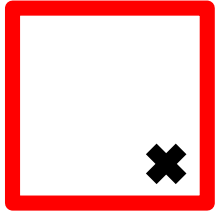


An Introduction to the Semantic Web

Hugo Mills



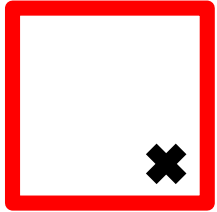
Semantic...

semantic, *a.* and *n.*

[...]

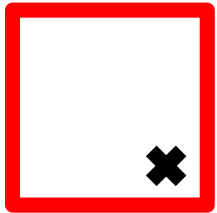
2. a. Relating to signification or meaning.

(OED)

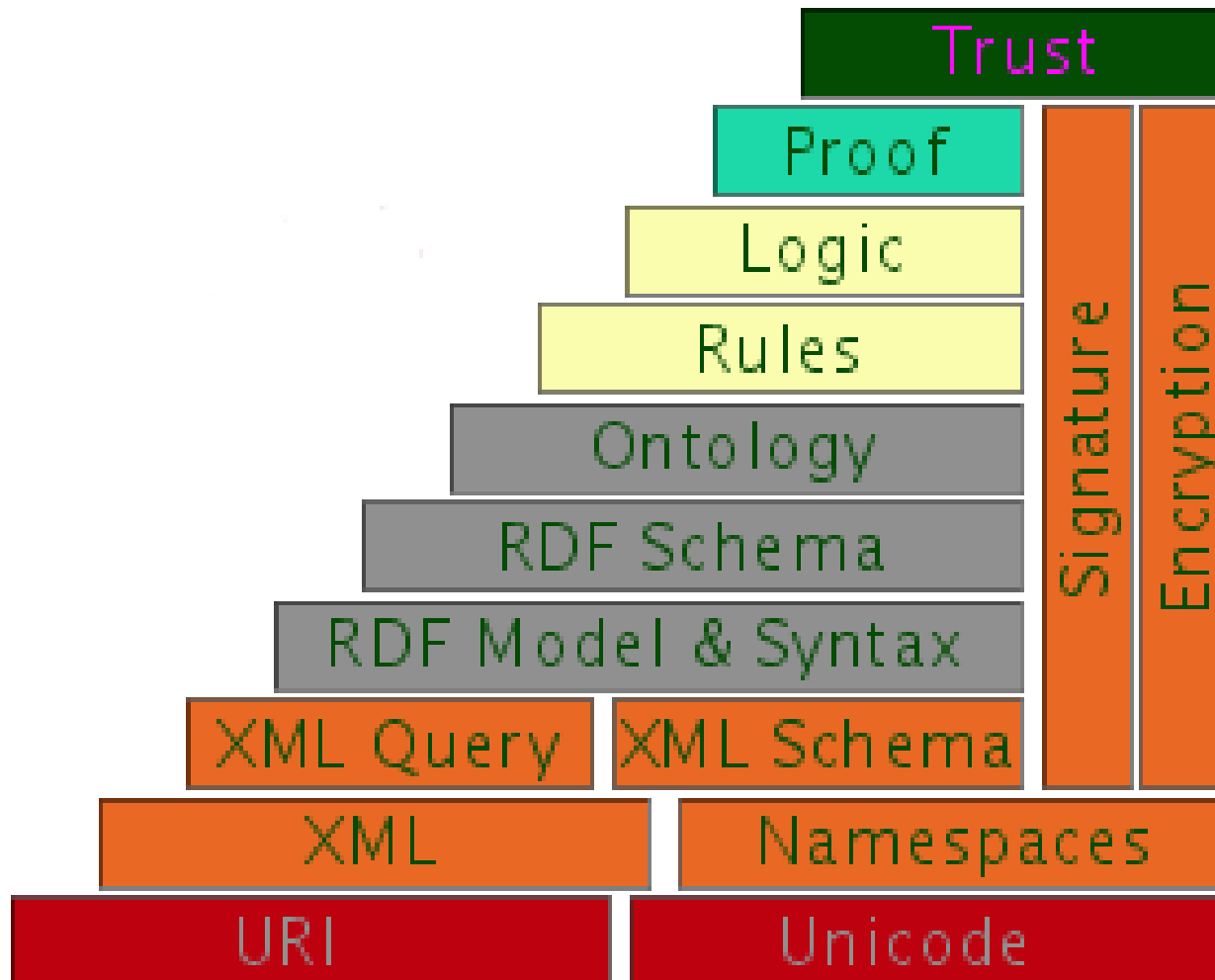


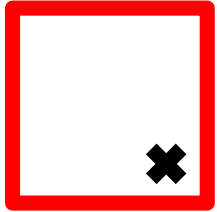
What's it all about?

