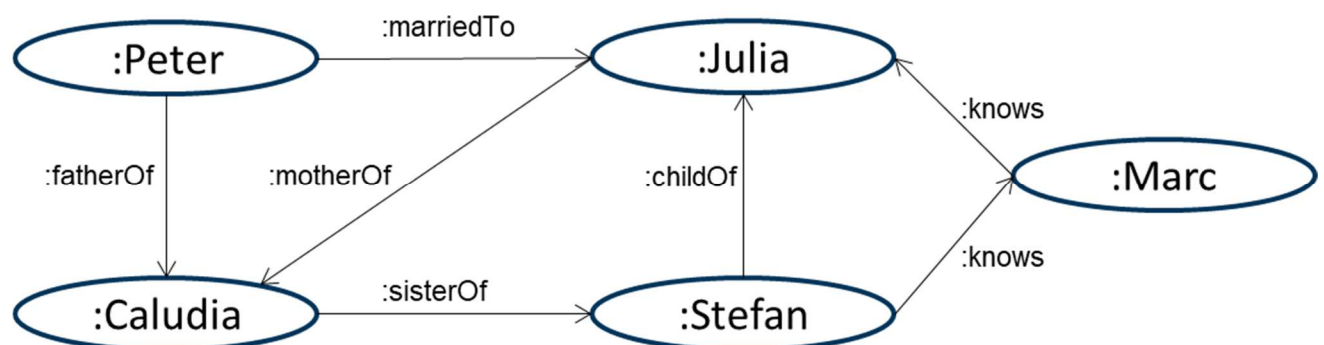# Semantic Web Technologies

## Exercise 5: SPARQL

### 5.1. SPARQL on a given Graph

You are given the following RDF graph:



Write the following queries in SPARQL:

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

Also state how you would interpret the results.

Now, you add the following T-box axioms:

```
: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 .
```

Does adding those axioms change the results of the above queries?

## 5.2. SPARQL on DBpedia

Write SPARQL queries for the following tasks. You can use DBpedia snorql
(http://dbpedia.org/snorql) or sparql endpoint (http://dbpedia.org/sparql).

1. List all winners of the Nobel Prize in Physics sorted from oldest to youngest
2. List the top-10 Universities with most winners of the Nobel Prize in Physics
3. The number of winners of the Nobel Prize in Physics who are immigrants (born in a country different from that of the University)
4. List all the married couples which have a common grandparent
5. List the people who have more than one spouse sharing a common grandparent
6. List the married couples that acted together in at least 10 films

## 5.3. SPARQL Puzzles

The Linked Open Numbers dataset (http://km.aifb.kit.edu/projects/numbers/) defines numbers and their interrelations. Relations defined encompass *previous*, *next*, *lessThan*, *greaterThan* and *primefactor*.

Use **only** those relations to define SPARQL queries for the following:

1. Find all even numbers.
2. Find all numbers that are successors of one of their prime factors.
3. Find all odd numbers.
4. Find all prime numbers.
5. Find all non-prime numbers.
6. Find all twin primes (i.e., two prime numbers at a distance of 2, e.g., 17 and 19).