2.1 Origins and Evolution of HTML

- HTML was defined with SGML

- Original intent of HTML: General layout of documents that could be displayed by a wide variety of computers

- Recent versions:
  - HTML 4.0 – 1997
    - Introduced many new features and deprecated many older features

  - HTML 4.01 - 1999 - A cleanup of 4.0

  - XHTML 1.0 - 2000
    - Just 4.01 defined using XML, instead of SGML

  - XHTML 1.1 – 2001
    - Modularized 1.0, and drops frames

  - Although the value of the consistent and coherent syntax rules of XHTML were widely recognized and accepted, its draconian error handling was not, so XHTML documents are served as HTML

  - W3C worked on XHTML 2.0; WHAT worked on a new version of HTML

2.1 Origins and Evolution of HTML

(continued)

- In 2009, XHTML 2.0 was stopped; W3C took over development of HTML5
- Reasons to use XHTML syntax rules:
  1. HTML has lax syntax rules, leading to sloppy and sometimes to ambiguous documents
     - XHTML syntax is much more strict, leading to clean and clear documents in a standard form
  2. HTML processors do not even enforce the few syntax rule that do exist in HTML
  3. The syntactic correctness of XHTML documents can be validated
- In this book, HTML5 is used, but with XHTML syntax rules

2.2 Basic Syntax

- Elements are defined by tags (markers)
  - Tag format:
    - Opening tag: <name>
    - Closing tag: </name>
- The opening tag and its closing tag together specify a container for the *content* they enclose

2.2 Basic Syntax (continued)

- Not all tags have content
  - If a tag has no content, its form is `<name />`

- The container and its content together are called an *element*

- If a tag has attributes, they appear between its name and the right bracket of the opening tag

- Comment form: `<!-- ... -->`

- Browsers ignore comments, unrecognized tags, line breaks, multiple spaces, and tabs

- Tags are suggestions to the browser, even if they are recognized by the browser

- In XHTML, element and attribute names must be in all lowercase letters

- In HTML, they can be any combination of uppercase and lowercase

2.3 Standard XHTML Document Structure

- Every XHTML document must begin with:

```
<!DOCTYPE html>
```

- `<html>`, `<head>`, `<title>`, and `<body>` are required in every document (in XHTML, not HTML)

- The whole document must have `<html>` as its root

- `html` must have the `lang` attribute:

```
<html lang = "en">
```
(this one is for English)

- A document consists of a head and a body

- The `<title>` tag is used to give the document a title, which is normally displayed in the browser's window title bar (at the top of the display)

- The `meta` tag is used to provide the character set used

```
<meta charset = "utf-8" />
```


2.4 Basic Text Markup

- Text is normally placed in paragraph elements

- *Paragraph Elements*

  - The `<p>` tag breaks the current line and inserts a blank line - the new line gets the beginning of the content of the paragraph
  - The closing tag is required in XHTML, not in HTML

```
<!DOCTYPE html>
<!-- greet.html
     A trivial document
     -->
<html lang = "en">
  <head>
    <title> Our first document </title>
    <meta charset = "utf-8" />
  </head>
  <body>
    <p>
      Greetings from your Webmaster!
    </p>
  </body>
</html>
```


2.4 Basic Text Markup (continued)

- Line breaks

  - The effect of the `<br />` tag is the same as that of `<p>`, except for the blank line (in HTML, it could be just <br>)
  - No closing tag!

- Example of paragraphs and line breaks

```
On the plains of hesitation <p> bleach the
bones of countless millions </p> <br />
who, at the dawn of victory <br /> sat down
to wait, and waiting, died.
```

- Typical display of this text:

```
On the plains of hesitation

bleach the bones of countless millions
who, at the dawn of victory
sat down to wait, and waiting, died.
```

