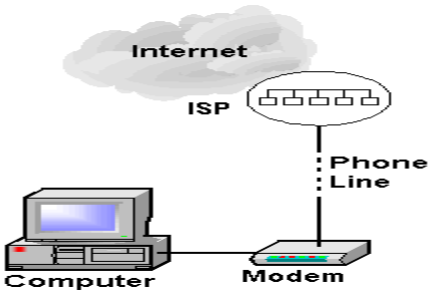
INTERNET PROGRAMMING I.

Internet

The Internet is a collection of information stored in computers that are networked together internationally. It is literally a network of networks. Physically, the Internet uses a subset of all of the resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet as a cooperative public network is its use of a set of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol).

How Do I Connect to the Internet?



Computer

Connection –

Phone Line, Cable, DSL, Wireless, ...

Modem

Network Software - TCP/IP

Application Software - Web Browser, Email, ...

Internet Service Provider (ISP)

WAYS TO CONNECT TO INTERNET

Dial-up access uses a modem and a phone call placed over the public switched telephone network (PSTN) to connect to a pool of modems operated by an ISP.

The modem converts a computer's digital signal into an analog signal that travels over a phone line's local loop until it reaches a telephone company's switching facilities or central office (CO) where it is switched to another phone line that connects to another modem at the remote end of the connection Cable Internet or cable modem access provides Internet access via Hybrid Fiber Coaxial wiring originally developed to carry television signals. Either fiber-optic or coaxial copper cable may connect a node to a customer's location at a connection known as a cable drop.

Digital Subscriber Line (DSL) service provides a connection to the Internet through the telephone network. Unlike dial-up, DSL can operate using a single phone line without preventing normal use of the telephone line for voice phone calls. DSL uses the high frequencies, while the low (audible) frequencies of the line are left free for regular telephone communication.

Wireless Fidelity (WIFI) 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. Wi-Fi is used to create campus-wide and city-wide wireless networks Wi-Fi networks are built using one or more wireless routers called Access Points.

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. WiMAX enables "the delivery of last mile wireless broadband access as an alternative to cable and DSL"
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

World Wide Web

The World Wide Web (or WWW) is a subset of the Internet. Technically it is all the resources and users on the Internet that are using the Hypertext Transport Protocol (HTTP).

How the Web Works

Hypertext Transfer Protocol (HTTP) is a fast and efficient communication protocol that controls many different operations that take place between the Web browser client and the server.
HTTP uses the **Transmission Control Protocol (TCP)** to transport all of its control and data messages from one computer to another.

Web pages are typically grouped at a Web site, where the main page is referred to as the home page. The user navigates by mouse clicking on hyperlinks displayed as text, buttons, or images. These hyperlinks reference other information. When you click a hyperlink, you jump to another part of the same page, a new page at the same Web site, or to another Website.

You might also execute a program, display a picture, or download a file. All of this hyperlinking is done with Hyper Text Markup Language, which works in concert with HTTP.
To connect with a Web site, you type **the Uniform Resource Locator (URL**) for the site into the Address field of a Web browser. Here is an example of the URL that retrieves the Microsoft Home Page.

When you type this request, the Web browser first gets the IP address of *www.microsoft.com* from a **Domain Name System (DNS)** server, and then connects with the target server. The server responds to the client and transfers this HTML coded document to your Web browser. Your Web browser then translates and displays the HTML information.

HYPERTEXT

In a hypertext document, certain words within the text are marked as *links* to other areas of the current document or to other documents
The user moves to a related area by moving his or her mouse pointer to the link and clicking once with the mouse button
Links are used to point to another part of the same document, in which case clicking the link will cause the browser to move to a new part of the currently displayed document

HYPERMEDIA

Hypermedia links uses the images tom point to HTML documents. For instance, a hypermedia link might point to an audio file, a QuickTime movie file, or a graphic file such as a GIF- or JPEG-format graphic.

BROWSER

A **browser** program enables your computer to extract information from remote computers working on any platform through the WWW. The program on your computer is called WWW *client*. The WWW program [usually] on another computer that the browser "talks" to is called the *server*. Technically, a Web browser is a client program that uses the Hypertext Transport Control Protocol (HTTP) to make requests of Web servers throughout the Internet on behalf of the browser user.

