The World Wide Web: Web Applications and Web Forms

Introduction to the World Wide Web and HTML

- HTML: HyperText Markup Language
  - Hypertext
    - Non-sequential reading and writing
    - Text contains embedded hot words that are links to other documents
  - Power of hypertext
    - Instant response on specifics
    - Go where you want when you want
    - Non-linear navigation
  - Hypermedia
    - Links can be references to non-textual information

World Wide Web (WWW)

- Started at CERN by physicist Tim Berners-Lee (1991)
- Hypertext-based system for finding and accessing internet resources
- Huge set of hypertext-linked documents on many computers
- Set of public specifications
- Library of code for building servers and clients

WWW Key Ideas

- URL (Uniform Resource Locator)
  - An "address" of a document
- HTTP (HyperText Transfer Protocol)
  - Protocol that specifies how document is transferred
    - Defines how web browsers and web servers communicate with each other over a TCP/IP connection
- HTML (HyperText Markup Language)
  - "Language" used to specify document content and how it is displayed

URL Format

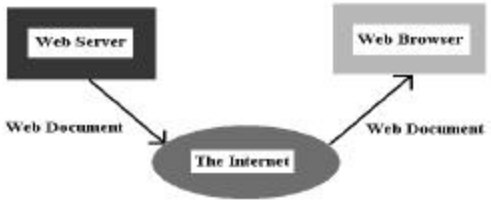
access method //: domain address / directory path / filename
(type of object) (computer) (directory) (file name)

- Example:
  http://watson.binghamton.edu/level2/faculty.html

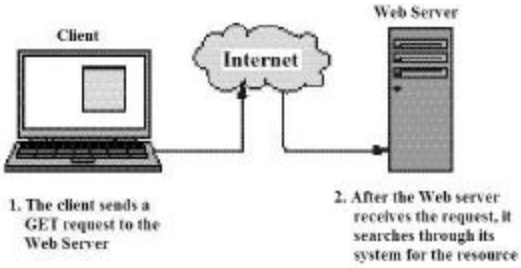
Web Servers & Browsers

- Web Server
  - Program that provides web documents (pages) to client applications running on other machines on the Internet
  - Pages are stored on this computer
- Web Browser
  - Client program that displays a page provided by a server
    - Pages may also contain programming logic in the form of a script that's executed on the client machine
      - JavaScript, VBScript, Java applets, etc.
  - Used to view WWW documents
  - When user starts a web page, the browser sends a request to the server
  - Server responds by sending the page

Web Servers and Browsers

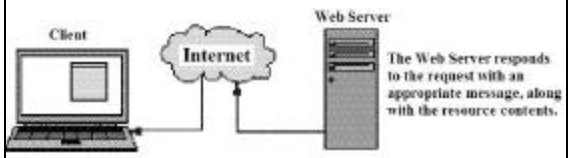


A Simple HTTP Transaction (1)



Client interacting with Web server.
Step 1: The **GET** request
GET /books/downloads.htm HTTP/1.1.

A Simple HTTP Transaction (2)



Client interacting with Web server.
Step 2: The HTTP response
HTTP/1.1 200 OK

Distributed System Architecture on the Web

- Multi-tier Applications
  - Web-based applications (n-tier applications)
  - Tiers are logical groupings of functionality
  - Can be on the same computer, but usually are not
- Information Tier (data tier or bottom tier)
  - Maintains data pertaining to the applications
  - Usually stores data in a database management system on a separate computer
- Middle Tier (Business Logic)
  - Acts as an intermediary between data in the information tier and the application's clients
  - Processes client requests and retrieves and processes data from the Information Tier
  - Typically a Web Server or Web Application
- Client Tier (top tier)
  - Application's user interface
  - Typically a browser

Distributed System Architecture

Some Common Web Browsers

- Netscape Communicator
- Microsoft Internet Explorer
- Lynx
  - Character-oriented (old)
- Mosaic
  - First Graphics-based browser
  - National Center for Supercomputing Applications (NCSA)
  - University of Illinois at Urbana-Champaign

Web Page

- A single WWW document displayed by a browser
- Home Page
  - First page that appears when user runs browser
  - Usually has information on that user site

Multimedia on Browsers

- Need "viewers" to display different types of multimedia files
- Viewer (plugin)
  - "External" program launched when link to multimedia file is clicked
    - (any link to non-text or non-html file)
  - Graphics: displays image
  - Sound: plays it
  - Movie/Animation: shows it

ASP.NET and Web Forms

- ASP.NET
  - Latest Web programming technology from Microsoft
  - Replaces and extends ASP (Active Server Pages)
    - Provides libraries, controls, & programming support to write Web applications that interact with the user, render controls, display data, and generate appropriate HTML
- Web Forms
  - Windows Forms run standalone on the local machine's Windows environment
  - Web Forms run on a server on a different computer
    - Web pages built around controls and event handlers
    - Extends the ideas of Windows Forms to distributed computing over the Web

Web Application Development

- First of all, the host computer must have a Web Server program running
  - Microsoft's Internet Information Services (IIS) is usually the web server in the Windows environment
    - To use ASP.NET, must have the .NET framework installed
  - An alternative is Microsoft's "Web Matrix"
    - Free software available from asp.net/webmatrix
    - A slim, lightweight web server that can run ASP.NET applications and services on machines that don't have a local web server installed
    - No security problems since it can only serve web apps to the local machine
      - But web applications developed with Web Matrix can easily be ported to other Windows machines running IIS
    - Web Matrix is installed on all the BU Pod computers

