RDFS (I)

- the Resource Description Framework Schema (RDFS) is a W3C recommendation used to describe types and properties of resources

- it provides a type system similar to those used in object-oriented programming languages
  - a class hierarchy
  - resources as instances of one or more classes

- RDFS facilities are themselves provided in form of an RDF vocabulary defined in a namespace which is bound to an URI
  - http://www.w3.org/2000/01/rdf-schema#

- vocabulary descriptions written in RDFS always represent valid RDF graphs

RDFS (II)

- a class in RDFS corresponds to the generic concept of a type or category and can represent almost any category of thing, such as web pages, people, document types, databases or abstract concepts

- describing classes:
  - resources: `rdfs:Class, rdf:Resource`
  - attributes `rdf:type, rdfs:subClassOf`

- describing properties:
  - class: `rdf:Property`
  - properties: `rdfs:domain, rdfs:range, rdfs:subPropertyOf`

Describing Classes

- "full" description
  - `<rdf:Description rdf:ID="class_name">`

    `<rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>`

    `</rdf:Description>`

- "abbreviated" description
  - `<rdfs:Class rdf:ID="class_name"/>`

- specialisation of classes
  - `<rdfs:Class rdf:ID="class_name">`

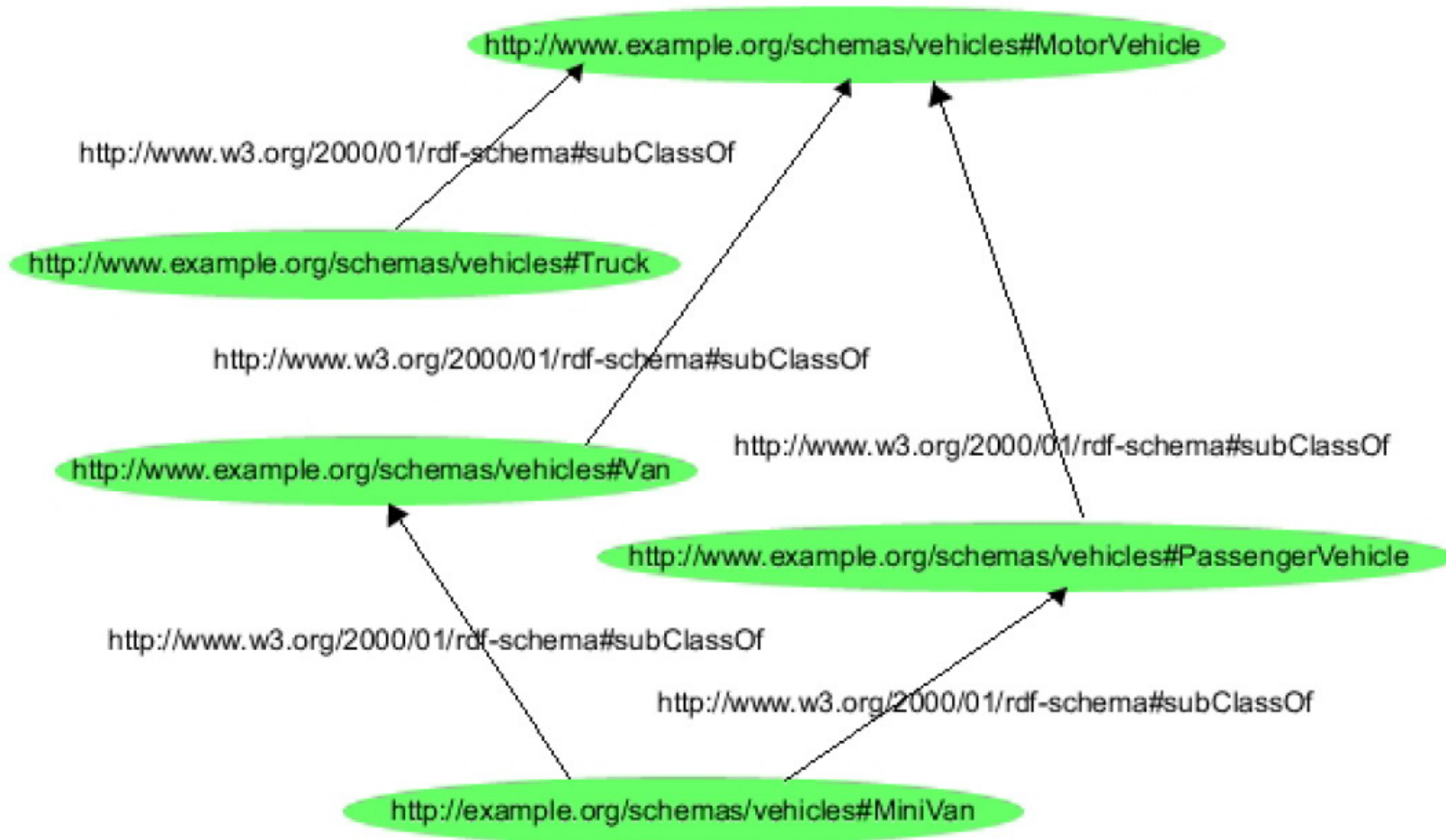   `<rdfs:subClassOf rdf:resource="super_class"/>`

