

# M2 DSC Semantic Web

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**14 :00 - 15 :30, Any document allowed**

In this exam we use the Turtle RDF syntax, and the following prefixes and base URI :

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>.
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>.
@prefix owl: <http://www.w3.org/2002/07/owl#>.
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix crs: <urn:ogc:def:crs:> .
@prefix foaf: <http://xmlns.com/foaf/0.1/>.
@prefix schema: <http://schema.org/>.
@prefix ex: <http://example.org/> .

@base <http://bob.fr/data/> .
```

## Origins of the Semantic Web

1. Recall the difference between the Internet and the Web.
2. In a few lines, explain the evolution Web 1.0 → 2.0 → 3.0.
3. Where, when, by whom the World Wide Web has been invented?

## Bases de RDF

4. What can there be in the place of a subject? a predicate? an object?

Among these elements written in Turtle 1.1 :

5. Which are URLs? blank nodes? literals?
6. Which are relative/absolute/prefixed URIs?
7. For those that are URIs, give their extended version.
8. For those that can be prefixed with one of those listed in the intro of this exam, give their prefixed version.

(a) "Bob" (b) <http://example.org/index.html?limit=100#12> (c) rdf:type (d) <product/13> (e) <EPSG:6.3:26986>  
(f) \_:hello

## Leila.

Here is a RDF graph in Turtle.

```
_:hannane rdf:type foaf:Person ;
  foaf:knows [ foaf:name "Alex" ] .

_:hannane foaf:child [ foaf:name "Tom" ] , <leila> .

<leila> foaf:birthDate "2017-11-15T05:00:00"^^xsd:dateTime ;
  foaf:name "Leila" ;
  ex:length [ ex:unit ex:centimetre ; ex:numericalValue "52"^^xsd:double ] ;
```

9. List (a) the distinct subjects, (b) the distinct literals, (c) the literal datatypes.

## Mickey mouse

Here is a situation : *Mickey the mouse runs in a labyrinth. It turns left, moves forward six squares, turns right, moves forward three squares.*

10. Suggest a RDF model of the situation using RDF lists. Define the vocabulary you need to use (classes and properties you need) under namespace `ex:` (for example, `ex:Labyrinthe`).
11. How many triples does your graph have?

Write a SPARQL query to :

12. List all the mice that run in the labyrinth, ordered by their name.

Note one can use regular expressions on properties in a triple in the WHERE clause of a SPARQL request. For example, `?x rdf:first/rdf:rest* ?y` means between `?x` and `?y`, there must be a path made of a `rdf:first` relation, then zero or more `rdf:rest` relations. Write a SPARQL query to :

13. Compute the total distance Mickey ran.

## Web of data

14. According to the Web of Linked Data best practices,
  - (a) Why does the identifier `foaf:name` validates criteria 1 and 2?
15. Why is it we insert structured data in Web pages? (10 lines max)

## RDFa

Here is a HTML+RDFa document retrieved from address <http://bob.fr/data/>.

```

<div vocab="http://xmlns.com/foaf/0.1/">
  <div resource="#manu" typeof="Person">
    <span property="name">Manu Sporny</span> knows
    <a property="knows" href="#alex">Alex</a> and
    <a property="knows" href="#brian">Brian</a>.
  </div>
  <div resource="#alex" typeof="Person">
    <span property="name">Alex Milowski</span> coded a RDFa processor.
  </div>
  <div resource="#brian" typeof="Person">
    <span property="name">Brian Sletten</span> coded also with <a property="knows"
      href="#manu">Manu</a>.
  </div>
</div>

```

16. What does RDFa mean?

17. What is the RDF graph that is embedded in this document (in Turtle)?

## JSON-LD

Here is a JSON-LD document (JSON for Linked Data) retrieved from address <http://bob.fr/data/>.

```

<script type="application/ld+json">
{
  "@context": {
    "@vocab": "http://schema.org/",
    "xsd": "http://www.w3.org/2001/XMLSchema#",
    "price": { "@type": "xsd:double" }
  },
  "@id": "product/4444",
  "@type": "Product",
  "name": "Kenmore White 17\" Microwave",
  "offers": {
    "@type": "Offer",
    "availability": "http://schema.org/InStock",
    "price": "55.00",
    "priceCurrency": "USD"
  }
}
</script>

```

18. What is the Turtle equivalent?