- *Preserving whitespace*

  - The text content of a `<pre>` element is displayed as it is entered

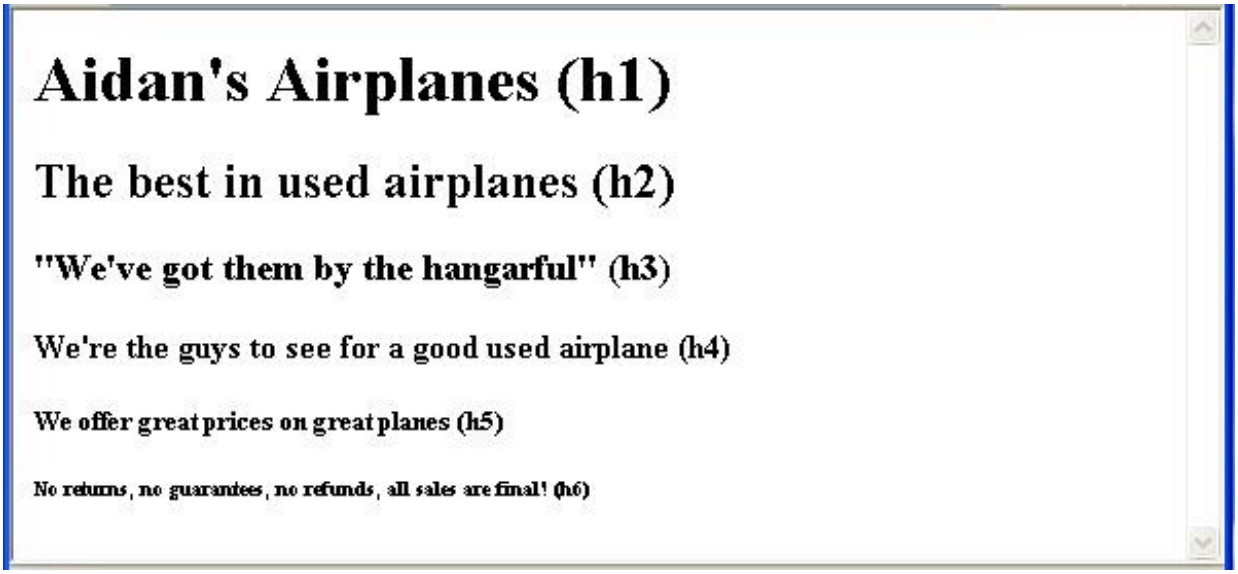
2.4 Basic Text Markup (continued)

- ***Headings***

  - Six sizes, 1 - 6, specified with `<h1>` to `<h6>`
  - 1, 2, and 3 use font sizes that are larger than the default font size
  - 4 uses the default size
  - 5 and 6 use smaller font sizes

```
<!DOCTYPE html>
<!-- headings.html
     An example to illustrate headings
     -->
<html lang = "en">
  <head>
    <title> Headings </title>
    <meta charset = "utf-8" />
  </head>
  <body>
    <h1> Aidan's Airplanes (h1) </h1>
    <h2> The best in used airplanes (h2) </h2>
    <h3> "We've got them by the hangarful" (h3)
    </h3>
    <h4> We're the guys to see for a good used
         airplane (h4) </h4>
    <h5> We offer great prices on great planes
         (h5) </h5>
    <h6> No returns, no guarantees, no refunds,
         all sales are final (h6) </h6>
  </body>
</html>
```


2.4 Basic Text Markup (continued)



- **Blockquotes**
  - **Content of `<blockquote>`**
  - **To set a block of text off from the normal flow and appearance of text**
  - **Browsers often indent, and sometimes italicize**

- ***Font Styles and Sizes (can be nested)***
  - **Emphasis - `<em>` (often set in italics)**
  - **Strong - `<strong>` (often set in boldface)**
  - **Monospace - `<code>` (often set in Courier)**

2.4 Basic Text Markup (continued)

- `<em>`, `<strong>`, and `<code>` are not affected if they appear in the content of a `<blockquote>`, unless there is a conflict (e.g., `<em>` (italics))

- ***Superscripts and subscripts***

  - Subscripts with `<sub>`
  - Superscripts with `<sup>`

  Example: `x<sub>2</sub><sup>3</sup>`

  Display: x_2^3

- Inline versus block elements

  - Block elements CANNOT be nested in inline elements (in XHTML)

2.4 Basic Text Markup (continued)

- All of this font size and font style stuff can be done with style sheets, but these tags are not yet deprecated

