) across the Internet.
- Simple network management protocol(SNMP).

1.4.2 Transport Layer

The Transport Layer provides end-to-end communication services. There are two primary Transport Layer protocols at present:

- Transmission Control Protocol (TCP)
- User Datagram Protocol (UDP)

TCP is a reliable connection-oriented transport service that provides end-to-end reliability and flow control. UDP is a connectionless (datagram) transport service.

1.4.3 Internet Layer

All Internet transport protocols use the Internet Protocol (IP) to carry data from source host to destination host. The first major version of IP, now referred to as Internet Protocol Version 4 (IPv4) is the dominant protocol of the Internet, although the successor. Internet Protocol Version 6 (IPv6) is in active, growing deployment worldwide. IP is a connectionless or datagram internetwork service, providing no end-to-end delivery guarantees. IP datagram's may arrive at the destination host damaged, duplicated, out of order, or not at all. The layers above IP are responsible for reliable delivery service when it is required. The IP protocol includes provision for addressing, type-of-service specification, fragmentation and reassembly, and security. The datagram or connectionless nature of IP is a fundamental and characteristic feature of the Internet architecture. The Internet Control Message Protocol (ICMP) is a control protocol that is considered to be an integral part of IP, although it is architecturally layered upon IP - it uses IP to carry its data end-to-end. ICMP provides error reporting, congestion reporting, and first-hop router redirection. The Internet Group Management Protocol (IGMP) is an Internet layer protocol used for establishing dynamic host groups for IP multicasting.

1.4.4 Network Interface Layer (Link Layer)

To communicate on a directly connected network, a host must implement the communication protocol used to interface to that network. We call this a Link Layer protocol. This layer contains everything below the Internet Layer and above the Physical Layer. Its responsibility is the correct delivery of messages. The core protocols specified in this layer are the Address Resolution Protocol (ARP) and the Reverse Address Resolution Protocol (RARP).

Check Your Progress 2

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) Telnet, FTP, SMTP, DNS, HTTP are examples of protocols that are used in.

   i) Application layer

   ii) Presentation layer

   iii) Link layer

   iv) Transport layer

2) Differentiate between TCP and UDP.

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3) Discuss the functionality of FTP and HTTP.

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4) List out the functions of Internet layer.

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5) The movement of data packets across a network would be managed by.

i) Application Layer

ii) Internet Layer

iii) Transport layer

iv) Link Layer

1.5 IP ADDRESSING

Here you will learn about IP Address, general overview of routing and subnet mask. IP address is an identifier for a computer or device on a TCP/IP network and Internet. Networks that use the TCP/IP protocols route traffic based on the IP address of the destination computer or network device. Every device connected to the Internet must need a unique identifier, which is called an IP address. An IP address is a numeric value separated by periods into four octets A typical IP address looks like this 128.230.1.12.

Each number in the IP address can be between 0 and 255. To make it easier for us humans to remember, IP addresses are normally expressed in decimal format as a "dotted decimal number" like the one above. But computers communicate in binary form. Look at the same IP address in binary: 10000000 11100110 00000001 00001100. The four numbers in an IP address are called octets, because they each have eight positions when viewed in binary form. If you add all the positions together, you get 32, which is why IP addresses are considered 32-bit numbers.

Two versions of the Internet Protocol (IP) are in use: IP Version 4 and IP Version 6. The designers of TCP/IP defined an IP address as a 32-bit number and this system, known as Internet Protocol Version 4 (IPv4), is still in use today. IPv4 was the first version of Internet Protocol to be widely used, and accounts for most of today's Internet traffic.

However, due to the enormous growth of the Internet and the predicted depletion of available addresses, a new addressing system IPv6, using 128 bits for the address, was developed in 1999.IPv6 provides a much larger address pool than IPv4, amongst other features. The major difference between IPv4 and IPv6 is the number of IP

addresses. There are 4,294,967,296 IPv4 addresses. In contrast, there are 340,282,366,920,938,463,463,374,607,431,768,211,456 IPv6 addresses.

	IPv4	IPv6
Deployed	1981	1999
Address Size	32-bit number	128-bit number
Address Format	192.149.252.76 Dotted Decimal Notation	3FFE:F200:0234:AB00:0123:4567:8901:ABCD Hexa Decimal Notation
Number of Addresses	2^{32}	2^{128}

1.5.1 Addressing Scheme

An IP address can be divided into two parts network portion and a host portion. Each IP address is associated with a subnet mask. The 32 bit address is broken into 4 octets and 1 octet=8 bits .The octets are broken down to provide a large number of the addressing scheme that can accommodate small and very large networks. There are five different classes of the IP networks class A, B, C, D and E.

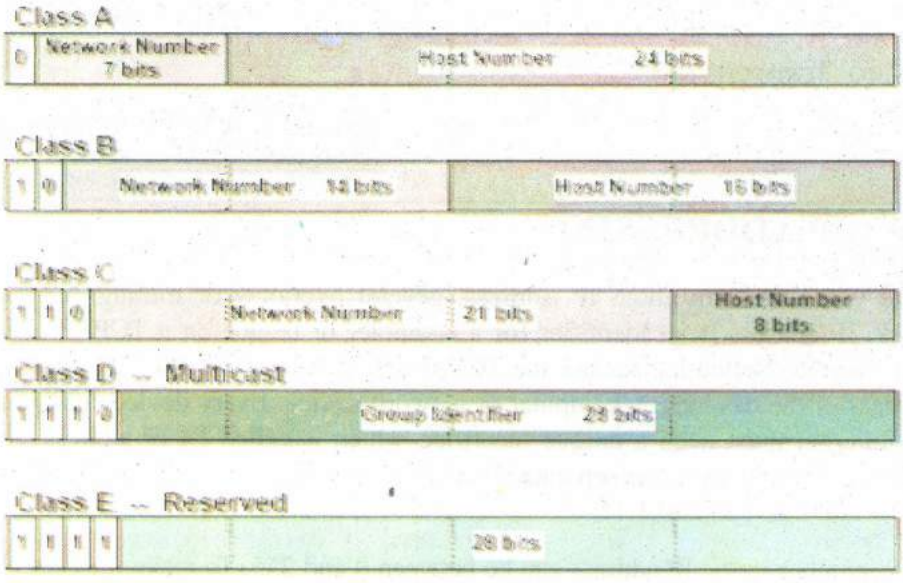

Fig. 9

An IP datagram carries 32-bit source and destination addresses, each of which is partitioned into two parts - a constituent network prefix and a host number on that network. Symbolically: IP-address ::= { <Network-prefix>, <Host-number> }

Class A

Class A addresses are specified to networks with large number of total hosts. Class A allows for 126 networks by using the first octet for the network ID. The first bit in this octet, is always set and fixed to zero. And next seven bits in the octet is all set to one, which then complete network ID. The 24 bits in the remaining octets represent the hosts ID, allowing 126 networks and approximately 17 million hosts per network. Class A network number values begin at 1 and end at 127. An example of a Class A IP address is 102.168.212.226, where "102" identifies the network and "168.212.226" identifies the host on that network.

Class B

Class B addresses are specified to medium to large sized of networks. Class B allows for 16,384 networks by using the first two octets for the network ID. The two bits in the first octet are always set and fixed to 1 0. The remaining 6 bits, together with the next octet, complete network ID. The 16 bits in the third and fourth octet represent host ID, allowing for approximately 65,000 hosts per network. Class B network number values begin at 128 and end at 191. An example of a Class B IP address is 168.212.226.204 where "168.212" identifies the network and "226.204" identifies the host on that network.

Class C

Class C addresses are used in small local area networks (LANs). Class C allows for approximately 2 million networks by using the first three octets for the network ID. In class C address three bits are always set and fixed to 1 1 0. And in the first three octets 21 bits complete the total network ID. The 8 bits of the last octet represent the host ID allowing for 254 hosts per one network. Class C network number values begin at 192 and end at 223. An example of a Class C IP address is 200.168.212.226 where "200.168.212" identifies the network and "226" identifies the host on that network.

Class D and E

Classes D and E are not allocated to hosts. Class D addresses are used for multicasting, and class E addresses are not available for general use: they are reserved for future purposes.

1.5.2 Subnetting

A subnetwork, or subnet, is a logically visible subdivision of an IP network. The practice of creating subnetworks is called subnetting. All computers that belong to a subnet are addressed with a common, identical, most-significant bit-group in their address.

When a class A IP license is granted, you are assigned something like this: 67.0.0.0. Only the value of the bits in the first octet is assigned. This means you are free to assign any values you wish in the second, third and fourth octets. The default subnet mask for a class A network is 255.0.0.0. High bits, ones, indicate the bits that are part of the network field of the IP address. The default subnet mask does not create subnets.

Therefore, a class A network with the default subnet mask is one network. The three octets that are unassigned and unmasked are part of the host field of the address. There is a total of 24 bits in those three octets. Each bit can be in one of two states. Therefore, 2^{24} is the number of host addresses that can be assigned on that network.

When a class B license is granted, the first two octets are assigned. For example, 164.198.x.x. The default subnet mask for a class B is 255.255.0.0. One network, two octets free, 16 bits for the host address field. 2^{16}-2=65,534 possible host addresses on a class B IP network.

When a class C license is granted, the first three octets are assigned, for example: 198.52.16.0. The default subnet mask for a class C is 255.255.255.0. One octet makes up the host address field. 2^{8}-2=254 host addresses possible on a class C network.

Applying a subnet mask to an IP address separates network address from host address. The network bits are represented by the 1's in the mask, and the host bits are represented by 0's. Performing a bitwise logical AND operation on the IP address with the subnet mask produces the network address.

For example, applying the Class C subnet mask to our IP address 216.3.128.12 produces the following network address:

IP: 1101 1000 . 0000 0011 . 1000 0000 . 0000 1100 (216.003.128.012)

Mask: 1111 1111 . 1111 1111 . 1111 1111 . 0000 0000 (255.255.255.000)

1101 1000 . 0000 0011 . 1000 0000 . 0000 0000 (216.003.128.000)

Another example using an IP address of 156.154.81.56 used with a network mask of 255.255.255.240 follows:

IP Address: 10011100.10011010.01010001.00111000

Subnet mask: 11111111.11111111.11111111.11110000

Bitwise AND ----------

Result: 10011100.10011010.01010001.00110000

Subnet Mask in "Slash Notation":

Alternately, we can express the subnet mask in "slash notation". This is just a slash followed by the number of ones in the subnet mask. 255.255.255.224 is equivalent to "/27"

1.5.3 CIDR – Classless Inter Domain Routing

Classless **Inter Domain Routing (CIDR)** was invented to keep the Internet from running out of IP Addresses. The IPv4, a 32-bit, addresses have a limit of 4,294,967,296 (2^{32}) unique IP addresses. The classful address scheme (Class A, B and C) of allocating IP addresses in 8-bit increments can be very wasteful. With classful addressing scheme, a minimum number of IP addresses allocated to an organization is 256 (Class C). Giving 256 IP addresses to an organization only requiring 15 IP addresses is wasteful. Also, an organization requiring more than 256 IP addresses (let's say 1,000 IP addresses) is assigned a Class B, which allocates 65,536 IP addresses. Similarly, an organization requiring more than 65,636 (65,634 usable IPs) is assigned a Class A network, which allocates 16,777,216 (16.7 Million) IP addresses. This type of address allocation is very wasteful.

With CIDR, a network of IP addresses is allocated in 1-bit increments as opposed to 8-bits in classful network. The use of a CIDR notated address can easily represent classful addresses (Class A = /8, Class B = /16, and Class C = /24). The number next to the slash (i.e. /8) represents the number of bits assigned to the network address.

The example shown above can be illustrated with CIDR as follows: 216.3.128.12, with subnet mask of 255.255.255.128 is written as 216.3.128.12/25.Similarly, the 8 customers with the block of 16 IP addresses can be written as: 216.3.128.129/28, 216.3.128.130/28, and etc. With an introduction of CIDR addressing scheme, IP addresses are more efficiently allocated to ISPs and customers; and hence there is less risk of IP addresses running out anytime soon.

1.5.4 Network Address Translation

NAT (Network Address Translation or Network Address Translator) is the translation of an Internet Protocol address (IP address) used within one network to a different IP address known within another network. One network is designated the inside network and the other is the outside. Typically, a company maps it's local inside network addresses to one or more global outside IP addresses and unmaps the global IP addresses on incoming packets back into local IP addresses.

This helps ensure security since each outgoing or incoming request must go through a translation process that also offers the opportunity to qualify or authenticate the request or match it to a previous request.

NAT is included as part of a router and is often part of a corporate firewall. Network administrators create a NAT table that does the global-to-local and local-to-global IP address mapping. When a computer running NAT receives a packet from an internal client, it replaces the packet header and translates the client's port number and internal IP address to its own port number and external IP address. It then sends the packet to the destination host on the Internet, and keeps track of the mapping information in a table, so that it can route the reply to the appropriate client computer. When the computer running NAT receives a reply from the Internet host, it again replaces te packet header and sends the packet to the client. Both the client computer and the Internet host appear to be communicating directly with each other. For example, a client computer with the IP address 192.168.10.2 wants to contact a Web server with the IP address 131.110.30.4. The client is configured to use 192.168.1.1 as the default gateway, which is the internal IP address of the computer running NAT. The external IP address of the computer running NAT is 131.110.5.1. In this example, the NAT process occurs as follows:

- The client computer sends a packet to the computer running NAT. The packet header indicates that the packet originates from port 1074 on the computer with the IP address 192.168.10.2, and has a destination of port 80 on 131.110.30.4.
- The computer running NAT changes the packet header to indicate that the packet originates from port 1563 on host 131.110.5.1, but does not change the destination. The computer running NAT then sends the packet to the Web server over the Internet.
- The external Web server receives the packet and sends a reply. The packet header for the reply indicates that the packet originates from port 80 on 131.110.30.4, and has a destination of port 1563 on host 131.110.5.1.
- The computer running NAT receives the packet and checks its mapping information to determine the destination client computer. The computer running NAT changes the packet header to indicate a destination of port 1074 on 192.168.10.5, and then sends the packet to the client. The source of the packet remains as port 80 on 131.110.30.4, which is the IP address of the Web server.

1.5.5 Internet Routing

The Internet is not just a vast array of computers connected to each other. There are a host of networking devices like the router, which control the data traffic between and within networks. A router is a networking device that is designed to control data traffic between different computer networks. There are various types of routers, which differ in their features according to the scale of computing networks, which they handle. Let us see how routers work and the role they play in the overall working on the Internet.

To know how routers work, you need to understand how data is transported across the Internet. The method of transport is 'Packet Switching'. Every file or piece of data on the Internet is not transported as a single entity. It is broken up into smaller packets and then labeled with sender's address and recipient address. Just like a post office package is sent across a network and then sorted at various post office nodes, until it reaches your door step, data packages are sorted and directed across the Internet. Routers are devices that connect multiple networks together and control what data is sent to and from any computer in those networks. Using, what is known as a configuration table (that has information about connections and associated network addresses), it reads every data packet that it receives from a

network and directs it through the right connection, so that it reaches the right destination. The configuration table stored on a router has information about the IP addresses of all computers in a network. It also has a set of priority rules for data transport, which the router follows.

The router is an intelligent device which calculates the optimum path for the data packet to reach the right destination in shortest time. This calculation and determination of a path is made possible, after the router has evaluated the traffic load across networks. An optimum use of bandwidth and faster data transfer is made possible because of routers. Routers also secure a computer network by providing encryption of data. Routers are silent backstage performers on the Internet, who ensure that data is directed in the right directions and reaches the right destinations, while also protecting networks from unauthorized access.

Internet routers are specialized computers that interconnect the network by switching communications from one line to another at cross points. When a computer communicates with another on the Internet, it addresses each packet with the other computer's IP address and then sends it to the closest Internet router. The router then uses a routing algorithm to send the packet across the Internet to the destination computer.

There are several types of routing protocols which include

1) Interior Gateway Protocols (IGP)

2) Exterior Gateway Protocols (EGP)

Interior Gateway Protocols (IGP)

Interior Gateway Protocols (IGP) are used to route Internet communications within a local area network, such as within an office building. The two main types of IGP protocols are described in the following sections, along with an example proprietary protocol for comparison purposes.

1) Routing Information Protocol (RIP)

2) Open Shortest Path First (OSPF)

Routing Information Protocol (RIP) – What makes RIP work is a routing database that stores information on the fastest route from computer to computer, an update process that enables each router to tell other routers which route is the fastest from its point of view, and an update algorithm that enables each router to update its database with the fastest route communicated from neighboring routers:

Open Shortest Path First (OSPF) – The main difference between OSPF and RIP is that RIP only keeps track of the closest router for each destination address, while OSPF keeps track of a complete topological database of all connections in the local network.

Exterior Gateway Protocols (EGP)

While IGP protocols are used within local networks, Exterior Gateway Protocols (EGP) are used for routing between networks, generally on the Internet backbone itself, linking the different networks together.

The following are the two common EGP protocols:

1) Border Gateway Protocol (BGP).

2) Exterior Gateway Protocol (EGP).

Border Gateway Protocol (BGP)

When a BGP router first comes up on the Internet, either for the first time or after being turned off, it establishes connections with the other BGP routers with which it directly communicates. The first thing it does is download the entire routing table of each neighboring router. After that it only exchanges much shorter update messages with other routers.

BGP routers send and receive update messages to indicate a change in the preferred path to reach a computer with a given IP address. If the router decides to update its own routing tables because this new path is better, then it will subsequently propagate this information to all of the other neighboring BGP routers to which it is connected, and they will in turn decide whether to update their own tables and propagate the information further.

Exterior Gateway Protocol (EGP)

Exterior Gateway Protocol (EGP) is a protocol for exchanging routing information between two neighbor gateway hosts (each with its own router) in a network of autonomous systems. EGP is commonly used between hosts on the Internet to exchange routing table information. The routing table contains a list of known routers, the addresses they can reach, and a cost metric associated with the path to each router so that the best available route is chosen. Each router polls its neighbor at intervals between 120 to 480 seconds and the neighbor responds by sending its complete routing table. The EGP protocol had several problems, most notably an inability to scale up to support the growth in the size of the Internet. EGP has since become superseded by the BGP protocol.

1.5.6 Packet Switching

Breaking digital communications into packets gave network technology something to work with. The key idea of packet switching is the division of each communication into individual, equal-sized packets. These packets are then sent individually to their destination through the network, and the entire message is reassembled when all the packets arrive. There are a range of procedures for retransmission of packets that might get lost in the network. On the Internet, a typical packet length is about one kilobyte, or a thousand characters. A large message may be divided into thousands of individual packets. The beginning of an packet is called the "header" and records the following information:

- Source. The IP address of the computer sending the packet.
- Destination. The IP address of the destination computer .
- Length. The length of the packet in bytes.
- Number. The total number of packets in the complete message.
- Sequence. The number of this packet in the whole list of packets making up this communication.

This data provides the information an Internet router needs to get packets and messages to their destination. For example, a destination computer can request the retransmission of missing packets, since it knows the number of total packets and therefore can figure out which ones it doesn't have. For additional reliability, Internet packet headers also contain an error correction code, which is a number representing a mathematical combination of the rest of the packet data. If even a single bit of the packet is changed in transmission, then recalculation of the error correction code by a router won't match the code transmitted with the message, and the packet will be discarded and a request made for retransmission. Switching systems enable packet networks to dynamically optimize their operation and recover from localized damage. The switching in Internet networks is performed by computers

called routers at the intersection where networks come together. Internet routers use a number of standard routing protocols to switch the incoming packets from one network to another as required.

Since routing software can reconfigure instantly, packet switching networks can adapt to downed links and maintain communications by roundabout paths even under very adverse conditions. Since the systems are operating at electronic speed, this means messages can be sent through even large, damaged networks very quickly. One of the biggest advantages of packet switched networks is that they use the available bandwidth very efficiently by sharing it at all times, so that no one communication ties up a communication link. In the early 1970's, the cost of electronics came down to the point where this model became cost-effective, and it became possible to install routing equipment at each network node, enabling wide area communications for the first time. Today's Internet routing protocols use sophisticated algorithms that have been optimized for efficiency over many years. In practice, most network connections today are very reliable, and so all packets for a given computer are usually sent over the same path as long as it remains operational. Today, switches are getting faster and faster, with optical switches providing large advances in speed, and the ultimate end result is now within site: near zero switching time as a packet moves from one network to another at near the speed of light.

Check Your Progress 3

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) Differentiate between IPv4 and IPv6.

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2) Explain various classes of IPAddress.

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3) Differentiate between interior gateway and exterior gateway protocols.

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4) What is a Subnet? Explain its advantages.

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5) Explain the functionality of NAT.

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6) A host has an IP address of 132.185.132.204. Determine:

i) The class of address

ii) The network id address

iii) The host address

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1.6 SECURITY ISSUES

Internet security has become a serious issue for anyone connected to the net. Even if you don't think you have anything worth protecting on your computer, it's still important that you keep it locked down. Your files are not the only thing at stake here. If someone gains access to your computer, it can be used as a "zombie} for hacking into other computer, hiding the trail of the person who is actually doing it. How would you like to get a call from your local police telling you that there's been a virus attack that has been traced back to your computer? No, even if your computer isn't used for anything critical you need to run security software such as an antivirus and a firewall.

These programs will keep your computer "hidden" from prying eyes over the internet, as well as protected from viruses and other malware that can be spread through e-mail or other methods. You also need to make sure you're familiar with the different types of security threats so you can deal with them if they ever come up. Although the Internet can be used for many useful and educational endeavors, it can also be quite dangerous. Harmful software, also known as malware, can infect your computer, steal your information and even destroy your hard drive. Luckily, there are plenty of tools you can use for security when going online.

Anti-Virus Software

The most basic security program is anti-virus software. Anti-virus software periodically downloads small components known as "definitions" from a server that help it to identify viruses on your computer. Having anti-virus software on your computer is essential, as it will get rid of any malware accidentally downloaded, and hopefully prevents the malware from spreading on your computer. However, the disadvantage of anti-virus software is that it only deletes anti-virus software after it has been identified or downloaded, and does not prevent malware from being downloaded on your computer.

An anti virus software is a program designed to identify and destroy all kinds of malicious software to ensure computer security. Antivirus is a term given to a protective software specifically designed to protect computers from all kind of viruses harmful to a computer system. It also gives protection against malicious software that includes viruses, key loggers, hijackers, and Trojan.

An antivirus program is software which can detect the presence of a virus on a computer and, to the best of its abilities, remove the virus. Eradicating a virus is the term used for cleaning out a computer.

There are several methods of eradication:

- Removing the code in the infected file which corresponds to the virus;
- Removing the infected file;
- Quarantining the infected file, which involves moving it to a location where it cannot be run.

The following are some of the anti-virus products available for free download:

- AntiVir
- avast!
- AVG Anti-Virus
- BitDefender
- Comodo anti-virus

Other Commercial Anti-Virus Products

Norton AntiVirus Software

Norton Antivirus is the most widely used Antivirus software for personal computers. Protect your computer by instantly downloading one of their antivirus programs: Norton Antivirus, Norton Internet Security, or Norton 360.

F-Secure Anti-Virus 2009

Complete protection for home and home office PCs. F-Secure Internet Security provides a complete and easy to use protection against Internet threats. It includes antivirus, personal firewall, anti-spyware and anti-phishing. F-Secure is a very popular anti-virus product, especially in the commercial sector.

Kaspersky Anti-Virus Products

Kaspersky Lab is one of the world"s top anti-virus companies, and well known all over the world as one of the leaders in the development of advanced anti-virus technologies. Kaspersky Lab produce anti-virus defence systems for workstations, file servers and application servers, e-mail gateways, firewalls, and Web servers for both Windows and Linux.

Firewall

Unlike anti-virus software, a firewall can actually prevent malware from downloading to your computer. In addition, a good firewall can prevent unauthorized users from accessing a network, which can help increase corporate security. A firewall works by monitoring connections made to and from your computer. Any connection that is not part of a pre-defined or custom approved connection is aborted automatically.

A firewall protects networked computers from intentional hostile intrusion that could compromise confidentiality or result in data corruption or denial of service. A firewall sits at the junction point or gateway between the two networks, usually a private network and a public network such as the Internet. The earliest firewalls were simply routers. A firewall examines all traffic routed between the two networks to see if it meets certain criteria. If it does, it is routed between the networks, otherwise it is stopped. A firewall filters both inbound and outbound traffic. It can

also manage public access to private networked resources such as host applications. It can be used to log all attempts to enter the private network and trigger alarms when hostile or unauthorized entry is attempted. Firewalls can filter packets based on their source and destination addresses and port numbers. This is known as address filtering. Firewalls can also filter specific types of network traffic. This is also known as protocol filtering because the decision to forward or reject traffic is dependant upon the protocol used, for example HTTP, ftp or telnet. Firewalls can also filter traffic by packet attribute or state.

A firewall cannot prevent individual users with modems from dialing into or out of the network, bypassing the firewall altogether. Employee misconduct or carelessness cannot be controlled by firewalls.

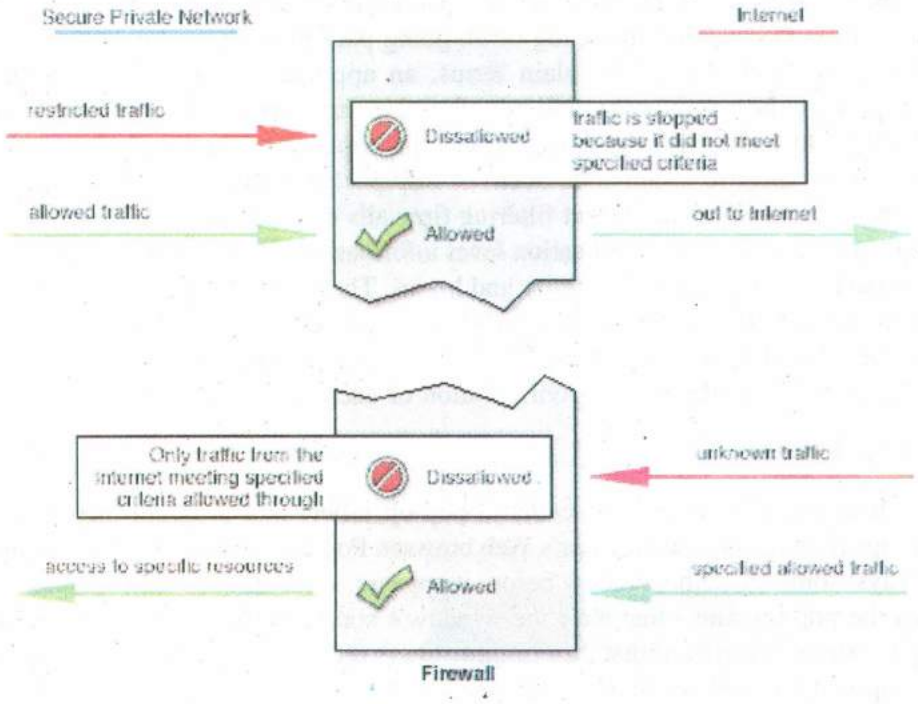

Fig. 10

There are several types of firewalls that include

1) Packet Filtering Firewalls

2) Application Level gateways

3) Circuit Level Gateways

Packet filtering firewalls

Packet filtering firewalls work at the IP layer of TCP/IP. They are usually part of a router. A router is a device that receives packets from one network and forwards them to another network. In a packet filtering firewall each packet is compared to a set of criteria before it is forwarded. Depending on the packet and the criteria, the firewall can drop the packet, forward it or send a message to the originator. Rules can include source and destination IP address, source and destination port number and protocol used. The advantage of packet filtering firewalls is their low cost and low impact on network performance. Most routers support packet filtering. Even if other firewalls are used, implementing packet filtering at the router level affords an initial degree of security at a low network layer. This type of firewall only works at the network layer however and does not support sophisticated rule based models. Network Address Translation (NAT) routers offer the advantages of packet filtering firewalls but can also hide the IP addresses of computers behind the firewall, and offer a level of circuit-based filtering.

