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**University of Rwanda**

**College of Science and Technology**

**School of ICT**

**Computer Science Department**

Academic year . . 2023

## **Module: Web Design Code: CSC2165 (Course Notes)**

**Instructors: BIZIMUNGU Theogene**

**Level: 1**

**Trimester: II**

**Credits: 10**

## Part 1: Internet, web and technologies

### Chapter 1: Internet

#### 1.1 Definitions

Internet is a means of connecting a computer to any other computer anywhere in the world via dedicated routers and servers. When two computers are connected over the Internet, they can send and receive all kinds of information such as text, graphics, voice, videos and computers programs.

Also The Internet allows distributed applications running on its end systems to exchange data with each other. These applications include remote login, file transfer, electronic mail, audio and video streaming, real-time audio and video conferencing, distributed games, the World Wide Web, and much, much more.

#### Who is the Owner of the Internet?

No one actually owns the internet, and no single person or organization controls the Internet in its entirety. The Internet is more of a concept than an actual tangible entity, and it relies on a physical infrastructure that connects networks to other networks.

One reason that the Internet is the communication medium of choice for the Web, however, is that no other existing packet switched network connects more than 100 million computers together and has over 350 million users.

#### Internet characteristics

##### Common Misconception

People (erroneously) tend to think the Internet:

- Has everything - full-text and for free
- Is more fun than using "traditional" library sources
- Is *always* the best source
  - Everything you find is current, truthful and accurate
  - What you find today will always be there
- Requires no particular skills to search or evaluate results

The Internet provides two services to its distributed applications: a connection-oriented service and a connectionless oriented service.

Loosely speaking, connection-oriented service guarantees that data transmitted from a sender to a receiver will eventually be delivered to the receiver in order and its entirety.

Connectionless service does not make any guarantees about eventual delivery. Typically, a distributed application makes use of one or the other of these two services and not both. Currently, the Internet does not provide a service that makes promises about how long it will take to deliver the data from sender to receiver. Also, except for increasing your access bit rate to your Internet service provider, you currently cannot obtain better service (for example, shorter delays) by paying more. Our second description of the Internet – in terms of the services it provides to distributed applications – is a non-traditional, but important, one. Increasingly, advances in the nuts-and-bolts components of the Internet are being driven by the needs of new applications. So it is important to keep in mind that the Internet is an infrastructure in which new applications are being constantly invented and deployed.

We have given two descriptions of the Internet, one in terms of its hardware and software components, the other in terms of the services it provides to distributed applications.

## 1.2 Internet Networks (LAN, WAN, WLAN)

Computer networking is one of the most exciting and important technological fields of our time. The internet interconnects millions and billions of computers, providing a global communication, storage and computation infrastructure. Moreover, the internet is currently being integrated with mobile and wireless technology, ushering

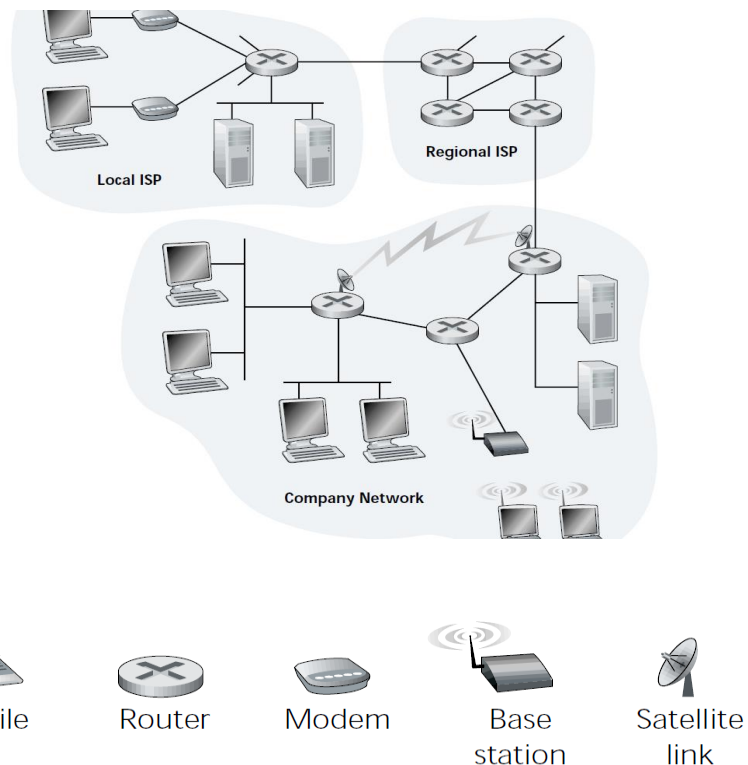


Figure 1: Some Pieces of the internet

According to Vangie Beal, a computer network is a group of two or more computer systems linked together. There many types of computer networks including:

- **Local Area Network(LAN):** The computer are geographically close together, that is in the same building
- **Wide area Networks (WAN):** The computers are father a part and are connected by telephone lines, copper cable, fiber optics or radio waves.
- **Campus area Network (CAN):** The computers are within a limited geographic area, such as a campus or military base.
- **Metropolitan area Network (MAN):** A data network designed for town or city.
- **Home area network (HAN):** A network contained within a user's home that connects a person's digital devices.

### 1.3 ICT, intranet, extranet and internet

#### - INFORMATION - COMMUNICATIONS – TECHNOLOGY (ICT)



ICT is an acronym that stands for **Information Communications Technology**

However, apart from explaining an acronym, there is not a universally accepted definition of ICT? Why? Because the concepts, methods and applications involved in ICT are constantly evolving on an almost daily basis. Its difficult to keep up with the changes - they happen so fast.

A good way to think about ICT is to consider all the uses of digital technology that already exist to help individuals, businesses and organizations use information.

**ICT covers any product that will store, retrieve, manipulate, transmits or receives information electronically in a digital form.** For example, personal computers, digital television, email, robots.

So ICT is concerned with the **storage, retrieval, manipulation, transmission or receipt** of digital data. Importantly, it is also concerned with the way these different uses can work with each other.

In business, ICT is often categorized into two broad types of product: -

(1) **The traditional computer-based technologies** (things you can typically do on a personal computer or using computers at home or at work); and

(2) The more recent, and fast-growing range of **digital communication technologies** (which allow people and organizations to communicate and share information digitally)

Let's take a brief look at these two categories to demonstrate the kinds of products and ideas that are covered by ICT:

### These types of ICT include:

Application	Use
<b>Standard Office Applications - Main Examples</b>	
<b>Word processing</b>	E.g. Microsoft Word: Write letters, reports etc
<b>Spreadsheets</b>	E.g. Microsoft Excel; Analyze financial information; calculations; create forecasting models etc
<b>Database software</b>	E.g. Oracle, Microsoft SQL Server, Access; Managing data in many forms, from basic lists (e.g. customer contacts through to complex material (e.g. catalogue)

<b><i>Presentation software</i></b>	E.g. Microsoft PowerPoint; make presentations, either directly using a computer screen or data projector. Publish in digital format via email or over the Internet
<b><i>Desktop publishing</i></b>	E.g. Adobe In design, Quark Express, Microsoft Publisher; produce newsletters, magazines and other complex documents.
<b><i>Graphics software</i></b>	E.g. Adobe Photoshop and Illustrator; create and edit images such as logos, drawings or pictures for use in DTP, web sites or other publications

### **Specialist Applications - Examples (there are many!)**

<b><i>Accounting package</i></b>	E.g. Sage, Oracle; Manage an organization's accounts including revenues/sales, purchases, bank accounts etc. A wide range of systems is available ranging from basic packages suitable for small businesses through to sophisticated ones aimed at multinational companies.
<b><i>Computer Aided Design</i></b>	Computer Aided Design (CAD) is the use of computers to assist the design process. Specialized CAD programs exist for many types of design: architectural, engineering, electronics, roadways
<b><i>Customer Relations Management (CRM)</i></b>	Software that allows businesses to better understand their customers by collecting and analyzing data on them such as their product preferences, buying habits etc. Often linked to software applications that run call centers and loyalty cards for example.

This course will also consider the following important topics that deal with the way ICT is used and managed in an organization:

- **The nature of information** (the "I" in ICT); this covers topics such as the meaning and value of information; how information is controlled; the limitations of ICT; legal considerations
- **Management of information** - this covers how data is captured, verified and stored for effective use; the manipulation, processing and distribution of information; keeping information secure; designing networks to share information
- **Information systems strategy** - this considers how ICT can be used within a business or organization as part of achieving goals and objectives

## **Internet**

This is *the world-wide network* of computers accessible to anyone who knows their Internet Protocol (**IP**) address - the IP address is a unique set of numbers (such as 209.33.27.100) that defines the computer's location. Most will have accessed a computer using a name such as <http://www.ur.ac.rw> . Before this *named* computer can be accessed, the name needs to be resolved (translated) into an IP address. To do this your browser (for example Netscape or Internet Explorer) will access a Domain Name Server (**DNS**) computer to lookup the name and return an IP address - or issue an error message to indicate that the name was not found. Once your browser has the IP address it can access the remote computer. The actual server (the computer that serves up the web pages) does not reside behind a firewall - if it did, it would be an Extranet. It may implement security at a directory level so that access is via a username and password, but otherwise all the information is accessible.

## Intranet

This is a network that is not available to the world outside of the Intranet. If the Intranet network is connected to the Internet, the Intranet will reside behind a firewall and, if it allows access from the Internet, will be an Extranet. The firewall helps to control access between the Intranet and Internet to permit access to the Intranet only to people who are members of the same company or organization.

In its simplest form, an Intranet can be set up on a networked PC without any PC on the network having access via the Intranet network to the Internet.

For example, consider an office with a few PCs and a few printers all networked together. The network would not be connected to the outside world. On one of the drives of one of the PCs there would be a directory of web pages that comprise the Intranet. Other PCs on the network could access this Intranet by pointing their browser (Netscape or Internet Explorer) to this directory - for example

U:\inet\index.htm.

From then onwards they would navigate around the Intranet in the same way as they would get around the Internet.

## Extranet

An Extranet is actually an Intranet that is partially accessible to authorized outsiders. The actual server (the computer that serves up the web pages) will reside behind a firewall. The firewall helps to control access between the Intranet and Internet permitting access to the Intranet only to people who are suitably authorized. The level of access can be set to different levels for individuals or groups of outside users. The access can be based on a username and password or an IP address (a unique set of numbers such as 209.33.27.100 that defines the computer that the user is on).

## 1.4 Internet Protocol (TCP/IP)

Now, since we have a little feel on what is the internet let's have time to discuss on the protocol. We will know what is a protocol, what does a protocol do? And how would recognize a protocol.

Let's take example in our everyday life. Consider what the human protocol use to do when there is a party. A typical Human exchange is shown down

