Types of Web Pages

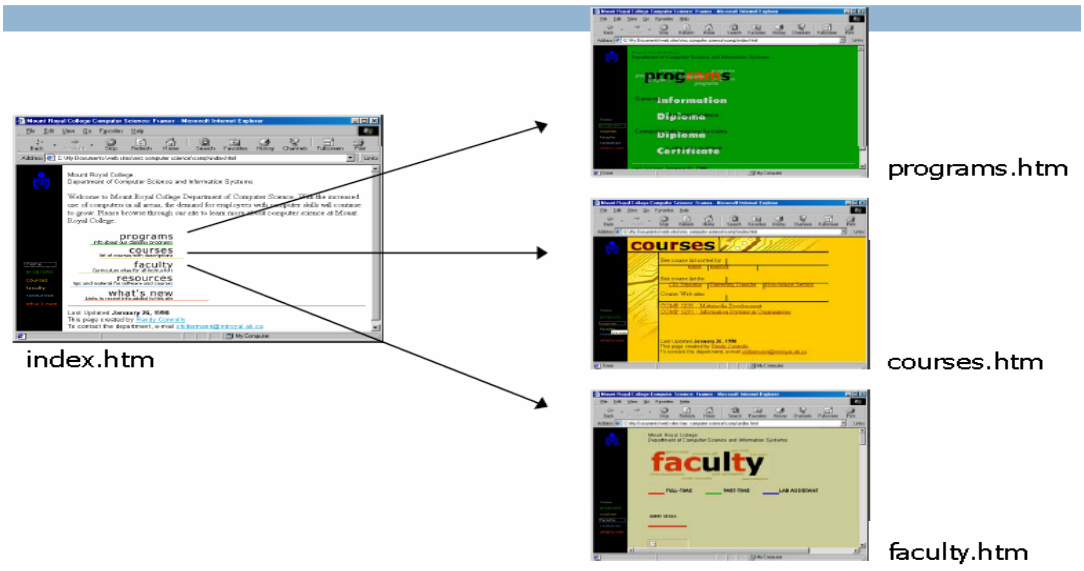
- Any web site composed from a set of web pages:
- Some of those pages are static (abstract) pages while other pages are dynamics (proactive) pages.

Web Development Languages &Tools

1. HTML/DHTML/XHTML.
2. Java.
3. Web Design Tools e.g. Frontpage, Dreamweaver.
3. Scripting Languages e.g. VBScript, JavaScript.
4. Cascading Style Sheets.
5. XML.
6. …more!!!

Web Site Structure

- A web site is typically composed of many files.
- A web site will have:
  - HTML files
    - These are ASCII text files. Most sites will have many HTML files.
    - These HTML files may also include client-side scripting (usually JavaScript).
  - image files (optional)
    - There are two file formats (GIF, PNG and JPG) that are supported by all browsers.
  - object files (optional)
    - Files that require a helper application or plug-in.
    - Sound files, video files, Flash files, Java files, etc
  - server-side scripts (optional)
    - programs for accessing server-based resources such as databases.
    - Typically, CGI-Perl, ASP, ASP.NET, JSP, Cold Fusion, etc.



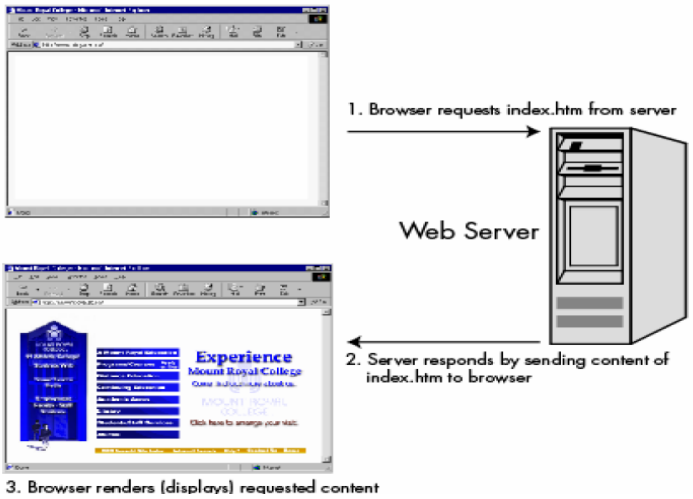
Test, Test, Test

- Always test your pages on as many browsers as possible.
- Always test your pages on as many computer platforms as possible.

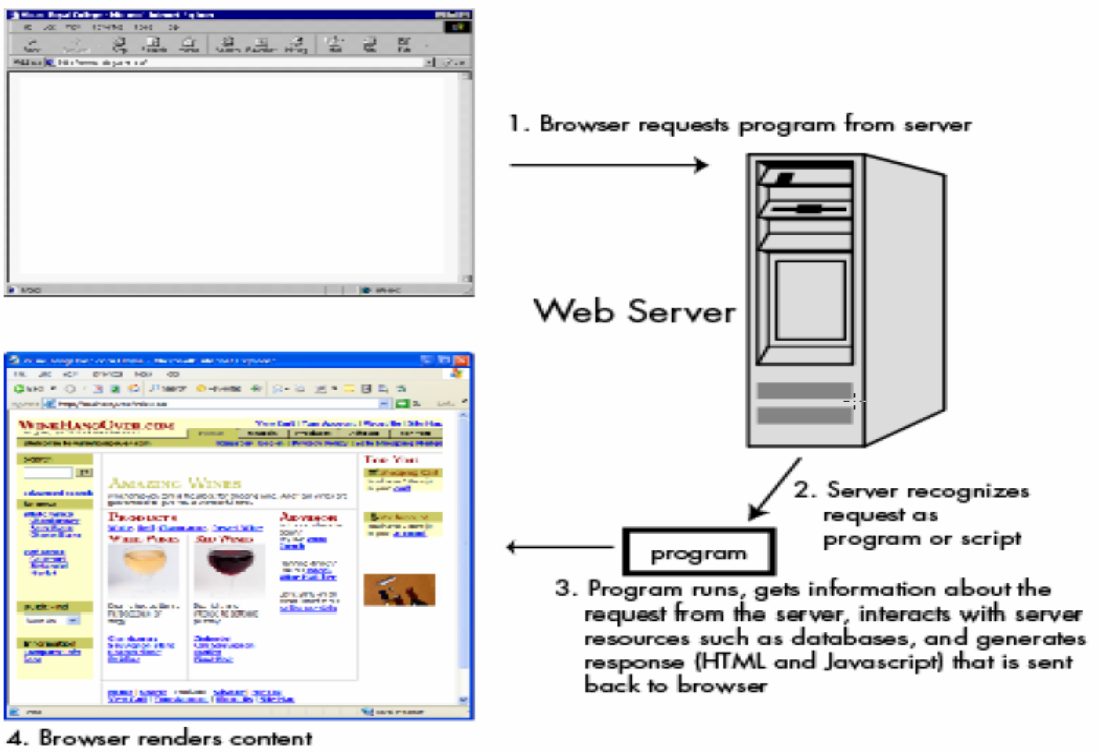
Static vs Dynamic Web Pages

- Most web pages that you view are not static HTML pages.
- Instead, they are output from programs that run on web servers.
  - These programs can interact with server resources like databases and XML Web services.