Web browsers communicate with Web servers primarily using **HTTP (Hypertext Transfer** Protocol) to fetch Web pages. HTTP allows Web browsers to submit information to Web servers as well as fetch Web pages from them.

Internet Explorer

Windows Internet Explorer (formerly **Microsoft Internet Explorer** abbreviated as **MSIE**), commonly abbreviated as **IE,** is a series of graphical web browsers developed by Microsoft and included as part of the Microsoft Windows line of operating systems starting in 1995. It has been the most widely used web browser since 1999.

Features of Internet Explorer

Internet Explorer has been designed to view the broadest range of web pages and to provide certain features within the operating system including Microsoft Update. Some of its features are as follows:

- **Standard support**

Internet Explorer almost fully support HTML, CSS XML implementation techniques.

- **Usability and Accessibility**

Internet Explorer makes use of the accessibility framework provided in Windows. Internet Explorer is also a user interface for FTP. Recent versions feature **pop – up blocking** and **tabbed browsing.**

- **Cache**

Internet Explorer caches visited content in the Temporary Internet Files folder to
allow quicker access to previously visited pages.

- **Security**

Internet Explorer uses a zone – based security framework that groups sites based on certain conditions, including whether it is an intranet or internet – based site. Security restrictions are applied on a per – zone basis, all the sites in a zone are subject to the restrictions.

- **Group Policy**

Internet Explorer is fully configurable using **Group Policy (**feature that provides centralized management and configuration of computers and remote users**).** Administrators of **Windows Server Domains (**a logical group of computers running versions of the Microsoft Windows operating system that share a central directory database**)** can apply and enforce a variety of settings that affect the user

interface (such as disabling menu items and individual configuration options), as well as underlying security features such as downloading of files, zone configuration, per – site settings, etc.

Advantages to using a browser:

1. Browsers are typically free or very inexpensive.
2. Browsers provide an almost universal interface for accessing and displaying information. Everyone uses the same or a similar interface, even people outside your organization and in different countries.
3. Browsers can connect with any Web server, no matter what operating system or platform.
4. Browsers require few system resources and little if any maintenance and system configuration.
5. Browsers can easily be updated by downloading the latest version from the Web page of the browser's developer or vendor.

URL

A URL (Uniform Resource Locator) is the address of a file or other resource accessible on the Internet

URL structure

protocol://host.domain[:port]/path/file.extension [?optional stuff]
http://www.hellohelpme.com/index.html

http: protocol
//www. host
hellohelpme.com domain
/index.html the individual document

the extension html shows that it was coded with html (web documents frequently have the extension html or htm)

Domains commonly end in:

.com - commercial entity e.g., www.godiva.com - Godiva Chocolates
.gov - government e.g., www.loc.gov - the library of congress
.net - a network e.g., www.psi.net PSInet

.org - a non-profit organization e.g., www.kennedy-center.org

.mil - the military e.g., www.army.mil

Foreign domains end in .ca (Canada), .uk (United kingdom), etc

Some proposed new domains

.arts - Entertainment, music, culture

.firm - Businesses

.info - Information services and providers

.nom - Personal home pages

.rec - Recreation

.store - Online sales

.web - Web activities

HTTP

The Hypertext Transfer Protocol (HTTP) is the set of rules for exchanging files (text, graphic images, sound, video, and other multimedia files) on the World Wide Web. Relative to the TCP/IP suite of protocols (which are the basis for information exchange on the Internet), HTTP is an application protocol.

HTTP include the idea that files can contain references to other files whose selection will elicit additional transfer requests. Any Web server contains, in addition to the Web files it can serve, Your Web browser is an HTTP client, sending requests to servers. When the browser user enters file requests by either "opening" a Web file (typing in a Uniform Resource Locator or URL) or clicking on a hypertext link, the browser builds an HTTP request and sends it to the Internet Protocol address indicated by the URL

Role of web sites in organizations

- **Advertising**

One of the things that highlight the importance of having a website is advertising. A website allows a user to quickly update addresses, phone numbers, products, services, events and any other relevant details. These changes are far less expensive and less time consuming than physically reprinting all sorts of different paper marketing materials. Online advertising on websites also has no limits on size

– there can be a huge amount of information included in full detail and color without worrying about added costs of printed materials.

