



Description Logics

Exercise Sheet 9

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The following two exercises finish the proof of Lemma 5.15.

Exercise 1

Show that the exhaustive application of the normalization rules NF1-NF5 to a general \mathcal{EL} -TBox terminates in polynomial time.

Exercise 2

Let \mathcal{T} be a general \mathcal{EL} -TBox and $\hat{\mathcal{T}}$ the TBox obtained from exhaustive application of rules NF1-NF5 to \mathcal{T} . Show

- $\hat{\mathcal{T}}$ is in normal form
- for all concept names A, B occurring in \mathcal{T} , $A \sqsubseteq_{\mathcal{T}} B$ iff $A \sqsubseteq_{\hat{\mathcal{T}}} B$.

Exercise 3

Consider the TBox \mathcal{T} having the following axioms:

$$\begin{aligned} A &\sqsubseteq B \sqcap \exists r.C \\ B \sqcap \exists r.B &\sqsubseteq C \sqcap D \\ C &\sqsubseteq \exists r.A \sqcap B \\ \exists r.\exists r.B \sqcap D &\sqsubseteq \exists r.(A \sqcap B) \end{aligned}$$

Test whether the following subsumption relations follow:

- $A \sqsubseteq C$,
- $A \sqsubseteq \exists r.\exists r.A$,
- $B \sqcap \exists r.A \sqsubseteq \exists r.C$.