An Introduction to Description Logics

0. Some RDFS Limitations

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Limitations

- global domain/range
- no number restrictions
- no union
- no existential assertion/inference
- no negation

global domain/range

- The parents of a Human are Humans
  - parent domain Human
  - parent range Human
- The parents of a Human are Humans and the parents of a Cat are Cats
  - impossible on this vocabulary
  - must add properties
    - humanParent subproperty of parent ; domain Human ; range Human
    - catParent subproperty of parent ; domain Cat ; range Cat

no number restrictions

Impossible to express

- an individual has at most one address
- a house has at least one owner
- an individual has exactly two biological parents

no "exact" union

- Students are either bachelor or master of PhD students, and nothing else
- All we can do in RDFS is
  - `BacStd rdfs:subClassOf Student`
  - `MasterStd rdfs:subClassOf Student`
  - `PhDStd rdfs:subClassOf Student`
- Impossible to express "and nothing else"
- Impossible to express the disjointness of these classes (if it's the case)

no existential statement and inference

knowing that

- A car necessarily has an owner (not expressible)
- c is a car (:c a :Car)

the query

```
select ?x
where {?x :hasOwner ?y}
```

should answer {c}

even is no triple (`:c :hasOwner :o`) is present in the graph

no negation

- Impossible to state that something is false
- In knowledge bases we often consider that what is not expressed is not known, it can be true or false

```
:ChemicalProduct a rdfs:Class .
:ToxicProduct rdfs:subClassOf ChemicalProduct .
:p1 a :ToxicProduct .
:p2 a :ChemicalProduct
```

does not mean that :p2 is not toxic