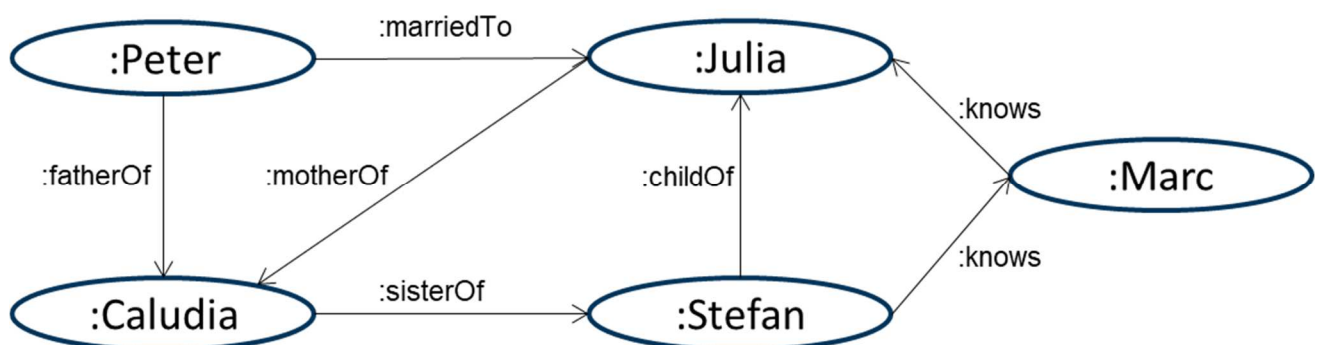


Knowledge Graphs

Exercise 8: OWL 1

8.1. Combining SPARQL and OWL

You are given the following RDF graph:



In the previous exercise, you examined the following queries:

1. Whom does Stefan know?
2. Who is a child of Julia?
3. Does Claudia have siblings?
4. Is Julia married?

You first ran the queries as such, and also with some additional RDFS axioms added:

```

:marriedTo rdfs:subPropertyOf :relative .
:fatherOf rdfs:subPropertyOf :parentOf .
:motherOf rdfs:subPropertyOf :parentOf .
:parentOf rdfs:subPropertyOf :relative .
:sisterOf rdfs:subPropertyOf :siblingOf .
:siblingOf rdfs:subPropertyOf :relative .
:relative rdfs:subPropertyOf :knows .
  
```

Now, let's move to OWL, and add the following:

```

:knows a owl:SymmetricProperty .
:marriedTo a owl:SymmetricProperty .
:siblingOf a owl:SymmetricProperty .
:childOf owl:inverseOf :parentOf .
:childOf rdfs:subPropertyOf :relative .
  
```

How do those changes affect the query results?

Would it be useful to add the following axiom?

```

:parentOf rdfs:subPropertyOf :knows .
  
```

8.2. Building an Ontology

You are asked to develop an ontology for a car vendor. The following information is given:

Cars are manufactured by different companies.
Each car has certain performance figures (speed, acceleration, gas consumption).
Cars may have accessories, such as hitches, roof racks, or children's seats.
Family cars always come with at least one children's seat,
and stations wagons come with at least a hitch or a roof rack.

Try to model this ontology in OWL as concisely as possible.

For this task and the next one you can use Protégé

<https://protege.stanford.edu/products.php#desktop-protege>

or WebProtege (without reasoning capabilities)

<https://webprotege.stanford.edu>

8.3. Zebra Puzzle / Einstein's Puzzle

There are three neighboring houses, a brown, a yellow, and a blue one, having the numbers 1, 2, and 3. One person lives in each house. The three persons have different hobbies (soccer, rugby, and icehockey), and different favorite desserts (pancakes, waffles, or ice). You furthermore know that

1. The person in house 2 prefers pancakes.
2. House 3 is not brown.
3. The person in house 3 plays ice hockey or soccer.
4. The person who likes waffles lives in the yellow house.
5. House 3 is not yellow.
6. The person in house 2 plays soccer.

Try to model this problem in OWL, and let a reasoner find out which person lives in which house.