- *Character Entities*

Char.	*Entity*	*Meaning*
&	`&`	Ampersand
<	`<`	Less than
>	`>`	Greater than
"	`&quot;`	Double quote
'	`&apos;`	Single quote
¼	`&frac14;`	One quarter
½	`&frac12;`	One half
¾	`&frac34;`	Three quarters
°	`&deg;`	Degree
(space)	` `	Non-breaking space

- Horizontal rules
  - `<hr />` draws a line across the display, after a line break

2.5 Images

- Formats:

  - GIF (Graphic Interchange Format)
    - 8-bit color (256 different colors)

  - JPEG (Joint Photographic Experts Group)
    - 24-bit color (16 million different colors)

    - Both use compression, but JPEG compression is better

  - Portable Network Graphics (PNG)
    - Relatively new
    - Should eventually replace both gif and jpeg
    - Files are bigger than jpeg – no lost data!

  - Images are inserted into a document with the `<img />` tag with the `src` attribute

    - The `alt` attribute is required by XHTML
      - Purposes:
        1. Non-graphical browsers
        2. Browsers with images turned off

```
<img src = "comets.jpg"
     alt = "Picture of comets" />
```

- The `<img>` tag has 30 different attributes, including `width` and `height` (in pixels)

2.5 Images (continued)

```
<!DOCTYPE html>
<!-- image.html
     An example to illustrate an image
     -->
<html lang = "en">
  <head>
    <title> Images </title>
    <meta charset = "utf-8" />
  </head>
  <body>
    <h1> Aidan's Airplanes </h1>
    <h2> The best in used airplanes </h2>
    <h3> "We've got them by the hangarful"
    </h3>
    <h2> Special of the month </h2>
    <p>
      1960 Cessna 210 <br />
      577 hours since major engine overhaul
      <br />
      1022 hours since prop overhaul
      <br /><br />
      <img src = "c210new.jpg"
           alt = "Picture of a Cessna 210"/>
      <br />
      Buy this fine airplane today at a
      remarkably low price <br />
      Call 999-555-1111 today!
    </p>
  </body>
</html>
```


2.5 Images (continued)

Aidan's Airplanes

The best in used airplanes

"We've got them by the hangarful"

Special of the month

1960 Cessna 210
577 hours since major engine overhaul
1022 hours since prop overhaul

Buy this fine airplane today at a remarkably low price
Call 999-555-1111 today!

2.5 Images (continued)

- HTML Validation
  - Replace `DOCTYPE` with:

```
<!DOCTYPE html PUBLIC "//W3C XHTML 1.0 Strict//EN"
  "http://www.w3.org/TR/xhtml11/DTD/xhtml1-strict.dtd"
```

  - Replace `xmlns` value in the `html` element with:

" http://www.w3.org/1999/xhtml "

  - Comment out the `meta` element

  - Download the validation tool from:

`http://totalValidator.com`

    - Use it on the document

2.6 Hypertext Links

- Hypertext is the essence of the Web!

- A link is specified with the `href` (*h*ypertext *ref*erence) attribute of `<a>` (the anchor tag)

  - The content of `<a>` is the visual link in the document

2.6 Hypertext Links (continued)

```
<!DOCTYPE html>
<!-- link.html
     An example to illustrate a link
     -->
<html lang = "en">
  <head>
    <title> Links </title>
    <meta charset = "utf-8" />
  </head>
  <body>
    <h1> Aidan's Airplanes </h1>
    <h2> The best in used airplanes </h2>
    <h3> "We've got them by the hangarful"
    </h3>
    <h2> Special of the month </h2>
    <p>
      1960 Cessna 210 <br />
      <a href = "C210data.html">
        Information on the Cessna 210 </a>
    </p>
  </body>
</html>
```


2.6 Hypertext Links (continued)

Aidan's Airplanes

The best in used airplanes

"We've got them by the hangarful"

Special of the month

1960 Cessna 210
Information on the Cessna 210

1960 Cessna 210 Information

577 hours since major engine overhaul
622 hours since prop overhaul

Buy this fine airplane today at a remarkably low price
Call 999-555-1111 today!