- Making web pages **machine readable**
- Combining information from multiple sources
- Making inferences to find new knowledge

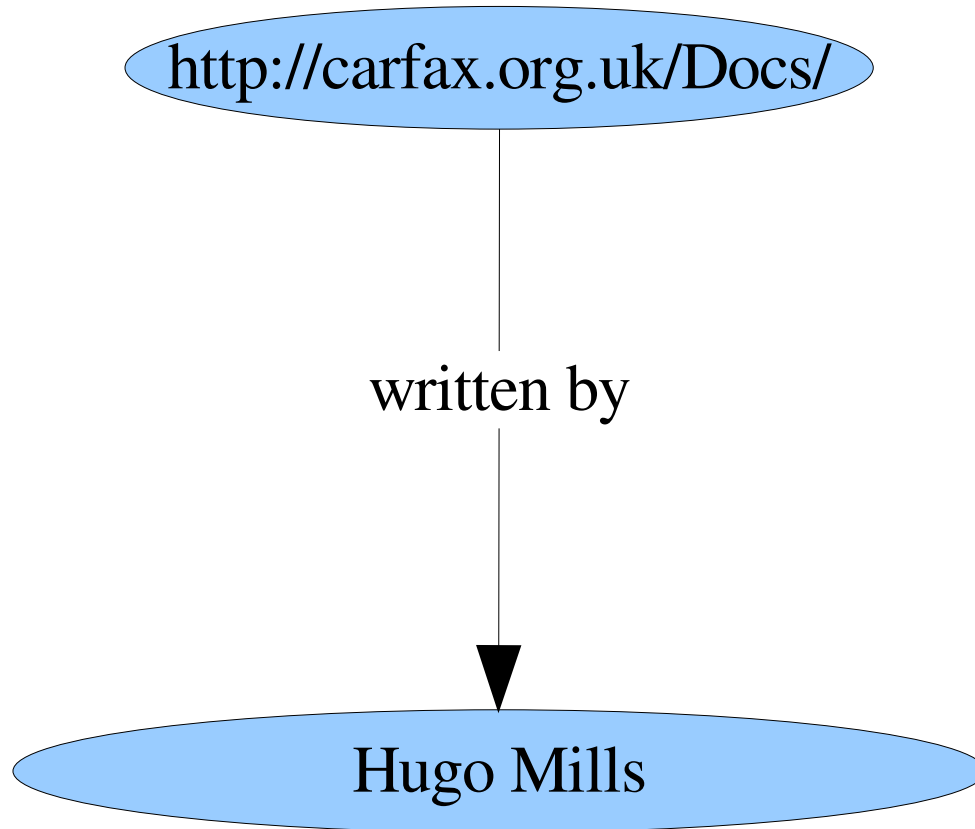


