**Chapter 16**

**Internet Services and Protocols**

*Lesson 16.1:* Basics of the Internet

*Lesson 16.2:* The Internet

*Lesson 16.3:* Implementation of Internet Services

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***Lesson 16.1***

***Basics of the Internet***

**16.1.0 Objectives**

*On the completion of this lesson you will know:*

* *Evolution of Internet*
* *OSI and TCP/IP Protocols*
* *Working Principle of the Internet*

**16.1.1 Evolution of Internet**

The Internet is the largest and most important network of the world which spans over the globe. It is a shared network of government, other agencies and organizations from all over the world. It has evolved into the information superhighway for the globe. Military, business, administration, education research networks etc now connect millions of computers and users to each other. It has become the key platform for rapidly expanding information and entertainment services and business applications coving electronic-commerce (e- commerce), e-governance and enterprise collaboration.

In 1969, the Advanced Research Projects Agency (ARPA) of Department of Defense, USA developed an experimental network called ARPAnet to link four supercomputing centers for military research. From those four computers, this network evolved into the vast network of millions of computers we know today as the Internet.

The Internet itself is really a massive “network of networks”. It is a collection of Internet service providers (ISPs) who each operate their own networks, with their own clients, and agree to interconnect with each other and exchange packets. Many of the large ISPs sell connections to their network to smaller ISPs, some of whom again sell connections to other smaller or local ISPs. Ultimately, these ISPs at all levels sell connections to individuals and corporations, who then merge their networks (or individual computers) into this larger network called the Internet. Figure 16.1.1 shows Internet connects LAN and WAN



**Figure 16.1:1**Internet.

Internet Society is a non-profit organization, which oversees communication standards and coordination of ISP actions. An affiliated organization called the Internet Engineering Task Force (IETF) coordinates the work of numerous committees and defines Internet communication standards.

**16.1.2 OSI and TCP/IP Stack**

All communications are governed by predetermined rules called protocols. Successful communication between hosts on a network requires the interaction of many different protocols. A group of inter-related protocols that are necessary to perform a communication function is called a protocol suite. Networking protocols suites describe processes such as: the format of the message, the process by which networking devices share information about pathways with other networks, how and when error and system messages are passed between devices, and the setup and termination of data transfer sessions. There are two basic types of networking models: reference models and protocol models.

**Reference Model**

A reference model provides a common reference for maintaining consistency within all types of network protocols and services. The Open Systems Interconnection (OSI) model is the most widely known Internetwork reference model. It is used for data network design, operation specifications, and troubleshooting.

**OSI Reference Model**: The OSI model was designed by the International Organization for Standardization (ISO) to provide a framework in order to build a suite of open systems protocols. Although there are few of the protocols developed using the OSI specifications are in widespread use today, the OSI model has made major contributions to the development of other protocols and products for all types of networks.

As a reference model, the OSI model provides an extensive list of functions and services that can occur at each layer. It also describes the interaction of each layer with the layers directly above and below it. OSI model contains seven layers as shown in Figure 16.1.2(a). The functions of the each layer are given below:

* ***Application Layer (Layer 7)***: It supports application and end-to-end connectivity between individuals. This layer provides application services for file transfers, e-mail, and other network software services.
* ***Presentation Layer (Layer 6)***: This layer provides for common representation for the data transferred between application layer services.
* ***Session Layer (Layer 5)***: This layer establishes, manages and terminates connections between applications.
* ***Transport Layer (Layer 4)***: This layer provides transfer of data between hosts.
* ***Network Layer (Layer 3)***: This layer provides services to exchange the individual pieces of data over the network between end devices. It also determines the best path through the network.
* ***Data Link Layer (Layer 2)***: The data protocol describes methods for exchanging data frame between devices over a common media.
* ***Physical Layer (Layer 1)***: This layer conveys the bit stream- electrical impulse, light or radio signal through the network.

**Protocol Model**

A protocol model closely matches the structure of a particular protocol suite. The hierarchical set of related protocols in a suite typically represents all the functionality required to interface the human network with the data network. The TCP/IP model is the example of a protocol model.