2.6 Hypertext Links (continued)

- If the target is not at the beginning of the document, the target spot must be marked

- Target labels can be defined in many different tags with the `id` attribute, as in

```
<h1 id = "baskets"> Baskets </h1>
```

- The link to an `id` must be preceded by a pound sign (#); If the `id` is in the same document, this target could be

```
<a href = "#baskets">
                What about baskets? </a>
```

- If the target is in a different document, the document reference must be included

```
<a href = "myAd.html#baskets”> Baskets </a>
```

- Links can have images:

```
<a href = "c210data.html">
  <img src = "smallplane.jpg"
    alt = "Small picture of an airplane" />
      Info on C210 </a>
```


2.7 Lists

- ***Unordered lists***

  - **The list is the content of the `<ul>` tag**

  - **List elements are the content of the `<li>` tag**

```
<h3> Some Common Single-Engine Aircraft </h3>
<ul>
  <li> Cessna Skyhawk </li>
  <li> Beechcraft Bonanza </li>
  <li> Piper Cherokee </li>
</ul>
```

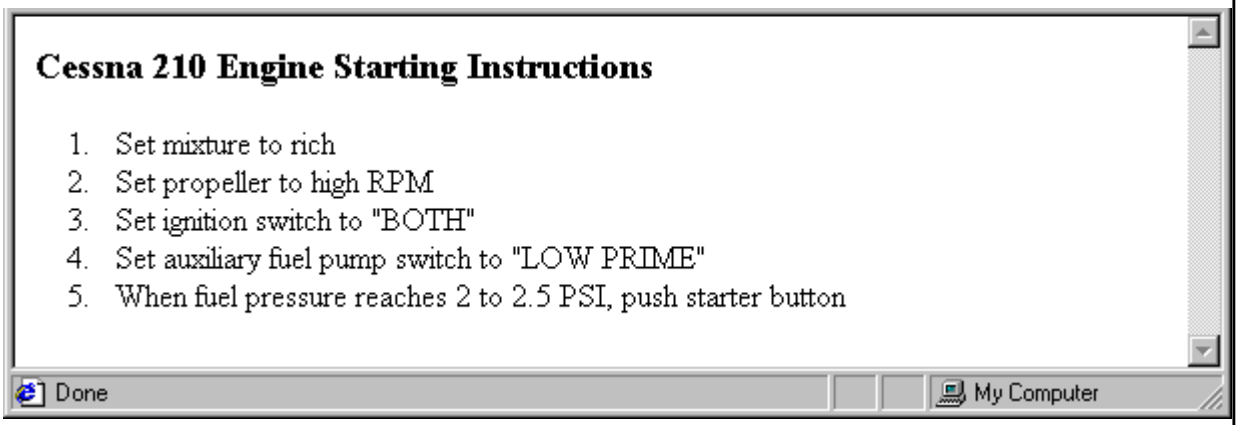
- ***Ordered lists***

  - **The list is the content of the `<ol>` tag**

  - **Each item in the display is preceded by a sequence value**

2.7 Lists (continued)

```
<h3> Cessna 210 Engine Starting Instructions
</h3>
<ol>
  <li> Set mixture to rich </li>
  <li> Set propeller to high RPM </li>
  <li> Set ignition switch to "BOTH" </li>
  <li> Set auxiliary fuel pump switch to
       "LOW PRIME" </li>
  <li> When fuel pressure reaches 2 to 2.5
       PSI, push starter button </li>
</ol>
```