Static Web Content



Dynamic Web Content



- A document on the Web is called a Web page
- A Web page is identified by a unique address called the Uniform Resource Locator (URL)
- A URL is also commonly referred to as a Web address
- A URL is a type of Uniform Resource Identifier (URI)
- A Web site refers to the location on the Internet of the Web pages and related files
- Web pages are displayed using a program called a Web browser
- A Web server is a computer that delivers Web pages
- The most popular Web server software is Apache HTTP Server (Apache)
- The second most popular Web server is Microsoft Internet Information Services (IIS) for Windows

Before we get started to design site

- What sites are you working on?
- What's the purpose of your site?
- What audience(s) are you trying to reach?
- Use pre-designed templates.
- Download lovely icons, backgrounds and images from the internet.
- Use pre-programmed scripts.

Site Planning

- Determine site goals
- Analyze your audience
- Analyze the "competition"
- Know your own abilities and resources
- Map the current site
- Design your new site

Audience Analysis

- Who are you trying to reach?
    - Age
    - Language and Culture
    - Level of education
    - Access to the Web (High-speed? Dial-in?)
    - Familiarity with the Web
    - Barriers to access?
- What are they looking for at your site?
    - Information
    - Services
    - Community

Design (or redesign) the site

- Review audience needs/wants with site owner.
- Determine the site structure (site map).
- Gather content (visuals, information).
- Mock up a visual design.
- Build the site in a "test" mode.
- Perform (user) testing and make changes.
- Put the site into production.
- Maintain and update the site.

Web sites can be generally categorized as:

- Personal Web sites
- Commercial Web sites
- Organizational including government and non-profit organization Web sites, and
- Entertainment Web sites

HTML Documents

- An Webpage is best thought as a set of VIRTUAL ELEMENTS (paragraphs,titles,tables,list,images).
- HTML (Hyper type Markup Language) defines the structure and layout of elements of a Web page with a variety of TAGS.
- Each tag may have a set of attributes that modify the appearance and layout of the virtual elements contained by the tag.
- Web pages are created using Hypertext Markup Language (HTML)
- Web pages are commonly referred to as HTML pages or HTML documents
- A markup language is a set of characters or symbols that define a document's logical structure
- HTML is based on an older language called Standard Generalized Markup Language (SGML)
- Like SGML, HTML was originally designed as a way of defining the elements in a document independent of how they would appear
- HTML has evolved into a language that defines how elements should appear in a Web browser

Basic HTML Syntax

- HTML documents are text documents that contain formatting instructions called tags
- HTML tags include:
  - Formatting commands (boldface or italic)
  - Controls that allow user input (option buttons or check boxes)
- Tags are enclosed in brackets (< >) and consist of an opening tag and a closing tag
- The closing tag must include a forward slash (/) immediately after the opening bracket
- A tag pair and the data it contains are referred to as an element
- The information contained within an element's opening and closing tags is referred to as its content
- Elements that do not require a closing tag are called empty elements

Table 1-1 Common HTML elements

HTML Element	Description
	Formats enclosed text in a bold typeface
<body></body>	Encloses the body of the HTML document
 	Inserts a line break
	Centers a paragraph in the middle of a Web page
<head></head>	Encloses the page header and contains information about the entire page
<h*n*></h*n*>	Indicates heading level elements, where *n* represents a number from 1 to 6
<hr>	Inserts a horizontal rule
<html></html>	Begins and ends an HTML document; these are required elements
	Formats enclosed text in an italic typeface
<img src="…">	Inserts an image file
	Identifies enclosed text as a paragraph
<u></u>	Formats enclosed text as underlined

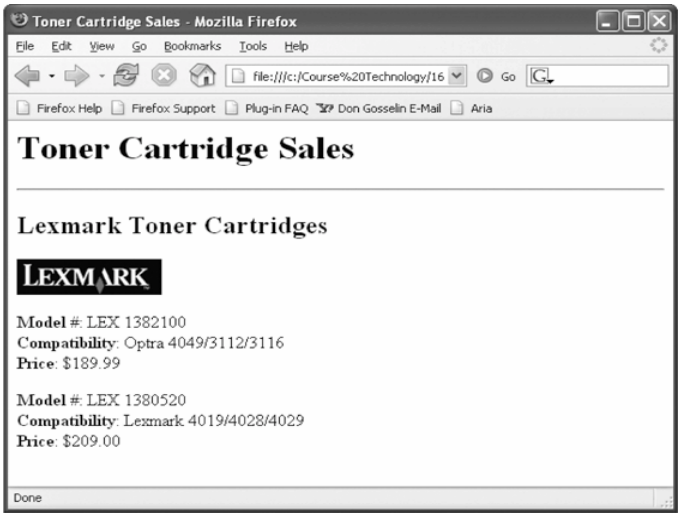
- HTML documents must have a file extension of .html or .htm
- All HTML documents must use the <html> element as the root element
- A root element contains all the other elements in a document
- The <head> element contains information that is used by the Web browser
- A <head> element must contain a <title> element
- The <head> element and the elements it contains are referred to as the document head
- The <body> element and the text and elements it contains are referred to as the document body
- The process by which a Web browser assembles or formats an HTML document is called parsing or rendering
- Example:
- This paragraph will appear in boldface in a Web browser
- Parameters used to configure many HTML elements are called attributes
- Insert line breaks using the paragraph and line break
 elements

Basic Structure of HTML Document

```
<!DOCTYPE html>
<html>
<body>
<h1> My first Heading </h1>
<p> My first paragraph </p>
</body>
</html>
```

Sample HTML Code

```
<html>
<head>
<title>Toner Cartridge Sales</title>
</head>
<body>
<h1>Toner Cartridge Sales</h1>
<hr>
<h2>Lexmark Toner Cartridges</h2>
<img src="lexmark_logo.gif">
<p><b>Model #</b>:LEX 1382100<br>
<b>Compatibility</b>: Optra 4049/3112/3116<br>
<b>Price</b>: $189.99</p>
<p><b>Model #</b>:LEX 1380520<br>
<b>Compatibility</b>:Lexmark 4019/4028/4029<br>
<b>Price</b>:$209.00</p>
</body>
</html>
```



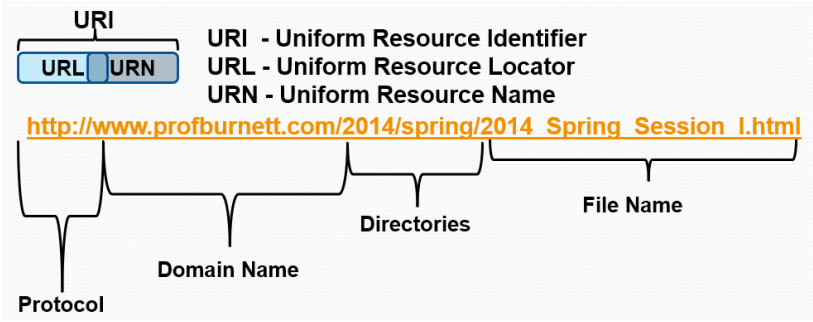
A simple HTML document in a Web browser

- HTML editors Macromedia Dreamweaver and Microsoft FrontPage are popular graphical interfaces that create WYSIWYG (what-you-see-is-what-you-get) Web pages.
- You cannot use a Web browser to create an HTML document.

