Computer Science E-75

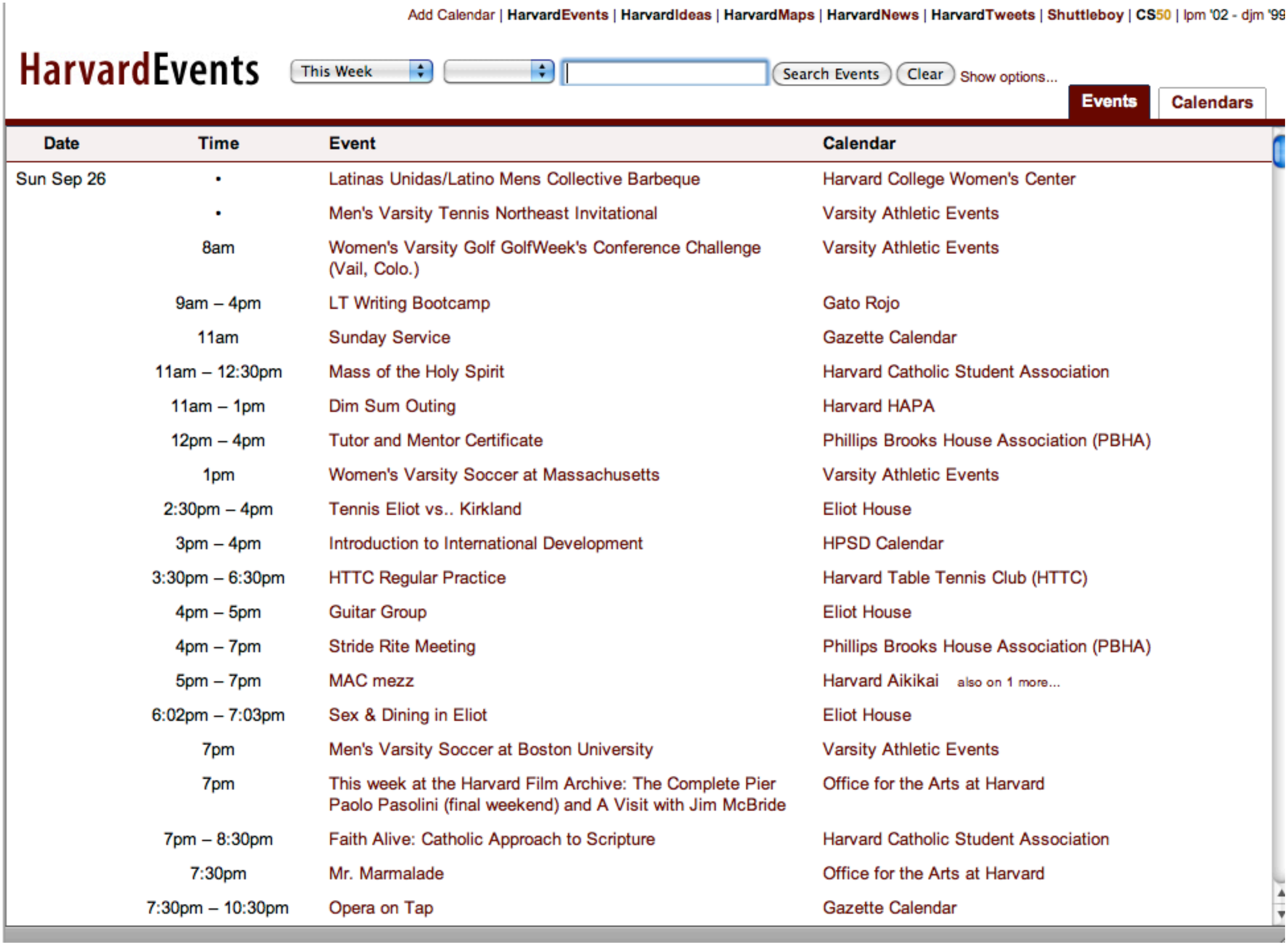
Building Dynamic Websites

Harvard Extension School

http://www.cs75.net/

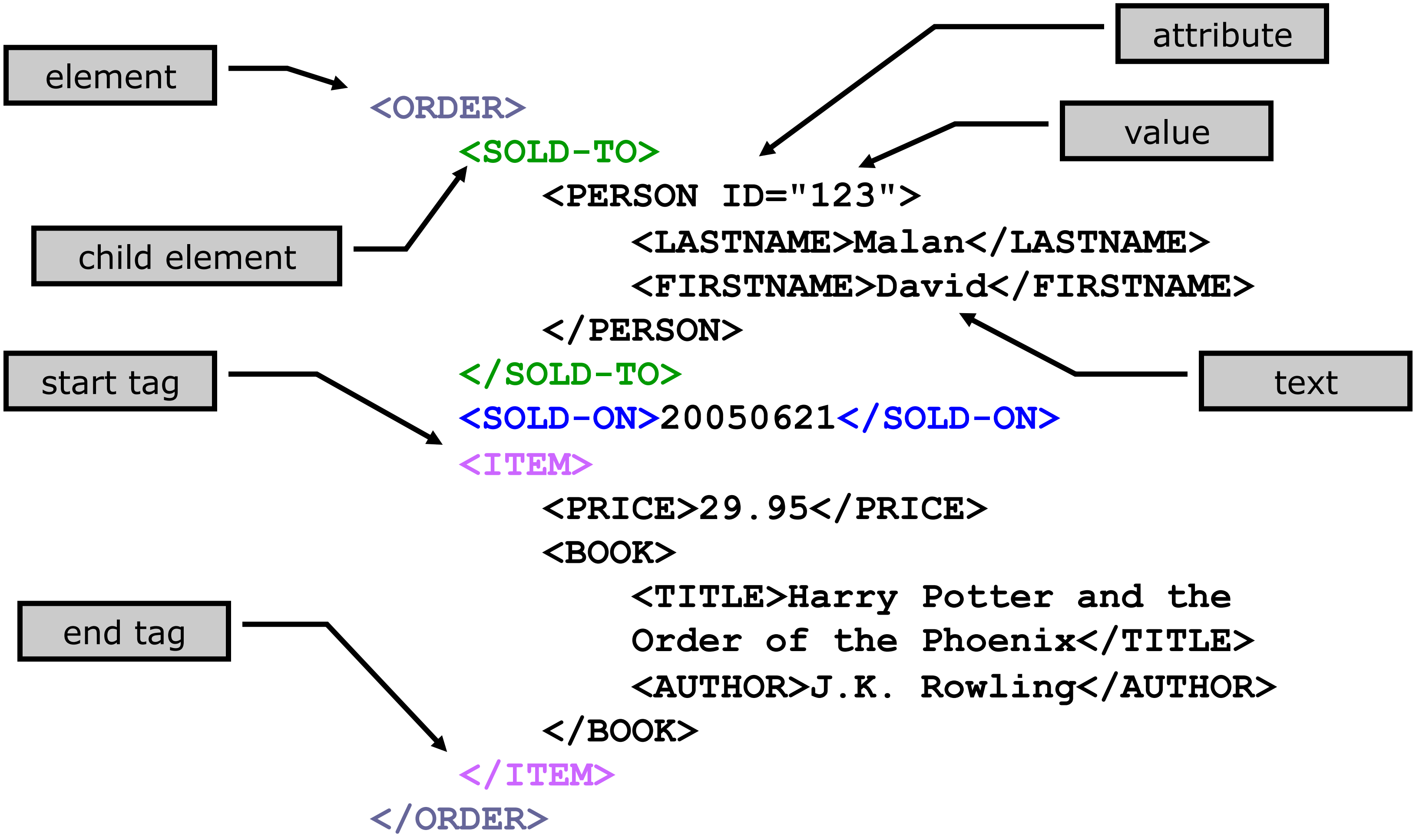
Lecture 3: XML

David J. Malan
dmalan@harvard.edu


Add Calendar | HarvardEvents | HarvardIdeas | HarvardMaps | HarvardNews | HarvardTweets | Shuttleboy | CS50 | lpm '02 - djm '99
HarvardEvents
This Week
Search Events
Clear
Show options...
Events
Calendars

