

## 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 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
- XHTML (Extensible HyperText Markup Language)
  - “Language” used to specify document content and how it is displayed

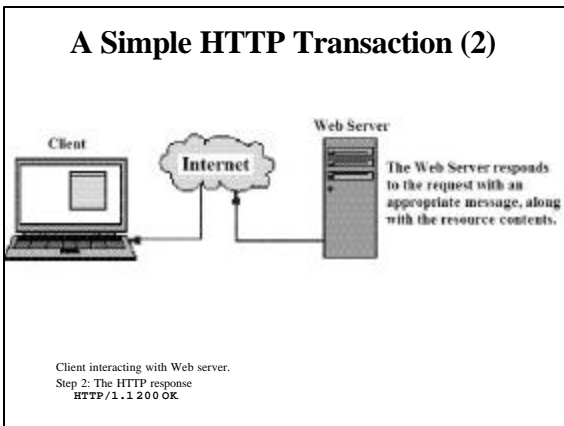
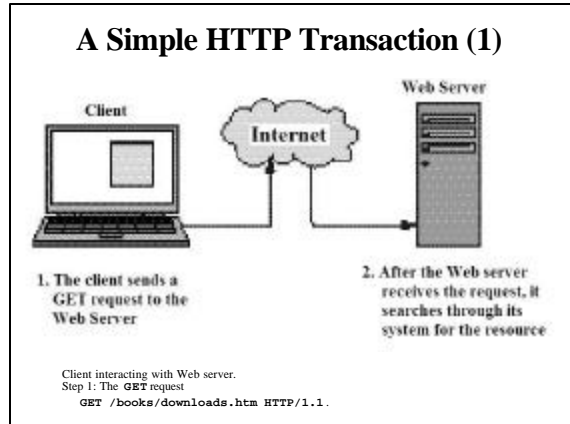
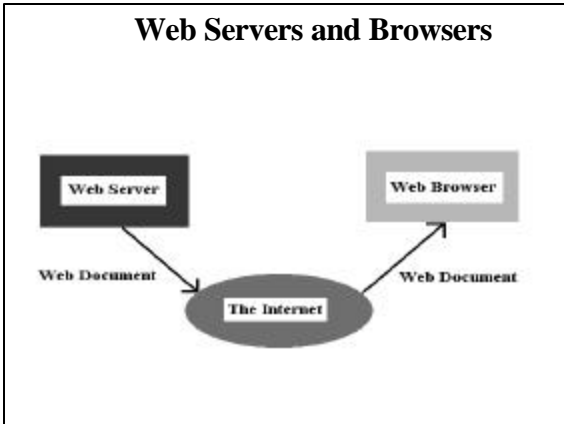
### URL Format

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

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

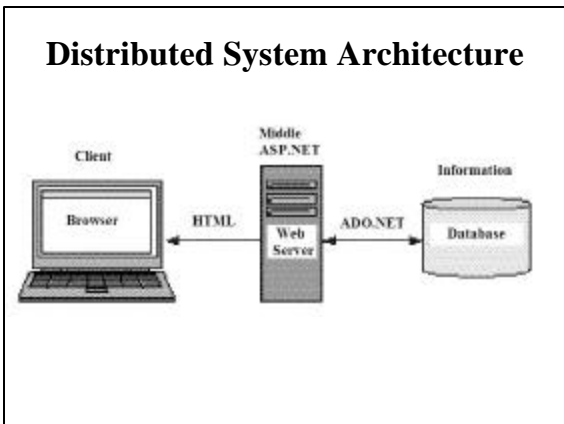
### Web Servers & Browsers

- 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



### 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



### Some Common Web Browsers

- Netscape Communicator
- Microsoft Internet Explorer
- Lynx
  - Character-oriented (old)
- Mosaic (even older)
  - 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](http://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

## Visual Studio 2005 Support for Web Application Development

- VS 2005 comes with ASP.NET Visual Web Developer
  - Has a built-in test web page server
  - Like WebMatrix it can't serve web pages to other computers, but it can be used for ASP.NET web page development
  - Web pages developed with it can be ported to servers running IIS
  - Don't need IIS to do web page development

## 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 (21<sup>st</sup> century)
    - Powerful, flexible, and easy to use
      - Object-oriented, event-driven
    - Fast: compiled

## Web Application Programming using XHTML

- 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 XHTML

- 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 XHTML Scripts

- Can use a text editor to type in the 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
  - 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 FrontPage

## XHTML Basic Components

- Tags
  - Basic elements of HTML
- Attributes
- URLs

## XHTML 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



## 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 on 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.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" from BU's Technology Training Center at:
  - <http://training.binghamton.edu/docindex.html>
  - Lots of other good stuff there too

## 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>

## 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
Accept: */*
Accept-Language: en-us
Accept-Encoding: gzip, deflate
If-Modified-Since: Fri, 24 Nov 2006 14:12:00 GMT
If-None-Match: "50b0d3ee955cc11:a78"
User-Agent: Mozilla/4.0.(compatible; MSIE.6.0 Windows NT 5.1)
Host: www.whatever.com
Connection: Keep-Alive
```

[Blank line]
- Start line: GET is a method requesting the desired resource
- Next 8 lines: **Message header** – contains info about the request
- 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
Server: Microsoft-IIS/5.0
Date: Fri, 24 Nov 2006 14:12:53 GMT
Content-Type: text/html
Accept-Ranges: bytes
Last-Modified: Wed, 22 Nov 2006 15:26:19 GMT
Etag: "d02acf81975cc11:a78"
Content-Length: 46
[blank line]
<html>
<body>
  Hello, world
</body>
</html>
```
- Browser then parses the returned HTML and displays the Web Page

## **A More Complicated HTML Page**

- [www.cs.binghamton.edu/~reckert/330/mypage1ok.html](http://www.cs.binghamton.edu/~reckert/330/mypage1ok.html)
- Use browser menu item “View” | “Source” to see a page’s HTML