Web Communication Protocols

- A Web page is identified by a unique address called the URL
- Each URL consists of two basic parts:
  - A protocol (usually HTTP) and
  - Either the domain name for a Web server or a Web server's Internet Protocol address
- Hypertext Transfer Protocol (HTTP) manages the hypertext links that are used to navigate the Web
- A host refers to a computer system that is being accessed by a remote computer
- A domain name is a unique address used for identifying a computer such as a Web server on the Internet
- The domain identifier identifies the type of institution or organization (.biz, .com, .edu, .org)
- An Internet Protocol, or IP address, is another way to identify computers or devices connected to the Internet
- An IP address consists of a series of four groups of numbers separated by periods. 192.168.2.231 187.56.245.4 164.211.32.94
- Each Internet domain name is associated with a unique IP address
- HTTP is a component of Transmission Control Protocol/Internet Protocol (TCP/IP)
- Hypertext Transfer Protocol Secure (HTTPS) provides secure Internet connections for transactions that require security and privacy

Figure 1-4 Sample URL



Publishing Your Web Site

- Web Hosting:
  - The publication of a Web site for public access.
  - Internet access (cable modem, DSL, satellite, dial-up modem, ISP).
- Internet Service Provider (ISP):
  - Provides access to the Internet along with other types of services such as e-mail
  - America Online, CompuServe, and EarthLink
- ISP advantages to hosting a Web site:
  - Extremely fast Internet connections using advanced fiber-optic connections
  - Large and powerful Web servers and the expertise and manpower to maintain and manage them
- Domain name registration
  - Pick a domain name that is similar to your business name or that describes your Web site
  - You cannot use a domain name that is already in use or a trademarked name
  - Contact a domain name registrar to find out the availability of a domain name and register it
  - Domain names are stored in a master database that is maintained by the InterNIC.
  - For a fee, domain names can be registered for a specified period of time.
  - A popular domain name registrar is Network Solutions.
  - After you register your domain name, notify your ISP of your domain information.
- File Transfer Protocol (FTP)
  - Is a TCP/IP protocol used for transferring files across the Internet
  - Transfers files between an FTP client (your computer) and an FTP server (a server capable of running FTP)

- The vehicle that allows you to get your Web page files to the Web server
- Your ISP provides a username and password to log on to the FTP site and upload files to the FTP server
- Examples of FTP clients include Firefox and Internet Explorer
- Allows you to use your browser to log on to an FTP server and upload your files

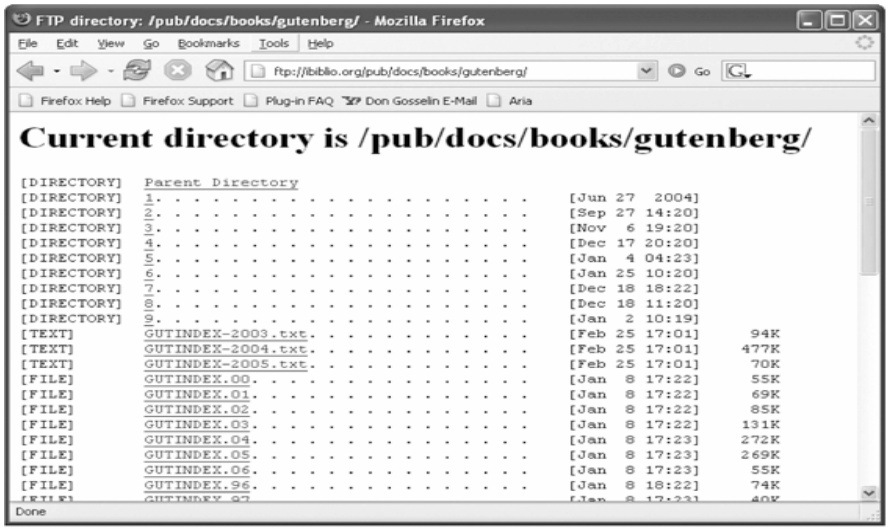
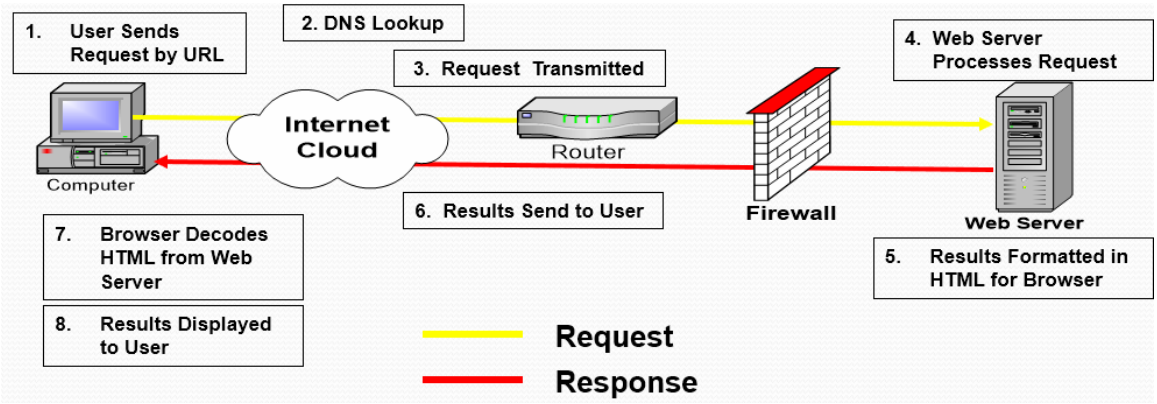


