Introduction to a Web of Linked Data

The RDF Data Model

Towards a Global Knowledge Graph

Catherine Faron faron@unice.fr

The RDF Data Model

1. Describing resources
2. A triple model and a graph model
3. Serialization syntaxes
4. Values, types and languages
5. Groups
6. Naming graphs
7. RDF schemas

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1. **Describing resources**
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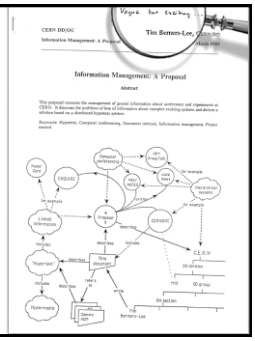
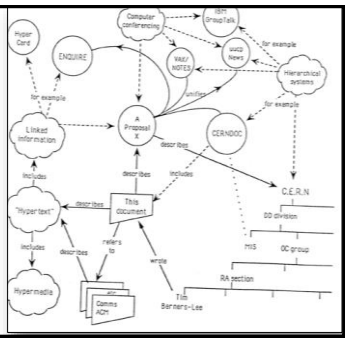
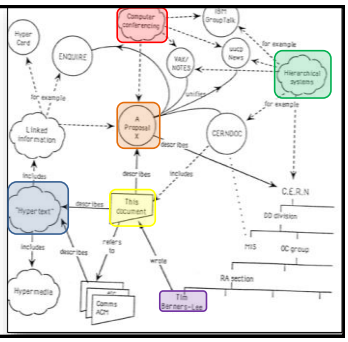
Original Proposal



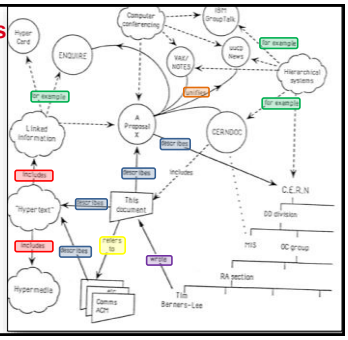
Schema



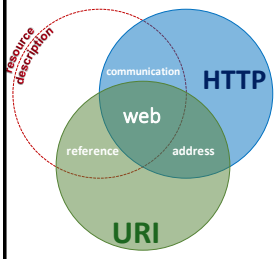
A Web of Resources



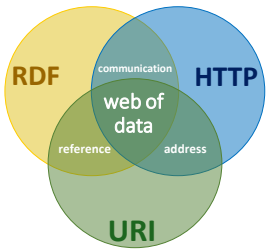
Various Kinds of Links

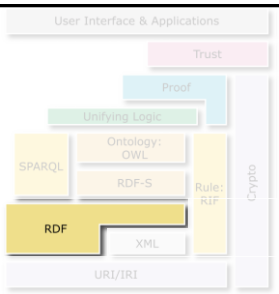


Describing Resources on the Web



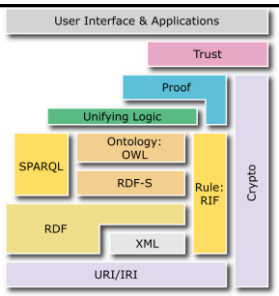
RDF: Basic Model





Semantic Web Stack of standards W3C®

Stack of standards



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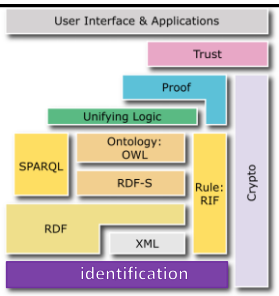
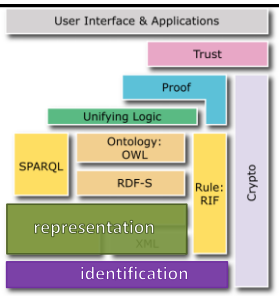


Semantic Web Stack of standards W3C®

Stack of standards



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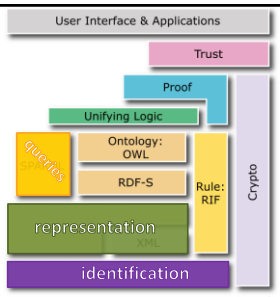

