



Description Logic

Summer Semester 2019

Exercise Sheet 12

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Exercise 12.1 Let \mathcal{T}_1 be an \mathcal{EL} TBox, C, D \mathcal{EL} concept descriptions, and $\mathcal{T}_2 := \mathcal{T}_1 \cup \{A \sqsubseteq C, D \sqsubseteq B\}$, where A, B are new concept names (as in Lemma 6.1). Show that \mathcal{T}_2 is a conservative extension of \mathcal{T}_1 . Is this still the case after adding $A \sqsubseteq B$ to \mathcal{T}_2 ? What about adding $B \sqsubseteq A$?

Exercise 12.2 Consider the \mathcal{EL} TBox

$$\mathcal{T} := \left\{ \begin{array}{l} A \sqsubseteq B \sqcap \exists r.C, \\ B \sqcap \exists r.B \sqsubseteq C \sqcap D, \\ C \sqsubseteq (\exists r.A) \sqcap B, \\ (\exists r.\exists r.B) \sqcap D \sqsubseteq \exists r.(A \sqcap B) \end{array} \right\},$$

where A, B, C, D are concept names. Use the classification procedure for \mathcal{EL} to check whether the following subsumption relationships hold true w.r.t. \mathcal{T} .

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

Exercise 12.3 Consider the \mathcal{ELI} TBox

$$\mathcal{T} := \left\{ \begin{array}{l} A_1 \sqcap A_2 \sqsubseteq \exists r.B, \\ \exists r^-.A_2 \sqsubseteq C, \\ A \sqsubseteq A_1 \sqcap A_2, \\ \exists r.(B \sqcap C) \sqsubseteq D \end{array} \right\},$$

where A, A_1, A_2, B, C, D are concept names. Use the classification procedure for \mathcal{ELI} to check whether the following subsumption relationships hold true w.r.t. \mathcal{T} .

- (a) $A \sqsubseteq D$
- (b) $\exists r.A \sqsubseteq \exists r.D$
- (c) $A \sqsubseteq \exists r.A$