Figure 1-6 FTP Web site example

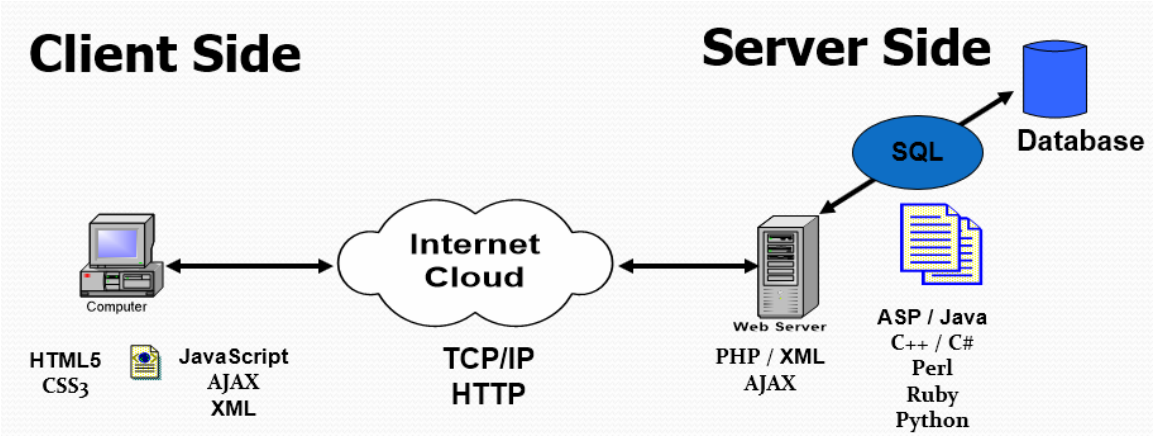
Web Request-Response Cycle

Static Web Page



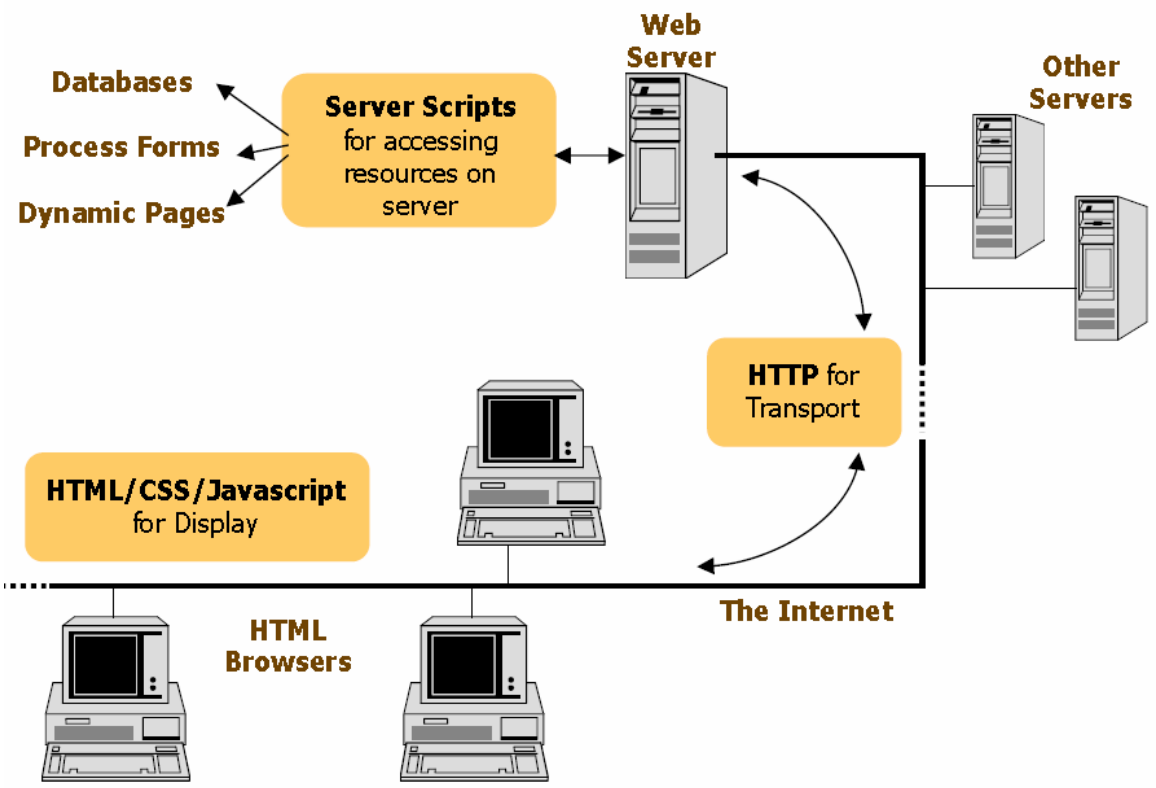
The Web Medium

Dynamic Web Site



How Does the Web Work?

- The browser (or client) requests and displays information.
- Browsers make requests of servers, then servers process those requests based on a set of rules (called a protocol).
- On the server, a web server software processes the requests and returns information to the client.

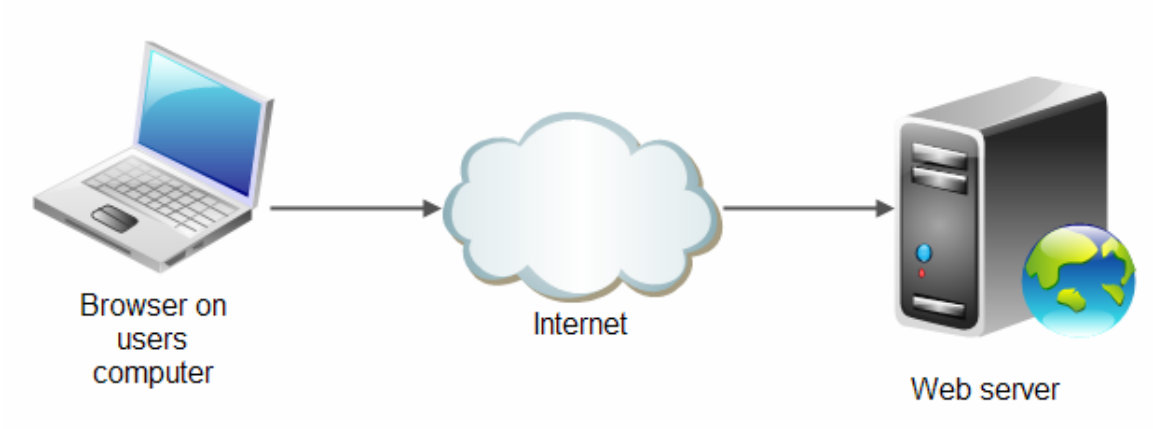


Web Browsing Components

- Web servers: Store and provide access to web sites
- Web browsers: Request and display information to individuals
- Web pages: The individual documents that web servers store and web browsers request.

Web Servers

- Powerful computers that provide data or services to other computers
- Receive requests for web page data and supplies it by sending it over the Internet.



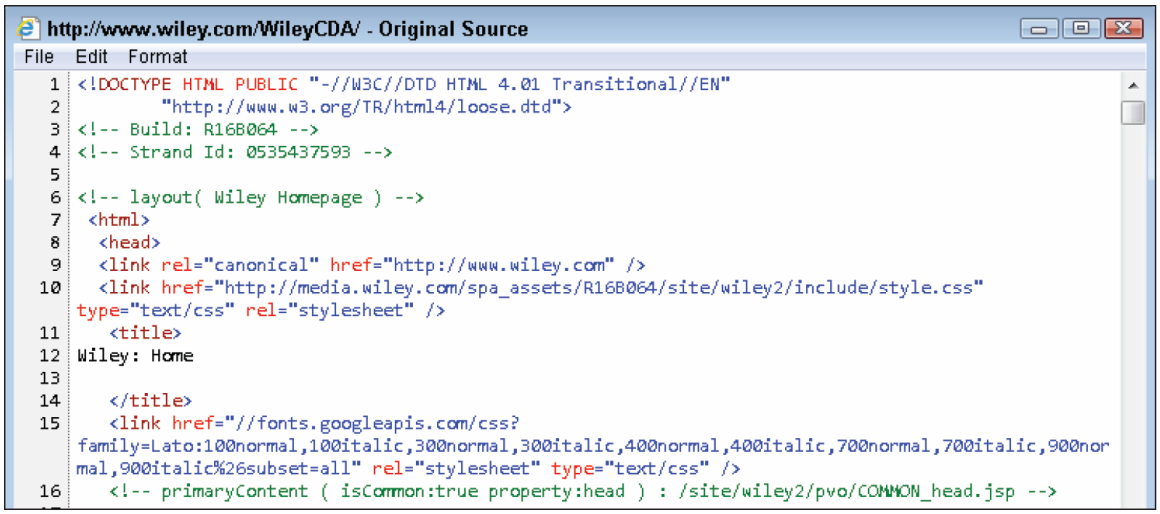
Web Browsers

- Many are available (Internet Explorer, Firefox, Chrome, Safari)
- Most are available for multiple operating systems
- Relationship between browser and server is platform-independent