Semantic Web Stack of standards W3C®

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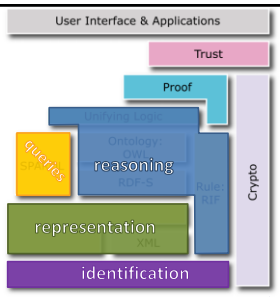
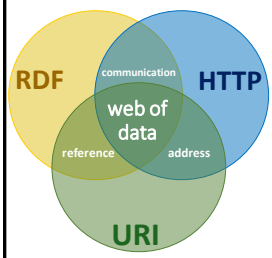
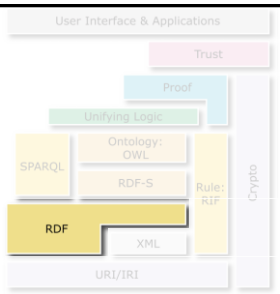


Semantic Web Stack of standards W3C®

Stack of standards





Semantic Web Stack of standards W3C®

The RDF Data Model

1. Describing resources
2. **A triple model and a graph model**
3. Serialization syntaxes
4. Values, types and languages
5. Groups
6. Naming graphs
7. RDF schemas

RDF means

***R**esource*

***D**escription*

***F**ramework*

RDF means

***R*esource:** pages, chairs, persons, ideas...
all that can have a URI

***D*escription**

***F*ramework**

RDF means

***R*esource:** pages, chairs, persons, ideas...
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***D*escription:** attributes, characteristics,
and relations between resources

***F*ramework**

RDF means

***R*esource:** pages, chairs, persons, ideas...
all that can have a URI

***D*escription:** attributes, characteristics,
and relations between resources

***F*ramework:** model, language and
syntaxes for these descriptions

RDF decomposes descriptions into triples

(subject , predicate , object)

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(subject , predicate , object)

E.g.: "doc.html has for authors Fabien, Catherine and Olivier and has for topic the Web of data"

RDF decomposes descriptions into triples

(subject , predicate , object)

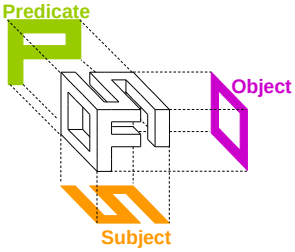
E.g.: doc.html has for author Fabien
doc.html has for author Catherine
doc.html has for author Olivier
doc.html has for topic Web of data

RDF decomposes descriptions into triples

(subject , predicate , object)

(doc.html , author , Fabien)
(doc.html , author , Catherine)
(doc.html , author , Olivier)
(doc.html , topic , Web of data)

RDF: triples are knowledge atoms



Composition Rules for RDF Triples

1. The subject is always a resource (and not a literal)

(subject , ,)

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2. The type of the binary property is identified by a URI

(subject , predicate ,)

Composition Rules for RDF Triples

1. The subject is always a resource (and not a literal)
2. The type of the binary property is identified by a URI
3. The value is a resource or a literal

(subject , predicate , object)

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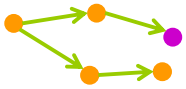
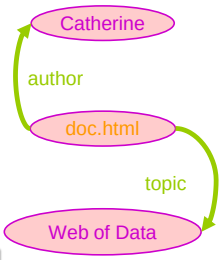
RDF: triples form graph edges

(subject , predicate , object)
→
(node, edge, node)

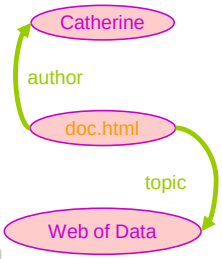


RDF is a graph model

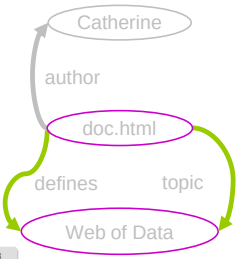


(doc.html , author, Catherine)
(doc.html , topic, Web of Data)