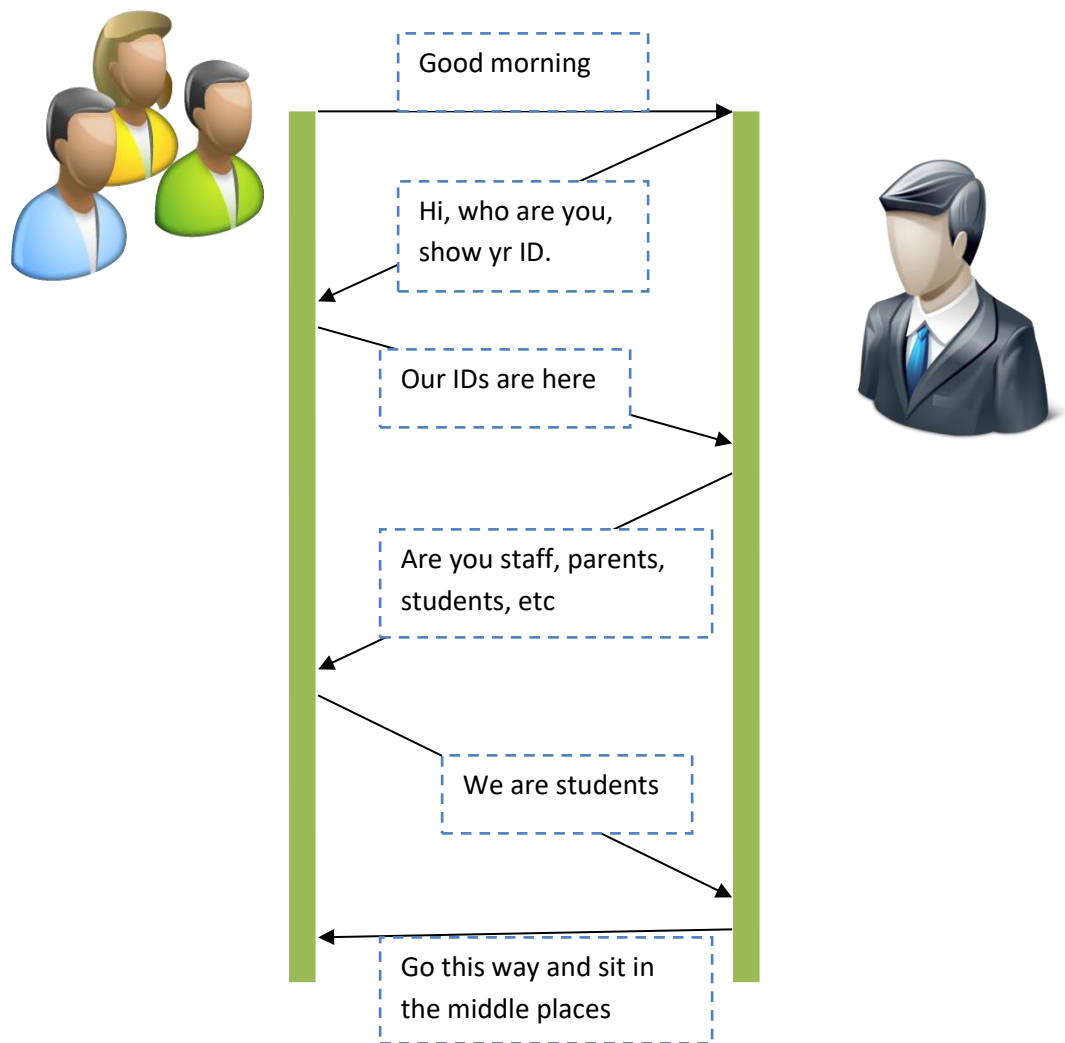


Figure 2: Human Communication/Protocol



To initiate the communication with someone you have at least to say hi or good morning as shown in Figure 3, then wait for the response such as “Don’t disturb me, or I don’t speak English, or keep quiet”, might indicate an unwillingness or inability to communicate with you. In this case, the human protocol would be not to continue the conversation. Sometimes one gets no response at all to a question. Note that in our human protocol, there are specific messages we send, and specific

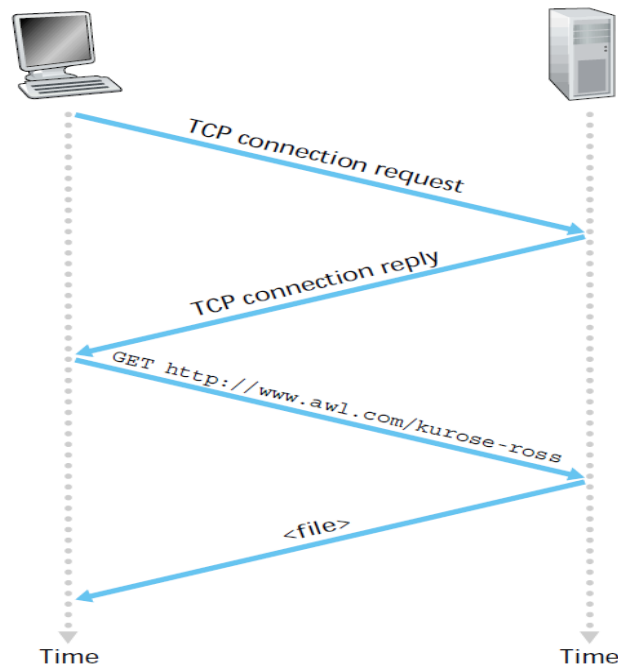


Figure 3: Computer Network Protocol

actions we take in response to the received reply messages or other events (such as no reply for some reasons.) Clearly transmitted and received messages and actions taken when these messages are sending and received or other events play a central role in human protocol. If people run different protocol, for instance if one person has manners but the other does not, or if one understand the concept of some events and the other does not, the protocols do not interoperate and no useful work can be accomplished.

The same is true in networking. It takes two or more communicating entities running the same protocol in order to accomplish a task.

## 1.5 Network Protocols

A network protocol is similar to human protocol, except that the entities exchanging messages and taking actions are hardware or software components of some device (for example computer, router, or other network capable devices). All activity in the internet that involves two or more communicating remote entities is governed by a protocol. For example, protocols in routers determine a packet’s path from source to destination; hardware implemented protocols in the network interface cards of two physically connected computers control flow of bits on the wire

between two network interface cards; congestion control protocol in and systems control the rate at which packets are transmitted between sender and receiver. Protocols are running everywhere in the internet.

An example of computer network protocol with which you are probably familiar, consider what happens when you make a request to a web server, that is, when you type in the URL of the web page into your web browser.

- First your computer will send a **connection request** message to the web server and wait for a reply. The web server will eventually receive your connection request message and return a **connection reply** message
- Knowing that it is now OK to request the web document, your computer then send the name of the web page it wants to fetch from that web server in a **get** message
- Finally, the web server returns the contents of the web document to the computer.

A **protocol** defines the format and the order of messages exchanged between two or more communicating entities, as well as the actions taken on the transmission and /or receipt of a message or other event.

The internet and computer networks in general make extensive use of protocols. Different protocols are used to accomplish different communication tasks. Some protocols are simple and straight forward while others are complex and intellectually deep.

➔ Mastering the field of computer networking is equivalent to understanding the what, why, and how the networking protocols.

## End systems, Clients and servers

In computer networking jargon, the computers connected to the internet are often referred to as **end systems**, because they sit at the edge of the internet.

**Client:** tend to be desktop and mobile PCs, PDAs and so on

**Server:** Tend to be more powerful machines hosting servers such as Web servers, mail servers...

## 1.6 IPv4 vs IPv6

IPv4 (Internet Protocol Version 4) is the most widely used version of the Internet Protocol. It defines IP addresses in a 32-bit format, which looks like 123.123.123.123. Each three-digit section can include a number from 0 to 255, which means the total number of IPv4 addresses available is 4,294,967,296 ( $256 \times 256 \times 256 \times 256$  or  $2^{32}$ ).

Each computer or device connected to the Internet must have a unique IP Address in order to communicate with other systems on the Internet. Because the number of systems connected to the Internet is quickly approaching the number of available IP addresses, IPv4 addresses are predicted to run out soon. When you consider that there are over 6 billion people in the world and many people have more than one system connected to the Internet (for example, at home, school, work, etc.), it is not surprising that roughly 4.3 billion addresses is not enough.

To solve this problem, a new 128-bit IP system, called IPv6 (Internet Protocol Version 6), has been developed and is in the process of replacing the current IPv4 system. During this transitional process from IPv4 to IPv6, systems connected to the Internet may be assigned both an IPv4 and IPv6 address.

- **IPv6** is a newer numbering system that provides a much larger address pool than IPv4. It was deployed in 1999 and should meet the world's IP addressing needs well into the future.
- IPv4 supports three different type of addressing modes:

#### Unicast Addressing Mode

In this mode, data is sent only to one destined host. The Destination Address field contains 32- bit IP address of the destination host.

#### Broadcast Addressing Mode

In this mode the packet is addressed to all hosts in a network segment. The Destination Address field contains special broadcast address i.e. **255.255.255.255**. When a host sees this packet on the network, it is bound to process it.

#### Multicast Addressing Mode

This mode is a mix of previous two modes, i.e. the packet sent is neither destined to a single host nor all the host on the segment. In this packet, the Destination Address contains special address which starts with 224.x.x.x and can be entertained by more than one host.

### Comparison of IPv4 and IPv6

	IPv4	IPv6
Deployed	1981	1999
Address Size	32-bit number	128-bit number
Address Format	Dotted Decimal Notation: 192.149.252.76	Hexadecimal Notation: 3FFE:F200:0234:AB00:

		0123:4567:8901:ABCD
<b>Prefix Notation</b>	192.149.0.0/24	3FFE:F200:0234::/48
<b>Number of Addresses</b>	$2^{32} = \sim 4,294,967,296$	$2^{128} = \sim 340,282,366,920,938,463,463,374,607,431,768,211,456$

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. The technical functioning of the Internet remains the same with both versions and it is likely that both versions will continue to operate simultaneously on networks well into the future. To date, most networks that use IPv6 support both IPv4 and IPv6 addresses in their networks.

## 1.7 Upload/Download

Nearly every online activity involves either downloading (data you receive) or uploading (data you send). The amount of usage you accumulate varies depending on the pages you visit and what you do online.

If you exceed your plan's monthly usage allowance you'll either be billed an additional charge or your access will be slowed –based on the plan you have chosen. Remember, keeping track of your usage is up to you. If you know what's adding to your usage, you'll know how to manage it effectively.

The easiest way to think about uploading and downloading is:

**UPLOAD:** Information going 'from' your computer

**DOWNLOAD**– Information coming 'to' your computer.

When you visit a website, view multi-media content such as video clips or just browse, you're downloading data to your computer. When you send an email, place image or comments on a website or allow access to files stored on your computer via a file sharing programs such as Bit-Torrent or Limewire, you're uploading data from your computer.

## WHAT & HOW MUCH IS 1 MB?

A megabyte (MB) is a measure of computer storage. 1MB is made up of approximately 1000 kilobytes. If you measured a megabyte by pages of text, it would be roughly equal to 600 pages

or a large novel. A plain text email has an average size of 2KB (kilobytes) –so a megabyte would be equal to about 500 plain text emails. A digital camera photo is usually between 1MB and 4MB in size, depending on the resolution and an MP3 music file is usually 4MB in size.

## WHAT ACTIVITIES IMPACT MY USAGE?

Here are some common applications and activities that can cause your usage to skyrocket.

- Peer to Peer
- Hackers
- File downloads
- Streaming Audio/video
- Using download managers
- Online gaming
- Sending and receiving emails
- News groups and chat
- Multiple users

Here are also some common causes of usage that you may not be aware of:

- Automatic downloads
- Sending/Receiving digital images, large attachments via emails
- Downloading songs on for your mp3 player, iPod
- Playing online games on your computer
- Emails that don't reach their destination

### Automatic Downloads

These days, most software includes an Automatic Update feature. It regularly contacts the software manufacturer online to check for and download updates. On one hand this is great. You don't have to remember to check for updates yourself or do anything to get them. However, software updates can be huge. They're downloaded on your internet account so this can really bump up your monthly usage. For example, the essential Windows XP Service Pack 2 update can be up to 260MB which could be all or a big chunk of your usage allowance!

### Digital Images & Large Attachments

Digital photos mean that you can share your special moments with anyone anywhere in the world almost instantly. The size of a high quality digital photo taken with a standard 5 mega pixel camera could be up to 1 MB or more (better picture quality means bigger size and more usage). Remember, both sending and receiving file attachments will send your usage up, so sharing special moments with your family and friends over email could potentially cause your usage to climb really high!

### Downloading Music

Downloading music online and playing it on your portable music player (mp3, iPod) is so easy and convenient. A standard music player has over 1 gig (1000MB) of storage -this means you could download 100's of songs from the internet which will send your usage up. For example, a standard track is about 3-10MB (better sound quality means larger size and more usage), so your usage can easily add up.

### Emails that don't reach their destination

Usually you don't need to think twice about sending and receiving emails. But, sometimes emails get stuck between the email program on your computer and the mail server. This can happen when the messages you're trying to send or receive are too big and therefore can't get to their destination. Your email program/server will keep trying to send or receive the email and every time this happens your usage goes up.

### Protect your system

The internet connects millions of users around the world, and while most use it for things like research, emailing, entertainment or shopping, there are some who use it for dishonest purposes. They can take advantage of unsuspecting users by finding ways to install programs, including viruses, on their computer. The damage of the programs can vary, they may:

- Display advertising
- Capture your browsing information and send them back to a central source
- Use your computer to send spam
- Use your computer to attack computer networks (often of major businesses)
- Enable hackers to browse your files
- Capture your username and password.

The programs will usually slow down your computer and cause unwanted usage on your account.

## 1.8 Internet Security and Firewall

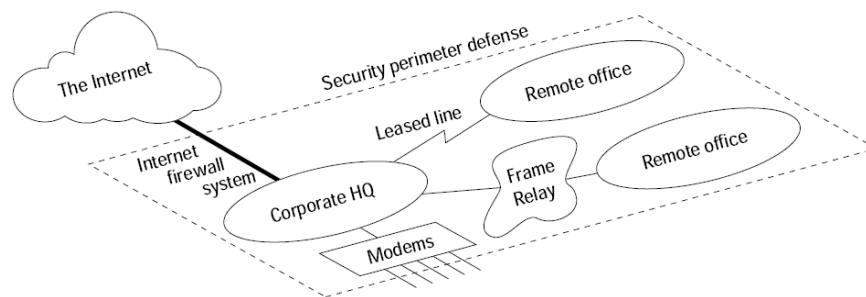
Security has become one of the primary concerns when an organization connects its private network to the Internet. Regardless of the business, an increasing number of users on private networks are demanding access to Internet services such as the World Wide Web (WWW), Internet mail, Telnet, and File Transfer Protocol (FTP). In addition, corporations want to offer WWW home pages and FTP servers for public access on the Internet.

