

Semantic Web Web Semântica

Exam

Open book – Duration: 2 hours

Group 1

There is active research on Provenance Ontologies. The following is an extension to the PROV-O ontology to represent scientific workflows. Present the following RDF graph as a list of triples (it is not necessary to represent its graph format). In order to simplify the writing of triples you can specify and use other namespace prefixes, besides the ones already declared in the document.

```
<rdf:RDF xmlns="http://www.ex.com/scientific-workflow#"
  xmlns:foaf="http://xmlns.com/foaf/0.1/"
  xmlns:prov="http://www.w3.org/ns/prov-o/"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:time="http://www.w3.org/2006/time#"
  xmlns:wf="http://www.ex.com/scientific-workflow#"
  xml:base="file:///home/user">

  <Process rdf:about="#workflowRun">
    <wasDefinedBy rdf:resource="http://www.ex.com/workflow1#workflow"/>
    <wasLaunchedBy>
      <prov:Agent rdf:about="#aUser">
        <rdf:type rdf:resource="http://xmlns.com/foaf/0.1/Person"/>
        <foaf:name>Stian Soiland-Reyes</foaf:name>
      </prov:Agent>
    </wasLaunchedBy>
    <prov:startedAt rdf:parseType="Resource">
      <time:inDateTimeXSD
        rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">
        2011-10-21T09:20:15Z</time:inDateTimeXSD>
      </prov:startedAt>
    <wf:generatedValue>
      <prov:Generation>
        <sawValue>
          <Value rdf:about="#sha1FromWorkflow">
            <value>a33d1fb1658d4fbf017de59ab67437a3eb5ff50d</value>
            <wf:sameValueAs rdf:resource="#sha1"/>
          </Value>
        </sawValue>
        <wasSeenAt rdf:resource="http://www.ex.com/workflow1#sha1" />
      </prov:Generation>
    </wf:generatedValue>
  </Process>
</rdf:RDF>
```

Group 2

Consider the following N3 data of the RDF graph **O**:

```
@prefix : <http://www.ex.com/> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix prov: <http://www.w3.org/ns/prov#> .

:v1 prov:alternateOf :v2 ; prov:specializationOf _:a .
:v2 prov:alternateOf :v1 ; prov:specializationOf _:a ; prov:wasRevisionOf :v1 .

_:a prov:wasAttributedTo :john ;
    prov:wasGeneratedBy [ prov:used [] ; prov:wasAssociatedWith :john ] .

:john a prov:Person.
```

Consider the following four RDF graphs where the prefixes are declared as in the previous N3 document.

1. <code>_:x prov:specializationOf _:y .</code> <code>_:x prov:alternateOf _:z .</code> <code>_:z prov:alternateOf _:z .</code>	2. <code>_:x prov:specializationOf _:y .</code> <code>_:x prov:specializationOf _:z .</code> <code>_:x prov:wasRevisionOf _:w</code>
3. <code>_:x prov:alternateOf _:y.</code> <code>_:y prov:alternateOf _:z.</code> <code>_:z prov:alternateOf _:y.</code>	4. <code>_:x prov:wasGeneratedBy _:y .</code> <code>_:x prov:wasAttributedTo _:z .</code> <code>_:x prov:wasAssociatedWith _:z .</code>

2a) From the graphs specified previously indicate the ones which are simply entailed by graph **O**. Justify in detail by using any of the methods studied for RDF simple entailment.

2b) The initial data in **O** is extended with the following information:

1. `prov:specializationOf rdfs:subPropertyOf prov:alternateOf .`
2. `prov:wasRevisionOf rdfs:subPropertyOf prov:wasDerivedFrom .`
3. `prov:wasDerivedFrom rdfs:subPropertyOf prov:wasInfluencedBy .`
4. `prov:wasDerivedFrom rdfs:domain prov:Entity .`
5. `prov:wasDerivedFrom rdfs:range prov:Entity .`
6. `prov:wasAssociatedWith rdfs:subPropertyOf prov:wasInfluencedBy .`
7. `prov:wasAssociatedWith rdfs:domain prov:Activity .`
8. `prov:wasAttributedTo rdfs:subPropertyOf prov:wasInfluencedBy .`
9. `prov:wasAttributedTo rdfs:domain prov:Entity .`
10. `prov:Person rdfs:subClassOf prov:Agent .`

Using the inference rules for RDF Schema entailment, check whether the following graph is entailed by the initial RDF graph **O** when merged with the previous information. Justify your answer.

```
[ a prov:Entity ] prov:alternateOf [ prov:wasInfluencedBy [ a prov:Agent ] ] .
```

2c) Construct a SPARQL query that retrieves the resources that are a specialization or an alternate of a `prov:Entity` that is related via some property with a `prov:Agent`, but those resources are not a revision of some `prov:Entity`. Assume that the graph has been previously closed with all RDFS entailed triples.

2d) Present the solutions of the following SPARQL query when applied to graph **O**, justifying the solutions with the studied SPARQL algebra. Treat blank nodes in **O** as different and distinct IRIs.

```
@prefix prov: < http://www.w3.org/ns/prov#>
SELECT ?x ?y ?z
WHERE { { ?x prov:alternateOf ?y .    ?y prov:alternateOf ?z . }
        OPTIONAL
        { ?x prov:wasRevisionOf ?z } }
```