Circuit level gateways

Circuit level gateways work at the session layer of the OSI model, or the TCP layer of TCP/IP. They monitor TCP handshaking between packets to determine whether a requested session is legitimate. Information passed to remote computer through a circuit level gateway appears to have originated from the gateway. This is useful for hiding information about protected networks. Circuit level gateways are relatively inexpensive and have the advantage of hiding information about the private network they protect. On the other hand, they do not filter individual packets.

Application level gateways

Application level gateways, also called proxies, are similar to circuit-level gateways except that they are application specific. They can filter packets at the application layer of the OSI model. Incoming or outgoing packets cannot access services for which there is no proxy. In plain terms, an application level gateway that is configured to be a web proxy will not allow any ftp, gopher, telnet or other traffic through. Because they examine packets at application layer, they can filter application specific commands such as http:post and get, etc. This cannot be accomplished with either packet filtering firewalls or circuit level neither of which know anything about the application level information. Application level gateways can also be used to log user activity and logins. They offer a high level of security, but have a significant impact on network performance. This is because of context switches that slow down network access dramatically. They are not transparent to end users and require manual configuration of each client computer

Pop-up Blocker

A pop-up blocker (sometimes called a pop-up killer) is a program that prevents pop-ups from displaying in a user's Web browser. Pop-up blockers work in a number of ways: some close the window before it appears, some disable the command that calls the pop-up, and some alter the window's source HTML. One problem with pop-up blockers has been that they cannot always differentiate between an unwanted pop-up window and one that is user-requested.

Check Your Progress 4

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) Define Virus. Mention some antivirus software.

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2) What is a firewall. List out its advantages?

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3) Explain how packet filter firewall works.

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4) What is an application level gateway?

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5) Explain the role of pop-up blockers.

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1.7 LET US SUM UP

This unit deals with the architectural design of the Internet. The Internet's architecture is based in the very specification of the standard TCP/IP protocol, designed to connect any two networks which may be very different in internal hardware, software, and technical design. Once two networks are interconnected, communication with TCP/IP is enabled end-to-end, so that any node on the Internet has the near magical ability to communicate with any other no matter where they are. This openness of design has enabled the Internet architecture to grow to a global scale.

1.8 CHECK YOUR PROGRESS: THE KEY

Check Your Progress 1

1) Client/server Architecture describes the relationship between two computer programs in which one program, the client, makes a service request from another program, the server, which fulfills the request. Relative to the internet, your Web browser is a client program that requests services from a Web server in another computer somewhere on the Internet.

2) An Internet exchange point (IX or IXP) is a physical infrastructure through which Internet service providers (ISPs) exchange Internet traffic between their networks. The primary role of an Internet Exchange Point (IXP) is to reduce costs associated with traffic exchange between Internet Service Providers (ISPs).

3) The Uniform Resources Locator, also known as the "URL" is the address of a website. It contains following parts

Protocol: "Http" is a communication protocol between the browser and the web server.

Hostname (Domain Name): This is usually everything after "://" Name of the domain where the web server belongs.

Path: is anything that appears after the "/" after the hostname. It can have a filename or just be one or more directories.

4) The Domain Name System (DNS) is vital to the Internet, providing a mechanism for resolving host names into Internet Protocol (IP) addresses. The goal of the DNS is for any Internet user any place in the world to reach a specific website IP address by entering its domain name. DNS automatically converts the names we type in our Web browser address bar to the IP addresses of Web servers hosting those sites. When clients like Web browsers issue requests involving Internet host names, a piece of software called the DNS resolver contacts a DNS server to determine the server"s IP address.

Check Your Progress 2

1) (i)

2) The main difference between the UDP and TCP protocol is that the UDP is connectionless protocol while the TCP is a connection oriented protocol. TCP breaks the data into packets and It supports error correction. User Datagram Protocol also breaks the data into packets like the TCP and it does not support error correction. TCP can establish a Connection and UDP cannot. TCP provides a stream of unlimited length, UDP sends small packets. TCP guarantees that as long as you have a connection data sent will arrive at the destination, UDP provides not guarantee delivery. UDP is faster for sending small amounts of data since no connection setup is required, the data can be sent in less time then it takes for TCP to establish a connection.

3) HTTP (Hypertext Transfer Protocol) and FTP (File Transfer Protocol) are one of the protocols that are being used in the internet, each with its own function. The purpose of HTTP is to serve as a means of accessing the World Wide Web. Websites are accessed using http with the help of browsers. FTP, as the name implies, is used in transferring files from one computer to another. When connecting to a FTP server you are using a FILE server (that means you can't see anything but files there), but if you connect to a HTTP server you access a WEB server, which means you can load web pages into a browser. Using a FTP connection you can download and upload files to the server, but when you use the HTTP connection you can only download content from the Internet for viewing, is a "read only" method.

4) The Internet layer is responsible for addressing, packaging, and routing functions. The core protocols of the Internet layer are IP, ARP, ICMP, and IGMP. The Internet Protocol (IP) is a routable protocol responsible for IP addressing, routing, and the fragmentation and reassembly of packets. The Address Resolution Protocol (ARP) is responsible for the resolution of the Internet layer address to the Network Interface layer address such as a hardware address. The Internet Control Message Protocol (ICMP) is responsible for providing diagnostic functions and reporting errors due to the unsuccessful delivery of IP packets. The Internet Group Management Protocol (IGMP) is responsible for the management of IP multicast groups. The Internet layer is analogous to the Network layer of the OSI model.

5) (ii)

1) The Internet Protocol version 4, or IPv4, is the defined standard in the world today, but it is being replaced by the more advanced IPv6, to help solve the IP address exhaustion problem.IPv4 is a 32 bit addressing scheme in a TCP/IP network where as IPv6 is a 128 bits address. Address available in IPv4 is 2^{32} where as in IPv6 it is 2^{128}.

2) IP addresses were originally organized into classes. The address class determined the potential size of the network. The class of an address specified which of the bits were used to identify the network, the network ID, or which bits were used to identify the host ID, host computer. It also defined the total number of hosts subnets per network. There were five classes of IP addresses: classes A through E. There are 5 different address classes. You can determine which class any IP address is in by examining the first 4 bits of the IP address.

   Class A addresses begin with 0xxx, or 1 to 126 decimal.

   Class B addresses begin with 10xx, or 128 to 191 decimal.

   Class C addresses begin with 110x, or 192 to 223 decimal.

   Class D addresses begin with 1110, or 224 to 239 decimal.

   Class E addresses begin with 1111, or 240 to 254 decimal.

3) An IGP (Interior Gateway Protocol) is a protocol for exchanging routing information between gateways (hosts with routers) within an autonomous network. Exterior Gateway Protocol (EGP) is a protocol for exchanging routing information between two neighbor gateway hosts (each with its own router) in a network of autonomous systems. EGP is commonly used between hosts on the Internet to exchange routing table information.

   Examples of an IGP: Routing Information Protocol (RIP),Interior Gateway

   Routing Protocol (IGRP),Open Shortest Path First (OSPF).

   Examples of an EGP: Border Gateway Protocol (BGP),Exterior Gateway Protocol

4) A subnet is a logically visible subdivision of an IP network. The practice of dividing a network into subnetworks is called subnetting. Typically, a subnet may represent all the machines at one geographic location, in one building, or on the same local area network (LAN). Network designers employ subnets as a way to partition networks into logical segments for better administration, improving performance and enhance network security. In addition, having an organization's network divided into subnets allows it to be connected to the Internet with a single shared network address, which help easing the problem of Internet IP address exhaustion. Subnet addressing allows each organization to have its own "internet within the Internet".

5) NAT allows an Internet Protocol (IP) network to maintain public IP addresses separately from private IP addresses. NAT is a popular technology for Internet connection sharing. Network Address Translation allows a single device, such as a router, to act as an agent between the Internet (or "public network") and a local (or "private") network. This means that only a single, unique IP address is required to represent an entire group of computers. This allows computers on the home LAN to share a single Internet connection. Additionally, it enhances home network security by limiting the access of external computers into the home IP network space.

6) i) The class of address: Class B

ii) The network id address: 132.185.x.x

iii) The host address: x.x.132.204

Check Your Progress 4

1) VIRUS stands for Vital Information Resource under Seize. A computer virus is a software program, script, or macro designed to infect, destroy, modify, or cause other problems with your computer or software programs. The user may protect themselves from virus using an anti-virus protection program. The anti-virus protection program is designed to detect, protect, and clean any computer viruses. The following are some of the best antivirus software used: AVG, Avira, Avast, Kaspersky, Norton etc.

2) A Firewall is a system which limits network access between two or more networks. An enterprise with an intranet that allows its workers access to the wider Internet installs a firewall to prevent outsiders from accessing its own private data resources and for controlling what outside resources its own users have access to. Firewalls protect private local area networks from hostile intrusion from the Internet. Consequently, many LANs are now connected to the Internet where Internet connectivity would otherwise have been too great a risk. Firewalls allow network administrators to offer access to specific types of Internet services to selected LAN users. Privileges can be granted according to job description and need rather than on an all-or-nothing basis.

3) Packet filtering firewalls work at the IP layer of TCP/IP. They are usually part of a router. A router is a device that receives packets from one network and forwards them to another network. In a packet filtering firewall each packet is compared to a set of criteria before it is forwarded. Depending on the packet and the criteria, the firewall can drop the packet, forward it or send a message to the originator. Rules can include source and destination IP address, source and destination port number and protocol used. The advantage of packet filtering firewalls is their low cost and low impact on network performance. Most routers support packet filtering.

4) Application level gateways, also called proxies, are similar to circuit-level gateways except that they are application specific. They can filter packets at the application layer of the TCP/IP model. Incoming or outgoing packets cannot access services for which there is no proxy. In plain terms, an application level gateway that is configured to be a web proxy will not allow any ftp, gopher, telnet or other traffic through. Because they examine packets at application layer, they can filter application specific commands. This cannot be accomplished with either packet filtering firewalls or circuit level neither of which know anything about the application level information. Application level gateways can also be used to log user activity and logins. They offer a high level of security, but have a significant impact on network performance. They are not transparent to end users and require manual configuration of each client computer.

5) Software that works in conjunction with your internet browser and is designed to block unwanted pop-ups from occurring while you are browsing the internet. Pop-up ads or pop-ups are a form of online advertising on the World Wide Web intended to attract web traffic or capture e-mail addresses. It works when certain web sites open a new web browser window to display advertisements.

1.9 SUGGESTED READINGS

- Internet architecture: an introduction to IP protocols By Uyless D. Black Prentice Hall.
- Internetworking with TCP/IP: Principles, protocols, and architecture By Douglas Comer, Prentice Hall India.
- www.informit.com
- www.nos.org/htm/it1.html
- www.tcpipguide.com

UNIT 2 SOCIAL NETWORKING SITES

Structure

2.0 INTRODUCTION

In both professional and personal life, human beings naturally form groups based on affinities and expertise. We gravitate to others with whom we share interests. Most of us belong to real world networks that formed organically. Not surprisingly, these networks rapidly migrated to the online world. In modern times people are able to communicate amongst themselves more efficiently than ever before. Due to advancements in computer technology people all over the world can now interact and communicate with virtually anyone else who has access to a computer and the internet using social networking. Social Networking is defined as a social structure connecting relationships between individuals or organizations. A social networking site is an online place where a user can create a profile and build a personal network that connects him or her to other users. Social networking sites allow you to meet other internet users without having to rely on chat rooms. Using Social Networking Sites people are able to publish multimedia content about themselves, their interests and concerns. Instead of being limited to a network amongst peers within the workplace, social networking sites are increasingly allowing relationships to be built up with people right across the globe and from all walks of life. Some of the more popular social networking sites include Facebook, YouTube, and

Twitter. This unit gives a detailed description of social networking websites providing some examples and also discusses their advantages.

2.1 OBJECTIVES

After studying this unit, you should be able to:

- Understand what social networking is;
- Identify various social networking site;.
- Recognize the areas /ways businesses can use social networking; and
- List the problems associated with social networking.

2.2 SOCIAL NETWORKING

Social networking can be explained as groups of people that are connected to one another and related through one common source. An example of a common source would be a job, and employees of that job would meet to form a social network. Social networking websites are online communities of people who share interests and activities, or who are interested in exploring the interests and activities of others. They typically provide a variety of ways for users to interact, through chat, messaging, email.

Social networking sites include web-based services that allow individuals to:

- construct a public or semi-public profile within a bounded system,
- articulate a list of other users within whom they share a connection, and
- View and traverse their list of connections and those made by others within their system.

2.2.1 Benefits of Social Networks

Social networks can provide a range of benefits to members of an organization:

Support for learning: Social networks can enhance informal learning and support social connections within groups of learners and with those involved in the support of learning.

Support for members of an organization: Social networks can potentially be used my all members of an organization, and not just those involved in working with students. Social networks can help the development of communities of practice.

Engaging with others: Passive use of social networks can provide valuable business intelligence and feedback on institutional services.

Ease of access to information and applications: The ease of use of many social networking services can provide benefits to users by simplifying access to other tools and applications. The Facebook Platform provides an example of how a social networking service can be used as an environment for other tools.

Common interface: A possible benefit of social networks may be the common interface which spans work/social boundaries. Since such services are often used in a personal capacity the interface and the way the service works may be familiar, thus minimizing training and support needed to exploit the services in a professional context. This can, however, also be a barrier to those who wish to have strict boundaries between work and social activities.

2.2.2 Social Networking for Business

Social networking websites are not just for individuals, businesses can also capitalize on the boom of social networking websites. Just as individuals build and maintain connections with each other on social networking websites, so can businesses build and maintain connections with their customers. Social networking websites offer several avenues for businesses to reach customers such as the usual banner advertising, creating a profile on the website, or creating groups and events.

Banner Advertising Banner advertising has long been a popular advertising method on the Internet. MySpace.com has banner advertisements running along the top and bottom of every page a user must access to view messages, comments, and others' profiles. Often these are flashy or involve an online game, making them hard to ignore. Facebook sells banner advertising, called "flyers," to its users who can post a room for rent or a notice of a group meeting. Facebook allows the purchaser of the advertisements to choose the network to which the flyer is displayed, allowing the advertiser to customize for its specific demographic. YouTube.com does not have many banner advertisements. Its advertisements are more subtle, such as company-sponsored videos.

Creating a Profile Just as individuals create profiles on social networking websites, so too can businesses. This would be a way for businesses to keep in steady contact with their customers. After all, the user already visits MySpace to read emails and to view friends' profiles. While the user is browsing his or her friend list, the likelihood that the user would click a company profile would be greater than the likelihood that the user would go through the trouble of entering a different website address to reach the company's separate website. Once at the company profile, the user could voice concerns, comments, and ideas while viewing blogs on product updates. Similarly, many companies have profiles on YouTube and upload videos so that users may view their favorite commercial spots or product demonstrations.

Creating Groups and Events One final option for business on social networking websites is the creation of groups or events centered on the company's product. Perhaps the company can create a group for people who like the product and open discussion forums so that users can talk about their experiences with the product. The company could also create an event on Facebook. This could be an event held on a campus that is sponsored by the company. The users of social networking websites are practically doing the advertising for the company.

2.2.3 Social Networking Functionalities

Identity Management: Identity management means sending a message to a public board or manipulating a public artifact without knowing exactly who will receive the message or notice the manipulation. Examples for functions enabling identity management are: user profile, group memberships.

Expert Search: Expert search identify implicit knowledge by searching the network according to different criteria (e.g. name, interests, company). Examples for functions enabling expert search are: search boxes.

Context Awareness: Context Awareness is the awareness of a common context with other people. This can be information about common contacts, about common interests. Context Awareness contributes a lot to creating common trust among the users, which is essential for a successful collaboration. Examples for functions enabling context awareness are: "How you're connected to ..."-box.

Contact Management: Contact management combines all functionalities that enable the maintenance of the (digital) personal network. Examples for functions enabling contact management are: tagging people, access restrictions to profile.

Network Awareness: The awareness of the activities (and/or the current status and changes of the latter) of the contacts in the personal network is supported by functionalities, too. These functionalities enable indirect communication via awareness. Examples for functions enabling network awareness are: News Feeds, "Birthdays"-box.

Exchange: Combines all possibilities to exchange information directly (e.g. messages) or indirectly (e.g. photos or messages via bulletin boards). Examples for functions enabling exchange are: Messages, photo albums.

2.3 PROS AND CONS OF SOCIAL NETWORKING

Social networking is a recent invention that has the Internet still at the edge of its seat due to its popularity with people. This is mostly because it really is for the people. Bringing every kind of social group together in one place and letting them interact is really a big thing indeed. Everything about it lies on the advantages and disadvantages of social networking, and what it can do for you.

These days the social networking sites have become extremely popular among the youth as well as the professional people. Keeping in mind, the growing popularity of these sites and the effect it has and the benefits that it brings along, it can be easily predicted that its popularity is sure to grow much more. Some of the sites such as Friendster and MySpace are the two most popular sites that aim to build special niche for people who share common interests and passions. Whereas social networking sites such as Twitter and LinkedIn are more professionally related and help the business men promote their businesses.

However, everything has a positive and negative side. Similarly, the social networking sites are also made up of their set of pros and cons.

2.3.1 Advantages

The social networking websites are more like the virtual meeting places where people can just chill and hang out with friends. They can discuss on different topics, share information, and exchange files and pictures. There are some people who use these sites as a platform to meet long lost friend and batch mates, whereas there are others for whom it becomes a bridge to meet their future love. You can either reconnect with your friends and family members or search a dating partner. Some people also use these websites to promote their blogs and services. The professional people uses this as a medium to raise their visibility, get noticed, tell about their company, service, and get more clients.

By joining different communities, now people can easily know about the latest news related to that community. You can easily get the experts advice on any challenge you may face related to their topic of interest. And the best part of this is that the advice is free. You don't need to pay a single paisa for it. Experts are always ready to give their advice and share information with you. These are just some of the several positive things that have contributed to make social networking really popular among people and spread smiles. It has made world a small pace and everyone can stay connected.

Low Costs: Definitely, it's cheaper to use online social networking for both personal and business use because most of it is usually free. While personal use is rather simple for anyone, the business functions are underestimated by many. In a social networking site, you can scout out potential customers and target markets with just a few clicks and keystrokes, adding a boost to your usual advertisements and promotional strategies. It lets you learn about their likes and dislikes, which is tremendous. If you want to fine tune your business, then this is the way to go, whether on a budget or not.

Builds Credibility: You definitely can gain the customers' confidence if you can connect to them on both a personal and professional level. Despite having to do a bit of work, it definitely pays off as you can be tapped for an offer if someone catches wind of your products or services. As long as you don't pursue them too aggressively, you will do well here.

Connections: You are friends with people who have other friends, and so on. There is potential in such a common situation. By using a social networking site, you can do what you can and get connected with these people to form a web of connections that can give you leverage if you play your cards right. As long as you give as well as you receive, then they will most likely stick with you. These connections are definitely valuable in the long run.

2.3.2 Disadvantages

Social networking helps in a lot of ways but the users have to really careful to stay secure and safe. Security is one of the topmost concerns of social networking sites that you currently use. This is mainly because the social networking sites allow you to display your personal information such as name, location, and email address. There are some people who always in search of a fake identity. If they get all the information about you on internet, they may use your identity for different type of illegal activities, which may cause you problems in future. It is always advisable to don't provide your entire identity information online. You may get many requests for adding as friends or joining different communities. Always try to know as much as possible before adding anyone as friend or joining any community. Because they may use fake identity or may involve in some illegal activities, which may spoil your image.

Lack of Anonymity: You are putting out information about your name, location, age, gender, and many other types of information that you may not want to let others know. Most people would say be careful, but no one can be certain at any given time. As long as people can know who you exactly are, then some can find ways to do you in.

Scams and Harassment: There is a potential for failure of security in both personal and business context. While many sites apply certain measures to keep any of these cases of harassment, cyber-stalking, online scams, and identity theft to an absolute minimum, you still may never know.

Time Consuming: If this is not your kind of thing that it would just be a waste of time for you. The key to social networking is that it is supposed to be fun, whether you are just doing it for kicks or clicking around for business purposes. That should be reasonable enough for anyone, but there are those people who don't see the point. For them, it can be a disadvantage.

Check Your Progress 1

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) What is Social networking?

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2) Explain how social networking is used for Business?

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3) List out various advantages of social networking.

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4) What are the disadvantages of social networking?

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2.4 SOCIAL NETWORK CATEGORIES

Social Network's can be categorised in a number of ways.

Profile-based social networks

Profile-based services are primarily organised around members' profile pages. Bebo, Facebook and MySpace are all good examples of this. Users develop their 'web space' in various ways and can often contribute to each other's spaces - typically leaving text, embedded content or links to external content. In addition, some offer their users the ability to embed video content from sites such as YouTube. These social networks tend to give the user the ability to choose where different content can be located on their social network pages.

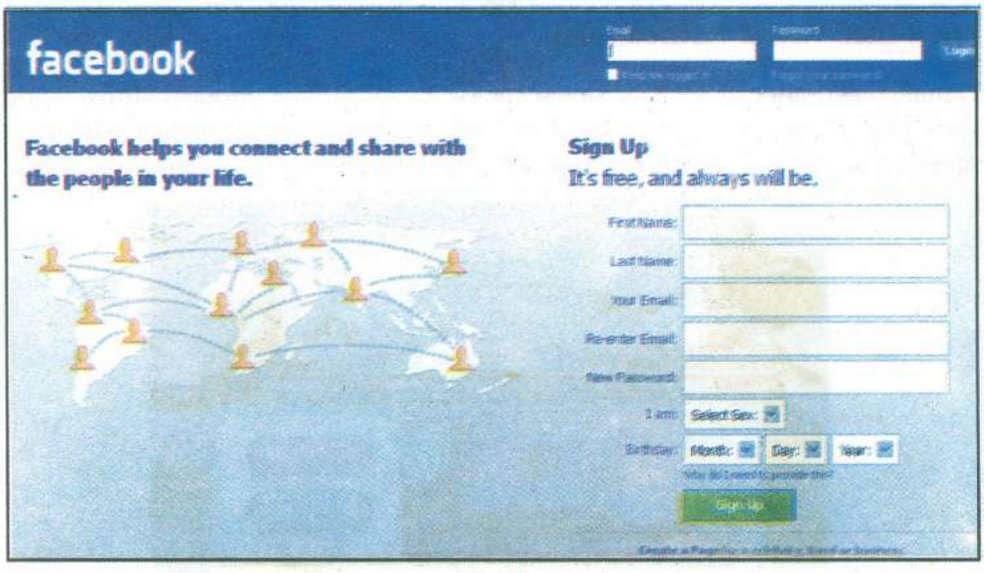

Fig. 1

Content-based social networks

With these services, the user's profile remains an important way of organising connections. However, they play a secondary role in the posting of content. Photo-sharing site Flickr (www.flickr.com) is an example of this type of service, one where groups and comments are based around pictures. Shelfari (www.shelfari.com) is one of the current crop of book-focused sites, with the members 'bookshelf' being a focal point of their profile and membership.

Fig. 2

White-label social networks

These sites offer members the opportunity to create and join communities - this means that users can create their own 'mini-MySpace's', small scale, personalised social networking sites about whatever the creator wants them to be about. One interesting example is WetPaint (www.wetpaint.com), which uses social wikis as its format to enable social networking. Groups of people can become members of a specific social wiki enabling them to join in with generating content on their chosen subjects and to interact with those who share a similar interest.

Fig. 3

Multi-User Virtual Environments

Gaming environments such as Runescape (www.runescape.com) and virtual world sites like Second Life (www.secondlife.com) allow users to interact with each other's avatars are a virtual representation of the user.

Fig. 4

Many social networking sites are now offering mobile access to their services, allowing members to interact with their personal networks via their mobile phones. Two examples are Facebook (www.facebook.com) and Bebo (www.bebo.com). Increasingly, there are mobile-led and mobile-only based communities emerging, such as Wadja (www.wadja.com).

Fig. 5

Micro-blogging/Presence updates

Many services let users post status updates i.e. short messages that can be updated to let people know what mood you are in or what you are doing. These types of networks enable users to be in constant touch with what their network is thinking, doing and talking about. Twitter (www.twitter.com) and Wayn (www.wayn.com) are examples.

Fig. 6

Social Search

Sites like Wink (www.wink.com) and Spokeo (www.spokeo.com) generate results by searching across the public profiles of multiple social networking sites. This allows anyone to search by name, interest, location and other information published publicly on profiles, allowing the creation of web-based 'dossiers' on individuals.

Fig. 7

Thematic Websites

The building of networks around areas of common interest is one way in which people can be brought together successfully. Sites like Netmums (www.netmums.com) also add in a local dimension by putting mums in touch with others in their area, where they can share advice, information, recommendations, information on schools and are able to network both at the local and national levels. In addition, there are also sites for those with a disability such as www.deafgateway.info which provides a place for deaf people to interact.

Fig. 8

Check Your Progress 2

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) Differentiate between profile based and content based social networks.

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2) Discuss about mobile social networks.

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3) List out the functionality of thematic websites.

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4) Explain Micro-Blogging.

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2.5 SOCIAL NETWORKING SITES

Some of the social networking services (FaceBook, YouTube, Flickr, Orkut, LinkedIn etc ...) are presented in the following section. These have been selected because of their individual focus. The selected sites are significant to demonstrate best practice models of social networks.