Network administrators have increasing concerns about the security of their networks when they expose their organization's private data and networking infrastructure to Internet crackers. To provide the required level of protection, an organization needs a security policy to prevent unauthorized users from accessing resources on the private network and to protect against the unauthorized export of private information. Even if an organization is not connected to the Internet, it may still want to establish an internal security policy to manage user access to portions of the network and protect sensitive or secret information.

## Internet Firewalls

An Internet firewall is a system or group of systems that enforces a security policy between an organization's network and the Internet. The firewall determines which inside services may be accessed from the outside, which outsiders are permitted access to the permitted inside services, and which outside services may be accessed by insiders.

For a firewall to be effective, all traffic to and from the Internet must pass through the firewall, where it can be inspected (Figure 5). The firewall must permit only authorized traffic to pass, and the firewall itself must be immune to penetration. Unfortunately, a firewall system cannot offer any protection once an attacker has gotten through or around the firewall. It is important to note that an Internet firewall is not just a router, a bastion host, or a combination of devices that provides security for a network. The firewall is part of an overall security policy that creates a perimeter defense designed to protect the information resources of the organization. This security policy must include published security guidelines to inform users of their responsibilities; corporate policies defining network access, service access, local and remote user authentication, dial-in and dialout, disk and data encryption, and virus protection measures; and employee training. All potential points of network attack must be protected with the same level of network security. Setting up an Internet firewall without a comprehensive security policy is like placing a steel door on a tent.

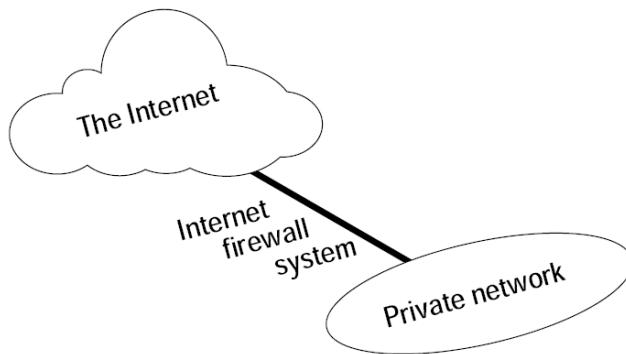


## Benefits of an Internet Firewall

1. Internet firewalls manage access between the Internet and an organization's private network (Figure 6). Without a firewall, each host system on the private network is exposed to attacks from other hosts on the Internet. This means that the security of the private network would depend on the "hardness" of each host's security features and

Figure 4: Security Policy Creates a Perimeter Defense

would be only as secure as the weakest system.



- Concentrates network security
- Serves as centralized access “choke point”
- Generates security alarms
- Monitors and logs Internet usage
- Good location for Network Address Translator (NAT)
- Good location for WWW and FTP servers

**Figure 5: Benefits of an Internet Firewall**

2. Internet firewalls allow the network administrator to define a centralized “check point” that keeps unauthorized users such as hackers, crackers, vandals, and spies out of the protected network; prohibits potentially vulnerable services from entering or leaving the protected network; and provides protection from various types of routing attacks. An Internet firewall simplifies security management, since network security is consolidated on the firewall systems rather than being distributed to every host in the entire private network.
3. Firewalls offer a convenient point where Internet security can be monitored and alarms generated. It should be noted that for organizations that have connections to the Internet, the question is not whether but when attacks will occur. Network administrators must audit and log all significant traffic through the firewall. If the network administrator doesn’t take the time to respond to each alarm and examine logs on a regular basis, there is no need for the firewall, since the network administrator will never know if the firewall has been successfully attacked!
4. For the past few years, the Internet has been experiencing an address space crisis that has made registered IP addresses a less plentiful resource. This means that organizations wanting to connect to the Internet may not be able to obtain enough registered IP addresses to meet the demands of their user population. An Internet firewall is a logical place to deploy a Network Address Translator (NAT) that can help alleviate the address space shortage and eliminate the need to renumber when an organization changes Internet service providers (ISPs).
5. An Internet firewall is the perfect point to audit or log Internet usage. This permits the network administrator to justify the expense of the Internet connection to management, pinpoint potential bandwidth bottlenecks, and provide a method for departmental charge-backs if this fits the organization’s financial model.
6. An Internet firewall can also offer a central point of contact for information delivery service to customers. The Internet firewall is the ideal location for deploying World Wide

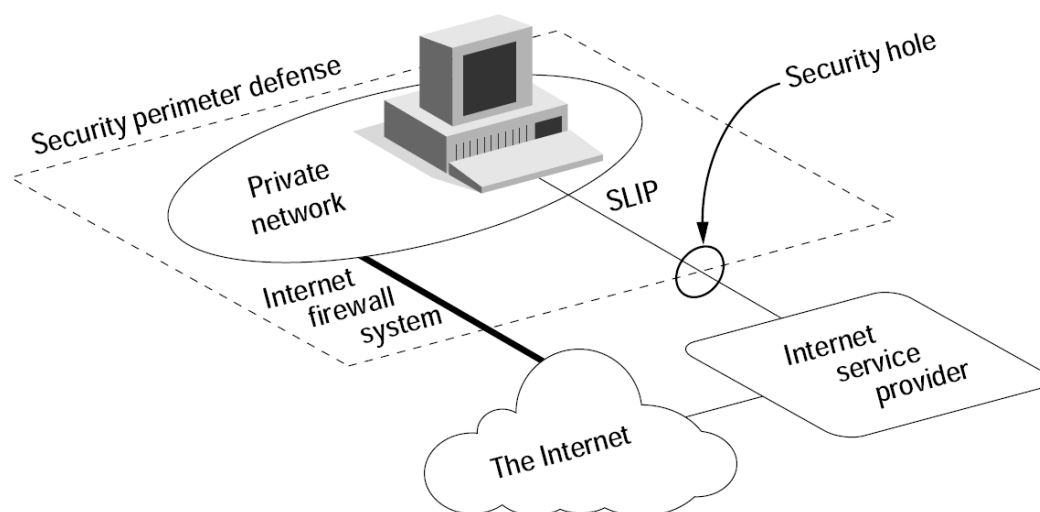


Web and FTP servers. The firewall can be configured to allow Internet access to these services, while prohibiting external access to other systems on the protected network.

7. Finally, some might argue that the deployment of an Internet firewall creates a single point of failure. It should be emphasized that if the connection to the Internet fails, the organization's private network will still continue to operate—only Internet access is lost. If there are multiple points of access, each one becomes a potential point of attack that the network administrator must firewall and monitor regularly.

## Limitations of an Internet Firewall

An Internet firewall cannot protect against attacks that do not go through the firewall. For example, if unrestricted dial-out is permitted from inside the protected network, internal users can make a direct SLIP or PPP connection to the Internet. Users who become irritated with the additional authentication required by firewall proxy servers may be tempted to circumvent the security system by purchasing a direct SLIP or PPP connection to an ISP. Since these types of connections bypass the security provided by the most carefully constructed firewall, they create a significant potential for back-door attacks (Figure 7). Users must be made aware that these types of connections are not permitted as part of the organization's overall security architecture.



**Figure 6: A Connection Circumventing an Internet Firewall**

Internet firewalls cannot protect against the types of threats posed by traitors or unwitting users. Firewalls do not prohibit traitors or corporate spies from copying sensitive data onto floppy disks or PCMCIA cards and removing them from a building. Firewalls do not protect against attacks where a hacker, pretending to be a supervisor or a befuddled new employee, persuades a less sophisticated user into revealing a password or granting them “temporary” network access. Employees must be educated about the various types of attacks and about the need to guard and periodically change their passwords.

Internet firewalls cannot protect against the transfer of virus-infected software or files. Since there are so many different viruses, operating systems, and ways of encoding and compressing binary files, an Internet firewall cannot be expected to accurately scan each and

every file for potential viruses. Concerned organizations should deploy anti-viral software at each desktop to protect against their arrival from floppy disks or any other source.

Finally, Internet firewalls cannot protect against data-driven attacks. A data-driven attack occurs when seemingly harmless data is mailed or copied to an internal host and is executed to launch an attack. For example, a data-driven attack could cause a host to modify security-related files, making it easier for an intruder to gain access to the system. As we will see, the deployment of proxy servers on a bastion host is an excellent means of prohibiting direct connections from the outside and reducing the threat of data-driven attacks.

#### WHAT FIREWALL DOES NOT DO?

- A firewall however will not give you full security and make you completely safe online.
- It is one of the first lines of defense, but on its own it will not protect you 100% that is why internet security software suite includes several other pieces of software as well.

#### THINGS THAT FIREWALL DOES NOT PROTECT YOU AGAINST

1. Most viruses
2. Spam messages
3. Poorly configured wireless network
4. Malware software installations (it prevents spyware actions , although the spyware may still be present in your computer).

#### SOME TERMINOLOGIES

- **Phishing:** is the attempt to acquire sensitive information such as user names , and credit card details by masquerading a trust worthy entity in an electronic communication
- **Encryption:** is the process of encoding messages in such away that only authorized parties can read it.
- **Malware:** a computer user can be tricked of forced into downloading software onto a computer that is malicious int. Such programs are known as malware and come in many forms , such as viruses, Trojan horses, spyware, and worms.
- **Worms:** are programs that can replicate themselves throughout a computer network, performing malicious tasks throughout.
- **Trojan horse:** is a general term for malicious that pretends to be harmless , so that a user willing allows to be downloaded onto the computer.
- **Spyware:** refers to programs that surreptitiously monitor activity on a computer system report that information to others without the user's consent.

### 1.9 Internet Service Provider

**ISP** (internet service provider): is an organization that provides services for accessing, using or participating in the internet. ISP may be organized in various forms such as commercial, community-owned, non profit or otherwise privately owned.

**Internet services** typically provided by internet service providers include internet access, internet transit, domain name registration, web hosting, collocation...

#### CLASSIFICATIONS OF ISP

- ❖ **Access providers:** Internet access is provided by ISPs that employ a range of technologies to connect users to their network. Available technologies have ranged from computer modems with acoustic couplers to telephone lines, to television cables (CATV), wireless Ethernet (WI FI), and fiber optics.
- ❖ **Mailbox providers:** Is an organization that provides services for hosting electronic mail domains with access to storage for mail boxes. It provides Email servers to send, receive access and store Email for end users or other organization.
- ❖ **Hosting ISPs:** Internet hosting services provides email, web hosting, or online storage services.
- ❖ **Transit ISPs:** Just as the customers pay them for internet access, ISP themselves pay upstream ISP for internet access. In simplest case, a single connection is established to an upstream ISP and is used to transmit data to and from areas of the internet beyond the home network.
- ❖ **Virtual ISPs:** is an operation that purchases services from another ISP, sometime called a **wholesale ISP** in this context.
- ❖ **Free ISPs:** are internet service providers that provide service free of charge. For example commercial television, communication
- ❖ **Wireless ISPs:** is an internet service providers with a network based on wireless networking. Example: Wi-Fi wireless.

#### FORMS OF INTERNET CONNECTION GIVEN BY ISP

- ❖ **Wireless:** Radio frequency bands are used in place of telephone or cable network, it is always on.
- ❖ **Mobile:** Many cell phone and smart phone provides after voice plans with internet access.
- ❖ **Hotspot:** Are sites that offer internet access over a wireless local area network by way of router that connect to an internet service provider.
- ❖ **Dial-up:** Link phone to a computer to access the internet. This is the oldest method of providing access to the Internet. It uses a telephone line to perform a modem-to-modem connection. For that purpose, the user's computer is attached to a telephone line enabled modem device, which dials into the node of the ISP and starts transferring data between the servers that store websites the user wants to see and their Internet connected device. The dial-up Internet is today considered outdated in most Internet societies due to the slow connection speed it ensures (about 40-50 kbit/s.). However, the wide availability of telephone access makes this type of Internet access the only alternative for remote areas that remain off the broadband network. It is also the least expensive Internet access service and is preferred by users on a tight budget.
- ❖ **Broad band:** This is a new-generation broadband Internet access technology, allowing the delivery of high-speed wireless Internet within a large area. Wireless broadband ISPs (WISPs) ensure connection speeds that come close to the wired broadband speeds provided by DSL and cable ISPs. To get wireless broadband you need to place a specific dish on your house roof or apartment balcony and point it to the transmitter of your

WISP. This type of Internet access is used as an alternative to the wired broadband connection in remote areas.