**Figure 16.1.2:** (a) OSI model and (b) TCP/IP protocol

**TCP/IP protocol suite**: The first layered protocol model for Internetwork communications was created in the early 1970s and is referred to as the Internet model. The TCP/IP model is an open standard. The definitions of the standard and the TCP/IP protocols are discussed in a public forum and defined in a publicly-available set of documents called Requests for Comments (RFCs). They contain both the formal specification of data communications protocols and resources that describe the use of the protocols. The RFCs also contain technical and organizational documents about the Internet, including the technical specifications and policy documents produced by the Internet Engineering Task Force (IETF). TCP/IP contains four layers. The functions of the each layer are as follows:

* ***Application layer***: It represents data to the user. Encoding and dialog control are also the functions of the application layer.
* ***Transport layer***: It support communication between different devices
* ***Internet layer***: It determine the best path through the network
* ***Network access***: It controls the hardware device and the transmission media

Figure 16.1.2 (b) shows TCP/IP protocol model.

**16.1.3 How Internet Works**

Internet is a global mesh of interconnected networks. The interconnected networks are belonging to Internet Service Providers (ISPs). These ISP networks connect to each other to provide access for millions of users all over the world. The term Intranet refers to a private connection of LANs and WANs that belongs to an organization, and is designed to be accessible only by the organization's members, employees, or others with authorization.

Every user connected to the Internet uses the same set of rules and procedure to control timing and data format. The set of commands and timing specifications used by the Internet is called TCP/IP suite.

When a host computer (web client) located in Dhaka, Bangladesh sends a request to a web server, say google, located in USA. The web server will respond by sending HTML formatted web page data. For sending message on a network, the protocol stack operates from top to bottom. Let us consider an example where a Web server is responding to the request of a web client. The process of sending an HTML web page to a client can be illustrated (Figure 16.1.3) by using the TCP/IP suite.

The Application layer protocol, HTTP, delivers the HTML formatted web page data to the Transport layer. There the application data is broken into TCP segments. Each TCP segment has a header containing information about the running process on the destination computer. It also contains the information to reassemble the data back to its original format at the web client. The Transport layer encapsulates the HTML data within the segment and sends it to the Internet layer, where the IP protocol is implemented. Here the entire TCP segment is encapsulated within an IP packet, which adds IP header. The IP header contains source and destination host IP addresses, as well as information necessary to deliver the packet to its corresponding destination process.



Figure 15.1.3: Communicating over the Internet

Next, the IP packet is sent to the Network Access layer Ethernet protocol where it is encapsulated within a frame header and trailer. Each frame header contains a source and destination physical address. The physical address uniquely identifies the devices on the local network. The trailer contains error checking information. Finally the bits are encoded onto the Ethernet media by the server Network Interface Card (NIC).

This process is reversed at the receiving host. The data is decapsulated as it moves up the stack toward the end user application.

**16.1.4 Key points**

* The Internet is a shared network of government, other agencies and organizations from all over the world.
* The Advanced Research Projects Agency (ARPA) has developed an experimental network called ARPAnet to link four supercomputing centers for military research.
* The Internet itself is really a massive “network of networks” which is essentially a collection of Internet service providers (ISPs).
* Internet Society oversees communication standards and coordination of ISP actions.
* Internet Engineering Task Force (IETF) coordinates the work of numerous committees and defines Internet communication standards.
* The OSI model was designed by the International Organization for Standardization (ISO) to provide a framework in order to build a suite of open systems protocols.
* As a reference model, the OSI model provides an extensive list of functions and services that can occur at each layer.
* OSI model contains seven layers whereas TCP/IP contains four layers.
* The first layered protocol model for Internetwork communications was created in the early 1970s and is referred to as the Internet model.

