

CHAPTER 16

LECTURE OUTLINE

Computer Science Illuminated, Seventh Edition

Nell Dale, PhD; John Lewis, PhD

The World Wide Web

16.1 Spinning the Web

- Search Engines
- Instant Messaging
- Weblogs
- Cookies Web
- Analytics

16.2 HTML and CSS

- Basic HTML Elements
- Tag Attributes
- More About CSS More
- HTML5 Elements

16.3 Interactive Web Pages

16.4 XML

16.5 Social Network Evolution



Credits

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Eric Pogue

Audio commentary plus slides with the grey backgrounds



Chapter Goals (1 of 2)

- Compare and contrast the Internet and the World Wide Web
- Describe general Web processing
- Write basic HTML documents
- Describe several specific HTML tags and their purposes



Chapter Goals (2 of 2)

- Describe the processing of Java applets and Java server pages
- Compare and contrast HTML and XML
- Define basic XML documents and their corresponding DTDs
- Explain how XML documents are viewed



The World Wide Web (1 of 4)

The Web

An infrastructure of information combined and the network software used to access it

Web Page

A document that contains or references various kinds of data

Links

Connections between one web page and another



The World Wide Web (2 of 4)

Website

A collection of related web pages

Web Browser

A software tool that retrieves and displays web pages

Web Server

A computer set up to respond to requests for web pages



The World Wide Web (3 of 4)

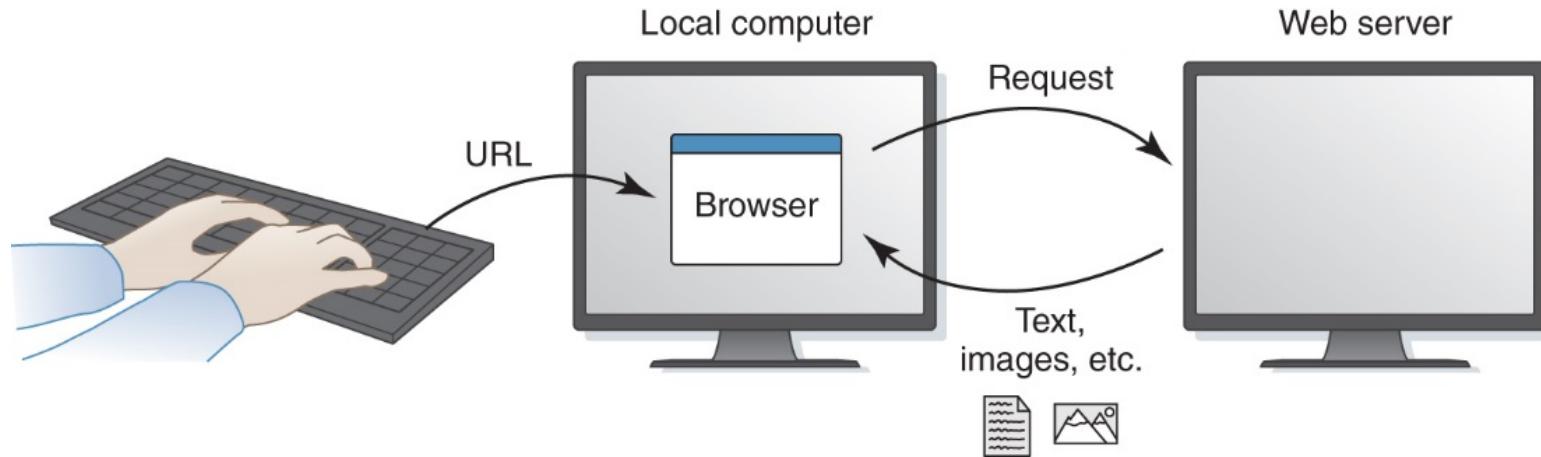
Uniform Resource Locator (URL)

A standard way of specifying the location of a Web page, containing the hostname, "/", and a file

What is the relationship between the Internet and the Web?