RDF is an oriented labeled multigraph model

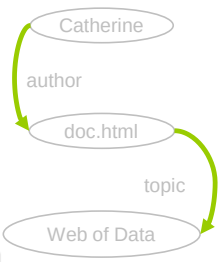


RDF is an oriented labeled **multigraph** model



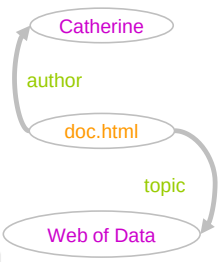
several edges can connect
the same two nodes

RDF is an **oriented** labeled multigraph model



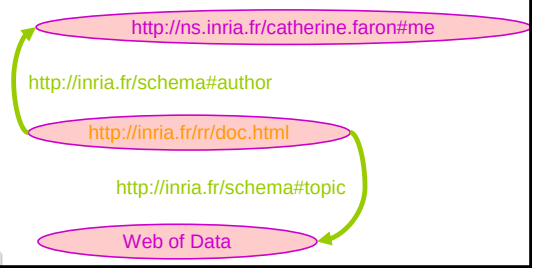
edges are oriented:
the head is the object
the tail is the subject

RDF is an oriented **labeled** graph multigraph model

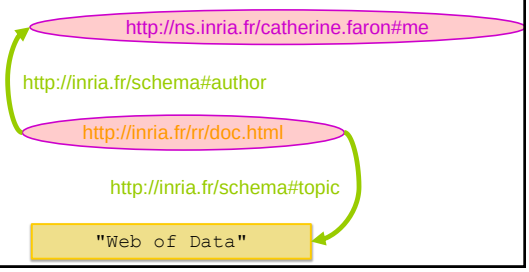


edges and nodes
are labeled

RDF graphs are labeled by resources and literals

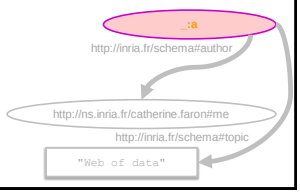


RDF graphs are labeled by resources and literals



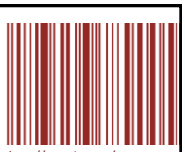
RDF Graphs are labeled by resources and literals

A resource is either a URI or an **anonymous resource (blank node)**
Existential quantification: there is a resource such that… { ∃ r ; …}

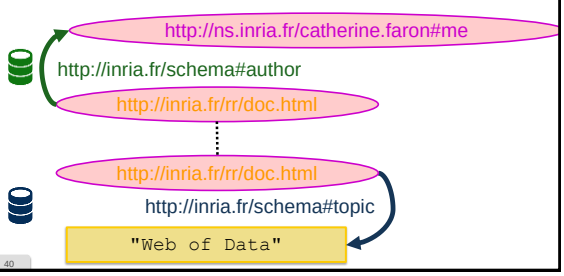


RDF is an Open Model

- Extensible vocabulary based on URIs
- Authorizes anyone to declare anything about any resource



RDF Global Giant Graph (GGG)

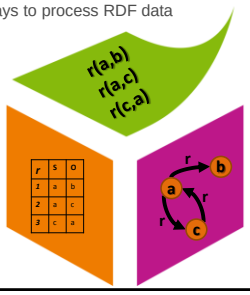


RDF Global Giant Graph (GGG)

Open and link data across the Web

Several Views on a Graph

There are many ways to process RDF data



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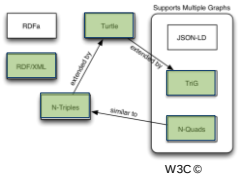
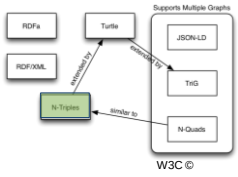
RDF has a historical XML syntax and several other syntaxes: Turtle, TriG, JSON-LD, N-Triples, N-Quads



RDF N-Triples: a minimalist syntax



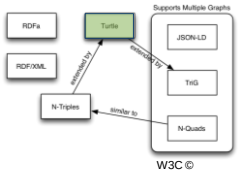
RDF N-Triples: easy parsing of triple lists

- URIs between less-than and greater-than signs
- Literal values between double quotes
- Triples separated by full stops

```
<http://inria.fr/rr/doc.html>
 <http://inria.fr/schema#author>
  <http://ns.inria.fr/catherine.faron#me> .

<http://inria.fr/rr/doc.html>
 <http://inria.fr/schema#topic> "Web of Data" .
```


RDF Turtle: the most popular RDF syntax



RDF Turtle: a very concise syntax

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>.
@prefix inria: <http://inria.fr/schema#> .