Date	Time	Event	Calendar
Sun Sep 26	•	Latinas Unidas/Latino Mens Collective Barbeque	Harvard College Women's Center
	•	Men's Varsity Tennis Northeast Invitational	Varsity Athletic Events
	8am	Women's Varsity Golf GolfWeek's Conference Challenge (Vail, Colo.)	Varsity Athletic Events
	9am – 4pm	LT Writing Bootcamp	Gato Rojo
	11am	Sunday Service	Gazette Calendar
	11am – 12:30pm	Mass of the Holy Spirit	Harvard Catholic Student Association
	11am – 1pm	Dim Sum Outing	Harvard HAPA
	12pm – 4pm	Tutor and Mentor Certificate	Phillips Brooks House Association (PBHA)
	1pm	Women's Varsity Soccer at Massachusetts	Varsity Athletic Events
	2:30pm – 4pm	Tennis Eliot vs.. Kirkland	Eliot House
	3pm – 4pm	Introduction to International Development	HPSD Calendar
	3:30pm – 6:30pm	HTTC Regular Practice	Harvard Table Tennis Club (HTTC)
	4pm – 5pm	Guitar Group	Eliot House
	4pm – 7pm	Stride Rite Meeting	Phillips Brooks House Association (PBHA)
	5pm – 7pm	MAC mezz	Harvard Aikikai also on 1 more...
	6:02pm – 7:03pm	Sex & Dining in Eliot	Eliot House
	7pm	Men's Varsity Soccer at Boston University	Varsity Athletic Events
	7pm	This week at the Harvard Film Archive: The Complete Pier Paolo Pasolini (final weekend) and A Visit with Jim McBride	Office for the Arts at Harvard
	7pm – 8:30pm	Faith Alive: Catholic Approach to Scripture	Harvard Catholic Student Association
	7:30pm	Mr. Marmalade	Office for the Arts at Harvard
	7:30pm – 10:30pm	Opera on Tap	Gazette Calendar

XML



```
<ORDER>
    <SOLD-TO>
        <PERSON ID="123">
            <LASTNAME>Malan</LASTNAME>
            <FIRSTNAME>David</FIRSTNAME>
        </PERSON>
    </SOLD-TO>
    <SOLD-ON>20050621</SOLD-ON>
    <ITEM>
        <PRICE>29.95</PRICE>
        <BOOK>
            <TITLE>Harry Potter and the
            Order of the Phoenix</TITLE>
            <AUTHOR>J.K. Rowling</AUTHOR>
        </BOOK>
    </ITEM>
</ORDER>
```

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; 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
  - …

Elements

```
<name>Jim Bob</name>
```

- 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)

`&amp;`

Entities

- Used to “escape” content or include content that is hard to enter or repeated frequently
  - Somewhat like macros
- Five pre-defined entities
  - `&amp; &lt; &gt; &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 "&#160;">`
- 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 `--`

