

Semantic Web

Exercise sheet 7

OWL

Exercise 1 (OWL reasoning) (7 points)

Provided with the ontology about people, things and animals explain the following class and instance inferences:

- Bus Drivers are Drivers.
- Cat Owners like Cats.
- Walt loves animals.
- Tom is a Cat.

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Namespace: owl = <http://www.w3.org/2002/07/owl#>
Namespace:      = <http://owl.test.com/people#>
Ontology:
<http://owl.test.com/peopleThingsAnimals>

Class: animal
  Annotations:
    rdfs:label "animal"
  SubClassOf:
    eats some owl:Thing

Class: person
  Annotations:
    rdfs:label "person",
  SubClassOf:
    animal

Class: bus_driver
  EquivalentTo:
    person
    that drives some bus

ObjectProperty: drives
  Annotations:
    rdfs:label "drives"

Class: bus
  Annotations:
    rdfs:label "bus",
  SubClassOf:
    vehicle

Class: vehicle
  Annotations:

Class: driver
  EquivalentTo:
    person
    that drives some vehicle

Class: cat_owner
  EquivalentTo:
    person
    that has_pet some cat

ObjectProperty: has_pet
  Annotations:
    rdfs:label "has pet",
    rdfs:comment "Anyone that has a pet must
like that pet."
  Domain:
    person
  Range:
    animal
  InverseOf:
    is_pet_of
  SubPropertyOf:
    likes

ObjectProperty: likes
  Annotations:
    rdfs:label "likes"

Class: cat
  Annotations:
    rdfs:label "cat",
  SubClassOf:
```

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    animal
  DisjointWith:
    dog
Class: cat_lover
  EquivalentTo:
    person
    that likes some cat
ObjectProperty: has_pet
  Annotations:
    rdfs:label "has pet",
    rdfs:comment "Anyone that has a pet must
like that pet."
  Domain:
    person
  Range:
    animal
  InverseOf:
    is_pet_of
  SubPropertyOf:
    likes
Class: duck
  Annotations:
    rdfs:label "duck",
  SubClassOf:
    animal
Individual: Walt
  Types:
    person
  Facts:
    has_pet Dewey,
    has_pet Huey,
    has_pet Louie
Individual: Huey
  Types:
    duck
  DifferentFrom: Dewey, Louie
Individual: Dewey
  Types:
    duck
  DifferentFrom: Huey, Louie
Individual: Louie
  Types:
    duck
  DifferentFrom: Huey, Dewey
Class: animal_lover
  EquivalentTo:
    person
    that has_pet min 3 owl:Thing
Class: elderly
  Annotations:
    rdfs:label "elderly",
  SubClassOf:
    adult
Class: adult
  Annotations:
    rdfs:label "adult",
    rdfs:comment "Things that are adult."
  DisjointWith:
    young
Class: female
  Annotations:
    rdfs:label "female"
ObjectProperty: is_pet_of
  Annotations:
    rdfs:label "is_pet_of"
  InverseOf:
    has_pet
Individual: Minnie
  Types:
    elderly,
    female
  Facts:
    has_pet Tom
Individual: Tom
  Types:
    owl:Thing
ObjectProperty: has_pet
  Domain:
    person
  Range:
    animal
  InverseOf:
    is_pet_of
  SubPropertyOf:
    likes
Class: old_lady
  EquivalentTo:
    elderly
    and female
    and person
  SubClassOf:
    has_pet some animal
    and has_pet only cat

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Exercise 2 (OWL modeling) (6 points)

Design an OWL DL ontology which models the domain described through a set of natural language statements given below. Express the model in N3 notation.

- Man is a Person.
- Person is a Human.
- A child of a human is a person.
- If a child is a child of a person then the person is the parent of the child.
- A parent of a person is a relative of the person.
- John is a Man.
- Mary is a child of John.

Exercise 3 (OWL inference) (7 points)

Based on the OWL ontology developed in Exercise 2 infer all other possible statements and express them in N3 notation.