2.5.1 FaceBook

Facebook is one of the most popular profile based online social network in the world. It provides a platform for users to connect with friends and others who work and study around them. Facebook has grown exponentially, allowing users to share photos, videos, to share links, to meet new friends and to organize events, amongst others. It Supports both offline networks and creates new ones. It is used to connect people to one another, their place of employment, their region, and schools. It links networks together.

How to create an individual profile in FaceBook

Follow the steps below to create a profile.

1) Go to the facebook homepage www.facebook.com

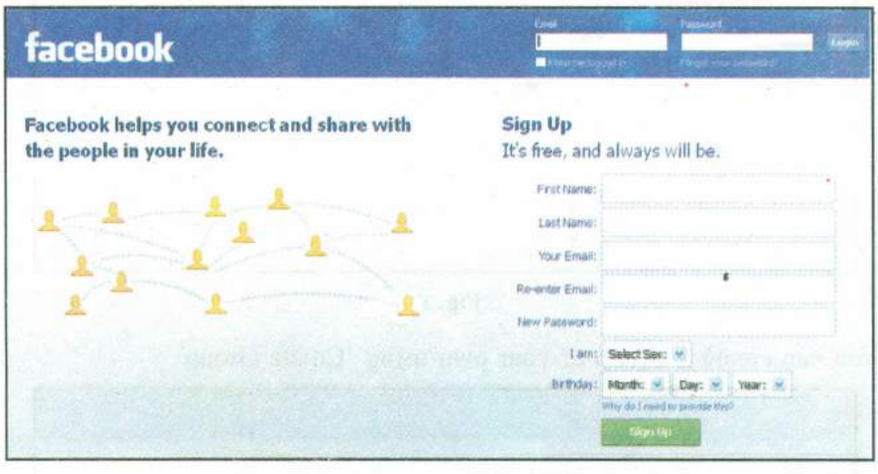

Fig. 9

2) Fill in your details in the 'Sign Up' section and click the green 'Sign Up' button.

3) Complete the details required for the security check and click the green 'Sign Up' button.

4) You will then be presented with a series of screens that walk you through adding friends, information and a photograph to your profile. For each step you can either choose to follow the onscreen instructions or skip the step if you don't wish to do it

5) Once these steps have been completed you will see the following screen. At this point you should also check your email account for the email from facebook titled 'Just one more step to get started on Facebook'. Open this email and click the link to complete the sign up process.

Fig. 10

6) You have now created your profile and it can be viewed by clicking your name on the left hand side next to your photo. You can then spend some time refining the information displayed on your profile - the facebook help function is also very useful and can be accessed by clicking the link at the bottom right of each page.

7) You can add Friends using 'Friends' option on the left hand side of the screen.

Fig. 11

8) You can create a Group of your own using 'Create Group'

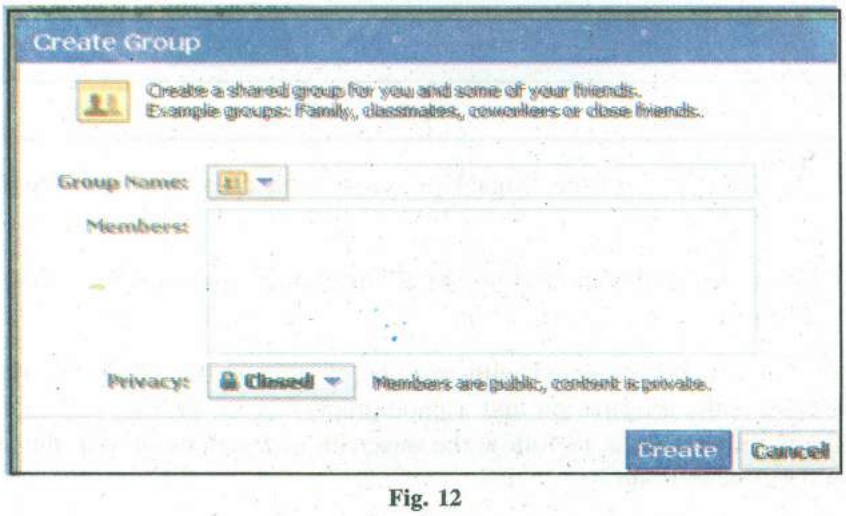

Fig. 12

2.5.2 YouTube

At its heart, YouTube (http://www.youtube.com/) is an online community designed for the sole purpose of allowing people to share their movies with others. YouTube is set up primarily as a place for people to interact with each other and share videos that they have created or that others have created which they think are cool, unique or hilarious.

How to get Started using YouTube

If you want to get the most amazing service from YouTube, you will first have to learn how to open an account.

1) Go to the YouTube homepage www.YouTube.com .When you visit YouTube for the first time, you will be presented with a selection of some of the most popular videos on the site that the editors want you to check out. We will skip over viewing all of these for now and move right along to the signup process. If you notice on the left of your screen there is a link that tells you to "Create Account." Go ahead and click that now.

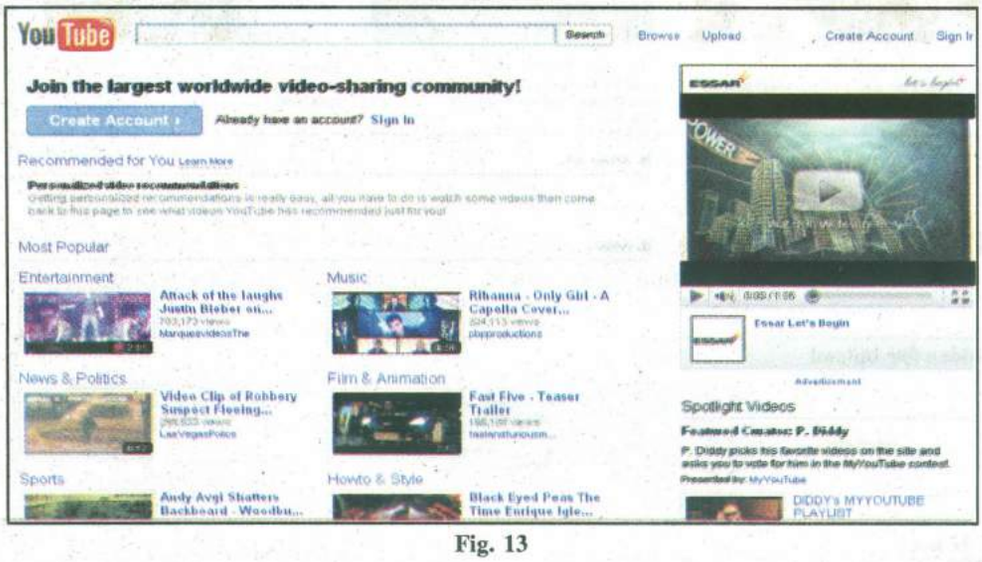

Fig. 13

2) As soon as you can see the "Get Started with your account", page, you can begin the process to open an account by filling the necessary details. Once you have entered all of your information on YouTube's signup page, you will be prompted to check your email for a validation link. This is the way that YouTube will validate your email address to make sure you are not creating a fake account. Just click on the link or copy and paste it into your browser and the signup process will be complete.

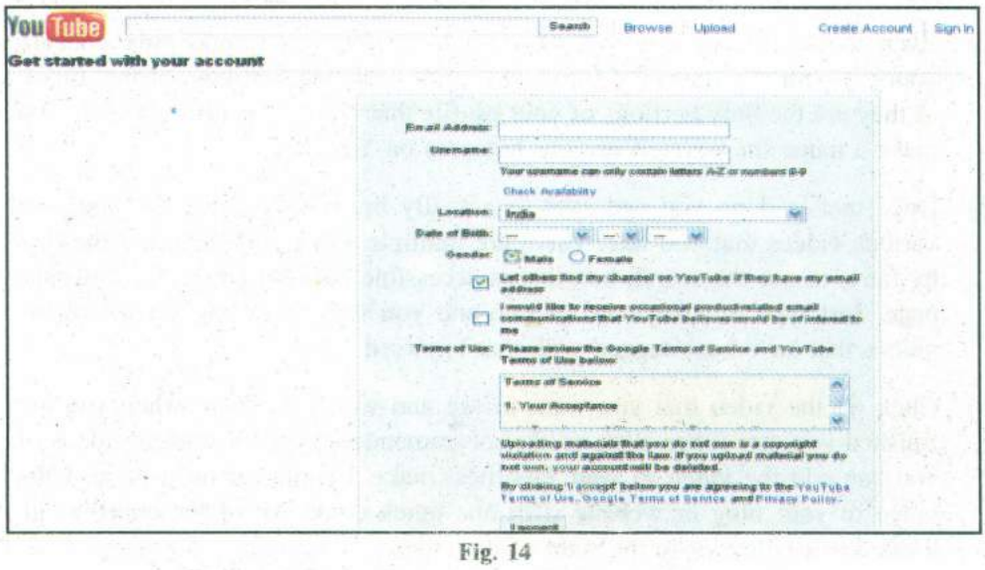

Fig. 14

3) Once you created an account you can start viewing, rating and commenting on other peoples' videos and upload videos. With a massive database filled with all kinds of full motion content, there are plenty of videos for you to view and browse. Click on 'All Categories' to select a category of your choice and click a video of that category. Once the video is over, you can rate it by clicking on a star directly below the video. You can save the video as a favorite or comment on the video.

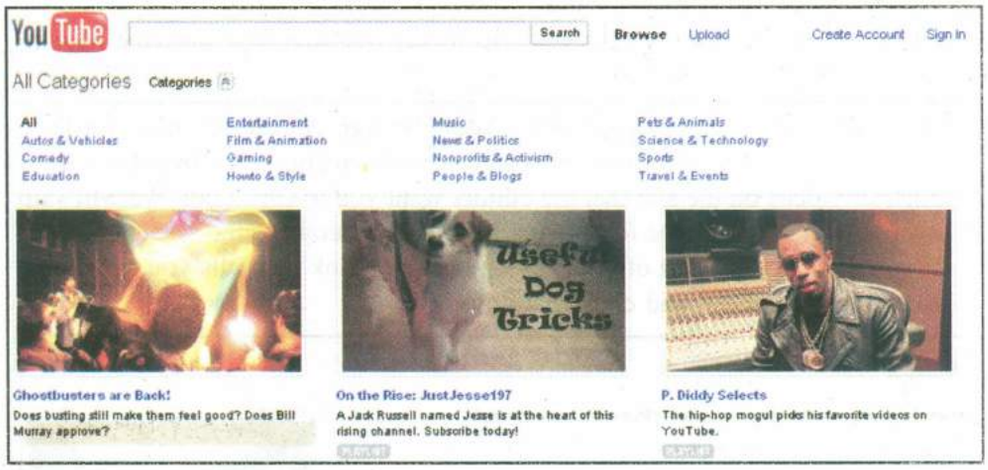

Fig. 15

4) A much better way to gain popularity on YouTube is to upload videos that you made or your company has made. Click on Upload video button.

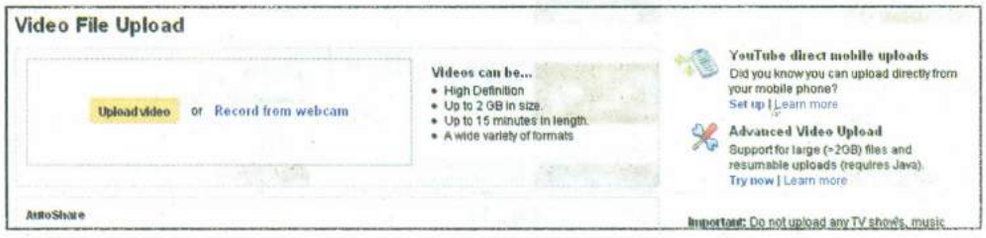

Fig. 16

Personalizing your profile in YouTube

1) Visit the main YouTube site itself. If you look to the top of the website, you will see a selection of links that start off with "Hello, (Your Username)." Just to the right of that is a link that says "My Account". Go ahead and click that right now so you can begin building your account profile.

2) Even though the page is full of clickable links, you should only concern yourself with the "Personal Info" and "Video Posting Settings" at this time - as they are the only portions of your profile that will be necessary to help you make a name for yourself or your business on YouTube.

3) Once that is done you can start to actually browse YouTube and look for various videos that you like. There are multiple ways to do this, but the best by far is to use the search box that is accessible on each and every YouTube page. Just type in a keyword or two and you will be taken to a list of the videos that have been tagged with that keyword.

4) Click on the video that you want to see and watch it. Then, when you are finished you can either click on the recommended links for related videos or you can add the video to your favorites, make a comment on it or post the video to your blog or website with one quick click. All of the controls are located just below or to the right of the video.

2.5.3 Orkut

Orkut is Google's social network that provides community and a way to build connections. In other words, Orkut is Google's version of Facebook and LinkedIn. If you have a Google account, you can sign right on and start building your profile. If not, it'll only take a minute to create an account and you'll be able to use it on all Google applications and beyond as many sites allow you to sign in with a Google ID.

Orkut works and runs just like any other social networking site. You create a profile, build a network of friends, and then interact with the community by posting updates about yourself, uploading photos and videos, and practically everything else that you normally do in a social networking site. Orkut makes it easy to find people who share your hobbies and interests, look for romantic connections or establish new business contacts. You can also create and join a wide variety of online communities to discuss current events, reconnect with old school mates or even exchange your favorite recipes. You can chat with your friends, find old friends, share photos, join communities related to your interests and more

Who you interact with is entirely up to you. Before getting to know an orkut member, you can read their profile and even see how they're connected to you through the friends network. To join orkut, simply sign in with your Google Account and you can begin to create your own profile right away.

Fig. 17

Like any other social networking website, Orkut has its own set of unique features that enable users to make new friends, maintain friends lists, send messages and scraps to friends, rate friends and off course create and join communities based on their interests where they can create forums and polls. One notable feature of Orkut is a facility for integrating Gmail's Instant Messaging service- GTalk. That means you can chat directly with your Gmail contacts right inside your Orkut profile page. You can also create community polls from time to time to ignite activities in your Orkut update stream. One feature which you may not like is that Orkut allows everyone to see your profile even if they are not in your list of Orkut friends. If you're a Facebook user, you might not like this feature. But if there is a particular person that you don't want to allow viewing of your profile, you can simply put them in your "ignore list".

Other features of the Orkut social networking site include profile customization, profile restriction, a "Crush List", and listing of friends by the order of their login time on the site.

Scrapping: Orkut allows users to send offline as well as online messages through its unique scrapping feature. Although earlier people were skeptical of the fact that these scrapbooks had unrestricted access to one and all, Orkut has upgraded the feature and now users can actually make their scrapbooks accessible only for their friends. This scrap booking feature has caught on with the younger generation, and for Orkut addicts, the number of scraps is has come to being a matter of pride for many.

Groups, Ratings, Fans and Testimonials: Orkut also allows users to manage their contacts by slotting them in distinct categories or levels that define your relationship with concerned people. These levels are 'haven't met', acquaintances, friends, good friends and best friends. In addition to this, users can create their own friend groups based on any criteria that the user prefers. Once you've categorized your friend groups you also get to rate each individual on their level of 'coolness' 'trustworthiness' and 'sexiness' on a scale of three. The coolness quotient is depicted with ice cubes, the trustworthiness with smileys and the sexiness with red hearts, on a scale of three cubes, three smileys and three hearts. In case you admire a person, you can become their fan, which will result in your name being shown in their fans list. The number of fans and other ratings are supposed to imply how popular a person is. Also Orkut allows its users to write testimonials for each other which are displayed on the user's profile. Off course the user has the right to accept or reject a testimonial according to his will.

Communities: The communities that one can create have no restrictions as far as the topics are concerned. Starting from conventional topics like food, countries, movies, music, poetry, books, television, celebrities etc. There are no limits as far as the topics are concerned which leads to redundancy. Often there exists more than one community about a single topic, which makes it a bit confusing.

User Lists and Teasers: Orkut users get to add people in their own personal lists which include: The crush list (users can add people in this list if they think they have a crush on that person), hot list (users can add people who they think are hot) and off course for the unwanted lot you have the ignore list to dump them.

Photographs, Videos, Blogs: Orkut allows users to upload their pictures, videos and also share links to their blogs on blogspot. Although the number of pictures one could upload earlier was restricted, once can now add as many pictures in their Orkut album as they want. Also the photos and videos can be locked for security and be made accessible only to selected friends according to the preference of the user. Being Google's brainchild, Orkut can also be linked with other Goggle applications like Picasa and even Gtalk.

2.5.4 Flickr

Flickr is an online photo management and sharing application on an online community platform. It was one of the first Web 2.0 applications that is still going strong, hosting over 2 billion images in their database. The site's popularity is heavily due to the organization tools and the ability to tag and browse photos by social classifications. Users can choose to share photos with the general public or keep them private. There are two basic functions to Flickr:

- Free online image hosting
- Photo sharing through peer-to-peer networking

Users can upload their digital images from their desktop to organize their photos in a centralized location and then choose to share them with the world.

Fig. 18

1) **Organization** - Images are organized by tags, sets, and groups. Flickr users can find images associated with the topic of their interest (such as a location name) through these forms of metadata.

2) **Sharing** - Photos can be shared with millions of users and targeted groups. Groups are people with common interests such as food, pets, events, destinations, activities or events, etc. If a topic of your passion is not found, you can start and create your own group.

3) **Control** - Photos can be stored as public or private.

4) **Interaction** - User friendly and compatible with various platforms and browsers. Flickr partners with third parties to offer streamlined services.

5) **Increase Web Presence** - Online photos are easily distributed. Flickr profiles often show up in organic search and do add to organic relevancy. You can also get some relevant traffic if uploaded pictures are tagged with the most desirable and relevant keywords.

How to Set Up an Account on Flickr?

1) Go to www.flickr.com

2) Create a Yahoo ID if you do not already have one.

Fig. 19

3) Click on Upload Photos

Fig. 20

4) Click on Step 1: Choose Photos and videos. You can select multiple pictures at a time. Select Public for the privacy setting (if you choose to share your photos with everyone on the web) and then click Upload.

5) Click on Describe Your Photos

6) Now add the Tile, Description, and Tag

- Title: Include the property name and locationo Description: Describe the PHOTO with location based keywords.
- Tag: insert main keywords. Make sure that keywords are in quote brackets if there are multiple words

7) Click Save This Batch

2.5.5 Twitter

Twitter is a social networking and microblogging service, owned and operated by Twitter Inc. that enables its users to send and read other users' messages called tweets.

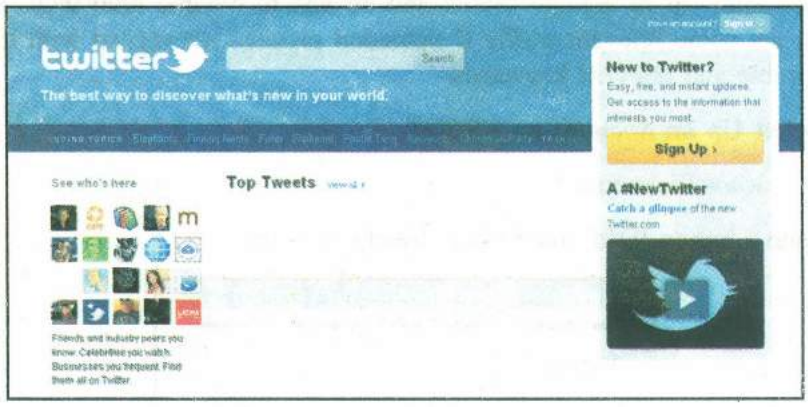

Fig. 21

The short format of the tweet is a defining characteristic of the service, allowing informal collaboration and quick information sharing .Twittering is also a less gated method of communication: you can share information with people that you wouldn't normally exchange email or IM messages with, opening up your circle of contacts to an ever-growing community of like-minded people.

You can send your messages using the Twitter website directly, as a single SMS alert, or via a third-party application such as Twirl, Snitter, or the Twitterfox add-on for Firefox.

Using Twitter

Visit the Twitter website and click "Join for free" to create your account. Consider using your real name as your user name to help your friends find you more easily. Once your account is created, login and click "Settings." From here, you can setup your account details, manage your password, register your mobile phone and IM account, configure how you receive Notices, upload your photo and customize your account's design.

Your Twitter page is located at twitter.com/your-username

You can "tweet" from your Twitter page by simply entering a message in the text field at the top of the page and clicking "Update."

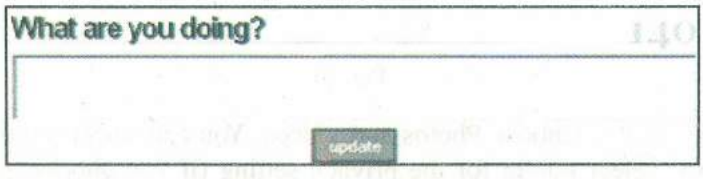

Fig. 22

Finding and adding friends to your "Twitterverse" is easy. Login to your account, visit your friends' Twitter pages and click "Follow" underneath their photo. If your friend's account is public, you will immediately start seeing their tweets on your page; otherwise your friend will need to approve you before you can see their updates.

2.5.6 MySpace

MySpace.com is one of a class of web sites that are termed "social networking" sites. People are given a web address where they can post information about themselves, and they can very conveniently contact other people on the same social networking site. Similar sites include Xanga.com, Friendster.com, and Facebook.com.

Fig. 23

After you sign up for MySpace, you will have to describe yourself and explain your interests so other members know stuff about you. There will be an "About Me" section where you basically write about yourself. After filling that out, there will be another self explanatory section labeled "Who I'd Like to Meet". This would be the basics of telling people about your self.

Soon, you will be to the point of where you fill out "Interests" and "Details." Interests are basically what your favorite books, music, televisions shows, and movies are. Details are how old you are, what your occupation is, and many other factual notations that you feel like providing to the internet community

Friends

Now that your site is up and running, it is time to find some friends. You most likely know someone that has MySpace, so it shouldn't be that difficult. Simply go up to the search function and look for people in your area. You can search your exact area and even your high school graduation year for old and existing friends.

Comments

Comments are little messages from friends that appear on your main MySpace page. Only friends on your friend list can post a comment to you. This keeps from random people you don't know from saturating your pages with stuff you might now want on your page.

Bulletins

A bulletin is just what it sounds like. It's a bulletin board that you can write a message on that everyone on your page can see. For example: It is your birthday and you are having a party next week. Post a bulletin on the bulletin board with the date, location, and time of the party, and everyone will know about it. It saves minutes on your phone and some money in the pocket.

Music

There are many MySpace pages of musicians that have their music on their site. Go to the music search to find your favorite band. Add the song that your want on your site to play and wallah! When a person goes to your MySpace, they hear your favorite bands song play.

Communication

There are four ways of communicating on myspace.

1) **E mail Messages –** These are private messages sent to and from member to member. They are good for talking to friends but very unreliable for making money.

2) **Bulletins –** Bulletins are the star performers for what we are talking about here. It's priceless real estate that we will be using to our benefit. Bulletins are really messages that are intended for everyone on your myspace friend's list to see.

3) **Blogs –** Blogs or 'Blogging' is another great source for getting targeted traffic to view what you have on offer. It's more like a newsletter format, where you keep readers up to date with specific detailed information with regular posts.

4) **Forums** – Forums are a great tool on myspace. Bulletins are similar to the forum; however a forum is more like active continuous conversation between different users. A bulletin is more like one person posting a comment and all responses are disabled.

2.5.7 LinkedIn

LinkedIn is a social network within the larger world of social media that is geared toward business. LinkedIn is very popular with those who are seeking work and trying to build their network of contacts so they can reach out to employers. LinkedIn is also popular as a way of marketing a business, because business owners can interact with those who are interested in their services by answering questions, participating in discussions and more.

Creating Your LinkedIn Profile

Signing up for and using LinkedIn is completely free to users if they so choose. The site does have some advertising, but it's not as invasive as other networking sites out there. All you need to get going and start learning how to use LinkedIn is to create a LinkedIn login to sign up for a free account. You can also upgrade to a paid LinkedIn membership.

Fig. 24

Components of a LinkedIn Profile

A LinkedIn profile has several main components:

Title

This part of your profile appears directly under your name. It's a one or two sentence summary of who you are or what you do. Use your key phrase(s) here, but construct it so your title makes sense. This is essentially who you are or who you'd like to be.

Summary

Your summary allows you to create a free-form description of your experience, expertise and your objectives. There are two sections - Professional Experience & Goals, and Specialties. Make sure this area is well written using proper grammar and is typo-free. Use short paragraphs with just one or two sentences each.

Experience

LinkedIn allows you to create a rather lengthy online resume with your current and previous work experience listed. The goal is to keep your readers engaged so they don't want to leave right away without finding out more about you.

Education

Since your LinkedIn profile is an online resume, this area is important if formal education is expected for what you do.

Additional Information

Just as it is with a paper resume, you'll want to consider adding information that can help make your profile stand out. Within your LinkedIn profile, you can add a photo of yourself, link to your Twitter account, your websites, awards and so on. You can also include your interests. Just don't list anything you wouldn't want a potential customer or employer to know about or you wouldn't want to be public information.

Recommendations

After you have established a LinkedIn profile and have built up some LinkedIn connections in your network, ask for recommendations from people who are familiar with your professional skills. The right recommendations can help your profile stand out and they might help you land more work. One of the best ways to get recommendations is to first write a LinkedIn recommendation for someone. During that process, the person you recommend will be asked to write one for you. To see how your LinkedIn profile looks to the public, click the link next to Public Profile on the Edit My Profile page.

Keep Your LinkedIn Profile Up to Date

Creating a LinkedIn profile is an easy undertaking, but it can prove to be more important to your at-home business than you may realize. Since this online resume is available around the clock to potential connections and even possible employers or clients, you will want to make sure it shines. You'll also want to make sure it's up-to-date. In fact, each time you update your LinkedIn profile, those in your network will be notified.

