

Ontologies (solutions)

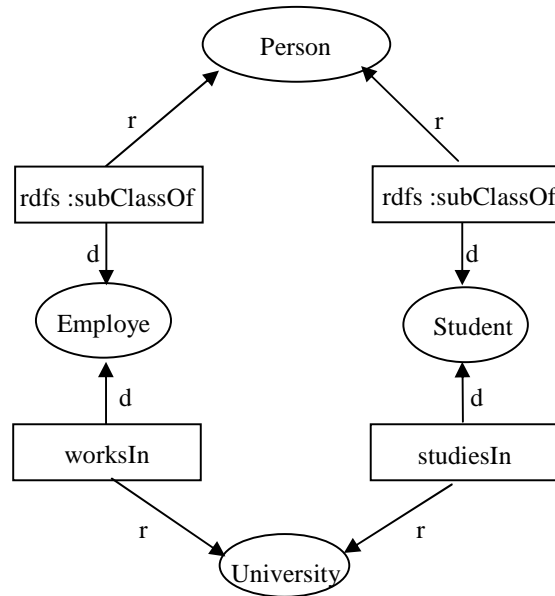
Exercise 1

Tripe notation:

```
<Person, rdf:type, rdfs:Class>
<Employee, rdf:type, rdfs:Class>
<Student, rdf:type, rdfs:Class>
<University, rdf:type, rdfs:Class>
<Employee, rdfs:subClassOf, Person>
<Student, rdfs:subClassOf, Person>
```

```
<worksIn, rdf:type, rdf:Property>
<studiesIn, rdf:type, rdf:Property>
<worksIn, rdfs:range, University>
<worksIn, rdfs:domain, Employee>
<studiesIn, rdfs:range, University>
<studiesIn, rdfs:domain, Student>
```

```
<Claudia, rdf:type, Student>
<EPFL, rdf:type, University>
<Claudia, studiesIn, EPFL>
```



Exercise 2

1. $\text{Student} \cap \exists \text{enrolledIn.CSCourse}$
2. $\text{Student} \cap \forall \text{enrolledIn.CSCourse}$
3. $\text{Student} \subseteq \exists \text{enrolledIn.Course}$
4. $\text{SoundLecturer} \equiv \text{Lecturer} \cap \exists \text{hasDegree.}\{\text{PhD}\}$
5. $\text{SpecialStudent} \supseteq \text{Student} \cap (\leq 1 \text{ enrolledIn})$

Exercise 3

1.

$\text{ext}(\text{Woman}) = \{b\}$

$\text{ext}(\text{Parent}) = \{a, b, g\}$

$\text{ext}(\text{Father}) = \{a, g\}$

$\text{ext}(\text{Mother}) = \{b\}$

$\text{ext}(\text{TwoChildFather}) = \emptyset$

$\text{ext}(\text{HappyFather}) = \{a\}$

$\text{ext}(\text{TiredFather}) = \emptyset$

$\text{ext}(\text{hasDescendant}) = \{(a, b), (a, h), (b, d), (g, a), (g, f), (a, d), (g, b), (g, h), (g, d)\}$

$\text{ext}(\text{hasAncestor}) = \{(b, a), (h, a), (d, b), (a, g), (f, g), (d, a), (b, g), (h, g), (d, g)\}$

2.

- Is the extension of any of the concepts empty? Yes (TwoChildFather and TiredFather)
- It does not mean that these concepts are unsatisfiable, because they can have instances later (open world assumption).

3.

- Is the extension of HappyFather empty? No
- Yes, HappyFather is satisfiable w.r.t. the ontology, since it has instances.

4.

- Is the extension of TwoChildFather equal to the extension of HappyFather? No
- If they had the same extension, it would not mean that these concepts are equivalent w.r.t. the ontology, since in the future, they could have more instances that make them different.