Computer Science E-75

Building Dynamic, Scalable Websites

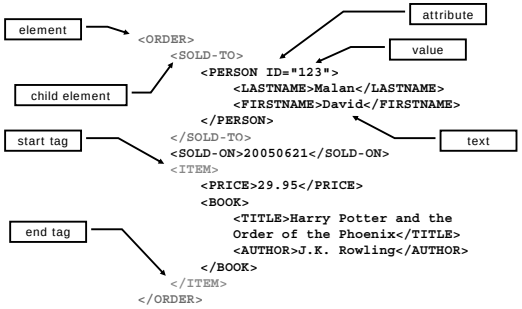
Harvard Extension School
http://www.cs75.net/

Lecture 3: XML

David J. Malan
malan@post.harvard.edu

A Dynamic Website

XML



Extensibility

```
<ORDER>
    <SOLD-TO>
        <PERSON ID="123">
            <LASTNAME>Malan</LASTNAME>
            <FIRSTNAME>David</FIRSTNAME>
            <INITIAL>J</INITIAL>
            <ADDRESS>
                <STREET>Oxford Street</STREET>
                <NUMBER>33</NUMBER>
                <CITY>Cambridge</CITY>
                <STATE>MA</STATE>
            </ADDRESS>
        </PERSON>
    </SOLD-TO>
    <SOLD-ON>20050621</SOLD-ON>
    <ITEM>
        ...
    </ITEM>
</ORDER>
```

extend structure without breaking existing data and applications

<students/>

```
<?xml version="1.0" encoding="UTF-8"?>

<!-- This is an XML document that describes students -->
<students>
        <student id="0001">
                <name>Jim Bob</name>
                <status>graduate</status>
                <dorm/>
                <major>Computer Science &amp;amp; Music</major>
                <description>
                        <![CDATA[ <h1>Jim Bob!</h1>
                        Hi my name is jim.  I look like
                        <img src="jim.jpg"> ]]>
                </description>
        </student>
        <student id="0002">
                ...
        </student>
</students>
```


<?xml version="1.0" encoding="UTF-8"?>

XML Declaration

- Optional
- Must appear at the very top of an XML document
- Used to indicate the version of the specification to which the document conforms (and whether the document is “standalone”)
- Used to indicate the character encoding of the document
  - UTF-8
  - UTF-16
  - iso-8859-1
  - …

<name>Jim Bob</name>

Elements

- Main structure in an XML document
- Only one root element allowed
- Start Tag
  - Allows specification of zero or more attributes
    `<student id="0001" ...>`
- End Tag
  - Must match name, case, and nesting level of start tag
    `</student>`
- Name must start with letter or underscore and can contain only letters, numbers, hyphens, periods, and underscores

Content Models

- Element Content
  ```
  <student>
      <status>...</status>
  </student>
  ```
- Parsed Character Data (aka PCDATA, aka Text)
  `<name>Jim Bob</name>`
- Mixed Content
  `<name>Jim <initial>J</initial> Bob</name>`
- No Content
  `<dorm/>`

<student id="0001">

Attributes

- Name
  - Must start with letter or underscore and can contain only letters, numbers, hyphens, periods, and underscores
- Value
  - Can be of several types, but is almost always a string
  - Must be quoted
    - `title="Lecture 2"`
    - `match='item="baseball bat"'`
  - Cannot contain `<` or `&` (by itself)

Jim Bob

PCDATA

- Text that appears as the content of an element
- Can reference entities
- Cannot contain `<` or `&` (by itself)

&

Entities

- Used to "escape" content or include content that is hard to enter or repeated frequently
  - Somewhat like macros
- Five pre-defined entities
  - `& < > &apos; &quot;`
- Character entities can refer to a single character by unicode number
  - *e.g.*, `&#x00A9;` is ©
- Must be declared to be legal
  - `<!ENTITY nbsp " ">`
- Cannot refer to themselves

<![CDATA[<h1>Jim Bob!</h1> ...]]>

CDATA

- Parsed in "one chunk" by the XML parser
- Data within is not checked for subelements, entities, *etc*.
- Allows you to include badly formed markup or character data that would cause a problem during parsing
- Example
  - Including HTML tags in an XML document

<!-- This is ... -->

Comments

- Can include any text inside a comment to make it easier for human readers to understand your document
- Generally not available to applications reading the document
- Always begin with `<!--` and end with `-->`
- Cannot contain `--`

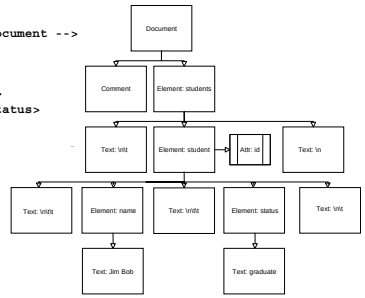
SimpleXML

http://us2.php.net/simplexml

DOM

```
<!-- smaller, simpler document -->

<students>
  <student id="1">
    <name>Jim Bob</name>
    <status>graduate</status>
  </student>
</students>
```



RSS

http://cyber.law.harvard.edu/rss/rss.html

Image from wikipedia.org.

RSS

```
<?xml version="1.0" encoding="UTF-8"?>
<rss version="2.0">
    <channel>
        <title></title>
        <description></description>
        <link></link>
        <item>
            <guid></guid>
            <title></title>
            <link></link>
            <description></description>
            <category></category>
            <pubDate></pubDate>
        </item>
        [...]
    </channel>
</rss>
```


XPath

```
/child::lectures/child::lecture[@number='0']
```

step — axis — node test — predicate

location path

PizzaML

Image from junkfoodnews.net.

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