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Data Models and Query Languages Summerterm 2014

4. Exercise Sheet: XQuery, XPath, SQL/XML

Submission: 26.06.2014, 14:00
Discussion: 26.06.2014

Submission Guidelines: Please hand out your written solutions directly to your tutors right before the exercise session. If you want to submit before the deadline, you can leave your solutions in the mail box in building 51-01 (first floor). Hand written solutions are also accepted as long as these are readable.

For solving the XML-related exercises it is recommended to use the tools specified in the section “recommended tools” in the webpage of the exercises.

Exercise 1 (XQuery, 6 Points)

- Consider the following variables:
 $\$x = (1, 2, 3)$, $\$y = (2, 4, 6)$, $\$z = (3, 6, 9)$
Verify that: $\$x > \y and $\$y > \z but $\$x \not> \z , justify your findings.
- Which of the following queries are pairwise equivalent? For query pairs that are not equivalent, give an XML document that verifies your findings.

c) (2 Pts.)

Query 1.1:

```
<q1> { for $a in /a, $b in $a//b return <match/> } </q1>
```

Query 1.2:

```
<q1> { for $a in /a return  
  for $b in $a//b return <match/> } </q1>
```

Query 1.3:

```
<q1> { for $b in /a//b return <match/> } </q1>
```

d) (2 Pts.)

Query 2.1:

```
<q2> { let $x := (1, 2, 3)  
  return <a>{ $x }</a> } </q2>
```

Query 2.2:

```
<q2> { let $x := (1, 2, 3)  
  for $y in $x return <a>{ $y }</a> } </q2>
```

Query 2.3:

```
<q2> { for $x in (1, 2, 3) return <a>{ $x }</a> } </q2>
```

e) (2 Pts.)

Query 3.1

```
<q3> { for $book in //book return
      for $article in //article
      where $article/author=$book/author
      return $book } </q3>
```

Query 3.2

```
<q3> { for $book in //book return
      for $article in //article return
      if ($article/author=$book/author)
      then $book else () } </q3>
```

Query 3.3

```
<q3> { for $book in //book return
      for $author in //article/author
      where $book/author=$author
      return $book } </q3>
```

Exercise 2 (XPath, XRel, 4 Points)

Given the XML document “bib.xml”¹. For each of the following queries, give the XPath expression that answers the query, and write the corresponding SQL query using XRel after formulating the needed tables.

- Output all unique authors’ last names. (1 Pts.)
- Output all the books published by “Addison-Wesley”. (1 Pts.)
- Output all the names of books² that was published after the year 1994 with a price lower than 50. (2 Pts.)

Exercise 3 (XML SQL, 3 Points)

Consider the following XML document:

```
<bib><book><title>DBMS</title><authors><author>Ramakrishnan</author>
<author>Gehrke</author></authors></book></bib>
```

- Draw the tree representation of the document and give for very node n its preorder rank $pre(n)$, postorder rank $post(n)$, depth $level(n)$ and size of its subtree $size(n)$. (2 Pts.)
- Is there a correlation between preorder/postorder rank and start/end tags? (1 Pts.)

¹<http://tinyurl.com/small-bib-xml>

²It is enough to output the starting position and the end position of the corresponding element instead of returning the element it self.