- **Market Expansion**

Having a website allows the market to increase substantially. There will be no limits on the market that can be reached because of time zones, countries, borders or even languages. Many web browsers will translate websites to the language of the user's choice at the click of a button. All of this market expansion is possible at a cost much less than other forms of advertising such as print mailers, newspaper ads or television commercials.

- **Client Expectations**

We are living in an ever increasingly digital world. People expect automatic answers to questions and honestly assume that nearly everyone has their own website. In fact, the internet has largely taken over directory assistance, yellow pages or even local phone books for contact information. If your information cannot be found online, it is almost as though you don't exist. It is also important that a website is fully functional from mobile devices such as smart phones for clients who are constantly on the go.

- **Legitimacy of the Group or Business**

Because so many different groups – both for profit and non-profit groups—and businesses have their own website, those without lack a certain amount of legitimacy. People who are interested in receiving more information may get the wrong impression on the size, scope and professionalism of a group without a website. Websites for all manner of groups, companies and even individuals are so common that potential clients may be more than put off by groups lacking one. These groups may be seen as technologically stymied at best and inferior quality at worst.

- **24/7 Availability**

Most businesses and groups simply cannot run as consistently as a website can. A website can offer information to interested parties 24 hours a day, 7 days a week with no regard to vacation time or even statutory holidays. People often visit websites outside of normal working hours and this may even be the only time that they have available to find out about your organization. Information simply must

be available at all times when people live in such a busy world and a website is the most cost effective way to provide an unlimited amount of information at all times.

- **Client Relations**

Part of the importance of having a website is to strengthen client relations. The website itself helps to develop and strengthen relations with current and prospective customers. The website can proactively target marketing efforts to specific people at certain times. It can let customers become familiar with a company's brand, marketing materials, products, core beliefs, philosophies, history and even employees. It opens up an entirely different venue for communication and dialogue between a group and the people which it serves.

- **Additional Sales**

A website provides a venue for additional sales. Websites can be set up to sell products and accept payments with the help of e-commerce technologies. Even if the group seeking a website is not a physical product, potential clients can research what the group does have to offer and develop more avenues to increase the group's size and reach.
Whether a website is being sought for a public organization, community or business, it is imperative to establish an online presence as soon as possible.

Web programming

Web programming refers to the writing, markup and coding involved in Web development, which includes Web content, Web client and server scripting and network security. The most common languages used for Web programming are XML, HTML, JavaScript, Perl 5 and PHP. Web programming is different from just programming, which requires interdisciplinary knowledge on the application area, client and server scripting, and database technology.

