

## Exercises sheet OWL/DL – Reasoning

1. Translate the following axioms into RDF Turtle

*Human*  $\sqsubseteq \neg$ *Alien*

*FatherWithDaughters*  $\sqsubseteq$  *Man*  $\sqcap \forall$ *hasChild*.*Woman*

*Child*  $\sqsubseteq$  *Human*  $\sqcap \exists$ *parent*.( $\exists$ *hasChild*.*Self*)

2. Decide whether the following translations are correct or not. Explain your answer

- a) Each Student had not written a habilitation

*Student*  $\sqsubseteq \neg(\exists$ *wrote*.*Habilitation*)

- b) A conference chair organizes at least one event that is both research and public

*Chair*  $\sqsubseteq \forall$ *organizes*.(*Research*  $\sqcap$  *Public*)

- c) Each assistant is a university staff member who cannot teach in a privatissimum (exclusive tutorial)

*Assistant*  $\sqsubseteq$  *Staff*  $\sqcap \forall$ *teaches*.( $\neg$ *Privatissimum*)

3. Decide if the user understood the ontological definitions correctly. Explain your answer.

- a) *Customer*  $\sqsubseteq$  *PublicOrganization*    *Customer*  $\sqsubseteq$  *Municipality*

A customer is both a public organization and a municipality

- b) *GuestProfessor*  $\sqsubseteq \neg \forall$ *holds*.(*Lecture*  $\sqcup$  *Seminar*)

If someone holds a Lecture or a seminar, then he/she is a guest professor.

- c) *Secretary*  $\sqsubseteq$  *UniEmployee*    *UniEmployee*  $\sqsubseteq \neg$ *Secretary*

All secretaries are university employees, but not every employee is a secretary

4. Use the ALC rules presented on the slides to check if the following ontology is consistent. Draw the derivation tree and explain how the rules are applied.

*Pizza*  $\sqsubseteq$  *Bread*  $\sqcap \exists$ *topping*.*Cheese*

*Pizza*(*Margherita*)

*topping*(*Margherita*, *Mozzarella*)

5. Use the ALC rules presented on the slides to check if the ontology entails *Prof*(*Peter*). Draw the derivation tree and explain how the rules are applied. Note that  $A \equiv B$  (equivalence) is a shortcut for the two axioms  $A \sqsubseteq B$  and  $B \sqsubseteq A$

*Student*  $\sqsubseteq \forall$ *visits*.*Lecture*

*Prof*  $\equiv \exists$ *teaches*.(*Seminar*  $\sqcup$  *Lecture*)

*teaches*(*Peter*, *AlgoDat*)

*Student*(*John*)

*visits*(*John*, *AlgoDat*)