The World Wide Web (4 of 4)



A browser retrieving a web page

*Why is the expression
"visiting a website" a bit misleading?*



Search Engines

Search Engine

A website that helps you find other websites



Instant Messaging

Instant Messaging (IM)

- Applications that allow people to send short messages
- Similar to texting, but based on username, not cellular phone number
- Some applications allow more than two users in a **chat room**
- If participants run application simultaneously, they can have an interactive conversation
- Most applications use proprietary protocols that dictate the precise format and structure of the messages
- Most instant messages are **not** secure



Weblogs

Blog or Weblog

An online journal or newsletter that is frequently updated and intended for public consumption



Cookies

Cookie

A small text file that a web server stores on your local computer's hard disk

- A cookie contains information about your visit to the site
- Cookies can be used
 - To determine number of unique visitors to the site
 - To customize the site for future visits
 - To implement shopping carts that can be maintained from visit to visit
- Cookies are **not** dangerous



Web Analytics

Web Analytics

- Collection and analysis of data regarding website usage
- Typically used by website owners to track the number and behavior of users visiting their sites
- For example, Google Analytics tracks:
 - Where users are geographically located (based on their ISP)
 - Which site referred them
 - Which pages within your site they visit
 - How long they spend on each page
 - From which page they leave your site
 - And more



HTML and CSS

(1 of 9)

Hypertext Markup Language (HTML)

The language used to create or build a web page

Markup Language

A language that uses tags to annotate the information in a document

Tag

The syntactic element in a markup language that annotate the information in a document



HTML and CSS (2 of 9)

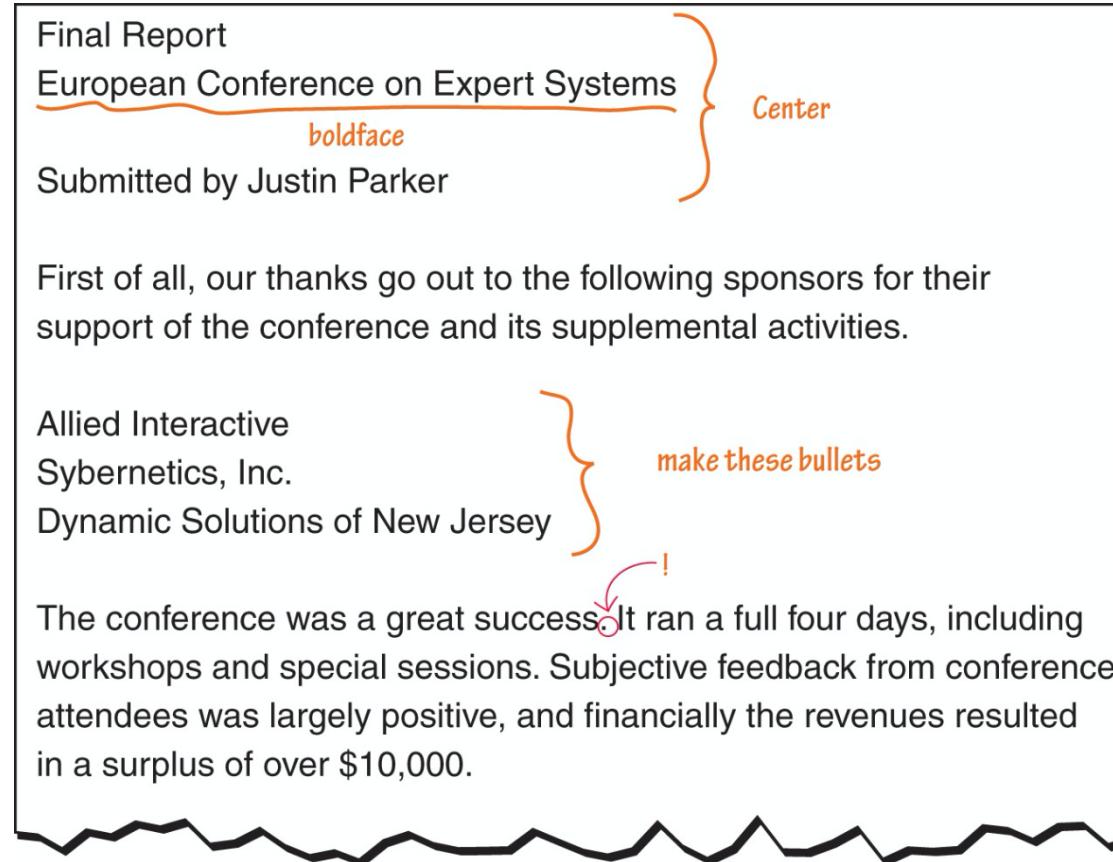
Final Report
European Conference on Expert Systems
boldface

Submitted by Justin Parker

First of all, our thanks go out to the following sponsors for their support of the conference and its supplemental activities.

Allied Interactive
Sybernetics, Inc.
Dynamic Solutions of New Jersey

The conference was a great success! It ran a full four days, including workshops and special sessions. Subjective feedback from conference attendees was largely positive, and financially the revenues resulted in a surplus of over \$10,000.



A marked-up document



HTML and CSS (3 of 9)

HTML5

- Current version of the HTML standard
- Released in 2012
- Supported by all major browsers
- Doing web development? Focus on HTML5.