- ❖ **DSL:** short for 'digital subscriber loop' or 'digital subscriber line', is an advanced version of the dial-up Internet access method. In contrast to dial-up, DSL uses high frequency to execute a connection over the local telephone network. This allows the Internet and the phone connections to be run on one and the same telephone line. The digital subscriber line technology ensures an Asymmetric Digital Subscriber Line (ADSL), where the upload speed is lower than the download speed, and a Symmetric Digital Subscriber Line (SDSL), offering equal upload and download speeds. Of them both, ADSL is much more popular and is even known as just DSL to users.
- ❖ **Cable:** The cable Internet is among the most preferred methods for providing residential Internet access. Technically speaking, it represents a broadband Internet access method, using the high-bandwidth cable television network to transmit data between the global network and the households. To use cable Internet you will need a cable modem at home that will be connected with the CMTS (Cable Modem Termination System) of your cable ISP. The cable Internet access can be offered together with a cable television subscription and separately, for customers' convenience. The second case incurs higher subscription fees due to the extra equipment installation costs.
- ❖ **Satellite**
- ❖ **WiFi:** Wi-Fi (from Wireless Fidelity) has become one of the most widely distributed Internet access methods, with the growing usage of portable computers and Internet enabled mobile devices, such as smart phones, PDAs, game consoles, etc. In this sense, it is the most mobile Internet access method, since you are able to use it everywhere as long as you are located within the scope of coverage, i.e. within the range of an Internet connected wireless network. Due to its ability to serve mobile devices, Wi-Fi is used in public places such as airports, hotels and restaurants to provide Internet access to customers. There are also specialized Wi-Fi hotspots where the service is either free or paid. Some of the largest cities in the world are in the process of building Wi-Fi networks that cover all the public places in the central areas.
- ❖ **Ethernet:** Another Internet access type worth mentioning is Ethernet - the most widespread wired LAN (local area network) technology, also used in wireless LANs. The Ethernet technology may ensure various speed levels and can thus be divided into several types: regular Ethernet, providing transmission speeds of up to 10 mbits/s, fast Ethernet, offering up to 100 mbits/s, gigabit Ethernet, supporting 1 gbit/s and 10-Gbit Ethernet, coming at up to 10 gbits/s.
- ❖ **ISDN:** Another online data transmission method worth considering is ISDN or the Integrated Services Digital Network. ISDN represents a telephone system network, integrating a high-quality digital transmission of voice and data over the ordinary phone line. Ensuring a much better data transmission over the phone line than an analog line could allow, the ISDN offers a fast upstream/downstream Internet connection speed of

128 kbit/s. This speed level can be considered as a broadband speed as opposed to the narrowband speed of standard analog 56k telephone lines.

## Chapter 2: Web

### 2.1 World Wide Web (WWW)

According to Vangie Beal, The World Wide Web is system internet servers that support specially formatted documents. The documents are formatted in a markup language called HTML (*HyperText Markup Language*) that supports links to other documents, as well as graphics, audio, and video files. This means you can jump from one document to another simply by clicking on hot spots. Not all Internet servers are part of the World Wide Web.

Also the World-Wide Web is defined as a collection of documents and services, distributed across the Internet and linked together by hypertext links. The web is therefore a subset of the Internet.

### 2.2 Is the Web and the Internet the Same?

*The **Internet*** is **not** synonymous with World Wide Web. The Internet is a massive network of networks, a networking infrastructure. It connects millions of computers together globally, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet. The World Wide Web, or simply Web, is a way of accessing information over the medium of the Internet. It is an information-sharing model that is built on top of the Internet.

*The **web*** is software application or services that run on the internet. It is a connection of documents and resources. It is one of the growing parts of the internet.

It is worth emphasizing that the Web is not a separate network but rather just one of many distributed applications that use the communication services provided by the Internet

### 2.3 Web interfaces and its ergonomics

- Users from various cultural and technological back ground are exposed to a common interface, the interface developer seeks to ensure that the interface does not harm the user. Ergonomics is from 2 Greek words which are: ergo= work, namoi = natural laws.

#### Web interface

- is the actual part of the browser where you view the web pages on the internet. It is also referred as the interaction between a user and software running on a Web server. The user interface is the Web browser and the Web page it has downloaded and rendered.

## Ergonomics

- refer to designing virtual interfaces that cater towards the wellness of the human body, its emotional and cognitive abilities.

The ergonomics should have the following characteristics.

### 1 Consistency

Certain aspects of an interface should behave in consistent ways at all times for all screens

- Terminology should be consistent between screens
- Icons should be consistent between screens
- Colors should be consistent between screens of similar function

### 2. Meet Human Memory Limitations

- Try to create short linear sequences of tasks.
- Don't flash important information onto the screen for brief time periods.
- Provide cues/navigation aids for the user to know where they are in the software or at what stage they are in an operation.
- Provide ongoing feedback on what is and/or just has happened.

### 3. Feedback

- Provide informative feedback at the appropriate points
- Provide appropriate articulatory feedback - feedback that confirms the physical operation you just did (e.g. typed 'help' and 'help' appear on the screen). This includes all forms of feedback, such as auditory feedback (e.g. system beeps, mouse click, key clicks etc.)
- Provide appropriate semantic feedback - feedback that confirms the intention of an action (e.g. highlighting an item being chosen from a list)
- Provide appropriate status indicators to show the user the progress with a lengthy operation (e.g. the copy bar when copying files, an hour glass icon when a process is being executed etc.)

### 4. Simplicity

- ❖ Break complex tasks into simpler tasks
- ❖ Break long sequences into separate steps
- ❖ Keep tasks easy by using icons, words etc.
- ❖ Use icons/objects that are familiar to the user

### 5. Modality

- Use modes cautiously - a mode is an interface state where what the user does has different actions than in other states (e.g. changing the shape of the cursor can indicate whether the user is in an editing mode or a browsing mode)
- Minimize preemptive modes, especially irreversible preemptive modes - a preemptive mode is one where the user must complete one task before proceeding to the next. In a preemptive mode other software functions are inaccessible (e.g. file save dialog boxes)
- Allow escape routes from operations

## 6. Attention

- Use colors appropriately and make use of expectations (e.g. don't have an OK button colored red! use green for OK, yellow for 'caution, and red for 'danger' or 'stop')
- Don't use more than 4 different colors on a screen
- Don't use blue for text (hard to read), blue is a good background color
- Don't put red text on a blue background
- Use colors consistently

## 2.4 Web Content Management

**Web Content Management Systems** (WCM or WCMS), are systems (usually web based) that facilitate the creation, management and delivery of information (content and documents), typically via corporate websites, portals, extranets or intranets.

A **web content management system (WCMS)** is a software system that provides websites authoring, collaboration, and administration tools designed to allow users with little knowledge of web programming languages or markup languages to create and manage website content with relative ease.

A **Web Content Management System** is typically a software tool used by both technical and non-technical staff to manage the creation of structured web pages for a web based experience such as an Internet Website, Intranet or Extranet solution.

### Capabilities

A web content management system is used to control a dynamic collection of web material, including HTML documents, images, and other forms of media. A CMS facilitates document control, auditing, editing, and timeline management.

A WCMS typically has the following features:

### Automated templates

Create standard output templates (usually HTML and XML) that can be automatically applied to new and existing content, allowing the appearance of all content to be changed from one central place.

### Access control

Some WCMS systems support user groups. User groups allow you to control how registered users interact with the site. A page on the site can be restricted to one or more groups. This means an anonymous user (someone not logged on), or a logged on user who is not a member of the group a page is restricted to, will be denied access to the page.



### **Content virtualization**

CMS software may provide a means of allowing each user to work within a virtual copy of the entire web site, document set, and/or code base. This enables changes to multiple interdependent resources to be viewed and/or executed in-context prior to submission.

### **Easily editable content**

Once content is separated from the visual presentation of a site, it usually becomes much easier and quicker to edit and manipulate. Most WCMS software includes WYSIWYG editing tools allowing non-technical users to create and edit content.

### **Web standards upgrades**

Active WCMS software usually receives regular updates that include new feature sets and keep the system up to current web standards.

### **Types of web content management systems**

There are three major types of WCMS: offline processing, online processing, and hybrid systems. These terms describe the deployment pattern for the WCMS in terms of when presentation templates are applied to render web pages from structured content.

#### **1. Offline processing**

These systems, sometimes referred to as "static site generators", pre-process all content, applying templates before publication to generate web pages. Since pre-processing systems do not require a server to apply the templates at request time, they may also exist purely as design-time tools.

#### **2. Online processing**

These systems apply templates on-demand. HTML may be generated when a user visits the page or it is pulled from a web cache.

#### **3. Hybrid systems**

Some systems combine the offline and online approaches. Some systems write out executable code (e.g., JSP, ASP, PHP, ColdFusion, or Perl pages) rather than just static HTML, so that the CMS itself does not need to be deployed on every web server. Other hybrids operate in either an online or offline mode.

### **Advantages**

#### **1. Low cost**

Some content management systems are free such as WordPress. Others may be affordable based on size subscriptions. Although subscriptions can be expensive, overall the cost of not having to hire full-time developers can lower the total costs. Plus software can be bought based on need for many CMSs.



## **2. Easy customization**

A universal layout is created, making pages have a similar theme and design without much code. Many CMS tools use a drag and drop AJAX system for their design modes. It makes it easy for beginner users to create custom front-ends.

## **3. Easy to use**

CMSs are designed with non-technical people in mind. Simplicity in design of the admin UI allows website content managers and other users to update content without much training in coding or technical aspects of system maintenance.

## **Disadvantages**

### **1. Cost of implementations**

Larger scale implementations may require training, planning, and certifications. Certain CMSs may require hardware installations. Commitment to the software is required on bigger investments. Commitment to training, developing, and upkeep are all costs that will be incurred for enterprise systems.

### **2. Cost of maintenance**

Maintaining CMSs may require license updates, upgrades, and hardware maintenance.

### **3. Latency issues**

Larger CMSs can experience latency if hardware infrastructure is not up to date, if databases are not being utilized correctly, and if web cache files that have to be reloaded every time data is updated grow large.

## **Security**

CMS's are often forgotten about when hardware, software, and operating systems are patched for security threats. Due to lack of patching by the user, a hacker can use unpatched CMS software to exploit vulnerabilities to enter an otherwise secure environment. CMS's should be part of an overall, holistic security patch management program.

## **2.5 Types of Web servers**

### **1. Server Platform**

A Server platform is the fundamental hardware or software for a system which acts as an engine that drives the server. It is often used synonymously with an operating system.

### **2. Application Server**

Application Servers occupy a substantial amount of computing space between database servers and the end user and is commonly sometimes used to connect the two.

### **3. Audio/Video Server**

It provides multimedia capabilities to websites by helping the user to broadcast streaming multimedia content.

#### **4. Chat Server**

It serves the users to exchange data in an environment similar to Internet newsgroup which provides real time discussion capabilities.

#### **5. Fax Server**

It is one of the best options for organizations seeking for minimum incoming and outgoing telephone resources, but requires to fax actual documents.

#### **6. FTP Server**

It works on one of the oldest of the Internet services, the file transfer protocol. It provides a secure file transfer between computers while ensuring file security and transfer control.

#### **7. Groupware Server**

It is software designed that enables the users to work together, irrespective of the location, through the Internet or a corporate intranet and to function together in a virtual atmosphere.

#### **8. IRC Server**

It is an ideal option for those looking for real-time discussion capabilities. Internet Relay Chat comprises different network servers that enable the users to connect to each other through an IRC network.

#### **9. List Server**

It provides a better way of managing mailing lists. The server can be either open interactive discussion for the people or a one-way list that provide announcements, newsletters or advertising.

#### **10. Mail Server**

It transfers data and stores mails over corporate networks through LANs, WANs and across the Internet.

#### **11. News Server**

It serves as a distribution and delivery source for many public news groups, approachable over the USENET news network.

#### **12. Proxy Server**

It acts as a mediator between a client program and an external server to filter requests, improve performance and share connections.

#### **13. Telnet Server**

It enables the users to log on to a host computer and execute tasks as if they are working on a remote computer.

#### **14 Web Servers**

It provides static content to a web browser by loading a file from a disk and transferring it across the network to the user's web browser. This exchange is intermediated by the browser and the server, communicating using HTTP.

## **2.6 Domain Name and Registration**

A domain name is a unique name that identifies a website. For example, the domain name of the Tech Terms Computer Dictionary is "techterms.com." Each website has a domain name that serves as an address, which is used to access the website.

