



Data Models and Query Languages Summerterm 2014

3. Exercise Sheet: Data Exchange, XML, DTD, XPath, XQuery

Submission: 05.06.2014, 14:00
Discussion: 05.06.2014

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 (Data Exchange, 3 Points)

Consider the following setting of a data-exchange problem. The source has three relations R, S, T with the same format $\{A, B, C\}$. The target schema has only one relation P with format $\{A, B, C\}$. Let M be the semantic mapping between S and T :

- $R(a, b, c) \rightarrow \exists Y \exists Z P(a, Y, Z)$
- $S(a, b, c) \rightarrow \exists X \exists U P(X, b, U)$
- $T(a, b, c) \rightarrow \exists V \exists W P(V, W, c)$

Let I be an instance of S :

$I = \{R(a_0, b'_0, c'_0), S(a''_0, b_0, c''_0), T(a'''_0, b'''_0, c_0)\}$

- Apply the Chase algorithm to derive a data-exchange universal solution (1 pts.).
- Are the following also data-exchange solutions? Justify your answer (1 pts.).
 - $J_1 = \{P(a_0, b_0, Z_1), P(V_1, W_1, c_0)\}$
 - $J_2 = \{P(a_0, b_0, c_0)\}$
- Find the homomorphisms from your derived universal solution from a) to the solutions from b) (1 pts.).

Exercise 2 (XML, DTD, XPath, XQuery, 5 Points)

- The XML document *programGuide.xml* describes the schedule of TV channels. Write a DTD which defines its structure (3 pts.).
- Based on the same XML document write an XPath expression which:
 - retrieves the names of all programs (0.5 pt.);
 - retrieves the names of all afternoon programs (> 12.00) (0.5 pt.);

- retrieves all URLs of the pictures used in the document (0.5 pt.);
 - retrieves the names of all programs for which pictures exist (0.5 pt.).
- c) Write a XQuery which transforms *programGuide.xml* into a website. The resulting output should be as the one in *ex2.3-expected-output.html*

Exercise 3 (XQuery - Understand given queries, 2 Points)

The XML document (named “book.xml”) describes an excerpt of the book “Data on the Web”.

Consider the four XQuery expressions *book-xquery1.xquery*, *book-xquery2.xquery*, *book-xquery3.xquery*, *book-xquery4.xquery*. What is the result of evaluating each of the queries? Provide the results for each of the queries and explain in your own words what is each of the queries asking for.