



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 `rdfs: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 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 (IIId)

```
<rdf:Property rdf:ID="primaryDriver">
 <rdfs:subPropertyOf rdf:resource="#driver"/>
</rdf:Property>
</rdf:RDF>
```



# RDFS – Example (III)

- corresponding RDF instance document

```
- <?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)

| <b>Property</b> | <b>Description</b>                                                     |
|-----------------|------------------------------------------------------------------------|
| 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)

| <b>Property</b> | <b>Description</b>                                                            |
|-----------------|-------------------------------------------------------------------------------|
| 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)

| <b>Property</b> | <b>Description</b>                                                   |
|-----------------|----------------------------------------------------------------------|
| 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/>