Web Pages

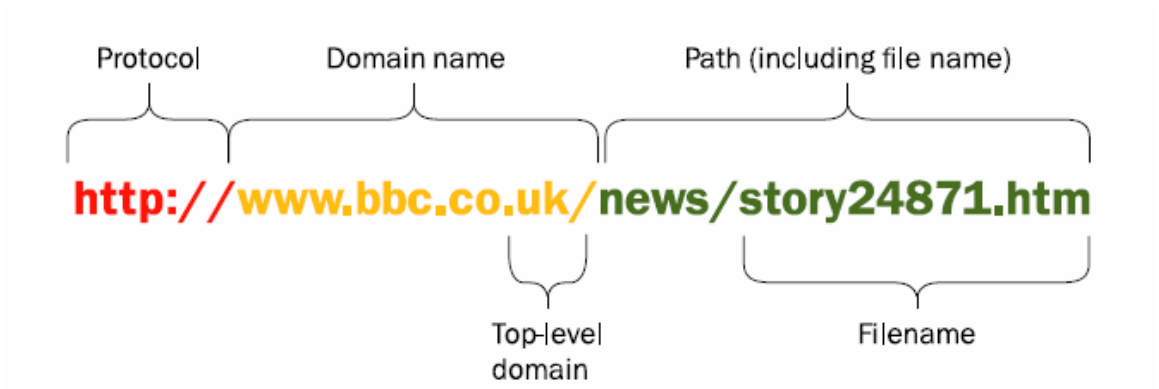
- A web page is a file that is formatted for use on WWW.
- Written in Hypertext Markup Language (HTML).
- Web page contains text, graphics, audio, and video
- Hyperlinks are pointer link to other pages or content in the same page
- Static web page

  - content does not change
  - can be updated manually
- Dynamic web page
  - frequently updating content
  - weather report



URLs

- Uniform resource locator (URL) is a web page address



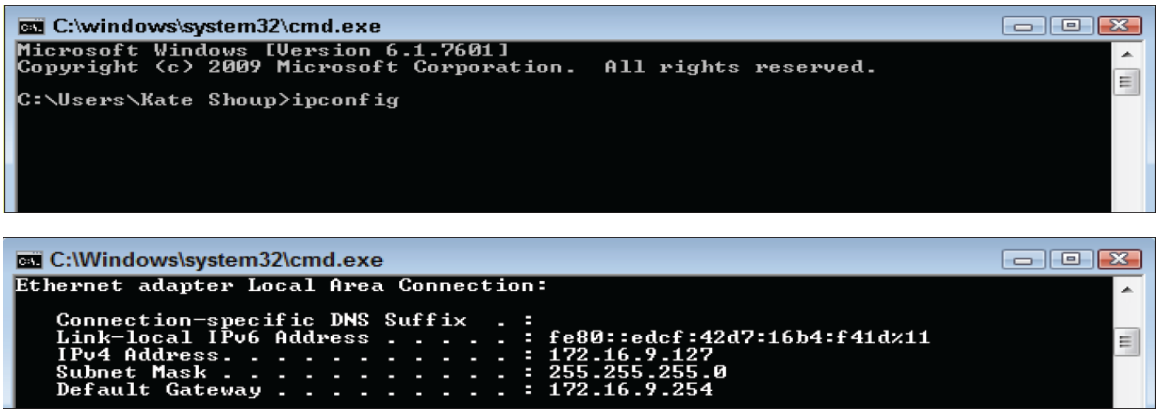
Parts of a URL

- Protocol: set of rules for the transmission; most common is http. Another example is IP
- Domain name: destination server, such as www.uob.edu.bh.
- Top-level domain is the final part, example: .com, .net, .edu, and many more.
- Some domain names include a two-letter country code, for example, .bh, .uk, .ae, .sa.
- Subdomain: usually www, but can be others
- Path: exact location on the server can include a folder (news) and a file name (story24871.htm)

IP Addresses

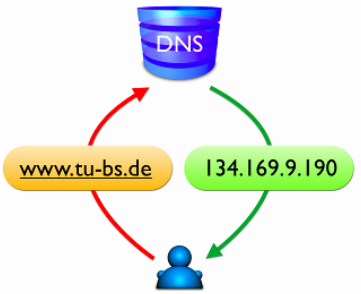
- IPv4
  - Currently used on the Internet
  - 32 bit binary number
  - Represented in dotted decimal notation
  - Example, 131.107.23.100
  - More than 4 billion combinations
- IPv6
  - Will be used on the Internet in the future (already in limited use)
  - 128 bit binary number
  - Represented as eight groups of four hexadecimal numbers
  - Example:2001:0:0:635:7b62:12ab:342:1038

Identifying Your IP Address



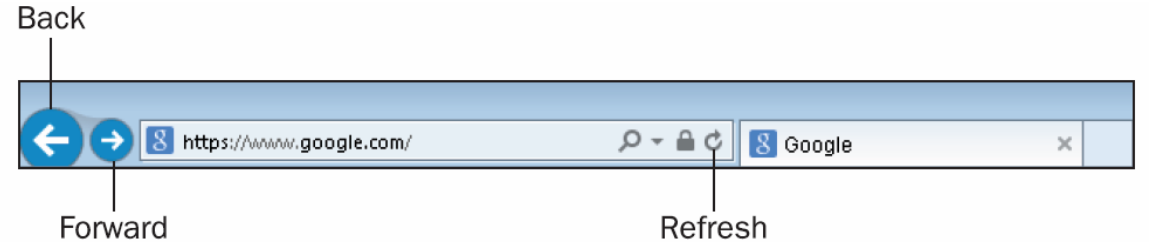
IP Address Translation

- Domain Name System (DNS) servers translate between IP addresses and domain names
  - directory lookup that converts domain names into their corresponding IP addresses
  - The process is called name resolution

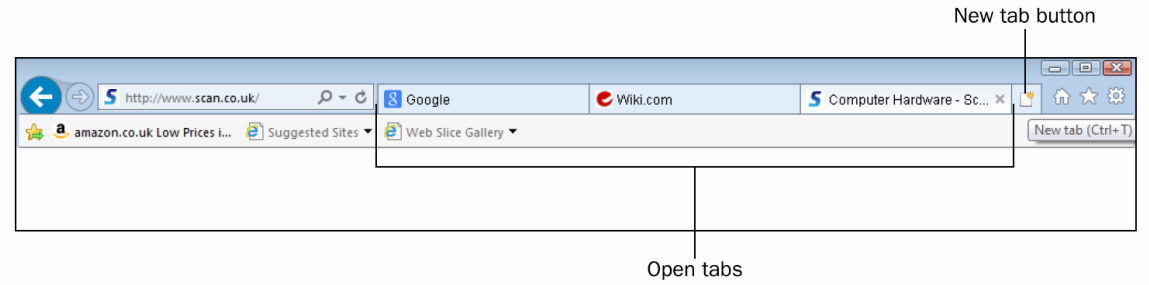


Browser Basics

- Homepage: The page that is displayed when you first launch your web browser.
  - Also, the main / first page of a website.