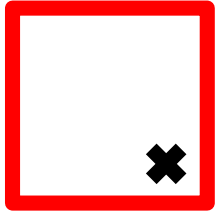
The Technology Stack



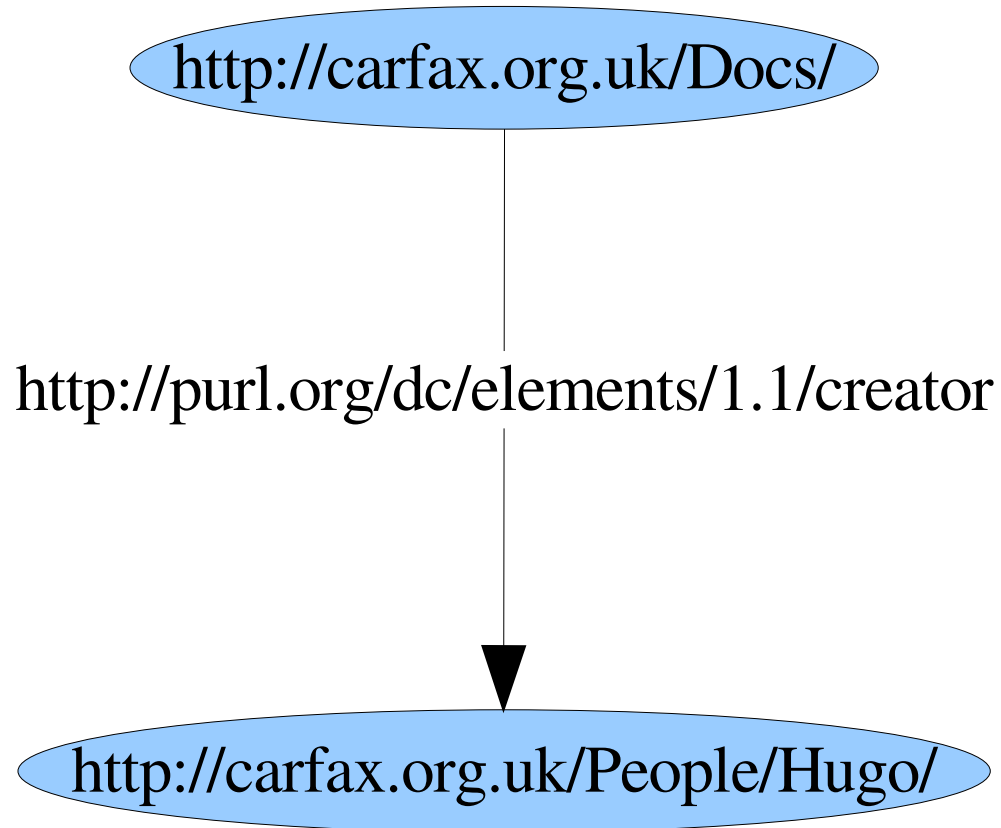


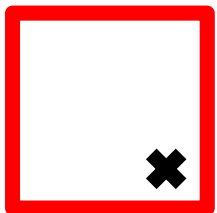
