Exercises for

Knowledge Representation for the Semantic Web

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Exercise 2.1 Consider the RDF graph for the single triple `Mother rdfs:subClassOf Woman .`

Write up an RDF graph with 5 nodes which is simply entailed by the previous graph.

Exercise 2.2 Give an RDFS-interpretation which is a model for the triple from Exercise 2.1.

Exercise 2.3 Model the following sentences from Exercise 1.6 in SROIQ:

1. Mary is a woman.
2. Every mother is a woman.
3. Mary is John's wife.
4. Mothers are women who are also parents.
5. At least one child of a grandparent has also a child.

Exercise 2.4 Consider the knowledge base consisting of the axioms $A \sqsubseteq B \sqcap C$ and $C \sqsubseteq D$. Show by arguing about models that $A \sqsubseteq D$ is a logical consequence of this knowledge base.

Exercise 2.5 Consider the knowledge base consisting of the axioms $\texttt{Homo} \sqsubseteq \texttt{Primate}$ and $\exists \texttt{speaksWith}.\top \sqsubseteq \texttt{Homo}$, which has $\exists \texttt{speaksWith}.\top \sqsubseteq \texttt{Primate}$ as logical consequence.

Find a representation of all three axioms as RDF Schema statements. Is the third triple RDFS-entailed by the first two triples?

Exercise 2.6 Consider the knowledge base consisting of the three axioms $\texttt{Unicorn} \sqsubseteq \texttt{Animal}$, $\texttt{Unicorn} \sqsubseteq \texttt{Fictitious}$ and $\texttt{Fictitions} \sqcap \texttt{Animal} \sqsubseteq \bot$. Give a model of this knowledge base. Also give an interpretation of this knowledge base which is not a model.

Exercise 2.7 Consider the knowledge base consisting of the five axioms $\texttt{RRRated} \sqsubseteq \texttt{CatMovie}$, $\texttt{CatMovie} \sqsubseteq \texttt{Movie}$, $\texttt{RRated} \equiv (\exists \texttt{hasScript}.\texttt{ThrillerScript}) \sqcup (\forall \texttt{hasViolenceLevel}.\texttt{High})$, $\texttt{Person} \sqsubseteq \neg \texttt{Movie}$ and $\exists \texttt{hasViolenceLevel}.\top \sqsubseteq \texttt{Movie}$.

Give an informal argument why $\texttt{Person} \sqsubseteq \bot$ is a logical consequence of these.