



Description Logics

Winter Semester 2016

Exercise Sheet 9

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Exercise 9.32 Let \mathcal{T} be a general \mathcal{EL} -TBox and $\widehat{\mathcal{T}}$ the TBox obtained from exhaustive application of the normalisation rules NF1–NF5 to \mathcal{T} .

Finish the proof of Lemma 5.15 by showing the following:

- (a) $\widehat{\mathcal{T}}$ can be obtained from \mathcal{T} in polynomial time.
- (b) $\widehat{\mathcal{T}}$ is in normal form.
- (c) For all concept names A, B occurring in \mathcal{T} , we have $A \sqsubseteq_{\mathcal{T}} B$ iff $A \sqsubseteq_{\widehat{\mathcal{T}}} B$.

Exercise 9.33 Consider the \mathcal{EL} -TBox \mathcal{T} consisting of the following axioms:

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

Check whether the following subsumption relations hold w.r.t. \mathcal{T} :

- (a) $A \sqsubseteq B$
- (b) $A \sqsubseteq \exists r.\exists r.A$
- (c) $B \sqcap \exists r.A \sqsubseteq \exists r.C$