Web Programming
CSCS 113 S2

	L	T	P	Credit
Scheme	3	0	2	04

What is the Internet?

- The Internet is a **global network** of billions of computers and other electronic devices. With the Internet, it's possible to access almost any information, communicate with anyone else in the world, and do much more.

- You can do all of this by connecting a computer to the Internet, which is also called **going online.** When someone says a computer is online, it's just another way of saying it's connected to the Internet.

What is the Internet?

- In its simplest terms, the Internet is nothing more than a series of interconnected networks or a network of networks.

- The Internet has revolutionized the computer and communication world. Its predecessors, radio, television, telegraph, telephone and computers helped set the stage for the integration of capabilities that has become the Internet.

Brief History

- The Internet started in the 1960s as a way for government researchers to share information. Computers in the '60s were large and immobile and in order to make use of information stored in any one computer, one had to either travel to the site of the computer or have magnetic computer tapes sent through the conventional postal system.

- Another catalyst in the formation of the Internet was the heating up of the Cold War. The Soviet Union's launch of the Sputnik satellite spurred the U.S. Defense Department to consider ways information could still be disseminated even after a nuclear attack.

- This eventually led to the formation of the ARPANET (Advanced Research Projects Agency Network), the network that ultimately evolved into what we now know as the Internet. ARPANET was a great success but membership was limited to certain academic and research organizations who had contracts with the Defense Department.

- **In response to this, other networks were created to provide information sharing.**

- **January 1, 1983** is considered the official birthday of the Internet. Prior to this, the various computer networks did not have a standard way to communicate with each other. A new communications protocol was established called Transfer Control Protocol/Internetwork Protocol (TCP/IP).

- This allowed different kinds of computers on different networks to "talk" to each other. ARPANET and the Defense Data Network officially changed to the TCP/IP standard on January 1, 1983, hence the birth of the Internet. All networks could now be connected by a universal language.

How does the Internet work?

- It's important to realize that the Internet is a global network of **physical cables**, which can include copper telephone wires, TV cables, and fiber optic cables. Even wireless connections like Wi-Fi and 3G/4G rely on these physical cables to access the Internet.

- When you visit a website, your computer sends a request over these wires to a **server**. A server is where websites are stored, and it works a lot like your computer's hard drive. Once the request arrives, the server retrieves the website and sends the correct data back to your computer.

World Wide Web

- World Wide Web, which is also known as a **Web**, is a collection of websites or web pages stored in web servers and connected to local computers through the internet.

- These websites contain text pages, digital images, audios, videos, etc.

- Users can access the content of these sites from any part of the world over the internet using their devices such as computers, laptops, cell phones, etc.

- The WWW, along with internet, enables the retrieval and display of text and media to your device.

World Wide Web

- A secure version of **HTTP "HTTPS"** is also common. Today the web mainly uses the HTTP and HTTPS protocols.

- Browsers such as Internet Explorer and Firefox are software programs that can interpret the HTTP protocol (and specific languages like HTML) and cause the data contained therein to be displayed on a computer monitor.

- Browsers facilitate access to web documents called **"web pages"** that are linked to each other using **"[hyperlinks.](#)"**

- A **hyper link** is an element in a web page that creates a link to another place in the same document, an entirely different document or media content of some type.

- **Web pages** as displayed in a browser window can contain graphics, sound, text and video. In reality, the graphics, sound and video are not part of the web document.

- They are linked to the web document and displayed in accordance with the instructions contained in it.

- So the images, sounds and videos are all transferred over the Internet separately and are displayed with the text according to the instructions contained in the hypertext document.

History of the World Wide Web:

- Tim Berners-Lee, a scientist working at CERN (The European Organization for Nuclear Research) invented the World-Wide Web in 1990.

- It was originally intended as a means to meet the demand for atomic information sharing between scientists working at different institutions around the world.

- The basic idea was to merge the technologies of personal computers, computer networking and hypertext into a powerful and easy to use information system.

- The first web server in the U.S. came on line in December of 1991 at Stanford University. At this time there were only two types of browser. One was the original version that only ran on the NeXT computer platform (a distinctive type of computer like PC or MAC) and a smaller limited version that would run on other computers.

