Web Development

Introduction

Introduction

- Internet
- World Wide Web
- Web Page
- Web Servers
- Server-Side Programming
- Web Browsers
- Client-Side Programming
- DNS – The Domain Name Service
- HTTP

Internet

- Late 1950s, U.S. government formed the Advanced Research Projects Agency (ARPA)
- During the 1960s, the agency created a decentralized computer network known as ARPAnet
  - Initially linked four computers located at
    - The University of California at Los Angeles,
    - Stanford Research Institute
    - The University of California at Santa Barbara
    - The University of Utah
- Email was implemented in 1972
- Telnet protocol for logging on to remote computers
- File Transfer Protocol (FTP), enabling file transfer between computers
- During 1989 Berners-Lee and his colleagues at the European particle physics laboratory CERN (*Conseil Europeen pour le Recherche Nucleaire*) proposed the concept of linking documents with *hypertext* that the now familiar World Wide Web began to take shape
- The use of hypertext pages and hyperlinks helped to define the page-based interface model that we still regard as the norm for web applications today

What is internet?

- The Internet is a worldwide collection of computer networks
- connecting academic, governmental, commercial, and
- organizational sites.
- It provides access to communication services and
- information resources to millions of users around the globe.
- Internet services include:
    - direct communication (e-mail, chat)
    - online conferencing (Usenet News, e-mail discussion lists)
    - remote login and file transfer (telnet, ftp)
    - and many other valuable tools and resources

- → The Internet and the WWW are no synonyms

World Wide Web (WWW)

- WWW also known as the web
- Collection of hyperlinked text documents, audio, and video files, and remote sites etc.
- Accessed via Internet, computers can contact each other
- Public files on computers can be read by remote user
  - usually Hypertext Markup Language (.html)
- URL - Universal Resource Locator - is name of file on a remote computer
  - http://www.microsoft.com

The World Wide Web

- A world wide collection of electronic documents
- The World Wide Web operates using a client/server networking principle
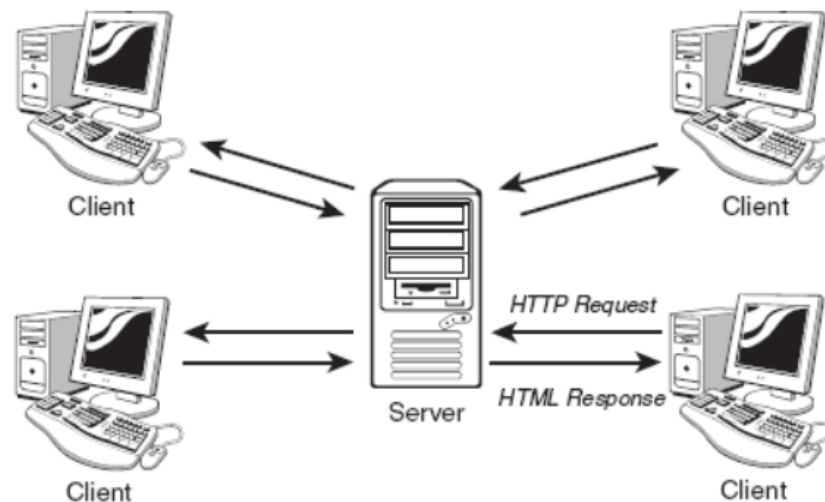
The World Wide Web

- HTTP request contains several pieces of information needed so that your page may be correctly identified and served to you, including the following:
  - ○ The domain at which the page is stored (for example, mydomain.com)
  - ○ The name of the page (This is the name of a file in the web server's file system - for example, mypage.html.)
  - ○ The names and values of any parameters that you want to send with your request

Web Page, Website

- Each electronic document on Web is called a Webpage

- Contain text, graphics, sound, video, and built-in connections

- A website is a collection of web pages

- Generally speaking, each web page is actually a separate file on the server. The collection of individual pages constituting a website is managed by a program called a *web server*

Web Fundamentals

- **Web Page**
  - Each page available on the website is called a *web page.*
  - It is usually written in Hypertext Markup Language (HTML).
  - It contains text, graphics, images, videos and may also contain hyperlinks to other web pages.
  - It is identified by a unique URL (Uniform Resource Locator).
    - URL is the the unique address of any document available on the web.

- **Website**
  - A collection of several related web pages written in HTML markup language.