- ***Nested lists***

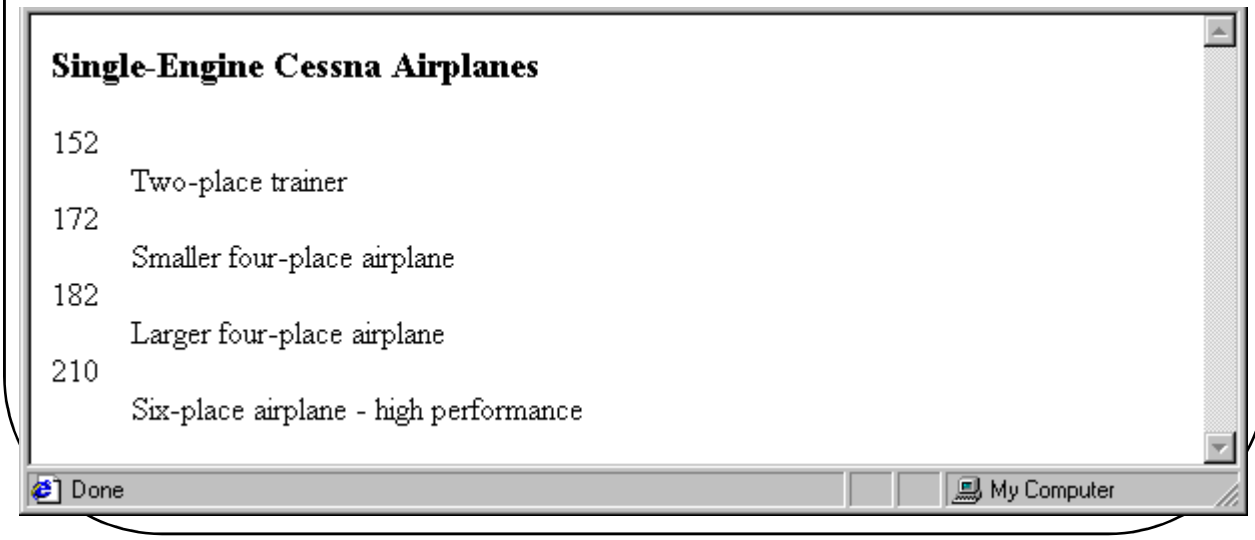
  - **Any type list can be nested inside any type list**

  - **The nested list must be in a list item**

2.7 Lists (continued)

- *Definition lists (for glossaries, etc.)*
  - List is the content of the `<dl>` tag
  - Terms being defined are the content of the `<dt>` tag
  - The definitions themselves are the content of the `<dd>` tag

```
<h3> Single-Engine Cessna Airplanes </h3>
<dl >
  <dt> 152 </dt>
  <dd> Two-place trainer </dd>
  <dt> 172 </dt>
  <dd> Smaller four-place airplane </dd>
  <dt> 182 </dt>
  <dd> Larger four-place airplane </dd>
  <dt> 210 </dt>
  <dd> Six-place airplane - high performance
  </dd>
</dl>
```



2.8 Tables

- A table is a matrix of cells, each possibly having content

  - The cells can include almost any element

- A table is specified as the content of a `<table>` tag

- In HTML5, tables do not have lines between the rows or between the columns
  - We can add those with Cascading Style Sheets, as will be discussed in Chapter 3

- Tables are given titles with the `<caption>` tag, which can immediately follow `<table>`

2.8 Tables (continued)

- Each row of a table is specified as the content of a `<tr>` tag

- The row headings are specified as the content of a `<th>` tag

- The contents of a data cell is specified as the content of a `<td>` tag

```
<table>
<caption> Fruit Juice Drinks </caption>
  <tr>
    <th> </th>
    <th> Apple </th>
    <th> Orange </th>
    <th> Screwdriver </th>
  </tr>
  <tr>
    <th> Breakfast </th>
    <td> 0 </td>
    <td> 1 </td>
    <td> 0 </td>
  </tr>
  <tr>
    <th> Lunch </th>
    <td> 1 </td>
    <td> 0 </td>
    <td> 0 </td>
  </tr>
</table>
```


2.8 Tables (continued)

	Fruit Juice Drinks		
	Apple	**Orange**	**Screwdriver**
Breakfast	0	1	0
Lunch	1	0	0
Dinner	0	0	1

- A table can have two levels of column labels

  - If so, the `colspan` attribute must be set in the `<th>` tag to specify that the label must span some number of columns

```
<tr>
  <th colspan = "3"> Fruit Juice Drinks </th>
</tr>
<tr>
  <th> Orange </th>
  <th> Apple </th>
  <th> Screwdriver </th>
</tr>
```

Fruit Juice Drinks		
Apple	**Orange**	**Screwdriver**

2.8 Tables (continued)

- If the rows have labels and there is a spanning column label, the upper left corner must be made larger, using `rowspan`

```
<table>
  <tr>
    <td rowspan = "2"> </td>
    <th colspan = "3"> Fruit Juice Drinks
    </th>
  </tr>
  <tr>
    <th> Apple </th>
    <th> Orange </th>
    <th> Screwdriver </th>
  </tr>
    ...
</table>
```

Fruit Juice Drinks and Meals

	Fruit Juice Drinks		
	Apple	**Orange**	**Screwdriver**
Breakfast	0	1	0
Lunch	1	0	0
Dinner	0	0	1