- It soon became clear that CERN could not do all the development work on the web so BernersLee pled for outside developers to help.

History of the World Wide Web:

- By the end of 1994, the web had 10,000 servers, 2,000 of which were commercial, and ten million users.

- In 1995 the International World-Wide Web Consortium (W3C) was founded to lead the web "to its fullest potential through development of common protocols that would promote its evolution and insure its operability."

- Since then, the protocols have continued to be developed, standardized and enhanced. When you launch a browser it requests and displays pages of information.

- The function of the browser is to interpret the program language of web pages and transform it into the words and graphics you see on your computer monitor.

- The language the browser interprets is called the Hypertext Markup Language (HTML). On each web page, words, phrases and even images are made into hyper links.

- Clicking on a link causes the browser to request and display another page which probably also contains links. The web documents are stored on a so called "**Web Server**".

Difference between World Wide Web and Internet

- Although many people use the terms "Internet" and "web" interchangeably, **in reality the Internet is the system that facilitates the transfer of data and the web is the data itself.**

- The web is just one of the ways that data can be distributed over the Internet. So the Internet is not the web and the two terms should not be confused or used interchangeably.

What is a protocol?

- A protocol is a set of rules for formatting and processing data. Network protocols are like a common language for computers.

- Usually either http:// or https://, this tells the web browser to expect a web address to follow.

- Some of the more common protocols used on the Internet include; the Hypertext Transfer Protocol (HTTP), Telnet, and File Transfer Protocol (FTP).