Whenever you visit a website, the domain name appears in the address bar of the web browser. Some domain names are preceded by "www" (which is not part of the domain name), while others omit the "www" prefix. All domain names have a domain suffix, such as .com, .net, or .org. The domain suffix helps identify the type of website the domain name represents. For example, ".com" domain names are typically used by commercial website, while ".org" websites are often used by non-profit organizations. Some domain names end with a country code, such as ".dk" (Denmark) or ".se" (Sweden), or .rw for Rwanda which helps identify the location and audience of the website. Domain names are relatively cheap to register, though they must be renewed every year or every few years. The good news is that anyone can register a domain name, so you can purchase a unique domain name for your blog or website. The bad news is that nearly all domain names with common words have already been registered. Therefore, if you want to register a custom domain name, you may need to think of a creative variation. Once you decide on a domain name and register it, the name is yours until you stop renewing it. When the renewal period expires, the domain name becomes available for others to purchase.

**NOTE:** When you access a website, the domain name is actually translated to an IP address, which defines the server where the website located. This translation is performed dynamically by a service called DNS.

### What is a Domain Name?

A domain name, like **www.coolexample.com**, is a lot like a street address for a house or business. Let's use the White House as an example. The street address, 1600 Pennsylvania Avenue, is an exact location — like an IP address. You might not know the exact street address, but when you visit Washington, D.C., you can tell your cabbie that you want to visit the White House and still get there. This is how a domain name is used: It's an easy way to reach the exact location of a website without having to remember its numeric address.

A domain name consists of, at least, a top-level and a second-level domain. A top-level domain (TLD) is the part of the domain name located to the right of the dot ("."). The most common TLDs are .com, .net, and .org.

Many domains, also called extensions, can be registered by anyone, like .com, .net, and .org. A second-level domain (SLD) is the portion of the domain name that is located immediately to the left of the dot and domain name extension. For example, the SLD in *coolexample.com* is *coolexample*.

### **Advanced Domain Name Description**

A domain name represents a physical point on the Internet — an IP address. The Internet Corporation for Assigned Names and Numbers (ICANN) governs coordination of the links

between IP addresses and domain names across the Internet. With this standardized coordination, you can find websites on the Internet by entering domain names instead of IP addresses into your Web browser.

### What is an IP Address?

An IP (Internet Protocol) address is a unique identifying string of numbers, like **216.27.61.137**, given to every individual computer, server, and network on the Internet. Like a license plate is used to help identify vehicles, an IP address is used to identify and locate information online. Additionally, they allow for communication over the internet between devices and networks connected to the internet.

### What is the 'www' before my domain name?

The **www** before your domain name is a subdomain, not part of the domain name itself. Therefore, if you set up your **www** CNAME record to point to your primary A record, your site will resolve both at **www.coolexample.com** and **coolexample.com**.

If you can reach your website by typing in your domain without the **www** but cannot reach it when you type the **www**, then your CNAME might be set up incorrectly. Follow the instructions below to ensure your domain name's settings are correct.

### How do domains work?

When visitors enter your domain name into a Web browser, the browser request uses your domain name to find the domain name's associated IP address and, therefore, the website. People use domain names instead of IP addresses because it is easier to remember a name rather than a series of numbers.

Your domain name and its associated IP address are stored in a common database along with every other domain and associated IP address that are accessible via the Internet.

### Remind on the URL?

A URL, or Uniform Resource Locator, is the address of an Internet website or webpage. Think of a URL as a street address for the location of information on the Internet. For instance, a complete URL like `http://coolexample.com/music`, points you to the music page of the `coolexample.com` website.

Take a look at the anatomy of this URL to better understand how they direct online users to specific information: `http://celestino.com/musics/music.html`

**http://** = protocol

**celestino** = domain name

**.com** = TLD

**/musics/music.html** = path

**/musics/** = directory

**/music.html** = file name

### What is a nameserver?

Nameservers are the Internet's equivalent to phone books. A nameserver maintains a directory of domain names that match certain IP addresses (computers). The information from all the nameservers across the Internet is gathered in a central registry.

Nameservers make it possible for visitors to access your website using a familiar domain name, instead of having to remember a series of numbers.

### What do I do with my domain once it's been registered?

Registering a domain name does not automatically activate a website that displays when visitors enter your domain name into a Web browser. The domain name must have a hosted website that includes a numeric address, called an IP address, for visitors to access the website using your domain name.

Besides setting up a website, there are a number of things you can do with your domain name once you register it.

- **Sell it** — Domain names can be a great investment. If you have registered a domain name that you are not using, maybe someone else can. You can set up a For Sale parked page to let visitors know that it's available — and don't forget to include your contact information. See what is the domain aftermarket? for more information.
- **Protect your brand online** — The more domain names you register, the better. Prevent others from registering a similar domain name to yours. These similar domain names can steal your customers or confuse them. What can you do with all these domain names? Forward them to your main domain name's website
- **Hold on to it** — Maybe you haven't decided what to do with your new domain name. Don't worry — there's no rush. You can leave it parked for the length of your registration.

### Why should I register more than one domain name?

If you're thinking about registering more than one domain name, you've got the right idea. Registering and using multiple domains names is great for building your business, protecting your brand name, and creating a dynamic online identity.

When you register multiple domain names, you can:

- Keep your competition from registering a similar domain name drawing customers to them instead of you
- Promote the different products and services you offer
- Drive more traffic to your website
- Enjoy more opportunities to market to — and be listed in — search engines
- Create distinct advertising strategies reaching different target markets
- Provide customers more ways to find you when searching the Internet

- Capture common misspellings of your domain name, instead of sending visitors to an error page
- Protect your brand and online identity

#### **When can I register an expired domain name?**

Usually, a domain name is not available for re-registration as soon as it expires. Most registrars allow a grace period that can be as short as one or two weeks or as long as a year for registrants to renew expired domain names. The actual grace period can be different for each individual registrar and domain name extension. That is, the grace period for a .com domain name might be different from the grace period for a .us domain name, even at the same registrar.

After the registrar's grace period, most domain names have a redemption period. This period can last from two weeks to 30 days, and, during this time, the current registrant can renew the domain name by paying a redemption fee along with the domain name's renewal fee.

If the current registrant does not renew or redeem the domain name, it might be auctioned. When a domain name is released to a public auction, you can participate and possibly capture the domain name by placing a bid on it.

If the domain name is not renewed, redeemed, or purchased through an auction, it is returned to its registry. The registry determines when the domain name is released again for registration. Once it's released, you can register the domain name through us.

## **2.7 Internet & web Regulation and web Ethics**

### **Definition of Computer Ethics**

Ethics are a set of moral principles that govern an individual or a group on what is acceptable behavior while using a computer. Computer ethics is a set of moral principles that govern the usage of computers. One of the common issues of computer ethics is violation of copyright issues.

Duplicating copyrighted content without the author's approval, accessing personal information of others are some of the examples that violate ethical principles.

### **Internet Ethics for everyone**

Internet ethics means acceptable behavior for using internet. We should be honest, respect the rights and property of others on the internet.

### **Acceptance**

One has to accept that Internet is not a value free-zone .It means World Wide Web is a place where values are considered in the broadest sense so we must take care while shaping content and services and we should recognize that internet is not apart from universal society but it is a primary component of it.

### **Sensitivity to National and Local cultures**

It belongs to all and there is no barrier of national and local cultures. It cannot be subject to one set of values like the local TV channel or the local newspaper we have to accommodate multiplicity of usage.

### **While using e-Mail and chatting**

Internet must be used for communication with family and friends. Avoid chatting with strangers and forwarding e-mails from unknown people /strangers. We must be aware of risks involved in chatting and forwarding e-mails to strangers.

### **Pretending to be someone else**

We must not use internet to fool others by pretending to be someone else. Hiding our own identity to fool others in the Internet world is a crime and may also be a risk to others.

### **Avoid Bad language**

We must not use rude or bad language while using e-Mail, chatting, blogging and social networking; we need to respect their views and should not criticize anyone on the internet.

### **Hide personal information**

We should not give personal details like home address, phone numbers, interests, passwords. No photographs should be sent to strangers because it might be misused and shared with others without their knowledge.

### **While Downloading**

Internet is used to listen and learn about music, it is also used to watch videos and play games we must not use it to download them or share copyrighted material. We must be aware of the importance of copyrights and issues of copyright.

### **Access to Internet**

The internet is a time-efficient tool for everyone that enlarges the possibilities for curriculum growth. Learning depends on the ability to find relevant and reliable information quickly and easily, and to select, understand and assess that information. Searching for information on the internet can help to develop these skills. Classroom exercises and take-home assessment tasks, where students are required to compare website content, are ideal for alerting students to the requirements of writing for different audiences, the purpose of particular content, identifying and judging accuracy and reliability. Since many sites adopt particular views about issues, the internet is a useful tool for developing the skills of distinguishing fact from opinion and exploring subjectivity and objectivity.

### Ethical rules for computer users

Some of the rules that individuals should follow while using a computer are listed below:

- Do not use computers to harm other users.
- Do not use computers to steal others information.
- Do not access files without the permission of the owner.
- Do not copy copyrighted software without the author's permission.
- Always respect copyright laws and policies.
- Respect the privacy of others, just as you expect the same from others.
- Do not use other user's computer resources without their permission.
- Use Internet ethically.
- Complain about illegal communication and activities, if found, to Internet service Providers and local law enforcement authorities.
- Users are responsible for safeguarding their User Id and Passwords. They should not write them on paper or anywhere else for remembrance.
- Users should not intentionally use the computers to retrieve or modify the information of others, which may include password information, files, etc..

### International and National Regulation of the Internet

Broadly speaking, Internet regulation today can be conceived of as involving three related spheres: Direct regulation of the internet infrastructure itself; regulation of activities that can be conducted only over the internet; and, regulation of activities which can be, but need not be, conducted over the Internet.

**The first sphere:** Direct regulation of the internet infrastructure itself, including

- the standards of communication,
- the equipment used to provide and access Internet communication,
- intermediaries engaged in the provision of Internet communications, e.g. Internet

Service Providers (ISPs)

**The second sphere:** Regulation of activities that can be conducted only over the internet and which have no significant off-line analogues. An example is the regulation of anonymous online communication.

**The third sphere:** Finally, there is the regulation of the enormous category of activities which may or may not be conducted over the internet, e.g. e-commerce in both tangible and intangible goods. In many cases the Internet version of an activity often will simply be swept up in the general regulation of the type of conduct.

(a) In some cases, however, the Internet version may be subject to special or additional regulation because the use of the Internet is seen as somehow aggravating an underlying problem or offense. An example of this is US attempts to regulate the provision of obscene or "indecent" content to minors via the Internet.

(b) In other cases, there may be attempts to craft special regulations for the Internet version of an activity because of fears that its international character (and concomitant regulatory arbitrage), the ease of anonymization, or the elimination of formerly prohibitive transactions costs changes the danger, incidence, or character of the activity -- or, most commonly, makes the enforcement of the pre-existing rules difficult or impossible. Examples of this include attempts to regulate peer-to-peer sharing of material copyrighted by others and regulation (or in some cases discouragement) of e-cash.



## 2.8 Web 2 Technologies and Features

### What is web 2.0?

- It is a version of World Wide Web which creates dynamic web pages.
- The term Web2.0 refers to the development of online services that encourage collaboration, communication and information sharing.
- Web 2.0 is difficult to define because it is not really a thing, but an approach, or shift, in how we use the Web we already have. *The key is a change to a more active user who actually creates content rather than just passively receiving it.*

### Web 2.0 Websites features/techniques

- **Search:** the ease of finding information through keyword searching.
- **Links:** guides to important pieces of information. The best pages are the most frequently linked to.
- **Authoring:** the ability to create constantly updating content that is co-created by users. In wikis, the content is *iterative* in the sense that the people undo and redo each other's work. In blogs, it is *cumulative* in that posts and comments of individuals are accumulated over time.
- **Tags:** categorization of content by creating tags that are simple, one-word descriptions to facilitate searching and avoid having to fit into rigid, pre-made categories.
- **Extensions:** automation of pattern matching for customization by using algorithms (i.e. Amazon.com recommendations).
- **Signals:** the use of RSS (Real Simple Syndication) technology to create a subscription model which notifies users of any content changes.
  - Young people seem to be particularly attracted to Web 2.0 developments, often for the social aspects of easy communication, coordination, and online self-expression. Web 2.0 innovations harmonize well with current thinking about educational practice.

### Web 2.0 Tools

- ✓ Blogs
- ✓ Podcasts
- ✓ Social Networks
- ✓ Wikis
- ✓ Micro-Blogs
- ✓ Social Bookmarking

## 1. Web log (Blog)?

A Weblog, or "blog", is a personal journal on the Web. Weblogs cover as many different topics, and express as many opinions, as there are people writing them. Some blogs are highly influential and have enormous readership, while others are mainly intended for a close circle of family and friends.

### Why are blogs important?

The power of Weblogs is that they allow millions of people to easily publish their ideas, and millions more to comment on them.

### What is the blogosphere?

Blogosphere is a word used to describe the online community of bloggers and their writings.

