More About RDF Namespaces

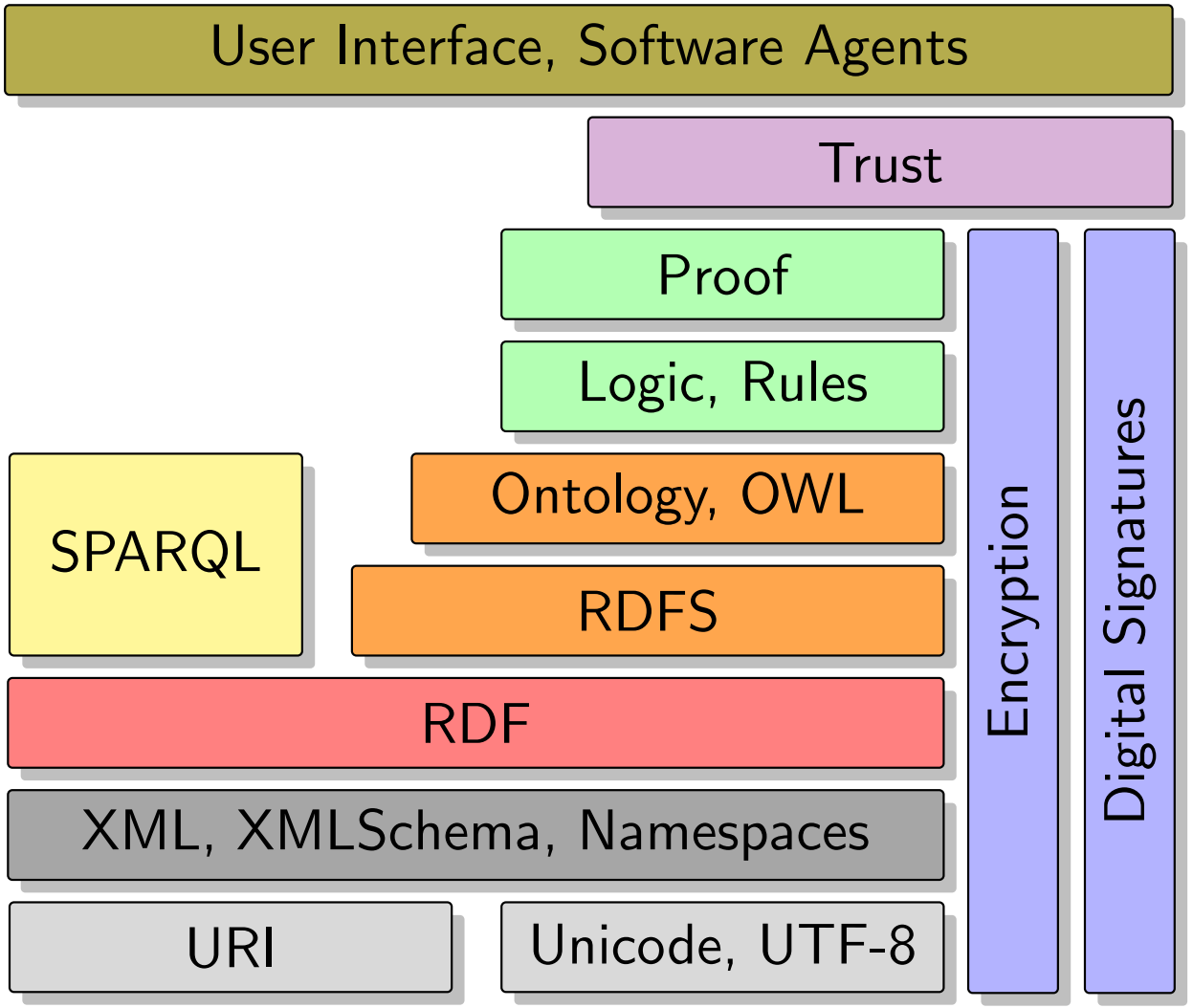
Camilo Thorne

Room 00.012
Institut für Maschinelle Sprachverarbeitung
Universität Stuttgart
+49 (0) 711 685-81369
camilo.thorne@ims.uni-stuttgart.de

Semantic Web, SS 2017

Institut für Maschinelle Sprachverarbeitung

The Semantic Web Stack [W3C, Tim Berners-Lee]



Institut für Maschinelle Sprachverarbeitung

Outline

Institut für Maschinelle Sprachverarbeitung

Outline

Institut für Maschinelle Sprachverarbeitung

Recap: What are namespaces

Recap:

- Everything has a URI, ours will always look like URLs.
- The first part is the *namespace*, the last part the *local name*.
- We can define prefixes for namespaces and abbreviate URIs with `prefix:LocalName`.