<http://inria.fr/rr/doc.html>
 inria:author <http://ns.inria.fr/catherine.faron#me> ;
 inria:topic "Web of data" .
```


RDF Turtle: prefix declaration

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix inria: <http://inria.fr/schema#> .

<http://inria.fr/rr/doc.html>
 inria:author <http://ns.inria.fr/catherine.faron#me> ;
 inria:topic "Web of data" .
```


RDF Turtle: <URI> or qualified name

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix inria: <http://inria.fr/schema#> .

<http://inria.fr/rr/doc.html>
 inria:author <http://ns.inria.fr/catherine.faron#me> ;
 inria:topic "Web of data" .
```


RDF Turtle: one (.) or several properties (;) or values (,)

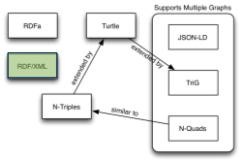
```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix inria: <http://inria.fr/schema#> .

<http://inria.fr/rr/doc.html>
 inria:author <http://ns.inria.fr/catherine.faron#me> ;
 inria:topic "Web of data", "Semantic Web".
```


RDF Turtle: [anonymous resources]

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix inria: <http://inria.fr/schema#> .
[ inria:author <http://ns.inria.fr/catherine.faron#me> ;
  inria:topic "Web of data" . ]
```


RDF/XML: the historical XML syntax



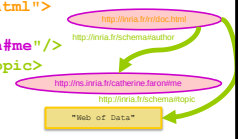
W3C ©

RDF/XML: capturing graphs into trees

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-
syntax-ns#" xmlns:inria="http://inria.fr/schema#" >

<rdf:Description
 rdf:about="http://inria.fr/rr/doc.html">
   <inria:author rdf:resource=
 "http://ns.inria.fr/catherine.faron#me"/>
  <inria:topic>Web of Data</inria:topic>
</rdf:Description>

</rdf:RDF>
```

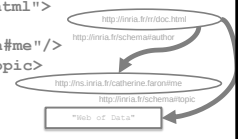


RDF/XML: a root

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-
syntax-ns#" xmlns:inria="http://inria.fr/schema#" >

<rdf:Description
 rdf:about="http://inria.fr/rr/doc.html">
   <inria:author rdf:resource=
 "http://ns.inria.fr/catherine.faron#me"/>
  <inria:topic>Web of Data</inria:topic>
</rdf:Description>

</rdf:RDF>
```

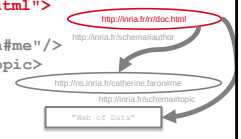


RDF/XML: descriptions of resources

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-
syntax-ns#" xmlns:inria="http://inria.fr/schema#" >

<rdf:Description
 rdf:about="http://inria.fr/rr/doc.html">
   <inria:author rdf:resource=
 "http://ns.inria.fr/catherine.faron#me"/>
  <inria:topic>Web of Data</inria:topic>
</rdf:Description>

</rdf:RDF>
```

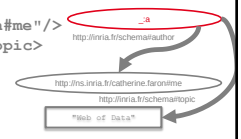


RDF/XML: anonymous resources (blank nodes)

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-
syntax-ns#" xmlns:inria="http://inria.fr/schema#" >

<rdf:Description>
   <inria:author rdf:resource=
 "http://ns.inria.fr/catherine.faron#me"/>
  <inria:topic>Web of Data</inria:topic>
</rdf:Description>

</rdf:RDF>
```

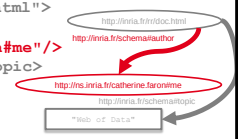


RDF/XML: links between resources

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-
syntax-ns#" xmlns:inria="http://inria.fr/schema#" >

<rdf:Description
 rdf:about="http://inria.fr/rr/doc.html">
   <inria:author rdf:resource=
 "http://ns.inria.fr/catherine.faron#me"/>
  <inria:topic>Web of Data</inria:topic>
</rdf:Description>

