WEB TECHNOLOGIES
A COMPUTER SCIENCE PERSPECTIVE

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# Chapter 2
# Markup Languages: XHTML 1.0

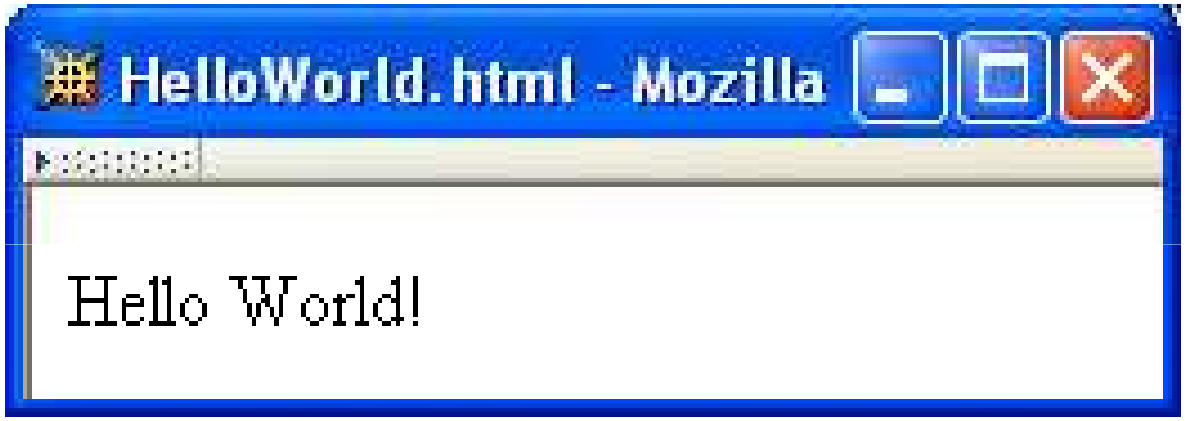
# HTML “Hello World!”

Document Type Declaration

Document Instance

```
<!DOCTYPE html
        PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
        "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>
      HelloWorld.html
    </title>
  </head>
  <body>
    <p>
      Hello World!
    </p>
  </body>
</html>
```

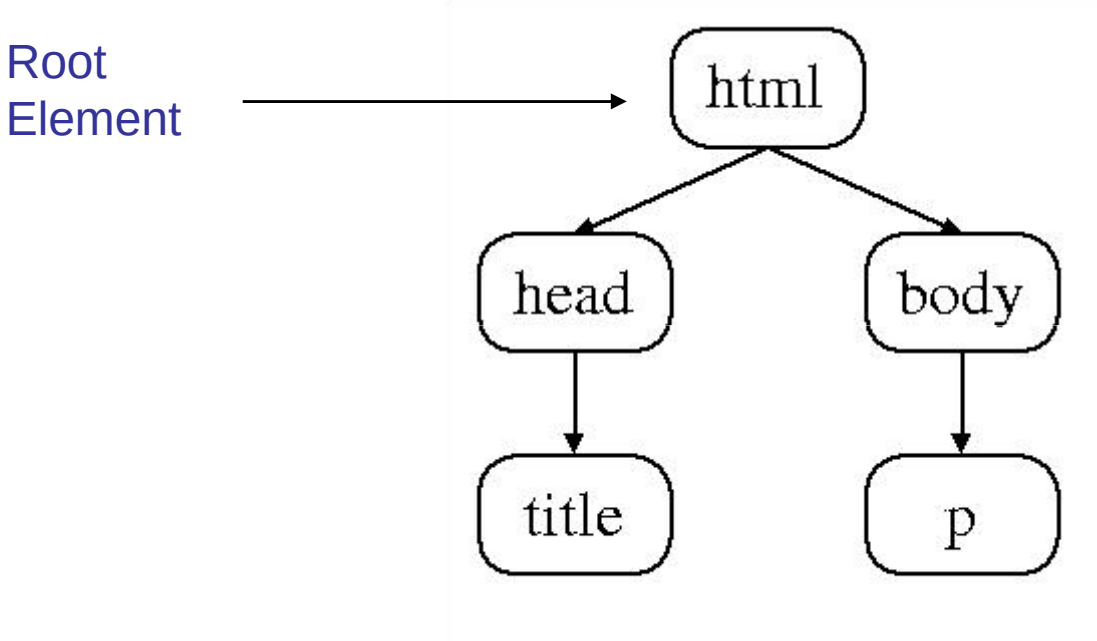
# HTML “Hello World”



# HTML Tags and Elements

- Any string of the form < … > is a *tag*
- All tags in document instance of Hello World are either end tags (begin with </) or start tags (all others)
  - Tags are an example of markup, that is, text treated specially by the browser
  - Non-markup text is called character data and is normally displayed by the browser
- String at beginning of start/end tag is an element name
- Everything from start tag to matching end tag, including tags, is an element
  - Content of element excludes its start and end tags

# HTML Element Tree



# HTML Root Element

- Document type declaration specifies name of root element:
  `<!DOCTYPE html`
- Root of HTML document must be `html`
- XHTML 1.0 (standard we will follow) requires that this element contain `xmlns` attribute specification (name/value pair)

# HTML head and body Elements

- The `body` element contains information displayed in the browser client area
- The `head` element contains information used for other purposes by the browser:
  - title (shown in title bar of browser window)
  - scripts (client-side programs)
  - style (display) information
  - etc.

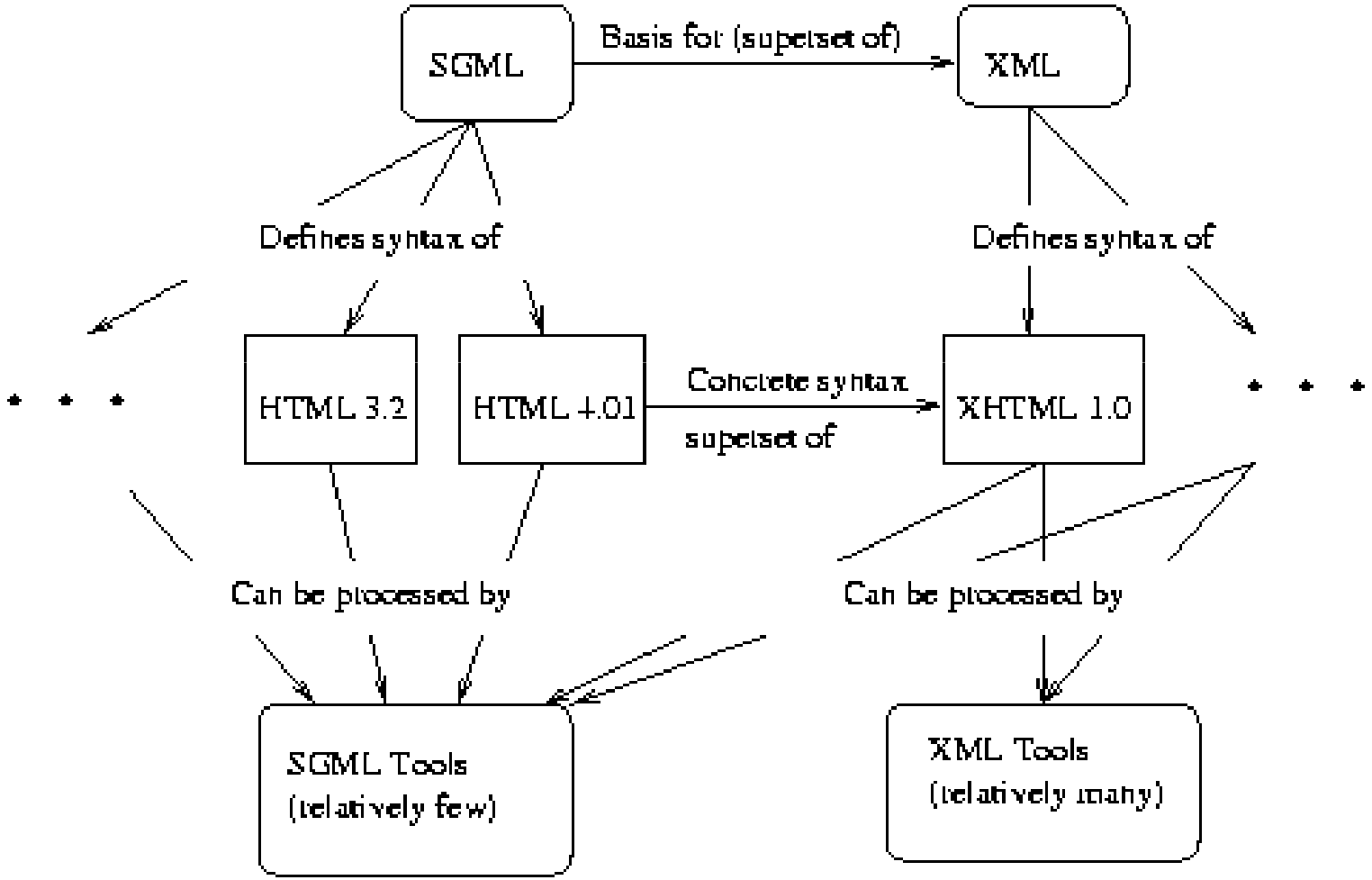
# HTML History

- 1990: HTML invented by Tim Berners-Lee
- 1993: Mosaic browser adds support for images, sound, video to HTML
- 1994-~1997: “Browser wars” between Netscape and Microsoft, HTML defined operationally by browser support
- ~1997-present: Increasingly, World-Wide Web Consortium (W3C) recommendations define HTML

# HTML Versions

- HTML 4.01 (Dec 1999) syntax defined using Standard Generalized Markup Language (SGML)
- XHTML 1.0 (Jan 2000) syntax defined using Extensible Markup Language (XML)
- Primary differences:
  - HTML allows some tag omissions (e.g., end tags)
  - XHTML element and attribute names are lower case (HTML names are case-insensitive)
  - XHTML requires that attribute values be quoted

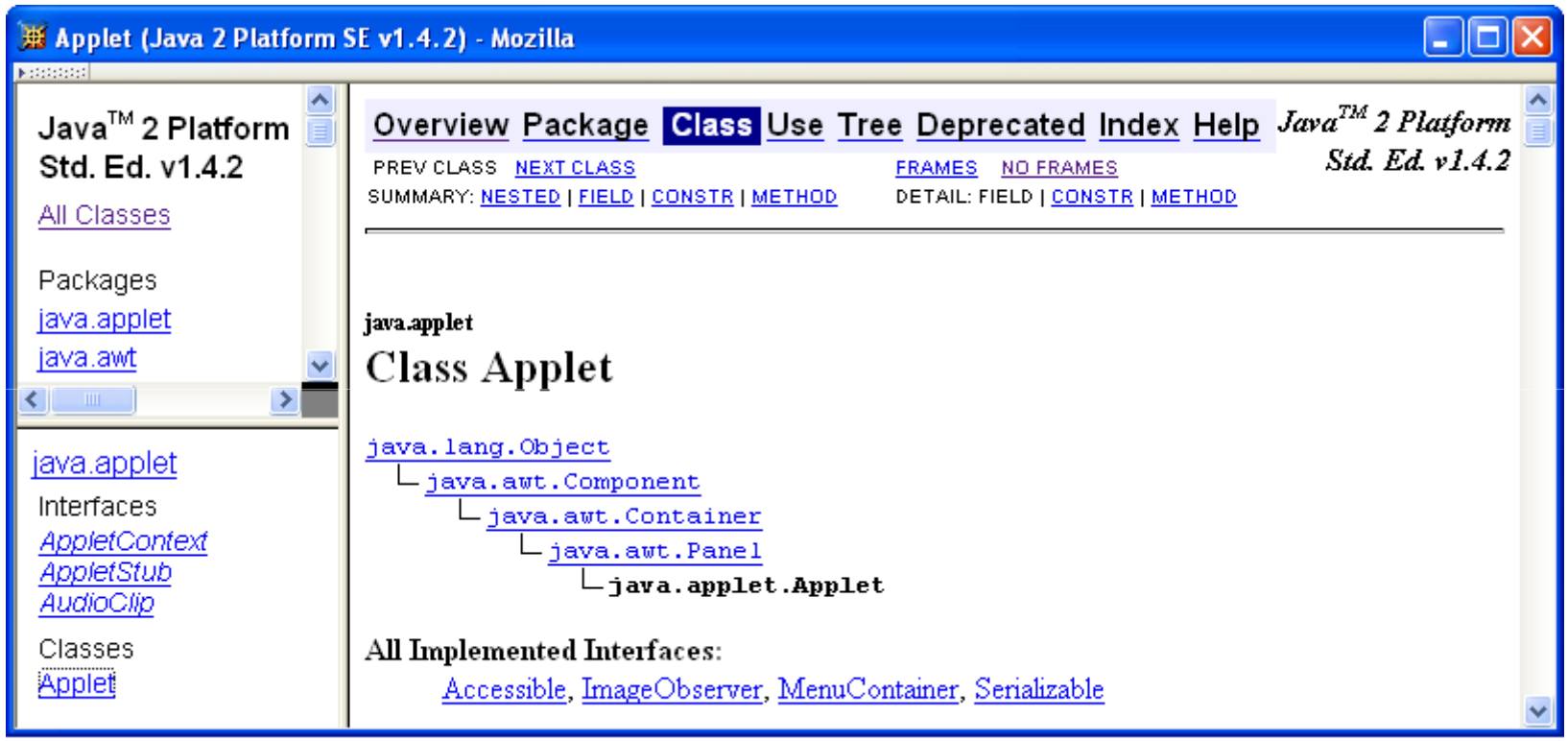
# SGML and XML



# HTML “Flavors”

- For HTML 4.01 and XHTML 1.0, the document type declaration can be used to select one of three “flavors”:
  - Strict: W3C ideal
  - Transitional: Includes deprecated elements and attributes (W3C recommends use of *style sheets* instead)
  - Frameset: Supports frames (subwindows within the client area)

# HTML Frameset



# HTML Document Type Declarations

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

- XHTML 1.0 Frameset:
  <!DOCTYPE html
  PUBLIC "-//W3C//DTD XHTML 1.0 Frameset//EN“
  "http://www.w3.org/TR/xhtml1/DTD/xhtml1-frameset.dtd">

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

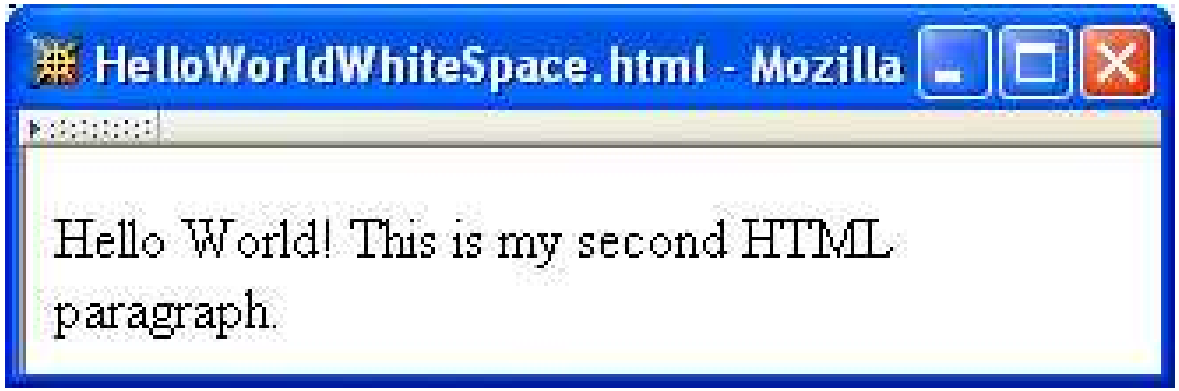
# XHTML White Space

- Four white space characters: carriage return, line feed, space, horizontal tab
- Normally, character data is normalized:
  - All white space is converted to space characters
  - Leading and trailing spaces are trimmed
  - Multiple consecutive space characters are replaced by a single space character

# XHTML White Space

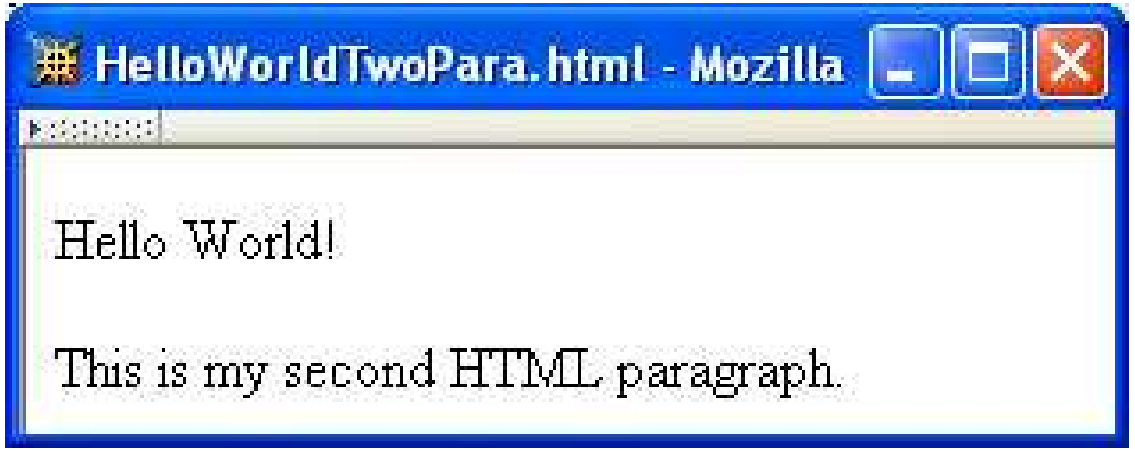
```
<body>
  <p>
    Hello World!

    This is my second HTML paragraph.
  </p>
</body>
```