Example:

- `http://www.example.org/#JohnSmith` has
  namespace `http://www.example.org/#`
  local name `JohnSmith`.
- Define the prefix `ex` for the above namespace.
- The URI is abbreviated as `ex:JohnSmith`.

Institut für Maschinelle Sprachverarbeitung

Recap: How to define and use namespaces in XML

Recap:

- Definine with `xmlns:prefix="URI"` within an element.
- Use with `prefix:elementName` or `prefix:attributeName`.

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF
      xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
      xmlns:ex="http://www.example.org/#">
   <rdf:Description rdf:about="http://www.example.org/#Theo">
      <ex:isPetOf rdf:resource="http://www.example.org/#JohnSmith" />
   </rdf:Description>
</rdf:RDF>
```

Institut für Maschinelle Sprachverarbeitung

Outline

Institut für Maschinelle Sprachverarbeitung

Why include other documents – RDF

- I want to write RDF in XML.
- I need to say that it is RDF (`rdf:RDF` root element).
- I need to say that the things contained in the document are RDF resources (`rdf:Description`) with URIs (`rdf:about`).

Example:

```
<rdf:RDF
      xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">
   <rdf:Description rdf:about="http://www.example.org/#Theo">
   </rdf:Description>
</rdf:RDF>
```

Institut für Maschinelle Sprachverarbeitung

Why include other documents – RDFS

- If I declare my own tag `subclass` it has no semantics.
- Only because I specifically use `rdfs:subClassOf` I have access to the formal definition of subclass.
- I can be sure it is understood the same way by everybody.

Example:

```
<rdf:RDF
      xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
      xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#" >
   <rdf:Description rdf:about="http://www.example.org/#Cat">
      <rdfs:subClassOf rdf:resource="http://www.example.org/#Animal" />
   </rdf:Description>
</rdf:RDF>
```

Institut für Maschinelle Sprachverarbeitung

Why include other documents – Re-use

- Many things are already done, save lots of effort!
- Example: DBpedia creates RDF from Wikipedia infoboxes.

Example:

```
<rdf:RDF
      xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
      xmlns:dbpedia="http://dbpedia.org/resource/" >
   <rdf:Description
         rdf:about="http://dbpedia.org/resource/Albert_Einstein">
      <dbpedia:doctoralAdvisor
            rdf:resource="http://dbpedia.org/resource/Alfred_Kleiner" />
   </rdf:Description>
</rdf:RDF>
```

Institut für Maschinelle Sprachverarbeitung

Outline

Institut für Maschinelle Sprachverarbeitung

Why I need namespaces – Readability

- Namespaces make the document readable.
- A URI may contain characters not allowed in XML element names (letters, digits, -, _, :, .).

Example:

```
<http://www.w3.org/1999/02/22-rdf-syntax-ns#RDF>
   <http://www.w3.org/1999/02/22-rdf-syntax-ns#Description
        http://www.w3.org/1999/02/22-rdf-syntax-ns#about
           ="http://www.example.org/#Theo">
      <http://www.example.org/#isPetOf
           http://www.w3.org/1999/02/22-rdf-syntax-ns#resource
              ="http://www.example.org/#JohnSmith" /
   </http://www.w3.org/1999/02/22-rdf-syntax-ns#Description>
</http://www.w3.org/1999/02/22-rdf-syntax-ns#RDF>
```

Institut für Maschinelle Sprachverarbeitung

Why I need namespaces – Disambiguation (1)

- Document 1 is an RDF document describing books:

```
<rdf:RDF
      xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" >
   <rdf:Description rdf:about="Book1">
      <hasTitle>Max und Moritz</hasTitle>
      <hasAuthor rdf:resource="Busch" />
   </rdf:Description>
</rdf:RDF>
```

- `hasTitle` is used to describe the title (name) of the book.
- `Busch` is used to refer to Wilhelm Busch (1832 – 1908).

Institut für Maschinelle Sprachverarbeitung

Why I need namespaces – Disambiguation (2)

- Document 2 is an RDF document describing people:

```
<rdf:RDF
      xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" >
   <rdf:Description rdf:about="Busch">
      <hasTitle>Prof. Dr. med.</hasTitle>
      <hasFirstName>Friedrich</hasFirstName>
      <hasLastName>Busch</hasLastName>
   </rdf:Description>
</rdf:RDF>
```

- `hasTitle` is used to describe the academic degree.
- `Busch` is used to refer to Prof. Dr. med. Friedrich Busch.

Institut für Maschinelle Sprachverarbeitung

Why I need namespaces – Disambiguation (3)

- If I combine the two we have a problem:

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

   <rdf:Description rdf:about="Book1">
      <hasTitle>Max und Moritz</hasTitle>
      <hasAuthor rdf:resource="Busch" />
   </rdf:Description>

   <rdf:Description rdf:about="Busch">
      <hasTitle>Prof. Dr. med.</hasTitle>
      <hasFirstName>Friedrich</hasFirstName>
      <hasLastName>Busch</hasLastName>
   </rdf:Description>

</rdf:RDF>
```

- `hasTitle` has two different meanings we cannot distinguish!
- Dr. Friedrich Busch didn't write "Max und Moritz"!