**16.1.5 Practice Set**

**Multiple Choice Questions**

1. The Advanced Research Projects Agency (ARPA) has developed an experimental network to \_\_\_\_\_\_\_\_\_\_.
   1. link four continents
   2. link four supercomputing centers for military research
   3. link four supercomputing centers for Institute of the world
   4. link more than four supercomputing centers for military research
2. TCP/IP Internet layer is analogous to \_\_\_\_\_\_\_\_\_\_ layer of OSI.
   1. application
   2. transport
   3. Internet
   4. Network
3. TCP/IP is called\_\_\_\_\_\_\_\_\_\_ .
   1. reference model
   2. protocol model
   3. architecture
   4. intranet model
4. Each frame header contains a source and destination physical address. The physical address \_\_\_\_\_\_\_\_\_\_\_.
   1. differently identifies the devices on the local network
   2. identifies the local network
   3. uniquely identifies the intermediate devices on the local network
   4. uniquely identifies the devices on the local network

**Questions for short answers**

1. What is an Internet?
2. Write down the history of Internet.
3. Distinguish between reference and protocol models.
4. List the layers of OSI and TCP/IP models.
5. Compare and contrast between OSI and TCP/IP models.

**Analytical questions**

1. Write a short note on Internet.
2. List the functions of the each layers of OSI model.
3. How does Internet work? Give an example.

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***Lesson 16.2***

***Internet Fundamental***

**16.2.0 Objectives**

*On completion of the lesson you will know:*

* *Internet Services and Internet Address*
* *Electronic Mail*
* *The World Wide Web*

**16.2.1 Internet Services**

Numerous application services have been developed for the Internet using TCP/IP protocol suite. The most popular Internet applications are email, browsing a site on World Wide Web (WWW) and participating special Internet news groups such as [www.bbc.com](http://www.bbc.com), [www.cnn.com](http://www.cnn.com), and [www.bdnews24.com](http://www.bdnews24.com) etc. The popular Internet services are described below:

**HTTP**: The WWW uses Hyper Text Transfer Protocol (HTTP). It defines how messages are formatted and transmitted and what actions Web servers and browses take in response to various commands. For example, when a Web address or URL is entered in a browser, this actually sends a HTTP command to the Web server directing it to fetch and transmit the requested HTML code for Web page.

**SMTP:** Simple Mail Transfer Protocol (SMTP) is used by a mail client to send e-mail messages to a mail server. In addition, it is used send mails from one server to another server.

**FTP**: File Transfer Protocol (FTP) is a protocol that is used to transfer and manipulate files on the Internet.

**TELNET**: Telnet is a network protocol used in the Internet or LANs to provide a bidirectional interactive text-oriented communication facility using a virtual terminal connection. User data is interspersed in-band with Telnet control information in connection oriented data connection over the Transmission Control Protocol (TCP).

**DNS**: Domain Name System (DNS) translates network address (such as IP addresses) into terms understood by humans (such as Domain Names) and vice-versa.

**DHCP**: Dynamic Host Configuration Protocol (DHCP) can automatically assign IP addresses to computers and users.

**IMAP**: Internet Message Access Protocol (IMAP) is a protocol for e-mail messages on the Internet.

**POP**: Post Office protocol (POP) a protocol used by e-mail clients to retrieve messages from remote servers.

**SNMP**: Simple Network Management Protocol (SNMP) is a set of protocols for managing complex networks.

**16.2.2 Internet Address**

An [Internet](http://www.webopedia.com/TERM/I/Internet.html) [address](http://www.webopedia.com/TERM/A/address.html) uniquely identifies a [node](http://www.webopedia.com/TERM/N/node.html) on the Internet.  Internet address may also refer to the name or [IP](http://www.webopedia.com/TERM/I/IP.html) of a [Web site](http://www.webopedia.com/TERM/W/Web_site.html) (URL). The term Internet address can also represent someone's [e-mail](http://www.webopedia.com/TERM/E/e_mail.html) address.

