

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
- Most recently, XHTML: Extensible Hypertext Markup Language

World Wide Web (WWW)

- Created at CERN (Switzerland high energy physics lab) by Tim Berners-Lee (1991)
- Hypertext-based system for finding and accessing internet resources
- Huge set of hypertext-linked documents on many computers
- A set of public specifications
- Library of code for building servers and clients

WWW Important Acronyms

- URL (Uniform Resource Locator)
 - The web “address” of a document (page)
- 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
- XHTML (Extensible HyperText Markup Language)
 - “Language” used to specify document content and how it is displayed

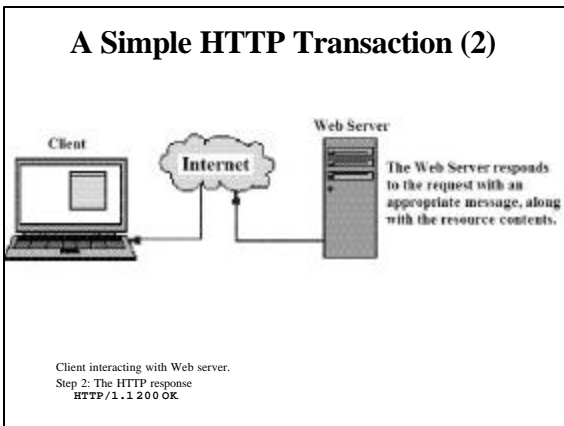
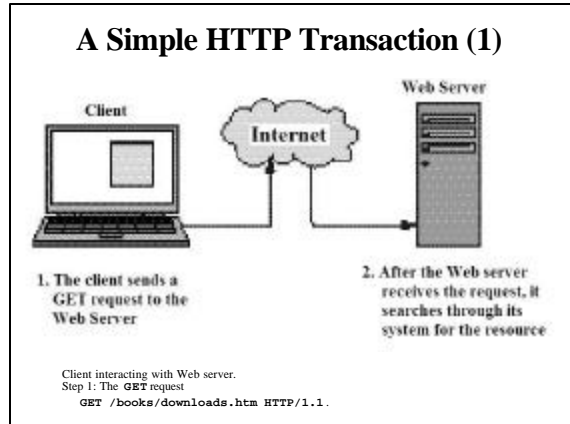
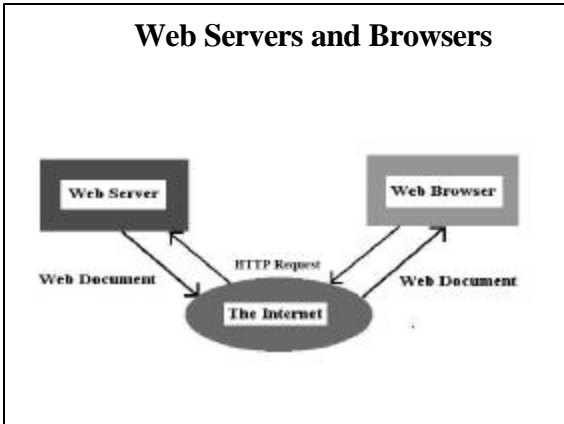
URL Format

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

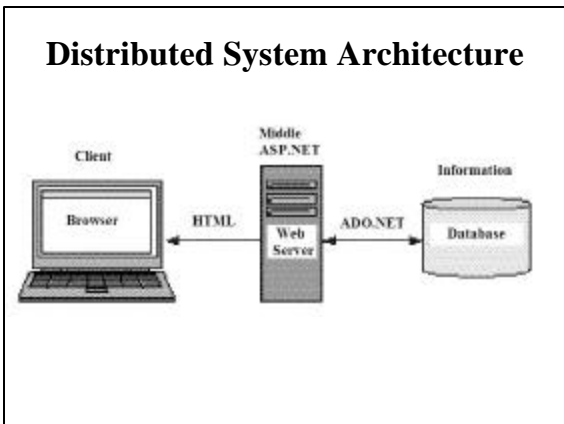
- Example:
<http://watson.binghamton.edu/level2/faculty.html>

Web Servers & Browsers

- Windows applications (Windows Forms) run on one computer
- Web applications require two programs
 - Usually run on two different computers connected over the internet
- Web Server
 - Program that provides web documents (pages) to client applications running on other machines on the Internet
 - Pages are stored on the Web Server computer
- Web Browser
 - Client program that interprets the HTML of a page provided by a Web Server and displays it
 - Common ones: Internet Explorer, Netscape Navigator, Mozilla FireFox
 - Pages may also contain programming logic in the form of a script that's executed on the client machine (VBScript, JavaScript, etc.)
 - When user starts a web page, the browser sends an HTTP request to the Server
 - Server responds by sending the page
 - May be a preformatted HTML file
 - Or the program running on the Server may dynamically generate the HTML



