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*Semantic Web*

**Q8. Identify two different assertions that would make the ontology inconsistent.**

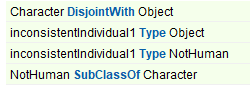
In order to create an inconsistency in our ontology, we declare an individual that has type *NotHuman* and *Object* at the same time. This will lead to inconsistency since in the class taxonomy *NotHuman* is *subClassOf* *Character* and the latter is defined to be disjoint with *Object*.

###  http://www.semanticweb.org/exam/narrative#inconsistentIndividual1

:inconsistentIndividual1 rdf:type owl:NamedIndividual ,

                                  :NotHuman ,

                                  :Object .



*Protégé Explanation:*

Another possibility to create an inconsistency in our ontology, is to violate the *HasKey* property. In the class taxonomy we defined that *Publisher* is identified by *hasID*, *hasName*. If we declare an individual that has same value of the DataProperty of one of the publishers but is defined to be a different individual with respect to it, then we will have an inconsistency.

###  http://www.semanticweb.org/exam/narrative#inconsistentIndividual2

:inconsistentIndividual2 rdf:type owl:NamedIndividual ,

                                  :Publisher ;

            :hasID "1200"^^xsd:positiveInteger ;

            :hasName "Mondadori"^^xsd:string .

###  http://www.semanticweb.org/exam/narrative#publisher1

:publisher1 rdf:type owl:NamedIndividual ,

                     :Publisher ;

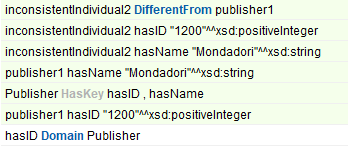
            :offersContractTo :narrator1 ;

            :sellsBookIn :bookshop1 ,

                         :bookshop2 ;

            :hasID "1200"^^xsd:positiveInteger ;

            :hasName "Mondadori"^^xsd:string .



*Protégé Explanation:*

There are other possible ways to create an inconsistency for instance forcing the cardinality constraint of the *ObjectProperty* (i.e. Book hasPublisher exactly 1 Publisher)

**Q9. Define the complex role inclusion axiom capturing the fact that if a narrator creates a narrative that is reported in a book that is published by a publisher, then the narrator has a contract with that publisher.**

In order to define the complex role inclusion axiom, we define the sets of *Classes* and *ObjectProperty* involved.

Vc = {:Book, :Narrator, :Narrative, :Publisher}

Vop = {:creates, :hasPublisher, :hasContractWith, :isReportedBy}

SubObjectPropertyOf(

ObjectPropertyChain(

:creates

:isReportedBy

:hasPublisher

)

:hasContractWith

)

The same chain can be represented in Protégé with the following formula:

(creates o isReportedBy o hasPublisher) → hasContractWith

**Q10. Verify if the created ontology (including the complex role inclusion axiom defined in Q9) satisfies the global restrictions on the axioms of an OWL 2 DL ontology.**

**Q11. Write the following queries in SPARQL:**

**Q11.1. Find how many events occurred in real locations, grouped by location.**

prefix : <http://www.semanticweb.org/exam/narrative#>

SELECT ?location (COUNT(?event) AS ?numEvent)

WHERE {

    ?location a :RealLocation .

    ?event a :Event ;

        :occursIn ?location .

}

GROUP BY ?location

**Q11.2. Find all the books with the ID of the publisher lower than 5000.**

prefix : <http://www.semanticweb.org/exam/narrative#>

SELECT ?book

WHERE {

    ?book a :Book .

    ?publisher a :Publisher ;

            :publishes ?book ;

            :hasID ?publisherID .

    FILTER ( ?publisherID < 5000 )

}

**Q11.3. Find all the events that do not have any human participants.**

prefix : <http://www.semanticweb.org/exam/narrative#>

SELECT ?event

WHERE {

    ?event a :Event .

    FILTER NOT EXISTS {

        ?partecipant a :Human ;

                :isCharacterOf ?event .

    }

}

**Q11.4. Find the number of the narratives that are published in a book, along with the title of the**

**book, the ISBN code of the book and the publisher of the book.**

prefix : <http://www.semanticweb.org/exam/narrative#>

SELECT ?book ?bookISBN ?bookTitle ?publisher (COUNT(?narrative) AS ?numNarratives)

WHERE {

    ?book a :Book ;

        :hasISBN ?bookISBN ;

        :hasTitle ?bookTitle ;

        :reports ?narrative ;

        :hasPublisher ?publisher .

    ?narrative a :Narrative .

    ?publisher a :Publisher .

    }

GROUP BY ?book ?bookISBN ?bookTitle ?publisher

**Q11.5. Find all the distinct events that have a human participant or occur in a real location.**

prefix : <http://www.semanticweb.org/exam/narrative#>

SELECT DISTINCT ?event

WHERE {

    ?event a :Event .

    {

        ?human a :Human ;

            :isCharacterOf ?event .

    }

    UNION

    {

        ?location a :RealLocation ;

            :isRelatedTo ?event .

    }

}