</rdf:RDF>
```

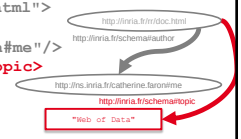


RDF/XML: literal values

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-
syntax-ns#" xmlns:inria="http://inria.fr/schema#" >

<rdf:Description
 rdf:about="http://inria.fr/rr/doc.html">
   <inria:author rdf:resource=
 "http://ns.inria.fr/catherine.faron#me"/>
  <inria:topic>Web of Data</inria:topic>
</rdf:Description>

</rdf:RDF>
```



RDF/XML: many syntactic variations

```
<rdf:RDF (…) >
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
   <inria:author rdf:resource=
    "http://ns.inria.fr/catherine.faron#me"/>
</rdf:Description>
</rdf:RDF>
```

```
<rdf:RDF (…) >
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
  <inria:topic>Web of Data</inria:topic>
</rdf:Description>
</rdf:RDF>
```

RDF/XML: many syntactic variations

```
<rdf:RDF (…) >
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
   <inria:author>
      <rdf:Description
         rdf:about="http://ns.inria.fr/catherine.faron#me"/>
   </inria:author>
</rdf:Description>
</rdf:RDF>
```


RDF/XML: many syntactic variations

```
<rdf:RDF (…) >
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
   <inria:author>
      <rdf:Description
         rdf:about="http://ns.inria.fr/catherine.faron#me">
         <inria:firstName>Catherine</firstName>
      </rdf:Description>
   </inria:author>
</rdf:Description>
</rdf:RDF>
```


RDF/XML: many syntactic variations

```
<rdf:RDF (…) >
<rdf:Description rdf:about="http://inria.fr/rr/doc.html"
   inria:topic="Web Of Data"/>
</rdf:RDF>
```


The RDF data model

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"XML Schema Datatypes" for Typing Literals

Literals are by default considered as character strings, of type xsd:string

"XML Schema Datatypes" for Typing Literals

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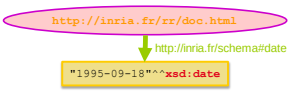
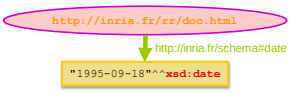


"XML Schema Datatypes" for Typing Literals

Literals are by default considered as character strings, of type xsd:string

```
@prefix (…)          Turtle
<http://inria.fr/rr/doc.html>
  inria:date "1995-09-18"^^xsd:date .
```

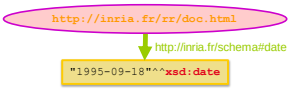


"XML Schema Datatypes" for Typing Literals

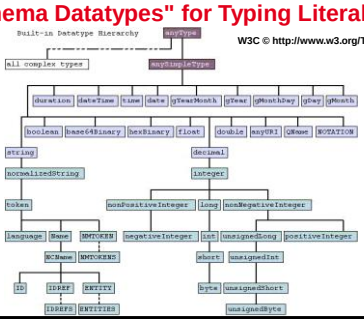
Literals are by default considered as character strings, of type xsd:string

```
@prefix (…)          Turtle
<http://inria.fr/rr/doc.html>
  inria:date "1995-09-18"^^xsd:date .

<rdf:RDF (…)>        RDF/XML
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
  <inria:date rdf:datatype="http://www.w3.org/2001/XMLSchema#date">
   1995-09-18</inria:date>
</rdf:Description>
</rdf:RDF>
```



"XML Schema Datatypes" for Typing Literals



W3C © http://www.w3.org/TR/xmlschema-2/

Indicating the Language of Textual Values

Literals can be associated to a language

Indicating the Language of Textual Values

Literals can be associated to a language

```
@prefix (…)          Turtle
<http://inria.fr/rr/doc.html>
  inria:topic "Web of Data"@en  ;
  inria:topic "Web de données"@fr .
```