Hyperlink

Home
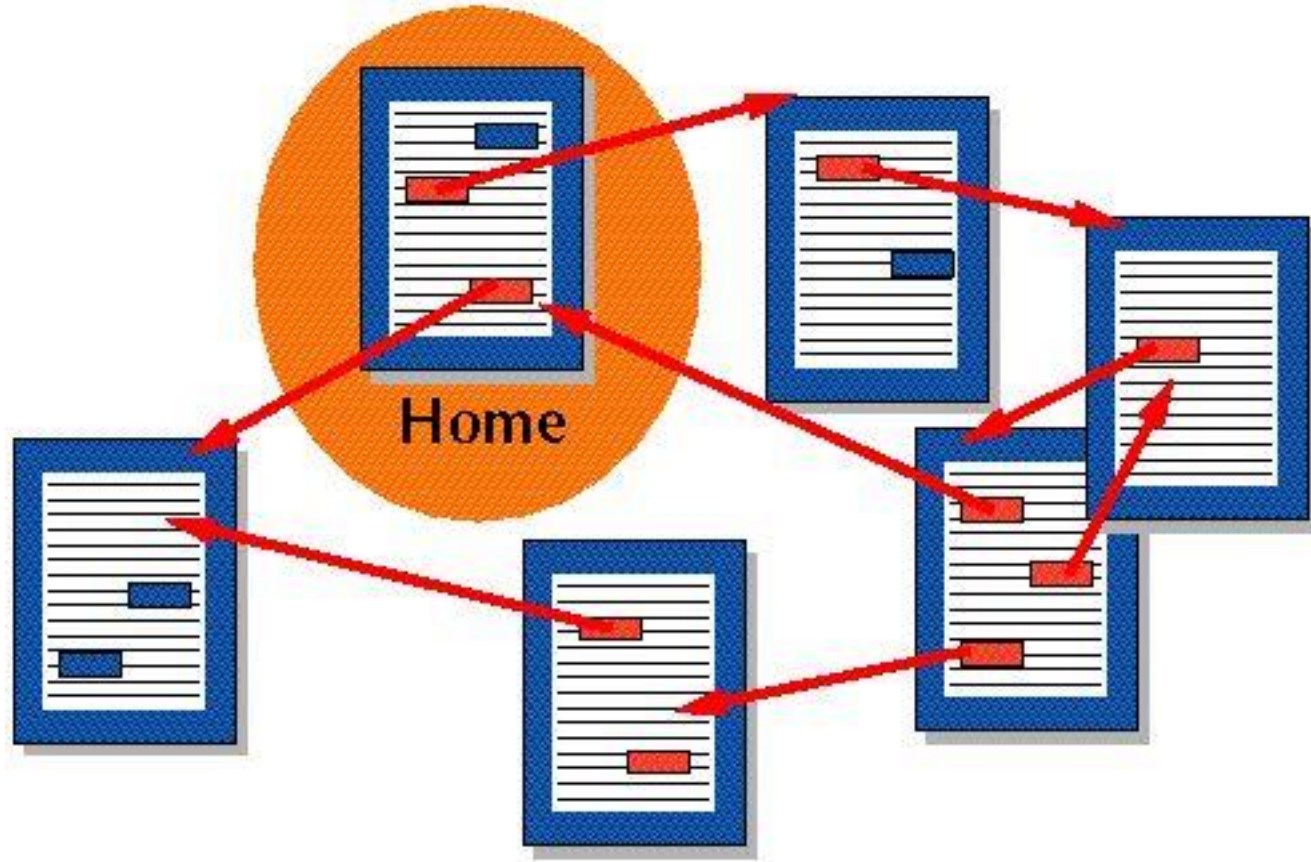
FTP vs HTTP

- HTTP (Hypertext Transfer Protocol) and FTP (File Transfer Protocol) are only two of the multitude of protocols that are being used in the internet, each with its own function.

- The purpose **of HTTP** is to serve as a means of accessing the world wide web. Websites are accessed using http with the help of browsers.

- **FTP,** as the name implies, is used in transferring files from one computer to another. It is a less popular protocol due to small number of people who actually use FTP, and even fewer people who know that they are using it.

What is web server?
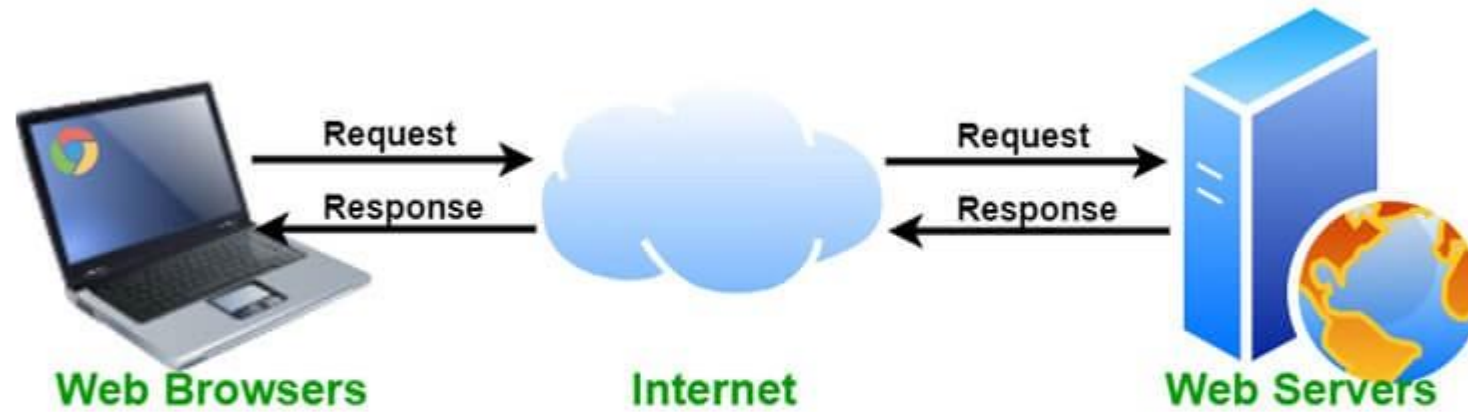
Web Server

- A Web Server is a computer intended to house and deliver web content.

- The computer is secured so that only authorized people can access it to make changes to the data. If you are on the same network as the Web Server, you may be able to save the data directly onto the Web Server computer (if authorized).

- If, however, you are not on the same network as the Web Server, you must connect to it remotely using a login and password specifically set up for that purpose. In this case the data is sent to the server using the FTP protocol or Secure FTP (which requires FTP or SFTP software to be installed on your local computer).

Web Server

- Since data is sent over the Internet serially (one data bit at a time) it takes a specific amount of time for each file, image or other element to be transmitted from one place to another.

