Fourth exercise sheet for the lecture

XML and Programming Languages

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Exercise 11
Use the alternative CoreXPath semantics to give a "query tree" (over F_{axis}, $\cap$, etc.) for efficient evaluation of $/\mathsf{descendant} :: a/b[c/d \vee \neg(\mathsf{following} :: *)]$. $\diamond$

Exercise 12
Discuss the general complexity, in terms of query size and data size, of query evaluation using the alternative CoreXPath semantics, under the assumption that operations like F_{axis}, $\cap$, etc. execute in linear time depending on the sizes of their input sets. $\diamond$

Exercise 13
A CoreXPath path p_1 is said to semantically contain another one p_2, written $p_1 \supseteq p_2$, if for every tree document and node n therein, $[\![p_1]\!]_{NodeSet}(n) \supseteq [\![p_2]\!]_{NodeSet}(n)$.

1. Let $p_1 = r[(a/b) \wedge (a/c)]/d$ and $p_2 = r[(a[b]/c) \wedge d]/d$. Check whether $p_1 \supseteq p_2$ and/or $p_1 \subseteq p_2$.
2. Let $p_1 = a/b/c$ and $p_2 = a/b[c]/c$. Check whether $p_1 \supseteq p_2$ and/or $p_1 \subseteq p_2$. $\diamond$

Exercise 14
A CoreXPath path p_1 is said to be semantically equivalent to another one p_2, written $p_1 \equiv p_2$, if $p_1 \supseteq p_2$ and $p_1 \subseteq p_2$. Prove the following equivalences, where the t_i and q_i are arbitrary:

1. $\mathsf{descendant}::t_1[q_1]/\mathsf{parent}::t_2[q_2] \equiv \mathsf{descendant\text{-}or\text{-}self}::t_2[q_2 \wedge t_1[q_1]]$
2. $t_1[q_1 \wedge (\mathsf{parent}::t_2[q_2])] \equiv \mathsf{self}::t_2[q_2]/t_1[q_1]$ $\diamond$