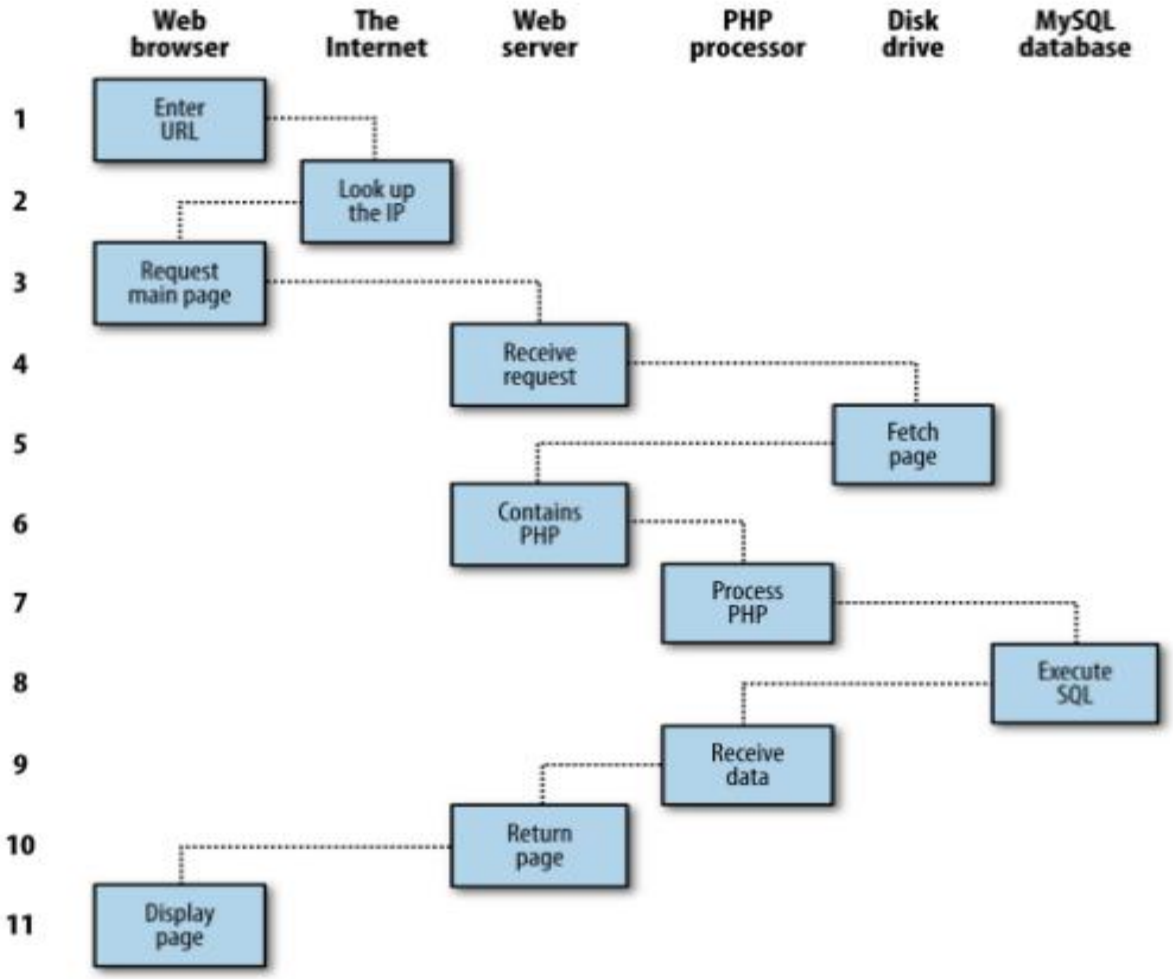
Approaches to Web Programming.

Server-side Programming - Server-side scripting is a technique used in web development which involves employing scripts on a web server which produce a response customized for each user's (client's) request to the website. The alternative is for the web server itself to deliver a static web page. Scripts can be written in any of a number of server-side scripting languages that are available.

Server-side scripting is distinguished from client-side scripting where embedded scripts, such as JavaScript, are run client-side in a web browser, but both techniques are often used together.
Server-side scripting is often used to provide a customized interface for the user. These scripts may assemble client characteristics for use in customizing the response based on those characteristics, the user's requirements, access rights, etc. Server-side scripting also enables the website owner to hide the source code that generates the interface, whereas with client-side scripting, the user has access to all the code received by the client.

When the server serves data in a commonly used manner, for example according to the HTTP or FTP protocols, users may have their choice of a number of client programs (most modern web browsers can request and receive data using both of those protocols). In the case of more specialized applications, programmers may write their own server, client, and communications protocol, that can only be used with one another.

Client side Programming - Client-side refers to operations that are performed by the client in a client–server relationship in a computer network. A client is a computer application, such as a web browser, that runs on a user's local computer or workstation and connects to a server as necessary. Operations may be performed client-side because they require access to information or functionality that is available on the client but not on the server, because the user needs to observe them or provide input, or because the server lacks the processing power to perform the operations in a timely manner for all of the clients it serves.
Additionally, if operations can be performed by the client, without sending data over the network, they may take less time, use less bandwidth, and incur a lesser security risk. The client then analyzes the data (a client-side operation), and, when the analysis is complete, transmits its results back to the server.