# XHTML White Space

```
<p>
  Hello World!
</p>
<p>
  This is my second HTML paragraph.
</p>
```



# Unrecognized HTML Elements

```
<!DOCTYPE htnl
        PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
        "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<htnl xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <titl>
      HelloWorldBadElt.html
    </title>
  </head>
  <body>
    <p>
      Hello World!
    </p>
  </body>
</html>
```

Misspelled element name

# Unrecognized HTML Elements

`title` character data

Belongs here

# Unrecognized HTML Elements

`title` character data

Displayed here

# Unrecognized HTML Elements

- Browsers ignore tags with unrecognized element names, attribute specifications with unrecognized attribute names
  - Allows evolution of HTML while older browsers are still in use
- Implication: an HTML document may have errors even if it displays properly
- Should use an HTML validator to check syntax

# HTML References

- Since < marks the beginning of a tag, how do you include a < in an HTML document?
- Use markup known as a reference
- Two types:
  - Character reference specifies a character by its Unicode code point
    - For <, use < or < or <
  - Entity reference specifies a character by an HTML-defined name
    - For <, use <

# HTML References

TABLE 2.2: Example entity and character references.

| Character | Entity Reference | Character Reference (decimal) |
|---|---|---|
| < | < | < |
| > | > | > |
| & | & | & |
| " | " | " |
| ' | ' | ' |
| © | © | © |
| ñ | ñ | ñ |
| α | α | α |
| ∀ | ∀ | ∀ |

# HTML References

- Since < and & begin markup, within character data or attribute values these characters must ***always*** be represented by references (normally `<` and `&`)
- Good idea to represent > using reference (normally `>`)
  - Provides consistency with treatment of <
  - Avoids accidental use of the reserved string `]]>`

# HTML References

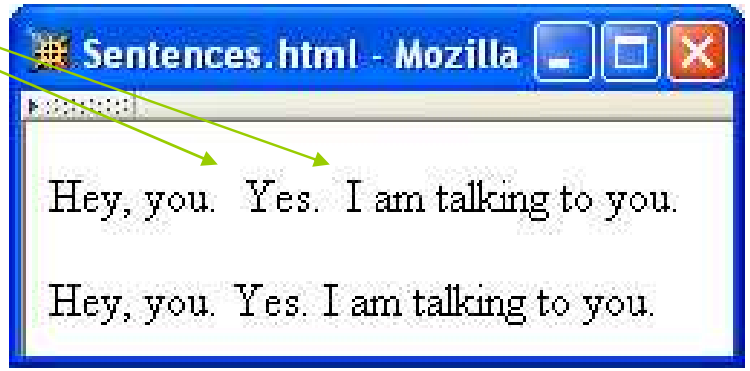
- Non-breaking space ( ` ` ) produces space but counts as part of a word
  - Ex: keep together keep together …

# HTML References

- Non-breaking space often used to create multiple spaces (not removed by normalization)

```
<p>
  Hey, you.  Yes.  I am talking to you.
</p>
<p>
  Hey, you.  Yes.  I am talking to you.
</p>
```

  + space displays as two spaces

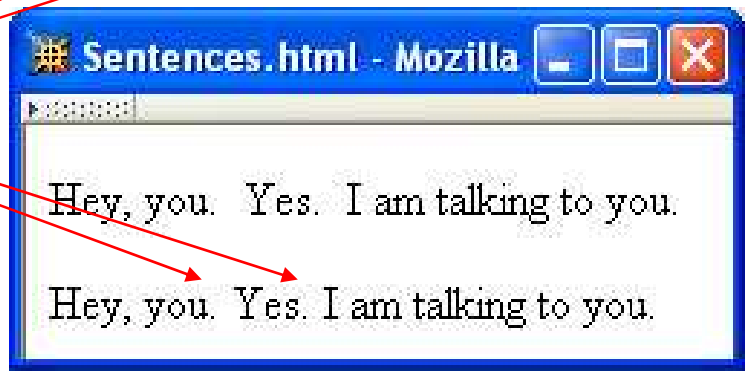


# HTML References

- Non-breaking space often used to create multiple spaces (not removed by normalization)

```
<p>
  Hey, you.  Yes.  I am talking to you.
</p>
<p>
  Hey, you.  Yes.  I am talking to you.
</p>
```

two spaces display as one



# XHTML Attribute Specifications

- Example:

```
<html xmlns="http://www.w3.org/1999/xhtml" lang="en" xml:lang="en">
```

- Syntax:
  - Valid attribute names specified by HTML recommendation (or XML, as in xml:lang)
  - Attribute values must be quoted (matching single or double quotes)
  - Multiple attribute specifications are space-separated, order-independent

# XHTML Attribute Values

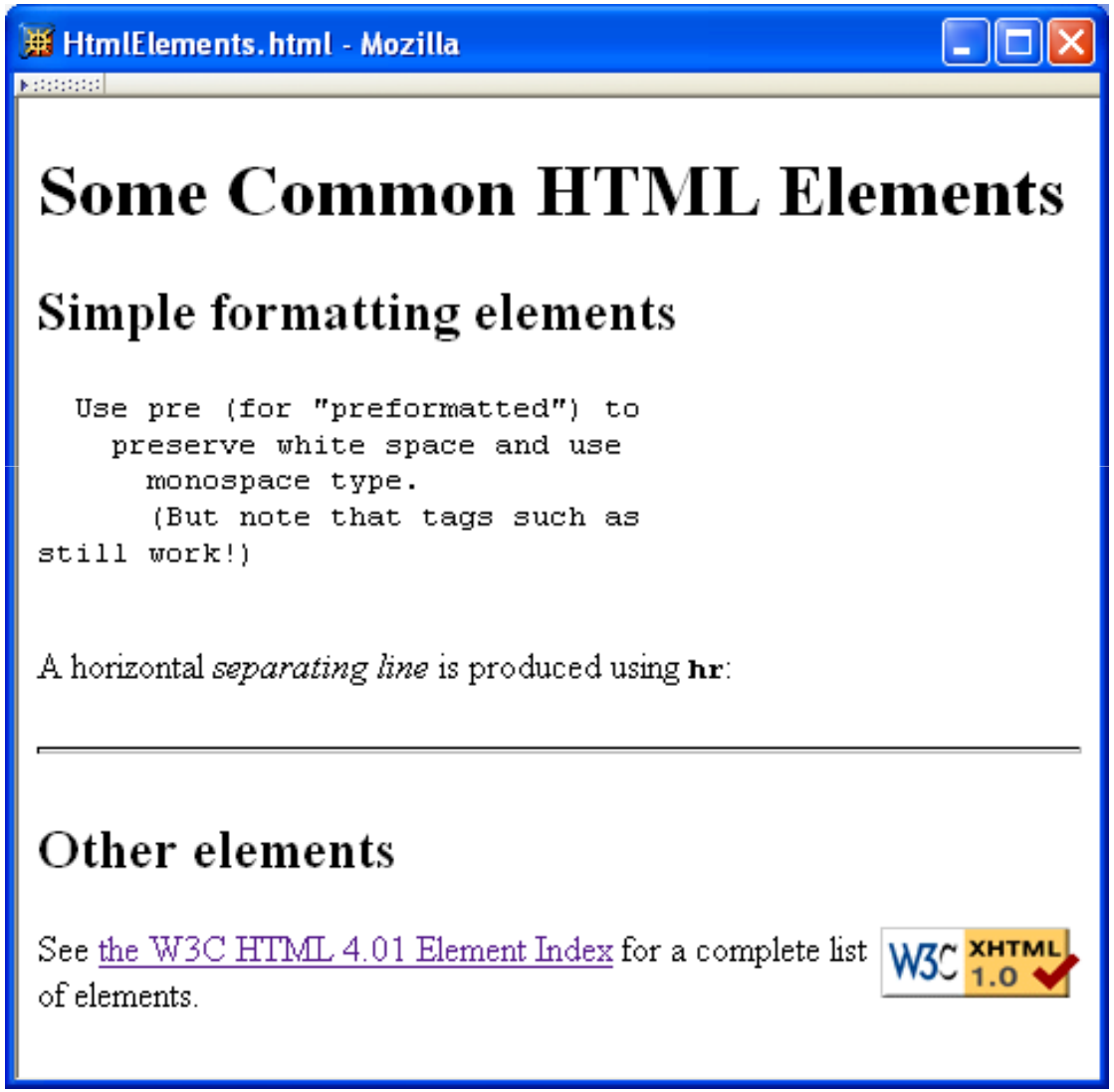
- Can contain embedded quotes or references to quotes



```
value = "Ain't this grand!"
value = "He said, &quot;She said&quot;, then sighed."
value = "He said, "She said", then sighed."
```

- May be normalized by browser
  - Best to normalize attribute values yourself for optimal browser compatibility

# Common HTML Elements



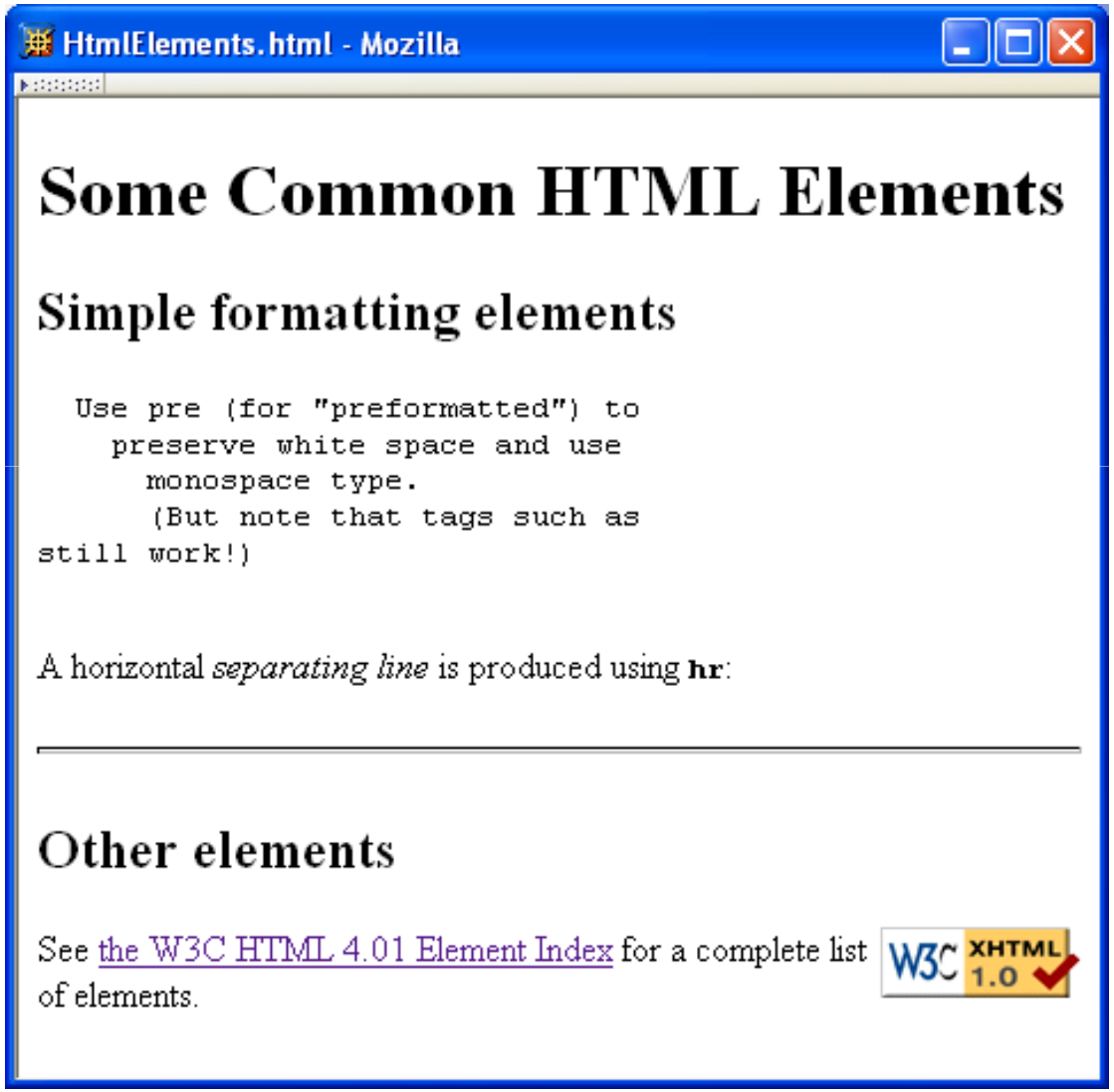
# Common HTML Elements

- Headings are produced using h1, h2, …, h6 elements:

```
<h1>
  Some Common HTML Elements
</h1>
<h2>
  Simple formatting elements
</h2>
```

- Should use h1 for highest level, h2 for next highest, etc.
  - Change style (next chapter) if you don't like the "look" of a heading

# Common HTML Elements



# Common HTML Elements

- Use `pre` to retain format of text and display using monospace font:

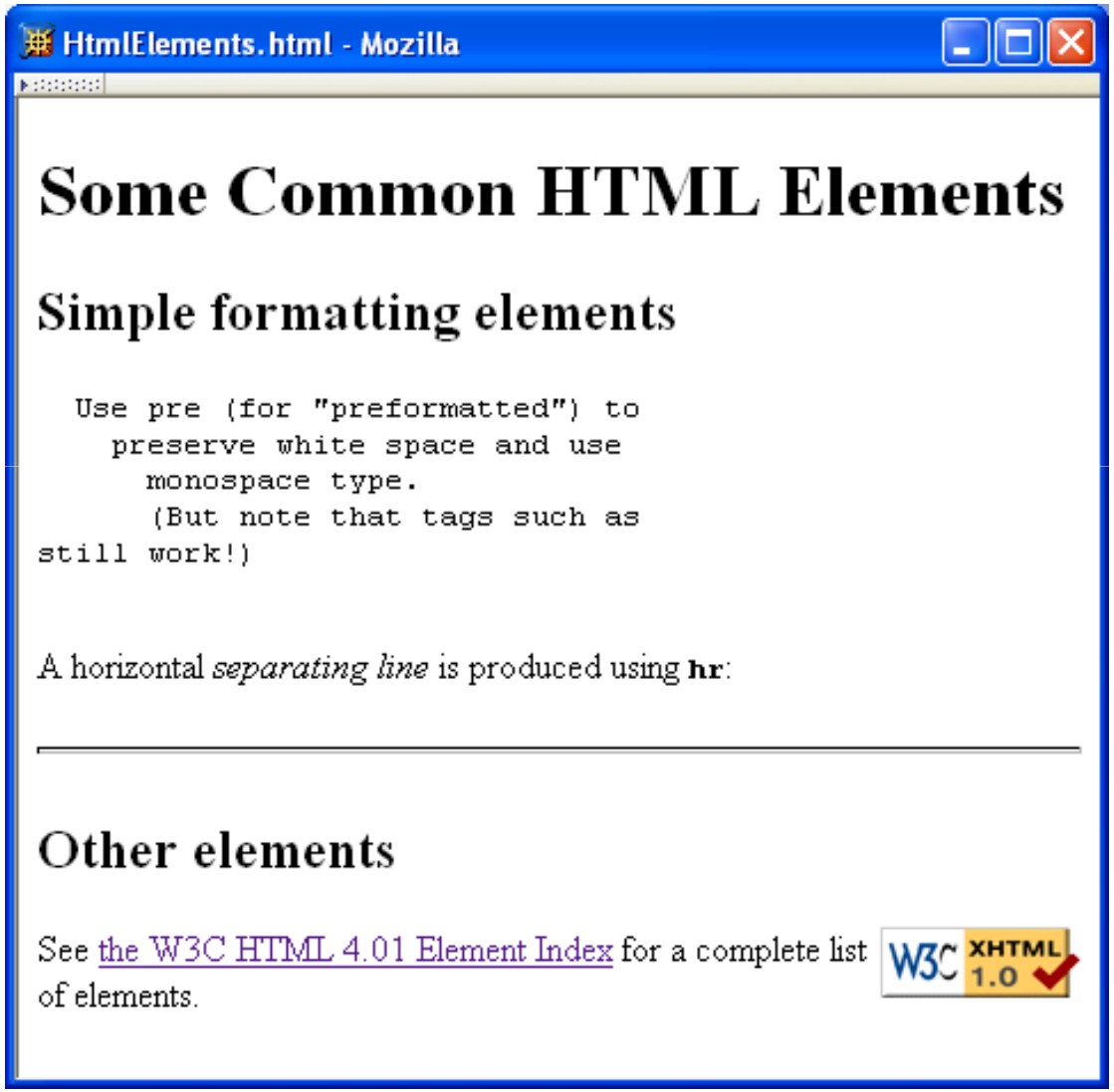
```
  <pre>
Use pre (for "preformatted") to
  preserve white space and use
    monospace type.
    (But note that tags such as<br />still work!)
  </pre>
```

- Note that any embedded markup (such as `<br />`) is still treated as markup!

