

XML Syntax for Relational Database Systems

Behrooz Seyed-Abbassi,

- Impact on formatting of Internet data
- Rapid evolution of XML

1997- World Wide Web Consortium (W3C) adopts a **tag-based**, less complex derivative of SGML called **Extensible Markup Language (XML)**.

1998- XML introduced as an applicable language for utilization with database systems using **semi-structured data and web-based systems**.



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Changes in Web Technology

Impact on formatting of Internet data

resulting in

Rapid evolution of XML
&
Its incorporation in database systems

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XML Paradigm

Tag-based, meta-language similar to HTML

- Represents and manipulates data elements in an organized structure with start tag and end tag -- <start> ... </end>

Example:

```
<FacultyName> Nancy Fields </FacultyName>  
Or  
<PartName> Modem </PartName>
```

- Tags:**
- Should be well-formed and valid
 - Have beginning and end tags
 - Use the same case
 - Be properly nested
 - XML or xml prefixes reserved for XML tags only
 - Not a replacement for HTML

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XML Document Example (FacultyInfo.xml)

```
<FACULTY>  
  <FIRSTNAME>Jim</FIRSTNAME>  
  <LASTNAME>Lange</LASTNAME>  
  <TITLE>Associate</TITLE>  
  <BIRTHDATE>12/25/1953</BIRTHDATE>  
  <ADDRESS>500 Main Street</ADDRESS>  
  <SALARY>50000</SALARY>  
</FACULTY>  
<FACULTY>  
  <FIRSTNAME>Jack</FIRSTNAME>  
  <LASTNAME>Amick</LASTNAME>  
  <TITLE>Assistant</TITLE>  
  <BIRTHDATE>1/10/1973</BIRTHDATE>  
  <ADDRESS>16 Lawn Ave.</ADDRESS>  
  <SALARY>35000</SALARY>  
</FACULTY>  
<FACULTY>  
  <FIRSTNAME>Helen</FIRSTNAME>  
  <LASTNAME>Knapp</LASTNAME>  
  <TITLE>Full Professor</TITLE>  
  <BIRTHDATE>1/10/1965</BIRTHDATE>  
  <ADDRESS>16 May Ave.</ADDRESS>  
  <SALARY>85000</SALARY>  
</FACULTY>
```

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XML Documents

Stored as text file using one of its major formats or templates for distribution by the Internet to different users on different sites.

- Data Type Definition (DTD)
- XML Schema Definition (XSD)

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Document Type Definition (DTD)

- File with .dtd extension to describe XML elements
- Provides composition of database's logical model
- Defines syntax rules for each XML document
- Defines valid tags

FacultyInfo is the root element

+ Occurrence of one or more times

* Occurrence of zero or more times

? Indicates optional elements

#PCDATA keyword represents the actual text data

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XML Document and DTD Document Example

```
<?xml version="1.0"?>
<DOCTYPE Faculty INFORMATION "Faculty Info.dtd">
<FACULTY>
  <FIRSTNAME>Jim</FIRSTNAME>
  <LASTNAME>Lange</LASTNAME>
  <TITLE>Associate</TITLE>
  <BIRTHDATE>12/25/1953</BIRTHDATE>
  <ADDRESS>500 Main Street</ADDRESS>
  <SALARY>50000</SALARY>
</FACULTY>
<FACULTY>
  <FIRSTNAME>Jack</FIRSTNAME>
  <LASTNAME>Amick</LASTNAME>
  <TITLE>Assistant</TITLE>
  <BIRTHDATE>1/10/1973</BIRTHDATE>
  <ADDRESS>16 Lawn Ave.</ADDRESS>
  <SALARY>35000</SALARY>
</FACULTY>
<FACULTY>
  <FIRSTNAME>Helen</FIRSTNAME>
  <LASTNAME>Knapp</LASTNAME>
  <TITLE>Full Professor</TITLE>
  <BIRTHDATE>1/10/1965</BIRTHDATE>
  <ADDRESS>16 May Ave.</ADDRESS>
  <SALARY>85000</SALARY>
</FACULTY>
```

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XML Schema

- Advanced data definition language to describe structure of XML documents
- Checks for database types
- Validates data for out-of-range values
- XML Schema Definition (XSD) file uses syntax-like XML document

Example of a simple type

```
<xsd:element name="FacultyID" type="xsd:integer"/>
```

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XML Schema Document Example

```
<?xml version="1.0"?>
<schema xmlns:xsd="FacultyXSDnew" elementFormDefault="qualified"
attributeFormDefault="qualified">
<xsd:complexType name="Faculty">
<xsd:element name="FIRSTNAME" type="xsd:string" maxOccurs="10" minOccurs="1" />
<xsd:element name="LASTNAME" type="xsd:string" maxOccurs="20" minOccurs="1" />
<xsd:element name="TITLE" type="xsd:string" maxOccurs="1" minOccurs="1" />
<xsd:element name="BIRTHDATE" type="xsd:date" maxOccurs="1" minOccurs="1"
date="mm/dd/yyyy" />
<xsd:element name="ADDRESS" type="xsd:string" maxOccurs="15" minOccurs="1" />
<xsd:element name="SALARY" type="xsd:decimal" maxOccurs="8" minOccurs="1" fraction="2" />
</xsd:complexType>
</schema>
```

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XML Project addition to SQL Engine Work

Development of simple Parsing language

to create insert Commands for relational Database and
SQL with added symbols

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