    `</rdfs:Class>`

Describing Attributes

- properties are described as instances of the class `rdf:Property`

- `rdfs:range` – values of a property are instances of a designated class

- `rdfs:domain` – properties apply to a designated class

- `rdfs:subPropertyOf` – properties can be specialised

- properties may have more than one `rdf:range`, `rdf:domain` and `rdf:subPropertyOf` properties

  - ```
    <rdf:Property rdf:ID="property_name">
        <rdfs:domain rdf:resource="#designated_class"/>
        <rdfs:range rdf:resource="#designated_class"/>
        <rdfs:subPropertyOf rdf:resource="#super_property"/>
    </rdf:Property>
    ```

RDFS – Example (I)

RDFS – Example (IIa)

- RDF Schema document:

  - ```xml
    <?xml version="1.0"?>

    <!DOCTYPE rdf:RDF [<!ENTITY xsd
      "http://www.w3.org/2001/XMLSchema#">]>

    <rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
      xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
      xml:base="http://example.org/schemas/vehicles">

    <rdfs:Class rdf:ID="MotorVehicle"/>

    <rdfs:Class rdf:ID="PassengerVehicle">
      <rdfs:subClassOf rdf:resource="#MotorVehicle"/>
    </rdfs:Class>
    ```

RDFS – Example (IIb)

```
<rdfs:Class rdf:ID="Truck">

  <rdfs:subClassOf rdf:resource="#MotorVehicle"/>

</rdfs:Class>

<rdfs:Class rdf:ID="Van">

  <rdfs:subClassOf rdf:resource="#MotorVehicle"/>

</rdfs:Class>

<rdfs:Class rdf:ID="MiniVan">

  <rdfs:subClassOf rdf:resource="#Van"/>

  <rdfs:subClassOf rdf:resource="#PassengerVehicle"/>

</rdfs:Class>

<rdfs:Class rdf:ID="Person"/>

<rdfs:Datatype rdf:about="&xsd;integer"/>
```

RDFS – Example (IIc)

```
<rdf:Property rdf:ID="registeredTo">

  <rdfs:domain rdf:resource="#MotorVehicle"/>

  <rdfs:range rdf:resource="#Person"/>

</rdf:Property>

<rdf:Property rdf:ID="rearSeatLegRoom">

  <rdfs:domain rdf:resource="#PassengerVehicle"/>

  <rdfs:range rdf:resource="&xsd;integer"/>

</rdf:Property>

<rdf:Property rdf:ID="driver">

  <rdfs:domain rdf:resource="#MotorVehicle"/>

</rdf:Property>
```

RDFS – Example (IId)

```
<rdf:Property rdf:ID="primaryDriver">

  <rdfs:subPropertyOf rdf:resource="#driver"/>

</rdf:Property>

</rdf:RDF>
```