**URL:** Uniform Resource Locator (URL) is the global address of documents and other resources on the WWW. The first part of the URL is called a protocol identifier and it indicates what [protocol](http://www.webopedia.com/TERM/P/protocol.html) to use and the second part is called a resource name and it specifies the [IP address](http://www.webopedia.com/TERM/I/IP_address.html) or the [domain name](http://www.webopedia.com/TERM/D/domain_name.html) where the resource is located. The protocol identifier and the resource name are separated by a colon and two forward slashes. For example, the two URLs below point to two different [files](http://www.webopedia.com/TERM/F/file.html) at the domainpcwebopedia.com. The first specifies an [executable file](http://www.webopedia.com/TERM/E/executable_file.html) that should be fetched using the [FTP protocol](http://www.webopedia.comhttp/FTP.html); the second specifies a [Web page](http://www.webopedia.com/TERM/W/web_page.html) that should be fetched using the [HTTP protocol](http://www.webopedia.com/TERM/H/HTTP.html):

ftp://www.tsrdiu.com/home.html   
http://www.sites.google.com/shamimkaiser.html

The Uniform Resource Locator (URL) was developed by Tim Berners-Lee in 1994 and the Internet Engineering Task Force ([IETF](http://www.webopedia.com/TERM/I/IETF.html)) URI working group. The URL format is specified in [RFC 1738 Uniform Resource Locators (URL)](http://www.ietf.org/rfc/rfc1738.txt).

**IP Address**: An IP address is an identifier for a computer or device on a TCP/IP network. Networks using the TCP/IP protocol route messages based on the IP address of the destination. An IP version 4 (IPv4) address is a 32-bit numeric address which is broken into 4 octets separated by dots called dotted decimal notation. An octet is a byte consisting of 8 bits. Each octet can be zero to 255. For example, 192.160.10.240 could be an IP address.

Within an isolated network, an IP addresses can be assigned at random as long as each one is unique. However, connecting a private network to the Internet requires using registered IP addresses to avoid duplicates. An IP address can be static or dynamic. A static IP address will never change and it is a permanent Internet address. A dynamic IP address is a temporary address that is assigned each time a computer or device accesses the Internet.

IETF grew concerned about the exhaustion of the IPv4 network addresses. It leads to the development of IPv6, which is 128-bit hierarchical addressing. The main advantage of IPv6 over IPv4 is that IPv6 expands addressing capabilities.

**16.2.3 Electronic Mail**

Electronic mail (Email) is the transmission of messages over communications networks. The messages can be entered from the keyboard or electronic files stored on disk. E-mail is the most popular network service, because it is fast, flexible, and reliable. But e-mail requires several applications and services. Two example application layer protocols are Post Office Protocol (POP) and Simple Mail Transfer Protocol (SMTP), shown in the figure. As with HTTP, these protocols define client/server processes.



**Figure 16.2.1**: Email services

A person composes e-mail messages using an application called a Mail User Agent (MUA), or e-mail client then send the email using message formats and command strings defined by the SMTP protocol. In order to receive e-mail messages from an e-mail server, the Mail User Agent (MUA) can use POP. Usually a MUA provides the functionality of both protocols within one application. Figure 16.2.1 shows E-mail services.

The e-mail server operates two separate processes:

* Mail Transfer Agent (MTA)
* Mail Delivery Agent (MDA)

MTA process is used to forward e-mail. As shown in the figure 16.2.2, the MTA receives messages from the MUA or from another MTA on another e-mail server. Based on the message header, it determines how a message has to be forwarded to reach its destination. If the mail is addressed to a user whose mailbox is on the local server, the mail is passed to the MDA. If the mail is for a user not on the local server, the MTA routes the e-mail to the MTA on the appropriate server.



**Figure 16.2.2:** Send and receive an email using SMTP and POP Protocol

MDA accepts a piece of e-mail from a MTA and performs the actual delivery. The MDA receives all the inbound mail from the MTA and places it into the appropriate users' mailboxes. The MDA can also resolve final delivery issues, such as virus scanning, spam filtering, and return-receipt handling. Most e-mail communications use the MUA, MTA, and MDA applications. However, there are other alternatives for e-mail delivery.

**16.2.4 The World Wide Web**

The World Wide Web (WWW) or W3 or simply Web is a system of interlinked hypertext documents accessed via the Internet. One can view [Web pages](http://en.wikipedia.org/wiki/Web_page) that may contain text, images, videos, and other [multimedia](http://en.wikipedia.org/wiki/Multimedia), and [navigate](http://en.wikipedia.org/wiki/Web_navigation) between them via [hyperlinks](http://en.wikipedia.org/wiki/Hyperlink) using a Web Brower such as Google chrome, Internet Explorer and Mozilla Firebox etc.

