

Fifth exercise sheet for the lecture

XML and Programming Languages

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Exercise 15

Consider the CoreXPath query $/\text{descendant} :: a/\text{preceding} :: b[\text{ancestor} :: c]$.

1. Give an equivalent query without reverse axis steps.
2. What would be generally applicable rules for doing the above transformation? \diamond

Exercise 16

Check query containment for each combination of the following CoreXPath expressions: $a/b/c$, $a/b[c]/*$, $a/b[*]/c$, $a/*/c$, and $*/b/c$. \diamond

Exercise 17

Find a minimal, equivalent Simple CoreXPath expression for $r[(a[b]/c) \wedge d]/d$. What further simplification would be possible if we knew that all inputs satisfy the DTD $(r, \{r \rightarrow a^*de, a \rightarrow (b|f|\epsilon)c, b \rightarrow c|\epsilon, c \rightarrow d, d \rightarrow \epsilon, e \rightarrow \epsilon, f \rightarrow \epsilon\})$? \diamond

Exercise 18

Consider the following formulas in first-order logic using only two variables:

1. $\phi(x) = \exists y. \text{descendant}(y, x) \wedge \neg \text{child}(x, y) \wedge \text{lab}_a(y)$
2. $\phi(x) = \exists y. \text{descendant}(y, x) \wedge \neg \text{child}(y, x) \wedge \text{lab}_a(y)$
3. $\phi(x) = \exists y. \neg \text{following-sibling}(y, x) \wedge \text{lab}_a(y)$
4. $\phi(x) = \exists y. (\exists x. \text{child}(y, x) \wedge \text{lab}_a(x) \wedge \text{lab}_b(y)) \wedge \text{descendant}(y, x) \wedge \neg \text{child}(y, x)$

For each, give an equivalent CoreXPath filter expression. \diamond