# Common HTML Elements

- `br` element represents line break
- `br` is example of an empty element, i.e., element that is not allowed to have content
- XML allows two syntactic representations of empty elements
  - Empty tag syntax <br /> is recommended for browser compatibility
  - XML parsers also recognize syntax <br></br> (start tag followed immediately by end tag), but many browsers do not understand this for empty elements

# Common HTML Elements



# Common HTML Elements

- Text can be formatted in various ways:
  - Apply style sheet technology (next chapter) to a span element (a styleless wrapper):

```
<span style="font-style:italic">separating line</span>
```

  - Use a phrase element that specifies semantics of text (not style directly):

```
<strong>hr</strong>
```

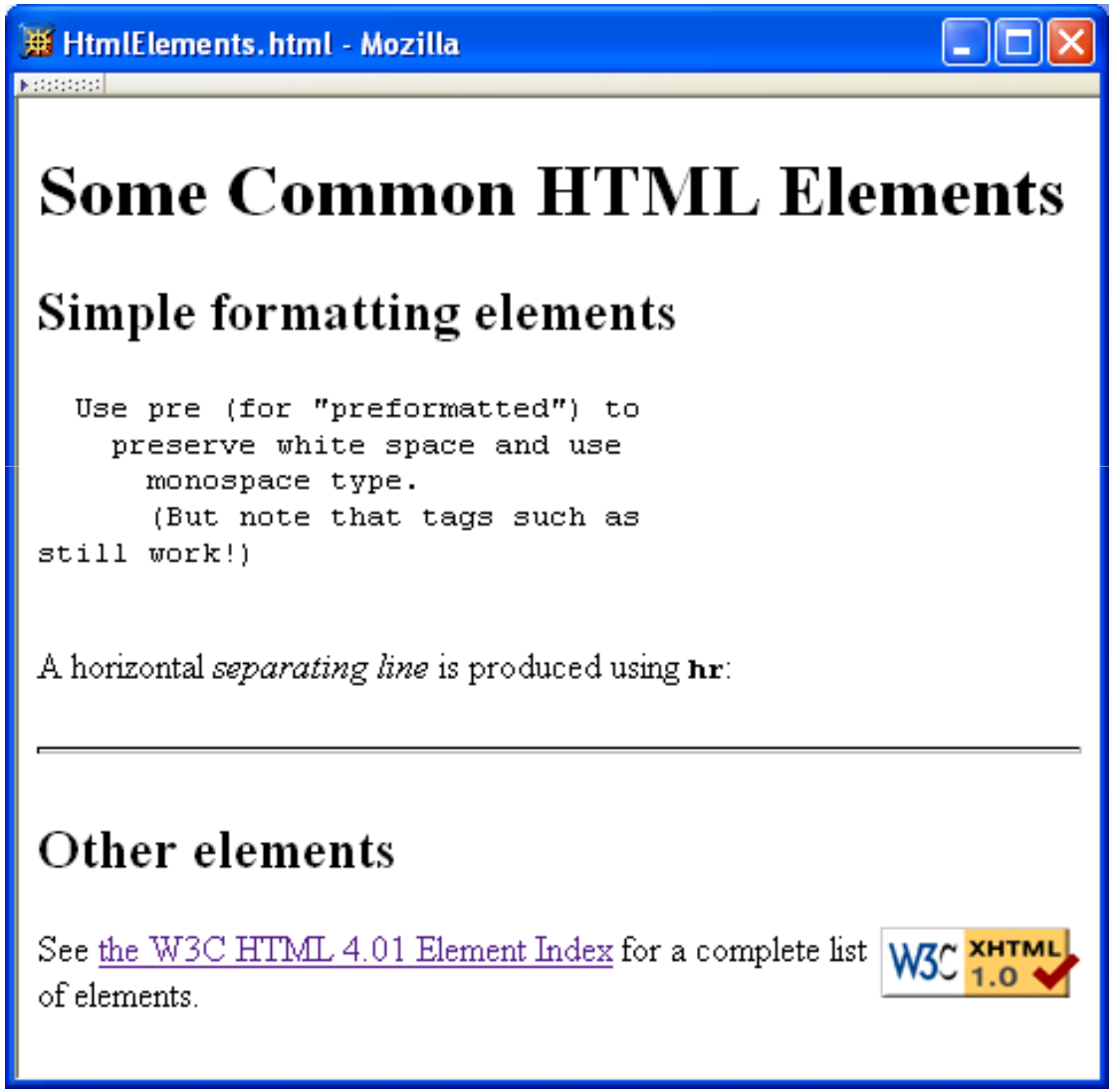
  - Use a font style element
    - Not recommended, but frequently used

# Common HTML Elements

TABLE 2.3: HTML font style elements.

| Element | Font used by content |
|---|---|
| b | Bold-face |
| i | Italic |
| tt | "Teletype" (fixed-width font) |
| big | Increased font size |
| small | Decreased font size |

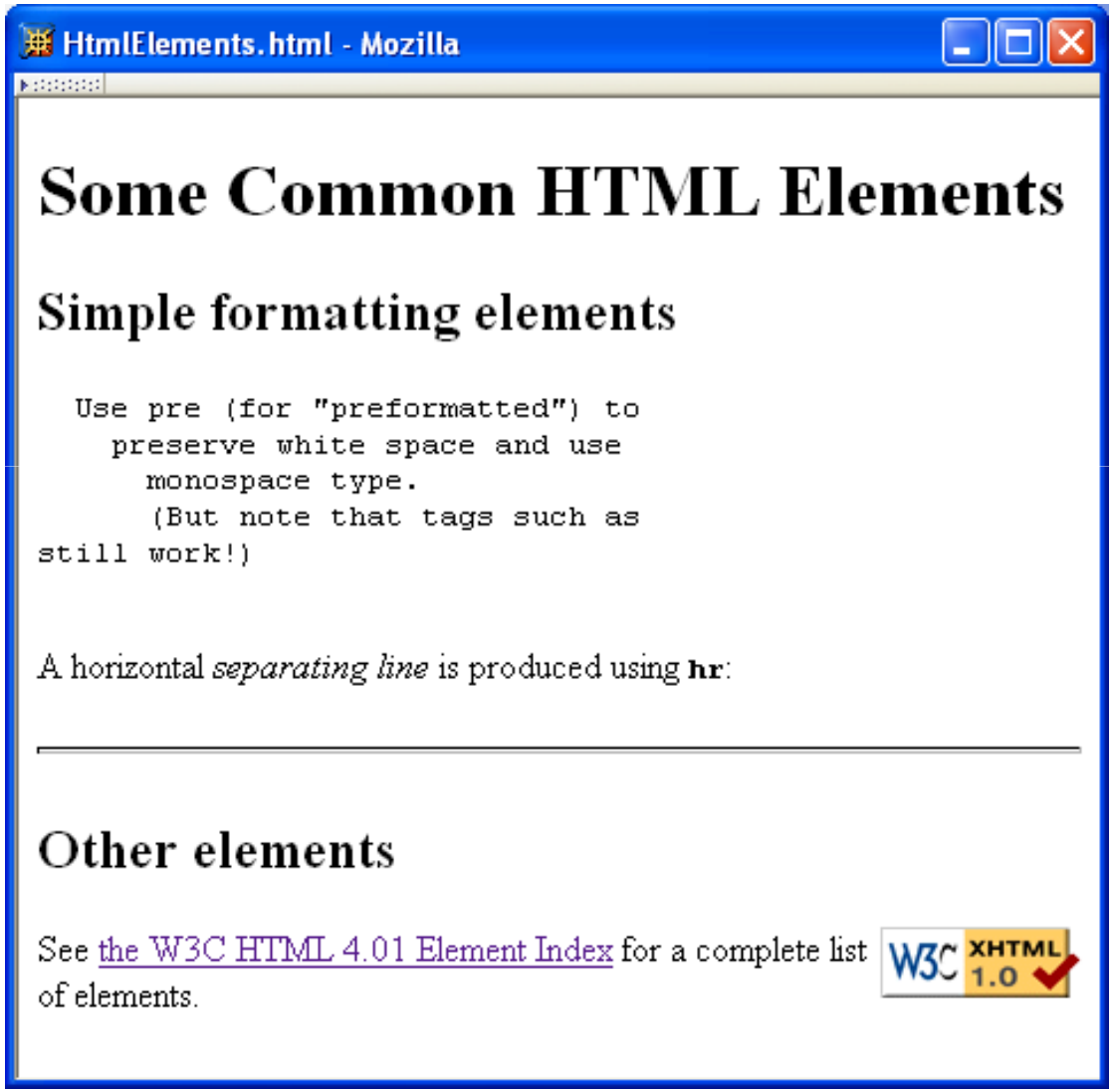
# Common HTML Elements



# Common HTML Elements

- Horizontal rule is produced using `hr`
- Also an empty element
- Style can be modified using style sheet technology

# Common HTML Elements



# Common HTML Elements

- Images can be embedded using `img` element

```
<img
    src="http://www.w3.org/Icons/valid-xhtml10"
    alt="Valid XHTML 1.0!" height="31" width="88"
    style="float:right" />
```

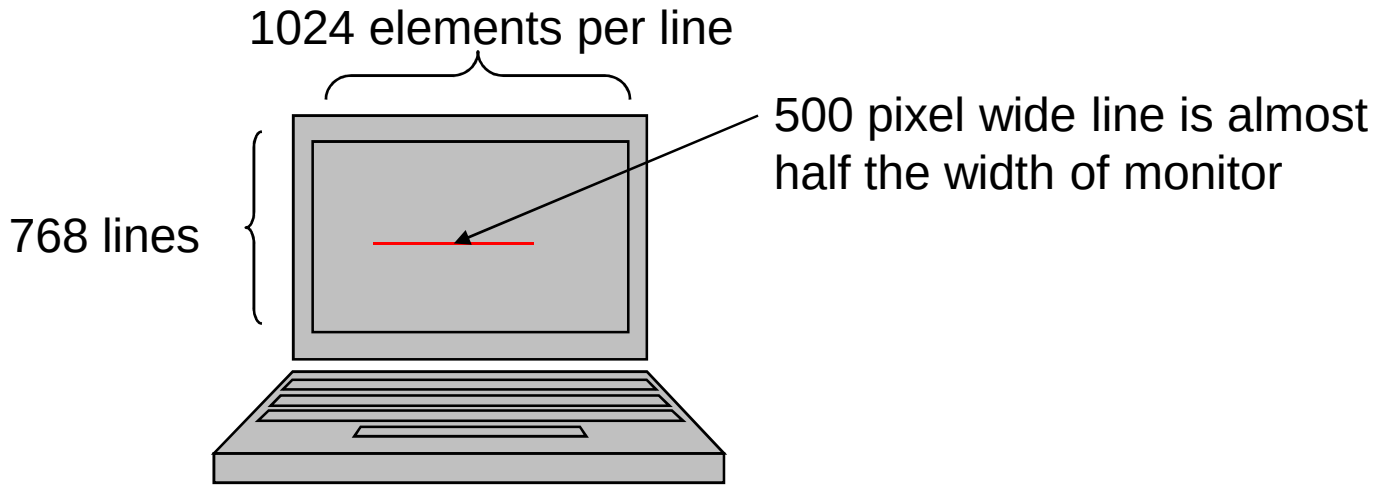
- Attributes:
  - `src`: URL of image file (required). Browser generates a GET request to this URL.
  - `alt`: text description of image (required)
  - `height` / `width`: dimensions of area that image will occupy (recommended)

# Common HTML Elements

- If height and width not specified for image, then browser may need to rearrange the client area after downloading the image (poor user interface for Web page)
- If height and width specified are not the same as the original dimensions of image, browser will resize the image
- Default units for height and width are “picture elements” (pixels)
  - Can specify percentage of client area using string such as “50%”

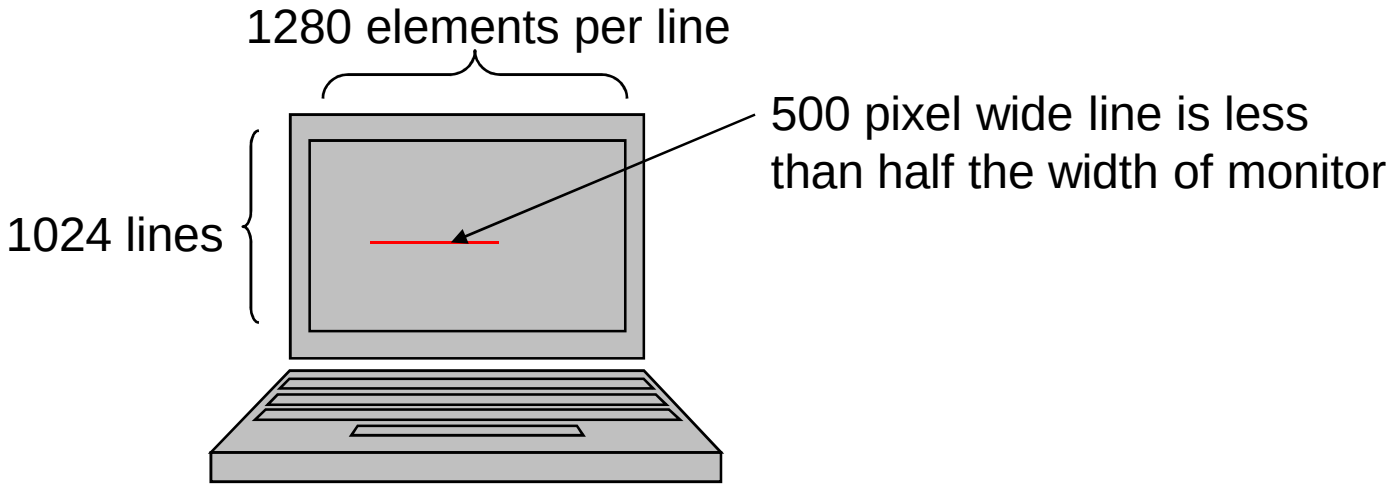
# Common HTML Elements

- Monitor resolution determines pixel size

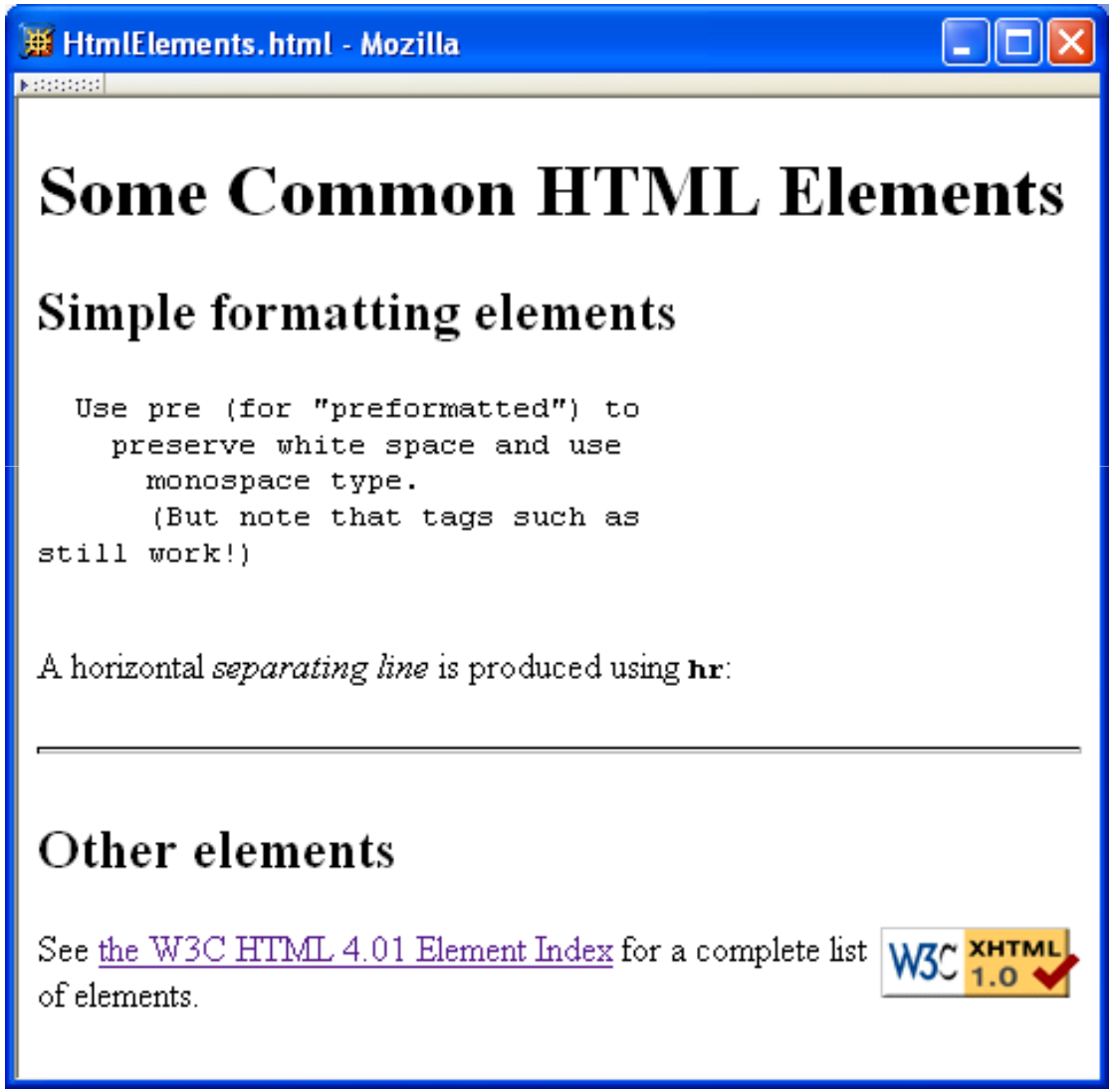


# Common HTML Elements

- Monitor resolution determines pixel size



# Common HTML Elements



# Common HTML Elements

- Hyperlinks are produced by the anchor element a

```
See
<a href="http://www.w3.org/TR/html4/index/elements.html">the
  W3C HTML 4.01 Element Index</a>
for a complete list of elements.
```