RDF



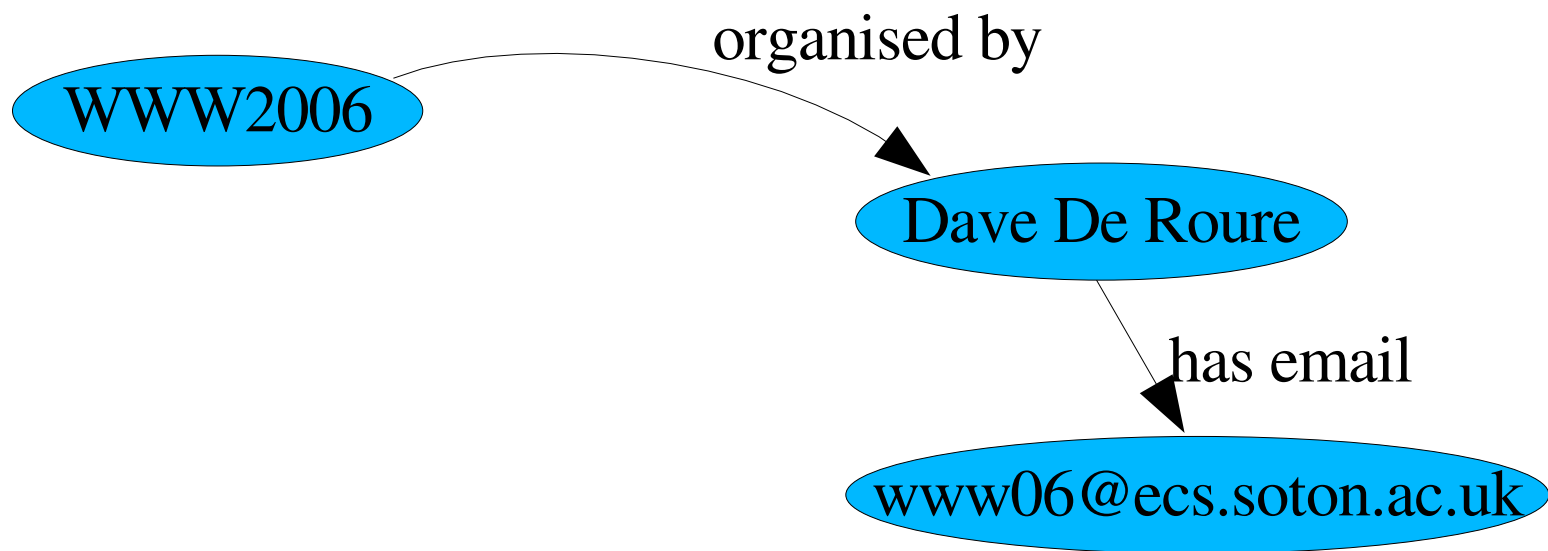


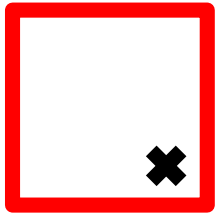
RDF



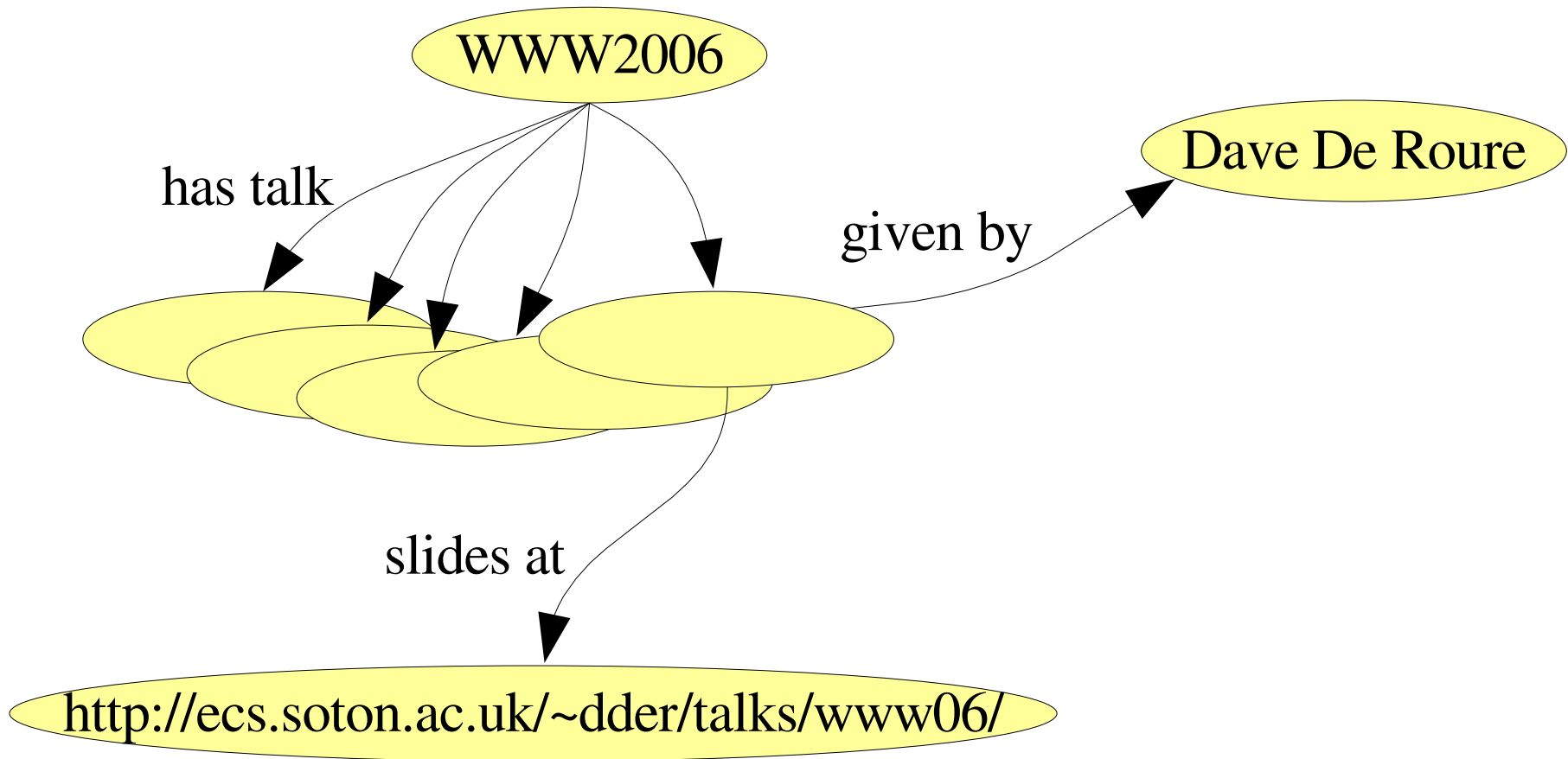


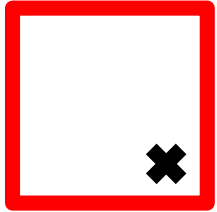
