

COMP 872 Social Semantic Web Fall 2014 Assignment 6—Solutions

Due Wednesday, Oct. 15 by 11:00 PM

Each of problems 1-3 below asks for just a couple of RDFS triples, not an entire document. They basically ask you to apply some of the inference patterns we discussed with regard to modeling with RDF. Problem 4 asks for an entire RDFS document and an entire RDF document.

Some standard prefixes:

```
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
```

1 (3 pts.). An organization tracks admissions at colleges and universities. It uses the following properties, all with the same domain (`foaf:Person`) and range (`ed:Institution`).

- `ed:sentApplication`—meaning the person sent their application to the institution
- `ed:paidFee`—meaning the person paid the application fee to the institution
- `ed:applied`—meaning the person applied to the institution

Indicate in RDFS that applying to an institution requires (among other things) sending your application to it and paying it the application fee.

Answer

We use the property-intersection pattern.

```
ed:applied rdfs:subPropertyOf ed:sentApplication .
ed:applied rdfs:subPropertyOf ed:paidFee .
```

2 (3 pts.). One organization uses the property `org1:residesAt` to indicate that a person lives at a certain address while another uses the property `org2:locatedAt` for the same relation. We want to federate the data involving either of these relations under a single property, `info:livesAt`. Write the required RDFS.

Answer

We use the property-union pattern.

```
org1:residesAt rdfs:subPropertyOf info:livesAt .
org2:locatedAt rdfs:subPropertyOf info:livesAt .
```

3 (3 pts.). Write the RDFS that indicates that, at a particular university, the students (class `cgnu:Student`) and faculty (`cgnu:Faculty`), and perhaps others, are counted as members (`cgnu:Member`) of that university.

Answer

We use the class-union pattern.

```
cgnu:Student rdfs:subClassOf cgnu:Member .
cgnu:Faculty rdfs:subClassOf cgnu:Member .
```

4 (11 pts.). Manor Farm keeps a relation, called `Cow`, with information on its cows. It is located at <http://www.ManorFarm.com>. The following shows a few of the rows in this relation

Cow

Registration Number	Born	Weaned	Castrated	Peak Daily Milk Production (gal./day)
12	2008-03-12	2008-09-16	2008-09-20	
14	2011-02-24			
8	2008-03-05	2008-09-16		8.2

You are to write an RDF document that captures the information in the first row of this table. But first you must write an RDFS document that defines the classes and properties. Specify a range for each property. For this, you should use the `date`, `integer`, and `float` XML Schema types; indicate that they are datatypes. Use the properties to define subclasses `Steer` (it's been castrated) and `MilkCow` of `Cow`. Assume that the namespace for RDFS document is <http://www.ManorFarm.com/terms/>. Use the `@base` directive so that you may use the empty prefix (just the ':').

What classes can you infer the cow represented by the first row belongs to? Justify your answer.

One kind of biological miracle would be represented by a row that has a non-null value under both the "Castrated" and "Peak Milk Production" columns. Define a class `MiracleCow` that includes such cases.

Answer

The RDFS document:

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@base <http://www.ManorFarm.com/terms/> .

:Cow a rdfs:Class .
:Steer a rdfs:Class;
      rdfs:subClassOf :Cow .
:MilkCow a rdfs:Class;
         rdfs:subClassOf :Cow .

xsd:integer a rdfs:Datatype .
:Cow_RegistrationNumber a rdf:Property;
                       rdfs:domain :Cow;
                       rdfs:range xsd:integer .

xsd:date rdf:type rdfs:Datatype .
:Cow_Born a rdf:Property;
          rdfs:domain :Cow;
          rdfs:range xsd:date .

:Cow_Castrated a rdf:Property;
               rdfs:range xsd:date;
```

```

        rdfs:domain :Steer .
:Cow_Weaned a rdf:Property;
        rdfs:range xsd:date .
xsd:float a rdfs:Datatype .
:Cow_PeakMilk a rdf:Property;
        rdfs:range xsd:float;
        rdfs:domain :MilkCow .

```

The RDF document:

```

@prefix rdf:    <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs:   <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix xsd:    <http://www.w3.org/2001/XMLSchema#> .
@prefix mfterms: <http://www.ManorFarm.com/terms/> .
@prefix mfarm:  <http://www.ManorFarm.com/> .

mfarm:Cow1 a mfterms:Cow;
        mfterms:Cow_RegistrationNumber "12"^^xsd:integer;
        mfterms:Cow_Born "2008-03-12"^^xsd:date;
        mfterms:Cow_Weaned "2008-09-16"^^xsd:date;
        mfterms:Cow_Castrated "2008-09-20"^^xsd:date .

```

The cow represented by the first row is a **:MilkCow** since it is in the domain of the **:Cow_PeakMilk** property, the domain of which is **:MilkCow**. Since it is a **:MilkCow**, this cow is also a **:Cow** (**:MilkCow** being a subclass of **:Cow**).

The following defines **:MiracleCow** as required.

```

:MiracleCow rdfs:subClassOf :Steer .
:MiracleCow rdfs:subClassOf :MilkCow .

```