

## Advanced Database Systems, second intermediate test – 31 May 2017 – V1.1

Please feel free to answer this test in English, Italian, or any mixture

1. Let \$doc be bound to an XML document with the following schema:

```
movies
  movie*
    @idmovie
    title
    year
    director (@idperson)
    actor* (@idperson)
persons
  persona*
    @idperson
    name
    birthyear
cinemas
  cinema*
    @idcinema
    name
    town
    screen*
      @idscreen
      nameOfScreen
      screening*
        @idmovie
        date
        starttime
        price
```

- a. Write a query that returns, for each date, the list of all movies that have been screened in that date, listing, for each date and movie, the number of cinemas that project that movie, the number of screenings, and the list of all of the screenings (for the movie and for the date), with the following format

```
date*
  date
  movie*
    title
    numberOfCinemas
    numberOfScreenings
    screening*
      nameOfCinema
      starttime
```

- b. Write a query that returns the list of all directors that only directed movies with no actor, or where the only actor is the director herself/himself
2. Consider an RDF graph with classes Person and Movie, and with the following declarations of classes and predicates

HasActor  $\subseteq$  Movie  $\times$  Actor  
 HasDirector  $\subseteq$  Movie  $\times$  Director  
 Directed  $\subseteq$  Director  $\times$  Actor  
 Actor, Director, SelfDirector  $\subseteq$  Person  
 ManyDirectorsMovie, ActorLessOne, ActorLessTwo  $\subseteq$  Movie

Formalize the following statements in OWL, paying extreme attention to the direction of the implication:

- If X has been the director of a movie where Y was among the actors, then X Directed Y
- X is a SelfDirector if and only if X Directed X
- Is (b) equivalent to say that X is a SelfDirector if and only if X has been the director of a movie where X was among the actors?
- A Movie is a 'ManyDirectorsMovie' if and only if this movie has at least two directors
- If a movie has no actor, then it is an ActorLessOne movie
- A movie is ActorLessTwo if and only if it has no Actor

Consider now a knowledge base that consists of the above declarations, of the formalization of a-f, and of a set of RDF triples talking about those predicates. Remembering the open world assumption and considering the directions of the implications, answer the following questions.

- In this knowledge base, may it be possible, or is it possible, to deduce that ActorLessOne is equivalent to ActorLessTwo, or that one is a subclass of the other?
- In such a knowledge base, may it be possible to prove that a movie is an ActorLessOne movie?
- In such a knowledge base, may it be possible to prove that a movie is not an ActorLessOne movie?
- In such a knowledge base, may it be possible to prove that a movie is an ActorLessTwo movie?
- In such a knowledge base, may it be possible to prove that a movie is not an ActorLessTwo movie?