2.5.8 Tagged

Tagged is a social network that has been created to fulfill the necessity of finding new friends. All you have to do is join for free and you will have access to messages, friends, and chat rooms where you can meet new people that share your interests or just chat when you feel like it. Tagged Features:

- Create your own custom profile
- Add friends and leave comments and tags
- Join groups and enter discussions

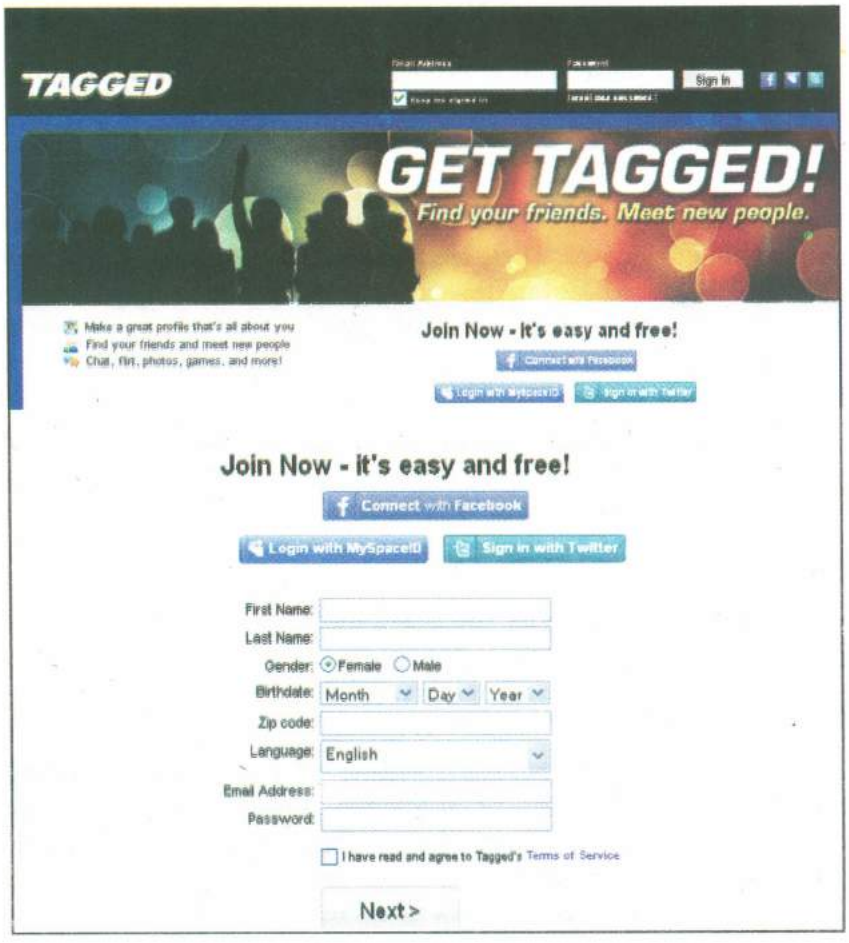

Fig. 25

If you desire you can browse through pictures so you can see if you recognize somebody, and you can also filter your search by gender, age, country, location and ethnicity. What is more, you can also check out some videos where you can search them by: most viewed, time, category and languages, and you may also upload your own videos. In addition, Tagged also offers advertisers the opportunity to place their ads on the site, they offer different types and sizes, and they provide a list for potential channel sponsorship.

2.5.9 Classmates

Classmates.com is a social networking site that helps members find, connect, and keep in touch with friends and acquaintances.

Fig. 26

1) Go to the website www.classmates.com.

2) Click the state or country you graduated in. An alphabet page appears. Click the letter that corresponds to your hometown. A city page opens up. Choose the city your school is in. Click the school. A free registration form appears.

3) Fill in the free registration form to continue. You will come to a homepage for your school. A list will appear half way down the screen that displays all the people now signed up with Classmates.com.

4) Search through the alphabetical list. You can search by last name or category. Categories include new members and parents of students. You can also specify what years you want to search.

5) Click on the name of someone you recognize. You are taken to a page displaying information about the person. You are also able to send the person an email from here. Click your browser's "Back" button to go back to the main list of names.

6) Click the down arrow next to the "Last Names" button to view names starting with another letter of the alphabet. You can also sort by first name if you don't remember someone's last name.

2.5.10 BharatStudent

Bharatstudent.com is a social utility that brings together all the young Indians living across the globe. It is for every Young Indian who is a student or a non-student, fresh graduate, a working professional or an Entrepreneur, and is focused on providing comprehensive solutions for any personal and professional issues.

Fig. 27

To join Bharatstudent.com, one has to be of Indian Origin and can join into a school or work network, or they can join a regional network. Members can grade their schools or work places, write reviews, connect with old friends, make new friends, share interests, join groups, send messages, write Blogs, share photos and watch .

Features of BharatStudent.com

GenXZone Gen X Zone is for people who believe in them and are at an edge over others. Gen X Zone consists of Boy Zone, girl Zone, Game Zone and live Radio.

CafeBharat Cafe Bharat is place where you can check for the latest film news, gossips, photo galleries, wallpapers, trailers and event videos.

Study Zone Study Zone consists of two separate sections viz: study India and study abroad. Study India sections provide all the information you need about various programs in various institutes and guidance on how to apply. Study abroad section is intended to guide the estimated 1 million Indian students aspiring to study abroad in the critical and time-consuming stage of identifying and selecting a short-list of institutes for higher education. Our online platform brings efficiency and a close sense of community of Indian Students that is scattered all around the world. The database of Indian students studying in major universities will be of great help for those who aspire to study in the US, Canada, Australia, UK and elsewhere. We guide the students in identifying schools that provide good education, provide financial assistantships, while being affordable.

Services Apart from the all the above features bharatstudent.com provides services such as Classifieds, Greeting, and store. In Classifieds the user can look for various categories and hence can narrow down to his perusal. In the greetings section the user has the chance to select among various available greeting cards and can greet his/her friends with them. In Store the user has the option of shopping various products such as books, DVD's etc... Online.

Check Your Progress 3

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) Explain the advantages of using FaceBook.

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2) Discuss about various features of YouTube.

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3) List out the benefits of using Flickr.

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4) What is a tweet? Explain the features of twitter.

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5) Explain the functionality of LinkedIn.

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2.6 SECURITY ISSUES

As wonderful as social networking sites can be, there are some disadvantages associated with using them. Since you can't physically see the people you are interacting with, you only have the image the other person projects to tell you whether they are trustworthy or not. Online relationships, for want of a better expression, lack the kinds of details we get when we meet someone face-to-face. Increased use of social networking sites for business purposes brings new security challenges to enterprises. The Following are some of the security threats enterprises should be mindful about when using social networking sites.

Malware

Social networking sites are vehicles for malicious attacks to spread malware, For Example Fake Twitter invitations that have been used to spread a mass-mailing and malicious worm. Instead of pointing to an invitation link, the Tweet directs users to a malicious attachment that gathers e-mail addresses from compromised computers and spreads by copying itself into removable drives and shared folders.

Spam

A Technique of social networking site abuse is Sender's account is hijacked and sends messages to everyone who is "connected" to the sender. When the receiver navigates to the message in the message, malware will try to load.

Targeted attack through employees

All the personal information the sites share can be easily collected by employees of the site with bad intentions and be used in sophisticated social engineering attacks.

Phishing

Social networking sites are used to launch attacks that aim to lure victims to a malicious and fake login page to obtain the user's personal login details. This information could be used for various cyber criminal activities, such as breaking into the users' online banking accounts or enterprise accounts.

Identity Hijacking

A computer hacker can choose to impersonate a reputable person in order to gain access to that individual's business contracts or acquaintances. Individuals who experience identity hijacking may also start receiving a large amount of spam, or discover that the people who appear on their "friends" list are receiving e-mails with inappropriate content.

2.7 LET US SUM UP

This unit deals with the "Social networking". Social networking is the grouping of individuals into specific groups, like small rural communities or a neighborhood subdivision. Although social networking is possible in person, especially in the workplace, universities, and high schools, it is most popular and easy in online platform. When it comes to online social networking, websites are commonly used known as social sites. Social networking websites function like an online community of internet users. Depending on the website in question, many of these online community members share common interests in hobbies, religion, or politics. Such networking helps in the development of public opinion and is the most common method of sharing or exchanging views.

2.8 CHECK YOUR PROGRESS: THE KEY

Check Your Progress 1

1) Social networking is all about communication. People with common interests are able to share information with each other via a huge variety of social networking sites, sites created specifically to make sharing, communicating, and creating information as simple and efficient as possible. A social networking site is generally focused on building online communities of people who share interests and/or activities, or who are interested in exploring the interests and activities of others. The best known social networks exist on the World Wide Web and offer a variety of ways for users to interact, including site email, and messaging, both public and private.

2) To reach the maximum number of potential customers, the organizations make advertising campaign. Social networking allows like minded people on the internet to interact with each other. This provides a great opportunity to the business organization to interact with so many potential customers at a single place. For a business organization, it is much easier to target a section of population and increase awareness of its product. Online social network sites allow us to connect to various users. It provides us with certain web space with our profile. This allows us to make our profile attractive and attract other users of the online social network. These new contacts will in turn recommend our profile to their contacts in their online social network. Thus a chain of contacts is created which easily connects to us. This provides easy marketing to a large number of people without much cost.

3) The individuals joining such Social Networks gain several advantages.

- **Job opportunities:** The individuals in the Social Networks can get better jobs through personal contacts. Even the Businesses can get new orders and opportunities through personal contacts of its employees.
- **Learning:** The Businesses and the individuals gain opportunities to learn new technologies and Business strategies from the experts and contacts for their own growth. Learning also aids in further improving the Business skills and expertise which in turn generate reputation.
- **Marketing:** The Social Networks help in gaining word-of mouth advertisement which is still considered the best form of advertisement. This does not involve any investment for gaining a huge reliable customer base.
- **Alliances and referrals:** The Social Networks also provides opportunities to form strong alliances and referrals. These opportunities help to a great extent in personal and Business growth.

4) Social Networking Sites has some disadvantages. The most glaring disadvantage of social networking sites is the risk of identity theft and fraud. The personal information of users can be used by dubious people for illegal activities. Information like the e-mail address, name, location, and age can be used to commit online crimes. Also, many people pretend to be someone else and prepare their online profiles with false information, so as to dupe unsuspecting users. Another cause of concern is cases of online harassment and stalking. Social networking sites have the potential to spread Anti-Social messages. Copyright Infringement is another major disadvantage.

Check Your Progress 2

1) In profile-based social networking sites such as Facebook and MySpace, services are organized around the profile pages of its members, which contain personal information about the individual and which may include photos and other details. In content-based networking sites, the main goal of the users is to share content, photos, and videos. Popular examples of this type of social networking site are Flickr and YouTube.

2) Mobile social networking is social networking where one or more individuals of similar interests or commonalities, conversing and connecting with one another using the mobile phone. Much like web based social networking, mobile social networking occurs in virtual communities. The main advantages of mobile social networking are its ease of use and the ability to send and receive quick messages to family and friends without logging into an Email program.

3) A thematic website is a mini website that focuses on a particular subject that we want to emphasize on a current website. It allows more efficient referencing and thus ensures better visibility. The main objective of a thematic website is to bring out specific information of our original website in order to help the search engine robots find it more easily. If any original website contains a lot of information, it can be difficult for the search engines to target a specific piece of information. Internet thus offers to create a new website in which specific information on products or services will be emphasized. When Internet users make a specific search, thematic website will appear more easily in the top results. Thematic website will also have links that will directly lead to the original website to ensure greater visibility and traffic.

4) Microblogging is a combination of blogging and instant messaging that allows users to create a short message that is posted on their profile. Websites such as Twitter also allow these messages to be delivered on cell phone, which allows micro-blogging to provide a quick way to communicate with a group of people. Microblogging is a web service that allows the subscriber to broadcast short messages to other subscribers of the service. Microposts can be made public on a Web site and/or distributed to a private group of subscribers. Subscribers can read microblog posts online or request that updates be delivered in real time to their desktop as an instant message or sent to a mobile device as an SMS text message.

Check Your Progress 3

1) Facebook is a social network service. Users can create profiles with photos, lists of personal interests, contact information, and other personal information. Users can communicate with friends and other users through private or public messages and a chat feature. They can also create and join interest groups and like pages. One of the main advantages that Facebook provides for individuals is that it allows them to easily connect with their friends and family wherever they might be. Facebook also has some advantages for businesses. Since

Facebook is a giant network of people, businesses can advertise their business to specific groups that would most likely be interested. Those people, if they liked the product, would in turn tell their friends about the company. Another advantage is that the cost of advertising is very low. Businesses can save a good amount of advertising budget by using Facebook. Facebook also helps business to develop relationships with their customers and raise the visibility of their company. Facebook is a very good site for both individuals and businesses as it helps them to connect and grow.

2) YouTube is most popular video sharing website and it has millions of users all over the world. It offers wide range of videos and people can view them for free. There are a lot of features of YouTube which have been analyzed by the business owners and they are using this platform for marketing their products and services as to elevate the prospective customers. This site is also helpful in getting socialize with people across nation as you can leave a comment on videos watched by you and you can even share the videos with others. You can upload the video on this site and make them available to public. You can record anything such as skits, plays and video related to nature and upload on the site. This site can also be used for education purposes as there are a lot of tutorials available which you can find by making a search in YouTube search bar. You will get a list of links and you can click on any of them. You will also get the information about related videos.

3) Flickr is one of the most popular image storing and sharing sites on the Web. Flickr is all about sharing content with family, friends and people from all around the world with following features

- Upload photos via email
- Share your photos
- View your contacts' photos
- View your contacts' comments
- Explore photos from the Flickr community
- Search for specific photos
- Mark photos as favorites
- Post comments on your contacts' photos

4) A tweet is a post or status update on Twitter, a microblogging service. Twitter is a free social networking and microblogging service which enables to broadcast short messages (limited to just 140 characters) to your friends, family, co-workers or so called "followers" in real-time. The following are the features of twitter. Twitter allows you to send and read other users updates (known as tweets). You can restrict delivery to your circle of friends (delivery to everyone is the default). You can use third party application such as Tweetie, Twitterrific, and Feedalizr to send Twitter messages. You can search for people by name or user name, Import friends from other networks, or invite friends via email

5) LinkedIn is a business-oriented social networking site. The purpose of the site is to allow registered users to maintain a list of contact details of people they know and trust in business. The people in the list are called Connections. It can be used to find jobs, people and business opportunities recommended by someone in one's contact network. Employers can list jobs and search for potential candidates. Users can post their own photos and view photos of others to aid in identification. Users can now follow different companies and can get notification about the new joining and offers available. LinkedIn also allows users to research companies with which they may be interested in working.

2.8 SUGGESTED READINGS

- Multimedia Communications: Applications, Networks, Protocols and Standards, Fred Halsall, Addison Wesley Publications
- Multimedia Communications: Protocols and Applications, Franklin F Kuo, J.Joaquin Garcia, Wolf gang Effelsberg, Prentice Hall Publications.
- www.socialnetworking.in
- www.whatissocialnetworking.com

UNIT 3 ADVANCED SEARCHING TECHNIQUES

Structure

3.0 INTRODUCTION

Web is the most appropriate medium to use and to find your information. There are hundreds of millions of pages available, to present information on an amazing variety of topics. When you need to know about a particular subject, how do you know which pages to read? The best and fastest way to find information is a Web search. There are several very useful techniques for finding the most reliable information available on web. Most internet searches are conducted using a tool called a search engine. Internet search engines are special sites on the Web that are designed to help people find information stored on other sites.. There are many search engines and many are good at searching for one kind of information but not another. The more powerful search engines, like Google, AltaVista and Yahoo!, are quite versatile. Regardless of the search engine you prefer, there are some methods of refining searches that are common to most engines. There are also techniques that are unique to the particular search engine you're using so you can't assume that the information presented here will always provide the most efficient search. This section provides various techniques related to searching for information on the engine that you're using.

3.1 OBJECTIVES

After studying this unit, you should be able to:

- Understand how search engine works;
- Identify effective searching tools;
- understand and gain experience of structuring effective searches;
- Use search engines and directories to locate information on the Internet related to a specific subject or topic; and
- Gain hands-on experience of effective searching.

3.2 SEARCHING THE WEB

The Internet contains a vast amount of information covering a wide variety of topics. While you can type in URL addresses to your favourite websites and use the embedded hyperlinks on those websites to get to other websites, these methods have limited use in accessing the Internet or searching for specific information from websites you have not yet visited. To access the wider web, you must use a search engine. A search engine permits you to search for keywords on websites throughout the web. Without search engines, looking something up on the Internet would be almost impossible. The following section traces effective searching strategies

3.2.1 Tools for Searching the Web

There are many search tools available: search engines, subject directories/virtual libraries, invisible (deep) web databases, Meta search engines, etc. A search engine is a keyword searchable database of Internet files that uses a software program to continually scour the Web. The resulting information is then indexed and stored in its database. Some of the best Search engines includes: Google, AlltheWeb (FAST), AltaVista etc.

Fig.1: A snapshot of AlltheWeb website

Fig 2: A snapshot of AltaVista website

A subject directory (web directory) is a searchable collection of Web pages gathered, selected and organized by human editors into hierarchically subject categories. A virtual library is a web directory that includes highly selective links, chosen mostly by librarians.

Web directories cover a much smaller proportion of the Web but using them will bring you more highly relevant results. The largest web directories index a few million pages compared with the billions of pages indexed by some major search engines. Remember that the web directories – like the search engines – do not search the Web directly. Instead, they search their own databases of indexed Web pages. Some search engines are in fact hybrid search tools because they are both search engines and web directories. (Google, for example, is a search engine and a directory, powered by Open Directory Project).

Some widely used web directories are: Google, Open Directory Project (dmoz.org),Yahoo!..Popular virtual libraries include: Librarians, WWW Virtual Library.

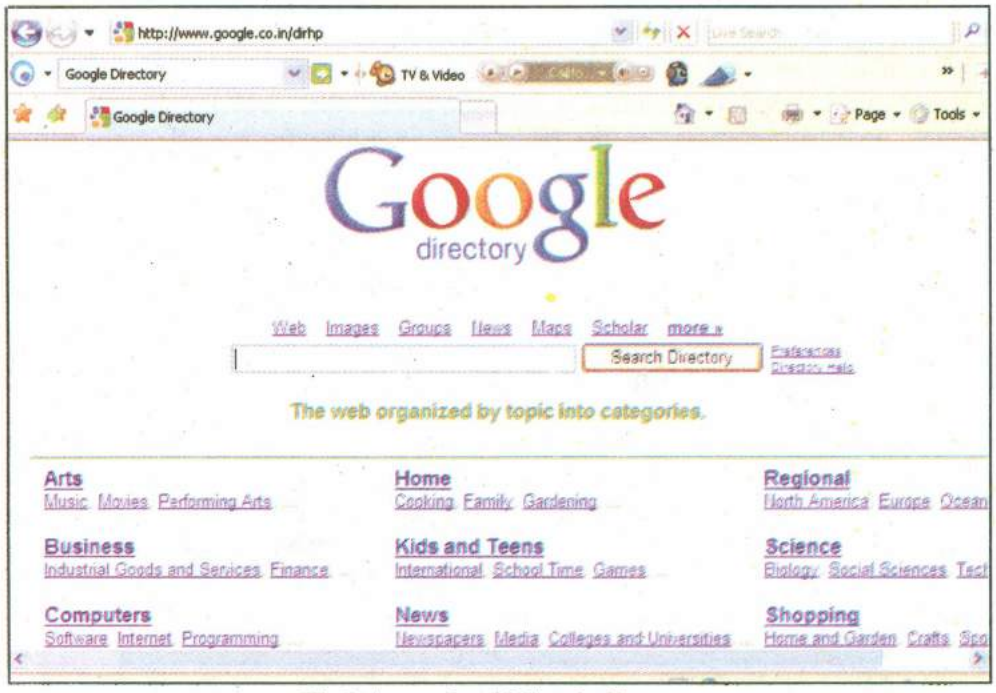

Fig.3: A snapshot of Google directory

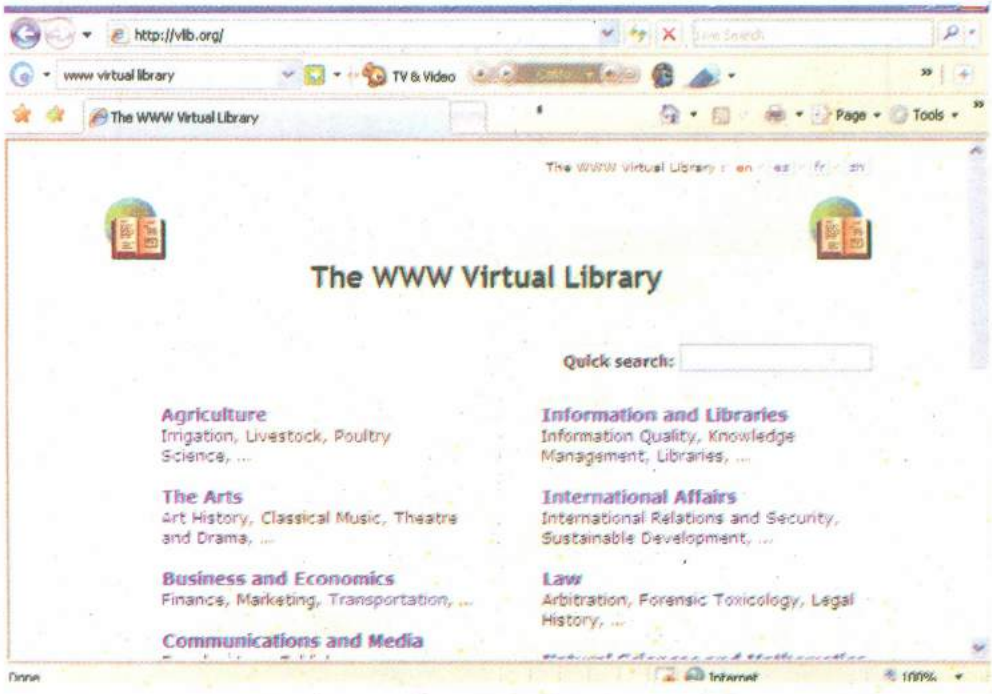

Fig. 4: A snapshot of Virtual Library website

The so-called invisible (deep) web is a collection of online information stored in live databases accessible on the Web but not indexed by traditional search engines. Examples of excellent invisible web databases are:

- omplete Planet
- Resource Discovery Network

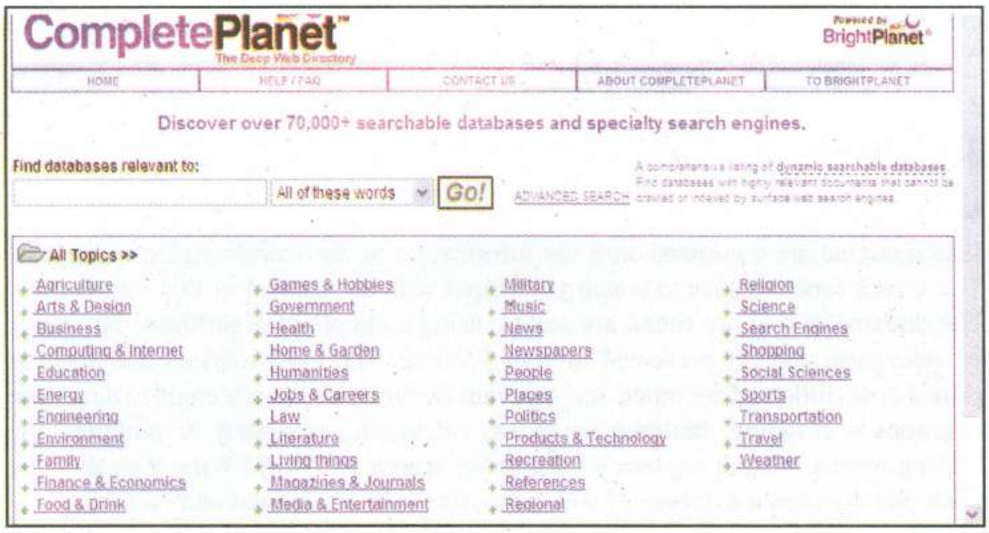

Fig. 5: A snapshot of Complete Planet

A Meta search engine (also known as metacrawler or multithreaded engine) is a search tool that sends your query simultaneously to several search engines, web directories and sometimes to the so-called invisible (deep) web. After collecting the results, the Meta search engine removes the duplicate links and – according to its algorithm - will combine and rank the results into a single merged list. Excellent meta search engines are:

- Dogpile
- HotBot
- IBoogie

Fig. 6: A snapshot of dogpile

Fig. 7: A snapshot of iBoogie website

3.2.2 How do Search Engines Work?

Words or combinations of words that you have entered in the search box of a search engine are compared with the information in the search engine's database. The search function tries to match your input with the content of this information. The documents that are found are sorted, using a couple of algorithms, but surely on relevance, and are presented in your browser. The most relevant document is shown first, followed by other, less relevant documents. Search engines have four functions – crawling, building an index, calculating relevancy & rankings and serving results. Search engines do not really search the World Wide Web directly. Each one searches a database of web pages that it has harvested and cached. When you use a search engine, you are always searching a somewhat stale copy of the real web page. When you click on links provided in a search engine's search results, you retrieve the current version of the page.

Search engine databases are selected and built by computer robot programs called spiders. These "crawl" the web, finding pages for potential inclusion by following the links in the pages they already have in their database. They cannot use imagination or enter terms in search boxes that they find on the web. If a web page is never linked from any other page, search engine spiders cannot find it. The only way a brand new page can get into a search engine is for other pages to link to it, or for a human to submit its URL for inclusion. All major search engines offer ways to do this. After spiders find pages, they pass them on to another computer program for "indexing". This program identifies the text, links, and other content in the page and stores it in the search engine database's files so that the database can be searched by keyword and whatever more advanced approaches are offered, and the page will be found if your search matches its content. Many web pages are excluded from most search engines by policy. The contents of most of the searchable databases mounted on the web, such as library catalogs and article databases, are excluded because search engine spiders cannot access them. All this material is referred to as the "Invisible Web" (what you don't see in search engine results).

3.3 BASIC SEARCH OPERATORS

We can simply search by writing the word we want to know about and that's it. We eventually find something useful. Have you ever noticed the amount of time you waste by doing this? This section describes how to perform sophisticated searches of online information that increase your chances of finding what you want in much less time.

3.3.1 Boolean Search

Boolean Logic is one of the most useful features in defining a search. The Boolean operators are: AND, OR, NOT are in many ways refines your searches.

AND

If you want a document that contains all of your keywords, use the capitalized word AND between keywords. The engine will only find documents that have both words. Here's an example:

Example: fly AND fishing

Search Results: WebPages that include both of the words containing both fly and fishing

OR

If you want to broaden your search to find documents that contain either of the keywords, use the OR operator between words. This is very useful when searching for terms that have synonyms.

Example: web OR designer

Search Results: WebPages that include either of the words or both them on the same webpage containing web or those containing designer.

NOT

Using the capitalized NOT preceding a search term eliminates documents that contain that term.

Example: web NOT spider

Search Results: WebPages that include the first word but not the second word on WebPages that contains web but not spider.

3.3.2 Truncation Search

Truncation Operators are used by search engines different ways. Most requires a minimum number of initial characters and the wildcard will often take the place of a limited number of characters. A wildcard character is a keyboard character such as an asterisk * or question mark '?'that you can use to represent real characters when you search for files or folders. Wildcard characters are often used in place of one or more characters when you don't know what the real character is or don't want to type the entire name. The symbol "*" is used to replace any single character, either inside the word or at the right end of the word. Note: The "*" cannot be used to begin a word.