- Clicking on a hyperlink causes browser to issue GET request to URL specified in `href` attribute and render response in client area
- Content of anchor element is text of hyperlink (avoid leading/trailing space in content)

# Common HTML Elements

- Anchors can be used as source (previous example) or destination

```
<a id="section1" name="section1"></a>
```

- The fragment portion of a URL is used to reference a destination anchor

```
<a href="http://www.example.org/PageWithAnchor.html#section1">...
```

- Browser scrolls so destination anchor is at (or near) top of client area

# Common HTML Elements

- Comments are a special form of tag

```
<!-- Notice that img must nest within a "block" element,
     such as p -->
```

- Not allowed to use -- within comment

```
<!-- This is NOT
  -- a good comment.
  -->
```

```
<!-- Can't end with more than two dashes! --->
```

# Nesting Elements

- If one element is nested within another element, then the content of the inner element is also content of the outer element

```
<tt><strong>hr</strong></tt>
```

- XHTML requires that elements be properly nested

✗ `<tt><strong>hr</tt></strong>`

# Nesting Elements

- Most HTML elements are either block or inline
  - Block: browser automatically generates line breaks before and after the element content
    - Ex: `p`
  - Inline: element content is added to the “flow”
    - Ex: `span`, `tt`, `strong`, `a`

# Nesting Elements

- Syntactic rules of thumb:
  - Children of body must be blocks
  - Blocks can contain inline elements
  - Inline elements *cannot* contain blocks
- Specific rules for each version of (X)HTML are defined using SGML or XML (covered later)

# Relative URL's

- Consider an <img> start tag containing attribute specification

```
src="valid-xhtml10.png"
```

- This is an example of a relative URL: it is interpreted relative to the URL of the document that contains the img tag
  - If document URL is http://localhost:8080/MultiFile.html then relative URL above represents absolute URL http://localhost:8080/valid-xhtml10.png

# Relative URL's

TABLE 2.4: Absolute URL's corresponding to relative URL's when the base URL is `http://www.example.org/a/b/c.html`.

| Relative URL | Absolute URL |
|---|---|
| `d/e.html` | `http://www.example.org/a/b/d/e.html` |
| `../f.html` | `http://www.example.org/a/f.html` |
| `../../g.html` | `http://www.example.org/g.html` |
| `../h/i.html` | `http://www.example.org/a/h/i.html` |
| `/j.html` | `http://www.example.org/j.html` |
| `/k/l.html` | `http://www.example.org/k/l.html` |

# Relative URL's

- Query and fragment portions of a relative URL are appended to the resulting absolute URL
  - Example: If document URL is http://localhost:8080/PageAnch.html and it contains the anchor element

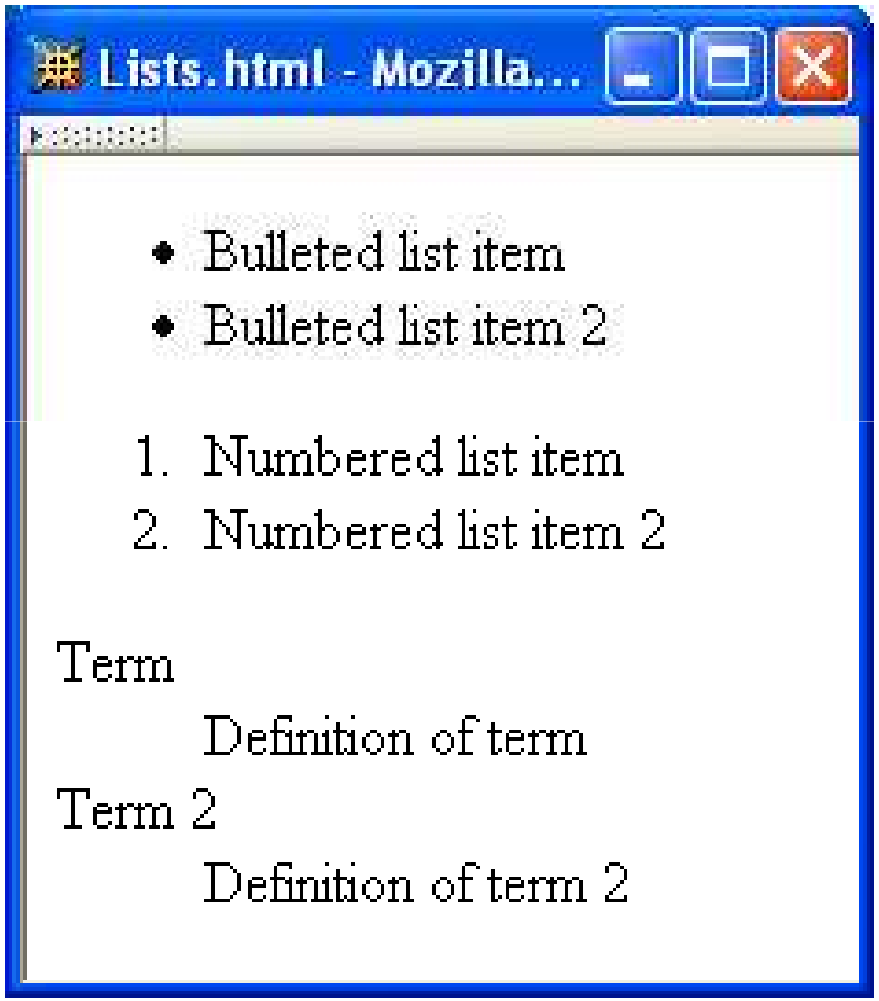
    ```
    <a href="#section1">...
    ```

    then the corresponding absolute URL is http://localhost:8080/PageAnch.html#section1

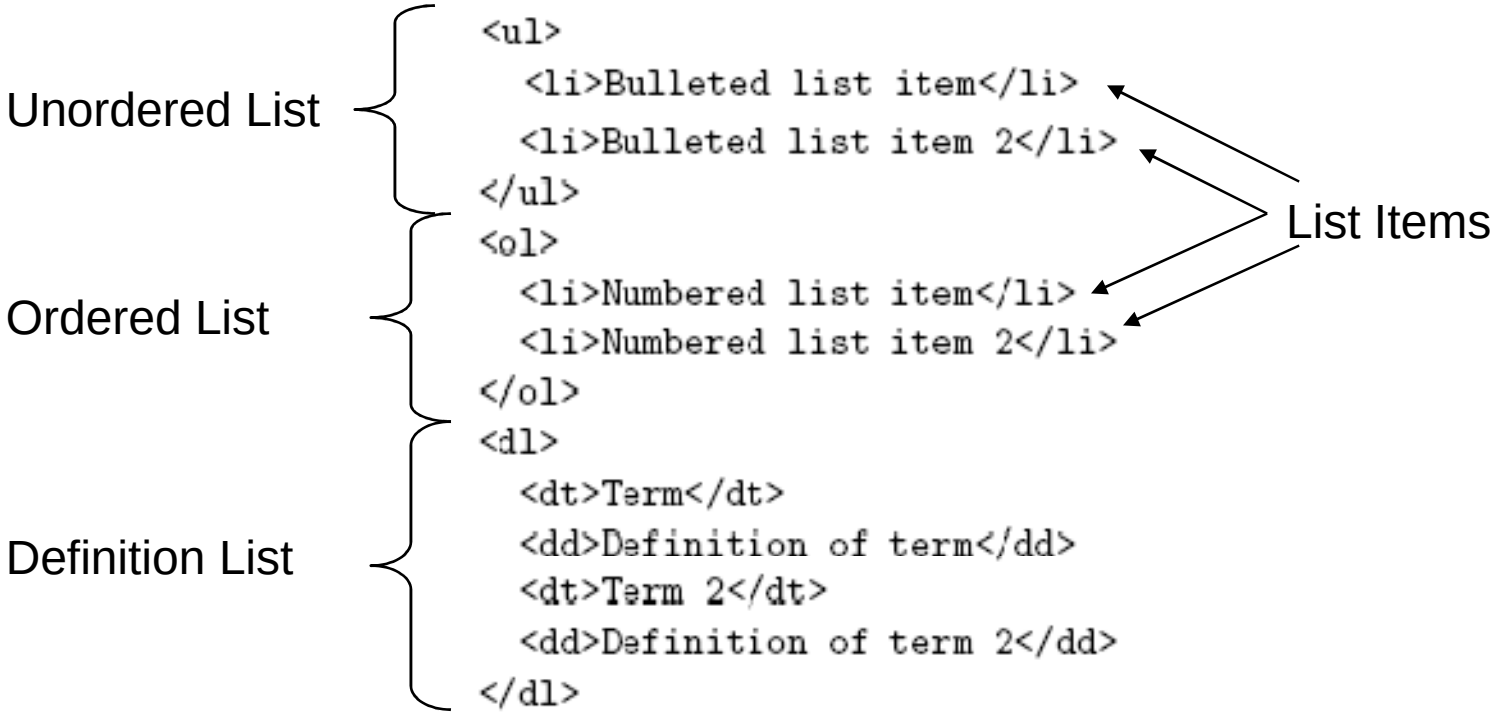
# Relative URL's

- Advantages:
  - Shorter than absolute URL's
  - Primary: can change the URL of a document (e.g., move document to a different directory or rename the server host) without needing to change URL's within the document
- Should use relative URL's whenever possible

# Lists



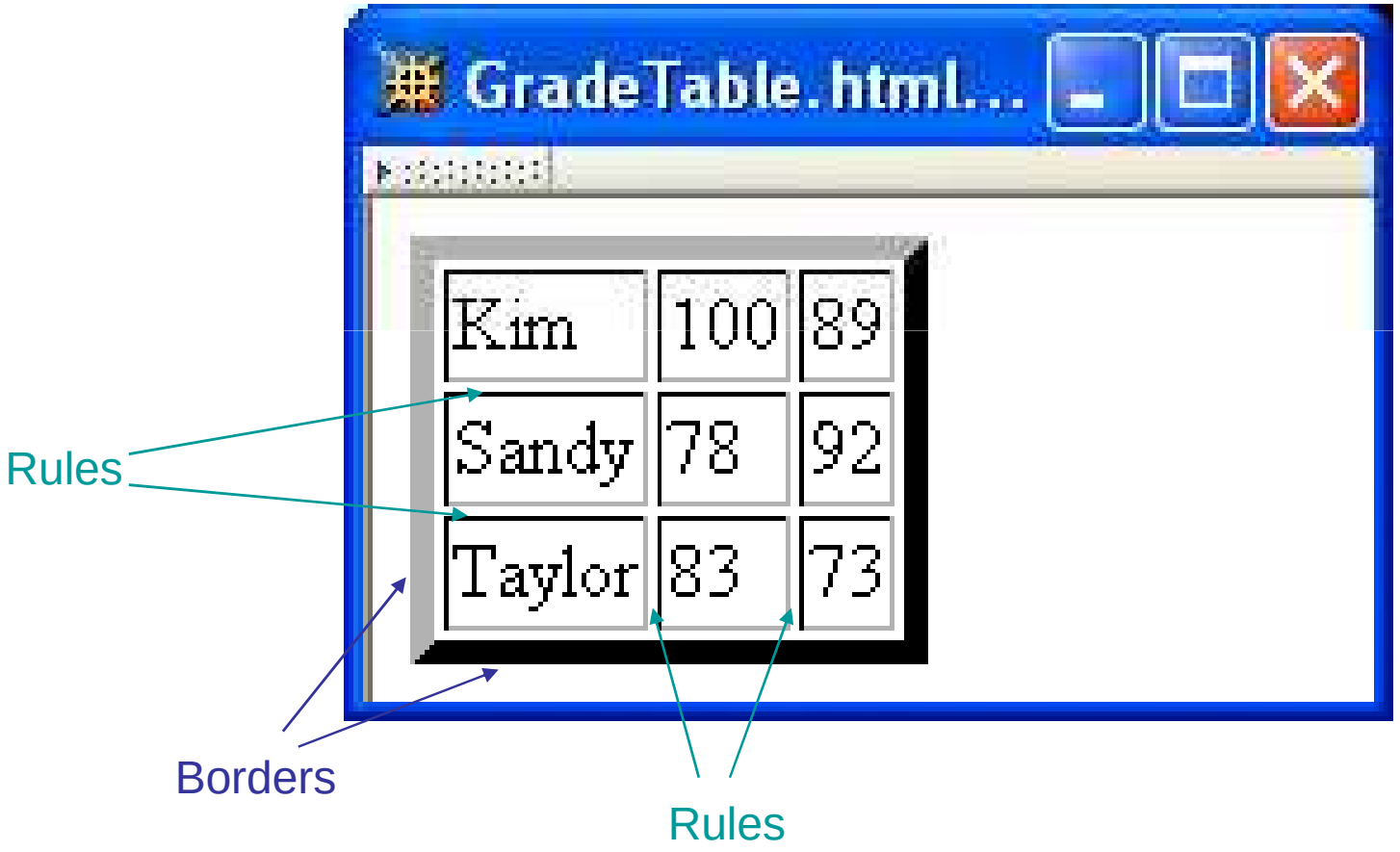
# Lists



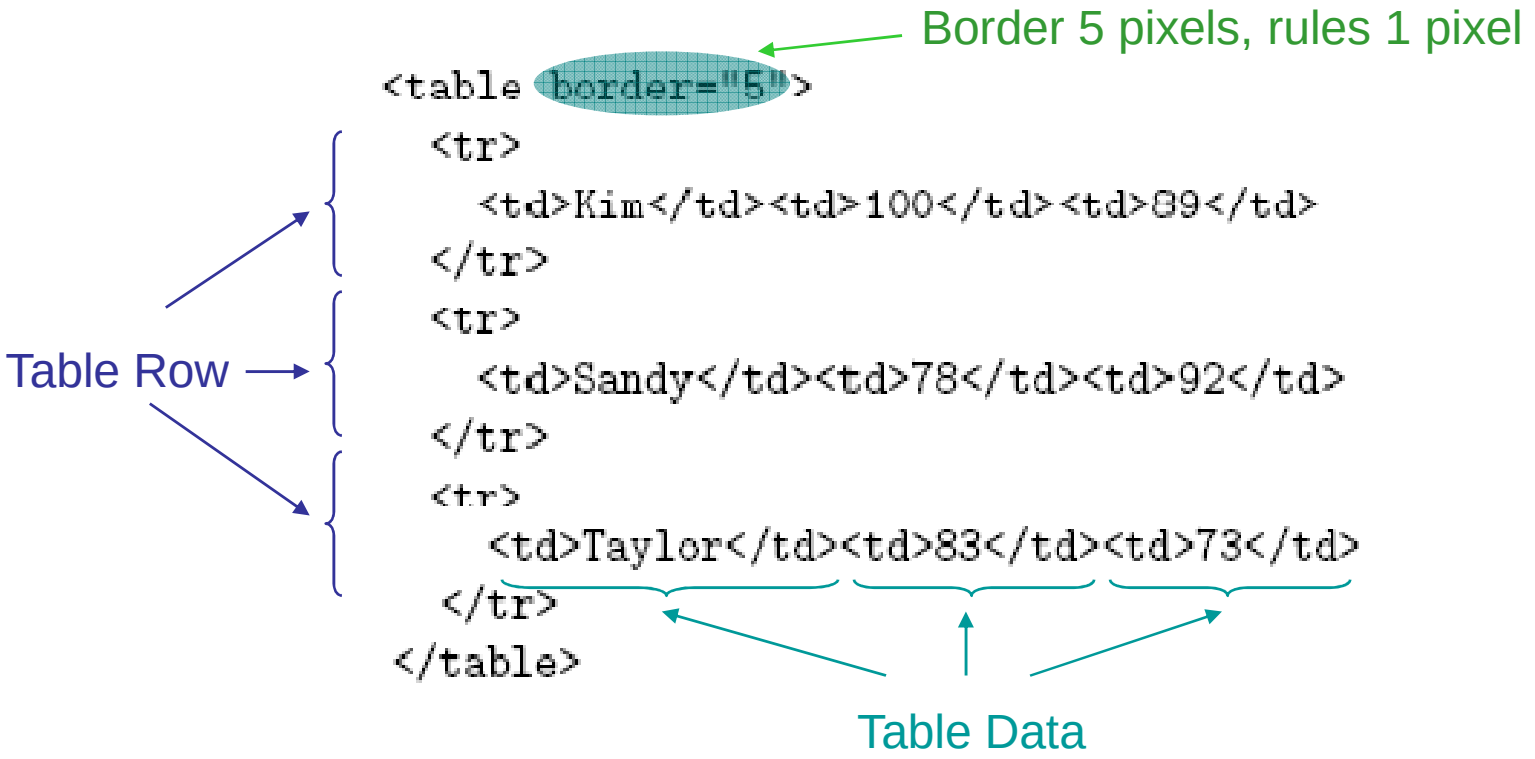
# Lists


```
<ul>
  <li>Bulleted list item
    <ul>
      <li>Nested list item</li>
      <li>Nested list item 2</li>
    </ul>
  </li>
  <li>Bulleted list item 2</li>
</ul>
```