Indicating the Language of Textual Values

Literals can be associated to a language

```
@prefix (…)          Turtle
<http://inria.fr/rr/doc.html>
  inria:topic "Web of data"@en  ;
  inria:topic "Web de données"@fr .

<rdf:RDF (…)>        RDF/XML
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
  <inria:topic xml:lang='en'>Web of Data</inria:topic >
  <inria:topic xml:lang='fr'>Web de données</inria:topic >
</rdf:Description>
</rdf:RDF>
```

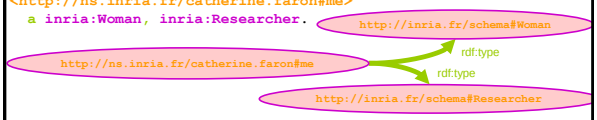
Typing Resources

Property **rdf:type** links the URIs of resources to the URIs of their classes

Typing Resources

Property **rdf:type** links the URIs of resources to the URIs of their classes

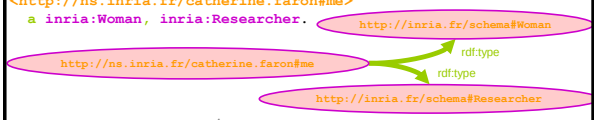
```
@prefix (…)          Turtle
<http://ns.inria.fr/catherine.faron#me>
  a inria:Woman, inria:Researcher.
```



Typing Resources

Property **rdf:type** links the URIs of resources to the URIs of their classes

```
@prefix (…)          Turtle
<http://ns.inria.fr/catherine.faron#me>
  a inria:Woman, inria:Researcher.
```




```
<rdf:RDF (…)>        RDF/XML
<inria:Researcher rdf:about="http://ns.inria.fr/catherine.faron#me">
  <rdf:type rdf:resource="http://www.inria.fr/schema#Woman" />
</inria:Researcher>
</rdf:RDF>
```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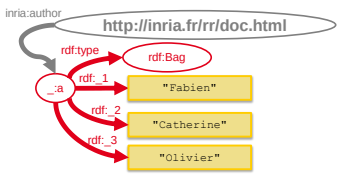
Bags (rdf:Bag) of Resources or Literals

Simple groups, without any order



Bags (rdf:Bag) of Resources or Literals

Simple groups, without any order

```
@prefix (…)          Turtle
<http://inria.fr/rr/doc.html> inria:author [ a rdf:Bag ;
  rdf:li "Fabien", "Catherine", "Olivier" . ] .
```


Bags (rdf:Bag) of Resources or Literals

Simple groups, without any order

```
@prefix (…)          Turtle
<http://inria.fr/rr/doc.html> inria:author [ a rdf:Bag ;
  rdf:li "Fabien", "Catherine", "Olivier" . ] .

<rdf:RDF (…)>        RDF/XML
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
  <inria:author>
    <rdf:Bag>
      <rdf:li>Fabien</rdf:li> <rdf:li>Catherine</rdf:li>
      <rdf:li>Olivier</rdf:li>
   </rdf:Bag>
  </inria:author>
 </rdf:Description>
 </rdf:RDF>
```


Sequences (rdf:Seq)

Ordered groups of resources or literals

```
@prefix (…)          Turtle
<http://inria.fr/rr/doc.html> inria:author [ a rdf:Seq ;
  rdf:li "Fabien", "Catherine", "Olivier" . ] .

<rdf:RDF (…)>        RDF/XML
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
  <inria:author>
    <rdf:Seq>
      <rdf:li>Fabien</rdf:li> <rdf:li>Catherine</rdf:li>
      <rdf:li>Olivier</rdf:li>
   </rdf:Seq>
  </inria:author>
 </rdf:Description>
 </rdf:RDF>
```


Alternatives (rdf:Alt)

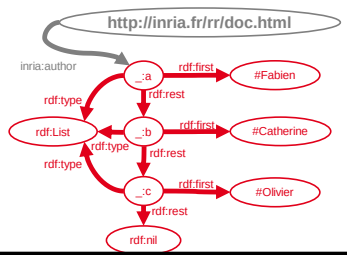
E.g. the same value in different languages

```
@prefix (…)          Turtle
<http://inria.fr/rr/doc.html> inria:theme [ a rdf:Alt ;
  rdf:li "Web of data"@en, "Web de données"@fr . ] .

<rdf:RDF (…)>        RDF/XML
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
  <inria:theme>
    <rdf:Alt>
      <rdf:li xml:lang='en'>Web of Data</rdf:li>
      <rdf:li xml:lang='fr'>Web de données</rdf:li>
   </rdf:Alt>
  </inria:theme>
 </rdf:Description>
 </rdf:RDF>
```


