COMP 474/6741 Intelligent Systems (Winter 2024)

Worksheet #2: Vocabularies & Ontologies

⌨ **Task 1.** Quick refresher: Using the N-Triples (N3) serialization format, write an RDF triple describing Concordia's location (city), as recorded in the `wikidata.org` knowledge graph:

....

Task 2. Define the fact that `Student` is a `class` (as opposed to an instance, like *Jane*). Use Turtle format with the following prefix definitions and define `Student` as part of the `ex` namespace (`ex:Student`):

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix ex: <http://example.org/> .
```

Add the triple to explicitly define `ex:Student` as a class within the `ex` namespace:

....

and draw the resulting RDF graph:

Task 3. Now add another triple stating that Jane (`ex:jane`) is of type `ex:Student`:

....

and add it to the graph above.

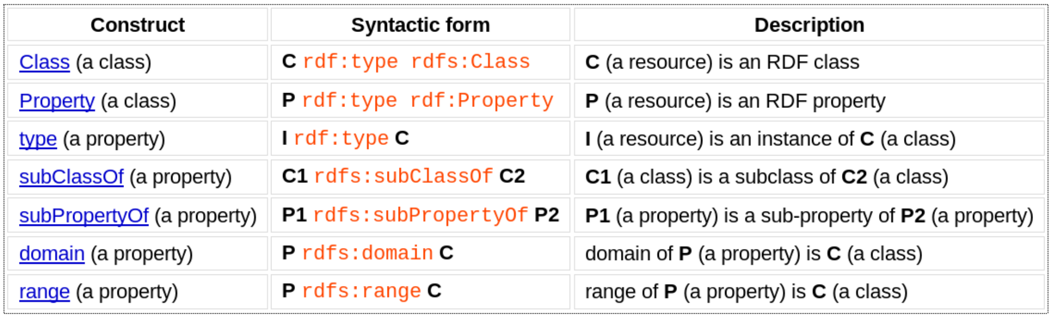
Task 4. It is good practice to give every IRI a human-readable label (where appropriate). Add two `rdfs:label` triples (in English and French) for "Student":

1. ....
2. ....

(Similarly, you would define an `rdfs:comment` to explain what it means to be a student.)

Task 5. For now at least, every *Student* is a *Person* (sorry, robots!). Define this fact as a triple (use the class `foaf:Person`) and add it to your graph above:

....



Construct	Syntactic form	Description
Class (a class)	**C** `rdf:type rdfs:Class`	**C** (a resource) is an RDF class
Property (a class)	**P** `rdf:type rdf:Property`	**P** (a resource) is an RDF property
type (a property)	**I** `rdf:type` **C**	**I** (a resource) is an instance of **C** (a class)
subClassOf (a property)	**C1** `rdfs:subClassOf` **C2**	**C1** (a class) is a subclass of **C2** (a class)
subPropertyOf (a property)	**P1** `rdfs:subPropertyOf` **P2**	**P1** (a property) is a sub-property of **P2** (a property)
domain (a property)	**P** `rdfs:domain` **C**	domain of **P** (a property) is **C** (a class)
range (a property)	**P** `rdfs:range` **C**	range of **P** (a property) is **C** (a class)

Task 6. Ok, let's look at these three triples (written in pseudocode for brevity):

```
<FG-C080> <teaches> <COMP474/6741> .
<professor> <is a> <slide> .
<student> <handed in by> <assignment> .
```

Are these *syntactically* legal triples? (Spoiler alert: yes, we could write each of them using perfectly fine RDF URIs.) So what exactly is wrong here? (Discuss with your worksheet team partner!)

....

Task 7. We now define a *property*, `studiesAt`, so that we can indicate at which university a student is studying. Write the triple defining `studiesAt` as a property (again using the `ex:` namespace):

....

(Note: properties should also have labels & comments, but we omit this here.)

Task 8. We now have to add *domain and range restrictions* for our property to avoid problems like the ones in Task 6 above. For the *domain* of our `studiesAt` property, we only permit `ex:Student` resources and for the *range*, we only admit `ex:University` resources. Write the two triples:

1. ....
2. ....

Task 9. A widely used vocabulary for describing people and their (social) networks is *Friend-of-a-Friend* (FOAF), which you've seen before:

```
PREFIX foaf:  <http://xmlns.com/foaf/0.1/>
```

1. Assume *Joe* has a photo of him published under `http://facebook.me/joe.png` (not a real URL). How can you add this information to the knowledge graph using FOAF (hint: look up the vocabulary using the prefix URL above):

   ....

2. Again using FOAF, model that *Jane* is 22 years old (use datatype `integer` for the age):

   ....