

Due/Discussion **24.05.2012**  
(May 17<sup>th</sup> is a holiday, therefore a “double” exercise)

Exercise Sheet 3+4  
RDFS Semantics + OWL

**Exercise 1 (RDFS Entailment)**

**20 points**

Given is the following example from the lecture

```
ex:speaksWith rdfs:domain ex:Homo .  
ex:Homo rdfs:subClassOf ex:Primates .
```

Show that using the RDF(S) entailment rules, it is not possible to derive

```
ex:speaksWith rdfs:domain ex:Primates .
```

One possible way of showing is to create all the possible derivations from the original triples, which will not include the desired result.

**Exercise 2 (Models)**

**15 points**

Given are the following statements

```
Ex:vegetableThaiCurry ex:thaiDishBasedOn ex:coconutMilk .  
Ex:sebastianrdf:type ex:allergicToNuts .  
Ex:sebastian ex:eats ex:vegetableThaiCurry .  
  
ex:allergicToNuts type:subClassOf ex:pitiable .  
ex:thaiDishBasedOn rdfs:domain ex:Thai .  
ex:thaiDishBasedOn rdfs:range ex:Nutty .  
ex:thaiDishBasedOn rdfs:subProperty ex:hasIngredient .  
ex:hasIngredient rdf:type rdfs:containerMembershipProperty .
```

Give a very simple interpretation which is a model of these statements. Recall that you need to define IR, IL, I<sup>ext</sup>, I<sub>s</sub> and LV!

**Exercise 3 (Entailment)**

**15 points**

For the RDF(S) statements of Exercise 3, find

- Simply entailed triple
- an RDF-entailed triple which is not simply entailed
- an RDFS-entailed triple which is not RDF-entailed

**Exercise 4****20 points**

For RDF(S), the *unique name assumption* does not hold, i.e. several URIs might be assigned to the same resource. (e.g. [http://de.wikipedia.org/wiki/Drei\\_gewinnt](http://de.wikipedia.org/wiki/Drei_gewinnt) and [http://de.wikipedia.org/wiki/Tic\\_Tac\\_Toe](http://de.wikipedia.org/wiki/Tic_Tac_Toe) denote the same thing)

- a) Can the same URI denote different resources?
- b) Is there a way to enforce the unique name assumption using RDF schema?

**Exercise 5 (Modelling in OWL)****20 points**

Formulate the following statements in OWL DL using the RDF/XML syntax.

- a) The class Vegetable is a subclass of PizzaTopping.
- b) The class PizzaTopping is disjoint from Pizza.
- c) The individual Eggplant is an element of the class Vegetable.
- d) The abstract role hasTopping exists only between elements of the classes Pizza and PizzaTopping.
- e) Pizzas always have at least two toppings.
- f) Every pizza in the class PizzaMargarita has Tomato as a topping.
- g) The class VegetarianPizza consists of elements that are in the classes PizzaWithoutMeat and Pizza- WithoutFish.
- h) No pizza in the class PizzaMargarita has a topping from the class Meat.

**Exercise 6 (Modelling in OWL)****15 points**

Decide whether the following statements with respect to the pizza ontology from the previous exercise make sense.

- a) The role hasIngredient is transitive.
- b) The role hasTopping is functional.
- c) The role hasTopping is inversely functional.