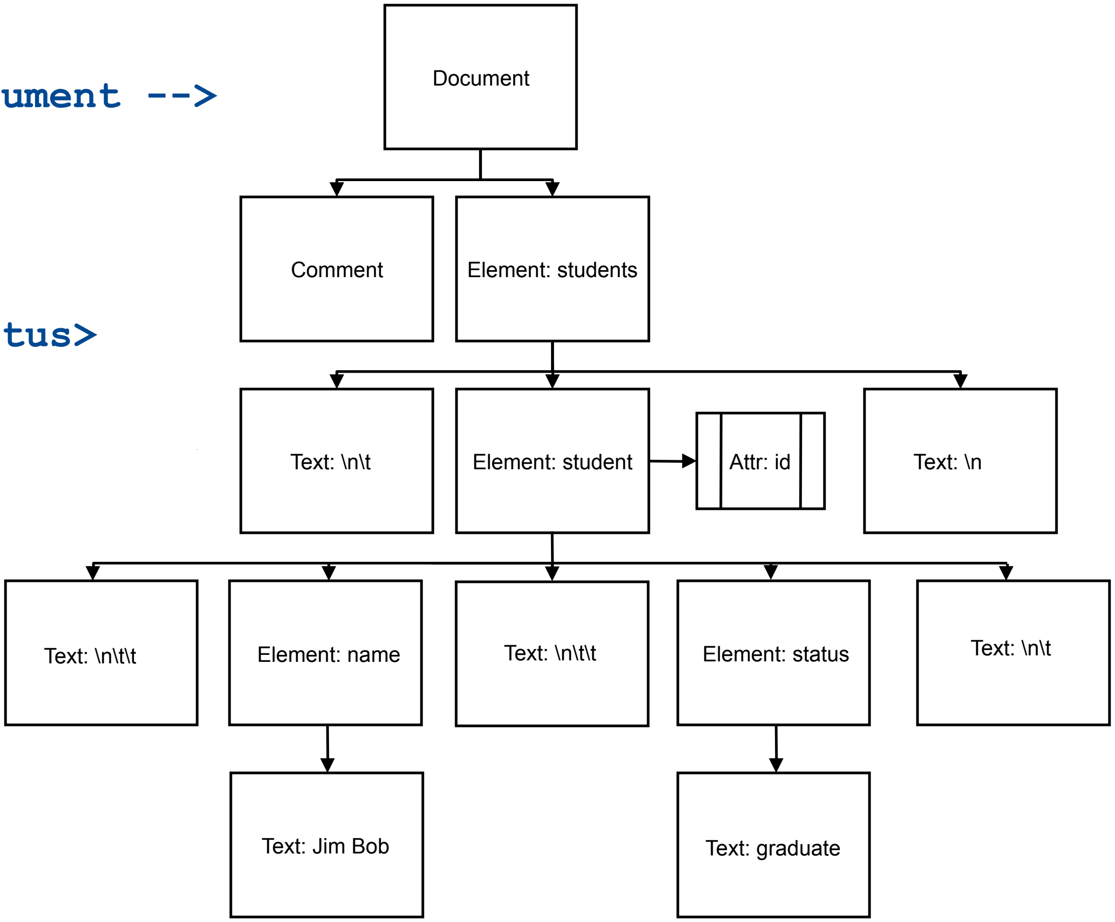
SimpleXML

`http://us2.php.net/simplexml`

DOM

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

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



RSS

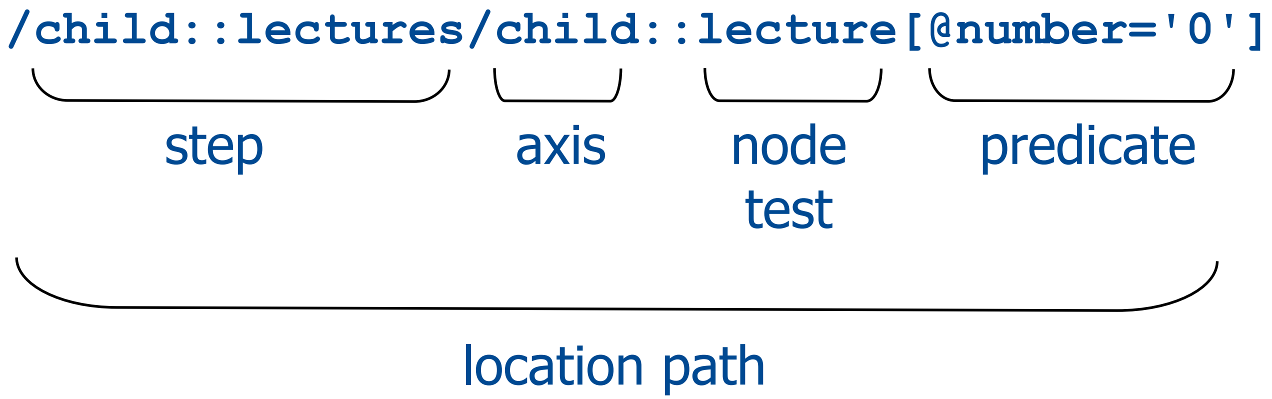
http://cyber.law.harvard.edu/rss/rss.html

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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