- A tab enables you to have multiple web pages open at once within the same browser window



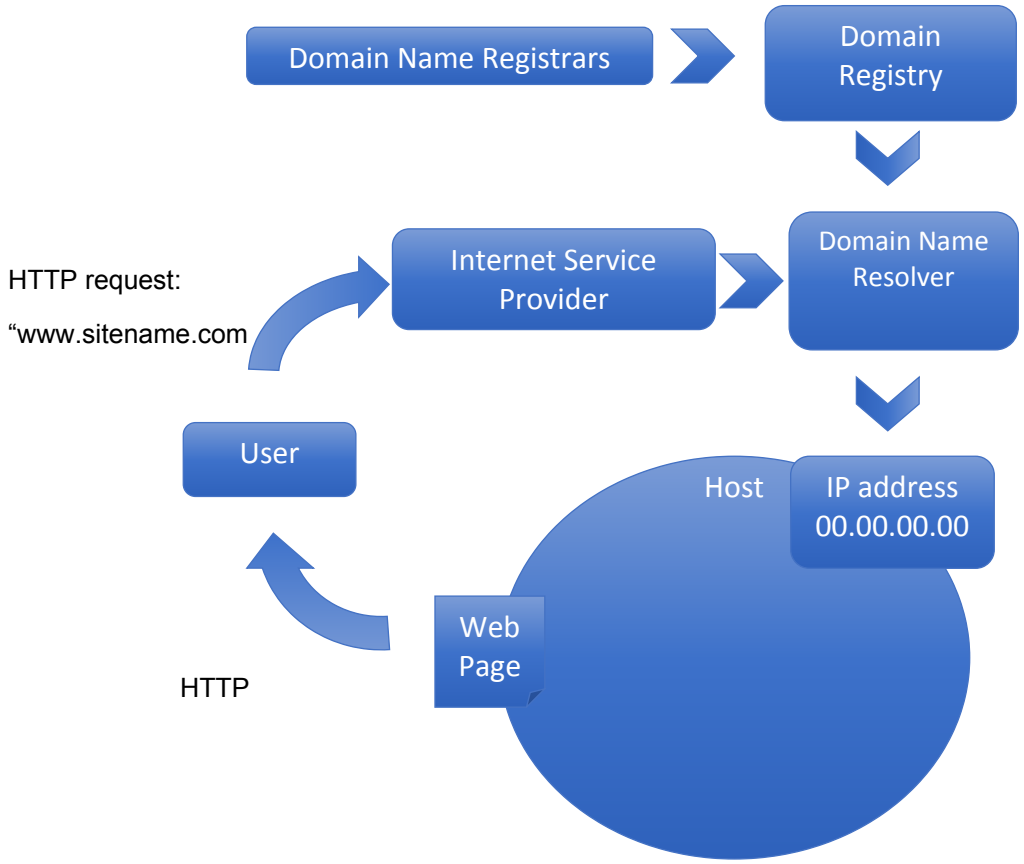
Identifying Secure Sites

- https:// rather than http://
- Lock symbol in Address bar
- Address bar may have a green background

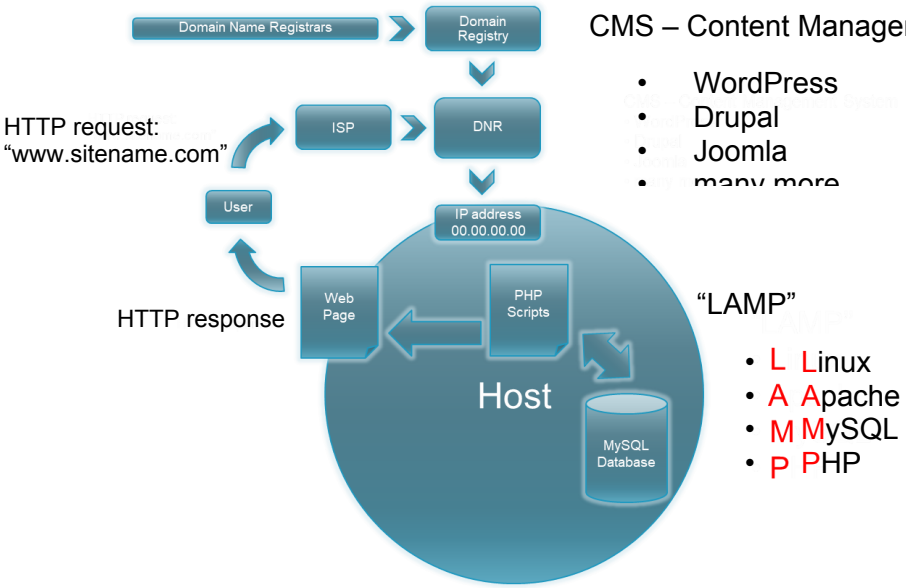
Web-Based Applications

- These days, developers can use a number of programming languages to run web-based applications within a web browser.
- A web-based application is software that is downloaded and run within the web browser rather than being installed directly on the user's computer.

Basic HTML pages – 'flat website'



Database-driven website



CMS – Content Management System

- WordPress
- Drupal
- Joomla
- many more

"LAMP"

- L Linux
- A Apache
- M MySQL
- P PHP

Gui editors

- Dreamweaver
  - Beginners always seem to start with this. It's a great tool.
  - The preview isn't quite right, it's slow, it's big, it's expensive. Has a built-in FTP tool. Tight integration with Adobe CS.
- FrontPage
  - Very common starting point on PC. Solid and serviceable. Deep integration with Windows OS.
  - Plain-text editor
  - Cheap. Fast. Efficient. Reliable. Trustworthy. Multi-platform.
  - My choice – BBEdit for the Mac. Downside: not quite as 'helpful' as GUI apps.