2.8 Tables (continued)

- *Table Sections*
  - Header, body, and footer, which are the elements: `thead`, `tbody`, and `tfoot`
  - If a document has multiple `tbody` elements, they are separated by thicker horizontal lines

- *Uses of Tables*
  - In the past, tables were used to align elements in rows and columns – general layout
  - That use of tables is now frowned upon
  - Use Cascading Style Sheets to place elements in rows and columns – general layout
  - Use tables only when the information is naturally tabular

2.9 Forms

- A form is the usual way information is gotten from a browser user to a server

- HTML has tags to create a collection of objects that implement this information gathering

  - The objects are called *widgets* or *controls* or *components*
    (e.g., radio buttons and checkboxes)

- When the *Submit* button of a form is clicked, the form's values are sent to the server for processing

- All of the widgets, or components of a form are defined in the content of a `<form>` tag

  - The only required attribute of `<form>` is `action`, which specifies the URL of the application that is to be called when the *Submit* button is clicked (XHTML requires it; HTML does not)

```
action =
  http://www.cs.ucp.edu/cgi-bin/survey.pl
```


2.9 Forms (continued)

- The `method` attribute of `<form>` specifies one of the two possible techniques of transferring the form data to the server, `get` and `post`
  - The default is `get`

- *Widgets*

  - Many are created with the `<input>` tag

    - The `type` attribute of `<input>` specifies the kind of widget being created

    1. Text

       - Creates a horizontal box for text input

       - Default size is 20; it can be changed with the `size` attribute

2.9 Forms (continued)

- If you don't want to allow the user to type more characters than will fit, set `maxlength`, which causes excess input to be ignored

```
<input type = "text" name = "Phone"
       size = "12" />
```

- Widgets should be placed in label elements

```
<label> Phone: <input type = "text"
                      name = "phone" />
</label>
```

2. *Password* – just like text except asterisks are displayed, rather than the input characters

3. *Checkboxes* - to collect multiple choice input

   - Every checkbox requires a `value` attribute, which is the widget's value in the form data when the checkbox is 'checked'

   - To initialize a checkbox to 'checked', the `checked` attribute must be set to `"checked"`

2.9 Forms (continued)

- *Widgets* (continued)

```
Grocery Checklist
<form action = "">
  <p>
  <label> <input type = "checkbox"  name ="groceries"
                value = "milk"  checked = "checked" />
   Milk </label>
  <label> <input type = "checkbox"  name ="groceries"
                 value = "bread" />
   Bread </label>
  <label> <input type = "checkbox"  name = "groceries"
                 value= "eggs" />
   Eggs </label>
  </p>
</form>
```

4. *Radio Buttons* - collections of checkboxes in which only one button can be 'checked' at a time
   - Every button in a radio button group MUST have the same name

2.9 Forms (continued)

- *Widgets* (continued)

4. *Radio Buttons* (continued)

    - If no button in a radio button group is 'pressed', the browser often 'presses' the first one

```
Age Category
<form action = "">
  <p>
  <label> <input type = "radio"  name = "age"
   value = "under20" checked = "checked" />
    0-19 </label>
  <label> <input type = "radio"  name = "age"
         value = "20-35" /> 20-35 </label>
  <label> <input type = "radio"  name = "age"
         value = "36-50" /> 36-50 </label>
  <label> <input type = "radio"  name = "age"
         value = "over50" /> Over 50 </label>
  </p>
</form>
```


2.9 Forms (continued)

- *Widgets* (continued)

5. The `<select>` tag

- There are two kinds of menus, those that behave like checkboxes and those that behave like radio buttons (the default)
  - Menus that behave like checkboxes are specified by including the `multiple` attribute, which must be set to `"multiple"`
- The `name` attribute of `<select>` is required
- The `size` attribute of `<select>` can be included to specify the number of menu items to be displayed (the default is 1)

2.9 Forms (continued)

- *Widgets* (continued)

5. `<select>` (continued)

- Each item of a menu is specified with an `<option>` tag, whose pure text content (no tags) is the value of the item

- An `<option>` tag can include the `selected` attribute, which when assigned `"selected"` specifies that the item is preselected