HTML and CSS

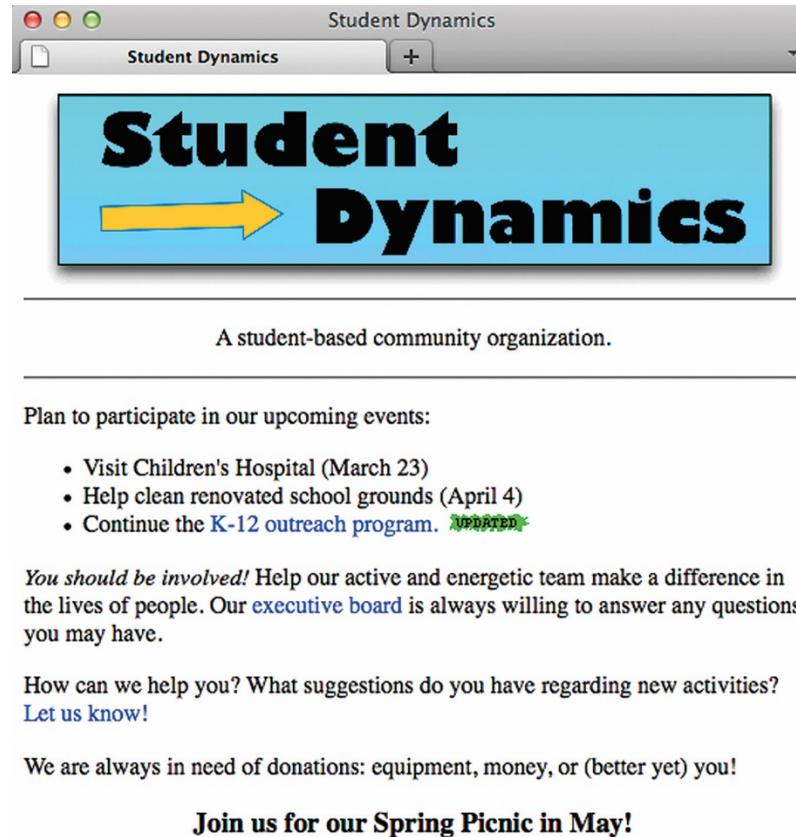
(4 of 9)

In a modern, well-designed webpage:

- HTML tags indicate what the information is
 - Paragraph
 - Image
 - List
 - Etc.
- CSS style information indicates how information should be displayed
 - Alignment
 - Borders
 - Background colors
 - Etc.



HTML and CSS (5 of 9)



The screenshot shows a Firefox browser window with a single tab titled "Student Dynamics". The main content area features a large blue header with the text "Student Dynamics" in bold black font, separated by a yellow arrow pointing right. Below the header is a horizontal line. Underneath the line, the text "A student-based community organization." is displayed. Another horizontal line follows. A section titled "Plan to participate in our upcoming events:" contains a bulleted list:

- Visit Children's Hospital (March 23)
- Help clean renovated school grounds (April 4)
- Continue the K-12 outreach program. [Learn more](#)

Below this, a paragraph reads: "You should be involved! Help our active and energetic team make a difference in the lives of people. Our [executive board](#) is always willing to answer any questions you may have." A question follows: "How can we help you? What suggestions do you have regarding new activities? [Let us know!](#)" At the bottom, the text "We are always in need of donations: equipment, money, or (better yet) you!" is followed by a call to action: "Join us for our Spring Picnic in May!"

Courtesy of John Lewis.

The Student Dynamics web page as displayed in Firefox



HTML and CSS (6 of 9)

```
<!DOCTYPE HTML>
<html>
<head>
    <title>Student Dynamics</title>
    <style type="text/css">
        img.banner {display:block; margin:auto;}
        a:link {color:#0000FF; text-decoration:none;}
        a:visited {color:#00FF00; text-decoration:none;}
        a:hover {color:#FF00FF; text-decoration:underline;}
    </style>
</head>
<body>
    
    <hr />
    <p style="text-align:center;">A student-based community organization.</p>
    <hr />
    <p>Plan to participate in our upcoming events:</p>
    <ul>
        <li>Visit Children's Hospital (March 23)</li>
        <li>Help clean renovated school grounds (April 4)</li>
        <li>Continue the <a href="outreach.html">K-12 outreach program.</a>
            </li>
    </ul>
    <p><em>You should be involved!</em> Help our active and energetic team make
        a difference in the lives of people. Our <a href="execBoard.html">
        executive board</a> is always willing to answer any questions you may
        have.</p>
    <p>How can we help you? What suggestions do you have regarding new
        activities? <a href="suggestions.html">Let us know!</a></p>
    <p>We are always in need of donations: equipment, money, or (better yet)
        you!</p>
    <h3 style="text-align:center;">Join us for our Spring Picnic in May!</h3>
</body>
</html>
```