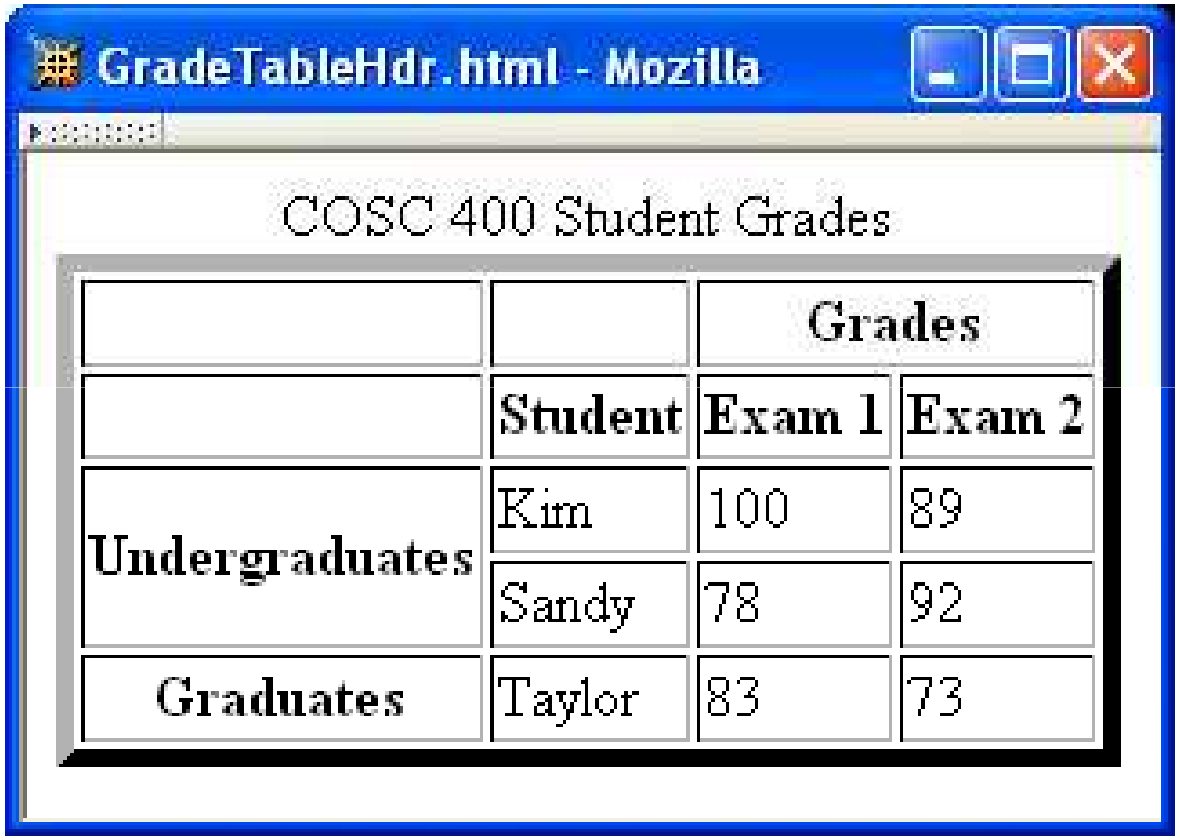
# Tables



# Tables

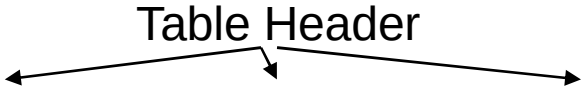


# Tables

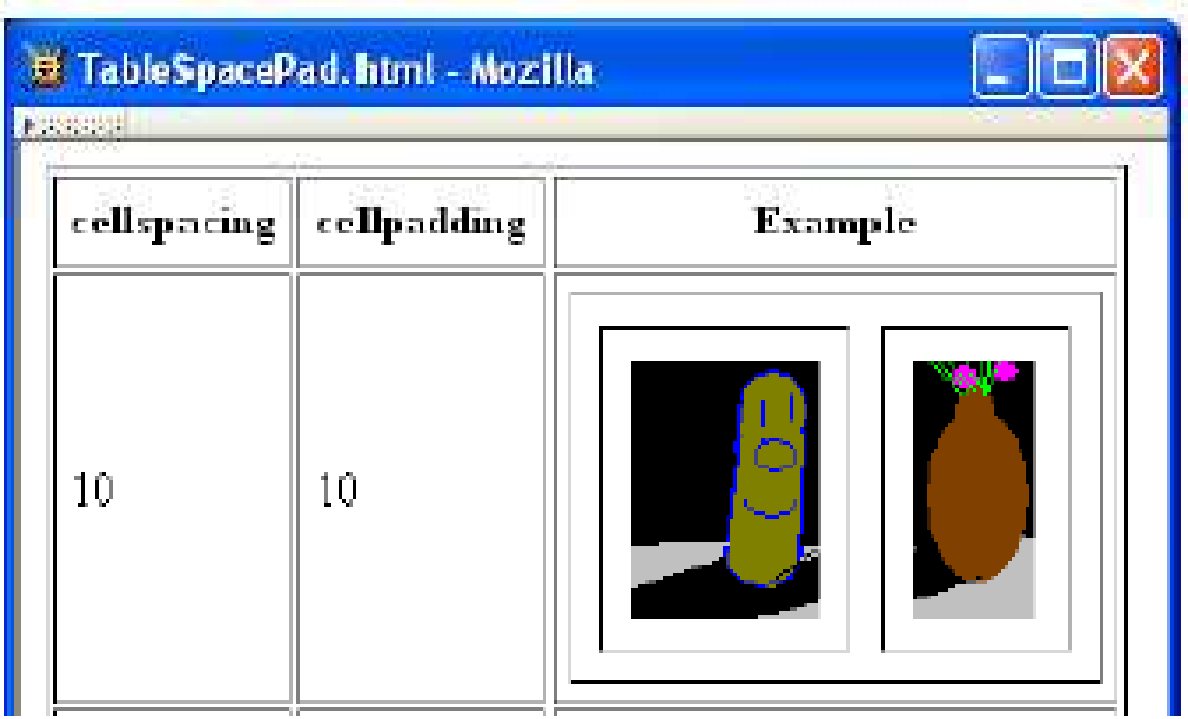


# Tables

```
<table border="5">
  <caption>
    COSC 400 Student Grades
  </caption>
  <tr>
    <td> </td><td> </td><th colspan="2">Grades</th>
  </tr>
  <tr>
    <td> </td><th>Student</th><th>Exam 1</th><th>Exam 2</th>
  </tr>
  <tr>
    <th rowspan="2">Undergraduates</th><td>Kim</td><td>100</td><td>89</td>
  </tr>
  <tr>
    <td>Sandy</td><td>78</td><td>92</td>
  </tr>
  <tr>
    <th>Graduates</th><td>Taylor</td><td>83</td><td>73</td>
  </tr>
</table>
```



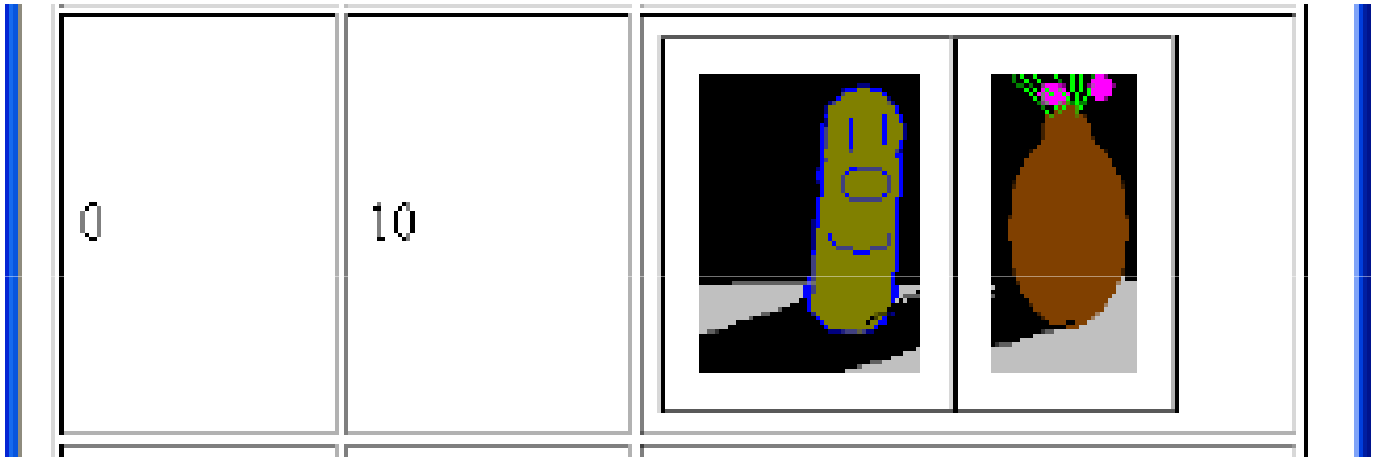
# Tables




```
<table border="1" cellspacing="10" cellpadding="10">
```

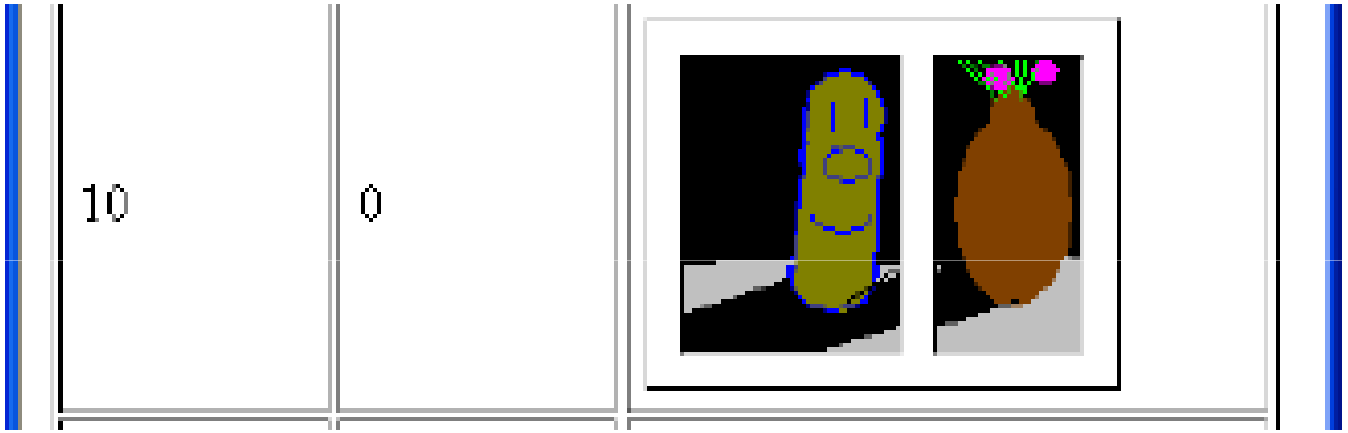
# Tables

cellspacing cellpadding



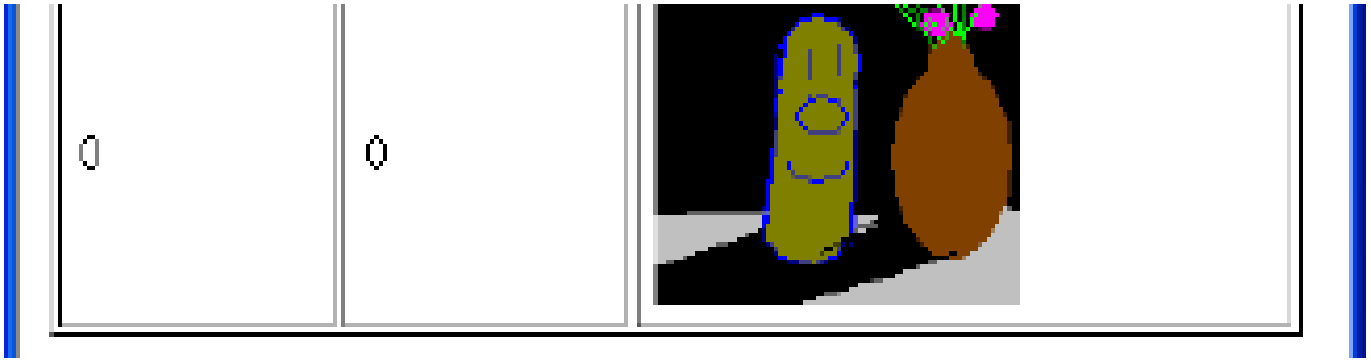
# Tables

cellspacing cellpadding

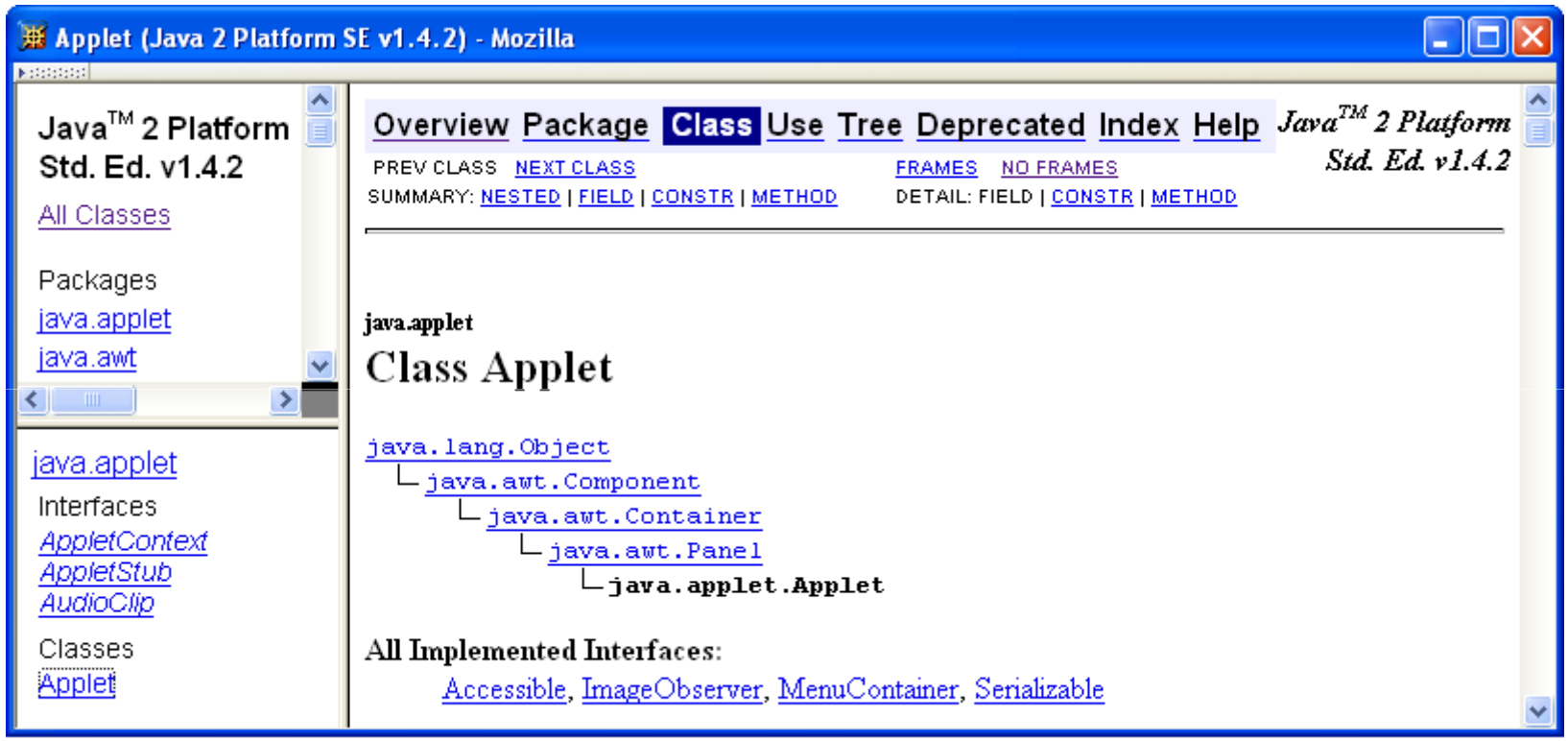


# Tables

cellspacing cellpadding



# Frames



# Frames

```
<!DOCTYPE html
   PUBLIC "-//W3C//DTD XHTML 1.0 Frameset//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-frameset.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>Java 2 Platform SE v1.4.2</title>
  </head>
  <frameset cols="20%,80%">
    <frameset rows="1*,2*">
      <frame src="overview-frame.html"
        id="upperLeftFrane" name="upperLeftFrame"></frame>
      <frame src="allclasses-frame.html"
        id="lowerLeftFrane" name="loverLeftFrame"></frame>
    </frameset>
    <frame src="overview-summary.html"
        id="rightFrame" name="rightFrame"></frame>
  </frameset>
</html>
```

