

Semantic Web

Exercises on OWL

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Exercise 1

Write an OWL ontology representing the following statements:

- URI1 and URI2 are classes
- URI3 is a property
- URI4 is an instance of class URI1
- URI5 and URI6 are instances of class URI2
- URI3 has domain URI1 and range URI2
- (URI6,URI4) is an instance of property URI3

Exercise 1: Solution

`myns:URI1 (myns:URI4)`

`myns:URI2 (myns:URI5)`

`myns:URI2 (myns:URI6)`

`∃ myns:URI3 ⊑ myns:URI1`

`∃ myns:URI3- ⊑ myns:URI2`

`myns:URI3 (myns:URI6, myns:URI4)`

Exercise 2

Write an OWL ontology that formalizes knowledge about the domain of people, in particular the classes `person`, `man`, `woman`, and the properties `parent`, `mother`, `father`.

Try to express all the knowledge you have about such classes and properties (e.g.: every man is a person, every woman is a person, every mother is a woman, etc.).

Exercise 2: Solution

myns:man \sqsubseteq **myns:person** (every man is a person)

myns:woman \sqsubseteq **myns:person** (every woman is a person)

myns:mother \sqsubseteq **myns:parent** (mother is a subproperty of parent)

myns:father \sqsubseteq **myns:parent** (father is a subproperty of parent)

\exists **myns:mother** \sqsubseteq **myns:woman** (every mother is a woman)

\exists **myns:father** \sqsubseteq **myns:man** (every father is a man)

myns:man (**myns:Joe**) (Joe is a man)

myns:mother (**myns:Ann**, **myns:Joe**) (Ann is the mother of Joe)

Exercise 3

Add to the ontology of Exercise 2 the following information:

- Man and woman are disjoint classes
- Every person has a mother
- Every person has a father
- Every person has exactly two parents
- Every person has a father, who is a man
- Every person has a mother, who is a woman
- Every person has a father and a mother

Exercise 2: Solution

`myns:man` $\sqsubseteq \neg$ **`myns:woman`** (man and woman are disjoint classes)

`myns:person` $\sqsubseteq \exists$ **`myns:mother-`** (every person has a mother)

`myns:person` $\sqsubseteq \exists$ **`myns:father-`** (every person has a father)

`myns:person` $\sqsubseteq (= 2$ **`myns:parent`**)

(every person has exactly two parents)

`myns:person` $\sqsubseteq \exists$ **`myns:father-.man`**

(every person has a father who is a man)

`myns:person` $\sqsubseteq \exists$ **`myns:mother-.man`**

(every person has a mother who is a woman)

`myns:person` $\sqsubseteq \exists$ **`myns:mother-`** AND \exists **`myns:father-`**

(every person has a mother and a father)