HTML and CSS

(7 of 9)

Tags are enclosed in angle brackets
(`<...>`)

Words such as `head`, `title`, and `body` are called **elements** and specify the type of the tag

Most elements consist of a start tag such as `<body>` and a corresponding end tag with a `/` before the element name, such as `</body>`



HTML and CSS

(8 of 9)

HTML Document Structure

- Entire document enclosed between `<html>` and `</html>`
- The head section (within `<head> ... </head>`) contains information about the document itself, such as its title
- The body section (within `<body> ... </body>`) contains the information to be displayed



HTML and CSS

(9 of 9)

- The browser
 - Uses HTML tags together with CSS style information to determine how page should be displayed
 - Ignores the way we format the HTML document using carriage returns, extra spaces, and blank lines
 - Takes into account the width and height of the browser window
 - Reformats the contents to fit your browser window



Basic HTML Elements

`<p> ... </p>` text that should be treated as a separate paragraph

`<hr />` horizontal rule across page

`...` unordered list (usually bullets)

`...` ordered list (e.g., numbered)

`...` list item

`<h1>...</h1>` level 1 heading

...

`<h6>...</h6>` level 6 heading



Tag Attributes

Attribute

Part of a tag that provides additional information about the element

Form

attribute-name=value

Examples

CSS style specification

style="text-align:center"

Image source file

Hyperlink URL

Google It!



More About CSS (1 of 2)

Cascading

Styles can be specified at multiple levels and overridden at lower levels as needed

- In an external file

```
p {color:#00FF00;}
```

- In the head section of the HTML document:

```
<head>
```

```
...
<style type="text/css">
  p {color:#00FF00; }
</style>
```

```
...
</head>
```

- As an attribute of an HTML element:

```
<p style="text-align:center">This text is centered!<p>
```



More About CSS (2 of 2)

In the Student Dynamics example, the following style tag is used in the head section of the document:

```
<style type="text/css">
    img.banner {display:block; margin:auto; }
    a:link {color:#0000FF; text-decoration:none; }
    a:visited {color:#00FF00; text-decoration:none; }
    a:hover {color:#FF00FF; text-
decoration:underline; }
</style>
```

- First rule: Applies to all `img` tags that have a `class` attribute with the value `banner`. Setting the margins to `auto` centers the image horizontally
- Second rule: An unvisited link is shown in blue text with no underline.
- Third rule: A visited link is shown in green with no underline.
- Fourth rule: When the mouse hovers over a link, the link text turns purple with an underline.



HTML5 (1 of 2)

Other tags in HTML5

`<section>` to define section of pages

`<header>` to define the header of a page

`<footer>` to define the footer of a page

`<nav>` to define the navigation elements on a page

`<article>` to define an article or primary content of a page

`<aside>` to define secondary content that might appear in a sidebar

`<figure>` to define images that annotate an article



HTML5 (2 of 2)

- Support for dynamic content (e.g., drop down menus)
- `async` attribute: Content is loaded asynchronously to improve download speed
- Tags supporting form input (e.g. times, dates, ranges, email addresses, URLs)



Java Applets (1 of 2)

Java Applet

A Java program designed to be embedded into an HTML document, transferred over the Web, and executed in a browser

```
<P><APPLET code = "FactByte.class" width=250  
height=150></APPLET></P>
```



Java Applets (2 of 2)

Example

Contents of FactByte.htm:

<H1>Factorial with Byte Result</H1>

<P>Enter increasing values beginning with 0 and record the results of the Factorial of your input. At some point, the answer will seem strange. Record what seems strange about the answer and return to the previous page. </P>

<P><HR></P>

<P><APPLET code = "FactByte.class" width=250 height=150></APPLET></P>

FactByte.class
contains the
Java applet



Java Applets, Flash
& Silverlight... RIP



Java Server Pages (1 of 3)

JSP Scriptlet

A portion of code embedded in an HTML document designed to dynamically contribute to the content of the web page

Java Server Page

A web page that has a JSP scriptlet interwoven among the HTML content



Java Server Pages (2 of 3)

A JSP scriptlet is encased in special tags beginning with <% and ending with %>

Imagine JSP scriptlets as having the expressive power of a full programming language

```
<H3>
<%
    out.println ("hello there");
%
</H3>
```