Truncation Operator *

Wildcard operator for strings; matches any string.

Example: micro*

Search Results: WebPages that contain microprocessor, microcomputer would be found.

Example: Wom*n finds "woman", "women;" ..etc

"*re" finds "tare', "tire", "tyre", etc.

Truncation Operator?

Wildcard operator for a single character; matches any one character

Examples: Kir?land

Search Results. WebPages that contain Kirtland, Kirkland etc.. Would be found.

The symbol "?" is used as a right-handed truncator only; it will find all forms of a word.

Example: Reengineeing? Finds "reengineer", "reengineers", and "reengineering", etc.

3.3.3 Phrase Search

When using search terms containing more than one word, enclosing them in quotation marks, returns documents containing the exact phrase only. Here's an example: When searching for information on gun control legislation, using "gun control" eliminates documents that contain the words gun and control, but not in that order; possibly in entirely different paragraphs and maybe not even relating to the topic of gun control.Use parentheses to clarify relationships between search terms. Example: (television or mass media) and women. This search looks for both "television and women" and "mass media and women".

3.3.4 Other Search Operators

"+" search

A '+' symbol preceding a word (with no space between) requires that the word be present in documents. If a common word is essential to getting the results you want, you can include it by putting a "+" sign in front of it.

Example: World War +I

"-" search

A '-' symbol preceding a keyword ensures that the word is not present in returned documents.

Example – dinner -movie

Meaning – Messages that contain the word "dinner" but do not contain the word 'movie"

"~" search

(~) search synonym:

Example: ~food

Return the results about food as well as recipe, nutrition and cooking information

'." search

(.) a single-character wildcard:

Example: m.trix

Return the results of m@trix, matrix, metrix.....

Check Your Progress 1

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) List out the functions of a search engine.

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2) Which type of search will find matches containing an exact sentence or part of a sentence as specified by a user?

   i) Keyword search

   ii) Phrase search

   iii) Concept search

   iv) Boolean search

3) Differentiate between Meta Search engine and Subject directory.

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   .....

   .....

   .....

4) The Search **salsa-dance** Finds Pages Containing –

   i) The word salsa and the word dance

   ii) The word salsa OR the word dance

   iii) The word salsa but NOT the word dance

   iv) Neither the word salsa nor the word dance

5) Match the following terms to their meanings:

i)	Dogpile	A) subject directory
ii)	Yahoo!	B) Meta search engine
iii)	Google	C) Boolean operator
iv)	+	D) wildcard
v)	%	E) search engine

3.4 GOOGLE: BASIC SEARCH

In the last few years, Google has attained the ranking of the #1 search engine on the Net, and consistently stayed there. Let's learn more about Google's search engine. Basically, Google is a crawler-based engine, meaning that it has software programs designed to "crawl" the information on the Net and add it to its database.

Fig. 8

3.4.1 Google Search Strategies

The following things make pages appear at the top of your search:

- If your search terms appears in the title of the web page
- If your search terms appear in links that lead to that page
- If your search terms appear in the content of the page (especially in headers)

When you choose the search terms you enter into Google, think about the titles you would expect to see on these pages or that you would see in links to these pages. The more well-known your search target, the easier it will be to find.

Fig. 9

Enter a single word

Enter the one word that you associate with your topic. Typically this will return too many results (unless the term is a commercial trademark and you are looking for the company's web site).

Enter several words

When you enter more than one word, Google assumes you want pages with ALL of these words present. This also often returns too many results. The pages you get will have all the words in any order, and they may or may not be near each other. For example, if you enter a first and last name, you may get some pages of the person you seek, but unless they are very well known, you will also get pages where a list of names contains one person with the first-name and another person with the last-name.

Fig. 10

"I'm Feeling Lucky"

If you use Google to find sites that you know are popular (such as the Microsoft Web site), you can click the "I Feel Lucky" link to bypass the search results and

go straight to the top of the list. While this works well for commercial sites, it is less certain for other searches.

Fig. 11

3.4.2 Google Basic Search Operators

Operator 'OR' or '|'

Use the "OR" word or "|" character to tell the system that either one word or the other must appear in each item in the search results. For example, if you type: bones or skeleton, (bones | skeleton) either the word "bones" or the word "skeleton" will be in the items found. Combining two words with OR yields more items than if only one of the words (for example, bones) were searched.

Fig. 12

Operator '+'

Google ignores certain "common words" (called stop words) because they appear too frequently in pages and would thus pull up too many pages that would not satisfy the search request properly. Using the "+' sign will force Google to treat the word following it (without a space in between) as a valid search term. For example, Google tells you that if searching for "Ramayan Episode 1" you should use [Ramayan Episode +1].

Fig. 13

Operator '-'

This special character is much more useful than the "+" sign. It tells Google to omit pages that have a particular word or phrase in it. Often words have multiple meanings and you end up with results that include pages that have nothing remotely to do with what you were interested in. For example, let's say that you were interested in learning about virus, with the exclusion of computer virus since you already know about that. The following would satisfy that search:[virus -computer]

Fig. 14

Operator '~'

By placing a "~" sign (called a tilde) right in front of a word (no space in between), you are instructing Google to search not only for the word following the tilde, but also its synonyms. Without doing this in certain types of searches you will miss many valuable sites. Let's say that you want to find sites that offer a primer on alternative energy. You know that the word "primer" is not the only way to say "an introduction to" or "the basics of' but you don't want to try to think up all the synonyms and build a massive OR query. So, you use the tilde like this:["security" ~primer] .You should execute this query by clicking the link to study the results. Looking at just the first page, you'll see pages that use the words, "basics', and "introduction". Although not "primer", the sites appear to be what we are looking for. Using just one word like "primer" would have missed many sites of interest.

Fig. 15

Operator '*'

You can use the asterisk "*" as a wildcard in your search query. It means that wherever there is an asterisk, the search will accept any word.

This works well if you know a phrase but forgot one of the words For example, let's say you know there is a story called Little something Riding Hood, but for the life of you, you cannot remember what that missing word is. You can search for it like this:

"little * riding hood"

Fig. 16

Operator " " (Enter a phrase in quotes)

This is the most effective way to limit a search. Google will return pages with these words in this exact order. This is good if you are searching for a specific phrase ("cyber security tools") a name, ("Gopal Sharma") or if there is a sentence that you would associate with the page you seek ("How to use PowerPoint").

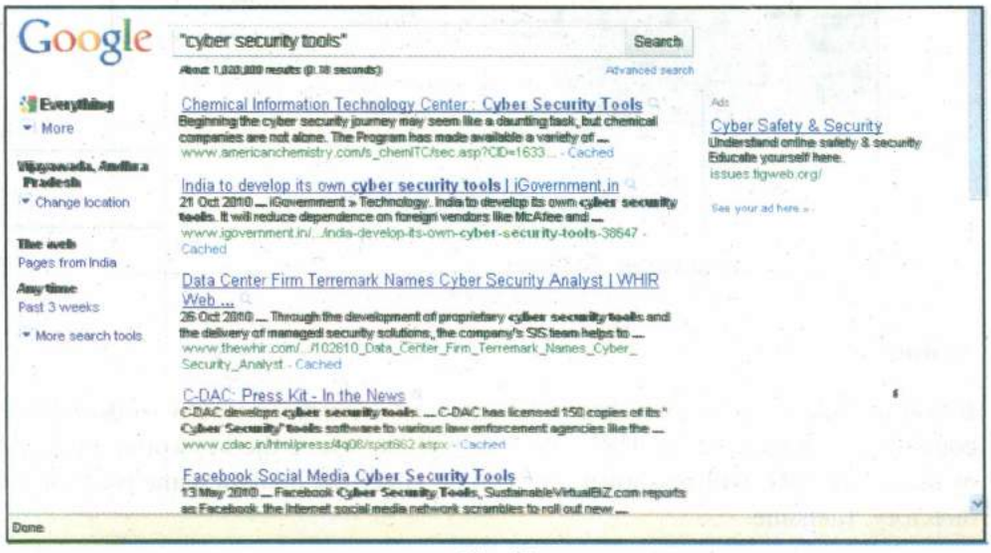

Fig. 17

3.5 GOOGLE: ADVANCED SEARCH

3.5.1 Advanced Operators

In order to find more detailed information from the Web site Google offers advanced search operators to make your searches more precise and to obtain more useful results. Google supports several advanced operators, which are query words that have special meaning to Google. Typically these operators modify the search in some way, or even tell Google to do a totally different type of search. They include allintext, allintitle, allinurl, define, filetype, info, intext, intitle, inurl, site, numrange, daterange etc.

Allintext

If you start your query with allintext:, Google restricts results to those containing all the query terms you specify in the text of the page. For example, [allintext: travel packing list] will return only pages in which the words "travel", "packing", and "list" appear in the text of the page.

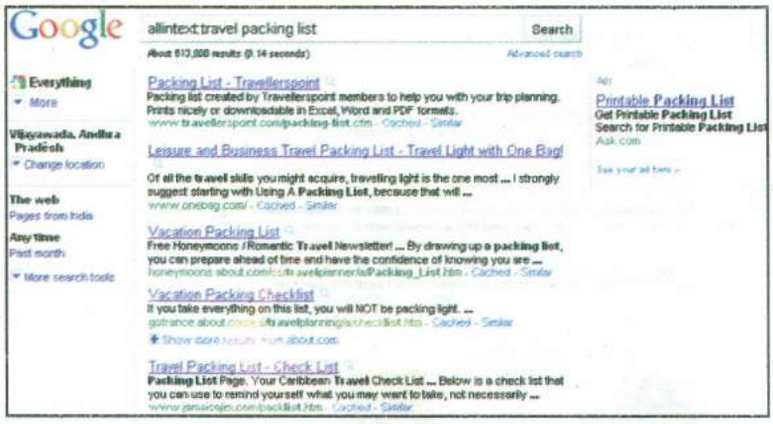

Fig. 18

Allintitle

If you start your query with allintitle:, Google restricts results to those containing all the query terms you specify in the title. For example, [allintitle: detect virus] will return only documents that contain the words "detect" and "virus' in the title.

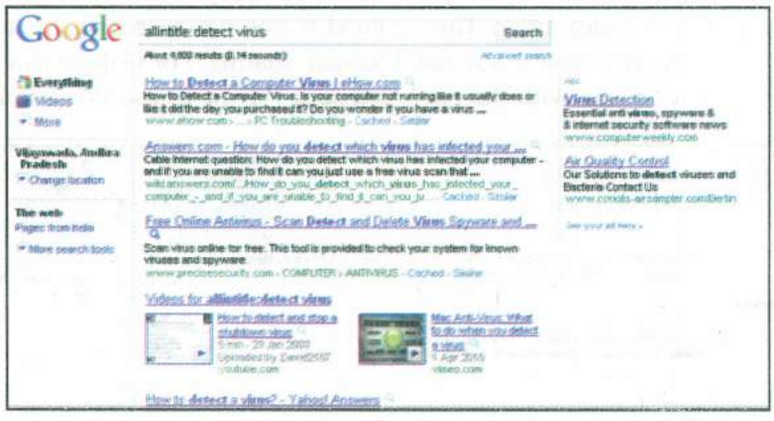

Fig. 19

Allinurl

If you include inurl: in your query, Google will restrict the results to documents containing that word in the URL. Only web-pages where the keywords form part of the actual URL will be shown, this can be either the domain name itself or the directory, filename.

Fig. 20

Cache

The query cache:*url* will display Google's cached version of a web page, instead of the current version of the page. For example, [cache:www.ignou.ac.in] will show Google's cached version of the ignou's home page. It shows the last copy of a web page that Google saved. In other words you can see the actual content that Google have on file exactly as their crawlers saw it.

Fig. 21

Define

If you start your query with define:, Google shows definitions from pages on the web for the term that follows. This advanced search operator is useful for finding definitions of words, phrases, and acronyms. For example, [define: blog] will show definitions for "Blog".

Fig. 22

Filetype

If you include filetype:suffix in your query, Google will restrict the results to pages whose names end in suffix. For example, [cyber security filetype:pdf] will return Adobe Acrobat PDF files that match the terms "cyber" and "security". You can restrict the results to pages whose names end with PDF and doc by using the OR operator, e.g. [cyber security filetype:pdf OR filetype:doc].

Fig. 23

Info

The query info:URL will present some information about the corresponding web page. For instance, [info:www.ignou.ac.in] will show information about the IGNOU website home page. This functionality can also be obtained by typing the web page URL directly into a Google search box.

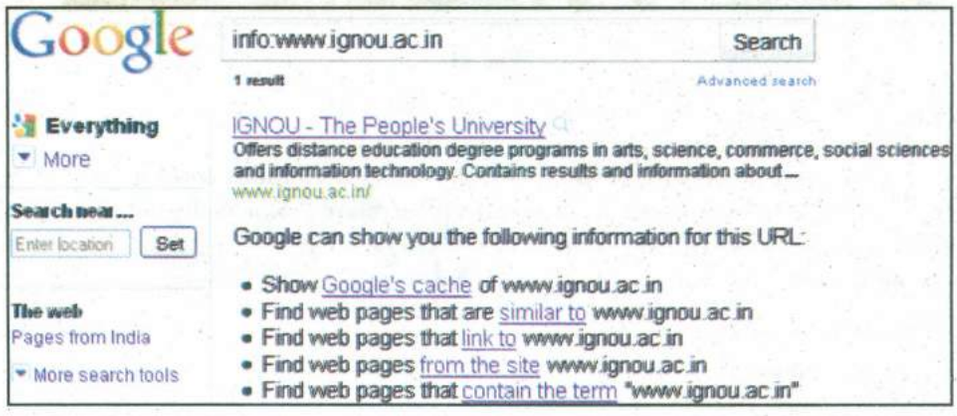

Fig. 24

Link

The query link:*URL* shows pages that point to that URL. For example, to find pages that point to ignou's home page, enter:[link:www.ignou.ac.in]

Fig. 25

Movie

If you include movie: in your query, Google will find movie-related information. For examples, movie:3 idiots will return the pages related to the movie.

Fig. 26

Music

if you're looking for music you can use the operator "music:". Google will try to find all information about Artists, Albums and Songs.

Fig. 27

Site

If you include site: in your query, Google will restrict your search results to the site or domain you specify. For example, [admissions site:www.ignou.ac.in] will show admissions related information from IGNOU's site.

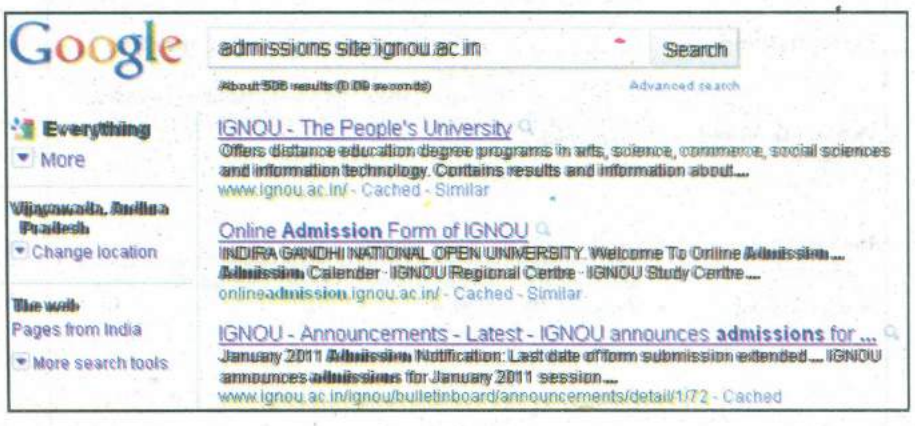

Fig. 28

Weather

If you enter a query with the word weather and a city or location name, if Google recognizes the location, the forecast will appear at the top of the results page.

Otherwise, your results will usually include links to sites with the weather conditions and forecast for that location.

For example, [weather New Delhi] will return the weather for New Delhi.

Fig. 29

Numrange

numrange is a powerful operator. It can be used for searching numbers within a desired range. You can use it to search for business contacts, addresses, and more. The following example searches for numbers from 1200 to 1230. Use a hypen (-) to separate the lower and upper bound of the two numbers.

Example: numrange:1200-1230

The .. operator

The .. (period period) operator is a shorthand for the numrange operator.

Example: laptops $700..$1200

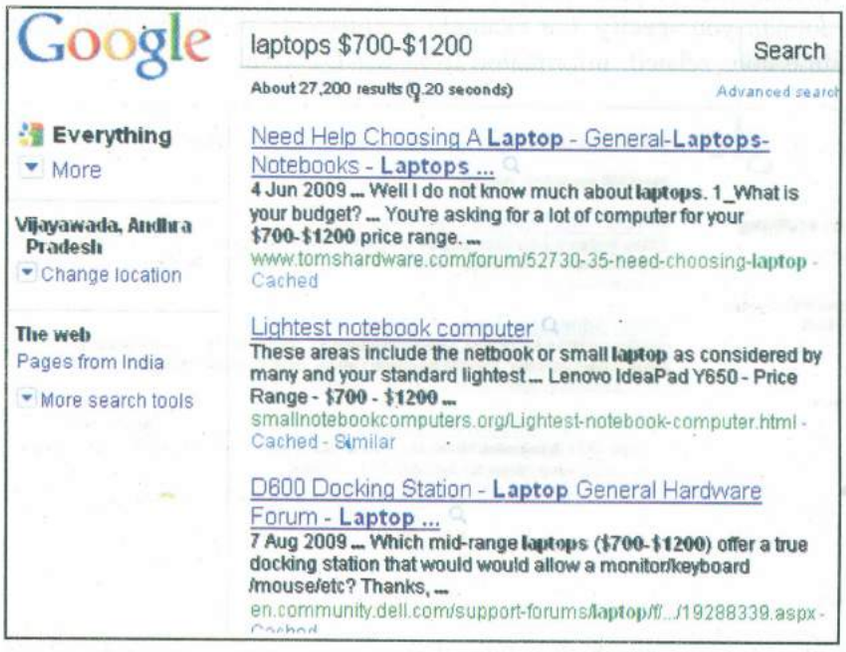

Fig. 30

3.5.2 Google Advanced Search Page Options

The Advanced Search option on Google offers users several options to obtain specific and focused search results. Here's how this feature can be used. With Advanced Search, you can search only for pages that...

- contain ALL the search terms you type in
- contain the exact phrase you type in
- contain at least one of the words you type in
- do NOT contain any of the words you type in
- is written in a certain language
- is created in a certain file format
- was updated within a certain period of time
- contain numbers within a certain range
- don't contain "adult" material

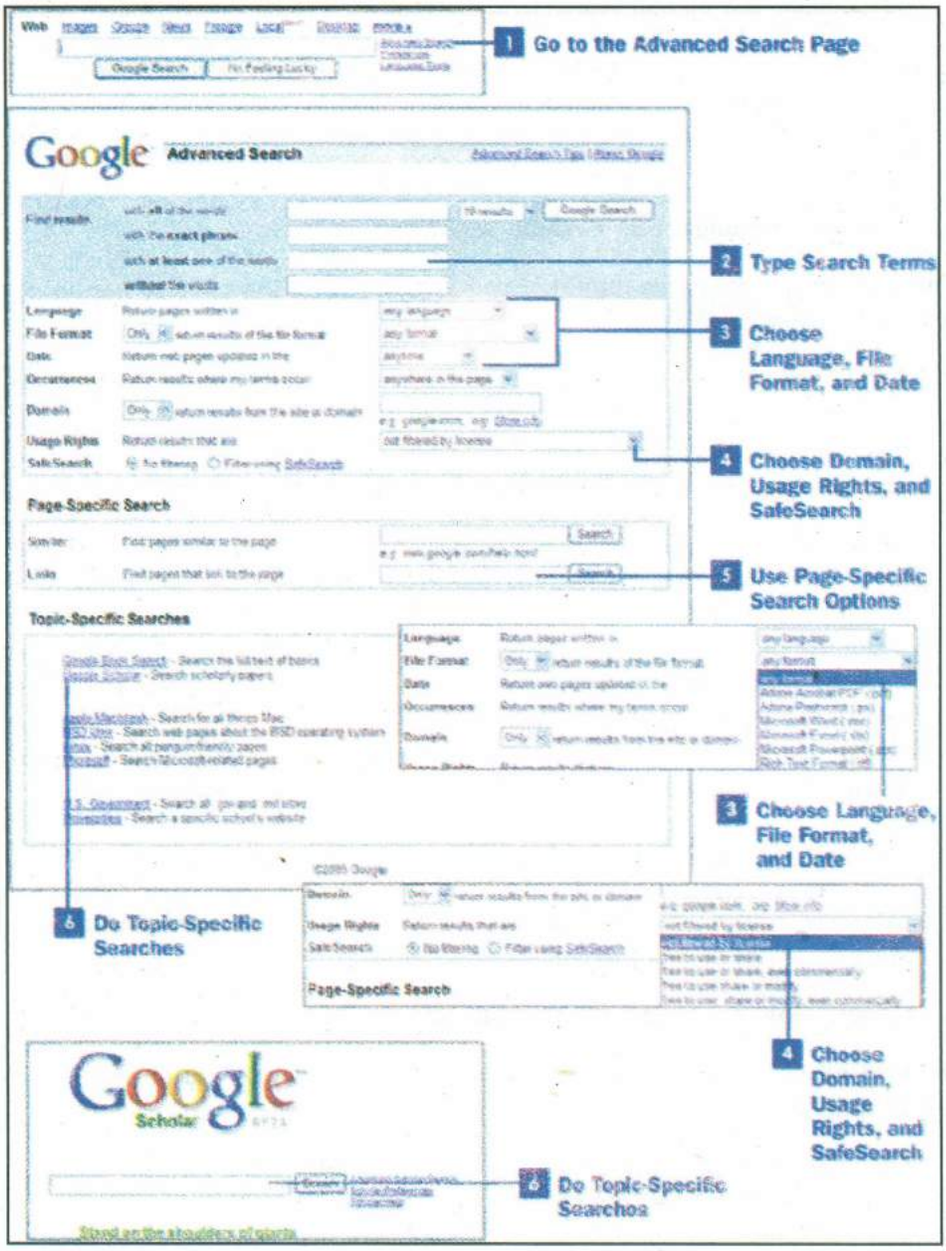

Fig. 31

1) Go to the Advanced Search Page

From Google's main search page, click the Advanced Search link to the right of the main search text box at the top of the page. You are sent to the Google Advanced Search page.

2) Type Search Terms

The top part of the page, highlighted in blue, enables you to type search terms and to combine them in unique ways. Keep in mind that you can combine several of these options. For example, you can search for pages that have the exact phrase rhubarb patch but that do not have the word Barber on them. Here are your choices:

- The with all of the words option means that Google returns results in which pages contain all your search terms. If a page is missing just one of the terms, it won't be included in the search results.
- The with the exact phrase option means that Google returns results in which pages contain the exact phrase it's the same as putting quotation marks around the words in your search phrase.
- The with at least one of the words option means that Google returns pages that contain any of your search terms. This is the default Google search method.
- The without the words option is meant to be used in combination with one of the previous search options as a way to narrow a search. When you use this option, Google excludes any pages that contain the search terms you type on this line.

3) Choose Language, File Format, and Date

The next set of options on the Advanced Search page allows you to narrow your search even further:

- The Language option enables you to narrow the results returned to pages that are primarily written in a single language. Click the drop-down box to make your choice of language. There are dozens of languages from which you can choose. The default search language is any language.
- The File Format option enables you to search for files, rather than web pages. So if you know that a particular piece of information is in a specific file format, use the File Format option to make it easier to find the file. You can search for files in half a dozen formats: Adobe Acrobat (.pdf), Adobe Postscript (.ps), Microsoft Word (.doc), Microsoft Excel (.xls), Microsoft PowerPoint (.ppt), and Rich Text Format (.rtf). You can also tell Google to have your results exclude the selected file formats by choosing Don't from the drop-down list just to the right of File Format.
- The Date option enables you to specify web pages that have been updated in a specific time period: in the past three months, the past six months, or the past year. You can also leave this option set to the Google default of anytime. Make your choice from the drop-down list.

4) Choose Domain, Usage Rights, and SafeSearch

The next set of choices on the Advanced Search page allow you to narrow your search in these ways:

- The Domain option enables you to search through only a specific domain or domains, such as www.ignou.com. To search multiple domains, separate the URLs by commas. You can also exclude domains from your search by selecting Don't from the drop-down box to the right of Domain.

- The Usage Rights option enables you to search through pages or material that is bound or not bound by specific usage rights (that is, by the way in which the information can be used). The default is not filtered by license, which means that Google searches for any material. From the drop-down list, you can make a wide range of choices, from free to use or share, up to free to use, share or modify, even commercially. The SafeSearch option enables you to filter searches so they do not contain sexually explicit or inappropriate material.

5) Use Page-Specific Search Options

The Page-Specific Search section of the Advanced Search page enables you to do two types of searches:

- Similar enables you to find pages similar to a page you've already found.
- Links enables you to find pages that link to a specific page.

6) Do Topic-Specific Searches

The final section of the Advanced Search page enables you to search through topic-specific pages (such as pages related to Microsoft or Apple Macintosh) or through scholarly pages. When you click any of the topic-specific searches, you are sent to a new Google page (Google determines which page has the most relevant information). Type your search term on that page, and you'll do a topic-specific search.

Check Your Progress 2

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) When do you use "I am Feeling Lucky" option in Google. Explain.

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2) Explain page specific options in Google advanced search.

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3) What does the Google search engine return when you use 'Cache' Operator? Explain.

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4) Differentiate between the operator's allinURL and allintitle

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3.6 GOOGLE: ADVANCED IMAGE SEARCH

Since the early/mid 90s, when the web started to become a popular place for posting and searching for information, the main type of info was text based. Most search engines would immediately return a list of web sites that had topics regarding your query – even if you were searching only for pictures.

Since then the web has exploded and digital images have become commonplace – the internet is now full of millions of digital images easily accessible to search engines. Google, being the leader in search technology, has created a resource to specifically search for images only called Google Advanced Image Search. Google Advanced Image Search is both powerful and easy to use.

Google Image Search is a search engine of images on the web. Thumbnails of images are displayed based on the search keywords used. The filename and surrounding text of the image are used to match the search keywords. You can specify small, medium, or large images.