Web Application Development

- Different ways of going in the Windows world:
  - Use HTML (possibly with CGI scripts)
    - "First generation" programming model (early 90s)
    - Good for static pages with no user data input
    - Usable on any platform, but slow with CGI
    - Difficult to use for dynamic web pages
  - Use ASP (Active Server Pages)
    - "Second generation" programming model (late 90s)
    - More powerful and easier to use
    - Relatively slow: interpreted
  - ASP.NET
    - "Third generation" programming model (21st century)
    - Powerful, flexible, and easy to use
      - Object-oriented, event-driven
    - Fast: compiled

Web Application Programming using HTML

- Markup language for preparing WWW hypertext documents
- Specifies what is to be displayed and how it is to be displayed
- Subset of SGML
  - Standard Generalized Markup Language
- Result--just a text file (a script)
  - extension .html or .htm
- Used to set up static web pages

Main Tasks in HTML

- Define Tags
  - Basic element of HTML
  - Specify what is to be displayed and how it is to be displayed
- Define hypertext Anchors and Links
  - For navigating
- Format the document
  - In general terms (details handled by browser)

Preparing HTML

- Can use a text editor to type in the tags
  - The most basic way to go
- But there are many HTLM editors
  - All generate HTML text files
  - Dreamweaver is a popular one (not free)
    - Easy to use GUI environment
  - Netscape Composer
    - From Netscape Navigator Browser: "File" | "Edit Page"
    - Or for a new page: "File" | "New" | "Composer Page"
  - Microsoft Internet Explorer
    - "File" | "Edit with Microsoft Word for Windows"
  - Microsoft FrontPage

HTML Basic Components

- Tags
  - Basic elements of HTML
- Attributes
- URLs

HTML Tags

- Most basic elements
- Inform browser to perform some action (display, format, link to, etc.)
- Usually appear in pairs:
  - <TAG> ... text specifying action ... </TAG>
  - Example: Heading Tag

    <h1>A Simple Home Page</h1>
    - Displays the text: "A Simple Home Page" large and highlighted
    - h1 means Level-one heading (most emphasis)
- Tags are often nested
- Not case sensitive

Attributes

- Used with some tags
- Define how actions will take place
- Like variables--you give their values
- <TAG ATTRIBUTE = "value">
- Example: SRC attribute of IMG tag

  <IMG SRC="myimage.gif">
  - Here "value" is the file name of the image file

URLs

- Attributes often specify files as links to other documents
- For these, the file's URL is the value of the attribute
- Example (including an inline graphic image): <IMG> tag:

```
<IMG SRC="http://____.____.____/____.GIF">
  ^      ^              ^
  |      |              |
 tag  attribute  value is a URL
```

Other document "information" Tags

- Give information to Browser
  - Don't affect document content
- Document HTML Tag:
  - <HTML> .. entire document script .. </HTML>
    - Specifies it's an HTML document
- Document Header Tag:
  - <HEAD> ... Header Info ... </HEAD>
  - Usually Contains Document Title

- Document Title Tag:
  - <TITLE> ... Document Title ... </TITLE>
  - Shown in Title Window
  - Only one allowed
  - Must be inside Header tags
- Document Body Tag:
  - <BODY> ... Body of Document ... </BODY>
  - the actual document

HTML Skeleton Script

```
<HTML>
  <HEAD>
    <TITLE>  Doc Title </TITLE>
  </HEAD>
  <BODY>
     .....
     .....
  </BODY>
</HTML>
```

Links and Anchors (Hypertext)

- Establish how user is guided through a body of hypertext information
- ANCHOR--the text itself
  - selected by user to go to a linked document
  - can be a word, phrase, picture, icon (anything displayable)
  - If text, it's usually underlined or highlighted or displayed in a different color
- LINKED ITEM--place user goes after clicking on the anchor
  - A file or URL

Creating an anchor and link

<A HREF="filename or URL"> some-text </A>

Link to this place	Make this text an anchor; Will be highlighted & underlined in document

Example of Links & Anchors

<A HREF="xxx.html">click here for xxx </A>

----> Click here for xxx

- Here file xxx.html is on same computer and in same directory as active page
- When user clicks on underlined text in the browser, the file is displayed
- To link to another server--give URL as linked item:

<A HREF="http://www.cs.binghamton.edu/~reckert">R. Eckert's Home Page </A>

----> R. Eckert's Home Page

  - When user clicks on underlined text, linked page is displayed

Links & Anchors (Continued)

- Can link to any file (not just an html document)
- But if it's multimedia, system must have an external viewer to handle it

More HTML

- Lots of references and books available
- Some of many Web Sites:
  - http://www.htmlprimer.com/
  - http://www.w3schools.com/
  - http://www.davesite.com/webstation/html/
  - http://www.htmlcodetutorial.com/
  - http://www.cwru.edu/help/introHTML/toc.html
  - http://archive.ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimer.html
  - http://www.htmlgoodies.com/
  - http://www.echoecho.com/html.htm
  - http://www.2kweb.net/html-tutorial/
- Also see BU's notes on "Using Mozilla Composer", "Dreamweaver for Beginners", and "Intermediate Dreamweaver" at:
  - http://training.binghamton.edu/docindex.html

MyPage0.html
A Simple HTML document

```
<html>
  <head>
    <title> My First Home Page </title>
  </head>
  <body>
    My name is John Smith and this is my first home page
  </body>
</html>
```

http://cs.binghamton.edu/~reckert/330/mypage0.html

A More Complicated HTML Page

- www.cs.binghamton.edu/~reckert/330/mypage1ok.html
- Use browser menu item "View" | "Source" to see a page's HTML