TEXT EDITORS

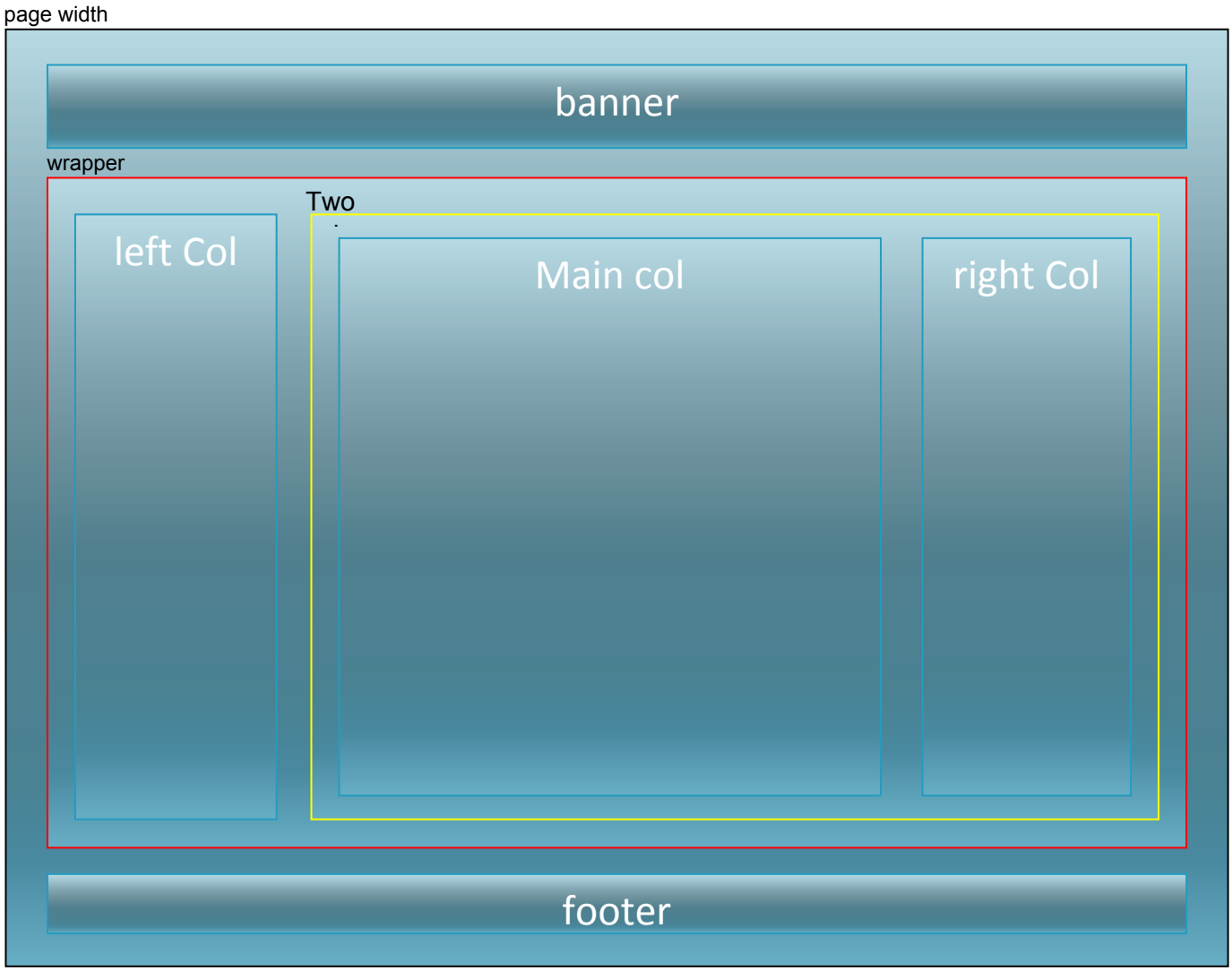
- For PC:
  - NotePad++ (notepad-plus.sourceforge.net/)
  - Crimson (www.crimsoneditor.com)
  - jEdit (http://www.jedit.org/)

Html Page Elements

- DOCTYPE – Rendering rules for HTML
- HTML – Beginning of hypertext
- HEAD – Title / Links / Scripts / Meta
- BODY – The visible content of the page

Anatomy of an HTML page

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN"
"http://www.w3.org/TR/html4/strict.dtd">

<html>

  <head>

    <title>Page Title</title>

    <link rel="stylesheet" href="/resources/my_styles.css" media="all">

    <script src="/resources/js/my_script.js" type="text/javascript"
language="javascript"></script>