- The larger the file, the longer the process takes. Because of this, in practical terms, it is better to keep the size of each individual file as small as possible so the transmission time is minimal.

Web Server

- In designing web content we try to keep the size of each file as small as possible to improve the "download time."

- To further help, the images and other media content of a web page are not saved as part of the HTML document but are linked to it so these items download separately which also improves efficiency.

- Additionally, the browser saves a copy of the downloaded files on the local computer in a process called "caching." When a file is cached on the local computer, if you want to see it again, the computer can call the file up from the local cache rather than having to download it again, thus saving more time.

- We can also save time by using an image on more than one page. The image can be displayed on multiple pages but only has to be downloaded once.

URL

- URL the same as a domain name? Surprisingly to many, the answer is no. But the terms are used so interchangeably, it's understandable why people confuse one for the other.

- But there is a difference. A domain name is part of a URL, which stands for Uniform Resource Locator. You can see the visual difference in the following example

URL Overview

https://www.computerhope.com/jargon/u/url.htm

Protocol   Subdomain   Domain and domain suffix   Directories   Web page

URL

- In order for computer networks and servers to "talk to one another," computers rely on a language made up of numbers and letters called an IP address. Every device that connects to the internet has a unique IP address and looks something like this:

22.231.113.64

- In order to navigate easily around the web, typing in a long IP address isn't ideal, or realistic, to an online user. This is the reason why domain names were created – to hide IP addresses with something more memorable.

- You could consider the domain name as a "nickname" to the IP address.

- A URL incorporates the domain name, along with other detailed information, to create a complete address (or "web address") to direct a browser to a specific page online called a web page.

- In essence, it's a set of directions and every web page has a unique one.

Domain Name System (DNS)

- DNS is a directory service that provides a mapping between the name of a host on the network and its numerical address.

- DNS is required for the functioning of the internet.

- Each node in a tree has a domain name, and a full domain name is a sequence of symbols specified by dots.

- DNS is a service that translates the domain name into IP addresses. This allows the users of networks to utilize user-friendly names when looking for other hosts instead of remembering the IP addresses.

- For example, suppose the FTP site at EduSoft had an IP address of 132.147.165.50, most people would reach this site by specifying ftp.EduSoft.com. Therefore, the domain name is more reliable than IP address
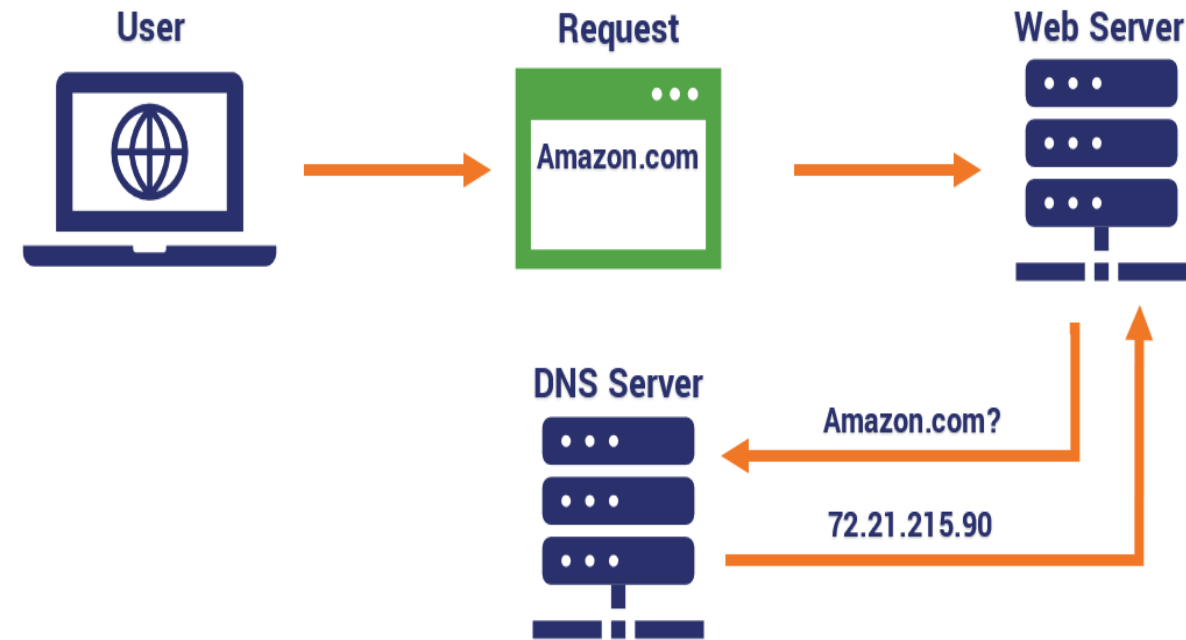
Domain Name System (DNS)