Java Server Pages (3 of 3)

JSPs are executed on the server side where the web page resides

By the time it arrives at your computer, all active processing has taken place, producing a static (though dynamically created) web page

JSPs are particularly good for coordinating the interaction between a web page and an underlying database

Compare and contrast Java applets and JSP scriptlets



Node.js (JavaScript), Python,
PHP, Java Servlets, & .NET (C#)



XML (1 of 4)

Extensible Markup Language (XML)

A language that allows the user to describe the content of a document

- HTML describes how a document should look
- XML describes a document's meaning

Metalanguage

A language for talking about, or defining, other languages

XML is a metalanguage



XML (2 of 4)

```
<?xml version="1.0" ?>
<!DOCTYPE books SYSTEM "books.dtd">
<books>
  <book>
    <title>The Hobbit</title>
    <authors>
      <author>J. R. R. Tolkien</author>
    </authors>
    <publisher>Ballantine</publisher>
    <pages>287</pages>
    <isbn>0-345-27257-9</isbn>
    <price currency="USD">7.95</price>
  </book>
  <book>
    <title>A Beginner's Guide to Bass Fishing</title>
    <authors>
      <author>J. T. Angler</author>
      <author>Ross G. Clearwater</author>
    </authors>
    <publisher>Quantas Publishing</publisher>
    <pages>750</pages>
    <isbn>0-781-40211-7</isbn>
    <price currency="USD">24.00</price>
  </book>
</books>
```

Like HTML, an XML document is made up of tagged data

An XML document containing data about books



XML (3 of 4)

Document Type Definition (DTD)

A specification of the organization of the document

The structure of a particular XML document is described by its corresponding DTD document

```
<!ELEMENT books (book*)>
<!ELEMENT book (title, authors, publisher, pages, isbn, price)>
<!ELEMENT authors (author+)>
<!ELEMENT title (#PCDATA)>
<!ELEMENT author (#PCDATA)>
<!ELEMENT publisher (#PCDATA)>
<!ELEMENT pages (#PCDATA)>
<!ELEMENT isbn (#PCDATA)>
<!ELEMENT price (#PCDATA)>
<!ATTLIST price currency CDATA #REQUIRED>
```

The DTD document corresponding to the XML books document

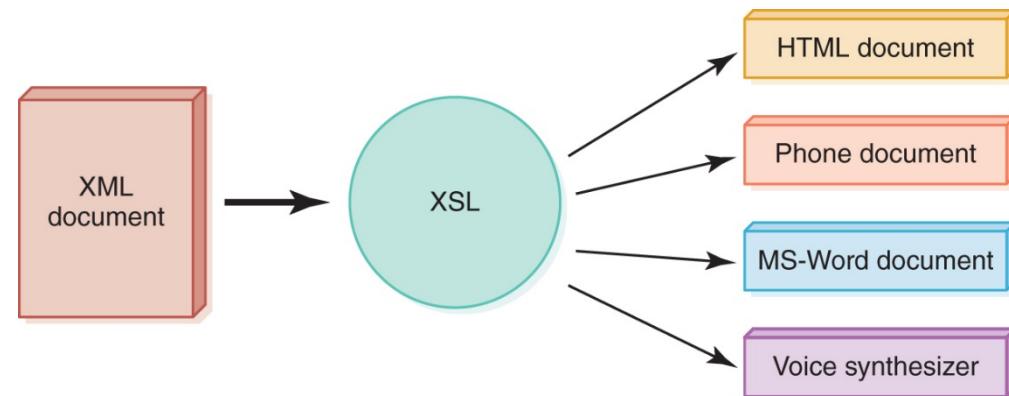


XML (4 of 4)

XML represents a standard format for organizing data without tying it to any particular type of output

Extensible Stylesheet Language (or XSL)

A language for defining transformations from XML documents to other output formats



An XML document can be transformed into many output formats



JSON



Social Networks

Social Network

An online service that allows people with shared interest to communicate and interact

- A few of the many: Facebook, Twitter, LinkedIn, Pinterest, Tumblr, Instagram
- Pre-Facebook history of online social networks includes BBS's, Classmates.com, SixDegrees.com, MySpace, LinkedIn
- Broader social network concept: Sociological model of how individuals or organizations interact
 - Network can be viewed as map of interactions
 - Research began in 1800s (e.g., to model spread of new ideas and practices, diseases, and formation of emotional clusters)
 - Stanley Milgram's study in 1967 showed the chain of social acquaintances to connect any two people to be about six steps, leading to the famous phrase



Chapter 16 Lecture