### How is a Weblog different from a Website?

A Weblog is a Website that is updated frequently, most often displaying its material in journal-like chronological dated entries or posts. Most blogs allow readers to post comments to your post, and link from their blog to your posts using the *permalink* URL or address.

### What is a Weblog post or entry?

An entry, a post, or a posting, are the terms often used to refer to a specific article or commentary written by the blogger on his or her Weblog.

### What is a permalink?

A permalink is the permanent identifier to a specific Weblog post or article. Bloggers love permalinks — they provide an easy way to capture specific references to posts or articles about which bloggers are writing.

## 2. Podcast

**A Podcast** is basically just an audio (or video) file.

### What is podcasting?

- “Pod” – a mobile playback device such as an iPod or any other MP3 player (a laptop or desktop computer also works).
- “Casting” – derived from broadcasting.
- Podcasting is the distribution of multimedia files, such as audio and video, over the Internet for playback on mobile devices and/or personal computers

## 3. Social Networking

Social networking Websites provide a “virtual community” for people interested in a particular subject or just to "hang out" together. Members create their own online profile page with biographical data, pictures, likes, dislikes and any other information they choose to post. Users can

communicate with each other text, voice, chat, instant message, videoconference, and blogs etc.  
Eg: facebook , myspace , linkedin , friendster.

#### 4. WIKIS

A wiki is a page or collection of Web pages designed to enable anyone who accesses them to contribute or modify the content easily. Wikis are often used to create collaborative Websites and to power online communities. Wikis are used in business to provide intranets and knowledge management systems. Wikis are used in education to allow students to co-create documents and research topics collaboratively.

Ex:wikipedia.org

#### THE ADVANTAGES OF WEB 2.0

- Supporting communication and building online communities.
- Similarly, libraries and librarians all over the world are using Web2.0 technologies to promote services, share information, and engage with users and network with colleagues, on a global scale.
- Encourage collaboration, communication and information sharing.
- ***Raising awareness and promotion***

Web2.0 services can be updated quickly and published instantly

- ***Reaching your audience:*** The global nature of web based services means that libraries can reach a vast audience, serving more people in the virtual sphere than would be possible at a physical location.
- ***Developing services:*** Static WebPages are useful for presenting information about your service but don't allow for the interaction of users.
- ***Professional development:*** Librarians have been using the internet to communicate, share ideas and offer support for a long time, mainly by using the email network. The advent of Web2.0 technologies presents new opportunities for large scale professional collaboration and cooperation.

#### DISADVANTAGES OF WEB 2.0

- Web 2.0 can introduce some threats
- Children can watch pornography videos by the help of video sharing websites such as YouTube.
- Some employees get distracted while serving the clients and they give poor services due to some of the above websites.

- Some students fail in class because they pretend that they are following the teacher while they are busy on some websites.
- Some website can be used when people want to publish wrong information for example: rumors that can even ruin somebody's life.

**Note:** The disadvantages are the opportunities for us, to provide solutions and therefore get a job.

## Chapter 3: Materials & Technologies of Connectivity

### 3.1 Equipment of Connectivity/Infrastructure

#### VSAT

A very small aperture terminal (VSAT),

- ▶ It is a small telecommunication earth station that receives and transmits real-time data via satellite.
- ▶ A VSAT transmits narrow and broadband signals to orbital satellites. The data from the satellites is then transmitted to different hubs in other locations around the globe.

#### **Advantages of VSAT**

- ✓ access in remote locations
- ✓ internet access
- ✓ scalable
- ✓ reliable

#### **Disadvantages of VSAT**

- ▶ High cost
- ▶ Equipments and training are required while installing
- ▶ Difficult to be managed

#### DIAL UP:

Dial-up Internet access is a form of Internet access that uses the facilities of the public switched telephone network (PSTN) to establish a dialed connection to an Internet service provider (ISP) via telephone lines. The user's computer or router uses an attached modem to encode and decode Internet Protocol packets and control information into and from analogue audio frequency signals, respectively. Dial-up internet is sometimes used where Broadband internet access is not available; primarily in rural or remote areas.

### **Advantages of dial-up**

- ✓ Low cost

### **Disadvantages of dial-up**

- Lags behind in speed (low speed)
- Unstable dial-up connection

## **ISDN**

*(Integrated Services Digital Network)*: Integrated services digital network (ISDN) is an international communications standard for sending voice, video, and data over digital telephone lines or normal telephone wires. Typical ISDN speeds range from 64 Kbps to 128 Kbps.

### **Advantages of ISDN**

- ✓ ISDN provides high data rate because of digital scheme which is 56kb
- ✓ The digital signals broadcasting transversely the telephone lines

### **Disadvantages of ISDN**

- ISDN lines is that it's very costly than other typical telephone system
- ISDN requires specialized digital devices like Telephone Company

## **3.2 FIBER OPTIC:**

It is a method of transmitting information from one place to another by sending pulses of light through an optical fiber. The light forms an electromagnetic carrier wave that is modulated to carry information. First developed in the 1970s, fiber-optic communication systems have revolutionized the telecommunications industry and have played a major role in the advent of the Information Age. Because of its advantages over electrical transmission, optical fibers have largely replaced copper wire communications in core networks in the developed world. Optical fiber is used by many telecommunications companies to transmit telephone signals, Internet communication, and cable television signals. Researchers at Bell Labs have reached internet speeds of over 100 petabytes per second using fiber-optic communication.

### **Advantages of optic fiber**

- ✓ **Broad bandwidth:**

A single optical fiber can carry 3,000,000 full-duplex voice calls or 90,000 TV channels.

✓ **Immunity to electromagnetic interference:**

Light transmission through optical fibers is unaffected by other electromagnetic radiation nearby. The optical fiber is electrically non-conductive, so it does not act as an antenna to pick up electromagnetic signals. Information traveling inside the optical fiber is immune to electromagnetic interference, even electromagnetic pulses generated by nuclear devices.

✓ **Low attenuation loss over long distances**

Attenuation loss can be as low as 0.2 dB/km in optical fiber cables, allowing transmission over long distances without the need for repeaters.

✓ **Early detection of cable damage and secure transmissions**

**disadvantages of fiber optic**

- installations cost while dropping are still high
- special test equipments is required
- wildlife damage to fiber optic cables

# PART 2:

# WEB DESIGN AND DEVELOPMENT TOOLS

## Section B: Hands onto practice (HTML)

### 1.1 Introduction to web design

#### 1.1 Introduction

Web pages are ordinary files with .htm or .html file extensions. They contain a code named "Hyper Text Mark-up Language" or html. This codes when viewed in a browser like Internet Explorer or Netscape will be seen as beautiful web pages however code under web page may be complicated.

**To design an html web page you have two options:**

- a. You can use a web page editor like Microsoft FrontPage to create web pages. It works exactly like Microsoft word (a complicated editor program used for creating and editing book, letter etc pages.) You just type text, insert graphics and finally save your document as an html web page. By the way word 2000 itself can save your existing documents as html pages. So you see designing a web page can be very easy. But soon you will see that this is not a good option for creating a professional web page.
- b. Second option is to learn html codes and write html pages in a simple text editors like Notepad, Edit Plus, Notepad++... As we said your codes will be seen as WebPages when viewed in a web browser.

#### 1.2 Reasons for choosing second option

- If you want to design professional web pages using these tools will not be enough. You must be familiar with html codes.
- Results of these editors are big and sometimes chaotic code. Maintaining this code is very difficult.
- If you want to design dynamic web pages in future you will need to know html codes.
- If you will need forms in your pages to send information to server and return result pages back to browser you will need to know html codes.

- There are other reasons that dictate us to learn html coding and not satisfy with these tools.

### 1.3 Tools you will need

You will need a simple text editor to write html codes. For example you can use notepad in windows or any text editor in other operating systems. You will also need a browser like Internet explorer or Netscape Navigator.

### 1.4 Web page structure

Open notepad and type the following code

```
<HTML>  
  
<HEAD>  
<TITLE>My company web page</TITLE>  
</HEAD>  
  
<BODY>  
Welcome to our homepage. I love you all.  
</BODY>  
  
</HTML>
```

Then save the file as welcome.html and save it on your desktop. Minimize or close your editor (notepad), then open the saved file with Internet Explorer, Mozilla, Netscape or any other browser. You will see the sentence “Welcome to our page. I love you all” displayed and the title will appear on the top of your browser.

<HTML>, <HEAD>, <TITLE>, AND <BODY> are called “TAGS”. Tags have the opening tag and the closing tags. Any html keyword (**html element**) must be enclosed within <....> symbols. Otherwise it will be displayed with other text.

### 1.5 Parts of a web Page

A web page is created using <HTML> and </HTML>, the opening and the closing tag respectively. Tags are something like commands in programming languages. <HTML> tag tells the browser that this is start of the HTML and </HTML> marks its end. A web page has two parts: Header and body parts. The header part starts with <HEAD> and ends with </HEAD> and it contains important information about the page while the body parts starts with <BODY> and ends with </BODY>. The body part is the main part of any web page. It is in this part that we will be learning how to insert text, images, graphics, music, videos and so on.

### 1.6 Title



One of the most important parts of a header is title. Title is the small text that will appear in title bar of viewer's browser. So html document will be as below.

```
<HTML>
<HEAD>
<TITLE>Title of the page</TITLE>
</HEAD>
</HTML>
```

## 1.7 Background color for body of web page

If you want you can change background color of your web page by extending <BODY> tag as below.

```
<HTML>
  <HEAD>
    <TITLE>Page with Back Color</TITLE>
  </HEAD>
    <BODY BGCOLOR="#00FF00">
      Page with Back Color
    </BODY>
</HTML>
```

This will change your background color to green. Format of color number is RRGGBB. You know that each color is a combination of three main colors: Red, Green and Blue. In color format RR is value of red component of the main color in hexadecimal format. GG is value of green component and BB is the value of blue component.

Two digit hexadecimal number can be anything between 00 to FF i.e. 0 to 255 in decimal format. So if we write 00FF00 we mean (red=0, green=255, blue=0) so the result is a pure green color. You can produce 16 million colors in this way but pay attention that not all of the browsers will be capable to show all these colors. So test your web page in 256 colors mode.

## 1.8 Background Image

We can use a background picture for web page instead of background color. You must have a ready image file in .gif or .jpg formats. Now you must extend <BODY> tag as below. "image1.gif" is file name of the image we want to use as background image.

```
<HTML>
<HEAD>
<TITLE>Page with background image</TITLE>
</HEAD>
<BODY BACKGROUND="image1.gif">
<B>Page with background image. </B>
</BODY>
</HTML>
```

Note that Image file must be in the same folder as your html file. Otherwise browser will not be able to find it.

## 2 Text Formatting

Until now we have learned to insert simple text into our web pages. In this lesson we will learn text formatting techniques. This part of html writing skills is the most important part of our whole web design course. So you must learn it word by word.

## 2.1 Changing text style

We can make a text bold, italic or underlined. If you want to make a text bold, you must enclose it in `<B>...</B>` tags.

```
<BODY>
```

```
This is very <B> important </B>
```

```
</BODY>
```

In above text the word "**important**" is typed bold. You can make a text italic by inclosing it in `<I>...</I>` tags.

And finally you can make some text underlined by inclosing it in `<U>...</U>` tags.

```
<HTML>
```

```
<HEAD>
```

```
<TITLE>Example </TITLE>
```

```
</HEAD>
```

```
<BODY>
```

```
<B>This text is bold</B><br>
```

```
<I>While this one is Italic</I><br>
```

```
<U>and this text is underlined</U> <br>
```

```
<B><I>Look at this, this is both bold and italic</I></B>
```

```
</BODY>
```

```
</HTML>
```

In above example you can see that how we can make a text both bold and italic or any other combination.

You may notice the tag `<BR>` in the end of each line. Let's see what this tag is. If you insert enter keys (new line characters) at the end of each line and wish that it will make new lines in your output page you will soon be disappointed.

All lines will be in a single line in output web page. No matter how html code is written in separate lines. To break lines in output web page you must insert `<BR>` tags in breaking points. Also pay attention that `<BR>` tag is one of few single tags in html language. It has not an ending tag.

## 2.2 Nested Tags

In previous section we saw a line of code with nested tags.

```
<B><I>This is both bold and italic</I></B>
```

When you use nested tags you must be sure that they do not overlap each other. They must be nested exactly. For example some part of text may change to bold although it is not desired.

## 2.3 Text with fixed width font

As you may know, regular fonts use different horizontal space. For example letter 'w' uses more space than the letter 'i'. Sometimes we need a font with exactly the same width for all letters. For example if you want to make a table of numbers and you want the columns to be exactly under each other in different rows, we will need this kind of text.

To specify this kind of text you must use <TT>...</TT> tags. TT means Typewriter Text.