The Web browser has changed the way people use the Internet. Web pages are now used to distribute news, interactive education services, product information and catalog, highway traffic report, live audio and video etc. Interactive web pages permit users to consult database, order products and information and submit payment with a credit or debit card.

**16.2.5 Internet Access**

The rapid growth in the use of the Internet by Military, business, administrative, education and research networks etc encouraged many organizations to provide Internet access to all. These organizations are popularly called Internet Service Provider (ISP).

**Connecting to the internet through guided media:**

**Dial-up access**: Dial-up access uses a modem to place a call to the public switched telephone network (PSTN) to connect to a pool of modems using a single channel. Multilink dial-up provides increased bandwidth by bonding two or more dial-up connections together and treating them as a single data channel.

**High speed broadband connections**: When users share an Internet connection through a LAN, the connection between the network and the ISP must be adequate to meet all needs. The dedicated high-speed data circuits are available from telephone companies, cable TV services and other suppliers such as large networking companies and satellite service provider. Therese high speed services are sometimes called broadband connections or leased lines, because they use media that can handle multiple signals at once, such as fiber optics, microwave and other technologies. Internet may be through a high speed connection such as T1 or T2 line. Even with hundreds of users on the network, these ultra-fast connections allow large files and complex web pages to download quickly.

#### Cable Modem Service: many cable television (CATV) companies now use a portion of their network’s bandwidth to offer Internet through existing CATV connections. This Internet connection option is called cable modem service because of the need to use a cable modem to connect. CATV system transmits data over coaxial cable which can carry data as much as one hundread times faster than common telephone lines. A user can access the Internet from computer and watch CATV at the same time, over the same cable connection and without the two data streams interfering with one another.

**ADSL**: Asymmetric Digital Subscriber Line (ADSL) is the most commonly deployed types of DSL in North America. ADSL supports downstream data rates of 1.5 to 9 Mbps and upstream data rates of 16 to 640 Kbps using a special ADSL modem.

**Connecting to the internet wirelessly:**

#### Wireless WAN (WWAN) connection: A wireless wide area network (WWAN) is a digital network that extends over a large geographical area. A WWAN receives and transmits data using radio signals over cellular sites and satellite which makes the network accessible to mobile computer system. At the switching center, the WWAN splits off into segments and then connects to either a specialized public or private network via telephone or other high speed communication links. WWAN connections include WiMAX, Mobile broadband and Satellite broadband system. These are discussed as follows:

* **WiMAX**: WiMAX (Worldwide Interoperability for Microwave Access) is a set of interoperable implementations of the IEEE 802.16 family of wireless-network standards certified by the [WiMAX Forum](http://en.wikipedia.org/wiki/WiMAX_Forum). It enables the delivery of [last mile](http://en.wikipedia.org/wiki/Last_mile) wireless broadband access.  A 2011 update provides data rates up to 1 Gbps for fixed stations.
* **Satellite broadband**: Satellites can provide fixed, portable, and mobile Internet access. It is among the most expensive forms of broadband Internet access, but may be the only choice available in remote areas. Data rates range from 2 kbps to 1 Gbps downstream and from 2 kbps to 10 Mbps upstream.
* **Mobile broadband**: Mobile broadband allows wireless Internet access through mobile phone towers to computers, mobile phones, and other digital devices using portable modems. GPRS and EDGE are data services used in 2G (second generation) GSM technology, CDMA2000 1xRTT, CDMA2000 EV-DO data services used in 3G technology, and HSPA, Mobile WiMax, LTE, LTE Advanced data services used in 4G mobile system.

#### Wireless LAN: Wireless LAN is very common now and is based on a technology that is called as wireless fidelity (Wi-Fi). This is not a technology that connects directly to an ISP as a WWAN connection will, but can be used to connect to another LANs or device through which Internet access is achieved. It uses one of the IEEE 802.11 standards of the Wi-Fi Alliance. Individual homes and businesses often use Wi-Fi to connect laptops and smart phones to the Internet. Wi-Fi Hotspots may be found in coffee shops and various other public establishments.

