STI · INNSBRUCK

Semantic Web Services PS

Exercise Sheet 8 – 20.05.2014

Please answer the following questions. Provide your elaborated answers in a PDF or a plain text file. If you make use of references when elaborating your answers, please add the proper citations to your document. The deadline for submissions to the tutors (ioan.toma@sti2.at and jose.garcia@sti2.at) is 26th May 2014 at 20:00 CET.

Exercise 1 (10 points)

Given the ontology in Listing 1, representing the knowledge about a famous American cartoon, define:

1. An axiom that states that all married people are in love with their spouse.
2. A logical expression to find out who is in love with who in the Simpsons world.
1. An axiom that states that if a character A is sibling with a character B then also B is sibling with A.
3. An axiom that defines the mother of a character as parent of female gender.
4. An axiom that states that male and female characters are disjoint.

Exercise 2 (10 points)

Extend the travel ontology presented in Listing 2 by introducing the bus travels, timetables and routes. Define a service for the public transport system of Innsbruck capable of providing: the departures from a given bus stop, the next bus stop on the route.

Listing 1: Simpson Ontology

```
wsmlVariant _"http://www.wsmo.org/wsml/wsml-syntax/wsml-flight"

namespace { _"http://ontologies.sti2.at/",
      wsml _"http://www.wsmo.org/wsml/wsml-syntax#",
      dc _"http://purl.org/dc/elements/1.1/" }

ontology simpsons

concept gender

concept character
      hasName ofType _string
      hasGender ofType gender
      hasSpouse ofType character
      hasChild ofType character
      hasParent ofType character
```

```
      hasSibling ofType character
      hasFriend ofType character
      hasCatchPhrase ofType _string
      inLoveWith ofType character
      isCustomerOf ofType workplace
      hasWorkingPlace ofType place
      attends ofType school

instance male memberOf gender

instance female memberOf gender

instance homer_simpson memberOf character
      annotations
            dc#title hasValue "Homer J Simpson"
      endAnnotations
      hasName hasValue "Homer J Simpson"
      hasGender hasValue male
      hasSpouse hasValue marge_simpson
      hasParent hasValue abe_simpson
      hasChild hasValue { bart_simpson, lisa_simpson, maggie_simpson }

instance marge_simpson memberOf character
      annotations
            dc#title hasValue "Marge Simpson"
      endAnnotations
      hasName hasValue "Marge Simpson"
      hasGender hasValue female
      hasSpouse hasValue homer_simpson
      hasChild hasValue { bart_simpson, lisa_simpson, maggie_simpson }
      hasSibling hasValue { patty_bouvier, selma_bouvier }

instance lisa_simpson memberOf character
      annotations
            dc#title hasValue "Lisa Simpson"
      endAnnotations
      hasName hasValue "Lisa Simpson"
      hasGender hasValue female
      hasParent hasValue { homer_simpson, marge_simpson }
      hasSibling hasValue { bart_simpson, maggie_simpson }

instance bart_simpson memberOf character
      annotations
            dc#title hasValue "Bart Simpson"
      endAnnotations
      hasName hasValue "Bart Simpson"
      hasGender hasValue male
      hasParent hasValue { homer_simpson, marge_simpson }
```

Listing 2: Travel Ontology

```
wsmlVariant _"http://www.wsmo.org/wsml/wsml-syntax/wsml-flight"

namespace { _"http://www.gsmo.org/dip/travel/domainOntology#",
      dc _"http://purl.org/dc/elements/1.1#",
      wsml _"http://www.wsmo.org/wsml/wsml-syntax#" }
```

```
ontology TravelOntology

concept Ticket
      annotations
            dc#description hasValue "concept of a ticket"
      endAnnotations
      from ofType Region
      to ofType Region
      vehicle ofType Vehicle

concept Region

concept Country subConceptOf Region
      name ofType string

concept City subConceptOf Region
      name ofType string
      country ofType Country

concept EUCity subConceptOf City
concept GermanCity subConceptOf EUCity
concept AustrianCity subConceptOf EUCity
concept UKCity subConceptOf EUCity
concept USCity subConceptOf City

concept Vehicle
      seats ofType integer

concept Airplane subConceptOf Vehicle

concept Train subConceptOf Vehicle

axiom GermanCityDef
      definedBy
            ?city memberOf GermanCity implies ?city[country hasValue
                  Germany].

axiom AustrianCityDef
      definedBy
            ?city memberOf AustrianCity impliedBy ?city[name hasValue
                  "Austria"] memberOf country.

axiom UKCityDef
      definedBy
            ?city memberOf UKCity implies ?city[country hasValue UK].

instance Innsbruck memberOf AustrianCity

instance Germany memberOf Country
      name hasValue "Germany"

instance UK memberOf Country
      name hasValue "United Kingdom"
instance Austria memberOf Country
      name hasValue "Austria"
```