# CSE 256
# INTERNET TECHNOLOGIES

## TUTORIAL SHEET-2

Presidency University, Bengaluru

Welcome to the exciting and rapidly evolving world of Internet and web programming!

# The Client-Server Model

The web is sometimes referred to as a client-server model of communications.

In the client-server model, there are two types of actors: clients and servers.

The server is a computer agent that is normally active 24 hours a day, 7 days a week, listening for queries from any client who make a request.

A client is a computer agent that makes requests and receives responses from the server, in the form of response codes, images, text files, and other data.

Client machines are the desktops, laptops, smart phones, and tablets you see everywhere in daily life.

These machines have a broad range of specifications regarding operating system, processing speed, screen size, available memory, and storage.

In the most familiar scenario, client requests for web pages come through a web browser.

The essential characteristic of a client is that it can make requests to particular servers for particular resources using URLs and then wait for the response.

These requests are processed in some way by the server.

The server in this model is the central repository, the command center, and the central hub of the client-server model.

It hosts web applications, stores user and program data, and performs security authorization tasks.

The essential characteristic of a server is that it is listening for requests, and upon getting one, responds with a message.

The exchange of information between the client and server is often referred as the request-response loop.

# Server Types

- Web servers. A web server is a computer servicing HTTP requests. This typically refers to a computer running web server software such as Apache or Microsoft IIS (Internet Information Services).

- Application servers. An application server is a computer that hosts and executes web applications, which may be created in PHP, ASP.NET, Ruby on Rails, or some other web development technology.

- Database servers. A database server is a computer that is devoted to running a Database Management System (DBMS), such as MySQL, Oracle, or SQL Server, that is being used by web applications.

- Mail servers. A mail server is a computer creating and satisfying mail requests, typically using the Simple Mail Transfer Protocol (SMTP).

- Media servers. A media server (also called a streaming server) is a special type of server dedicated to servicing requests for images and videos. It may run special software that allows video content to be streamed to clients.

# Web Basics

a web page is nothing more than an HTML (HyperText Markup Language) document (with the extension .html or .htm)
that describes to a web browser the document's content and structure.

## Hyperlinks

HTML documents normally contain hyperlinks, which, when clicked, load a specified web document.

Both images and text may be hyperlinked.

When the mouse pointer hovers over a hyperlink, the default arrow pointer changes into a hand with the index finger pointing upward.

Often hyperlinked text appears underlined and in a different color from regular text in a web page.

## URL Formats

All URLs have the same general format:

The first part of the URL is the protocol that we are using.


The domain identifies the server from which we are requesting resources. Since the DNS system is case insensitive, this part of the URL is case insensitive. Alternatively, an IP address can be used for the domain.

The path is a familiar concept to anyone who has ever used a computer file system. The root of a web server corresponds to a folder somewhere on that server.

*Query strings is a way of passing information such as user form input from the client to the server. In URLs, they are encoded as key-value pairs delimited by “&” symbols and preceded by the “?” symbol.

The last part of a URL is the optional fragment. This is used as a way of requesting a portion of a page.

*[will be explained in later sessions]*

# The Hypertext Transfer Protocol

All Web communications transactions use the same protocol: the Hypertext Transfer Protocol (HTTP).

HTTP consists of two phases: the request and the response.

Each HTTP communication (request or response) between a browser and a Web server consists of two parts: a header and a body.

The header contains information about the communication

The body contains the data of the communication if there is any.

The HTTP establishes a TCP connection on port 80 (by default).

The HTTP protocol defines several different types of requests, each with a different intent and characteristics.

The most common requests are the GET and POST request.

## GET request

In this request one is asking for a resource located at a specified URL to be retrieved. Whenever you click on a link, type in a URL in your browser, or click on a book mark, you are usually making a GET request.

## POST request

This method is normally used to transmit data to the server using an HTML form. A post request sends form data as part of the HTTP message, not as part of the URL. since the data is not transmitted in the URL, it is seen to be a safer way of transmitting data

Response codes are integer values returned by the server as part of the response header. These codes describe the state of the request, including whether it was successful, had errors, requires permission, and more.

200: OK :-The 200 response code means that the request was successful.

301: Moved Permanently:- Tells the client that the requested resource has permanently moved. Codes like this allow search engines to update their databases to reflect the new location of the resource. Normally the new location for that resource is returned in the response.

304: Not Modified:- If the client so requested a resource with appropriate Cache-Control
headers, the response might say that the resource on the server is no newer than the one in the client cache. A response like this is just a header, since we expect the client to use a cached copy of the resource.

401: Unauthorized:- Some web resources are protected and require the user to provide credentials to access the resource. If the client gets a 401 code, the request will have
to be resent, and the user will need to provide those credentials.

404: Not found:- 404 codes are one of the only ones known to web users. Many browsers will display an HTML page with the 404 code to them when the requested resource was not found.

414: Request URI too long:- URLs have a length limitation, which varies depending on the server software in place. A 414 response code likely means too much data is likely trying to be submitted via the URL.

307: Temporary redirect :-This code is similar to 301, except the redirection should be considered temporary.

400: Bad Request:- If something about the headers or HTTP request in general is not correctly adhering to HTTP protocol, the 400 response code will inform the client.

500: Internal server error:- This error provides almost no information to the client except to say the server has encountered an error.

# Web Applications in Comparison to Desktop Applications

advantages of web applications include:

- Accessible from any Internet-enabled computer.
- Usable with different operating systems and browser applications.
- Easier to roll out program updates since only software on the server needs to be updated and not on every desktop in the organization.
- Centralized storage on the server means fewer security concerns about local.

Some of these disadvantages include:

- Requirement to have an active Internet connection (the Internet is not always available everywhere at all times).
- Security concerns about sensitive private data being transmitted over the Internet.
- Concerns over the storage, licensing, and use of uploaded data.
- Problems with certain websites on certain browsers not looking quite right.

# Static Websites versus Dynamic Websites

Static website consists only of HTML pages that look identical for all users at all times.

dynamic website  page content is being created at run time by a program created by a programmer; this page content can vary from user to user.

# Client-Side Scripting versus Server-Side Scripting

Client-side scripting:- method of interacting with web browser

Client-side scripting with JavaScript can be used to validate user input, to interact with the browser, to enhance web pages, and to add client/server communication between a browser and a web server.

server-side scripts:- allow user to interact with server