Operating System Fundamentals

Module 11:
Web Technologies

Agenda

- HTML
- JavaScript
- Web Servers
- Server-side Programming

HTML History

- HTML: Hypertext Markup Language
- Based on SGML – Standard Generalized Markup Language
- Tim Berners-Lee described ENQUIRE in 1980 at CERN
  - Created as a tool for sharing research documents

HTML History

- 1980 – Berners-Lee creates ENQUIRE
- 1987 – Apple introduces HyperCard for Mac
- 1991 – first specifications for HTML released
- 1995 – HTML 2.0 released
- 1996 – World Wide Web Consortium (W3C) takes on task to maintain specification, with input from vendors
- 1997 (January) – HTML 3.2
- 1997 (December) – HTML 4.0
- 2000 – XHTML 1.0
- 2008 – HTML 5 published as working draft
- 2014 – HTML 5 target date for final specification

Structure of HTML Doc

- Referred to as a "well formed" document
  - Structured and rules-based
- Made up of:
  - Elements
    - Start and end tags with the same name
      i.e. <tag>…</tag> or <tag />
    - Use lower case for names
  - Content
    - Provided between start and end tags
  - Empty elements
    - Not content related, like a line break -
  - Attributes
    - Associated with an element, and supplied after the element name
    - Key-value pairs with equals sign (=) between the key and value
    - Use lower case for key name
    - Use single or double quotes to enclose the value

Structure of HTML Doc

- Entire document is enclosed in <html> element
  - Two elements inside of <html> are:
    - <head>
    - <body>
  - Simple example:

```
<html>
    <head>
            <title>Sample Doc</title>
    </head>
    <body>
            Just some text…
    </body>
</html>
```

  - Notice the hierarchical structure in the above example

Role of the Browser

- Purpose of the browser:
  - To interpret or render the information retrieved from an information resource
    - Information resources usually identified by Uniform Resource Locator (URL)
  - Includes presenting the markup and executing the links
  - URL may point to information other than a web page. For example:
    - Image
    - Video
    - Zip folder
  - If a browser does not support a document type or feature, it may be implemented with a plug-in

Browsers

- Most common for desktop today (alphabetically):
  - Chrome
  - Firefox
  - Internet Explorer
  - Opera
  - Safari

Browsers

- How a browser works:
  - URL is supplied by the user
  - URL prefix (like http:) indicates protocol and, in turn, how to process the retrieved information
  - If web-base, needs to resolve the domain to an IP address
  - Hyperlinks in a document provide URL's for further retrieval and processing
  - Support for scripting languages like JavaScript add further programmability to the markup language

Editing HTML

- HTML source code is text
  - Any text editor can be used
  - Basic editors provide colour coding
  - Advanced editors can provide help, IntelliSense or even automatic scripting
- Commonly used editors
  - Adobe Dreamweaver
  - Microsoft Expression Web
  - Microsoft Visual Studio
  - Various software packages can save as HTML

Examples

- Demonstrations
- Review the tutorial on W3Schools: http://www.w3schools.com/html/default.asp

JavaScript

- Scripting language used on the client-side (browser)
- Allows programmability within the HTML pages
- Generally used to respond to events
- See W3Schools tutorial: http://www.w3schools.com/js/default.asp

jQuery

- JavaScript library
- Simplifies event handling, animation and Ajax communications
- Well supported in the industry
- Works well across browsers
- Full API available on jQuery web site: http://jquery.com/
- Tutorial on W3Schools: http://w3schools.com/jquery/default.asp

Web Server

- If you can display an html page on your local disk, why use a web server?
  - Security
  - Dynamic page generation
    - Support for data-driven content
  - Centralized content management

Web Server

- Usually runs as a service
  - "Serves" a response to a request
  - Supports several protocols like HTTP and FTP
  - Provides secured access to content
  - May allow access to a processor - supporting Java (Tomcat), PHP or ASP.NET

Web Server

- Common Web Servers:
  - Apache
  - Internet Information Services (Microsoft)
  - nginx (NGINX, Inc.)
  - GWS (Google)

How it works…

- Web Server is on a computer with a specific IP address
  - Listens to a particular port
    - Default for HTTP: port 80
    - Can be configured to other ports – useful for security, testing and supporting multiple services on a single computer
- A configurable directory on the server is mapped to the requesting URL
- Server tries to provide the resource (usually web page) as a response to the request

Server-side Programming

- Page-related code can be executed on the server
- Processor used to interpret/execute code in web page
- Popular server-side technologies include:
  - PHP
  - CGI
  - ASP
  - JSP
  - ASP.NET

- Major benefits:
  - Security
  - Hidden code
  - Possible performance improvements
- Additional information:
  - http://w3schools.com
  - http://www.php.net
  - http://msdn.microsoft.com
  - http://www.oracle.com
  - http://www.w3.org/CGI
  - http://tomcat.apache.org/

Server-side Programming

Installation

- Installation and Configuration details available on vendor web sites:
  - Apache: http://httpd.apache.org/download.cgi
  - IIS: http://www.iis.net/configreference