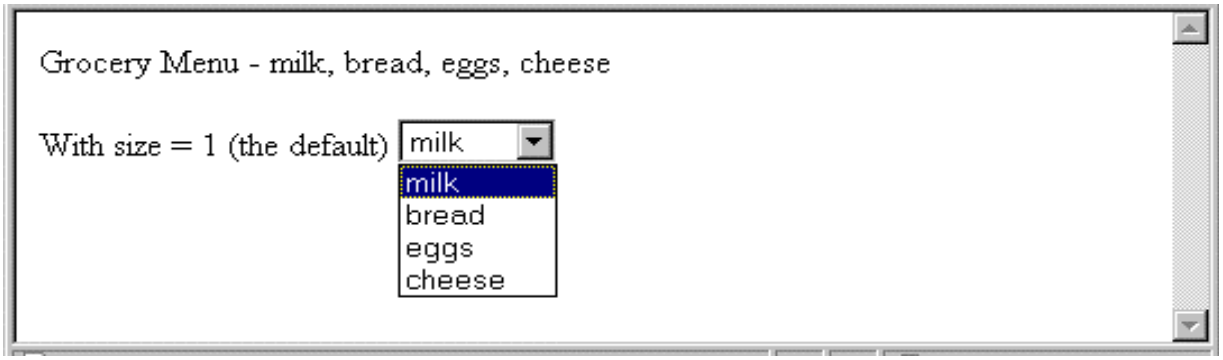
```
Grocery Menu – milk, bread, eggs, cheese

<form action = "">
  <p>
    With size = 1 (the default)
    <select name = "groceries">
      <option> milk </option>
      <option> bread </option>
      <option> eggs </option>
      <option> cheese </option>
    </select>
  </p>
</form>
```


2.9 Forms (continued)

- *Widgets* (continued)

- After clicking the menu:



- After changing `size` to 2:

2.9 Forms (continued)

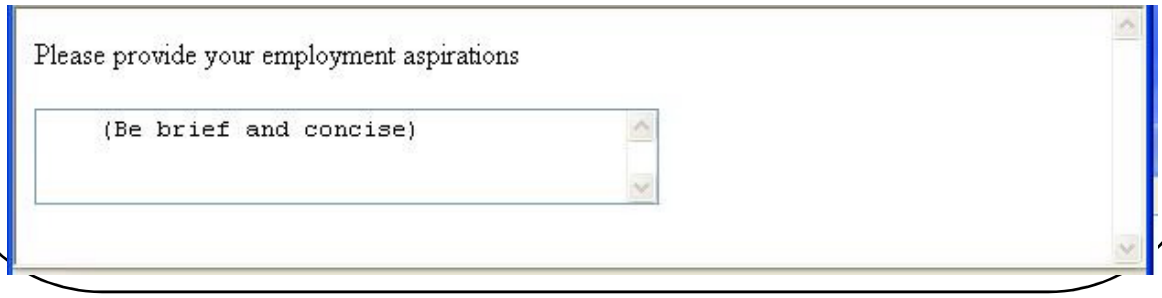
- *Widgets* (continued)

6. Text areas - created with `<textarea>`

- Usually include the `rows` and `cols` attributes to specify the size of the text area

```
Please provide your employment aspirations

<form action = "">
   <p>
   <textarea name = "aspirations"  rows = "3"
             cols = "40">
   (Be brief and concise)
   </textarea>
   </p>
</form>
```



2.9 Forms (continued)

- *Widgets* (continued)

7. Reset and Submit buttons

- Both are created with `<input>`

```
<input type = "reset"
       value = "Reset Form" />
<input type = "submit"
       value = "Submit Form" />
```

- Submit has two actions:

1. Encode the data of the form

2. Request that the server execute the server-resident program specified as the value of the `action` attribute of `<form>`

- A Submit button is required in every form

→SHOW `popcorn.html` and display it

2.10 HTML5

- Using HTML5 is a bit premature, because there are still many browsers in use that do not support it

- Code can be included in a document to detect HTML5 features and produce a message to the user – This is covered in Chapter 4

- The `audio` Element

  - Prior to HTML5, a plug-in was required to play sound while a document was being displayed