- **Home Page**
  - The first page of any website is called *home page.*

Web Fundamentals (Con't)

- **Web Server**

A machine that responds to client requests and sends the requested page back to user.

popular web server software:

- Apache: www.apache.org

- **Web Browser**
  - Web browser is a software tool used to access and search information on web.
  - Some of popular web browser software are:
    - Mozilla Firefox: getfirefox.co
    - Microsoft Internet Explorer (IE): part of Windows
    - Apple Safari: part of Mac OS X
    - Opera: opera.com
    - Google Chrome

Web Server

- A web server is a program that interprets HTTP requests and delivers the appropriate web page in a form that your browser can understand

- *Examples*
  - *Apache Web Server* from the Apache Software Foundation (http://www.apache.org), an open source project used to serve millions of websites around the world
  - Microsoft's IIS (Internet Information Services), often used on host computers running the Microsoft Windows operating system

Server-Side Programming

- Server-side programs, scripts, or languages, refer to programs that run on the server computer

- Languages and Tools
  - PHP, Java, and ASP

- Server-Side scripting allows web pages to be served with rich and varied content that would be beyond the scope of any design using only static pages—that is, pages with fixed content

Client-Side Programming

- Client-side programming, on the other hand, happens not at the server but right inside the user's browser *after* the page has been received
- Such scripts allow you to carry out many tasks relating to the data in the received page
  - Calculations, changing display colors and styles, checking the validity of user input, and much more
- JavaScript, a client-side programming language

DNS – The Domain Name Service

- IP Address
  - 198.105.232.4
- Domain Name
  - www.somedomain.com
- DNS Server
  - Maps domain name to the corresponding IP
- DNS servers around the Internet are connected together into a network that constantly updates itself as changes are made

Introducing HTTP

- HTTP defines a set of rules regarding how messages and other data should be formatted and exchanged between servers and browsers
  - HTTP Client – The Browser
  - HTTP Server – Web Server
- The HTTP Request and Response
  - The HTTP protocol can be likened to a conversation based on a series of questions and answers, which we refer to respectively as *HTTP requests* and *HTTP responses*

The HTTP Request and Response

- HTTP Request
  - After opening a connection to the intended server, the HTTP client transmits a request in the following format:
    - An opening line
    - Optionally, a number of *header lines*
    - Optionally, a message body
  - Opening Line
    - The opening line is generally split into three parts; the name of the *method*, the path to the required *server resource*, and the *HTTP version* being used.
      - GET /sams/testpage.html HTTP/1.0
  - Header lines
    - Used to send information about the request, or about the data being sent in the message body. One parameter and value pair is sent per line, the parameter and value being separated by a colon
      - User-agent: Mozilla/4.0
      - Accept: text/plain, text/html

The HTTP Request and Response

- **The HTTP Response**
  - In answer to such a request, the server typically issues an HTTP response
  - Status Line
    - server echoes the HTTP version and gives a response status code (a three-digit integer)
  - Reason Phrase
  - HTTP/1.0 200 OK
  - The response may also contain header lines each containing a header and value pair, containing information about the server and/or the resource being returned:
    - Server: Apache/1.3.22
    - Last-Modified: Fri, 24 Dec 1999 13:33:59 GMT

The HTTP Request and Response

- Some Commonly Encountered HTTP Response Status Codes

Status Code	Explanation
200 - OK	The request succeeded.
204 - No Content	The document contains no data.
301 - Moved Permanently	The resource has permanently moved to a different URI.
401 - Not Authorized	The request needs user authentication.
403 - Forbidden	The server has refused to fulfill the request.
404 - Not Found	The requested resource does not exist on the server.
408 - Request Timeout	The client failed to send a request in the time allowed by the server.
500 - Server Error	Due to a malfunctioning script, server configuration error or similar.

URL

A **URL** is one type of Uniform Resource Identifier (URI); the generic term for all types of names and addresses that refer to objects on the World Wide **Web**. The term "**Web** address" is a synonym for a **URL** that uses the HTTP or HTTPS(Hypertext Transfer Protocol Secure) protocol.