**Figure 16.2.3**: Different methods of Internet access

**16.2.6 Key points**

* The WWW uses Hyper Text Transfer Protocol (HTTP). It defines how messages are formatted and transmitted and what actions Web servers and browses take in response to various commands.
* Simple Mail Transfer Protocol (SMTP) is used by a mail client to send e-mail messages to a mail server.
* File Transfer Protocol (FTP) is a protocol that is used to transfer and manipulate files on the Internet.
* Telnet is a network protocol used in the Internet or LANs to provide a bidirectional interactive text-oriented communication facility using a virtual terminal connection.
* Domain Name System (DNS) translates network address (such as IP addresses) into terms understood by humans
* Dynamic Host Configuration Protocol can automatically assign IP addresses to computers and users.
* Internet Message Access Protocol (IMAP) is a protocol for e-mail messages on the Internet.
* Post Office protocol (POP) a protocol used to retrieve messages from remote servers.
* Simple Network Management Protocol (SNMP) manages complex networks.
* Uniform Resource Locator (URL) is the global address of documents and other resources on the WWW.
* An IP address is an identifier for a computer or device on a TCP/IP network.
* The main advantage of IPv6 over IPv4 is that IPv6 expands addressing capabilities.
* Common methods of Internet access include are Dial-up access, leased lines, cable internet access, Wifi, WiMax, Power-line internet, ATM and Frame Relay, ISDN, Satellite broadband, Mobile Broadband etc.

**16.2.7 Practice Set**

**Multiple Choice Questions**

1. Which of the following is not an Internet Protocols?
   1. HTML
   2. IMAP
   3. FTP
   4. TFTP
2. The WWW uses \_\_\_\_\_\_\_\_\_\_.
   1. SMTP
   2. IMAP
   3. HTML
   4. HTTP
3. Which one is an IPv4 address?
   1. 192.2.1
   2. 192.3.2.1
   3. 192.4.2.1.3
   4. None of above
4. MTA process is used \_\_\_\_\_\_\_\_\_\_\_.
   1. to retrieve e-mail
   2. to forward IP address
   3. to forward e-mail
   4. to retrieve IP address
5. Which of the following is not an example of mobile broadband?
   1. GPRS
   2. HSPA
   3. LTE
   4. WiFi

**Questions for short answers**

1. What is a HTTP?
2. Define URL and IP address.
3. Distinguish between MTA and MDA.
4. Distinguish between FTP and HTTP.
5. List the different internet access methods.

**Analytical questions**

1. Name the popular TCP/IP protocol. Explain three of them.
2. What is an IP address? Why it is important? Distinguish between IPv4 and IPv6.
3. Write a short note on Email.
4. Explain different internet access methods with a suitable diagram.

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***Lesson 16.3***

***Implementation of Internet Services***

**16.1.0 Objectives**

*On completion of this lesson you will know:*

* *Hyper Text Makeup Language*
* *Major states in designing a website.*
* *Domain and web hosting*

**16.3.1 Hyper Text Markup Language**

Hyper Text Markup Language (HTML) is the authoring [language](http://www.webopedia.com/TERM/L/language.htm) used to create documents on the [World Wide Web](http://www.webopedia.com/TERM/W/World_Wide_Web.htm). HTML defines the structure and layout of a Web document by using a variety of[tags](http://www.webopedia.com/TERM/T/tag.html) and [attributes](http://www.webopedia.com/TERM/A/attribute.html). The correct structure for an HTML document starts with

<HTML>

<HEAD>Your Name Here

</HEAD>

<BODY> Main content of Web page goes here

</BODY>

</HTML>.

All the information we like to include in a Web page fits in between the <BODY> and </BODY> tags. There are hundreds of other tags used to format and layout the information in a Web page. Tags are also used to specify hypertext links. These allow Web developers to direct users to other Web pages with only a click of the mouse on either an image or word(s). HTML is a text file that can be created in a text editor such as Microsoft’s Notepad. When saving a web page in Notepad, it is needed to include the file extension of .htm or .html. The file can then be read by a web browser such as Internet Explorer, Netscape, Safari or Mozilla.

