

### 3. Unit: OWL

**Exercise 3.1 (Win-Move Game: Draw Nodes)** Consider again the Win-Move-Game. There, WinNodes and LoseNodes have been axiomatized.

a) Is it possible to characterize DrawNodes in OWL?

Consider two alternative variants:

a) use the game axioms/rules to axiomatize DrawNodes explicitly.

b) consider the possible values: win/lost/drawn.

Test both with *typical* minimal examples and explain the results.

Comparison with the Database Theory lecture: Interpret the results and compare them with the semantics of the well-founded model and of stable models.

b) Is it possible to obtain the drawn nodes by using SPARQL?

If yes, give a query that does this.

**Exercise 3.2 (Gods)** Give an OWL specification of the following situation:

The Jewish belief is a monotheistic belief – the only god is Jehova. The old northern European belief was polytheistic, the set of gods consists of Odin, Thor, and Freya. Moshe is a Jew, Haegar is a northern European.

State a SPARQL query that tells you who believes in whom.

**Exercise 3.3 (Male and Female Names)**

Consider again the *Male and Female Names* Example from the lecture:

The name commonly female name “Maria” is (mainly by catholics) also used as an additional first name for males, e.g. Rainer Maria Rilke (German poet, 1875-1926), José Maria Aznar (\*1956, Spanish Prime Minister 1996-2004), cf. also Jean-Marie Le Pen (\*1928, French Politician).

Discuss the consequences on the ontology.

**Exercise 3.4** Consider again the “Escher Stairs” example from the lecture: [Filename: escher-stairs.n3]

- what happens when the above program is extended to four corners (:a :b :c :d)?
  - What is the result of the SPARQL query?
  - What are the possible models? – Analyze the result also from the logical point of view.
- Characterize the models when the program is extended to five and six nodes.

**Exercise 3.5 (Role Chains: Uncles)**

Characterize the uncle relationship as a role chain:

- $x$ 's uncles are the brothers of  $x$ 's parents, and
- $x$ 's uncles are husbands of the sisters of  $x$ 's parents.

**Exercise 3.6 (Gods)** Solve Exercise 3.2 using OWL2 features.