Some Web programming technologies

- Hypertext Markup Language (HTML/XHTML):
  - used for writing web pages

- Cascading Style Sheets (CSS):
  - supplies stylistic info to web pages

  - JavaScript: allows to program the behavior of web pages

  - Hypertext Processor (PHP): allows the web server to create pages dynamically

- Structured Query Language (SQL): interaction with databases

Websites Categories

- **Personal websites**
  - These websites are used by people for their personal use such as to share information about themselves or their products, to enhance their skills or post their curriculum vitae online to improve their chances of getting a job.
  - Another most common use is to publish virtual journals called *blogs* that describe events in people's lives, their interests and their personal opinions on different topics.

- **Professional websites**
  - These are created as **portals** that provide platform for businesses and provide information on their products and services. Some of these portals enable businesses to sell products online and act as virtual storefronts for receiving orders and payment.
  - Such sites can directly generate revenue for businesses.

Websites Categories (Con't)

- **Static websites** are developed with fixed-content pages that do not contain any programmatically controlled content.
- Fixed contents pages are pages with content that does not change dynamically.
- The content will only change when the website designer manually modifies it.

- **Dynamic websites** are driven by dynamic content that is loaded or created using programming and databases.

What is Database and Database Management System (DBMS)?

- **Database**
  - Collection of related data stored on a particular topic
  - Storage and retrieval is in an organized and efficient way
  - Examples: Hospital database, Library database, Student database etc.

- **Database Management System (DBMS)**
  - Collection of programs that allows users to create and maintain a database
  - Examples: MS Access, MySQL, DB2, SQL Server etc.

store
products
customers
orders

MySQL.

Database   DBMS
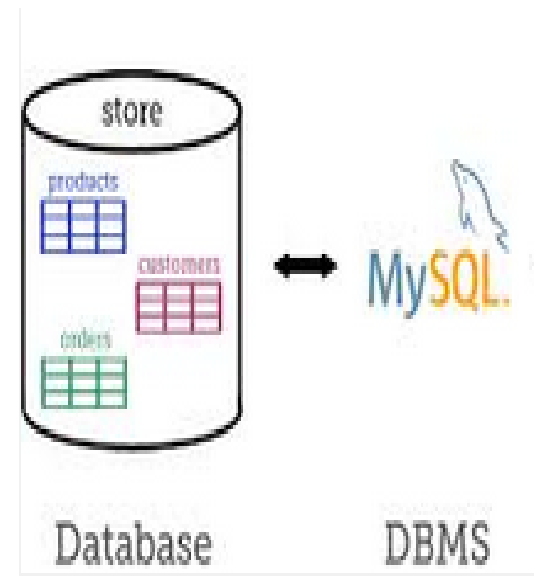
Why is 'Databases on the Web' Important?

- Databases are established technology for managing large amounts of data.
- Achieving complete separation between your site's design and the content you want to present.
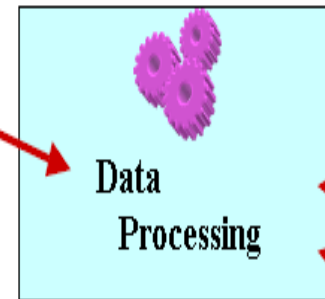- Interaction in real time

What is a database-driven Web site?

- A database-driven Web site is a Web site that uses a database to gather, display, or manipulate information