XHTML is currently the most widely used standard among browsers, despite the fact that the new standard, HTML 5, is available but only supported by the most current browsers. XHTML is a family of current and future document types and modules that reproduce, subset, and extend HTML 4. It extends HTML 4 by utilizing Extensible Markup Language (XML), which is a language that is designed to carry data, not display it. By combining HTML with XML it retains the flexibility of HTML but allows for cleaner, well-formed coding. What this means is that a web page can now have dynamic, interactive content as XHTML is actually an XML application.

JavaScript is the scripting language of the web. The scripting language adds functionality to web pages by validating forms, detecting browsers, adding interactivity and much more. JavaScript in a lightweight programming language for the web and Java developed by Sun Microsystems is a much more powerful language for developing systems.

Cascading styles sheets (CSS) are a set of styles rules that have been created to style an HTML element. Styles can be saved to an external style sheet and then applied to many web pages, or be saved in part of the HTML file, usually the head tag.

Dynamic HTML (DHTML) includes a collaboration of technologies, HTML, CSS and JavaScript.

**16.3.2 Designing Web Site**

A Website can be defined as a collection of related web pages. Each Website is owned and updated by the individual, company or organization. A Web site on the WWW is addressed by its own Internet address, i.e., <http://www.sites.google.com>.

Each document produced in HTML is considered to be one web page. No matter how long or short it is. An entire group of web pages collected at one location is called a web site.

There are four major stages in designing a Web site:

1. **Planning**: Writing a web page is simple. When planning and designing a Web site it is important to keep in mind: the target audience, purpose, loading time, navigation and readability.
2. **Creating:** After the web site is planned, Web developer needs to write the text and format it with HTML commands. Web developer will also need to gather or create the graphics for the site.
3. **Testing**: After each page is created, it is necessary to test it with one or more different browsers to make sure it looks and acts like the demand of the client. A web developer can do the initial testing off-line, on the computer and correct any mistakes before publishing.
4. **Publishing**: Publishing a web site is similar to publishing a book. After that the Web site is available to anyone who wants to see it by uploading, or moving finished page (or pages) from a client computer to a web server. A web server is simply a computer whose job is to send the file to any computer asking to look at it.

**16.3.4 Domain and Hosting**

**Domain**: Domain is a group of [computers](http://www.webopedia.com/TERM/C/computer.html) and [devices](http://www.webopedia.com/TERM/D/device.html) on a [network](http://www.webopedia.com/TERM/N/network.html) that are administered as a unit with common rules and procedures. Within the [Internet](http://www.webopedia.com/TERM/I/Internet.html), domains are defined by the [IP address](http://www.webopedia.com/TERM/I/IP_address.html). All devices sharing a common part of the IP address are said to be in the same domain. Domain name are used to identify one or more [IP addresses](http://www.webopedia.com/TERM/I/IP_address.html). For example, the domain name google.com represents about a half dozen IP addresses. Domain names are used in [URLs](http://www.webopedia.com/TERM/U/URL.html) to identify particular [Web pages](http://www.webopedia.com/TERM/W/web_page.html). For example, the domain name is google.com in URL <http://www.google.com>.bd.

Every domain name has a suffix that indicates which [top level domain (TLD)](http://www.webopedia.com/TERM/T/TLD.html) it belongs to. Examples of TLD are given below

* **gov** – Government agencies
* **edu** – Educational institutions
* **org** – Organizations (nonprofit)
* **mil** – Military
* **com** – commercial business
* **net** – Network organizations
* **bd** – Bangladesh
* **tv** – Television
* **ac** – Academic, etc

Because the Internet is based on IP addresses not the domain names. Every [Web server](http://www.webopedia.com/TERM/W/Web_server.html) requires a [Domain Name Server (DNS)](http://www.webopedia.com/TERM/D/DNS.html) server to translate domain names into IP addresses. Figure 16.3.1 shows resolving DNS addresses. On the Internet these domain names, such as www.google.com, are much easier for people to remember than 203.10.11.20, which is the actual numeric address for this server. DNS server translates domain name www.google.com into IP addresses 203.10.11.20.