Here are the steps for a dynamic client/server request/response sequence:

1. You enter *http://server.com* into your browser's address bar.
2. Your browser looks up the IP address for *server.com*.
3. Your browser issues a request to that address for the web server's home page.
4. The request crosses the Internet and arrives at the *server.com* web server.
5. The web server, having received the request, fetches the home page from its hard disk.
6. With the home page now in memory, the web server notices that it is a file incorporating PHP scripting and passes the page to the PHP interpreter.
7. The PHP interpreter executes the PHP code.
8. Some of the PHP contains MySQL statements, which the PHP interpreter now passes to the MySQL database engine.
9. The MySQL database returns the results of the statements back to the PHP interpreter.

WINS

(**W**indows **I**nternet **N**aming **S**ervice) WINS Name resolution software from Microsoft that ran in Windows servers at the time networks were being converted to IP. Windows workgroup PCs use NetBIOS names, and prior to Windows XP, required this service to convert the names to IP addresses.

Windows PCs identified themselves to WINS so other Windows PCs could find their IP addresses. WINS allowed machines in one LAN segment to locate machines in another by name. Hence the word "internet" in WINS referred to multiple company networks, not the global Internet.

Web Programming languages

1)HTML

HyperText Markup Language (HTML) is the standard markup language for creating web pages and web applications. With Cascading Style Sheets (CSS), and JavaScript, it forms a triad of cornerstone technologies for the World Wide Web. Web browsers receive HTML documents from a webserver or from local storage and render them into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects, such as interactive forms, may be embedded into the rendered page. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. HTML elements are delineated by tags, written using angle brackets. Tags such as <img /> and <input /> introduce content into the page directly. Others such as ... surround and provide information about document text and may include other tags as sub-elements. Browsers do not display the HTML tags, but use them to interpret the content of the page.

2)Perl

Perl is a family of high-level, general-purpose, interpreted, dynamic programming languages. The languages in this family include Perl 5 and Perl 6. Though Perl is not officially an acronym, there are various backronyms in use, the best-known being "Practical Extraction and Reporting Language".

3) **PHP**

PHP (recursive acronym for *PHP: Hypertext Preprocessor*) is a widely-used open-source general-purpose scripting language that is especially suited for web development and can be embedded into HTML. PHP is a server scripting language, and a powerful tool for making dynamic and interactive Web pages. PHP is a widely-used, free, and efficient alternative to competitors such as Microsoft's.

4) **Python**

Python is a widely used high-level programming language for general-purpose programming. An interpreted language, Python has a design philosophy which emphasizes code readability (notably using whitespace indentation to delimit code blocks rather than curly braces or keywords), and a syntax which allows programmers to express concepts in fewer lines of code than possible in languages such as C++ or Java. The language provides constructs intended to enable writing clear programs on both a small and large scale.

5) **Java Script**

JavaScript is a high-level, dynamic, untyped, and interpreted programming language. JavaScript is prototype-based with first-class functions, making it a multi-paradigm language, supporting object-oriented, imperative, and functional programming styles. It has an API for working with text, arrays, dates and regular expressions, but does not include any I/O, such as networking, storage, or graphics facilities, relying for these upon the host environment in which it is embedded.

6) **CSS**

CSS or Cascading Style Sheets is rather a markup language. When paired with HTML, CSS allow a developer to decide and define how a web page or a website will eventually look or how it will appear to the visitors of the web platform. Some of the elements which CSS has an impact on include font size, font style, the overall layout, the colors and other design elements. For most websites across the world, CSS is the platform to opt for if they need help to create visually attractive webpages and finds use not just in the creation of web applications but also mobile apps.