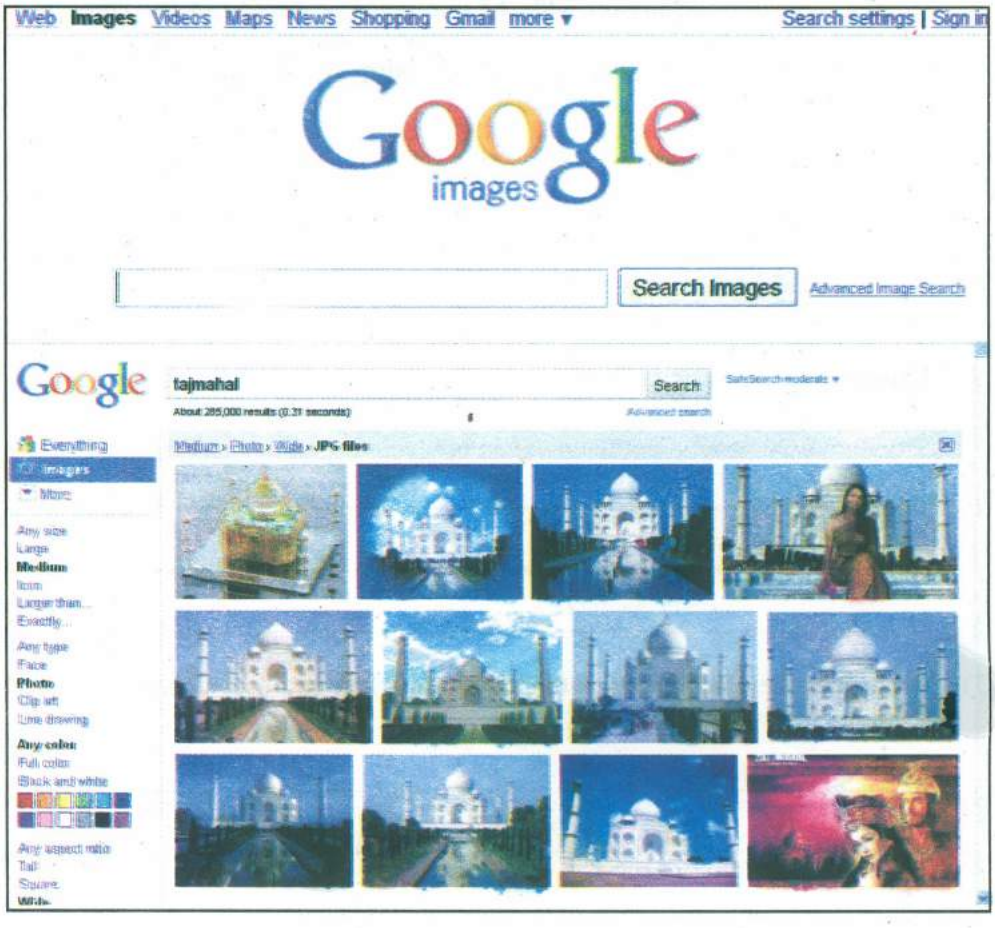

Fig. 32

Following are some options to use in Google Advanced Image Search.

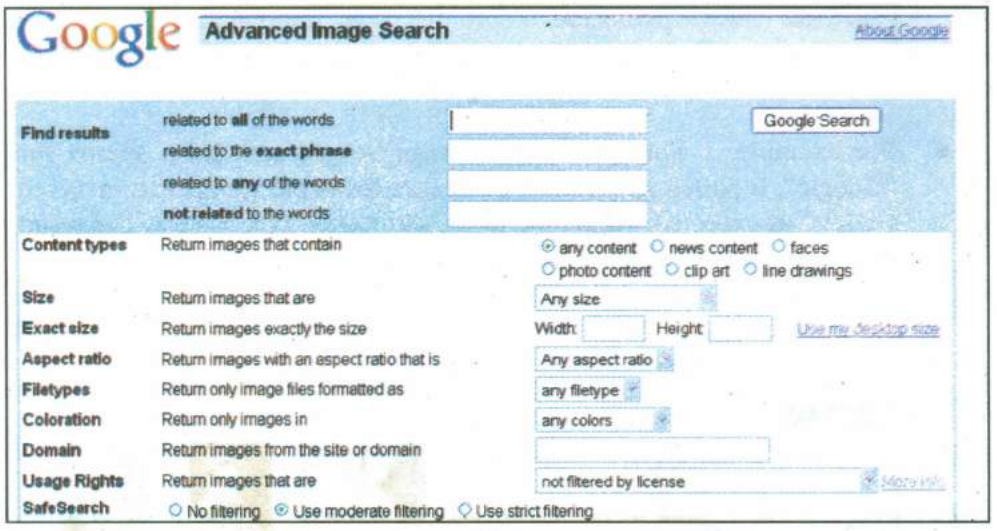

Fig. 33

Now let's see the options:

1) Google Advanced Image Search Find Options

- Find results related to all of the words: simply type keywords in here and press search. You will get results related to all the keywords you searched. This should be used for general searches only.

Fig. 34

- Find results related to the exact phrase: for more exact results, type the keywords in here and you will get results related to the exact phrase you are looking for. Those results should be more satisfying than the one provided with the general search.
- Find results related to any of the words: if you want to find pictures related to a couple of words but not to all of them, just use this option. Could be used for specific term searches, where there might not be many pictures, so it could be useful to add a couple of synonyms in the pot.
- Find results not related to the words: although this field might seem useless, it can come in handy when you're searching for a keyword with several meanings: you can restrict the search to what you want by providing synonyms to the other meanings of the keyword in this field.

2) Google Advanced Image Search Filters

- **Content types:** returns images according to their content. What each of the radio buttons does is kind of self explanatory: 1. any content 2. news content 3. faces etc.

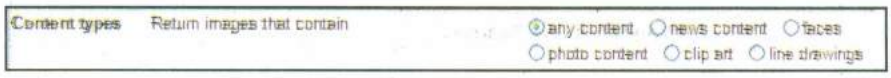

Fig. 35

- For example, I went to Google Image Search and did a search for "Google". It pulled up a variety of images (example above) that involved Google, as expected. To get the faces, set content type = face. The result was a page full of Google faces

Fig. 36

- **Size:** return images according to their size that you can select from the drop-down list: extra large, large, medium, small, any size etc.
- **Filetypes:** you can choose from this drop-list the format of your results, between BMP, JPG, GIF and PNG.

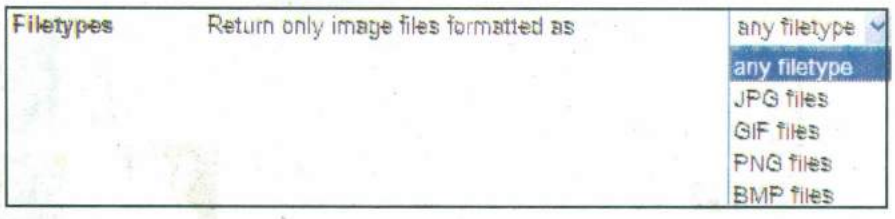

Fig. 37

- **Coloration:** this is quite an interesting filter, as it allows you to get images according to their colors: black and white, gray-scale or full color.
- **Domain:** an option useful for webmasters or for the ones trying to find only the pictures from a specific domain. All you have to do is type that domain in this field.

3) Google Advanced Image Search SafeSearch

- SafeSearch is kind of an advanced filter allowing you to screen the results, according to the level of filtering you select. Very useful for the cases when your kids are around and you don't want any disturbing results to pop up on your screen.

3.7 ALTAVISTA: ADVANCED SEARCH

AltaVista currently claims one of the largest search engine databases at over 550 million websites. AltaVista offers both a Simple Search and an Advanced Search page. Simple Search requires the use of implied Boolean logic (plus and minus), while Advanced Search requires full Boolean logic (and, or, and not).

Fig. 38

The Advanced Search page also requires that the most important keyword appear in the "Sort by" search box in order to return the most relevant results at the top of the list.

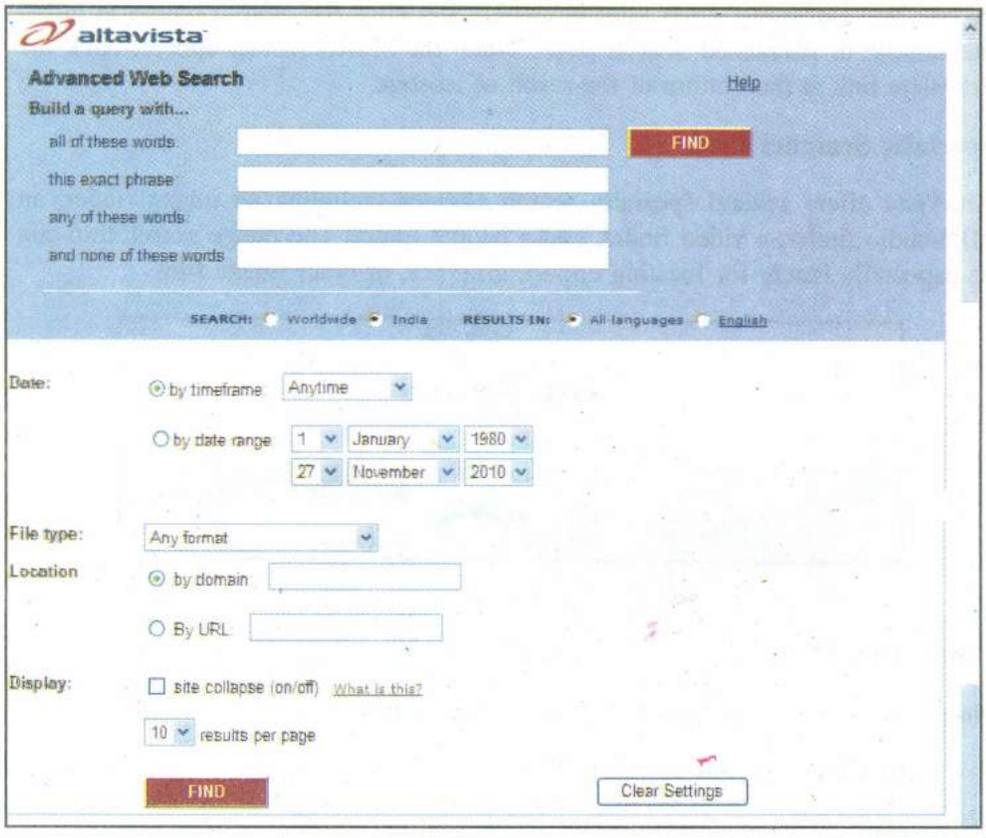

Fig. 39

Asic Search Tips

- Use + immediately before a word to require that word
- Use - immediately before a word to exclude that word.
- Use double quotes ("word") to search for a phrase.
- Use a wild card * (*root) to search for variations of a word root.
- Use AND if the following word must be included.
- Use OR between words if one of them must be included.
- Use NOT to indicate that your chosen word must NOT be included.
- Use AND NOT if your following word must NOT be included.
- Use NEAR between words which must be within 10 words of each other.
- Use parentheses around a phrase or group of words that must NOT be found together.

Near

AltaVista offers a number of powerful search features not found elsewhere. One very effective tool available on the Advanced Search page is the NEAR search. A NEAR search limits results to pages where keywords appear within 10 words of each other. This can be extremely helpful in situations where an AND search produces too many results and a phrase search (" ") produces too few results.

Example: "heart disease" near prevent

Translation

Whenever your search results list a relevant resource in another language, check out AltaVista's translation feature. With this service, French, German, Italian, Spanish, and Portuguese websites are translated to English (and vice versa).

To use this capability, enter your keywords and click the Search button at either the Simple or Advanced Search page. When the search results appear, click the Translate link at the bottom of the result of interest.

Specialty Searches

AltaVista offers several specialty search engines including an image finder, an MP3/audio finder, a video finder, and a people finder. The image search tool can be especially handy for locating clipart, graphics, or other image files.

Fig. 40

Check Your Progress 3

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) Explain different "content types" supported by Google.

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2) List out various "File Types" that can be searched using Google.

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3) Explain the advantages of using NEAR operator in AltaVista.

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3.8 SEARCH TIPS

Following search tips can greatly increase your chances of quickly and easily locating what you want on the Internet.

TIP 1: Choose the Right Search Tool or Technique: Besides various search engines for searching the information on the Internet you can use subject directories to acquaint yourself with the field and select the most appropriate information resources.

TIP 2: Use Boolean Operators: To narrow your search use Boolean operators .They restricts your search results by telling the search engine to return only Web pages that satisfy the given condition.

TIP 3: Use Advanced Search Operators : The major search engines, offer advanced search operators that let you really zero in what you are looking for on the Internet.

TIP 4: Don't Stick to One Search Engine: Although Google is by far and away the most popular search engine, no single search engine, not even Google, can cover even a fraction of the entire Internet. To perform a more comprehensive search of the Internet and, hence, increase your odds of finding additional useful information about a topic, be sure to use these other general purpose search engines: AllTheWeb, AltaVista, Hotbot, Yahoo! Etc.

TIP 5: Use Met search Engines: Since each search engine covers different portions of the Internet at different times, to perform a thorough search of the Internet, you should query as many search engines as possible. However, going to each search engine and repeatedly entering the same search query is both time consuming and tedious. Meta search engines let you enter your query just once and then query multiple search engines simultaneously, returning a compilation of search results from all the search engines queried. Some of the more powerful meta search engines include: dog pile, metacrawler, Vivisimo etc.

TIP 6: Use Subject Directories: Subject directories provide the ability to quickly get a birds-eye-view of a topic, and then drill down to find detailed or "finer-grained" information about the topic. Unlike search engines, which index millions of Web pages and typically present you with an overwhelming number of search results, subject directories offer a limited and neatly categorized set of topics, typically sorted alphabetically for easy reference and browsing. A few of the most popular broad-coverage subject directories include: Digital Librarian, Directory Resources, Google Directory, Librarians' Internet Index, Open Directory Project, WWW Virtual Library etc.

TIP 7: Use Deep Web: The *invisible or deep* Web is the vast reservoir of information stored in databases and sometimes dynamically generated only upon request, making it inaccessible to search engines, subject directories, and even intuitive searches. It is difficult to measure the precise size of the deep Web.

TIP 8: Use Social Search: Social *search* uses the power of the community participation and judgment to locate information of general interest and answer

specific questions. Social search works well for finding subjective content through informed opinions. Common social search platforms include blogs, microblogs (Twitter), social networks (Facebook. LinkedIn), question-and-answer (Q&A) sites (Answerbag.com, allexperts.com, WikiAnswers).

3.9 LET US SUM UP

This unit deals with about the search engines. It helps in locating the things or information which you are looking for in the virtual world i.e. WWW. The information may consist of web pages, images, information and other types of files. Some search engines also mine data available in databases or open directories. Unlike web directories, which are maintained by human editors, search engines operate algorithmically or are a mixture of algorithmic and human input.

3.10 CHECK YOUR PROGRESS: THE KEY

Check Your Progress 1

1) A Search engine is computer software that is continually modified to avail of the latest technologies in order to provide improved search results. Each search engine does the same functions of collecting, organizing, indexing and serving results by employing various algorithms and techniques. The functions of a search engine are:

   - Crawling the internet for web content.
   - Indexing the web content.
   - Storing the website contents.
   - Results.

2) ii)

3) A Meta-Search engine is a search tool that sends user requests to several other search engines and/or databases and aggregates the results into a single list or displays them according to their source. Metasearch engines enable users to enter search criteria once and access several search engines simultaneously. On the other hand, a subject directory is a catalog of sites collected and organized by humans. Subject directories are often called subject "trees" because they start with a few main categories and then branch out into subcategories, topics, and subtopics. They allow you to browse Internet resources by different subject categories and enable you to search by keywords within the contents of the directories

4) iii)

5) i) – B

   ii) – A

   iii) – E

   iv) – C

   v) – D

Check Your Progress 2

1) When you enter your search term in Google search box and clicking on "I'm Feeling Lucky" button will automatically take you straight to the top-ranking

result returned for your query. "I'm Feeling Lucky" means you will be get to see the first web page returned for your query without other choices. For example if you type "apple" into the search box and press I'm Feeling Lucky, you'll go directly to Apple Computer's Web site.

2) The two option are available for Page specific tool in Google Advanced search: Similar and link. Similar will list pages that Google feels are similar to the page you enter. Link will list pages that link to the page you enter.

3) Google takes a snapshot of each page it examines and caches (stores) that version as a back-up. The cached version is what Google uses to judge if a page is a good match for your query. Practically every search result includes a Cached link. Clicking on that link takes you to the Google cached version of that web page, instead of the current version of the page. This is useful if the original page is unavailable because of Internet congestion or when the owner recently removed the page from the Web.

4) The title of a webpage is usually displayed at the top of the browser window and in the first line of Google's search results for a page. The author of a website specifies the title of a page with the HTML TITLE element. If you start your query with allintitle:, Google restricts results to those containing all the query terms you specify in the title. The Uniform Resource Locator, more commonly known as URL, is the address that specifies the location of a file on the Internet. If you start your query with allinurl:, Google restricts results to those containing all the query terms you specify in the URL.

Check Your Progress 3

1) Google image search is one of the most powerful tools to find an image on the Internet. Content types Option returns images according to their content.

   - **Any Content:** Results will include images with any type of content.
   - **News Content:** Results will include images used by news websites.
   - **Faces:** Results will only include images with a face as the focal point.
   - **Photo Content:** Results will only include images that are actual photos.
   - **Clip Art:** Results will only include images that are clip art and exclude actual photos.
   - **Line Drawings:** Results will only include images of line art like those used with pen or pencil.

2) When you use the filetype: operator in a Google search (for example, filetype:.xml, Google searches for files with the .xml extension, not for files of file type XML.Limiting your search to a specific file type will return pages with that file extension, and may return fewer relevant results. Supported file types for Google Search include: PDF, PS, TXT, PPT, DOC, XLS, SWF (Shockwave Flash), RTF etc.

3) When two terms or phrases are linked with the NEAR operator, only documents where the terms appear within 10 words of one another will be retrieved, thereby indicating a higher probability of a conceptual link. This gives the NEAR operator considerably greater power in focusing in on a topic. NEAR is a restrictive AND. For example, the search string software NEAR programmer returns ONLY those documents that have software and programmer within 10 words of each other.

3.11 SUGGESTED READINGS

- www.googleguide.com
- www.learnwebskills.com/search/engines.html
- www.searchengineguide.com/searchengines.html

UNIT 4 LATEST TREND IN INTERNET SECURITIES

Structure

4.0 INTRODUCTION

Web 2.0 is the use of World Wide Web technology and web design that aims to facilitate the users to share ideas, opinions, reflections and contents. Web2.0 is about making global information available to local social contexts and giving people the flexibility to find, organize, share and create information in a locally meaningful fashion that is globally accessible. Web2.0 is defined as a framework of a web of connections where the content is generated by the user. Web 1.0 pushed information out to the user from a single source. Web 2.0 allows the user to become an active participant in knowledge generation. Web2.0 technology enables interaction through the use of wikis, blogs, social networks and RSS feeds that facilitate knowledge sharing. Web 2.0 allows users to communicate with the data stored on servers and is typically performed via forms in a Hypertext Markup Language (HTML) page, a scripting language such as JavaScript, or through Flash, Silverlight or Java applications. These methods use the client's computer to reduce server workloads and increase the responsiveness of the application. This unit discuss about various applications of web 2.0, its characteristics and related technologies.

4.1 OBJECTIVES

After studying this unit, you should be able to:

- Identify Applications and Principles of Web 2.0;
- List out Characteristics of Web 2.0;
- Recognize the Technologies related to web 2.0; and
- Understand the security trends associated with web 2.0.

4.2 WEB 2.0 APPLICATIONS

Web 2.0 provides a new way for users to interact with and through the Internet. O'Reilly Media defined the phrase in 2004 to refer to a perceived second generation of web-based services such as social networking sites, wikis, communication tools, etc that emphasize online collaboration and sharing among users. Web 2.0 defines a new way for users to interact with the Web versus a new version of technical standards. Web 2.0 has also been defined as the transition of web sites from isolated information to sources of content and functionality.

Web 2.0 includes the following types of websites and web applications:

Blogs (short for 'web logs') are online journals or diaries hosted on a website and often distributed to other sites or readers using RSS (see below). They tend to be treated differently depending on the target audience. Their emphasis is usually "personal", with the audience makeup generally being to a group of users already known to the content editor.

Microblogging sites These are similar to blogs, except that posts are intended to be as condensed as possible. The most prominent of these services is arguably Twitter (http://twitter.com/), where users are encouraged to answer the question "What are you doing?", in 160 characters or less (i.e. the length of an SMS text message - one means of posting to the service).

Collective intelligence refers to any system that attempts to tap the expertise of a group rather than an individual to make decisions. Technologies that contribute to collective intelligence include collaborative publishing and common databases for sharing knowledge.

Mash-ups are aggregations of content and functionalities from different online sources/applications to create a new service, i.e mashing- up existing technologies for an entirely new purpose. For example, www.WikiMapia.org takes the functions of a wiki and overlays it with Google Maps for an entirely new kind of map. Similarly, Google Maps can also process RSS feeds from photo-sharing sites which can include positioning data where available (e.g. Flickr), to show photos and the locations where they were taken.

Peer-to-peer networking (sometimes called P2P) is a technique for efficiently sharing files (music, videos, or text) either over the internet or within a closed set of users. Unlike the traditional method of storing a file on a single machine or fileserver – which can result in a 'bottleneck' if many people try to access it at once – P2P distributes files by breaking them up into many files across many machines, often those of the users themselves. Some systems such as BitTorrent retrieve files by gathering the component pieces from many machines, and reassembling them back into the original file. Some network applications use P2P technology to 'spread the load' of network access across the machines of the users. The most well-known is probably the Internet 'telephon' application Skype.

Podcasts are audio or video recordings - a multimedia form of a blog or other content. They are often distributed through an aggregator, such as iTunes. Their web 1.0 analogue was simply 'streamed' internet radio (i.e. audio content played back simultaneously as it is downloaded).

RSS (Really Simple Syndication) allows people to subscribe to online distributions of news, blogs, podcasts and other information. Examples include the BBC and ESRC press releases.

Aggregators and social bookmarking sites are sites or programs that gather data from multiple sources (such as RSS feeds) and organise the information to present in a new, more streamlined or appropriate format.

Social networking refers to systems that allow members of a specific site to learn about other members' skills, talents, knowledge, or preferences. Commercial examples include www.Facebook.com and www.LinkedIn.com. Some companies use these systems internally to help identify experts. Other examples include www.MySpace.com and www.bebo.com.

Social media user-generated, such as blogs (www.wordpress.com, www.blogger.com, www.typepad.com), photo-sharing (www.flickr.com, www.picasa.com, etc.), and so on

Video This includes online video (www.YouTube.com, http://blip.tv/), or other online streaming media or internet TV (www.getmiro.com). There are also a number of services which allow users to stream live video direct from their mobile device (e.g. a 'Smartphone' such as the Nokia N95), to the service's Web site.

Web applications online programs that can do virtually everything other existing software programs can do - www.zoho.com, for instance, can replace Microsoft Office programs, as can Google Docs (http://docs.google.com/).

Web services are software systems that make it easier for different systems to communicate with one another automatically in order to pass information or conduct transactions. For example, a retailer and supplier might use web services to communicate over the internet and automatically update each other's inventory systems.

Wikis are systems for collaborative publishing, allowing many authors to contribute to an online document or discussion. The most obvious example is ww.Wikipedia.org.

4.2.1 Web 2.0 Domains

Sci-Mate is an open collaboration of scientists using Web 2.0 software to address well known challenges in academic publishing and technology transfer. The site provides free access to a collection of Web 2.0 software applications intended to make it easier for researchers and developers to bring together the necessary knowledge, tools and people for productive research and/or development.

Science 2.0 uses the technologies of web 2.0 to conversations between researchers, let them discuss the data and connect it with other data that might be relevant. Blogs, wikis and such permit users to make information available in ways that create a conversation. Web 2.0 permits scientists to create digitized conversations that provide context for the data.

Health 2.0 is the use of a specific set of Web tools (blogs, Podcasts, tagging, search, wikis, etc) by actors in health care including doctors, patients, and scientists, using principles of open source and generation of content by users, and the power

of networks in order to personalize health care, collaborate, and promote health education.

Business Intelligence 2.0 (BI 2.0) is a term that refers to new tools and software for business intelligence, beginning in the mid-2000s, that enable, among other things, dynamic querying of real-time corporate data by employees, and a more web- and browser-based approached to such data, as opposed to the proprietary querying tools that had characterized previous business intelligence software.

Open web The entire space of the World Wide Web open to anyone to access and participate. This has been the initial domain in which Web 2.0 technologies, applications, and attitudes have developed.

Enterprise Inside the firewalls of organizations and their business partners. The power of Web 2.0 technologies, originally developed on the open web, are now being applied within enterprises to enhance performance and achieve business outcomes. This domain is sometimes termed Enterprise 2.0.

4.2.2 Web 2.0 Principles

To understand why there is so much hyper surrounding Web 2.0, it is first important to understand the underlying principles that are connected to it. Web 2.0 is a platform that is connected to a large number of devices on the Internet. The overall goal of Web 2.0 is to provide an online experience that is much richer than the experience we currently have with Web 1.0. The principles behind this new system are quite different than the Internet that existed a decade ago. One of the most important principles behind Web 2.0 is the fact that web based services are now available that can pull information from a number of different sources to serve them to the user. With this new system, data will be freed and exposed to everyone that wants to view it. In addition to this, the data can be altered in a number of different ways.

Another powerful principle of Web 2.0 is the permission it gives for the construction of applications that are virtual. When this virtual application is constructed, data and functions can be pulled from a variety of different sources. In most cases, these applications will be small, and they can be deployed quickly within a short period of time. Currently, this function is only made available to a select few corporations. Once Web 2.0 is introduced, this power will be given to individuals.

Another principle that has often been connected to Web 2.0 is its ability to be participative. Historically, the Internet has been similar to traditional media in the sense that those who used it generally viewed information. Rather than participating in the online world as they surfed, they were mere spectators. The content basically flowed from the person who provided to those who wanted to view it.

The ability for viewers to be involved in the application is one of the most important aspects of Web 2.0. One of the most important things that separate Web 2.0 from 1.0 is the fact that content can be generated to meet the needs of the individual user. The traditional Internet has been a place where viewers were forced to view what the provider wanted them to view. With Web 2.0, they can view what they want. One term that is often used to describe Web 2.0 is modularity. This term is used to describe the ability of developers and users to pick from a variety of components to construct something that suits their needs.

The Web 2.0 applications can be used to build more applications. The developers responsible for the construction of Web 2.0 have stated that they are placing an emphasis on sharing. Sharing can include ideas, content, or even code. At the same time, business people should not take this to mean that they can't make money. To be profitable on Web 2.0, businesses must become more skilled at adding

value that is beyond the existing infrastructure. The most important aspect of this new system will be communication, and those who wish to succeed must understand the importance that communication plays on the web.

