

Semantic Web Technologies - Test Exam

2007

Name: |
Studentnr: |
Date: | May 16, 2007

You are not allowed to use any course material; the only thing on the table should be this exam sheet, the answer sheets, and a pen.

All RDF graphs are written using the Turtle syntax.
Throughout the exam, the namespace abbreviation `rdf` stands for `http://www.w3.org/1999/02/22-rdf-syntax-ns#`, `rdfs` stands for `http://www.w3.org/2000/01/rdf-schema#`, `owl` stands for `http://www.w3.org/2002/07/owl#`, `xsd` stands for `http://www.w3.org/2001/XMLSchema#`, and the default namespace is `http://example.org/example#`.

You can earn a total of 100 points for this exam. The maximum number of points awarded for each individual question is indicated together with the question.

1. (10) Given the following RDFS graph:

```
<http://example.org/#a> <http://example.org/#b> <http://example.org/#c> .  
<http://example.org/#b> rdfs:domain <http://example.org/#a> .  
<http://example.org/#a> rdfs:subClassOf <http://example.org/#c> .  
<http://example.org/#b> rdfs:subClassOf <http://example.org/#a> .  
<http://example.org/#b> rdf:type <http://example.org/#a> .
```

Which of the following triples is **not** part of the RDFS-entailed graph:

- (a) `<http://example.org/#a> <http://example.org/#b> <http://example.org/#c> .`
- (b) `<http://example.org/#b> rdf:type <http://example.org/#c> .`
- (c) `<http://example.org/#c> rdf:type <http://example.org/#a> .`
- (d) `<http://example.org/#a> rdf:type <http://example.org/#c> .`
- (e) `<http://example.org/#b> rdfs:subClassOf <http://example.org/#c> .`
- (f) `<http://example.org/#a> rdf:type <http://example.org/#a> .`

2. (10) RDF(S)

- (a) Which two characteristics of RDF(S) are the main cause for the problems in layering Description Logic-based languages on top of it?

3. (20) RDF(S) Entailment

Given the RDF graph S :

```
:b rdfs:subClassOf :a .  
:b rdfs:domain _:x .  
:c rdf:type owl:Class .
```

```
:f :b :g .
```

(a) Is the following graph simple-entailed by S ? (Yes / No)

```
rdf:type rdf:type rdf:Property .  
:b rdfs:domain _:y .
```

(b) Is the following graph simple-entailed by S ? (Yes / No)

```
:b rdfs:domain _:z .  
  
:f :b :g .
```

(c) Is the following graph RDF-entailed by S ? (Yes / No)

```
:c rdf:type rdfs:Class .  
:b rdf:type rdf:Property .  
:f rdf:type _:x .
```

(d) Is the following graph RDF-entailed by S ? (Yes / No)

```
:b rdfs:subClassOf :a .  
_:v rdf:type rdfs:Class .  
:f rdf:type _:x .  
:g rdf:type _:y .
```

4. (20) SPARQL

(a) Why is there a notion of E-entailment regime in SPARQL?

(b) Given the following RDF graph:

```
:person rdfs:subClassOf :animal .  
:hasName rdfs:domain :person .  
:man rdfs:subClassOf :person .  
:woman rdfs:subClassOf :person .
```

```
:lawyer rdfs:subClassOf :person
```

```
:john rdf:type :man .  
:john rdf:type :lawyer .
```

Write a SPARQL query which retrieves the direct superclasses of `:lawyer`.

(c) Is it possible to write a query to retrieve all superclasses of `:lawyer`? If so, write this query. If not, explain why not.

(d) Write an ASK query which checks whether `:john` has at least two types.

5. (10) OWL

- (a) Explain the main differences between the OWL species Lite, DL, and Full.
 - (b) Name three characteristics of properties which can be modeled in OWL.
6. (20) F-Logic
- (a) Write the RDFS ontology of question 4b as an F-logic ontology.
 - (b) Explain the major semantic difference between the ways classes and relations are modeled in F-Logic and in Description Logics (OWL).
7. (10) Semantic Web Services
- (a) What is the difference between an **Exact** match and a **PlugIn** match?
 - (b) Mention the four main components of WSMO and describe for each of these in one sentence what they are used for.

Please make sure to include the following information on each answer sheet:

- Name
- Student number
- Lecture name ("Semantic Web Technologies")
- Date