## 2.4 Changing size and face of fonts

We can change face and size of fonts using <FONT>...</FONT> tags. Also using this tag alone will not change the text. You need to use parameters for this tag. This parameters specify what kind of change you need in text font.

### a. Size of font

To change size of font in a part of text, enclose it with a <FONT> tag as below:

<FONT SIZE=n>...</font> n is size of font. Size of font must be a number between 1 and 7. If you insert some text without determining its size default size will be 3.

```
<HTML>
<HEAD>
<TITLE>Example </TITLE>
</HEAD>
<BODY>
<FONT SIZE=1>1This text is not bold</FONT><br>
<FONT SIZE=2>2This text is not bold</FONT><br>
<FONT SIZE=3>3This text is not bold</FONT><br>
<FONT SIZE=4>4This text is not bold</FONT><br>
<FONT SIZE=5>5This text is not bold</FONT><br>
<FONT SIZE=6>6This text is not bold</FONT><br>
<FONT SIZE=7>7This text is not bold</FONT><br>
</BODY>
</HTML>
```

### b. Changing font colors

In previous lesson you learned how to change web page background color. Here we will learn how to change text color. Look at this example:

```
<HTML>
<HEAD>
<TITLE>Example 4, Lesson 2</TITLE>
</HEAD>
<BODY>
<FONT COLOR="#FF0000">This text is in red color. </FONT><br>
<FONT COLOR="#00FF00">This text is in green color. </FONT><br>
<FONT COLOR="#0000FF">This text is in blue color. </FONT><br>
</BODY>
</HTML>
```

In above text different colors are used. You can change text color by changing color number. If you don't remember how to specify color numbers return to previous lesson and review section on "web page background color".

### c. Combining Font attributes

We can obviously combine <FONT> tag parameters as we wish. In this way we will be able to have text with different colors and font sizes.

You can even use text styles with <FONT> tag by nesting style and font tags.

```
<B>
<I>
    <FONT SIZE="5" COLOR="#00FF00">
        How is this?
    </FONT>
</I>
</B>
```

### d. Changing default font colors in a web page

Each browser has its own default settings for text color, link color, visited link color and active link color.

Text color default is black. Links are usually blue. To change default settings for these values you must use <BODY> tag with more parameters.

```
<BODY BGCOLOR="#FFFFFF" TEXT="#000000" LINK="#0000FF"
VLINK="#00FF00" ALINK="#FF0000">Some Text </BODY>
```

BGCOLOR: Web page background

TEXT: Text Color

LINK: Link Color

VLINK: Visited link

ALINK: Active link

## 2.5 Line Breaks, Paragraphs

As we saw in previous lesson if we break lines in html code by simply inserting enter keys (new line characters), lines will not break in output result in browser. They will be printed in a single line in browser. We must use <BR> tag to do this as you used it in previous lesson.

You can also divide text using paragraphs. A paragraph starts on a new line with one blank line after previous line.

Paragraph tag is <p> </p>

```
<p>First paragraph</p>
```

```
<p>Second paragraph</p>
```

You will nest other tags inside paragraph tag for fonts, styles and other tags that will be used inside a paragraph.

There is another option in forming text that is using <PRE> tag. Text between <PRE> </PRE> tags will be displayed exactly as it is typed in html source. Therefore you will not need <BR> tags to break lines. It is enough to enter text in separate lines with enter key (new line character) at their end.



```
This is an image:<BR>
<IMG SRC="abanner.gif" WIDTH=234 HEIGHT=30>
</BODY>
</HTML>
```

### 3.4 Alignment and border size for images

You can align image in your web page by inclosing it in a paragraph that is aligned as aligned to left, right or center.

```
<HTML>
<HEAD>
<TITLE>Example </TITLE>
</HEAD>
<BODY>
This is an image:<BR>
<P ALIGN="center">
<IMG SRC="abanner.gif">
</P>
</BODY>
</HTML>
```

You can add a border to an image by adding a border parameter to <IMG> tag.

```
<HTML>
<HEAD>
<TITLE>Example </TITLE>
</HEAD>
<P ALIGN="center">
<IMG SRC="abanner.gif" border=3>
</P>
</HTML>
```

### 3.5 Alternative text for images

Some web surfers may use browsers that do not support graphics. An example is lynx browser that is used in Unix text environments. If you want to consider these users, you can enter a text as an alternative to each image in your web page. In this way image will be replaced by its alternative text.

It is very easy. Just add an ALT parameter to <IMG> tag.

```
<IMG SRC="abanner.gif" ALT="Learning Online">
```

### 3.6 Path of image file (URL) or any other file

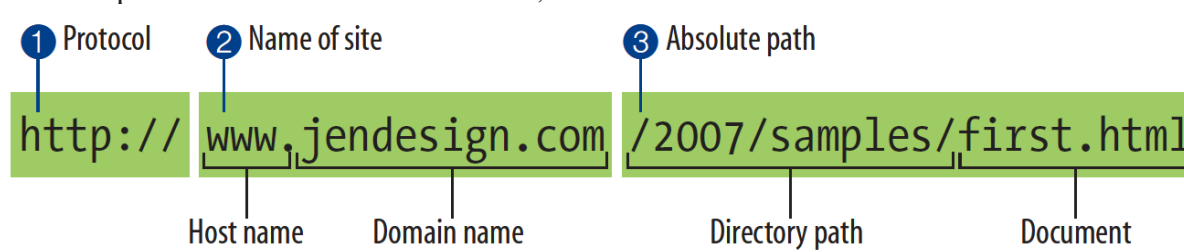
With all those web pages on all those servers, how would you ever find the one you're looking for? Fortunately, each document has its own special address called a **URL** (Uniform Resource Locator). It's nearly impossible to get through a day without seeing a URL (pronounced "U-R-L," not "erl"). In above examples, image file must be located in the same directory that html file is located. If our image file resides in other directory, we must add a relational path or a complete URL (Uniform Resource Locator) to this image.

`<IMG SRC="images/abanner.gif">` Image is located in "images" directory below the directory that html file resides.

`<IMG SRC="../../abanner.gif">` Image is located in parent directory of the directory of html file.

#### The parts of a URL

A complete URL is generally made up of three components: the protocol, the site name, and the absolute path to the document or resource,



## 4 Links and Horizontal rule

Any object such as text, a graphic image etc. that leads us to a new page on the web is called a link. Links can point to a page on our site or to a web page on another site.

### 4.1 Text links

Creating a text link is an easy task. We will use `<A> </A>` tag to do this. As before we will need extra parameters from this tag

```
<HTML>
<HEAD>
<TITLE>Example </TITLE>
</HEAD>
<BODY>
<A HREF="http://www.yahoo.com">Click here to visit Yahoo</A>
</BODY>
</HTML>
```

Above code will create a link that clicking on it will send the user to Yahoo website. We have used HREF parameter to specify destination web page. Text between `<A>` and `</A>` is link text which user will click on it to go to destination page.

#### 4.2. Image links

In previous section we used a text as a link point. It is possible to use an image instead of text. Too this, you must replace link text between <A> and </A> with an <IMG> tag that displays an image file.

```
<BODY>
Click on below picture to visit my homepage.<BR><BR>
<A HREF="http://www.angelfire.com/nt/sarmadys">
<IMG SRC="me.gif">
</A>
</BODY>
```

In above example clicking on picture will bring surfer to the address of <A HREF=".."> tag. If you see the result in a browser you will notice a blue border around the picture. This blue border is added to image because it is a default for image links. If you don't want this border, use border=0 parameter.

```
<A HREF="http://www.angelfire.com/nt/sarmadys">
<IMG SRC="me.gif">
</A>
<BR><BR>Without link border : <BR><BR>
<A HREF="http://www.angelfire.com/nt/sarmadys">
<IMG SRC="me.gif" border=0>
</A>
```

#### 4.3. Email links

If you have surfed web for a while you have seen links that when you click on them your email program starts a "compose new message" window that its receiver address is entered from web page . This email address is the address you want email to be sent to.

Look at example below to see how you can make a link to an email address.

```
<BODY>
Click on below link to send an email to me <BR>
<A HREF="mailto:cmbonabucya@ur.ac.rw">
Contact me by Email
</A>
</BODY>
```

It uses a "mailto:" string before desired email address to convert it into a link address. If you want, you can use a subject for the email.

```
<HTML>
<HEAD>
<TITLE>Example </TITLE>
</HEAD>
<BODY>
Click on below link to send us your comments .<BR>
<A HREF="mailto:cmbonabucya@ur.ac.rw?subject:comments about your site">Email Me</A>
```



```
</BODY>
</HTML>
```

Just know that some browsers and email programs do not support subject in email links.

#### 4.4. Horizontal Separator Rule

Another useful html tag that you will use is <HR> tag. If you need to separate text in your web page by horizontal lines, you may use this tag.

```
<BODY>
First section
<HR>
Second section
</BODY>
```

Result is two lines of text separated by a horizontal rule. You can specify parameters for horizontal rule. If you want to change width of rule you can use width parameter.

```
<HR WIDTH="50%"> width in percent
<HR WIDTH="100"> width in pixels
```

You can also determine line size parameter to change line diameter.

```
<HR size=5>
```

It is obvious that you can mix parameters with each other.

Horizontal rule created by this tag is a line that has a shade. You can change the rule to a solid line instead of a shaded line, you can add a NOSHADE parameter.

```
<HR SIZE=1 NOSHADE>
```

You can also determine Color for your line:

```
<HR color="#000000">
```

Above line will not have a shade and it is a solid line.

## 5 LISTS

There are times that you want to insert items related to a subject in list form in your web page. HTML provides you with tags to do this.

### 5.1. Unordered List <UL>

```
<BODY>
This is a list of subjects covered in this lesson :
<UL>
<LI>Text Links
<LI>Image Links
<LI>Email Links
<LI>List of Items
</UL>
```

</BODY>

Result page will display list items in separate lines started with a small bullet. You see that we have entered list items started with a <LI> tag between <UL></UL> tags. <UL> tag is a part of list tags.

## 5.2. Ordered List <OL>

If you want the items to start with numbers instead of bullets, you must use <OL></OL> tags instead of <UL></UL> tags

<OL>

<LI>Text Links

<LI>Image Links

<LI>Email Links

<LI>List of Items

</OL>

## 6 Tables

Table is a matrix like object that holds other objects such as text, images, buttons and etc. Even if you don't see them they are present in all professional web pages. Hidden tables hold graphic images and text in their places in these pages.

### 6.1 Drawing a table

To draw a table we will use <TABLE> tag. We will need two other related tags to make table rows and columns. These are <TR> and <TD> tags.

<TR> tag is used to create a row in table. Data that will fit in a row will be enclosed in <TR> </TR> tags.

Following example produces a table with two rows. We will need <TD> tag to create columns in each row.

<TABLE>

<TR>

<TD>First Row</TD>

</TR>

<TR>

<TD>Second Row</TD>

</TR>

</TABLE>

If you browse this code in a browser you may surprise. You will not see any table but two lines of code. In fact table is there but you cannot see it.

<TABLE> Tag will not make table borders. You must use a parameter to add borders to the table.

You can specify a border width for a table by adding a border parameter to <TABLE> tag.

<TABLE BORDER=1>

<TR>

<TD>First Row</TD>

```
</TR>
<TR>
<TD>Second Row</TD>
</TR>
</TABLE>
```

As you may guess default border size is 0. When we do not specify sizes for a table it will be in a size that it needs to be able to fit text or any other object that it will hold.

## 6.2 Specifying table sizes

You can specify width for a table both in percents of page width and in pixels.

```
<BODY>
<TABLE WIDTH=50% BORDER=1>
<TR>
<TD>Cell Row1 Col1</TD>
<TD>Cell Row1 Col2</TD>
</TR>
<TR>
<TD>Cell Row2 Col1</TD>
<TD>Cell Row2 Col2</TD>
</TR>
</TABLE>
```

If you want you can determine table width in pixels.

```
<TABLE WIDTH=250 BORDER=1>
<TR>
<TD>Cell Row1 Col1</TD>
<TD>Cell Row1 Col2</TD>
</TR>
<TR>
<TD>Cell Row2 Col1</TD>
<TD>Cell Row2 Col2</TD>
</TR>
</TABLE>
```

You can specify table height too. In this way you can determine height and width of table. Width and height of table will be divided between cells in rows and columns so if table width is 100 and there are 2 columns then width of each cell will be 50.

Just pay attention to this important point that if you put a lot of text in a cell of a table it will be expanded to fit the text in it.

## 6.3 Text alignment in table cells

By default text entered in a cell will appear at the left side of the cell. You can add either of these options to <TD> tag to specify horizontal alignment of text.

```
<TD ALIGN=CENTER> or
<TD ALIGN=RIGHT> or
<TD ALIGN=LEFT>
```

As we saw, left alignment is default for cells.