Institut für Maschinelle Sprachverarbeitung

Why I need namespaces – Disambiguation (4)

- With namespaces we can easily distinguish the two sources:

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
      xmlns:books="http://www.books.org/#"
      xmlns:people="http://www.example.org/people/#" >

   <rdf:Description rdf:about="http://www.books.org/#Book1">
      <books:hasTitle>Max und Moritz</books:hasTitle>
      <books:hasAuthor rdf:resource="http://www.books.org/#Busch" />
   </rdf:Description>

   <rdf:Description rdf:about="http://www.example.org/people/#Busch">
      <people:hasTitle>Prof. Dr. med.</people:hasTitle>
      <people:hasFirstName>Friedrich</people:hasFirstName>
      <people:hasLastName>Busch</people:hasLastName>
   </rdf:Description>

</rdf:RDF>
```

- `books:hasTitle` is different from `people:hasTitle`.
- `books:Busch` is different from `people:Busch`.

Institut für Maschinelle Sprachverarbeitung

Outline

Institut für Maschinelle Sprachverarbeitung

The default namespace

- All elements that are used without namespace are in the default namespace.
- Set it with `xmlns="URI"` or `xml:base="URI"`.

Example (`isPetOf` is the same URI as `ex:isPetOf`):

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
      xml:base="http://www.example.org/"
      xmlns:ex="http://www.example.org/#">
   <rdf:Description rdf:about="http://www.example.org/#Theo" />
      <ex:isPetOf rdf:resource="http://www.example.org/#JohnSmith" />
      <isPetOf rdf:resource="http://www.example.org/#JaneDoe" />
   </rdf:Description>
</rdf:RDF>
```

Institut für Maschinelle Sprachverarbeitung

Namespaces in attribute values – Problem

- In XML attribute values no expansion of namespaces is done.
- The values of `rdf:about` and `rdf:resource` have to be URIs.
- A namespace prefix would be incorrectly interpreted, e.g., `rdf:about="ex:Theo"` would just be the URI `ex:Theo`, not the correct expanded URI `http://www.example.org/#Theo`.

Example (wrong):

```
<rdf:RDF
      xml:base="http://www.example.org/"
      xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
      xmlns:ex="http://www.example.org/#">
   <rdf:Description rdf:about="ex:Theo" />
</rdf:RDF>
```

Institut für Maschinelle Sprachverarbeitung

Namespaces in attribute values – Solution

- Use complete URIs like `rdf:about="http://www.example.org/#Theo"`
- Use a reference to the base URI with `rdf:about="#Theo"`

Example (`http://www.example.org/#Theo` is the same as `#Theo`):

```
<rdf:RDF
      xml:base="http://www.example.org/"
      xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
      xmlns:ex="http://www.example.org/#">
   <rdf:Description rdf:about="http://www.example.org/#Theo" />
   <rdf:Description rdf:about="#Theo" />
</rdf:RDF>
```

Institut für Maschinelle Sprachverarbeitung

RDF specifics

- In RDF, only `xml:base` can be used to set the default namespace.
- In RDF, XML elements must always have a namespace prefix, unqualified names are not allowed. So this is valid XML, but not valid RDF:

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">
   <rdf:Description rdf:about="http://www.example.org/#Theo" />
      <isPetOf rdf:resource="http://www.example.org/#JaneDoe" />
   </rdf:Description>
</rdf:RDF>
```

- You can freely chose the prefixes you use, but it is customary to use `rdf` and `rdfs` for RDF and RDFS respectively.

Institut für Maschinelle Sprachverarbeitung

Outline

Institut für Maschinelle Sprachverarbeitung

Some References

- W3C Recommendation for XML Namespaces (2009)
  `http://www.w3.org/TR/xml-names/`
- Miloslav Nic: XML Namespaces Tutorial
  `http://www.zvon.org/xxl/NamespaceTutorial/Output/index.html`
- Ronald Bourret: XML Namespaces FAQ (last update 2009)
  `http://www.rpbourret.com/xml/NamespacesFAQ.htm`

Institut für Maschinelle Sprachverarbeitung