UNIVERSITY OF MANNHEIM
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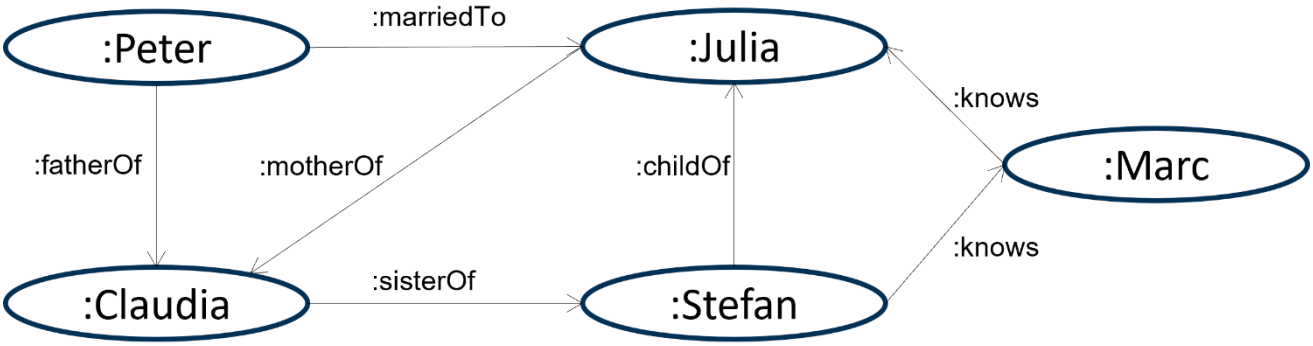
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Knowledge Graphs

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, you can use Protégé (https://protege.stanford.edu/software.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 people have different hobbies (soccer, rugby, and ice hockey), and different favorite desserts (pancakes, waffles, or ice cream). 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.

Model this problem in OWL, and let a reasoner determine which person lives in which house.