4.2.3 Web 2.0 Characteristics

Web 2.0 websites allow users to do more than just retrieve information. By increasing what was already possible in "Web 1.0", they provide the user with more user interface, software and storage facilities, all through their browser. This has been called "Network as platform" computing. Users can provide the data that is on a Web 2.0 site and exercise some control over that data. The concept of Web-as-participation-platform captures many of these characteristics. The key characteristics of Web 2.0 services are:

Participation Every aspect of Web 2.0 is driven by participation. The transition to Web 2.0 was enabled by the emergence of platforms such as blogging, social networks, and free image and video uploading, that collectively allowed extremely easy content creation and sharing by anyone.

Standards provide an essential platform for Web 2.0. Common interfaces for accessing content and applications are the glue that allows integration across the many elements of the emergent web.

Decentralization Web 2.0 is decentralized in its architecture, participation, and usage. Power and flexibility emerges from distributing applications and content over many computers and systems, rather than maintaining them on centralized systems.

Openness The world of Web 2.0 has only become possible through a spirit of openness whereby developers and companies provide open, transparent access to their applications and content.

Modularity Web 2.0 is the antithesis of the monolithic. It emerges from many, many components or modules that are designed to link and integrate with others, together building a whole that is greater than the sum of its parts.

User Control A primary direction of Web 2.0 is for users to control the content they create, the data captured about their web activities, and their identity. This powerful trend is driven by the clear desires of participants.

Identity is a critical element of both Web 2.0 and the future direction of the internet. We can increasingly choose to represent our identities however we please, across interactions, virtual worlds, and social networks. We can also own and verify our real identities in transactions if we choose.

Network as platform: Rather than having to install software locally, Web 2.0 services allow applications to be hosted on the network.

Culture of openness: A key benefit of Web 2.0 is provided by allowing others to reuse your content and you to make use of others' content. Creative commons licenses allow copyright owners to permit such reuse. This has particular benefits in the cultural heritage sector.

Tagging: Rather than having to rely on use of formal classification systems (which may not be meaningful to many users) tags can be created by users. The tags, which may also be meaningful to their peers, provide communal ways of accessing Web resources.

Embedding: Many examples of Web 2.0 services allow the content to be embedded in third party Web sites, blogs, etc

Check Your Progress 1

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) What are the advantages of Blogs?

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2) Explain how RSS work?

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3) List out the uses of Podcasting in education.

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4) What is a web service?

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4.3 WEB 2.0 CONCEPTS

There are a number of important innovations which are expected to play a pivotal role in the introduction of Web 2.0. Some of these innovations are applications that are web based. One of the most powerful tools that have allowed this is Ajax.

4.3.1 AJAX (Asynchronous JavaScript and XML)

AJAX (Asynchronous JavaScript and XML) is "a group of interrelated Web development techniques used to create interactive web applications or rich Internet applications". Using AJAX it is possible to develop Web applications which have a rich user interface which can approach the usability of well-written desktop application.

The Origins of AJAX

The key technical components of AJAX are:

- XHTML – a stricter, cleaner rendering of HTML into XML.

- CSS for marking up and adding styles.
- The JavaScript Document Object Model (DOM) which allows the content, structure and style of a document to be dynamically accessed and updated.
- The XMLHttpRequest object which exchanges data asynchronously with the Web server reducing the need to continually fetch resources from the server.

Since data can be sent and retrieved without requiring the user to reload an entire Web page, small amounts of data can be transferred as and when required. Moreover, page elements can be dynamically refreshed at any level of granularity to reflect this. An AJAX application performs in a similar way to local applications residing on a user's machine, resulting in a user experience that may differ from traditional Web browsing. Examples of AJAX usage include GMail and Flickr. It is largely due to these and other prominent sites that AJAX has become popular only relatively recently - the technology has been available for some time. One precursor was dynamic HTML (DHTML), which twinned HTML with CSS and JavaScript but suffered from cross-browser compatibility issues. AJAX is not a technology, rather, the term refers to a proposed set of methods using a number of existing technologies. As yet, there is no firm AJAX standard, although the recent establishment of the Open AJAX Alliance, supported by major industry figures such as IBM and Google, suggests that one will become available soon.

Developing AJAX Applications

AJAX applications can benefit both the user and the developer. Web applications can respond much more quickly to many types of user interaction and avoid repeatedly sending unchanged information across the network. Also, because AJAX technologies are open, they are supported in all JavaScript-enabled browsers, regardless of operating system - however, implementation differences between browsers cause some issues, some using an ActiveX object, others providing a native implementation.

Although the techniques within AJAX are relatively mature, the overall approach is still fairly new and there has been criticism of the usability of its applications.

Advantages and Disadvantages of AJAX

Advantages provided by use of AJAX include:

- State can be maintained throughout a Web site.
- A Web application can request only the content that needs to be updated, thus drastically reducing bandwidth usage and load time.
- Users may perceive an AJAX-enabled application to be faster or more responsive.
- Use of Ajax can reduce connections to the server, since scripts and style sheets only have to be requested once.

The disadvantages include:

- Clicking the browser's "back" button may not function as expected.
- Dynamic Web page updates make it difficult for a user to use bookmarks.
- Browser does not support JavaScript or have JavaScript disabled, will not be able to use its functionality.
- AJAX may provide a mechanism for attacks by malicious code.

Ajax is powerful because it has now allowed many web sites to run applications that are very similar to those that are commonly used on personal computers. Some

of these applications include spreadsheets and word processing programs. In addition to this, some websites are now capable of carrying out project management functions. A number of operating systems have also appeared that are browser based.

While these operating systems don't function in the same way as Windows or Mac OS, they mimic the experience that is commonly found with these products. The key advantage they have over traditional operating systems is that they are more functional, and they can be run on almost every browser that is available today.

4.3.2 Rich Internet Applications

Another innovation that will be seen in Web 2.0 is Rich Internet applications. Rich Internet applications have been responsible for enhancing the browsing experience of users. With these applications, a page can make a request for an update for various portions of the content, and the content that is altered can be presented in the browser. The cool thing about this is that users will not have to refresh the browser to see these changes. In addition to Rich Internet applications, another innovation lies in server side software. While the systems will be constructed on the existing structure of the Internet, a higher important will be placed on software that is back end. The syndication will not be very different from the generation of dynamic content management. However, these services will have a demand for a database that is flexible, and the workflow must be highly robust.

The additional functionality of Web 2.0 is heavily dependent on the ability of users to access the data that is stored in servers. This can be accomplished in a number of different ways. Forms can be placed on an HTML page, or they could be done through a scripting program like Java or Flash. Each process can be useful because it will allow computers to decrease the workloads that will be placed on servers.

4.3.3 SOAP (Simple Object Access Protocol)

One of the prominent protocols that are used for Web 2.0 is SOAP. The term SOAP is used to deal with the posting of messages that are based in XML. SOAP is used to communicate between applications via HTTP using XML or extensible Markup Language. Soap is a protocol that is neither a distributed object system nor an RPC system or even a Web application, but a messaging format for machine-to-machine construction. Soap applications communicate with each other over the internet. One of the most important uses of SOAP is to help enable XML Web Services. A web Service is an application provided as a service on the web. They are functional software components that can be accessed over the Internet. Web Services combines the best of component-based development and are based on Internet Standards that supports communication over the net.

A SOAP message is an ordinary XML document containing the following elements:

- An Envelope element that identifies the XML document as a SOAP message
- A Header element that contains header information
- A Body element that contains call and response information
- A Fault element containing errors and status information

An advantage of SOAP is that program calls are much more likely to get through firewall servers that screen out requests other than those for known applications (through the designated port mechanism). Since HTTP requests are usually allowed through firewalls, programs using SOAP to communicate can be sure that they can communicate with programs anywhere.

4.3.4 REST (Representational State Transfer)

Representational State Transfer (REST) is a style of software architecture for distributed hypermedia systems such as the World Wide Web. REST strictly refers to a collection of network architecture principles that outline how resources are defined and addressed. The term is often used in a looser sense to describe any simple interface that transmits domain-specific data over HTTP without an additional messaging layer such as SOAP or session tracking via HTTP cookies.

The key abstraction of information in REST is a 'resource'. Any information that can be named can be a resource: a document or image, a temporal service (e.g. "today's weather in Los Angeles"), a collection of other resources, a non-virtual object (e.g. a person), and so on. In other words, any concept that might be the target of an author's hypertext reference must fit within the definition of a resource. A resource is a conceptual mapping to a set of entities, not the entity that corresponds to the mapping at any particular point in time. REST uses a 'resource identifier' to identify the particular resource involved in an interaction between components.

REST connectors provide a generic interface for accessing and manipulating the value set of a resource, regardless of how the membership function is defined or the type of software that is handling the request. URL or URN are the examples of a resource identifier. REST components perform actions with a resource by using a 'representation' to capture the current or intended state of that resource and transferring that representation between components. A representation is a sequence of bytes, plus 'representation metadata' to describe those bytes. Other commonly used but less precise names for a representation include: document, file, and HTTP message entity, instance, or variant. A representation consists of data, metadata describing the data, and, on occasion, metadata to describe the metadata (usually for the purpose of verifying message integrity). Metadata are in the form of name-value pairs, where the name corresponds to a standard that defines the value's structure and semantics. The data format of a representation is known as a media type.

REST Data Elements

Data Element	Modern Web Examples
Resource	the intended conceptual target of a hypertext reference
Resource identifier	URL, URN
Representation	HTML document, JPEG image
Representation metadata	media type, last-modified time
Resource metadata	Source link, alternates, vary
Control data	if-modified-since, cache-control

REST uses various connector types to encapsulate the activities of accessing resources and transferring resource representations. The connectors present an abstract interface for component communication, enhancing simplicity by providing a complete separation of concepts and hiding the underlying implementation of resources and communication mechanisms.

REST Connectors

The primary connector types are client and server. The essential difference between the two is that a client initiates communication by making a request, whereas a

server listens for connections and responds to requests in order to supply access to its services. A component may include both client and server connectors.

- An important part of Restful architecture is a well-defined interface to communicate; in particular it is a set of HTTP methods such as POST, GET, PUT and DELETE. These methods are often compared with the CREATE, READ, UPDATE, DELETE (CRUD) operations associated with database technologies.

Check Your Progress 2

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) Explain the advantages of AJAX.

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2) Discuss about SOAP.

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3) List out the characteristics of REST.

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4) What are the characteristics of Rich Internet Application?

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4.4 WEB 2.0 TECHNOLOGIES

4.4.1 RSS

RSS stands for "Really Simple Syndication". It is a way to easily distribute a list of headlines, update notices, and sometimes content to a wide number of people. It is used by computer programs that organize those headlines and notices for easy reading.

What problem does RSS solve?

Most people are interested in many websites whose content changes on an unpredictable schedule. Examples of such websites are news sites, community and religious organization information pages, product information pages, medical websites, and weblogs. Repeatedly checking each website to see if there is any new content can be very tedious. Email notification of changes was an early solution to this problem. Unfortunately, when you receive email notifications from multiple websites they are usually disorganized and can get overwhelming, and are often mistaken for spam. RSS is a better way to be notified of new and changed content. Notifications of changes to multiple websites are handled easily, and the results are presented to you well organized and distinct from email.

How does RSS work?

RSS works by having the website author maintain a list of notifications on their website in a standard way. This list of notifications is called an **"RSS Feed"**. People who are interested in finding out the latest headlines or changes can check this list. Special computer programs called **"RSS aggregators"** have been developed that automatically access the RSS feeds of websites you care about on your behalf and organize the results for you. (RSS feeds and aggregators are also sometimes called **"RSS Channels"** and **"RSS Readers"**.) Producing an RSS feed is very simple and hundreds of thousands of websites now provide this feature, including major news organizations like the New York Times, the BBC, and Reuters, as well as many weblogs.

What information does RSS provide?

RSS provides very basic information to do its notification. It is made up of a list of items presented in order from newest to oldest. Each item usually consists of a simple title describing the item along with a more complete description and a link to a web page with the actual information being described. Sometimes this description is the full information you want to read (such as the content of a weblog post) and sometimes it is just a summary. The RSS information is placed into a single file on a website in a manner similar to normal web pages. However, the information is coded in the XML computer language for use by a program (the RSS aggregator) and not by a person like a normal web page.

RSS aggregator programs

Think of an RSS aggregator as just a web browser for RSS content. RSS aggregators automatically check a series of RSS feeds for new items on an ongoing basis, making it is possible to keep track of changes to multiple websites without needing to tediously read and re-read each of the websites yourself. They detect the additions and present them all together to you in a compact and useful manner. If the title and description of an item are of interest, the link can be used to quickly bring the related web page up for reading. There are many RSS aggregators available. Some are accessed through a browser, some are integrated into email programs, and some run as a standalone application on your personal computer.

How do I find out if a website has an RSS feed?

It is getting more and more common for websites to have RSS feeds. They usually indicate the existence of the feed on the home page or main news page with a link to "RSS", or sometimes by displaying an orange button with the letters "XML" or "RSS". RSS feeds are also often found via a "Syndicate this" link. Text "RSS" links sometimes (there are lots of variations) point to a web page explaining the nature of the RSS feeds provided and how to find them. The buttons are often linked directly to the RSS feed file itself. Once you know the URL of an RSS feed, you can provide that address to an RSS aggregator program and have the

aggregator monitor the feed for you. Many RSS aggregators come preconfigured with a list to choose from of RSS feed URLs for popular news websites.

RSS and Atom

RSS is defined in Wikipedia as "a family of Web feed formats used to publish frequently updated works-such as blog entries, news headlines, audio and video-in a standardized format" . RSS and the related Atom standard can be used to provide alerts and syndication of content. These lightweight standards play an important role in a Web 2.0 environment in allowing content to be easily reused.

How RSS and Atom Are Being Used?

News feeds are an example of automated syndication. News feed technologies allow information to be automatically provided and updated on Web sites, emailed to users, etc. As the name implies news feeds are normally used to provide news; however the technology can be used to syndicate a wide range of information.

RSS and Atom are widely used by popular Web 2.0 services, allowing the content provided by the services to be viewed without the user having to visit the service. Examples include:

- Amazon which provides RSS feeds on the availability of new products
- Flickr which provides a variety of customizable RSS feeds.
- YouTube which provides a variety of RSS feeds about various categorized groups of videos.

In addition to notifying you about news headlines and changes to websites, RSS can be used for many other purposes. There does not even have to be a web page associated with the items listed -- sometimes all the information you need may be in the titles and descriptions themselves.

Some commonly mentioned uses are:

- Notification of the arrival of new products in a store
- Listing and notifying you of newsletter issues, including email newsletters
- Weather and other alerts of changing conditions
- Notification of additions of new items to a database, or new members to a group

One RSS aggregator is all that you need to read all of the RSS feeds, be they headlines, alerts, changes, or other notifications. RSS is shaping up to be a very popular and useful means for communicating.

Newsreader

A newsreader gathers the news from multiple blogs or news sites via RSS (see below), allowing readers to access all their news from a single web site or program. Online newsreaders (like Bloglines, Pluck, or Newsgator) are web sites that let you read RSS feeds from within your web browser. Desktop newsreaders download the news to your computer, and let you read your news inside a dedicated software program.

4.4.2 Blog

A weblog or blog (a derivative of "web" and "log") is essentially an online diary, where anyone with a basic knowledge of computers can post anything – random

thoughts, photos, homework, and poetry, just to name a few – for the rest of the world to see. A blog is just a web page that contains entries in reverse chronological order, with the most recent entry on top. In addition to the classic text blog, we now have photo blogs (consisting of uploaded photos), audio blogs (a.k.a. "podcasts") and video blogs (which consist of regularly uploaded video files).

Blogs range in scope from individual diaries to political campaigns, media programs, and businesses. They range in scale from the writings of one occasional author (known as a blogger), to the collaboration of a large community of writers. Many blogs enable visitors to leave public comments, which can lead to a community of readers centred on the blog. Hence, the totality of weblogs or blog-related websites is known as a "blogosphere."

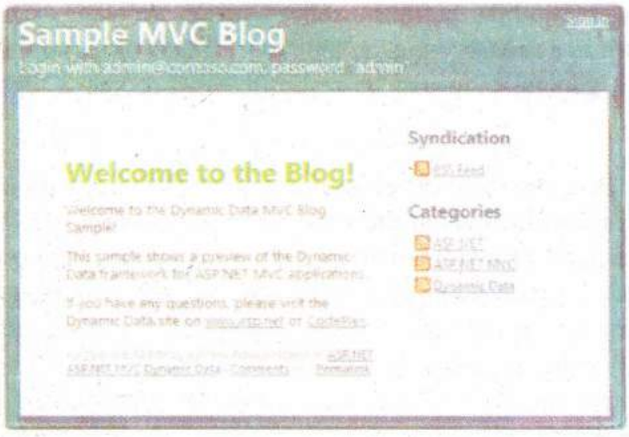

Fig. 1

In general, not only do blogs contain several hyperlinks to other websites and stories, there is usually a standing list of links to the author's favorite bookmarks. Blogging technology gave users a huge variety of templates, an easy-to-navigate five-minute registration process, and (perhaps best of all) free web hosting.

Blogroll

A list of recommended sites that appears in the sidebar of a blog. These sites are typically sites that are either on similar topics, sites that the blogger reads regularly, or sites that belong to the blogger's friends or colleagues.

Moblogging

Short for mobile blogging, moblogging refers to posting blog updates from a cell phone, camera phone or pda (personal digital assistant). Mobloggers may update their web sites more frequently than other bloggers, because they don't have to be at their computers in order to post.

Types of Blogs

This section samples just a small flavour of what is out there in the blogosphere.

Political Blogs: When discussed in the news, the term blog is often understood to refer to a "political blog." Political blogs may take a number of forms. Often an individual will link to articles from news web sites and post their own comments as well. Others focus on long essays about current political topics. Most news, activism, and issue-based blogs follow the same format. In fact, a recent trend in politics is that candidates are incorporating blogging into their own campaigns, tying blogs into the world of politics.

Personal Blogs: The term personal blogs is often used to describe an online diary or journal, such as Xanga. The weblog format of an online diary makes it possible for users without much experience to create, format, and post entries with ease. People often write their day-to-day experiences, complaints, poems, prose, illicit thoughts and more, allowing others to contribute.

Business Blogs: A number of entrepreneurs are establishing blogs to promote their businesses. Often business blogs act as a showcase for entrepreneurs to provide a window into the behind-the-scenes activities at their business, presenting a more personal "face" to the public. In some cases the blog itself is the core of the business bringing in revenue from advertising, selling products or information.

Topical Blogs: Topical blogs focus on very particular niche. An example is Google Blog, which covers nothing but news about Google. Another example is a soldier blog, also known as a military blog, or "milblog." Many blogs now allow categories, which means a general blog can be reshuffled to become a topical blog at the user's need.

Health Blogs: Blogs written as personal accounts of living with a specific health issue, sharing information about the experience with others who have an interest in that health issue and providing mutual support. A major category of health blogs are medical blogs, which themselves generally fall into two categories. One type is a blog written by a health care professional about his or her work experiences, medical news or other personal thoughts. A more recent trend is a blog that deals with actual patient cases. This latter blog allows other physicians to submit cases to the web site. Physicians can then offer comments or help with the case.

Literary Blogs: A "litblog" as it is sometimes called, is a blog that focuses primarily on the topic of literature. There is a community of litblogs in the blogosphere whose authors cover a variety of subtopics within the realm of literary matters. Litbloggers write about the publishing industry, writing, current fiction, poetry, literary journals, reader's diaries, criticism and genres of literature, including science fiction and mystery, just to name a few.

Travel Blogs: Famous explorers wrote their journeys down on paper. Blogging has opened the forum for everyone, thus allowing modern-day travelers with blogs as a way to share their stories and photos, even while they are traveling around the world.

Research Blogs: An increasing number of scholars and students blog their research notes, combining the traditional scholar's private notebook with public discussion. A related genre is the anonymous professor's blog, where the various issues related to academia are freely discussed.

Legal Blawgs: Blogs by lawyers or law students, which discuss law and legal affairs, are often referred to as "blawgs." By extension, the creator of such a blog is a blawger, sometimes spelled blawgger.

Educational Blogs: Students often use blogs as records of their learning while teachers use them as records of what they taught. For example, a teacher can blog a course, recording day-by-day what was taught, including links to internet resources, and specifying what homework students are required to carry out. This application has many advantages: (1) a student can quickly catch-up if they miss a class; (2) the teacher can use the blog as a course plan; and (3) the blog serves as an accurate summary of the course that prospective students or new teachers can refer to.

We'll turn now to the various components of an average blog.

Fig. 2

1) **Advertising -** Many blogs have advertising banners on them. Most often the money generated by advertising goes to the company providing the blog software, not the individual blogger.

2) **Title -** The blog's title.

3) **Date -** The date of the most recent post. You will notice that previous posts have been pushed down on the page to fit below the most recent one.

4) **Post Title -** The title of the most recent post.

5) **Text -** The actual text of the most recent post.

6) **Posting Information -** Information telling who wrote that particular post and when it was posted to the blog.

7) **Comments -** An area for readers of the blog to add their comments. This is an option some bloggers use and others avoid.

8) **Previous Posts -** A list of the most recent posts.

9) **Archives -** A link to view the archive section which contains older posts.

Though there may be variety from one to another depending on the preferences of the individual blogger, most blogs have all or most of those components.

4.4.3 Mashups

The term mashup was borrowed from the pop music scene. In the music business, a mashup describes a new song that is mixed from the vocal and instrumental

tracks from two different songs (usually belonging to different genres). Mashup is a web service or software tool that combines two or more tools to create a whole new service. Wikipedia defines a mashup as "a web application that combines data from more than one source into a single integrated tool". Many popular examples of mashups use the Google Map service to provide a location display of data taken from another source.

Technical Concepts

In a desktop PC environment, application programmers make use of operating system functions (e.g. drawing a shape on a screen, accessing a file on a hard disk drive, etc.) to make use of common functions within the application they are developing. A key characteristic of Web 2.0 is the notion of 'the network as the platform'. APIs provided by Web-based services (such as services provided by companies such as Google and Yahoo) can similarly be used by programmers to build new services, based on popular functions the companies may provide. APIs are available for, for example, the Google Maps service. A mashup application has three components: the content/information provider(s), the mashup site, and the client's Web browser. These components are logically and physically disjoint and are likely separated by both network and organizational boundaries. The information content being "mashed" originates from the content providers and these providers are frequently unwitting of how their information is being used downstream. The mashup may or may not be executed where the mashup site is located as mashups can be implemented via traditional Web applications using server-side dynamic content-generation technologies like Java servlets, Common Gateway Interfaces, Hypertext Preprocessor, or Active Server Pages. The client's Web browser provides the user interaction and the rendering of the application and data.

Examples of Mashups

Yahoo Pipes

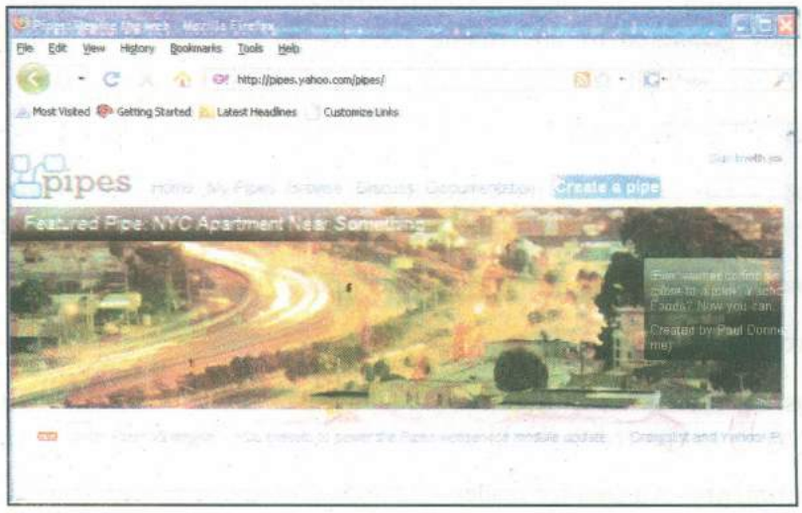

Fig. 3

Yahoo Pipes is a free online service that allows people without programming experience to remix popular streams of content types (e.g., Really Simple Syndication [RSS]) and create data mashups using a visual drag-and-drop editor. Yahoo Pipes also provides a library of pipes (currently numbering in the thousands) enabling users to copy, re-use, and modify pipes for their own design. Yahoo Pipes can provide a more focused set of news feeds than a traditional feed aggregator offered by sites like My Yahoo. The My Yahoo site allows the user to select news from a pre-designed set menu, whereas Yahoo Pipes allows the user to design the specific view with only the data sources and information of interest at

the moment regardless of any pre-design by the content owner. Pipes also allows the analysis of data feeds that were previously inaccessible due to conditions such as high volume of data (too much to sift through) or foreign language constraints (information was not understandable). Another unique attribute of Pipes is the ability for a Web publisher to include RSS feeds on its pages without the need of specific pre-configured server-side software.

Flickr

Flickr allows users to search through pictorial databases maintained on Flickr servers by retrieving pictures marked with meta-tags. Flickr provides a significant mashup opportunity as it provides an API that enables other programs to access tags, photos, user names, and contacts Third party developers have written wrappers for the Flickr API that make it usable within other programming environments such as Flash, PHP, Python, Java, Perl, and Ruby.

YouTube

YouTube is a video-sharing site that allows users to upload videos to the YouTube server and make them "findable" by others by adding descriptions (tags) to the videos. The site contains a wide variety of different video styles such as movie and TV clips, music videos, video-blogging, etc. Users can post videos in a number of different formats: WMV, AVI, MOV and MPEG. The YouTube site translates the file into the Flash Video (FLV) format. This format is very useful because of its compatibility with most web browsers which enables users to provide a link to a video or embed it within another web page because each video is accompanied by the full HTML markup. This allows the video to autoplay within the web browser.

4.4.4 Podcast

Podcasting has been described as "a method of publishing files to the internet, often allowing users to subscribe to a feed and receive new files automatically by subscription, usually at no cost". Podcast is an audio blog, typically updated weekly or daily. You don't have to have an ipod to listen to a podcast; although you can download podcasts to an ipod, you can also listen to podcasts on a desktop computer, or many other mp3 players.

From a technical perspective, Podcasting is an application of the RSS 2.0 format. RSS can be used to syndicate Web content, allowing Web resources to be automatically embedded in third party Web sites or processed by dedicated RSS viewers. The same approach is used by Podcasting, allowing audio files (typically in MP3 format) to be automatically processed by third party applications - however rather than embedding the content in Web pages, the audio files are transferred to a computer hard disk or to an MP3 player - such as an iPod.