1/3,2/3 split

# Frames

- Hyperlink in one frame can load document in another:

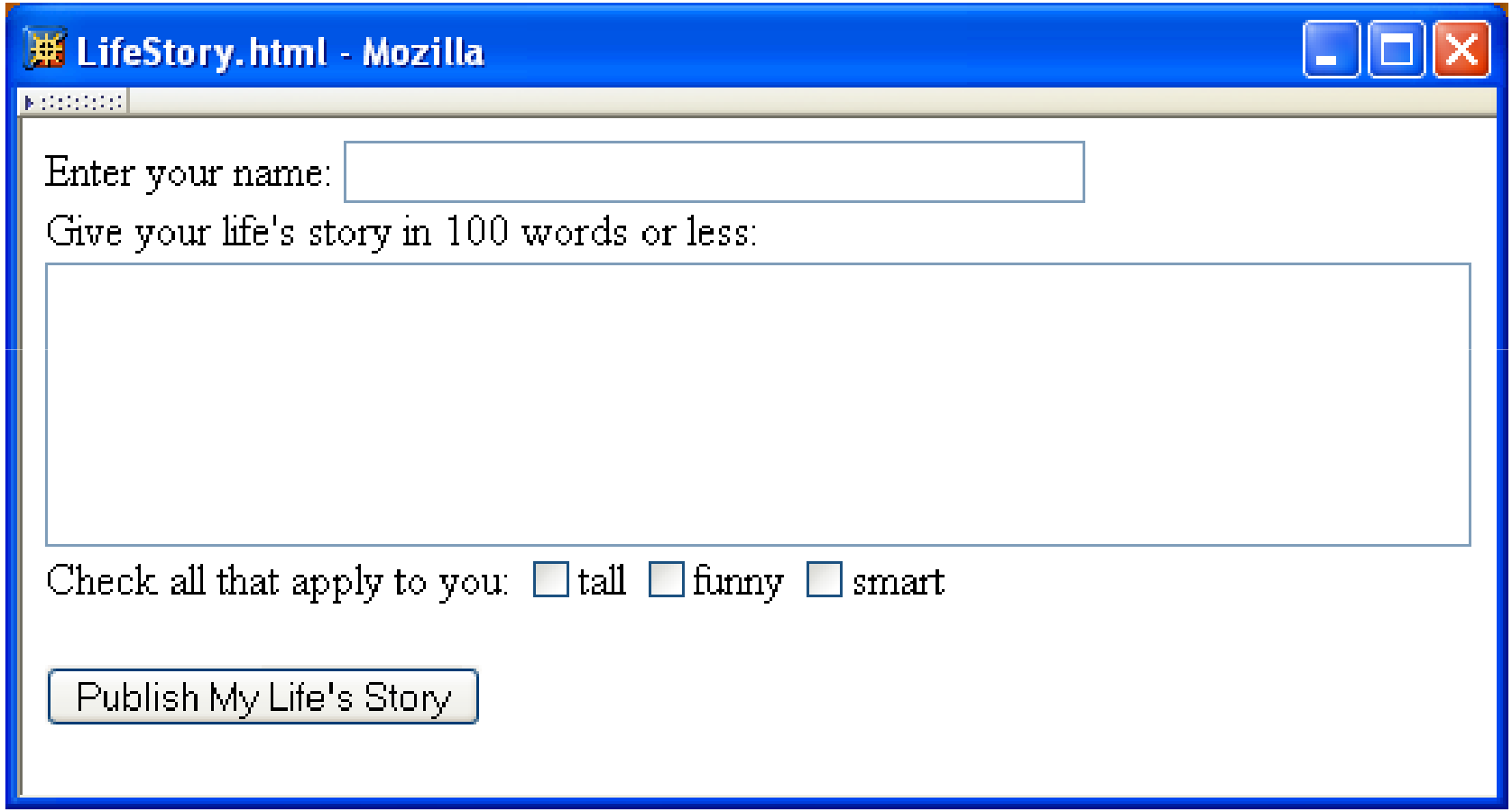
```
<a href="java/applet/package-frame.html" target="lowerLeftFrame">
```

- Value of target attribute specification is id/name of a frame

# Frames

- User interface issues:
  - What happens when the page is printed?
  - What happens when the Back button is clicked?
  - How should assistive technology "read" the page?
  - How should the information be displayed on a small display?
- Recommendation: avoid frames except for applications aimed at "power users"

# Forms



# Forms

Each form is content of a `form` element

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

# Forms

`action` specifies URL where form data is sent in an HTTP request

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

# Forms

HTTP request method (lower case)

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

`div` is the block element analog of `span` (no-style block element)

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

Form control elements must be content of a block element

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

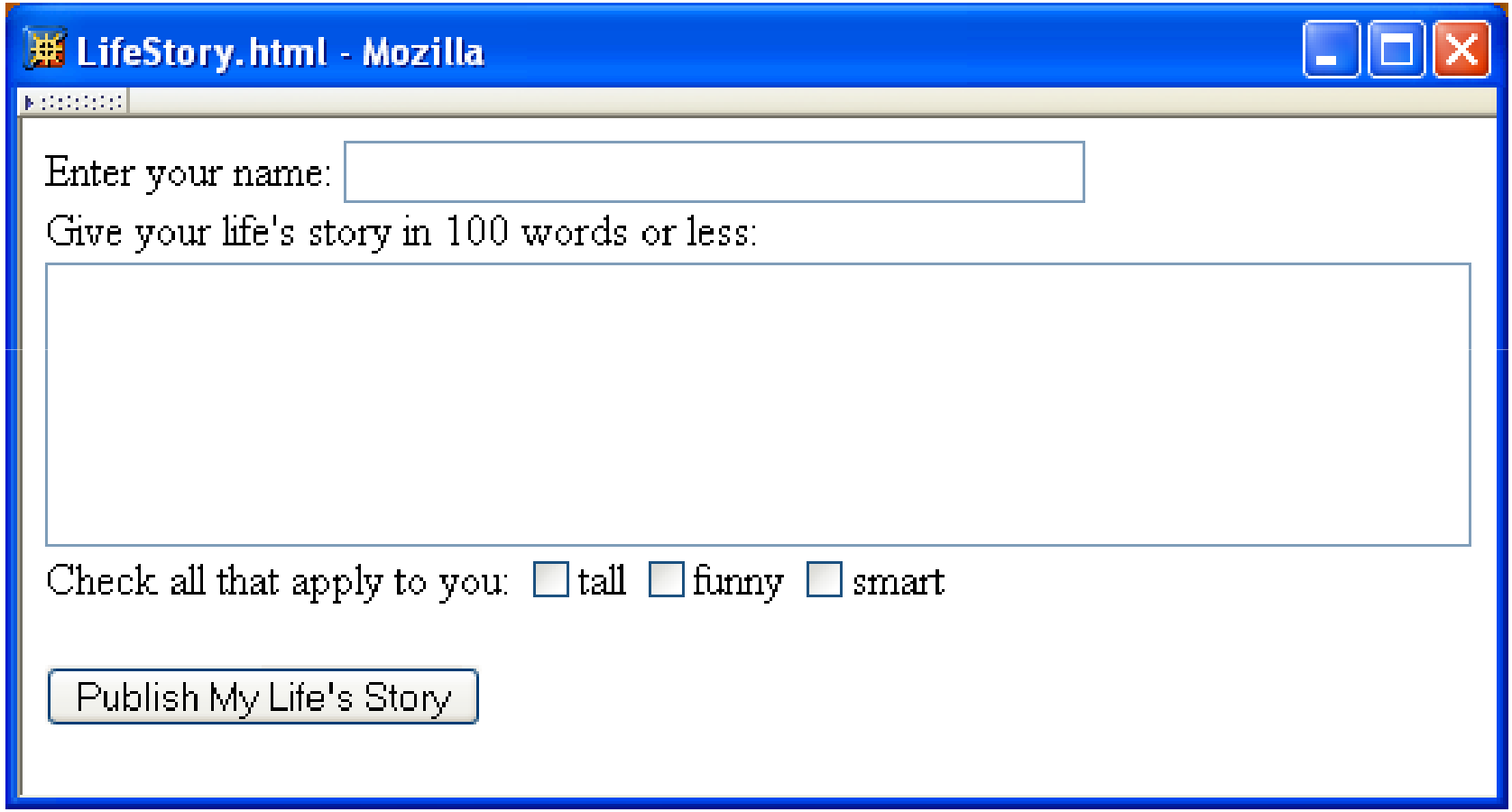
Text field *control* (form user-interface element)

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

Text field used for one-line inputs

# Forms



# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

Name associated with this control's data in HTTP request

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

Width (number of characters) of text field

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

`input` is an empty element

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

Use `label` to associate text with a control

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

Form controls are inline elements

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

`textarea` control used for multi-line input

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

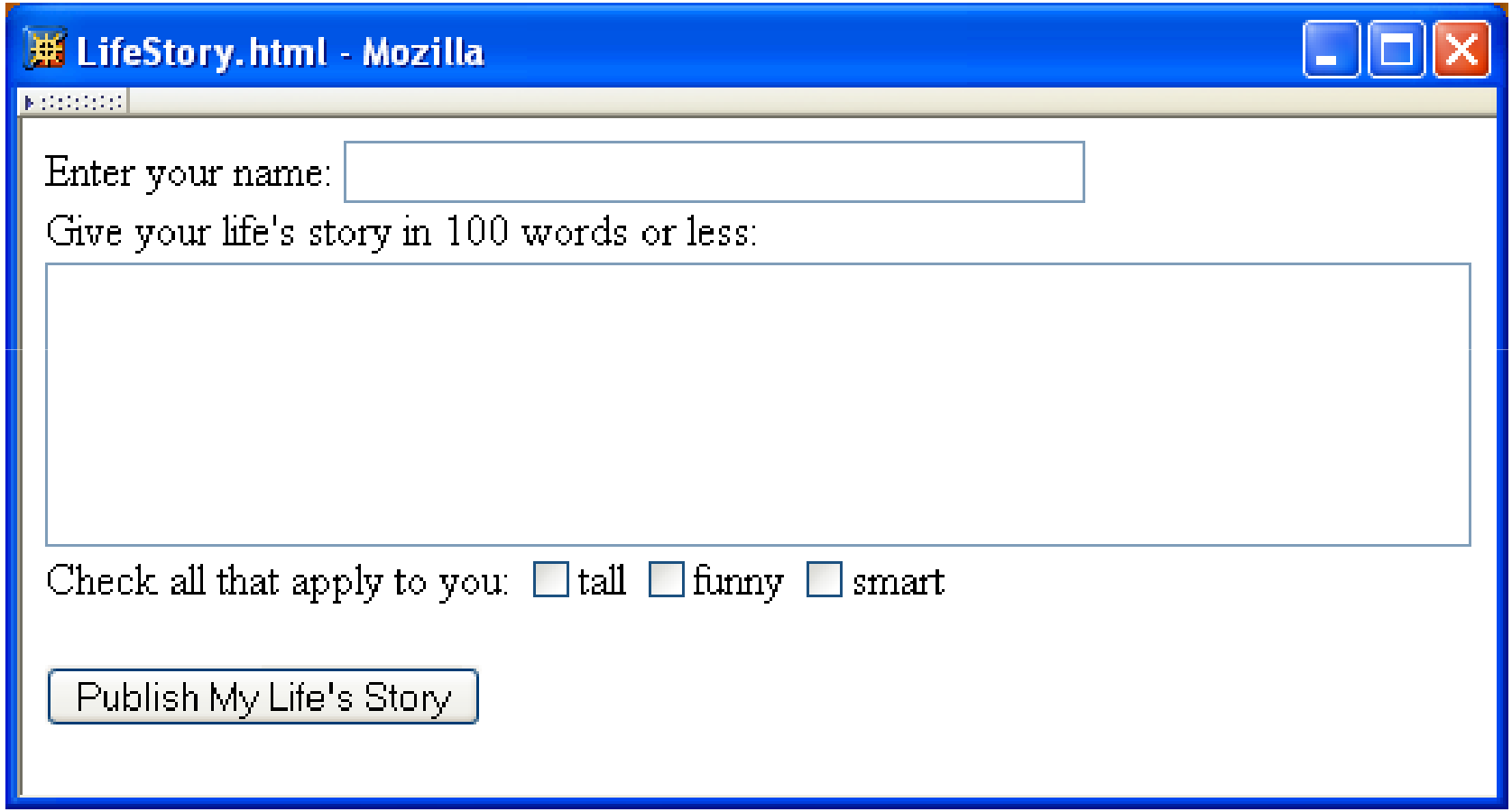
Height and width in characters

# Forms

```
<form action="http://www.example.org" method="get">
  <div>
    <label>
      Enter your name: <input type="text" name="username" size="40" />
    </label>
    <br />
    <label>
      Give your life's story in 100 words or less:
      <br />
      <textarea name="lifestory" rows="5" cols="60"></textarea>
    </label>
    <br />
```

`textarea` is not an empty element; any content is displayed

# Forms



# Forms

```
    Check all that apply to you:
    <label>
      <input type="checkbox" name="boxgroup1" value="tall" />tall
    </label>
    <label>
      <input type="checkbox" name="boxgroup1" value="funny" />funny
    </label>
    <label>
      <input type="checkbox" name="boxgroup1" value="smart" />smart
    </label>
    <br /><br />
    <input type="submit" name="doit" value="Publish My Life's Story" />
  </div>
</form>
```

Checkbox control

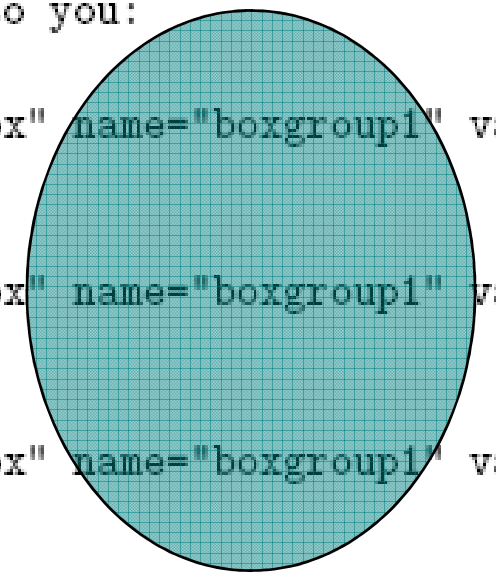
# Forms

```
    Check all that apply to you:
    <label>
      <input type="checkbox" name="boxgroup1" value="tall" />tall
    </label>
    <label>
      <input type="checkbox" name="boxgroup1" value="funny" />funny
    </label>
    <label>
      <input type="checkbox" name="boxgroup1" value="smart" />smart
    </label>
    <br /><br />
    <input type="submit" name="doit" value="Publish My Life's Story" />
  </div>
</form>
```