com	Commercial Organizations
coop	Cooperative business Organizations
edu	Educational institutions
gov	Government institutions
info	Information service providers
org	Nonprofit Organizations

Types of Web server

- Every Website sits on a computer known as a Web server. This server is always connected to the internet.

- Every Web server that is connected to the Internet is given a unique address made up of a series of four numbers between 0 and 255 separated by periods.

- For example, 68.178.157.132 When you register a web address, also known as a domain name, such as example.com you have to specify the IP address of the Web server that will host the site. You can load up with Dedicated Servers that can support your web-based operations.

Types of Web server

Common and top web server software on the market

- **Apache HTTP Server.** Developed by Apache Software Foundation, it is a free and open source web server for Windows, Mac OS X, Unix, Linux, Solaris and other operating systems; it needs the Apache license.

- **Microsoft Internet Information Services (IIS).** Developed by Microsoft for Microsoft platforms; it is not open sourced, but widely used.

- **Nginx.** A popular open source web server for administrators because of its light resource utilization and scalability.

- **Lighttpd.** A free web server that comes with the FreeBSD operating system. It is seen as fast and secure, while consuming less CPU power.

- **Sun Java System Web Server.** A free web server from Sun Microsystems that can run on Windows, Linux and Unix. It is well-equipped to handle medium to large websites.

- Leading web servers include Apache, Microsoft's Internet Information Services (IIS) and Nginx -- pronounced *engine X*. Other web servers include Novell's NetWare server, Google Web Server (GWS) and IBM's family of Domino servers.

Web Browsers

- A software application used to access information on the World Wide Web is called a Web Browser. When a user requests some information, the web browser fetches the data from a web server and then displays the webpage on the user's screen.

- A web browser takes you anywhere on the internet. It retrieves information from other parts of the web and displays it on your desktop or mobile device.

- Not all browser makers choose to interpret the format in the same way. For users, this means that a website can look and function differently. Creating consistency between browsers, so that any user can enjoy the internet, regardless of the browser they choose, is called web standards

History of Web Browser

- Today web browsers are easily accessible and can be used on devices like computer, laptops, mobile phones, etc. but this evolution of making browsers available for easy use took many years.

- Given below are some salient points which one must know with regard to the history of web browsers:

- **"WorldWideWeb"** was the first web browser created by Tim Berners Lee in 1990. This is completely different from the World Wide Web we use today

- In 1993, the **"Mosaic"** web browser was released. It had the feature of adding images and an innovative graphical interface. It was the "the world's first popular browser"

- After this, in 1994, Marc Andreessen (leader of Mosaic Team) started working on a new web browser, which was released and was named **"Netscape Navigator"**

- In 1995, **"Internet Explorer"** was launched by Microsoft. It soon overtook as the most popular web browser

- In 2002, **"Mozilla Firefox"** was introduced which was equally as competent as Internet Explorer

- Apple too launched a web browser in the year 2003 and named it **"Safari"**. This browser is commonly used in Apple devices only and not popular with other devices

- Finally, in the year 2008, Google released "Chrome" and within a time span of 3 years it took over all the other existing browsers and is one of the most commonly used web browsers across the world

Cookies

- Websites save information about you in files called cookies.
- They are saved on your computer for the next time you visit that site. Upon your return, the website code will read that file to see that it's you.
- For example, when you go to a website, the page remembers your username and password – that's made possible by a cookie.
- There are also cookies that remember more detailed information about you. Perhaps your interests, your web browsing patterns, etc.
- This means that a site can provide you more targeted content – often in the form of ads. There are types of cookies, called **third party cookies**, that come from sites you're not even visiting at the time and can track you from site to site to gather information about you, which is sometimes sold to other companies.
- Sometimes you can block these kinds of cookies, though not all browsers allow you to

Understanding privacy

- Nearly all major browsers have a private browsing setting. These exist to hide the browsing history from other users on the same computer.