The strength of Podcasting is the ease of use it provides rather than any radical new functionality. If, for example, you subscribe to a Podcast provided by the BBC, new episodes will appear automatically on your chosen device - you will not have to go to the BBC Web site to see if new files are available and then download them.

What Can Podcasting Be Used For?

There are several potential applications for Podcasting in an educational context:

- Recording of lectures allowing students to easily access the recording as a revision aid, to catch up on missed lectures, etc.
- Asking students to record their own Podcasts on, for example, project reports.

- Automated conversion of text files, email messages, RSS feeds, etc. to MP3 format, allowing the content to be accessed on mobile MP3 players.
- Maximizing the impact of talks by allowing seminars, lectures, conference presentations, etc. to be listened to by a wider audience.
- Recordings of meetings to provide access for people who could not attend.
- Enhancing the accessibility of talks to people with disabilities.

Possible Problems

Although there is much interest in the potential for Podcasting, there are potential problem areas which will need to be considered:

- Recording lectures, presentations, etc. may infringe copyright or undermine the business model for the copyright owners.
- Making recordings available to a wider audience could mean that comments could be taken out of context or speakers may feel inhibited when giving presentations.
- The technical quality of recordings may not be to the standard expected.
- Although appealing to the publisher, end users may not make use of the Podcasts.

It would be advisable to seek permission before making recordings or making recordings available as Podcasts.

Creating Podcasts

When creating a Podcast you first need to create your MP3 (or similar) audio file. Many recording tools are available, such as the open source Audacity software. You may also wish to make use of audio editing software to edit files, include sound effects, etc. You will then need to create the RSS file which accompanies your audio file, enabling users to subscribe to your recording and automate the download.

4.4.5 Social Bookmarking

The collaborative equivalent of storing favorites or bookmarks within a web browser, social bookmarking services let people store their favorite web sites online. Social bookmarking services also let people share their favorite web sites with other people, making them a great way to discover new sites or colleagues who share your interests.

It is tagging a website and saving it for later. Instead of saving them to your web browser, you are saving them to the web. And, because your bookmarks are online, you can easily share them with friends.

Most social bookmarking sites allow you to browse through the items based on most popular, recently added, or belonging to a certain category like shopping, technology, politics, blogging, news, sports, etc.

Social bookmarking and social news allow you to specifically target what you want to see. Instead of going into a search engine, typing something in, and then searching for that needle in a haystack, you can quickly narrow down the items to what you are looking for.

Because many social bookmarking sites display recently added lists and popular links, you can both stay current and see relevant information.

How to get Started

The first thing you will need to do to get started with social bookmarking is to decide on a social bookmarking website. Most social bookmarking sites allow you to search through the public bookmarks as a guest. The best way to find out which one is right for you is to actually use the site. Search through the bookmarks, see if the look-and-feel appeals to you, and determine whether or not you find the site easy to use.

Once you have picked a social bookmarking site, you will want to install a button onto your browser to make it easy to use. This is usually a quick and painless operation. The site should provide a tutorial on installing the button either after you sign up or in their help section. Once you have your account set up and have the button installed, you are ready to go onto the World Wide Web and start bookmarking websites. You've got your handy button, so this is an easy process. Simply go to whatever website you want to bookmark, and click the button.

Most sites will either pop up a small window or take you to their site and ask you a few questions about the website you are bookmarking. It should fill out some of the information for you, like the title and the website address.

The main thing you want to be concerned with is the tag. A tag is a keyword or phrase used to describe the website. Think of it like the name of a folder. You can also have multiple tags, which can be very handy.

For example, if you are on a blog about video games, you might tag the blog with the keywords "games" and "blog". If you are on a blog about football, you might tag it with "football" and "blog".

How To 'Meet' People On Social Bookmarking Sites

It might sound strange, the idea of meeting people on the web. And, perhaps, the word 'meet' isn't entirely accurate. A more accurate description might be "become familiar with" as in: you know they exist, and have made special note of their existence.

In terms of social bookmarking, becoming familiar with other users and adding them to your friends list can be an invaluable tool in finding websites that interest you. Just as a friend might recommend a good book or movie, a social bookmarking friend can lead you to good websites. So, how do you go about it? By searching through the public bookmarks. As you find interesting websites make note of the user who added the bookmark to the site. You can view their profile, and browse through other bookmarks they have added. If their interests are aligned with yours, and you like the sites they have bookmarked, add them as a friend.

4.4.6 Social Networking

Social networking sites help people discover new friends or colleagues by illuminating shared interests, related skills, or a common geographic location. Leading examples include Friendster, LinkedIn etc. Social networking is based on a certain structure that allow people to both express their individuality and meet people with similar interests. This structure includes having profiles, friends, blog posts, widgets, and usually something unique to that particular social networking website — such as the ability to 'poke' people on Facebook or high-five someone on Hi5.

Profile: This is where you tell the world about yourself. Profiles contain basic information, like where you live and how old you are, and personality questions, like who's your favorite actor and what's your favorite book. Social networks dedicated to a special theme like music or movies might ask questions related to that theme..

Friends: Friends are trusted members of the site that are allowed to post comments on your profile or send you private messages. You can also keep tabs on how your friends are using social networking, such as when they post a new picture or update their profile. Friends are the heart and soul of social networking. It should be noted that not all social networks refer to them as 'friends' — LinkedIn refers to them as 'connections — but all social networks have a way to designate members as trusted.

Groups: Most social networks use groups to help you find people with similar interests or engage in discussions on certain topics. They are both a way to connect with like-minded people and a way to identify your interests. Sometimes, groups are called by other names, such as the 'networks' on Facebook.

Discussions: A primary focus of groups is to create interaction between users in the form of discussions. Most social networking websites support discussion boards for the groups, and many also allow members of the group to post pictures, music, video clips, and other tidbits related to the group.

Blogs: Another feature of some social networks is the ability to create your own blog entries. While not as feature-rich as blog hosts like Wordpress or Blogger, blogging through a social network is perfect for keeping people informed on what you are up to.

Widgets: A popular way of letting your personality shine through is by gracing your social networking profile with web widgets. Many social networks allow a variety of widgets, and you can usually find interesting widgets located on widget galleries.

4.4.7 Tags

Keywords that describe the content of a web site, bookmark, photo or blog post. You can assign multiple tags to the same online resource, and different people can assign different tags to the same resource. Tag-enabled web services include social bookmarking sites (like del.icio.us), photo sharing sites (like Flickr) and blog tracking sites (like Technorati). Tags provide a useful way of organizing, retrieving and discovering information.

What is a Tag?

Wikipedia defines a **tag** as "a non-hierarchical keyword or term assigned to a piece of information (such as an internet bookmark, digital image, or computer file)".

Tags, which are a form of metadata, allow resources to be more easier found.

Tag Features

A list of typical characteristics of tags is given below:

- Tags are chosen by the creator and/or by the viewer of the tagged item.
- Tags are not part of a formal subject indexing term set.
- Tags are informal and personal.
- An item may have multiple tags assigned to it.
- There is no 'wrong' tag.

Tag Clouds

Web sites that use tags often display the tags visually as a tag cloud. These usually take the form of an alphabetical list of tags and use font size and/or color to

identify the most frequently used tags. This enables viewers to either pick from the alphabetical list or to easily spot the most popular tags.

Tag Cloud Types

A number of different types of tag clouds may be found. For example:

- The size represents the number of times that tag has been applied to a single item.
- The size represents the number of items to which a specific tag has been applied.
- The size represents the number of items in a content category.

Hash Tags (# Tags)

Hash tags (also written as 'hashtags') are used in messages using services such as Twitter. The hash symbol (#) is placed before the word to be treated as a tag, as in the example below.

#goji berries are the new #superfood

This enables tweets on a specific topic to be found by searching on the hashtag.

Adding Tags

Systems vary in how you enter tags. When a single text box is provided and you want to enter more than one tag, you will need to use a separator between the tags. The most popular separator is the space character but some systems use other separators; e.g. quotation marks. Other systems only allow one tag to be entered at a time; in these cases you will have to repeat the process to add further tags.

'Official' Tags

Events and conferences increasingly are creating 'official' tags. These tags can then be used by participants for blog posts, photos of the event, presentation slides and other supporting materials and resources. This use of a consistent tag maximizes the effectiveness of searching for resources relating to specific events

4.4.8 Folksonomies

A folksonomy is a decentralised, social approach to creating metadata for digital resources. It is usually created by a group of individuals, typically the resource users, who add natural language tags to online items, such as images, videos, bookmarks and text. These tags are then shared and sometimes refined.

Folksonomies can be divided into broad folksonomies, when lots of users tag one object, and narrow folksonomies, when a small number of users tag individual items. This new social approach to creating online metadata has sparked much discussion in the cataloguing world. Note that despite its name a folksonomy is not taxonomy. Taxonomy is the process, within subject-based classification, of arranging the terms given in a controlled vocabulary into a hierarchy. Folksonomies move away from the hierarchical approach to an approach more akin to that taken by faceted classification or other flat systems.

4.4.9 Wiki

Wiki is a collaboratively edited web page. The best known example is wikipedia, an encyclopedia that anyone in the world can help to write or update. Wikis are frequently used to allow people to write a document together, or to share reference material that lets colleagues or even members of the public contribute content.

What Is A Wiki?

A wiki is a Web site that uses wiki software, allowing the easy creation and editing of any number of interlinked Web pages, using a simplified markup language or a WYSIWYG text editor, within the browser.

The key characteristics of typical wikis are:

- The ability to create and edit content within a Web environment without the need to download any special software.
- Use of a simple markup language which is designed to simplify the process of creating and editing documents.
- The ability to easily create and edit content, often without need for special privileges.

What Can Wikis Be Used For?

Wikis can be used for a number of purposes:

- On public Web sites to enable end users to easily contribute information, such as the Science Museums Object Wiki .
- Wikis can support communities of practice. For example see the Museums Wiki site , the Blogging Libraries Wiki and the AHA's Archives Wiki .
- Wikis can be used to allow local residents to contribute to an official archive.

Wikipedia

Wikipedia is probably the largest and best-known example of a wiki (http://www.wikipedia.org/) .Wikipedia is a good example of a wiki in which content is provided by contributors around the world.

Fig. 4

Wikis can be public, like this wiki. That means that all content is visible to the public and that the public may make changes.

Protected wikis may be viewed by the public, but only authorized users may make any edits or changes.

Private wikis are hidden from public view and can only be seen and edited by designated users.

Wikis are designed to be easy to use by nontechnical personnel. While there is an initial learning curve to become accustomed to the look and functioning of the wiki, it's similarity to word processing software usually makes it relatively easy to learn.

Check Your Progress 3

Note: a) Space is given below for writing your answer.

b) Compare your answer with the one given at the end of the Unit.

1) Differentiate between RSS Feeds and Aggregators.

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2) Discuss about moblogging.

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3) List out the functionality of Social Bookmarking.

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.....

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4) Explain about Folksonomies.

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.....

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5) What is a Wiki? Discuss its Advantages

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4.5 WEB SECURITY THREATS

Most Web sites today add dynamic content to a Web page making the experience for the user more enjoyable. Dynamic content is content generated by some server process, which when delivered can behave and display differently to the user depending upon their settings and needs. Dynamic Web sites have a threat that static Web sites don't, called "cross-site scripting," also known as "XSS".

Cross Site Scripting

Cross Site Scripting (or XSS) is one of the most common application-layer web attacks. XSS commonly targets scripts embedded in a page which are executed on the client-side (in the user's web browser) rather than on the server-side. XSS in itself is a threat which is brought about by the internet security weaknesses of client-side scripting languages, with HTML and JavaScript (others being VBScript, ActiveX, HTML, or Flash) as the prime culprits for this exploit. The concept of XSS is to manipulate client-side scripts of a web application to execute in the manner desired by the malicious user. Such a manipulation can embed a script in a page which can be executed every time the page is loaded, or whenever an associated event is performed.

A basic example of XSS is when a malicious user injects a script in a legitimate shopping site URL which in turn redirects a user to a fake but identical page. The malicious page would run a script to capture the cookie of the user browsing the shopping site, and that cookie gets sent to the malicious user who can now hijack the legitimate user's session. Although no real hack has been performed against the shopping site, XSS has still exploited a scripting weakness in the page to snare a user and take command of his session. A trick which often is used to make malicious URLs less obvious is to have the XSS part of the URL encoded in HEX (or other encoding methods). This will look harmless to the user who recognizes the URL he is familiar with, and simply disregards and following 'tricked' code which would be encoded and therefore inconspicuous.

Exploited XSS is commonly used to achieve the following malicious results:

- Identity theft
- Accessing sensitive or restricted information
- Gaining free access to otherwise paid for content
- Spying on user's web browsing habits
- Altering browser functionality
- Public defamation of an individual or corporation
- Web application defacement
- Denial of Service attacks

Avoiding an XSS attack

As stated above, cross-site scripting is achieved when an attacker is able to cause a legitimate Web server to send a page to a victim user's Web browser that contains a malicious script of the attacker's choosing. The attacker then has the malicious script run with the privileges of a legitimate script originating from the legitimate Web server. Now that we know the basis of an attack, what can we do to protect ourselves from this vulnerability?

Web site developers can protect their sites from being abused in conjunction with these attacks by ensuring that dynamically generated pages do not contained

undesired tags. From the Web user's perspective, two options exist to reduce the risk of being attacked through this vulnerability. The first -- disabling scripting languages in the Web browser as well as the HTML-enabled e-mail client -- provides the most protection but has the side effect of disabling functionality. The second -- only following links from the main Web site for viewing -- will significantly reduce a user's exposure while still maintaining functionality.

However, none of the solutions that Web users can take are complete solutions. In the end, it is up to Web page developers to modify their pages to eliminate these types of problems. This can be accomplished by properly filtering and validating the input received and properly encoding or filtering the output returned to the user.

Cross Site Reference Forgery

Cross Site Reference Forgery (XSRF) is a class of attack that affects web based applications with a predictable structure for invocation1. The attack's name is abbreviated differently but the most common form is XSRF, the acronym CSRF is also in common use. XSRF attacks are also known as "Hostile Linking' attacks, and have in some form been known about and exploited since before the turn of the millennium.

XSRF flaws exist in web applications with a predictable action structure and which use cookies, browser authentication or client side certificates to authenticate users. The basic idea of XSRF is simple; an attacker tricks the user into performing an action of the attackers choosing by directing the victim's actions on the target application with a link or other content. This is easiest to understand in the example of a HTTP GET.

The most popular ways to execute CSRF attacks is by using a HTML image tag, or JavaScript image object. Typically an attacker will embed these into an email or website so when the user loads the page or email, they perform a web request to any URL of the attackers liking. Below is a list of the common ways that an attacker may try sending a request.

HTML Methods

IMG SRC

<img src="http://host/?command'>

SCRIPT SRC

<script src="http://host/?command">

IFRAME SRC

<iframe src="http://host/?command">

Avoiding an XSRF Attack

The most popular suggestion to preventing CSRF involves appending non predictable challenge tokens to each request. It is important to state that this challenge token MUST be associated with the user session otherwise an attacker may be able to fetch a valid token on their own and utilize it in an attack. In addition to being tied to the user session it is important to limit the time period to which a token is valid. This method is documented in multiple documents however as pointed out in mailing list postings an attacker can utilize an existing browser vulnerability or XSS flaw to grab this session token.

When the web application formulates an Action (by generating a link or form that causes an Action when submitted or clicked by the user) the application includes

as a query parameter (usually as an "Input" tag of type "hidden") a name value pair with a name like: XSRFPreventionToken, and a value that is an HMAC_sha1(Action_Name + Secret, SessionID).

When an action is performed by the user, before the action is executed the XSRFPreventionToken has it's value verified by comparing the value of the provided token to a calculation of HMAC_sha1_(Reqested_action_name + Secret, User_SessionID). If the values do not match, then the Action Formulator is not the application, the Action should be aborted and the event can be logged as a potential security incident.

Note the action name should be different for each action, although the "Secret" can remain constant. From time to time XSRFPreventionTokens may leak out from the application, for example an application that doesn't use SSL will result in XSRFPreventionTokens being sent to other sites in the referer field when users click on links to those sites. By keeping action_names unique the application minimizes the impact on the application of a potentially hostile third party learning an XSRFPreventionToken (the attacker could now formulate only the actions with the same name as that which referred the victim to the attacker's site). Using SSL is almost always necessary for secure web applications.

4.6 LET US SUM UP

This unit deals with the Web 2.0. It is about revolutionary new ways of creating, collaborating, editing and sharing user-generated content online. It's also about ease of use. There's no need to download, and teachers and students can master many of these tools in minutes. Technology has never been easier or more accessible to all. Web 2.0 is a category of new Internet tools and technologies created around the idea that the people who consume media, access the Internet, and use the Web shouldn't passively absorb what's available; rather, they should be active contributors, helping customize media and technology for their own purposes, as well as those of their communities.

4.7 CHECK YOUR PROGRESS: THE KEY

Check Your Progress 1

1) Blog is an abbreviated version of "weblog", which is a term used to describe web sites that maintain an ongoing chronicle of information. logs are the simplest from of having websites. Owning a blog and posting on it can be an interesting and fun way to share information with the world

   The Advantages of blog are:

   - Blogs are easy to create
   - Blogs are easy to maintain
   - Blogs are search Engine Friendly
   - Blogs allows you to interact with your customer base
   - Blogs creates room for online community
   - Blog hosts are for free
   - Blogs gives you unlimited space

2) RSS stands for "Really Simple Syndication". It is a way to easily distribute a list of headlines, update notices, and sometimes content to a wide number of people.

RSS works by having the website author maintain a list of notifications on their website in a standard way. This list of notifications is called an "RSS Feed". People who are interested in finding out the latest headlines or changes can check this list. Special computer programs called "RSS aggregators" have been developed that automatically access the RSS feeds of websites you care about on your behalf and organize the results for you.

Some commonly mentioned uses of RSS are:

- Notification of the arrival of new products in a store
- Listing and notifying you of newsletter issues, including email newsletters
- Weather and other alerts of changing conditions
- Notification of additions of new items to a database, or new members to a group

3) A podcast is a series of digital media files (either audio or video) that are released episodically and often downloaded through web syndication. Podcasts enable students and teachers to share information with anyone anytime. If a student is absent, he or she can download the podcast of the recorded lesson. Teachers may also create podcasts to be used as a preparation tool for students. This would be pedagogically equivalent to having students read a text before a lesson. It can be a tool for teachers or administrators to communicate curriculum, assignments and other information with parents and the community. Teachers can record book talks, vocabulary or foreign language lessons, international pen pal letters (podcast pals!), music performance, interviews, debates. Podcasting can be a publishing tool for student oral presentations

4) Web services (sometimes called application services) are services that are made available from a business's Web server for Web users or other Web-connected programs. Web services are software-powered resources or functional components whose capabilities can be accessed at an internet URI. Standards-based web services use XML to interact with each other, which allows them to link up on demand using loose coupling. Web service consumers are able to invoke method calls on remote objects by using SOAP and HTTP over the Web.

Check Your Progress 2

1) Ajax's primary contribution to web pages is user-experience improvement. Web pages usually require several applications to function. This can make it seem like a cumbersome operation where users have to wait for the separate applications to refresh before interacting with the complete page. Decreasing user delay, which is a direct result of Ajax techniques, could make the Internet even more popular and pervasive than it already is. Another advantage of Ajax is a decrease in bandwidth use. Bandwidth in web hosting refers to the amount of data that can be communicated between user and server/website. Ajax also allows programmers to separate methods and formatting for specific information delivery functions on the Web. Programmers can use whatever languages or formats work for their specific goal. Ajax also separates the functionality of web pages by combining different elements in different ways.

2) SOAP is a simple XML-based protocol to let applications exchange information over HTTP. SOAP (Simple Object Access Protocol) is a way for a program running in one kind of operating system (such as Windows 2000) to communicate with a program in the same or another kind of an operating

system (such as Linux) by using the World Wide Web's Hypertext Transfer Protocol (HTTP)and its Extensible Markup Language (XML) as the mechanisms for information exchange. Since Web protocols are installed and available for use by all major operating system platforms, HTTP and XML provide an already at-hand solution to the problem of how programs running under different operating systems in a network can communicate with each other. SOAP specifies exactly how to encode an HTTP header and an XML file so that a program in one computer can call a program in another computer and pass it information. It also specifies how the called program can return a response. An advantage of SOAP is that program calls are much more likely to get through firewall servers that screen out requests other than those for known applications (through the designated port mechanism). Since HTTP requests are usually allowed through firewalls, programs using SOAP to communicate can be sure that they can communicate with programs anywhere.

3) Representational State Transfer (REST) is a style of software architecture for distributed hypermedia systems such as the World Wide Web. REST describes an architecture style for networked systems. It also happens to be the underlying architectural model of the Web.

   REST Principles:

   - Application state and functionality are divided into resources
   - Every resource is uniquely addressable using a universal syntax for use in hypermedia links
   - All resources share a uniform interface for the transfer of state between client and resource, consisting of
     - A constrained set of swell-defined operations
     - A constrained set of content types, optionally supporting code on demand
   - A protocol which is: Client-server, Stateless, Cacheable, Layered.

4) Rich Internet Applications (RIAs) are web applications, which use data that can be processed both by the server and the client. Furthermore, the data exchange takes place in an asynchronous way so that the client stays responsive while continuously recalculating or updating parts of the user interface. Rich Internet Applications provide the end user with an interface that is faster and more responsive than traditional applications. Providing an unparalleled interactive web experience, Rich Internet Application enable businesses to improve productivity, utilize advanced communication systems, and provide a higher level of service to customers. Delivering a variety of exciting features and uses, Rich Internet Applications such as videos, word processors, online games and mobile apps have been consistently gaining in popularity around the world. Rich Internet Applications offer superior accessibility, portability and scalability. Rich Internet Applications are more interactive and more responsive applications than traditional web applications. The basic characteristics are unnecessary page reload, drag & drop facilities, short response time and multimedia animations. Based on these characteristics, different functionalities such as live validation, auto completion, periodic refresh, and even rich text editors can be offered to the RIA user.

Check Your Progress 3

1) RSS works by having the website author maintain a list of notifications on their website in a standard way. This list of notifications is called an "RSS

Feed". People who are interested in finding out the latest headlines or changes can check this list. Special computer programs called "RSS aggregators" have been developed that automatically access the RSS feeds of websites you care about on your behalf and organize the results for you. (RSS feeds and aggregators are also sometimes called "RSS Channels" and "RSS Readers". RSS aggregators automatically check a series of RSS feeds for new items on an ongoing basis, making it is possible to keep track of changes to multiple websites without needing to tediously read and re-read each of the websites yourself. They detect the additions and present them all together to you in a compact and useful manner. If the title and description of an item are of interest, the link can be used to quickly bring the related web page up for reading.

2) Mobile blogging (moblogging) is a method of publishing to a website or blog from a mobile phone or other handheld device. A moblog helps habitual bloggers to post write-ups directly from their phones even when on the move. Mobile blogging is popular among people with camera phones which allow them to e-mail/MMS or SMS photos and video that then appear as entries on a web site, or to use mobile browsers to publish content directly to any blogging platform with Mobile Posting compatibility.

3) Social bookmarking is a method for Internet users to share, organize, search, and manage bookmarks of web resources. Unlike file sharing, the resources themselves aren't shared, merely bookmarks that reference them. Social bookmarking sites allow you to store, tag and share links. You can share these links with friends and colleagues.

4) A folksonomy is a system of classification derived from the practice and method of collaboratively creating and managing tags to annotate and categorize content this practice is also known as collaborative tagging, social classification, social indexing, and social tagging. A folksonomy is an Internet-based information retrieval methodology consisting of collaboratively generated, open-ended labels (or tags) that categorize content.

5) A wiki is a website that allows the creation and editing of any number of interlinked web pages via a web browser using a simplified markup language. Using wiki users can add, remove, and edit every page using a web browser

Wiki has following advantages:

- Good for writing down quick ideas or longer ones, giving you more time for formal writing and editing.
- Instantly collaborative without emailing documents, keeping the group in sync.
- Accessible from anywhere with a web connection
- It acts as an archive, because every page revision is kept.
- Exciting, immediate, and empowering
- Emailing a large document to several people can take time and some people may not receive it due to spam filters. By using a wiki one user can share his or her work with all of the users at one time.
- Another advantage to using a wiki is that all the drafts of a document are saved.
- A wiki can be protected with a password.

4.8 SUGGESTED READINGS

- Internet & World Wide Web How to Program, 4/e, Harvey M. Deitel and Paul J. Deitel
- www.en.wikipedia.org/wiki/Web_2.0
- www.exforsys.com/.../web-2.0/introduction-to-web-2.0.html
- www.oreilly.com/web2/archive/what-is-web-20.html

Student Satisfaction Survey

Student Satisfaction Survey of IGNOU Students

ignou THE PEOPLE'S UNIVERSITY

Enrollment No.	
Mobile No.	
Name	
Programme of Study	
Year of Enrolment	
Age Group	☐ Below 30 ☐ 31-40 ☐ 41-50 ☐ 51 and above
Gender	☐ Male ☐ Female
Regional Centre	
States	
Study Center Code	

Please indicate how much you are satisfied or dissatisfied with the following statements

Sl. No.	Questions	Very Satisfied	Satisfied	Average	Dissatisfied	Very Dissatisfied
1.	Concepts are clearly explained in the printed learning material	☐	☐	☐	☐	☐
2.	The learning materials were received in time	☐	☐	☐	☐	☐
3.	Supplementary study materials (like video/audio) available	☐	☐	☐	☐	☐
4.	Academic counselors explain the concepts clearly	☐	☐	☐	☐	☐
5.	The counseling sessions were interactive	☐	☐	☐	☐	☐
6.	Changes in the counseling schedule were communicated to you on time	☐	☐	☐	☐	☐
7.	Examination procedures were clearly given to you	☐	☐	☐	☐	☐
8.	Personnel in the study centers are helpful	☐	☐	☐	☐	☐
9.	Academic counseling sessions are well organized	☐	☐	☐	☐	☐
10.	Studying the programme/course provide the knowledge of the subject	☐	☐	☐	☐	☐
11.	Assignments are returned in time	☐	☐	☐	☐	☐
12.	Feedbacks on the assignments helped in clarifying the concepts	☐	☐	☐	☐	☐
13.	Project proposals are clearly marked and discussed	☐	☐	☐	☐	☐
14.	Results and grade card of the examination were provided on time	☐	☐	☐	☐	☐
15.	Overall, I am satisfied with the programme	☐	☐	☐	☐	☐
16.	Guidance from the programme coordinator and teachers from the school	☐	☐	☐	☐	☐

After filling this questionnaire send it to:
Programme Coordinator, School of Vocational Education and Training,
Room no. 19, Block no. 1, IGNOU, Maidangarhi, New Delhi- 110068

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