Value sent in HTTP request if box is checked

# Forms

Controls can share a common name



```
    Check all that apply to you:
    <label>
      <input type="checkbox" name="boxgroup1" value="tall" />tall
    </label>
    <label>
      <input type="checkbox" name="boxgroup1" value="funny" />funny
    </label>
    <label>
      <input type="checkbox" name="boxgroup1" value="smart" />smart
    </label>
    <br /><br />
    <input type="submit" name="doit" value="Publish My Life's Story" />
  </div>
</form>
```

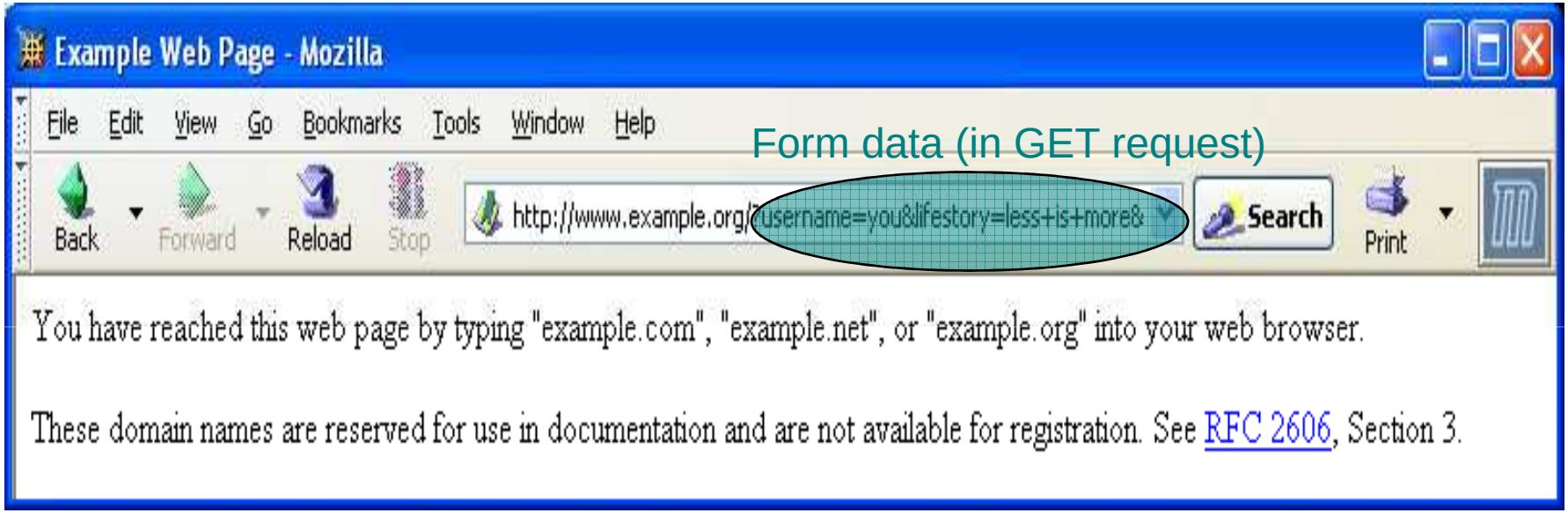
# Forms

```
Check all that apply to you:
<label>
  <input type="checkbox" name="boxgroup1" value="tall" />tall
</label>
<label>
  <input type="checkbox" name="boxgroup1" value="funny" />funny
</label>
<label>
  <input type="checkbox" name="boxgroup1" value="smart" />smart
</label>
<br /><br />
<input type="submit" name="doit" value="Publish My Life's Story" />
</div>
</form>
```

Submit button: form data sent to action URL if button is clicked

# Forms

# Forms



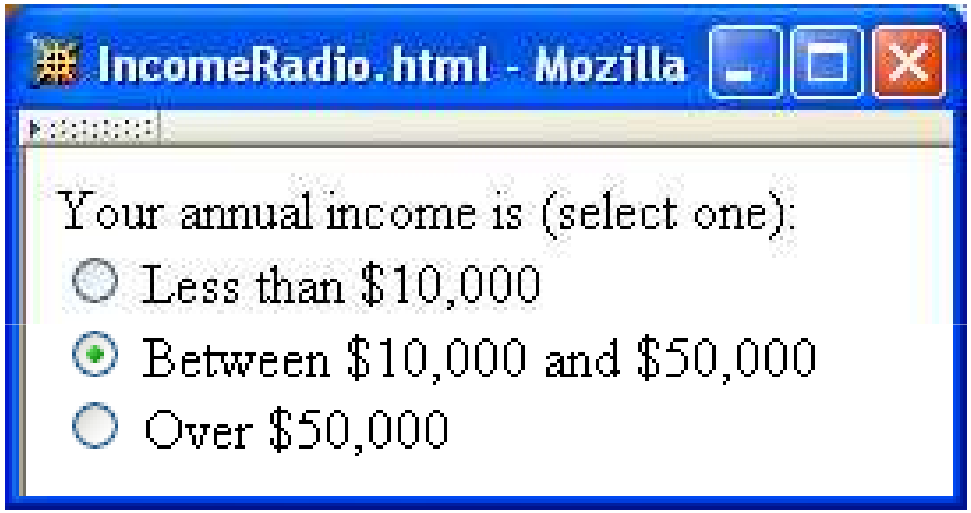
# Forms

```
    Check all that apply to you:
    <label>
      <input type="checkbox" name="boxgroup1" value="tall" />tall
    </label>
    <label>
      <input type="checkbox" name="boxgroup1" value="funny" />funny
    </label>
    <label>
      <input type="checkbox" name="boxgroup1" value="smart" />smart
    </label>
    <br /><br />
    <input type="submit" name="doit" value="Publish My Life's Story" />
  </div>
</form>
```

Displayed on button and sent to server if button clicked

# Forms

Radio buttons: at most one can be selected at a time.



# Forms

```
Your annual income is (select one):<br />
<label>
  <input type="radio" name="radgroup1" value="0-10" />
    Less than $10,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="10-50"
         checked="checked" />
    Between $10,000 and $50,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="&gt;50" />
    Over $50,000
</label>
```

Radio button control

# Forms

```
Your annual income is (select one):<br />
<label>
  <input type="radio" name="radgroup1" value="0-10" />
    Less than $10,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="10-50"
         checked="checked" />
    Between $10,000 and $50,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="&gt;50" />
    Over $50,000
</label>
```

All radio buttons with the same name form a *button set*

# Forms

```
Your annual income is (select one):<br />
<label>
  <input type="radio" name="radgroup1" value="0-10" />
    Less than $10,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="10-50"
         checked="checked" />
    Between $10,000 and $50,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="&gt;50" />
    Over $50,000
</label>
```

Only one button of a set can be selected at a time

# Forms

```
Your annual income is (select one):<br />
<label>
  <input type="radio" name="radgroup1" value="0-10" />
    Less than $10,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="10-50"
         checked="checked" />
    Between $10,000 and $50,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="&gt;50" />
    Over $50,000
</label>
```

This button is initially selected (`checked` attribute also applies to check boxes)

# Forms

```
Your annual income is (select one):<br />
<label>
  <input type="radio" name="radgroup1" value="0-10" />
    Less than $10,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="10-50"
         checked="checked" />
    Between $10,000 and $50,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="&gt;50" />
    Over $50,000
</label>
```

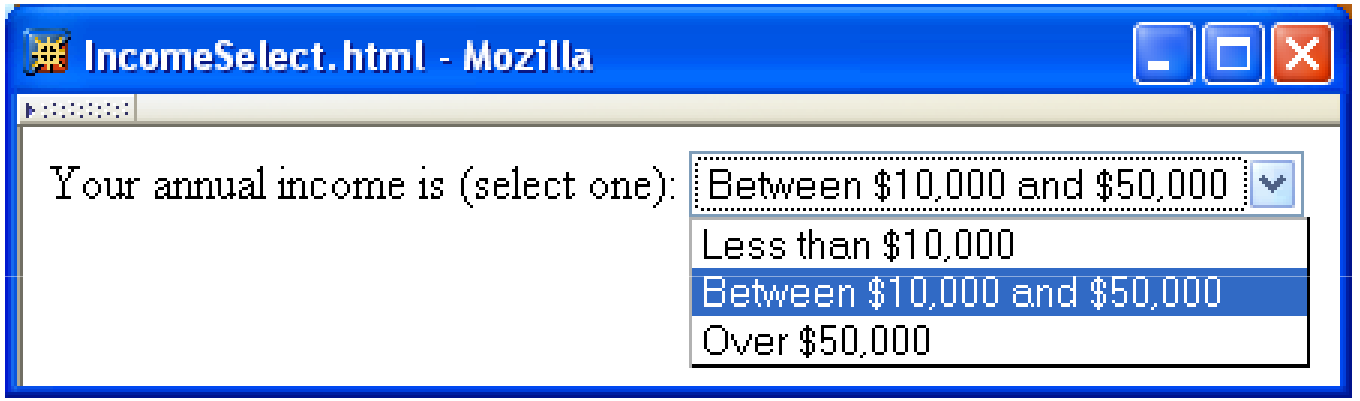
*Boolean attribute*: default false, set true by specifying name as value

# Forms

```
Your annual income is (select one):<br />
<label>
  <input type="radio" name="radgroup1" value="0-10" />
    Less than $10,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="10-50"
         checked="checked" />
    Between $10,000 and $50,000
</label><br />
<label>
  <input type="radio" name="radgroup1" value="&gt;50" />
    Over $50,000
</label>
```

Represents string: >50

# Forms



# Forms

```
Your annual income is (select one):
<select name="income">
  <option value="0-10">Less than $10,000</option>
  <option value="10-50" selected="selected">
    Between $10,000 and $50,000
  </option>
  <option value="&gt;50">Over $50,000</option>
</select>
```

Menu control; name given once

# Forms

```
Your annual income is (select one):
<select name="income">
  <option value="0-10">Less than $10,000</option>
  <option value="10-50" selected="selected">
    Between $10,000 and $50,000
  </option>
  <option value="&gt;50">Over $50,000</option>
</select>
```

Each menu item has its own value

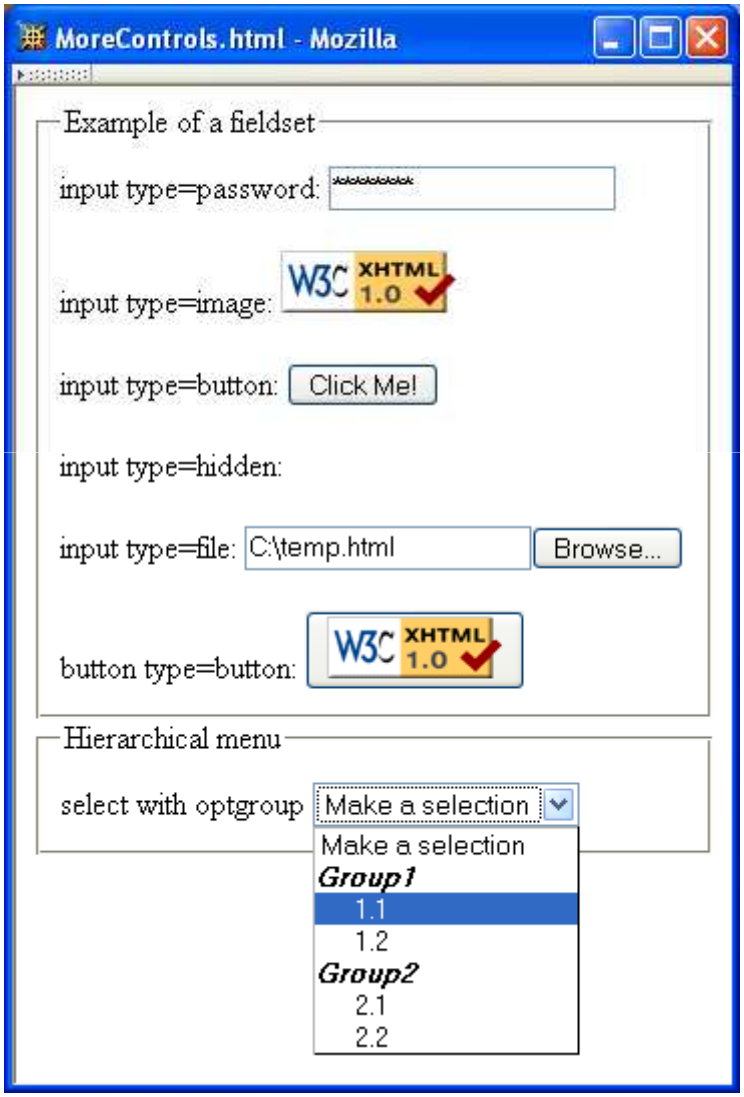
# Forms

```
Your annual income is (select one):
<select name="income">
  <option value="0-10">Less than $10,000</option>
  <option value="10-50" selected="selected">
    Between $10,000 and $50,000
  </option>
  <option value="&gt;50">Over $50,000</option>
</select>
```

Item initially displayed in menu control

# Forms

- Other form controls:
  - Fieldset (grouping)
  - Password
  - Clickable image
  - Non-submit buttons
  - Hidden (embed data)
  - File upload
  - Hierarchical menus



# Forms

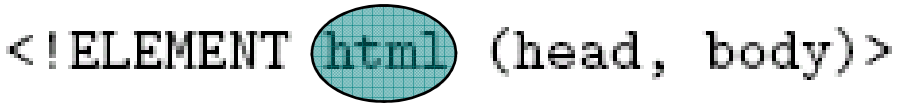
TABLE 2.5: HTML 4.01/XHTML 1.0 non-deprecated form controls.

| Element | type Attribute | Control |
|---|---|---|
| input | text | Text input |
| input | password | Password input |
| input | checkbox | Checkbox |
| input | radio | Radio button |
| input | submit | Submit button |
| input | image | Graphical submit button |
| input | reset | Reset button (form clear) |
| input | button | Push button (for use with scripts) |
| input | hidden | Non-displayed control (stores server-supplied information) |
| input | file | File select |
| button | submit | Submit button with content (not an empty element) |
| button | reset | Cancel button with content (not an empty element) |
| button | button | Button with content but no predefined action |
| select | N/A | Menu |
| option | N/A | Menu item |
| optgroup | N/A | Heading in a hierarchical menu |
| textarea | N/A | Multi-line text input |
| label | N/A | Associate label with control(s) |
| fieldset | N/A | Groups controls |
| legend | N/A | Add caption to a fieldset |

# XML DTD

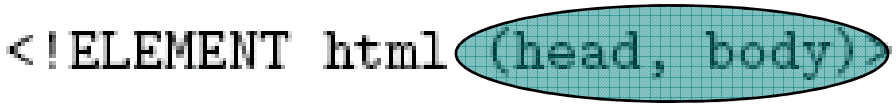
- Recall that XML is used to define the syntax of XHTML
- Set of XML files that define a language are known as the document type definition (DTD)
- DTD primarily consists of declarations:
  - Element type: name and content of elements
  - Attribute list: attributes of an element
  - Entity: define meaning of, *e.g.*, `>`

# XML Element Type Declaration




Element type name

# XML Element Type Declaration




Element type *content specification* (or *content model*)

# XML Element Type Declaration

```
<!ELEMENT html (head, body)>
```

Element type *content specification* (or *content model*)

TABLE 2.6: Basic XML content specifications.

| Specification Type | Syntax | Content Allowed |
|---|---|---|
| Empty | `EMPTY` | None |
| Arbitrary | `ANY` | Any content (no restrictions) |
| Sequence | `(elt1, elt2, ...)` | Sequence of elements that must appear in order specified |
| Choice | `(elt1 \| elt2 \| ...)` | Exactly one of the specified elements must appear |
| Character data | `(#PCDATA)` | Arbitrary character data, but no elements |
| Mixed | `(#PCDATA \| elt1 \| elt2 \|... )*` | Any mixture of character data and the specified elements in any order |

# XML Element Type Declaration

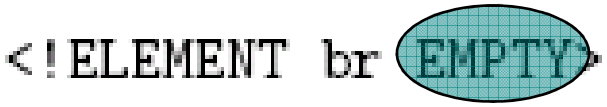
```
<!ELEMENT html (head, body)>
```

Element type *content specification* (or *content model*)

TABLE 2.6: Basic XML content specifications.

| Specification Type | Syntax | Content Allowed |
|---|---|---|
| Empty | `EMPTY` | None |
| Arbitrary | `ANY` | Any content (no restrictions) |
| Sequence | `(elt1, elt2, ...)` | Sequence of elements that must appear in order specified |
| Choice | `(elt1 \| elt2 \| ...)` | Exactly one of the specified elements must appear |
| Character data | `(#PCDATA)` | Arbitrary character data, but no elements |
| Mixed | `(#PCDATA \| elt1 \| elt2 \|... )*` | Any mixture of character data and the specified elements in any order |

# XML Element Type Declaration




Element type *content specification* (or *content model*)

TABLE 2.6: Basic XML content specifications.