  - Audio encoding algorithms are called *audio codecs* – e.g., MP3, Vorbis

  - Coded audio data is stored in containers—e.g., Ogg, MP3, and Wav (file name extension indicates the container, not the audio code)

    - Vorbis code is stored in Ogg containers

    - MP3 code is stored in MP3 containers

    - Wav code is stored in Wav containers

2.10 HTML5 (continued)

- The `audio` Element (continued)
  - General syntax:

```
<audio attributes>
   <source src = "filename1" >
   ...
   <source src = "filenamen" >

Your browser does not support the audio
element
</audio>
```

  - Browser chooses the first audio file it can play and skips the content; if none, it displays the content

  - Different browsers have different audio capabilities

  - The controls attribute, which is set to `controls"`, creates a start/stop button, a clock, a progress slider, total time of the file, and a volume slider

2.10 HTML5 (continued)

- The `audio` Element (continued)

```
<!DOCTYPE html>
<!- audio.html
    Test the audio element
    -->
<html lang = "en" >
  <head>
    <title> Test audio element </title>
    <meta charset = "utf-8" />
  </head>
  <body>
    This is a test of the audio element
    <audio controls = "controls" >
      <source src = "nineoneone.ogg" />
      <source src = "nineoneone.wav" />
      <source src = "nineoneone.mp3" />
    Your browser does not support the audio
     element
    </audio>
  </body>
</html>
```


2.10 HTML5 (continued)

- The `video` Element

  - Prior to HTML5, there was no standard way to play video clips while a document was being displayed

  - Video codecs are stored in containers

  - Video codecs:
    H.264 (MPEG-4 AVC) – can be stored in an MPEG-4 container
    Theora – can be stored in any container
    VP8—can be stored in any container

  - Different browsers support different codecs

  - The `width` and `height` attributes set the screen size

  - The `autoplay` attribute, set to `"autoplay"`, specifies that the video should play as soon as it is ready

  - The `preload` attribute, set to `"preload"`, specifies that the video should be loaded as soon as the document is loaded

  -The `controls` attribute, set to `"controls"`, is like that of the `audio` element

2.10 HTML5 (continued)

- The `video` Element (continued)

```
<!DOCTYPE html>
<!-- testvideo.html
     test the video element
     -->
<html lang = "en">
  <head>
    <meta charset = "UTF-8" />
    <title> test video element </title>
  </head>
  <body>
    This is a test of the video element.....
    <video width = "600" height = "500"
           autoplay = "autoplay"
           controls = "controls"
           preload = "preload">
      <source src = "NorskTippingKebab.mp4" />
      <source src = "NorskTippingKebab.ogv" />
      <source src = "NorskTippingKebab.webm" />
      Your browser does not support the video
      element
    </video>
  </body>
</html>
```


2.10 HTML5 (continued)

- Organizational Elements
  - Header Elements
    - `hgroup` – a container for header information

```
<hgroup>
  <header>
    <h1> The Podunk Press </h1>
    <h2> "All the news we can fit" </h2>
  </header>
  -- table of contents -
</hgroup>
```

  - Footer Elements
    - `footer` – a container for footer information

```
<footer>
  &copy; The Podunk Press, 2012
  <br />
  Editor in Chief: Squeak Martin
</footer>
```

- The `section` Element – a container for sections
- The `article` Element – a container for self-contained part of a document (from another source)
- The `aside` Element – a container for tangential info
- The `nav` Element – navigation sections (list of links)

2.10 HTML5 (continued)

- The `time` Element
  - For putting a time stamp on a document
  - Two parts, text and machine-readable (`datetime`)
  - `datetime` attribute (optional) – the machine-readable part
    - Date part: 4-digit year, a dash, 2-digit month, a dash, 2-digit day of the month (`"2012-08-29"`)
    - Time (optional) format: `T09:00`
  - Text part is given as the content of `time`

```
<time datetime = "2012-08-29T09:00">
   August 8, 2012 9:00 am
</time>
```

  - The two parts need not specify the same date
  - Deficiencies:
    1. Dates prior to the Christian era are not possible
    2. No approximations

2.11 Syntactic Differences between HTML & XHTML

- Case sensitivity
- Closing tags
- Quoted attribute values
- Explicit attribute values
- `id` and `name` attributes
- Element nesting