- Examples:
  - News sites: CNN.com and MSNBC.com
  - E-commerce companies: Amazon.com, which is a Web interface of a big-sized database system containing customer and transactional information.
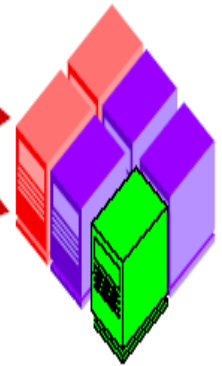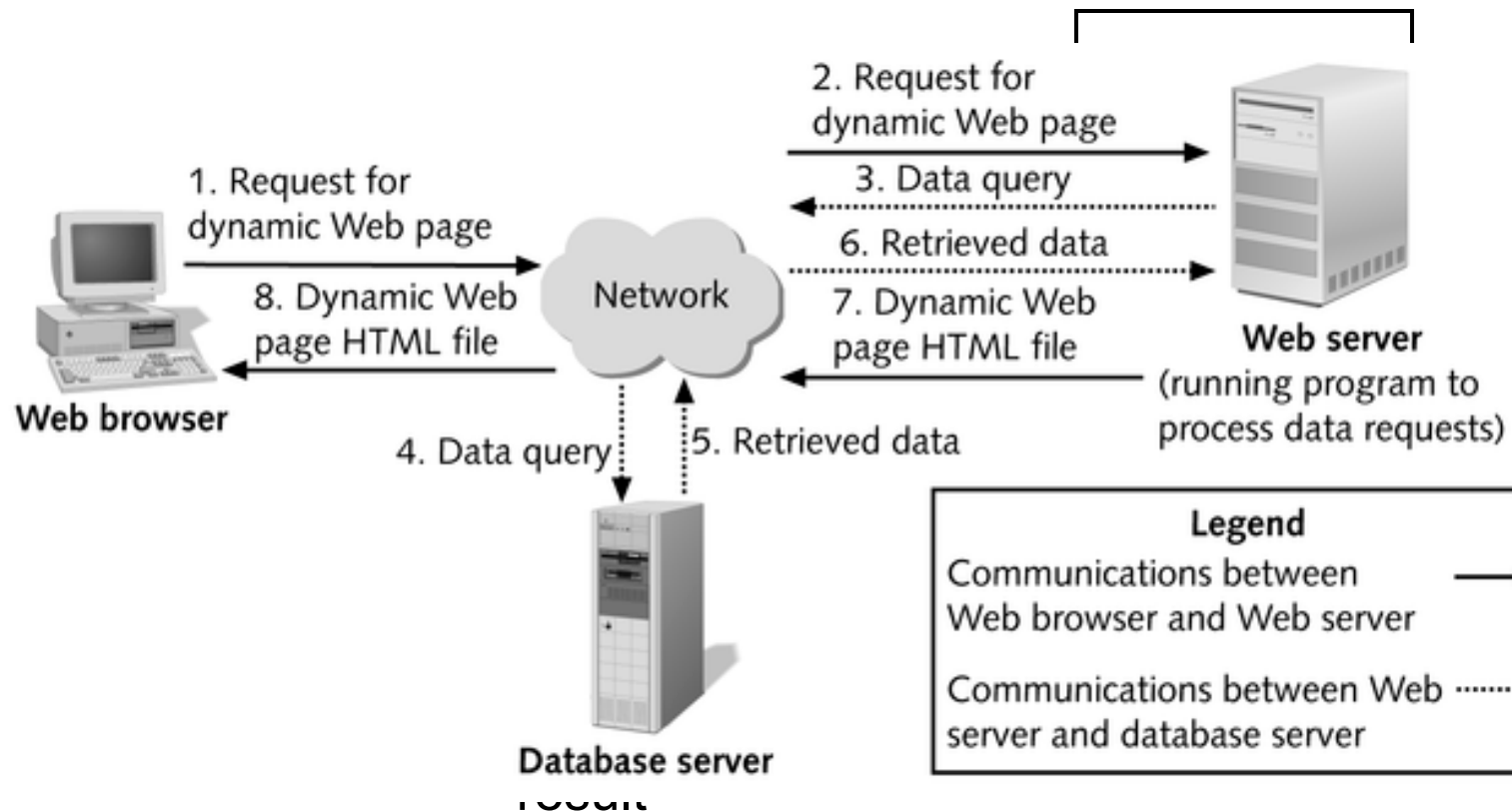
Web Interface

Database Servers

Data Processing

Users

↔ HTTP(S)

Database-driven Web site Architecture

2. Request for dynamic Web page

3. Data query

6. Retrieved data

7. Dynamic Web page HTML file

Web server
(running program to process data requests)

1. Request for dynamic Web page

8. Dynamic Web page HTML file

Web browser

Network

4. Data query

5. Retrieved data

Database server

result

Legend

Communications between Web browser and Web server →

Communications between Web server and database server ┄┄►

How to Integrate Databases and the Web?

○ **Databases**
  - MS Access
  - MySQL, mSQL
  - Oracle, Sybase, MS SQL Server

○ **Integration tools**
  - PHP or CGI, Servlets, JSP, ASP etc.

Common Gateway Interface (**CGI**) is a standard way for [web servers](#)) is a standard way for web servers to interface with executable [programs](#)) is a standard way for web servers to interface with executable programs installed on a server that [generate web pages dynamically](#).

Home tasks

- Describe the different type of the websites.
- Explore the various option of your favorite Browser
- Describe in detail for the Port.
- Describe the sitemap.
- Describe Storyboarding
- What do you mean by a page layout? What are the technology available for preparing page layout? List the design point to be considered while preparing page layout.
- Discuss the XHTML.