Collections

Exhaustive and ordered lists



Collections

Exhaustive and ordered lists

```
@prefix (…)          Turtle
<http://inria.fr/rr/doc.html> inria:author
 ( <#Fabien> <#Catherine> <#Olivier> ).

<rdf:RDF (…)>        RDF/XML
<rdf:Description rdf:about="http://inria.fr/rr/doc.html">
 <inria:author rdf:parseType="Collection">
  <rdf:Description rdf:about="#Fabien"/>
  <rdf:Description rdf:about="#Catherine"/>
  <rdf:Description rdf:about="#Olivier"/>
 </inria:author>
</rdf:Description>
</rdf:RDF>
```

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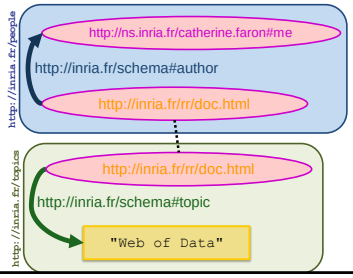
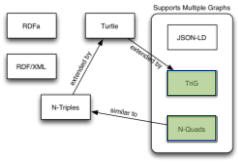
Named Graphs

Grouping triples in subgraphs identified by URIs



RDF has the TriG and N-Quads syntaxes to enable the representation of contexts



W3C ©

Named Graphs in TriG

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix inria: <http://inria.fr/schema#> .

GRAPH <http://inria.fr/people>
{ <http://inria.fr/rr/doc.html>
   inria:author
    <http://ns.inria.fr/catherine.faron#me> .
}

GRAPH <http://inria.fr/topics>
{ <http://inria.fr/rr/doc.html>
   inria:topic
    "Web of Data" .
}
```


Named Graphs in N-Quads

```
<http://inria.fr/rr/doc.html>
 <http://inria.fr/schema#author>
  <http://ns.inria.fr/catherine.faron#me>
   <http://inria.fr/people> .


<http://inria.fr/rr/doc.html>
 <http://inria.fr/schema#topic>
  "Web of Data"
   <http://inria.fr/topics> .
```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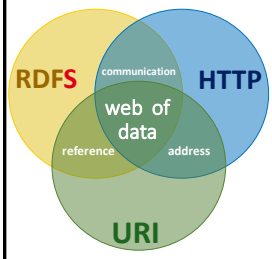
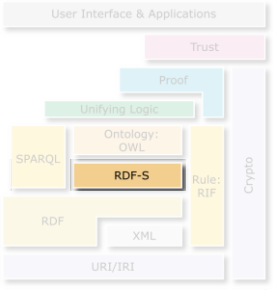
Stack of standards





Semantic Web Stack of standards W3C®

RDFS Means RDF Schema

- RDFS provides standard vocabulary to declare *in RDF* vocabularies to be used in RDF descriptions
- RDFS reuses the vocabulary of RDF and introduces additional constructs
- An RDF vocabulary is a set of property declarations and class declarations

Associating a Namespace to a Vocabulary

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
@base <http://inria.fr/2005/humans.rdfs>
(…)
```

```
<rdf:RDF xml:base="http://inria.fr/2005/humans.rdfs"
 xmlns:rdf ="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
(…)
</rdf:RDF>
```


Declaring Classes of Resources

- Naming classes
- Organizing them into hierarchies

Declaring Classes of Resources

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
@base <http://inria.fr/2005/humans.rdfs>
<Woman> a rdfs:Class ;
      rdfs:subClassOf <Person>, <Female> .
```

Declaring Classes of Resources

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
@base <http://inria.fr/2005/humans.rdfs>
<Woman> a rdfs:Class ;
      rdfs:subClassOf <Person>, <Female> .
```