- Many people think that private browsing or incognito mode will hide both their identity and browsing history from internet service providers, governments and advertisers.

- They don't. These settings just clear the history on your system, which is helpful if you're dealing with sensitive personal information on a shared or public computer

Static Web page

- Static web pages are also known as **flat or stationary** web page.

- They are loaded on the client's browser as exactly they are stored on the web server. Such web pages contain only static information.

- User can only read the information but can't do any modification or interact with the information. Static web pages are created using only HTML. Static web pages are only used when the information is no more required to be modified

Dynamic Web page

- Dynamic web page shows different information at different point of time. It is possible to change a portion of a web page without loading the entire web page.

- **Server-side dynamic web page** It is created by using server-side scripting. There are server-side scripting parameters that determine how to assemble a new web page which also include setting up of more client-side processing.

- **Client-side dynamic web page** It is processed using client side scripting such as JavaScript.

Scripting Languages

- Scripting languages are like programming languages that allow us to write programs in form of script. These scripts are interpreted not compiled and executed line by line. Scripting language is used to create dynamic web pages.

- **Client-side scripting** refers to the programs that are executed on client-side. Client-side scripts contains the instruction for the browser to be executed in response to certain user's action Client-side scripting programs can be embedded into HTML files or also can be kept as separate files. Eg. Javascript

- **Sever-side scripting** acts as an interface for the client and also limit the user access the resources on web server. It can also collects the user's characteristics in order to customize response. Eg. ASP.net, java, python

Mark up language

- A markup language is a computer language that uses tags to define elements within a document.

- It is human-readable, meaning markup files contain standard words, rather than typical programming syntax. While several markup languages exist, the two most popular are HTML and XML

Web Document

- A document is the name of a message sends over HTTP.

- It's the data unit for the web. A document moves on the internet and is understand by the web client (browser mainly).

- When you serve a file via a web server, it's wrapped inside an http request and becomes a document.

- Documents on the web have generally by nature a hierarchical nature. This is generally a HTML document but it can be also other type of document such as an XML document. This document (file) can be rendered by the user agent (Generally a browser).

Hypertext :

Hypertext is a cross referencing tool which connects the links to other text using hyperlinks.

Hypertext is non-linear and multi sequential and it is different from our normal text. By the help of hypertext one organized way is achieved to present information.

This makes the user to move from one part of the information to another part of the information which is in same page or any other page. It makes the documentation simple by providing a way of easy accessible to the end user.

- **Example** of Hypertext is that GeeksForGeeks is a computer science portal, when we read one article it uses hypertext to link other pages and when we click on that hypertext it takes to us to that page so that we we can gather more information related to the topic.

Hypermedia :
Hypermedia is the extension of Hypertext which includes multiple forms of media such as text, graphics, audio or video etc rather than only text based like hypertext.

It provides a facility to connect the web pages to create a network with multimedia elements with a simple click for a better multimedia experience. Hypermedia allows links to be integrate in multimedia elements like images and videos and when we click on that it takes us to that page.

• **Example** of hypermedia is that when we use e-commerce site say flipkart and when we click on any product it takes us to the specific product page which belongs to that. So here the link is embedded to the image.

S.No.	HYPERTEXT	HYPERMEDIA
01.	Hypertext refers to the system of managing the information related to the plain text.	Hypermedia refers to connecting hypertext with other media such as graphics, sounds, animations.
02.	Hypertext involves only text.	It involves graphics, image, video, audio etc.
03.	Here only text becomes the part of link.	It is enhanced version of hypertext here along with text other multimedia also becomes the part of link.
04.	Hypertext is the part of hypermedia means it comes under hypermedia.	Hypermedia is the superior entity which is the advanced version of hypertext.