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

Various assertions can make the ontology inconsistent:

* Having 2 different individuals having the same key.
* Going against a cardinality restriction.
* Giving to an individual 2 class types which are disjoint.
* Etc etc

The first example is based on going against having key uniqueness for the individuals of a class. In the case below 2 different books are asserted to have the same ISBN, which is the key property of class Book. Having the same key creates a clash, which could be avoided by giving different ISBNs or alternatively not ensuring the inequivalence between :book1 and :book2 (this would end up in the reasoner assuming the 2 books are actually the same).

:book1 rdf:type owl:NamedIndividual ,

               :Book ;

       :hasISBN "978-3-598-21545-2"^^xsd:string .

:book2 rdf:type owl:NamedIndividual ,

               :Book ;

       :hasISBN "978-3-598-21545-2"^^xsd:string .

\_:x rdf:type owl:AllDifferent ;

  owl:distinctMembers ( :book1 :book2) .

The second example is based on going against a cardinality restriction for a specific property of a class. Having the cardinality restriction on Book:

hasISBN exactly 1 xsd:string

Therefore a Book has to have a single ISBN specified by the Data Property :hasISBN. Having 2 different ISBNs for a single Book (as in the case below) creates an inconsistency.

:book rdf:type owl:NamedIndividual ,

               :Book ;

      :hasISBN "978-3-598-21545-2"^^xsd:string ,

               "978-3-598-22432-5"^^xsd:string .

**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.**

The solution axiom is the following, given:

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

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

SubObjectPropertyOf(

ObjectPropertyChain(

:creates

:reportedBy

:hasPublisher

)

:hasContractWith

)

The same chain was represented in Protégé with the following mathematical composition:

(creates o reportedBy 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.**

**DOMANI MATTINA**

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

prefix : <http://www.semanticweb.org/narrativeExam#>

prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

SELECT ?realLocation (COUNT(?event) AS ?eventNumber)

WHERE{

?realLocation rdf:type :RealLocation .

?event rdf:type :Event ;

:occursIn ?realLocation .

}

GROUP BY ?realLocation

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

prefix : <http://www.semanticweb.org/narrativeExam#>

prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

SELECT ?book

WHERE{

?book rdf:type :Book .

?publisher rdf:type :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/narrativeExam#>

prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

SELECT ?eventWithNoHuman

WHERE{

?eventWithNoHuman rdf:type :Event .

FILTER NOT EXISTS {

?character :isCharacterOf ?eventWithNoHuman ;

rdf:type :Human .

}

}

**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/narrativeExam#>

prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

SELECT ?title (COUNT(?narrative) AS ?numberOfNarratives) ?isbn ?publisher

WHERE{

?book rdf:type :Book;

:hasISBN ?isbn;

:hasTitle ?title;

:hasPublisher ?publisher;

:reports ?narrative .

?publisher rdf:type :Publisher .

?narrative rdf:type :Narrative .

}

GROUP BY ?book ?title ?isbn ?publisher

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

prefix : <http://www.semanticweb.org/narrativeExam#>

prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

SELECT DISTINCT ?event

WHERE{

?event rdf:type :Event .

{

?human rdf:type :Human ;

:isCharacterOf ?event .

}

UNION

{

?realLocation rdf:type :RealLocation ;

:isPlaceOf ?event .

}

}