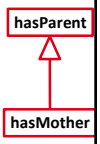
Declaring Classes of Resources

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
@base <http://inria.fr/2005/humans.rdfs>
<Woman> a rdfs:Class ;
        rdfs:subClassOf <Person>, <Female> .
```

```
<rdf:RDF xml:base="http://inria.fr/2005/humans.rdfs"
 xmlns:rdf ="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
 <rdfs:Class rdf:ID="Woman">
  <rdfs:subClassOf rdf:resource="#Person"/>
  <rdfs:subClassOf rdf:resource="#Female"/>
 </rdfs:Class>
</rdf:RDF>
```


Declaring Types of Properties

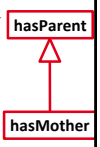
- Naming types of properties
- Organizing them into hierarchies



Declaring Types of Properties

Class `Property` is in the RDF namespace since properties are the key of RDF triples

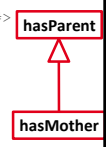
```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
@base <http://inria.fr/2005/humans.rdfs>
<hasMother> a rdf:Property ;
  rdfs:subPropertyOf <hasParent> .
```



Declaring Types of Properties

Class `Property` is in the RDF namespace since properties are the key of RDF triples

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
@base <http://inria.fr/2005/humans.rdfs>
<hasMother> a rdf:Property ;
  rdfs:subPropertyOf <hasParent> .
```

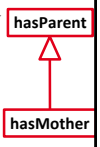


Declaring Types of Properties

Class `Property` is in the RDF namespace since properties are the key of RDF triples

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
@base <http://inria.fr/2005/humans.rdfs>
<hasMother> a rdf:Property ;
  rdfs:subPropertyOf <hasParent> .
```

```
<rdf:RDF xml:base="http://inria.fr/2005/humans.rdfs"
 xmlns:rdf ="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
 <rdf:Property rdf:ID="hasMother">
  <rdfs:subPropertyOf rdf:resource="#hasParent"/>
 </rdf:Property>
</rdf:RDF>
```



Declaring Property Signatures

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
@base <http://inria.fr/2005/humans.rdfs>
<hasMother> a rdf:Property ;
  rdfs:subPropertyOf <hasParent> ;
  rdfs:domain <Person> ;
  rdfs:range <Woman> .
```

```
<rdf:RDF … >
 <rdf:Property rdf:ID="hasMother">
  <rdfs:subPropertyOf rdf:resource="#hasParent"/>
  <rdfs:domain rdf:resource="#Person"/>
  <rdfs:range rdf:resource="#Woman"/>
 </rdf:Property>
</rdf:RDF>
```

Documenting Class and Property Declarations

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
@base <http://inria.fr/2005/humans.rdfs>
<Woman> a rdfs:Class ;
  rdfs:label "woman"@en ;
  rdfs:comment "an adult female person"@en .

<hasMother> a rdf:Property ;
  rdfs:label "has for mother"@en ;
  rdfs:comment "to have a woman for mother"@en .
```


Referencing and Using Schemas

in the description of a resource

```
@prefix h: <http://inria.fr/2005/humans.rdfs#>
@base <http://inria.fr/2005/humans.rdfs-instances>
<Alice> a h:Woman; h:hasMother <Laura> .
```


Referencing and Using Schemas

in the description of a resource

```
@prefix h: <http://inria.fr/2005/humans.rdfs#>
@base <http://inria.fr/2005/humans.rdfs-instances>
<Alice> a h:Woman; h:hasMother <Laura> .
```


Referencing and Using Schemas

in the description of a resource

```
@prefix h: <http://inria.fr/2005/humans.rdfs#>
@base <http://inria.fr/2005/humans.rdfs-instances>
<Alice> a h:Woman; h:hasMother <Laura> .
```

```
<rdf:RDF xmlns:rdf ="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
 xmlns:h="http://inria.fr/2005/humans.rdfs#"
 xml:base=" http://inria.fr/2005/humans.rdfs-instances" >
 <h:Woman rdf:ID="Alice">
   <h:hasMother rdf:resource="#Laura"/>
 </h:Woman>
</rdf:RDF>
```