    <meta name="keywords" content="dog, cat, bird, mouse, platypus">

  </head>

  <body>

    <div id="pagewidth">

      <div id=”banner">Page Banner</div>

      <div id="wrapper" class="clearfix">

        <div id="twocols" class="clearfix">

          <div id="maincol">Main Content Column</div>

          <div id="rightcol”>Right Column</div>

        </div>

        <div id="leftcol">Left Column</div>

      </div>

      <div id="footer">Footer</div>

    </div>

  </body>

</html>
```

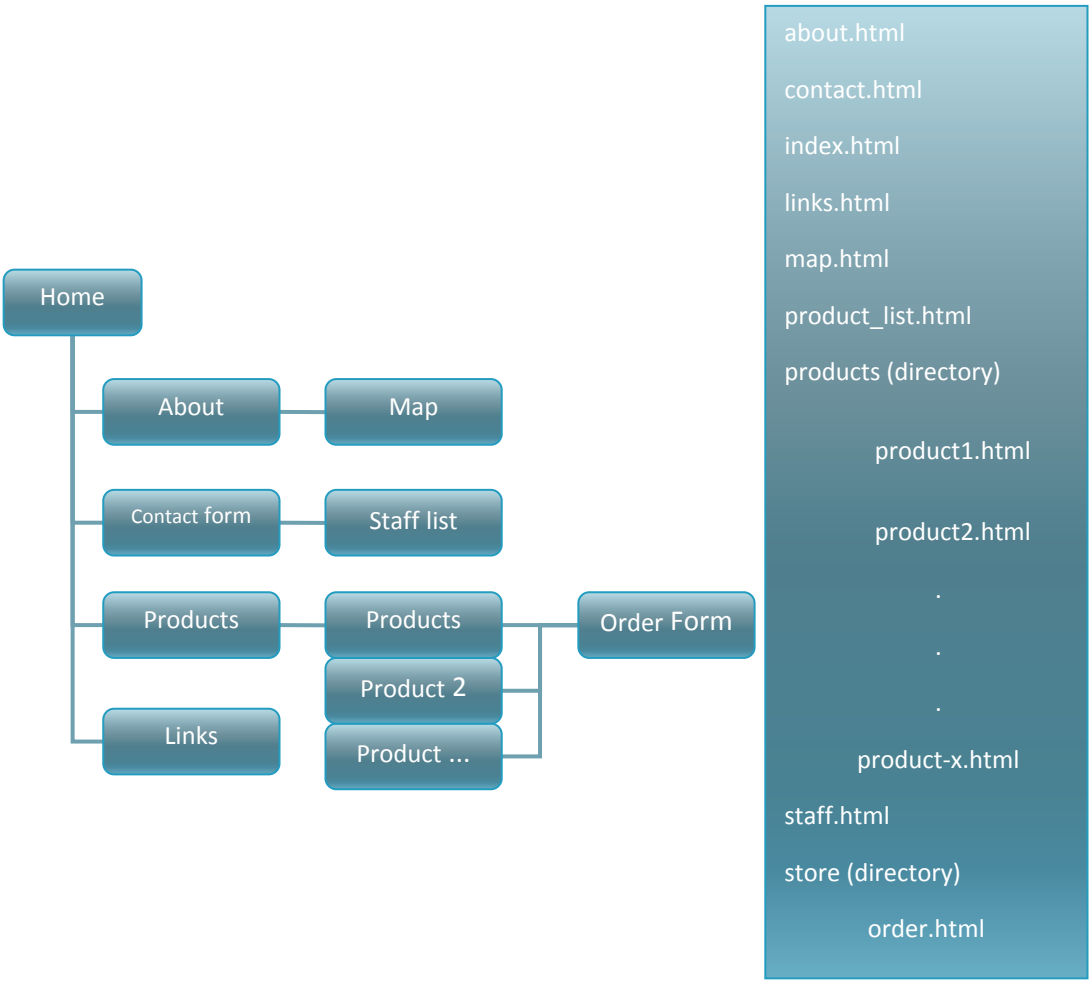


PHP and ASP

- PHP – Hypertext Preprocessor – a language designed to create HTML using programming logic
- ASP – Active Server Pages – the Microsoft version of PHP.

Information Architecture

- The blueprint that describes how information is organized and structured.
- The relative position of files and folders
- The 'concept' behind your navigation



Internet v.s. Web

- The Internet: a inter-connected computer networks, linked by wires, cables, wireless connections, etc.
- Web: a collection of interconnected documents and other resources.
- The world wide web (WWW) is accessible via the Internet, as are many other services including email, file sharing, etc.

How does the Internet Work?

- Through communication protocols
- A communication protocol is a specification of how communication between two computers will be carried out
    - IP (Internet Protocol): defines the packets that carry blocks of data from one node to another

- TCP (Transmission Control Protocol) and UDP (User Datagram Protocol): the protocols by which one host sends data to another.
- Other application protocols: DNS (Domain Name Service), SMTP (Simple Mail Transmission Protocol), and FTP (File Transmission Protocol)

The World Wide Web (WWW)

- WWW is a system of interlinked, hypertext documents that runs over the Internet
- Two types of software:
  - Client: a system that wishes to access the information provided by servers must run client software (e.g., web browser)
  - Server: an internet-connected computer that wishes to provide information to others must run server software
  - Client and server applications communicate over the Internet by following a protocol built on top of TCP/IP – HyperText Transport Protocol (HTTP)

Basics of the WWW

- Hypertext: a format of information which allows one to move from one part of a document to another or from one document to another through hyperlinks
- Uniform Resource Locator (URL): unique identifiers used to locate a particular resource on the network
- Markup language: defines the structure and content of hypertext documents

Web Client: Browser

- Makes HTTP requests on behalf of the user
  - Reformat the URL entered as a valid HTTP request
  - Use DNS to convert server's host name to appropriate IP address
  - Establish a TCP connection using the IP address
  - Send HTTP request over the connection and wait for server's response
  - Display the document contained in the response
    - If the document is not a plain-text document but instead is written in HTML, this involves rendering the document (positioning text, graphics, creating table borders, using appropriate fonts, etc.)

Web Servers

- Main functionalities:
  - Server waits for connect requests
  - When a connection request is received, the server creates a new process to handle this connection
  - The new process establishes the TCP connection and waits for HTTP requests

- The new process invokes software that maps the requested URL to a resource on the server
- If the resource is a file, creates an HTTP response that contains the file in the body of the response message
- If the resource is a program, runs the program, and returns the output

Static Web: HTML/XHTML, CSS

- HTML stands for HyperText Markup Language
  - It is a text file containing small markup tags that tell the Web browser how to display the page
  - XHTML stands for eXtensible HyperText Markup Language
  - It is identical to HTML 4.01
  - It is a stricter and cleaner version of HTML
  - CSS stands for Cascading Style Sheets
  - It defines how to display HTML elements

Good Design is:

- Understandable
- Interesting
- Easy to use
- Uniform in look and feel
- Done from a visitor's point of view:
  - WYSIWYW (What You See Is What You WANT)

Good Design Maxims

- "Rules" are only guidelines -- no single model fits every situation, and there is no such thing as the "right" way to create a web site.

Remember WYSIWYW

- Web users want control over the online material -- they want to seamlessly obtain the information they need.
- Don't force visitors down a specific path -- give them control.

Influences of Technology on Design

- Browsers
  - Internet Explorer is the dominant browser
- Operating systems
  - Windows XP is the most popular operating system
- Connection speeds
  - 75% access the Internet using broadband (DSL/T1/T3)
    25% access it using narrowband (modem)

- User screen sizes

  80% of users are using a display with 1024x768 pixels or more and a color depth of at least 65000 colors

Influences of Content on Design

- The content drives how the web site looks
  - Sites designed for students look different than sites designed for staff, which look different from sites designed for potential faculty
  - Sites designed for current employees look different than sites designed for potential clients
  - Sites designed to get people to purchase items look different than sites designed to provide information
- Use quality content from subject matter experts
- Have site reviewed PERIODICALLY by key members (CEOs, Department Heads, Supervisors, etc.) of the group the site supports
- Have non-affiliated people review content for clarity
- Have others proofread for grammar

Economic Considerations

Budget concerns

- Staff time for creation
- Staff time for maintenance
- In-house vs. outsourcing

Usability

- Browsers don't use web sites -- people do. Don't design a site for a particular browser -- design a site for the user.
- There are no generic people. Try to envision a real person accessing your site.
  - Most users absorb data visually.
  - Most users will not expend effort to remember things about how your site works.

Usability -- Making It Easy To Read

- Factors that affect readability
  - Poor eyesight of users
  - Smaller, older computer monitors as displays
  - Poor color perception of users
  - "Cocktail-party" effect -- lots of information on a single web page
- Design fixes:
  - Use high contrast between text and background

- Use lots of white space
- Use larger fonts
- Put key navigation buttons in the upper left
- Don't rely on color alone to distinguish between elements on a web page
- Avoid busy graphics
- Limit page noise -- ensure page elements don't compete for a visitor's attention

Usability -- User's Memory

- Don't force visitors to remember how to navigate/use the site
- Provide redundant, easily recognizable features
- Generally, have visited and unvisited links be different colors to make it easy for users to remember where they've been
- Limit the number of items in a group of choices

Usability -- Response Times

- The amount of time a user will wait is proportional to the payoff. If they know there is something they want to see, they will wait for it.
- Otherwise…
  - 1 second: no major potential for interrupt
  - 10 seconds: users become bored
  - More than 10 seconds: user may leave

Without a progress bar or other browser feedback, users generally will go about other business -- look at sites in other windows, talk on the phone, etc. Designers must provide some sort of indication as to how much longer the download will take, if the wait will be more than 10 seconds.

Accessibility in Web Design

- Make the navigation clear and simple
- Use a clean visual layout with ample white space
- Use descriptive link texts (avoid using "click here" without more information)
- Provide text equivalents for non-text elements
- Don't rely solely on color to indicate links
- Don't make the screen flicker
- Use plain, understandable English
- Don't rely completely on high-tech solutions
- Use markup and style sheets -- HTML for structure and CSS for presentation. Don't use visual markup (for example, to make text bold, use strong instead of b; to italicize, use em instead of i)
- Don't use header tags for visual formatting
- Add "skip to" links to main navigation and page content
- If PDF files are used, provide alternate formats for the information

Approvals/Proofing

- Get feedback on the entire web design from:
  - Other web designers (for design)
  - Subject matter experts (for content)
  - All represented parties, including department heads, managers, deans, etc. (for final approval)
  - Non-affiliated people (for clarity)
- Proofread for grammar -- fresh eyes may catch things you miss!
- Validate for accessibility and compliance with W3C guidelines
  - http://wave.webaim.org/
  - http://validator.w3.org/
  - http://cynthiasays.com/

Maintenance/Improvement

- Set a maintenance schedule for the site.
  - Who will do the maintenance?
  - What to do if emergency problems occur?
  - Where will backup copies of the site be located?
- Schedule a quarterly review of the site.
  - Does the content need update?
  - Is the design still working?
  - Are there newer, cutting-edge tools we should be using?

Resources - Books

- HTML & XHTML: The Complete Reference
  Author: Thomas Powell
  ISBN: 0-07-222942-X
- Web Design: The Complete Reference
  Author: Thomas Powell
  ISBN: 0-07-222442-8
- Designing With Web Standards
  Author: Jeffrey Zeldman
  ISBN: 0-73-571201-8
- HTML for the World Wide Web
  Author: Elizabeth Castro
  ISBN: 0-32-113007-3
- Integrated Web Design
  Author: Molly Holzschlag
  ISBN: 0-73-571233-6