Universität Freiburg
Institut für Informatik
Michael Meier
Fang Wei

Georges-Köhler Allee, Geb. 51
D-79110 Freiburg
Tel. (0761) 203-8126
Tel. (0761) 203-8125

Webbasierte Informationssysteme
Winter Term 2010/2011
December 1, 2010

Sixth Exercise Set: SPARQL

Exercise 1

We write $P_1 \equiv P_2$ for two SPARQL queries P_1, P_2 if and only if P_1 and P_2 yield the same result on every possible RDF document.

Let A, B, and C be SPARQL graph patterns, i.e. they are composed of BGPs, Union, Join and Leftjoin. For each of the following equivalences either prove that it holds or show – by counterexample – that the equivalence does not hold.

Note that we use LEFTJOIN(A, B) as an abbreviation for LEFTJOIN$(A, B, true)$. Assume that filter conditions are built from variables, URIs, literals, the bound operator, equality and the logical connectives $!, \wedge, \vee$

a) UNION$(A, A) \equiv A$

b) LEFTJOIN$(A, A) \equiv A$

c) JOIN$(A, A) \equiv A$

d) UNION$(A, \text{JOIN}(B, C)) \equiv \text{JOIN}(\text{UNION}(A, B), \text{UNION}(A, C))$

e) JOIN$(A, \text{UNION}(B, C)) \equiv \text{UNION}(\text{JOIN}(A, B), \text{JOIN}(A, C))$

f) LEFTJOIN$(A, B) \equiv \text{LEFTJOIN}(A, \text{JOIN}(A, B))$

g) LEFTJOIN$(\text{UNION}(A, B), C) \equiv \text{UNION}(\text{LEFTJOIN}(A, C), \text{LEFTJOIN}(B, C))$

h) Let $?x$ be a variable that occurs in B. FILTER$(\text{LEFTJOIN}(A, B), bound(?x)) \equiv \text{JOIN}(A, B)$

i) Let $?x$ be a variable that occurs in A and F and F be a filter condition. FILTER$(\text{JOIN}(A, B), F) \equiv$ JOIN$(\text{FILTER}(A, F), B)$

j) Let $?x$ be a variable that occurs in A and F and F be a filter condition. FILTER$(\text{LEFTJOIN}(A, B), F) \equiv$ LEFTJOIN$(\text{FILTER}(A, F), B)$

Exercise 2

We consider the RDF database D from Exercise 1 on Exercise Set 5.

a) Provide the relational database instance that stores the RDF graph D according to the Vertical Partitioning scheme.

b) Translate the queries from Exercise 1 on Exercise Set 5 into SQL queries over the vertically partitioned scheme from part a).

Due by: December 8, 2010 before the tutorial starts.