**Domain hosting**: [Domain hosting](http://www.webopedia.com/TERM/D/domain_hosting.html) refers to businesses that specialize in hosting [domain names](http://www.webopedia.com/TERM/D/domain_name.html) for individuals and companies. [Domain names](http://www.webopedia.com/TERM/D/domain_hosting.html) are used to identify particular [Web pages](http://www.webopedia.com/TERM/W/web_page.html).



**Figure 16.3.1**: Conversion of domain name into an IP address

**16.3.5 Key points**

* Hyper Text Markup Language (HTML) is the authoring [language](http://www.webopedia.com/TERM/L/language.htm) used to create documents on the [World Wide Web](http://www.webopedia.com/TERM/W/World_Wide_Web.htm).
* All the information we like to include in a Web page fits in between the <BODY> and </BODY> tags.
* When saving a web page in Notepad, it is needed to include the file extension of .htm or .html.
* JavaScript is the scripting language which adds functionality to web pages by validating forms, detecting browsers, adding interactivity and much more.
* Dynamic HTML (DHTML) includes a collaboration of technologies, HTML, CSS and JavaScript.
* There are four major stages in designing a Web site are planning, creating, testing and publishing.
* Domain is a group of [computers](http://www.webopedia.com/TERM/C/computer.html) and [devices](http://www.webopedia.com/TERM/D/device.html) on a [network](http://www.webopedia.com/TERM/N/network.html) that are administered as a unit with common rules and procedures. Within the [Internet](http://www.webopedia.com/TERM/I/Internet.html), domains are defined by the [IP address](http://www.webopedia.com/TERM/I/IP_address.html).
* Every [Web server](http://www.webopedia.com/TERM/W/Web_server.html) requires a [Domain Name Server (DNS)](http://www.webopedia.com/TERM/D/DNS.html) server to translate domain names into IP addresses.

**16.3.6 Practice Set**

**Multiple Choice Questions**

1. Hyper Text Markup Language is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_on the [World Wide Web](http://www.webopedia.com/TERM/W/World_Wide_Web.htm)
   1. authoring [language](http://www.webopedia.com/TERM/L/language.htm) used to create documents
   2. C# language used to create documents
   3. machine [language](http://www.webopedia.com/TERM/L/language.htm) used to create documents
   4. None of above
2. When saving a web page in Notepad, it is needed to include the file extension of \_\_\_\_\_\_\_\_\_\_.
   1. .htm or .html
   2. .doc or .docx
   3. .css or .m
   4. None of above
3. \_\_\_\_\_\_\_\_\_\_\_\_is a group of [computers](http://www.webopedia.com/TERM/C/computer.html) and [devices](http://www.webopedia.com/TERM/D/device.html) on a [network](http://www.webopedia.com/TERM/N/network.html) that are administered as a unit with common rules and procedures.
   1. Doman
   2. Doramon
   3. Domain
   4. Server
4. There are four major stages in designing a Web site, these are \_\_\_\_\_\_\_\_\_\_\_.
   1. planning, creating, publishing and testing
   2. creating, planning, testing and publishing
   3. planning, creating, testing and publishing
   4. planning, testing, creating and publishing
5. DNS server translates \_\_\_\_\_\_\_\_\_\_\_.
   1. IP addresses 203.10.11.20 into domain name www.google.com
   2. domain name www.google.com into IP addresses 203.10.11.20
   3. domain name www.google.com.bd into domain name www.google.com
   4. domain name www.google.com into country domain name www.google.com.bd

**Questions for short answers**

1. What is HTML?
2. Define JavaScript and Dynamic HTML.
3. What are the steps involve in designing a website?
4. Give some examples of TLD.
5. What is the main function of a DNS server?

**Analytical questions**

1. Write a short note on HTML.
2. Explain the major stages in designing a webpage.
3. How does a DNS server resolve an address? Explain it with a figure.