MCS

Web Technologies

MCS

Outline

Introduction

Conventional software-system development is the process of designing a correct HOW for a well-defined WHAT. Patridge (1992)

- By seperating the content from presentation, using an appropriate technology becomes easy.
- Additionaly, we have to consider requirements for the distribution and integration of other systems according to a selected or existing architecture.
- Web technologies stem from the three views of Web Standards
  - Client:: request
  - Server:: response
  - Protocol:: rules for the communication between client and server

Fundamentals

- The very roots of the Web are in the markup and hypertext
- SGML (Standard Generalized Markup Language) is the basis of HTML and XML
- **Markup**
- Concept of markup originates from the publishing industry
- These are the typographic instructions for document formatting
    - *Hello* can be defined as **Hello**

Fundamentals-II

- ISO Defines the following markup classes
  - *Markup:* This is text inserted in a document to add information as to how characters and contents should be represented in the document.
  - *Descriptive markup:* This is markup that describes the structure and other attributes of a document, regardless of how this document is processed for representation (e.g., comments).
  - *Processing instructions:* This is markup consisting of system-specific data; it controls the way a document is processed.
- **SGML** standards promoted by US publishing industry
- Primarily uses tags (<tags>)

Fundamentals-III

Hypertext and Hypermedia

- Hypertext is understood as the organization of the interconnection of single information units.
- Links are used to express the relationships between these units
- It is the core concept of World Wide Web (WWW)
- ***Hypermedia*** is commonly seen as a way to extend the hypertext principle to arbitrary multimedia objects, e.g., images or video.

Client/Server Communication

- Basic communication mechanism through which a user (client) interacts with the Web application (server)
- Primarily a 2-layer architecture
- However, the server may involve addition steps of processing to integration various applications or data/information sources
- Discuss few of the protocols/technologies here
  - SMTP – Simple Mail Transfer Protocol
  - RTSP – Real Time Streaming Protocol
  - HTTP – HyperText Transfer Protocol
  - Session Tracking

Protocols

SMTP – Simple Mail Transfer Protocol

- SMTP combined with POP3 (Post Office Protocol) or IMAP (Internet Message Access Protocol) is used to send and receive emails
- SMTP is increasingly used as a transport protocol for asynchronous message exchange based on SOAP

RTSP – Real Time Streaming Protocol

- It is standard designed to support the delivery of multimedia data in real-time conditions
- RTSP allows the transmission of resources to the client in a timely context rather than delivering them in their entirety (at once).
- This transmission form is commonly called streaming

HTTP - HyperText Transfer Protocol

- HTTP is a text-based stateless protocol, controlling how resources, e.g., HTML documents or images, are accessed
- HTTP builds on the TCP/IP stack, where the service is normally offered over port 80
- Resources are addressed by using the concept of a Uniform Resource Identifier (URI)
- A URI allocates unique identifiers to resources, regardless of their type

HTTP - II

- URL is on of the most common types of URIs
- A URI, e.g., (http://www.uni-karlsruhe.de/Uni/index.html), typically describes three things

HTTP - II

- URL is on of the most common types of URIs
- A URI, e.g., (http://www.uni-karlsruhe.de/Uni/index.html), typically describes three things
  - how a resource is accessed, e.g., (http://) if HTTP is used
  - the destination computer (host) where the resource is located, e.g., (www.uni-karlsruhe.de) and,
  - the name of that resource, e.g., Uni/index.html
- URIs also define a query delimiter, "?", which allows HTTP to pass on parameters.

HTTP-GET Method

GET

- The Get is one the simplest Http method.
- Its main job is to ask the server for the resource.
- the total amount of characters in a GET is really limited.
- In get method the data we send is appended with the URL
- Data is visible to other users

HTTP-POST Method

- The Post method is more powerful request
- By using Post we can request as well as send some data to the server.
- Data is sent alongwith the body of the request/content
- Normally we define the GET/POST method in an HTML form

Session Tracking

- The term *session* is used to define such a sequence of related HTTP requests between a specific user and a server within a specific time window.
- Web server cannot automatically allocate incoming requests to a session
- Two ways to achieve this:
  - In each of its requests to a server, the client identifies itself with a unique identification. This means that all data sent to the server are then allocated to the respective session.
  - All data exchanged between a client and a server are included in each request a client sends to a server, so that the server logic can be developed even though the communication is stateless.
- Session tracking is normally implemented by URL rewriting or cookies.

URL Rewriting

- URL rewriting is a mechanism that transmits session-relevant data as parameters in a URL
- Disadvantage
  - If a large data volume is required within a session, then the URL can easily become messy and error-prone.
  - Limiting the length of a URL
  - URLs have to be dynamically generated for each page and request

Cookies

- Cookies are small text files used to store server information (e.g., a session ID) on the client computer.
- information is written to a text file in the form of name-value pairs.
- Cookies are generated by Web servers and transmitted to clients in the header of the HTTP response.
- The major benefit of cookies is that information identifying a session can be exchanged transparently between a client and a server.
- Drawback of cookies is that some users deactivate the cookie functionality in their browsers to prevent their browsing behavior from being captured.