

CMSC 330: Organization of Programming Languages

Markup & Query Languages

Other Language Types

- Markup languages
 - Set of annotations to text
- Query languages
 - Make queries to databases & information systems
- Used together in
 - Web interface to databases

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2

Markup Languages

- Set of annotations (tags) added to text
 - Example – `<tag> text </tag>`
- Describe how text is
 - Structured, laid out, formatted...
- First used in publishing industry
 - Typesetting, proofreading
 - `nroff`, `troff`, TeX, LaTeX
 - Mostly replaced by WYSIWYG editors like MS Word
 - What you see is what you get
- Regained importance with advent of web
 - Used to describe format & presentation of web pages

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3

History of Markup Languages

- GML (1960s)
 - Generalized markup language
 - Describe both structure & presentation of content
- HTML (1991)
 - Hypertext markup language
 - Flexible & simple descriptive markup for web pages
 - Hypertext links parts of document to other documents

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4

History of Markup Languages (cont.)

- XML (1998)
 - Extensible markup language
 - Language for describing tags (meta-language)
 - User can create tags and describe their uses
 - Used to describe documents w/ structured information
 - No mechanism for displaying XML document

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5

Markup Language – GML

- Example

```
:h1.Recipes:
:p.Bread
:ol
:li.Flour
:li.Yeast
:li.Water
:eol
```

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6

Markup Language – HTML

- ▶ Example

```
<html>
<head><title>Bread Recipe</title></head>
<body>
<h1>Bread</h1>
<ol>
<li>Flour
<li>Yeast
<li>Water
</ol>
</body>
</html>
```

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7

Markup Language – XML

- ▶ Example

```
<recipe name="Bread">
<title>Bread</title>
<ingredient>Flour </ingredient>
<ingredient>Yeast</ingredient>
<ingredient>Water</ingredient>
</recipe>
```

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8

HTML / XML Elements

- ▶ Element
 - A start tag, an end tag, and data in between
 - Examples
 - > <director> Tyler Perry </director>
 - > <actor> Tyler Perry </actor>
- ▶ Attribute
 - A name-value pair separated by an equal sign (=)
 - Used to attach additional information to an element
 - Example
 - > <city ZIP="20742"> College Park </city>

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9

HTML Elements

- ▶ Structural
 - Describes purpose of text
 - Examples
 - > <h1> Level 1 heading </h1>
 - > Ordered list
 - > Unordered list
 - > List item

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10

HTML Elements (cont.)

- ▶ Presentation
 - Describes appearance of text
 - Examples
 - > boldface
 - > <i> italics </i>
 - > <p> line spacing </p>
- ▶ Hypertext
 - Links part of document to other documents
 - Examples
 - > <a> Anchor
 - > URL link

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11

XML Document

- ▶ An XML element with nested XML elements
 - Example

```
<movies>
<movie year="2005">
<title> Diary of a Mad Black Woman </title>
<director> Tyler Perry </director>
</movie>
<movie year="2006">
<title> Madea's Family Reunion </title>
<director> Tyler Perry </director>
</movie>
</movies>
```

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12

XML Documents (cont.)

- ▶ Guidelines
 - Elements must have an end tag (unlike HTML)
 - Elements must be cleanly nested
 - Overlapping elements are not allowed
 - Attribute values must be enclosed in quotation marks
 - Document must have unique first element (root node)
- ▶ Document Type Definition (DTD)
 - User can create set of rules to specify legal content
 - Place restrictions on XML file

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13

Comparing HTML With XML

- | | |
|-----------------------------------|--------------------------------|
| ▶ HTML | ▶ XML |
| • Fixed set of tags | • Extensible set of tags |
| • Presentation oriented | • Content oriented |
| • No data validation capabilities | • Standard Data infrastructure |
| • Single presentation | • Multiple output forms |

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14

Using Markup Languages

- ▶ Descriptive markup
 - Structure
 - How is this organized? (<chapter>, <section>)
 - Semantics
 - What is this? (<person>, <title>)
- ▶ Separate presentation from content
 - Keep presentation elsewhere (CSS, XSL)
 - Puts content in "delivery neutral format"
 - <h1> is a first level heading, but can be any font

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15

Markup Language Usage

- ▶ Started with documents
- ▶ Now also used to organize
 - Metadata
 - Data about data, used to help understand / manage data
 - Example: <LastName optional="true"> Smith </LastName>
 - Transactions
 - Single unit of work for application
 - Applications
 - Helping applications interact / work together

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16

Query Languages

- ▶ Make queries to
 - Databases
 - Information systems
- ▶ Goals
 - Data retrieval
 - Data management
- ▶ Examples
 - SQL (1970s) – Query relational databases
 - LDAP (1993) – Query directory services for TCP/IP

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17

Databases (DB)

- ▶ A structured collection of data (records)
 - Whose content can be quickly and easily
 - Accessed, managed, updated
- ▶ Database model
 - Hierarchical
 - Records are stored in a tree
 - Network
 - Records have links to other records
 - Relational
 - Records are stored in tables (relations)

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18