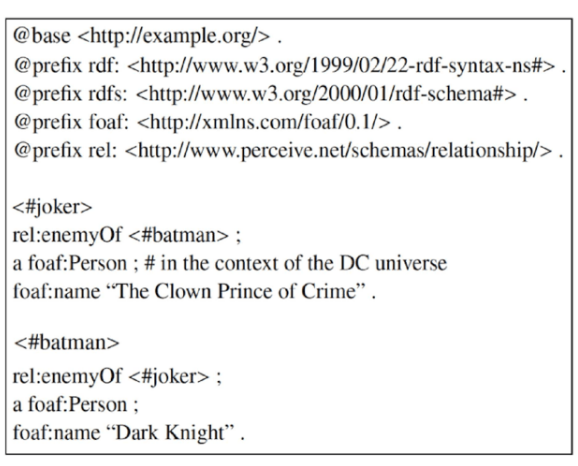
Exercises

1) We want to give Batman a sidekick—namely, Robin. How or what would you add to the KG fragment to express this additional information.



Solution:

<#batman>

rel:enemyOf <#joker> ;

rel:sidekick <#robin> ;

a foaf:Person ;

foaf:name "Dark Knight".

<#robin>

...

2) The FOAF vocabulary can be accessed at the link that is provided in the prefix. Go to the link and study some of the classes and properties listed in FOAF Core. Can you use FOAF to add a single statement to the Turtle fragment that expresses the information that the Joker is 32 years old?

Solution:

@prefix rel: <http://www.perceive.net/schemas/relationship#> .

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

@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .

@prefix foaf: <http://xmlns.com/foaf/0.1/> .

@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<#joker>

rel:enemyOf <#batman> ;

a foaf:Person ;

foaf:name "The Crown Prince of Crime";

foaf:age "32"^^xsd:string.

3) Write out the entire portion of the fragment from <#batman> downward in N-triples.

Solution:

<http://example.org#batman><http://www.perceive.net/schemas/relationship#enemyOf> <http://example.org#joker> .

<http://example.org#batman> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://xmlns.com/foaf/0.1/Person> .

<http://example.org#batman> <http://xmlns.com/foaf/0.1/name> "Dark Knight" .

4) Let us try to compare the reduction in complexity that can be incurred by using Turtle instead of N-triples. Suppose we measure complexity in terms of both the number of terms as well as statements, for example, the fragment that you rewrote above in N-triples has four statements in Turtle, and seven terms (the single subject <#batman>, three predicates, and three objects, one of which is a literal). Suppose that you were told that your KG had only URIs and no literals. Furthermore, your KG has 1,000,000 nodes, each of which has four predicates (you may assume that these are all unique) linking it to four other nodes on average. You may also assume that everything has a single common prefix, so Turtle only involves a single additional statement declaring the prefix. Ignoring this prefix statement, how many statements and terms would be in your KG representation if expressed in Turtle? How about N-triples? What are the percentage reductions in statements and terms if Turtle is used over N-triples?

Solution:

In N-triples,

1M nodes - 4 predicates each

4M nodes in subject ; 4M nodes in predicates ; 4M nodes in objects

All the nodes in N-triples are URI's

In Turtle,

1M nodes – 4 predicates each

1 node in subject ; 4M nodes in predicated ; 4M nodes in objects

All the nodes in turtle are terms.

% of reduction = (12 – 4) / 12 = 33.33%

5) You are told that “John Green, Michael Brown, and Jerry Red are members of the Mensa organization,” and that “Michael Brown is additionally a member of IEEE. Michael and John are friends, while Jerry’s current project involves using AI for social good.” Using FOAF and/or some of the vocabularies covered in the “Software and Resources” section, could you write out the “knowledge” expressed in that sentence in the Turtle format? For this question, you should not be using made up terms (i.e. any terms that you use must be defined already in an established vocabulary). Values such as names and literals can be mnemonically proposed if necessary.

Solution:

@prefix rel: <http://www.perceive.net/schemas/relationship#> .

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

@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .

@prefix foaf: <http://xmlns.com/foaf/0.1/> .

<#johnGreen>

rel:friendOf <#michaelBrown> ;

a foaf:Person ;

foaf:name "John Green";

foaf:Organization "Mensa organization".

<#michaelBrown>

rel:friendOf <#johnGreen> ;

a foaf:Person ;

foaf:name "Michael Brown";

foaf:Organization "Mensa organization"

foaf:member "IEEE".

<#jerryRed>

a foaf:Person ;

foaf:name "Jerry Red";

foaf:Organization "Mensa organization";

foaf:currentProject "AI for social good".