| Specification Type | Syntax | Content Allowed |
|---|---|---|
| Empty | `EMPTY` | None |
| Arbitrary | `ANY` | Any content (no restrictions) |
| Sequence | `(elt1, elt2, ...)` | Sequence of elements that must appear in order specified |
| Choice | `(elt1 \| elt2 \| ...)` | Exactly one of the specified elements must appear |
| Character data | `(#PCDATA)` | Arbitrary character data, but no elements |
| Mixed | `(#PCDATA \| elt1 \| elt2 \|... )*` | Any mixture of character data and the specified elements in any order |

# XML Element Type Declaration

```
<!ELEMENT br EMPTY>
```

Element type *content specification* (or *content model*)

TABLE 2.6: Basic XML content specifications.

| Specification Type | Syntax | Content Allowed |
|---|---|---|
| Empty | EMPTY | None |
| Arbitrary | ANY | Any content (no restrictions) |
| Sequence | (elt1, elt2, ...) | Sequence of elements that must appear in order specified |
| Choice | (elt1 \| elt2 \| ...) | Exactly one of the specified elements must appear |
| Character data | (#PCDATA) | Arbitrary character data, but no elements |
| Mixed | (#PCDATA \| elt1 \| elt2 \|... )* | Any mixture of character data and the specified elements in any order |

# XML Element Type Declaration

```
<!ELEMENT select (optgroup|option)+>
```

Element type *content specification* (or *content model*)

TABLE 2.6: Basic XML content specifications.

| Specification Type | Syntax | Content Allowed |
|---|---|---|
| Empty | `EMPTY` | None |
| Arbitrary | `ANY` | Any content (no restrictions) |
| Sequence | `(elt1, elt2, ...)` | Sequence of elements that must appear in order specified |
| Choice | `(elt1 \| elt2 \| ...)` | Exactly one of the specified elements must appear |
| Character data | `(#PCDATA)` | Arbitrary character data, but no elements |
| Mixed | `(#PCDATA \| elt1 \| elt2 \|... )*` | Any mixture of character data and the specified elements in any order |

# XML Element Type Declaration

```
<!ELEMENT select (optgroup|option)+>
```

Element type *content specification* (or *content model*)

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| Sequence | `(elt1, elt2, ...)` | Sequence of elements that must appear in order specified |
| Choice | `(elt1 \| elt2 \| ...)` | Exactly one of the specified elements must appear |
| Character data | `(#PCDATA)` | Arbitrary character data, but no elements |
| Mixed | `(#PCDATA \| elt1 \| elt2 \|... )*` | Any mixture of character data and the specified elements in any order |

# XML Element Type Declaration

**<!ELEMENT textarea (#PCDATA)>**

Element type *content specification* (or *content model*)

TABLE 2.6: Basic XML content specifications.

| Specification Type | Syntax | Content Allowed |
|---|---|---|
| Empty | `EMPTY` | None |
| Arbitrary | `ANY` | Any content (no restrictions) |
| Sequence | `(elt1, elt2, ...)` | Sequence of elements that must appear in order specified |
| Choice | `(elt1 \| elt2 \| ...)` | Exactly one of the specified elements must appear |
| Character data | `(#PCDATA)` | Arbitrary character data, but no elements |
| Mixed | `(#PCDATA \| elt1 \| elt2 \|... )*` | Any mixture of character data and the specified elements in any order |

# XML Element Type Declaration

**<!ELEMENT textarea (#PCDATA)>**

Element type *content specification* (or *content model*)

TABLE 2.6: Basic XML content specifications.

| Specification Type | Syntax | Content Allowed |
|---|---|---|
| Empty | `EMPTY` | None |
| Arbitrary | `ANY` | Any content (no restrictions) |
| Sequence | `(elt1, elt2, ...)` | Sequence of elements that must appear in order specified |
| Choice | `(elt1 \| elt2 \| ...)` | Exactly one of the specified elements must appear |
| Character data | `(#PCDATA)` | Arbitrary character data, but no elements |
| Mixed | `(#PCDATA \| elt1 \| elt2 \|... )*` | Any mixture of character data and the specified elements in any order |

# XML Element Type Declaration


Element type *content specification* (or *content model*)

# XML Element Type Declaration

```
<!ELEMENT select (optgroup|option)+>
```

Element type *content specification* (or *content model*)

TABLE 2.7: XML content specification iterator characters.

| Character | Meaning |
|---|---|
| ? | Sequence/choice is optional (appears zero or one times) |
| * | Sequence/choice may be repeated an arbitrary number of times, including none |
| + | Sequence/choice may appear one or more times |

# XML Element Type Declaration

```
<!ELEMENT select (optgroup|option)+>
```

Element type *content specification* (or *content model*)

TABLE 2.7: XML content specification iterator characters.

| Character | Meaning |
|---|---|
| ? | Sequence/choice is optional (appears zero or one times) |
| * | Sequence/choice may be repeated an arbitrary number of times, including none |
| + | Sequence/choice may appear one or more times |

# XML Element Type Declaration

```
<!ELEMENT table
     (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:

# XML Element Type Declaration

```
<!ELEMENT table
      (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption`

# XML Element Type Declaration

```
<!ELEMENT table
      (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by

# XML Element Type Declaration

```
<!ELEMENT table
    (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements

# XML Element Type Declaration

```
<!ELEMENT table
     (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or

# XML Element Type Declaration

```
<!ELEMENT table
     (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or any number of `colgroup` elements

# XML Element Type Declaration

```
<!ELEMENT table
     (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or any number of `colgroup` elements then

# XML Element Type Declaration

```
<!ELEMENT table
    (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or any number of `colgroup` elements then
  - Optional header

# XML Element Type Declaration

```
<!ELEMENT table
     (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or any number of `colgroup` elements then
  - Optional header followed by

# XML Element Type Declaration

```
<!ELEMENT table
    (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or any number of `colgroup` elements then
  - Optional header followed by optional footer

# XML Element Type Declaration

```
<!ELEMENT table
      (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or any number of `colgroup` elements then
  - Optional header followed by optional footer then

# XML Element Type Declaration

```
<!ELEMENT table
    (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or any number of `colgroup` elements then
  - Optional header followed by optional footer then
  - One or more `tbody` elements

# XML Element Type Declaration

```
<!ELEMENT table
    (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or any number of `colgroup` elements then
  - Optional header followed by optional footer then
  - One or more `tbody` elements or

# XML Element Type Declaration

```
<!ELEMENT table
    (caption?, (col*|colgroup*), thead?, tfoot?, (tbody+|tr+))>
```

- Child elements of `table` are:
  - Optional `caption` followed by
  - Any number of `col` elements or any number of `colgroup` elements then
  - Optional header followed by optional footer then
  - One or more `tbody` elements or one or more `tr` elements

# XML Attribute List Declaration

Element type name

```
<!ATTLIST html
  lang          NMTOKEN    #IMPLIED
  xml:lang      NMTOKEN    #IMPLIED
  dir           (ltr|rtl)  #IMPLIED
  id            ID         #IMPLIED
  xmlns         CDATA      #FIXED 'http://www.w3.org/1999/xhtml'>
```

# XML Attribute List Declaration

```
<!ATTLIST html
    lang        NMTOKEN    #IMPLIED
    xml:lang    NMTOKEN    #IMPLIED
    dir         (ltr|rtl)  #IMPLIED
    id          ID         #IMPLIED
    xmlns       CDATA      #FIXED 'http://www.w3.org/1999/xhtml'>
```

Recognized attribute names

# XML Attribute List Declaration

```
<!ATTLIST html
   lang          NMTOKEN     #IMPLIED
   xml:lang      NMTOKEN     #IMPLIED
   dir           (ltr|rtl)   #IMPLIED
   id            ID          #IMPLIED
   xmlns         CDATA       #FIXED 'http://www.w3.org/1999/xhtml'>
```

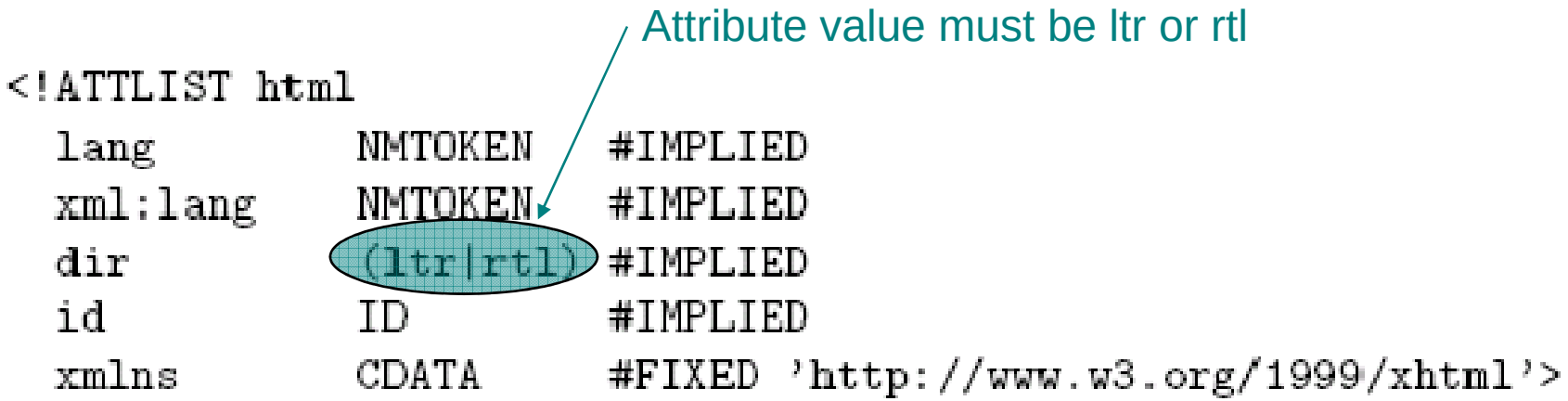
Attribute types
(data types allowed as attribute values)

# XML Attribute List Declaration

ASCII characters: letter, digit, or . - _ :

```
<!ATTLIST html
  lang          NMTOKEN     #IMPLIED
  xml:lang      NMTOKEN     #IMPLIED
  dir           (ltr|rtl)   #IMPLIED
  id            ID          #IMPLIED
  xmlns         CDATA       #FIXED 'http://www.w3.org/1999/xhtml'>
```

# XML Attribute List Declaration



# XML Attribute List Declaration

```
<!ATTLIST html
  lang          NMTOKEN    #IMPLIED
  xml:lang      NMTOKEN    #IMPLIED
  dir           (ltr|rtl)  #IMPLIED
  id            ID         #IMPLIED
  xmlns         CDATA      #FIXED 'http://www.w3.org/1999/xhtml'>
```

Like NMTOKEN but must begin with letter or _ :
Attribute value must be unique

# XML Attribute List Declaration

```
<!ATTLIST html
   lang          NMTOKEN    #IMPLIED
   xml:lang      NMTOKEN    #IMPLIED
   dir           (ltr|rtl)  #IMPLIED
   id            ID         #IMPLIED
   xmlns         CDATA      #FIXED 'http://www.w3.org/1999/xhtml'>
```

Any character except XML special characters < and &
or the quote character enclosing the attribute value

# XML Attribute List Declaration

TABLE 2.8: Key attribute types used in XHTML 1.0 Strict DTD.

| **Attribute type** | **Syntax** | **Usage** |
|---|---|---|
| Name token | `NMTOKEN` | Name (word) |
| Enumerated | `( string1 \| string2 \| ... )` | List of all possible attribute values |
| Identifier | `ID` | Type for `id` attribute |
| Identifier reference | `IDREF` | Reference to an `id` attribute value |
| Identifier reference list | `IDREFS` | List of references to `id` attribute values |
| Character data | `CDATA` | Arbitrary character data (except < and &) |

# XML Attribute List Declaration

```
<!ATTLIST html
   lang          NMTOKEN     #IMPLIED
   xml:lang      NMTOKEN     #IMPLIED
   dir           (ltr|rtl)   #IMPLIED
   id            ID          #IMPLIED
   xmlns         CDATA       #FIXED 'http://www.w3.org/1999/xhtml'>
```

Attribute default declarations

# XML Attribute List Declaration

TABLE 2.9: XML attribute default-value declarations.

| **Default type** | **Syntax** |
|---|---|
| No default value provided by DTD, attribute optional | `#IMPLIED` |
| Default provided by DTD, may not be changed | `#FIXED` followed by any valid value (quoted) |
| Default provided by DTD, may be overridden by user | Any valid value (quoted) |
| No default value provided by DTD, attribute required | `#REQUIRED` |

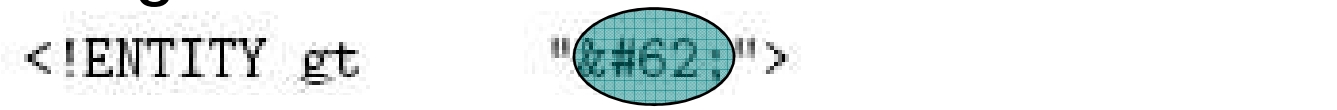
# XML Entity Declaration

- Entity declaration is essentially a macro
- Two types of entity:
  - General: referenced from HTML document using &


Entity name

# XML Entity Declaration

- Entity declaration is essentially a macro
- Two types of entity:
  - General: referenced from HTML document using &




Replacement text;
recursively replaced if it is a reference

# XML Entity Declaration

- Entity declaration is essentially a macro
- Two types of entity:
  - General: referenced from HTML document using &

```
<!ENTITY gt      "&#62;">
```

  - Parameter: reference from DTD using %

```
<!ENTITY %LanguageCode "NMTOKEN">

<!ATTLIST html
  lang         NMTOKEN    #IMPLIED
  xml:lang     %LanguageCode; #IMPLIED
```

# XML Entity Declaration

- Entity declaration is essentially a macro
- Two types of entity:
  - General: referenced from HTML document using &

```
<!ENTITY gt      "&#62;">
```

  - Parameter: reference from DTD using %

```
<!ENTITY % LanguageCode "NMTOKEN">

<!ATTLIST html
  lang        NMTOKEN    #IMPLIED
  xml:lang    %LanguageCode; #IMPLIED
```

# DTD Files

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

*System Identifier*: URL for primary DTD document

- DTD document contains element type, attribute list, and entity declarations
- May also contain declaration of external entities: identifiers for secondary DTD documents

# DTD Files

External entity name

```
<!ENTITY % HTMLlat1 PUBLIC
   "-//W3C//ENTITIES Latin 1 for XHTML//EN"
   "xhtml-lat1.ent">
%HTMLlat1;
```

# DTD Files

```
<!ENTITY % HTMLlat1 PUBLIC
   "-//W3C//ENTITIES Latin 1 for XHTML//EN"
   "xhtml-lat1.ent">
%HTMLlat1;
```

System identifier (relative URL)

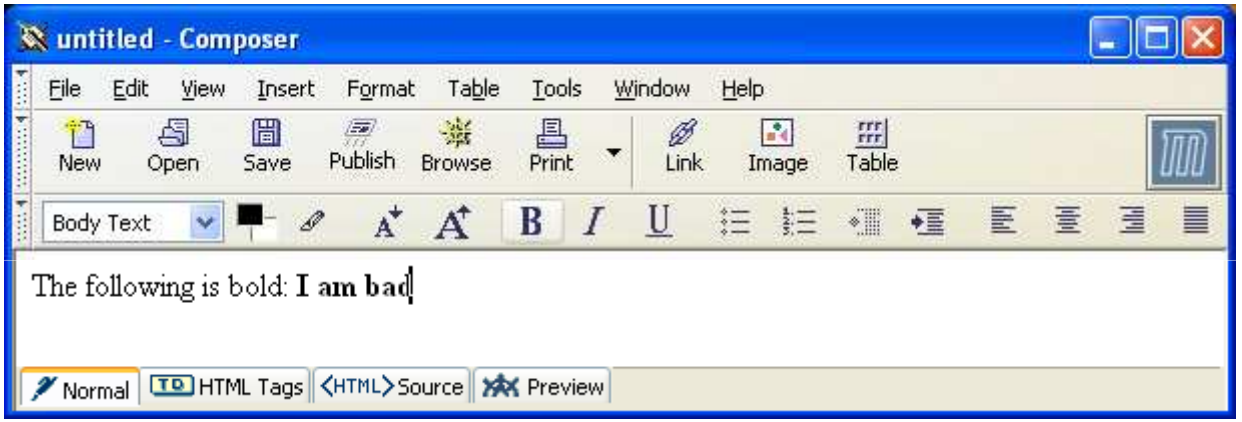
# DTD Files

```
<!ENTITY % HTMLlat1 PUBLIC
   "-//W3C//ENTITIES Latin 1 for XHTML//EN"
   "xhtml-lat1.ent">
%HTMLlat1;
```

Entity reference; imports content (entity declarations, called *entity set*) of external entity at this point in the primary DTD

# HTML Creation Tools

- Mozilla Composer




- Microsoft FrontPage
- Macromedia Dreamweaver
- Etc.