You can also determine vertical alignment of text in a cell by adding VALIGN option to <TD> tag. There are three values for VALIGN option: TOP, BOTTOM and MIDDLE. MIDDLE is default value if you do not use this parameter.

```
<BODY>
<TABLE WIDTH=50% HEIGHT=100 BORDER=3>
<TR>
<TD ALIGN=LEFT VALIGN=TOP>TOP LEFT</TD>
<TD ALIGN=RIGHT VALIGN=TOP>TOP RIGHT</TD>
</TR>
<TR>
<TD ALIGN=LEFT VALIGN=BOTTOM>BOTTOM LEFT</TD>
<TD ALIGN=RIGHT VALIGN=BOTTOM>BOTTOM RIGHT</TD>
</TR>
</TABLE>
</BODY>
```

## 6.4 Images in table cells

You will soon need to insert images in table cells. As we told later tables will be used to hold images in their places.

You can insert an image in a table cell by inserting <IMG> tag between <TD></TD> tags of a certain cell.

## 6.5 Cell Width (Column Width)

In previous lesson we learned how we can determine width and height of a table.

```
<HTML>
<HEAD>
<TITLE>Table: Column widths not specified</TITLE>
</HEAD>
<BODY>
<TABLE WIDTH=400 HEIGHT=100 BORDER=3>
<TR>
<TD>TOP LEFT</TD>
<TD>TOP RIGHT</TD>
</TR>
<TR>
<TD>BOTTOM LEFT</TD>
<TD>BOTTOM RIGHT</TD>
</TR>
</TABLE>
</BODY>
</HTML>
```

In above table we have not determined sizes for two cells in first row. In this way you will not be able to say how these cells will display in different browsers and different screen modes.

You can determine width of each column in your table by specifying width of cells in first row. Just be careful about correctness of sizes you specify. For example if your table width is 200 pixels sum of cell widths must be exactly 200.

```
<BODY>
<TABLE WIDTH=400 HEIGHT=100 BORDER=3>
<TR>
<TD WIDTH=140>TOP LEFT</TD>
<TD WIDTH=260>TOP RIGHT</TD>
</TR>
<TR>
<TD>BOTTOM LEFT</TD>
<TD>BOTTOM RIGHT</TD>
</TR>
</TABLE>
</BODY>
```

You can also determine cell widths in percent. Sum of cell width percentages must be 100%.

```
<TABLE WIDTH=400 HEIGHT=100 BORDER=3>
<TR>
<TD WIDTH=35%>TOP LEFT</TD>
<TD WIDTH=65%>TOP RIGHT</TD>
</TR>
<TR>
<TD>BOTTOM LEFT</TD>
<TD>BOTTOM RIGHT</TD>
</TR>
</TABLE>
```

When you determine sizes of first row cells you will not need to determine widths for second row cells.

If you want a cell to be empty, you cannot omit definition for that cell. Insert cell definition, and enter a &nbsp; between <TD></TD> tags. As we told in later lessons this means a space character. You must enter at least a space in this form if you need an empty cell. Otherwise area of that cell will not appear like an empty cell.

```
<TABLE WIDTH=400 HEIGHT=100 BORDER=3>
<TR>
<TD WIDTH=140>TOP LEFT</TD>
<TD WIDTH=260>&nbsp;</TD>
</TR>
<TR>
<TD>&nbsp;</TD>
<TD>BOTTOM RIGHT</TD>
</TR>
</TABLE>
```

In above example we have two empty cells but as we have specified both tables and cell sizes, table will not lose its shape. If we remove sizes, we cannot guarantee how it will be displayed on different browsers and screen modes.

For the above reason we suggest you to determine table sizes in every table you use. Using fixed sizes is not a good idea. Use percent sizes instead of fixed sizes.

## 6.6 Cell padding

You can specify two other important size parameters for a table. Cell padding is the space between cell borders and table contents such as text, image etc.

```
<TABLE BORDER=3 CELLPADDING=20>
<TR>
<TD>TOP LEFT</TD>
<TD>TOP RIGHT</TD>
</TR>
<TR>
<TD>BOTTOM LEFT</TD>
<TD>BOTTOM RIGHT</TD>
</TR>
</TABLE>
```

Default value for this option is 1. It means that contents of a cell will have a distance of one pixel with borders. If you don't want any space between object inside the cells and its borders you can determine the value of 0 for this option.

## 6.7 Cell spacing

Cell spacing parameter determines the space between inner and outer parts of a table. In fact a table is constructed from two borders: A border area and a cell area. There is a space between cell area and outer border. We call this "cell spacing".

If you increase this value you will have a thick border. Default value for this property is 2. If you specify 0 for it, you will have a very thin border.

```
<TABLE BORDER=3 CELLSPACING=10>
<TR>
<TD>TOP LEFT</TD>
<TD>TOP RIGHT</TD>
</TR>
<TR>
<TD>BOTTOM LEFT</TD>
<TD>BOTTOM RIGHT</TD>
</TR>
</TABLE>
```

You can also mix cell spacing and cell padding options to make specific tables that you need.

## 6.8 Tables and images

Sometimes you need an image that when users click on different parts of it they go to different pages. In previous lessons you learned how to use an image as a link to another address or page. In this special case you will need to cut your picture into as many parts as you need and insert them in a table that holds image parts beside each other. Then you will link each image part to a different page.

You will also need to set both cell spacing and cell padding to the value of 0 to prevent the table to be seen between image parts.

In this way users will see a single image but when they click on different parts of image they will go to different addresses.

## 6.9 Table background color

We can use background colors for tables in new browsers. You can specify background color options inside <TABLE> tag.

```
<TABLE width="300" BGCOLOR="#66CCFF">
<TR>
<TD width="50%">A</TD>
<TD width="50%">B</TD>
</TR>
<TR>
<TD width="50%">C</TD>
<TD width="50%">D</TD>
</TR>
</TABLE>
```

In above example entire table will change to new color even table borders.

- You can also determine background color for each row of your table. If you want to do this, you must use BGCOLOR option inside <TR> tag of the desired row.
- This second method will only change colors of cells in specified row.
- You can even change color of individual cells by using BGCOLOR option in <TD> </TD> cell tags.
- You can mix all above options to create your desired table.

## 6.10 Column Span

Sometimes you need to join two cells in a row to each other. For example in a 2\*3 table we may want to join two cells with each other. In this way we will have two cells in first row and three cells in second row.

```
<TABLE BORDER=1>
<TR>
<TD COLSPAN=2>A</TD>
<TD>B</TD>
</TR>
<TR>
<TD>A</TD>
<TD>B</TD>
<TD>C</TD>
</TR>
</TABLE>
```

The above code will output the following results:

Just be careful that when you have for example 2 cells in first row and first one uses column span parameter COLSPAN=2 it means that it is equal to two cells. Therefore you must have three cells in next row (three <TR> tags) or you may use COLSPAN to create cells that when you add them, it will be equal to previous row or 3 in this example.

## 6.11 Row Span

This time we want to join two cells in a column (from different rows). This is the same as previous section with the difference that we will join cells from different rows rather than cells in different columns. This time we must use ROWSPAN instead of COLSPAN.

```
<TABLE BORDER="1" WIDTH="200">
<TR>
<TD ROWSPAN="2">A</TD>
<TD>B</TD>
<TD>C</TD>
</TR>
<TR>
<TD>D</TD>
<TD>E</TD>
</TR>
</TABLE>
```



Again you must be careful that when you have for example a cell in first column that you have joined two cells to create it using the option ROWSPAN=2 then your table must have two rows and you must take this in mind in next parts of your table. In above example we only entered two cells

in second row (started from second <TR> ) as first cell of first row has occupied first cell of this row too and we have only two cells left of 3 cells. Enter this example and browse it to see the results.

You may want to mix these tags to create your custom tables however this is a complicated task and you must work hard to gain needed experience with these tables.

## 6.12 Nested Tables

Yes we can nest tables in each other. If you are going to design complicated web pages you will always do this. For example you need a table with border size of 3 in a specific part of a web page.

To fix position of that table in your desired place you will need a table with border size of 0. In this case first table can be seen as its border size is 2 but second one will not be seen as you used it just for positioning of first table.

```
<BODY>
<TABLE border="0" width="750">
<TR>
<TD width="25%">&nbsp;</TD>
<TD width="25%">&nbsp;</TD>
<TD width="25%">
  <TABLE border="2" width="100%">
    <TR>
      <TD width="50%">1-</TD>
      <TD width="50%">HTML</TD>
    </TR>
    <TR>
      <TD width="50%">2-</TD>
      <TD width="50%">C Prog.</TD>
    </TR>
    <TR>
      <TD width="50%">3-</TD>
      <TD width="50%">JScript</TD>
    </TR>
  </TABLE>
</TD>
<TD width="25%">&nbsp;</TD>
</TR>
</TABLE>
```

In this example we have a 1\*4 table. We want to hold our main table inside this table in its third column so that our main table will be shown in right side of the center of the screen. Main table has a border size of 1 while first table is hidden.

## Conclusion

Now you have learned table basics. You see what you learned about tables was not too complicated however writing a complicated tables is not very easy. You must work for a little to be able to use them effectively. Tables are one of the most powerful features of html design so you must be able to use their power correctly.

## 7 FORMS

### 7.1 Introduction

HTML forms simply place a handful of GUI controls on the user agent to allow the user to enter data. The controls can allow text input; allow selection of predefined choices from a list, radio or check boxes, or other standard GUI controls.

After the data is entered into the fields, a special control is used to pass the entered data on to a program that can do something useful with the data. Such programs are typically referred to as form handlers because they “handle” the form data.

The screenshot shows a Microsoft Internet Explorer window titled 'A Simple Form - Microsoft Internet Explorer'. The address bar displays 'http://localhost/Chapter13/Fig01.html'. The form contains the following elements:

- First Name:
- Last Name:
- Address:
- Password:
- What product(s) are you interested in? (List box with options: Motherboards, Processors, Cases, Power Supplies)
- Contact me via: ☒ Email, ☐ Postal Mail
- How soon will you be buying hardware? (Radio buttons: ASAP, Within 10 business days, Within the month, Never!)
- Buttons: Submit Query, Reset, Leave site!
- Coupon:

Figure 7: A simple form

```
<html>
<head>
<title>A Simple Form</title>
</head>
<body>
<form action="formhandler.php" method="post">
<table cellpadding="20">
<tr><td>
<!-- Text boxes -->
<p><label for="fname">First Name: </label>
<input type="text" name="fname" id="fname" size="20"><br>
<label for="lname">Last Name: </label>
<input type="text" name="lname" id="lname" size="20">
</p>
<!-- Text area -->
<p><label for="address">Address:</label><br>
<textarea name="address" id="address" cols=20 rows=4></textarea>
</p>
<!-- Password -->
<p><label for="password">Password: </label>
```

---

```
<input type="reset">
</p>
<!-- Button -->
<p>
<input type="button" name="Leave" value="Leave site!">
</p>
<!-- Image -->
<input type="image" name="Coupon" src="coupon.jpg">
<!-- Hidden field -->
<input type="hidden" name="referrerby" value="Google">
</td>
</tr>
</table>
</form>
</body>
</html>
```

## 7.2 Inserting a Form

You insert a form into your document by placing form fields within `<form>` tags. The entire form or any of the tags can be formatted like any other element in your document, and can be placed within any element capable of holding other elements (paragraphs, tables, and so on).

The `<form>` tag has the following, minimum format:

**`<form action="url_to_send_data" method="get/post">`**

The action attribute defines a URL where the data from the form should be sent to be "handled." Although you can use just about any URL, the destination should be a script or other construct capable of correctly interpreting and doing something useful with the data.

**Note:** Form actions and form data handlers are covered in PHP lesson

The second attribute, method, controls how the data is sent to the handler. The two valid values are get and post. Each value corresponds to the HTTP protocol of the same name.

## 7.3 HTTP GET

The HTTP GET protocol attaches data to the actual URL text to pass the data to the target. You have probably noticed URLs that resemble the following:

<http://www.ur.ac.rw.com/register.php?id=231145677&data=John>

The data appears after the question mark and is in name/value pairs. For example, the name id has the value of 231145677, and the name data has the value of John.

However, because the data is passed in the text of the URL, it is easy to implement—you can pass data by simply adding appropriate text to the URL used to call the data handler. However, GET is also inherently insecure. Never use GET to send confidential data to a handler, because the data is clearly visible in most user agents and can be easily sniffed by hackers.

## 7.4 HTTP POST

The HTTP POST method passes data encoded in the HTTP data stream. As such, it is not typically visible to a user and is a more secure method to pass data, but can be harder to implement.

Frames and frameset control Use the "Insert Citation" button to add citations to this document.

## 2. Bibliography

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