RDFS – Example (III)

- corresponding RDF instance document

  - ```xml
    <?xml version="1.0"?>
    <!DOCTYPE rdf:RDF [<!ENTITY xsd "http://www.w3.org/2001/XMLSchema#">]>
    <rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
            xmlns:ex="http://example.org/schemas/vehicles#"
            xml:base="http://example.org/things">
     <ex:PassengerVehicle rdf:ID="johnSmithsCar">
      <ex:registeredTo rdf:resource="http://www.example.org/staffid/85740"/>
      <ex:rearSeatLegRoom rdf:datatype="&xsd;integer">127</ex:rearSeatLegRoom>
      <ex:primaryDriver rdf:resource="http://www.example.org/staffid/85740"/>
     </ex:PassengerVehicle>
    </rdf:RDF>
    ```

Built-In Properties

- RDFS supplies a number of built-in properties
    - `rdfs:comment` - to provide a human-readable description of a resource
    - `rdfs:label` - to provide a more human-readable version of a resource's name
    - `rdfs:seeAlso` - to indicate a resource that might provide additional information about the subject resource
    - `rdfs:isDefinedBy` - to indicate a resource that defines the subject resource (subproperty of `rdfs:seeAlso`)

Dublin Core

- minimal set of descriptive elements that facilitate the description and the automated indexing of document-like networked objects

- originally developed by the Dublin Core Metadata Initiative (DCMI) in March 1995 at a workshop on metadata management in Dublin, Ohio

- i.e. used for the OASIS Open Document Format for Office Applications (OpenDocument) and for RSS 1.0

- imports the namespaces `dc` (http://purl.org/dc/elements/1.1/) and `dcterms` (http://purl.org/dc/terms/)

  - the latter defines additional vocabulary

- of course Dublin Core properties can be declared within an RDFS document

Dublin Core – Elements (I)

Property	Description
title	a name given to the resource
creator	an entity primarily responsible for making the content of the resource
subject	the topic of the content of the resource
description	an account of the content of the resource
publisher	an entity responsible for making the resource available

Dublin Core – Elements (II)

Property	Description
contributor	an entity responsible for making contributions to the content of the resource
date	a date associated with an event in the life cycle of the resource
type	the nature or genre of the content of the resource
format	the physical or digital manifestation of the resource
identifier	an unambiguous reference to the resource within a given context

Dublin Core – Elements (III)

Property	Description
source	a reference to a resource from which the present resource is derived
language	a language of the intellectual content of the resource
relation	a reference to a related resource
coverage	the extent or scope of the content of the resource
rights	information about rights held in and over the resource

Dublin Core - Example

-
```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
         xmlns:dc="http://purl.org/dc/elements/1.1/">
  <rdf:Description rdf:about="http://www.dlib.org">
   <dc:title>D-Lib Program - Research in Digital Libraries</dc:title>
   <dc:description>The D-Lib program supports the community of people with
    research interests in digital libraries and publishing.</dc:description>
   <dc:publisher>Corporation For National Research Initiatives</dc:publisher>
   <dc:date>1995-01-07</dc:date>
   <dc:subject>Research, statistical methods</dc:subject>
   <dc:type>World Wide Web Home Page</dc:type>
   <dc:format>text/html</dc:format>
   <dc:language>en</dc:language>
  </rdf:Description>
</rdf:RDF>
```

Resources

- Dublin Core Metadata Initiative (DCMI)
  - http://dublincore.org/

- expressing Dublin Core in HTML/XHTML meta and link elements
  - http://dublincore.org/documents/dcq-html/

- expressing qualified Dublin Core in RDF / XML
  - http://dublincore.org/documents/dcq-rdf-xml/

- expressing Dublin Core using SelfHTML
  - http://de.selfhtml.org/html/kopfdaten/meta.htm#dublin_core

- RDF test cases
  - http://www.w3.org/TR/rdf-testcases/