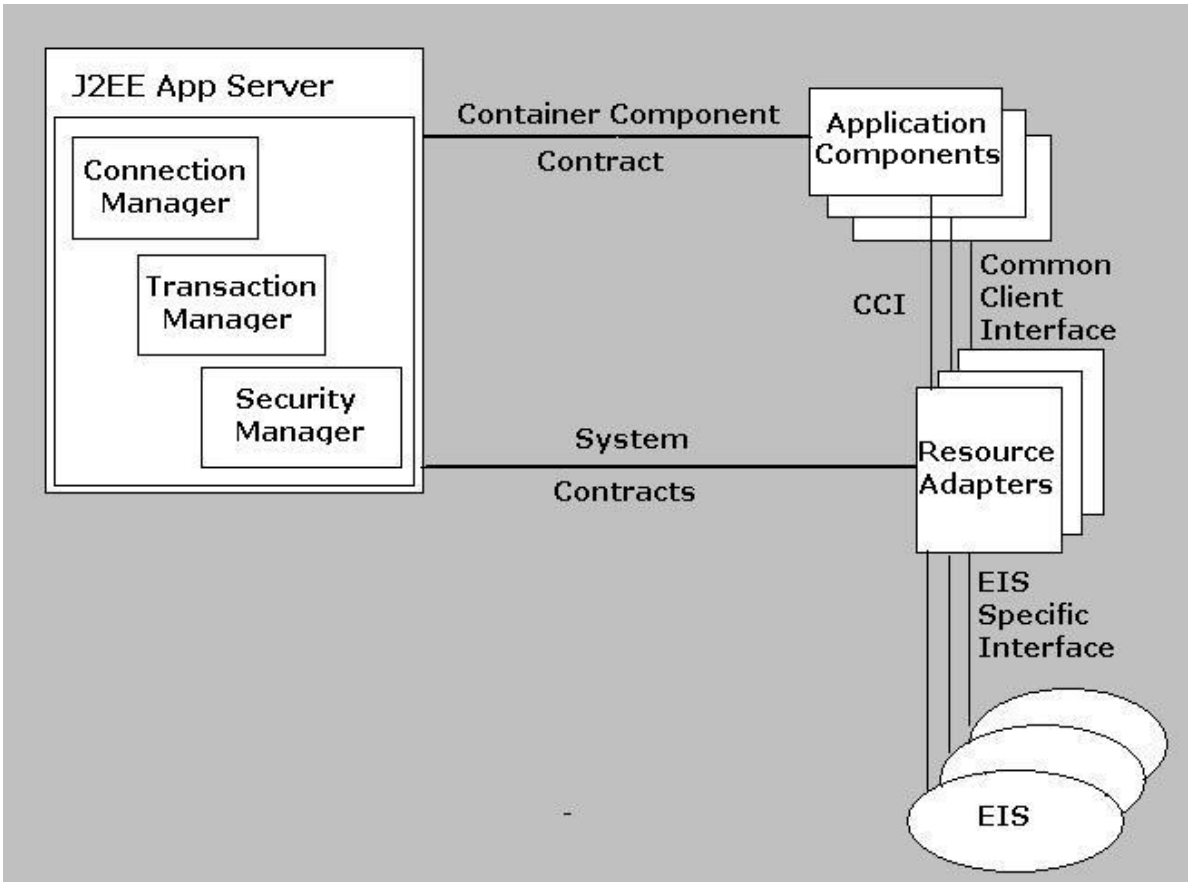
The Style sheets included in CSS consist of a selector and a declarator. The simple syntax of the language uses several English language words to define the styling properties.

Web Programming Interfaces

1) Common Client Interface (CCI)

The CCI API defines a set of interfaces and classes whose methods allow a client to perform typical data access operations. The CCI interfaces and classes are as follows:

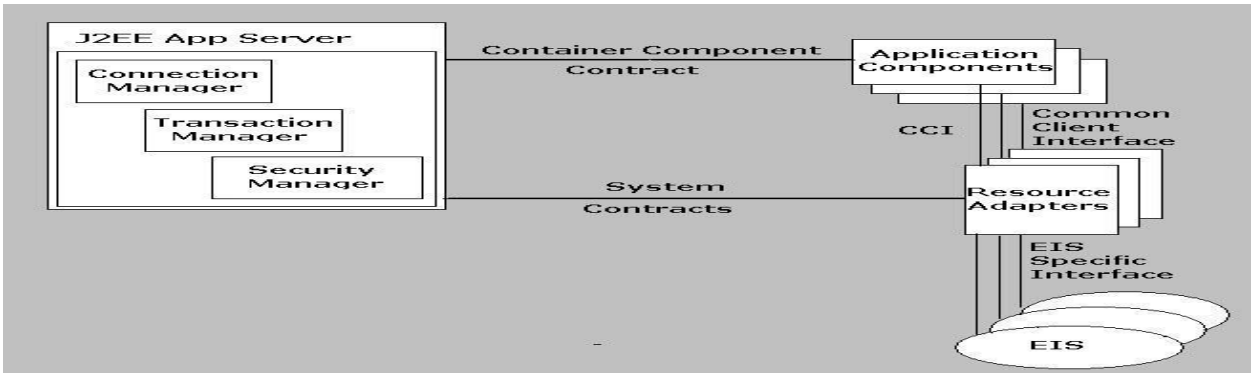
- ConnectionFactory: Provides an application component with a Connection instance to an EIS.
- Connection: Represents the connection to the underlying EIS.
- ConnectionSpec: Provides a means for an application component to pass connection-request-specific properties to the ConnectionFactory when making a connection request.
- Interaction: Provides a means for an application component to execute EIS functions, such as database stored procedures.
- InteractionSpec: Holds properties pertaining to an application component's interaction with an EIS.
- Record: The super interface for the various kinds of record instances. Record instances can be MappedRecord, IndexedRecord, or ResultSet instances, all of which inherit from the Record interface.
- RecordFactory: Provides an application component with a Record instance.
- IndexedRecord: Represents an ordered collection of Record instances based on the java.util.List interface.



The Environment Interface Standard (EIS) is a Java-based interface standard for connecting agents to controllable entities in an environment. The interface provides support for managing the connection (e.g., for pausing and terminating an environment) and for interaction between agents and entities that are available in an environment.

The CCI provides a standard interface that allows developers to communicate with any number of Enterprise Information Systems (EISs) through their specific resource adapters, using a generic programming style. The CCI is closely modeled on the client interface used by Java Database Connectivity (JDBC), and is similar in its use of *Connections* and *Interactions*.

Some clients can be controlled by other programs through some external communications mechanism. A WWW standard for this mechanism is still under development, but Mosaic and Netscape have their own ways of doing it.



2) Common Gateway Interface (CGI)

CGI is a method used to exchange data between the server and the web browser. CGI is a set of standards where a program or script can send data back to the web server where it can be processed.

Common uses of CGI include:

- Guestbooks
- Email Forms- A page on a website that allows users to communicate with the site owner. The page has fields for filling in name, address and type of comment
- Mailing List Maintenance
- Blogs - a regularly updated website or web page, typically one run by an individual or small group, that is written in an informal or conversational style.

