

## Recent Developments for Data Models – Exercise 6

Monday, July 16, 2012 – 15:30 to 17:00 – Room 36-336

### 1) XML Data Type Conversions

SQL/XML provides a new SQL built-in data type called XML. A value of the XML data type is distinct from a textual representation of the same XML data. SQL/XML provides a set of functions that can be used for converting between XML and other data types, namely `XMLParse`, `XMLSerialize` and `XMLCast`.

What result is produced by the following SQL statements?

- a. `VALUES(XMLParse(DOCUMENT '<b><c></a>'));`
- b. `VALUES(XMLParse(DOCUMENT '><b><c/>'));`
- c. `VALUES(XMLCast('<b><c/></a>' AS XML));`
- d. `VALUES(XMLCast('<a/><b/><c/>' AS XML));`
- e. `VALUES(XMLSerialize(  
XMLParse(DOCUMENT  
'<a> <b> text </b> <c> </c> </a>'  
AS VARCHAR(40)));`
- f. `VALUES(XMLSerialize(  
XMLParse(DOCUMENT  
'<a> <b> text </b> <c> </c> </a>'  
PRESERVE WHITESPACE) AS VARCHAR(40)));`
- g. `VALUES(XMLCast(  
XMLParse(DOCUMENT  
'<a> <b> text </b> <c> </c> </a>'  
AS VARCHAR(20)));`
- h. `VALUES(XMLCast(  
XMLParse(DOCUMENT  
'<a> <b> text </b> <c> </c> </a>') AS XML));`

### 2) XML Publishing Functions

SQL/XML provides a set of functions for converting (or publishing) relational data into XML format. Reconsider the publication database schema introduced by the first exercise sheet. Specify SQL/XML queries to publish the relational data as XML!

- a. Use the `XMLElement` function to obtain data of the following structure.

PUBLKEY	2
EiMe02	<publication> <title>SQL/XML is Making Good Progress</title> <year>2002</year> </publication>
...	...

- b. Use the XMLForest function to obtain data of the structure indicated in a.  
c. Specify an SQL/XML query to obtain data of the following structure.

PUBLKEY	2
EiMe02	<publication title="SQL/XML is Making Good Progress" year="2002"/>
...	...

- d. Specify an SQL/XML query to obtain data of the following structure.

PUBLKEY	2
EiMe02	<publication> <title>SQL/XML is Making Good Progress</title> was published in the year <year>2002</year> </publication>
...	...

- e. Specify an SQL/XML query to obtain data of the following structure.

YEAR	2
2002	<year year="2002"> <title>XQuery: An XML query language</title> <title>SQL/XML is Making Good Progress</title> </year>
...	...

- f. Specify an SQL/XML query to obtain data of the following structure.

PUBLICA-TION	2
EiMe02	<publication> <title>SQL/XML is Making Good Progress</title> by <name>Eisenberg</name> <name>Melton</name> was published in the year <year>2002</year>. </publication>
...	...

- g. Specify an SQL/XML query to obtain data of the following structure.

PUBLKEY	2
EiMe02	SQL/XML is Making Good Progress is electronically available at <a href="some url">some url</a>.
...	...

- h. Specify an SQL/XML query to obtain data of the following structure.

1
<pre> &lt;authors&gt;   &lt;firstname&gt;Andrew&lt;/firstname&gt;   &lt;lastname&gt;Eisenberg&lt;/lastname&gt;   &lt;firstname&gt;Jim&lt;/firstname&gt;   &lt;lastname&gt;Melton&lt;/lastname&gt;   ... &lt;/authors&gt; </pre>

- i. Specify an SQL/XML query to obtain data of the following structure.

PUBLKEY	2
ABD+90	<pre> &lt;publication&gt;   &lt;title&gt;     The Object-Oriented Database System Manifesto   &lt;/title&gt;   &lt;author position="1"&gt;     &lt;firstname&gt;Malcolm P.&lt;/firstname&gt;     &lt;lastname&gt;Atkinson&lt;/lastname&gt;   &lt;/author&gt;   &lt;author position="2"&gt;     &lt;firstname&gt;François &lt;/firstname&gt;     &lt;lastname&gt;Bancilhon&lt;/lastname&gt;   &lt;/author&gt;   ...   &lt;keyword&gt;object-relational&lt;/keyword&gt; &lt;/publication&gt; </pre>
...	...

### 3) XML Query Functions

SQL/XML allows for embedding XQuery expressions inside SQL statements. In this way, XML values stored or generated by an SQL database may be queried.

SQL/XML provides three functions for this purpose: `XMLQuery`, which executes an XQuery expression and returns a scalar value; `XMLExists`, which acts as a predicate, and `XMLTable`, which executes an XQuery expression and returns the result in the form of a table.

Consider the following view definition!

```

create view pubview as
  select publication, XMLDOCUMENT(XMLELEMENT(
    NAME "publication",
    XMLELEMENT(NAME "title", publication->title),
    XMLELEMENT(NAME "year", YEAR(publication->pdate)),
    XMLAGG(
      XMLELEMENT (NAME "keyword", keyw->topic)
      ORDER BY keyw->topic
    )
  )) AS pubxml
  from publkeywords
  group by publication;

```

- a. Specify a query that retrieves publications with the keyword “XML” from the view.
- b. What tuples are returned by the following query?

```
select publication, pubxml,
       XMLCAST(XMLQuery('$publ//keyword/text() = "XML"'
       PASSING pubxml AS "publ") AS CHAR(5))
from pubview
where XMExists('$publ//keyword/text() = "XML"'
              PASSING pubxml AS "publ");
```

- c. Specify a query to retrieve all tuples from the view such that the XML column contains the title of the publication only.
- d. Specify a query to retrieve all tuples from the view and restructure the XML column as indicated by the following example.

PUBLKEY	2
ABD+90	<pre>&lt;publication year="1990"&gt;   &lt;title&gt;     The Object-Oriented Database System Manifesto   &lt;/title&gt;   &lt;keywords count="1"&gt;     &lt;keyword&gt;object-relational&lt;/keyword&gt;   &lt;/keywords&gt; &lt;/publication&gt;</pre>
...	...

- e. Specify a query to retrieve flat relational tuples including the publication key, the title, and the year of those publications that appeared since 2000.
- f. Extend the query of e) and add an XML column that contains all keyword elements nested within a root element called “keywords”.
- g. Assume that a table called “ImportantTopics” exists that contains a single column named “keyword”. Specify a query to retrieve the key and title of publications (as flat tuples) that have at least one important keyword.

#### 4) XQuery Update

The XQuery Update Facility provides expressions that can be used to make persistent changes to instances of XML data. Assume that a table named “pubtab” is created with the same schema as the view “pubview” defined in 3). Specify XQuery Update expressions for the following tasks!

- a. Set the year of the publication with key “ABD+90” to “1992 “.
- b. Delete the keyword “XML” from all publications.
- c. Rename the element “year” to “yearOfPublication”.
- d. Add the keyword “SQL/XML” to those publications where “SQL/XML” is found in the title.