- ### 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 on different ones
 - 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



- ### Web Application Development
- Different ways of developing web pages/sites in the Microsoft Windows world:
 - Write them in HTML
 - "First generation" programming model (early 90s)
 - Good for static pages with no user data input or processing
 - Can be used with CGI for dynamic pages
 - Usable on any platform, but slow with CGI
 - 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
 - Same paradigm as Windows forms
 - Fast: compiled

ASP.NET and Web Forms

- ASP.NET
 - Provides libraries, controls, & programming support to write Web applications that interact with the user, render controls, display data, and generate appropriate HTML
 - Using C# and ASP.NET we can create object-oriented, event-driven Web applications
 - We'll see how soon
- Web Forms
 - Windows Form applications run standalone on the local machine's Windows environment
 - Web Form applications run on a server on a different computer
 - Web pages are built around controls and event handlers
 - ASP.NET Extends the ideas of Windows Forms to distributed computing over the Web

C# and ASP.NET

- An ASP.NET Web Form has two pieces:
 - HTML needed to render the page
 - A file with .aspx extension
 - Code that contains program logic to:
 - Interact with user, respond to events, render controls, display data, generate appropriate HTML
 - In C#, a file with .aspx.cs extension
 - The “code-behind” file

Web Application Development with Visual Studio 2005

- Web applications are referred to as Web sites
- Host computer must have a “Web Server” program running
 - Microsoft's Internet Information Services (IIS) is usually the Web server in the Windows environment
 - Part of the Windows 2000, XP Professional, and Server 2003 OS
 - When running IIS on a local machine you are hosting a Web server that must be secured
 - Must have administrative rights to create IIS-served Web applications
 - By default, the files are stored in c:\inetpub\wwwroot
- An alternative is a File System Web site
 - Stores Web pages and associated files in a folder on the local machine
 - Pages are tested using the new Visual Studio Web server program
 - But cannot be served to browsers running on other computers
 - VS Web server does not expose the computer to security vulnerabilities and doesn't require administrative rights
 - Can run on Windows XP Home OS
 - VS Web Server web applications can be ported to IIS

First, Look at Web Application Development using HTML

- See Appendices F and G of your Deitel text
- 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 nonsequentially (hypertext)
- Format the document
 - In general terms (details handled by browser)

Preparing HTML Scripts

- Can use a text editor to type in the HTML tags
 - The most basic way to go
- But there are many HTML editors
 - All generate HTML text files
 - Dreamweaver is a popular one (not free)
 - Easy to use GUI environment
 - Very powerful
 - Netscape Composer
 - From Netscape Navigator Browser: “File” | “Edit Page”
 - Or for a new page: “File” | “New” | “Composer Page”
 - Microsoft Word
 - “File” | “Save As” | “Web Page”
 - » Result can be kind or “quirky”
 - Microsoft Internet Explorer
 - “File” | “Edit with ...”
 - Microsoft FrontPage

HTML Basic Components

- Tags
- 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>
<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
- Provide more information related to the tag
- Define how actions will take place
- Like variables--you give their values
- <TAG ATTRIBUTE = "value">
- Example: SRC attribute of IMG tag

 - Here “value” is the file name of the image file

URLs

- Attribute values 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):
 tag:

 ^ ^ ^
 | | |
 tag attribute value is a URL

Other document “information” Tags

- Give other information to Browser
 - Don't affect document content
- Document HTML Tag:
 - <HTML> .. entire document script .. </HTML>
 - Specifies it's an HTML document
- Document HEAD 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
- Comment Tag:
 - <! ... whatever comment you want ... >
 - Browser takes no action

MyPage0.html A Very 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>

What Happens when a URL such as www.whatever.com/fn.html is Typed into a Browser

- Browser uses the DNS to convert the URL into an IP address
- Then opens a socket connection to the server on port 80 and transmits an HTTP request:
GET /fn.html HTTP/1.1
8 more lines of message header containing information about the request
[Blank line]
- Start line: GET is a method requesting the desired resource
- Blank line (CR/LF) marks end of header and end of request

Web Server Response to GET Command

- If fn.html is a valid resource identifier and security settings don't prevent it from being returned:
 - Server transmits an HTTP response like:
HTTP/1.1 200 OK
7 lines of header information
[blank line]
<html>
<body>
Hello, world {This is the HTML of the returned page}
</body>
</html>
- The browser then parses the returned HTML and displays the Web Page