



Universität Freiburg  
Institut für Informatik  
Michael Meier  
Fang Wei

Georges-Köhler Allee, Geb. 51  
D-79110 Freiburg  
Tel. (0761) 203-8126  
Tel. (0761) 203-8125

**Webbasierte Informationssysteme**  
**Winter Term 2010/2011**  
November 3, 2010

## **Third Exercise Set: OWL**

### **Exercise 1 (Modelling in OWL)**

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 PizzaWithoutFish.
- h) No pizza in the class PizzaMargarita has a topping from the class Meat.

### **Exercise 2 (Modelling in OWL)**

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.

### **Exercise 3 (First-order Logic)**

Translate the OWL statements from Exercise 1 into first-order logic.

#### Exercise 4 (Automatic Inference)

From

```
<owl:Class rdf:about="Professor">
  <rdfs:subClassOf>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:intersectionOf rdf:parseType="Collection">
          <owl:Class rdf:about="Person"/>
          <owl:Class rdf:about="UniAngestellter"/>
        </owl:intersectionOf>
        <owl:intersectionOf rdf:parseType="Collection">
          <owl:Class rdf:about="Person"/>
          <owl:complementOf rdf:resource="Student">
        </owl:intersectionOf>
      </owl:Class>
    </owl:intersectionOf>
  </rdfs:subClassOf>
</owl:Class>
```

we can conclude that every professor is also a person. Sketch a procedure that is able to infer this automatically.

Hint: You may want to use that there is an algorithm that translates OWL DL into first-order logic sentences.

Due by: November 10, 2010 before the tutorial starts.