

Semantic Web Services

Exercise sheet 7
WSMO**Exercise 1 (WSMO ontology modeling) (6 points)**

Extend the WSMO ontology available in Listing 1 with other elements that capture knowledge about bus transportation. You should add at least one example of concept, relation, function, concept instance, relation instance and axiom.

Exercise 2 (WSMO service modeling) (10 points)

Consider a bus transportation company as one company that provides tourism services as part of the VTA scenario (VTA scenario was introduced in Exercise Sheet 4). Create a WSMO description for the bus transportation service. The resulting description should include description of the capability, including pre-conditions, post-conditions, assumptions and effects. Explain in your own words the difference between these elements using your example.

Exercise 3 (Service vs. Web service) (4 points)

Discuss differences between a service and a Web service in the WSMO approach. Give an example of service and one of Web service using in the hotel booking sub-domain of the VTA scenario.

Listing 1: VTA ontology

```
namespace {"http://www.wsmo.org/ontologies/trainConnection",
  dc_"http://purl.org/dc/elements/1.1#",
  dt_"http://www.wsmo.org/ontologies/dateTime",
  prs_"http://www.wsmo.org/2004/d3/d3.3/v0.1/20041008/resources/owlPersonMediator.wsml",
  loc_"http://www.wsmo.org/ontologies/location#",
  geo_"http://www.wsmo.org/2004/d3/d3.3/v0.1/20041008/resources/owlGeoMediator.wsml#",
  xsd_"http://www.w3.org/2001/XMLSchema#}

ontology_"http://www.wsmo.org/ontologies/trainConnection"
  annotations
```

```
dc#title hasValue "International Train Connections Ontology"
dc#creator hasValue "DERI International"
dc#subject hasValues {"Train", "Itinerary", "Train Connection", "Ticket"}
dc#description hasValue "International Train Connections"
dc#publisher hasValue "STI Innsbruck"
dc#contributor hasValue {"Michael Stollberg"}
endAnnotations

importsOntology { _"http://www.wsmo.org/ontologies/dateTime", _"http://www.wsmo.org/ontologies/location"}
usedMediators { _"http://www.wsmo.org/2004/d3/d3.3/v0.1/20041008/resources/owlPersonMediator.wsml",
_ "http://www.wsmo.org/2004/d3/d3.3/v0.1/20041008/resources/owlFactBookMediator.wsml"}

concept station subConceptOf geo#geographicLocation
  annotations
    dc#description hasValue "Train station"
  endAnnotations
  code ofType xsd:string
  annotations
    dc#description hasValue "Code of the station"
  endAnnotations
  borderToCountry ofType loc:border
  annotations
    dc#description hasValue "For stations located at the border"
  endAnnotations

concept ticket
  annotations
    dc#description hasValue "a ticket for an itinerary"
  endAnnotations
  itinerary ofType itinerary
  provider ofType po#partnerDescription
  price ofType po#price

concept itinerary
  annotations
    dc#description hasValue "An itinerary between two locations"
  endAnnotations
  passenger ofType prs#person
  annotations
    dc#description hasValue "prs#person is a subset of vCard (http://www.ietf.org/rfc/rfc2425.txt)"
  endAnnotations
  recordLocatorNumber ofType xsd:string
  trip ofType trip

concept trip
  start ofType loc#location
  end ofType loc#location
  via ofType set loc#location
  departure ofType dt#dateAndTime
  arrival ofType dt#dateAndTime
  duration ofType dt:#nterval
  distance ofType loc#distance

concept trainTrip subConceptOf trip
  annotations
    dc#description hasValue "A train trip"
  endAnnotations
  start ofType station
  end ofType station
  via ofType set station
  seat ofType xsd:string
  train ofType xsd:string
  class ofType xsd:string

axiom stationCountry
  annotations
```

```
dc:description hasValue "Integrity constraint: if a station is located in a place which is located in a
given country, the country of the station is the same"
endAnnotations
definedBy
  constraint
    ?S[
      locatedIn hasValue ?L,
      country hasValue ?C
    ]memberOf station
    and not ?L[
      country hasValue ?C
    ]memberOf loc#location .

axiom departureBeforeArrival
  annotations
    dc:description hasValue "Integrity Constraint: departure has to be before arrival"
  endAnnotations
  definedBy
    constraint
      ?T[
        departure hasValue ?D,
        arrival hasValue ?A
      ]memberOf trip
      and ?A <= ?D.

axiom startNotEqualEnd
  annotations
    dc:description hasValue "Integrity Constraint: the start and end of a trip have to be different"
  endAnnotations
  definedBy
    constraint
      ?T[
        start hasValue ?Start,
        end hasValue ?End
      ]memberOf trip
      and ?Start = ?End.
```