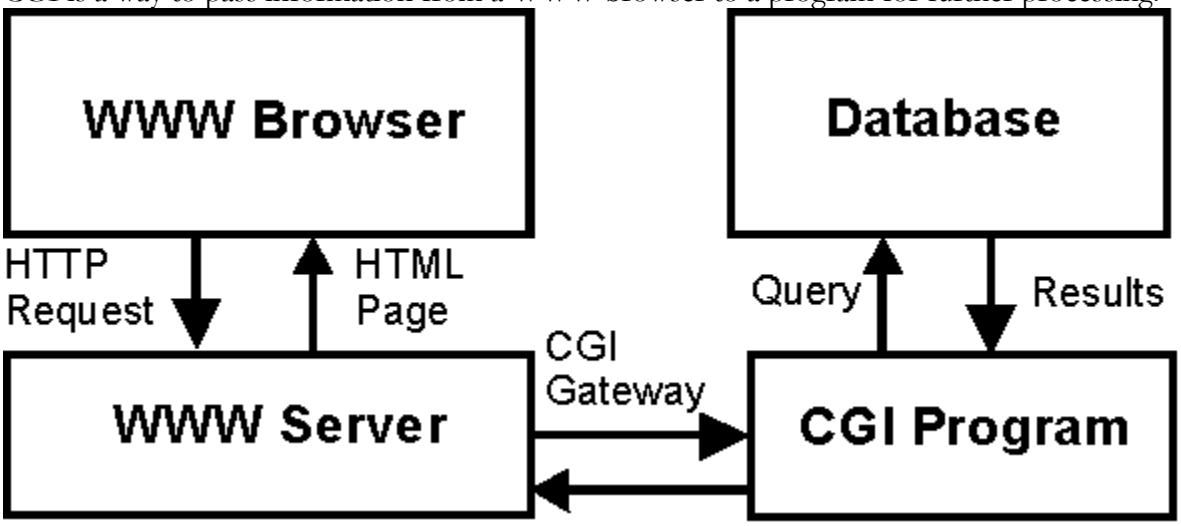
The Common Gateway Interface – CGI

- All of the WWW pages we have developed so far are *static*. They are the same each time we visit unless you modify the file.
- Many WWW sites (e.g. the Netscape search page) are *Dynamic*. The contents change each time we visit.
- Other nice things we like to do is to Search, fill out questionnaires, order things from catalogs.

- We need two pieces:

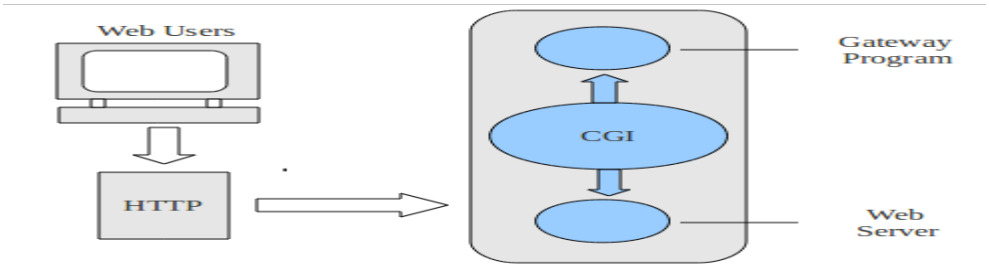
1. HTML language to create *Forms*
2. Common Gateway Interface (CGI) to process the forms.

- CGI is a way to pass information from a WWW browser to a program for further processing.



Common Gateway Interface (CGI) offers a standard protocol for web servers to execute programs that execute like Console applications (also called Command-line interface programs) running on a server that generates web pages dynamically. Such programs are known as CGI scripts or simply as CGIs. The specifics of how the script is executed by the server are determined by the server. In the common case, a CGI script essentially executes at the time a request is made and generates HTML. An HTTP server is often used as a gateway to a legacy information system; for example, an existing body of documents or an existing database application. The Common Gateway Interface is an agreement between HTTP server implementors about how to integrate such gateway scripts and programs.

It is typically used in conjunction with HTML forms to build database applications.



Criteria for Choosing A web programming Language

- **Popularity**. This is a very important one. You are more likely to find people to collaborate with if you use a popular language. You are also more likely to find reference material and other help. Unfortunately, the most popular language globally may not be a good match for your problem domain.
- **The Targeted Platform.** It is very important to consider the platform on which the program will run. With Java development, the program can run on any machine provided a Java Virtual Machine (JVM) is installed. The same goes for web pages. They should all look and work the same across all browsers. However, using CSS3 tags and HTML 5 without checking browser compatibility will cause the site to look and behave differently across different browsers.
- **Programmer Experience.** Where more than one programming language is available for the development of the same program, a programmer should choose the language he/she is more conversant with. Generally, one should go for the language for which he is more experienced.
- **Language-domain match**. Choose one that matches your problem domain. You can do this by looking at what other people in your field are using or by looking at some code that solves problems you are likely to have and seeing how natural the mapping is**.**
- **Support / Community / Availability of libraries.** Programming languages and good software are similar in that they both need a community following to help them grow. Languages with active forums are likely to be more popular than even greater languages without similar forums. Some of the offerings of community support include wikis, forums, tutorials and most importantly additional libraries, all of which help the language to grow.
- **Ease of Development and Maintenance.** Programmers develop programs using the language they are most comfortable in. Generally, there is a preference for object-oriented languages over the procedural oriented languages. The reason for this is that, code developed in object-oriented languages can be reused and maintained with great ease.
- **Error Checking and Diagnosis.** Programmers should choose programming languages which contain efficient error handling features. The task of code development and testing is easier when undertaken with a programming language with efficient and robust error detection and correction mechanisms. A good example is Java. This language provides an efficient error handling mechanism of try/catch block. This feature in Java programs can be used to handle the unexpected errors that may occur during the execution of a program.