Combining RDF information



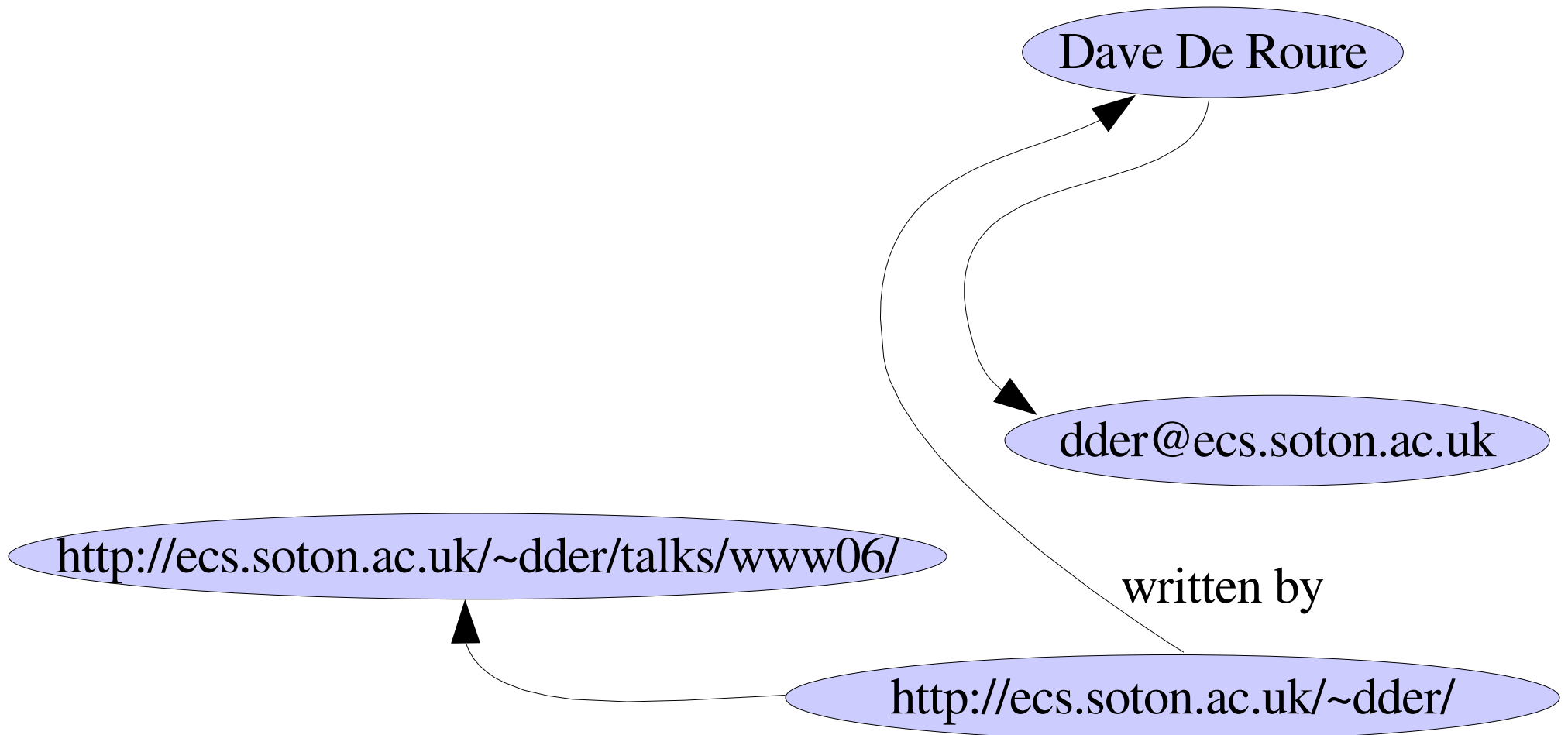


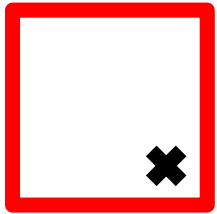
Combining RDF information



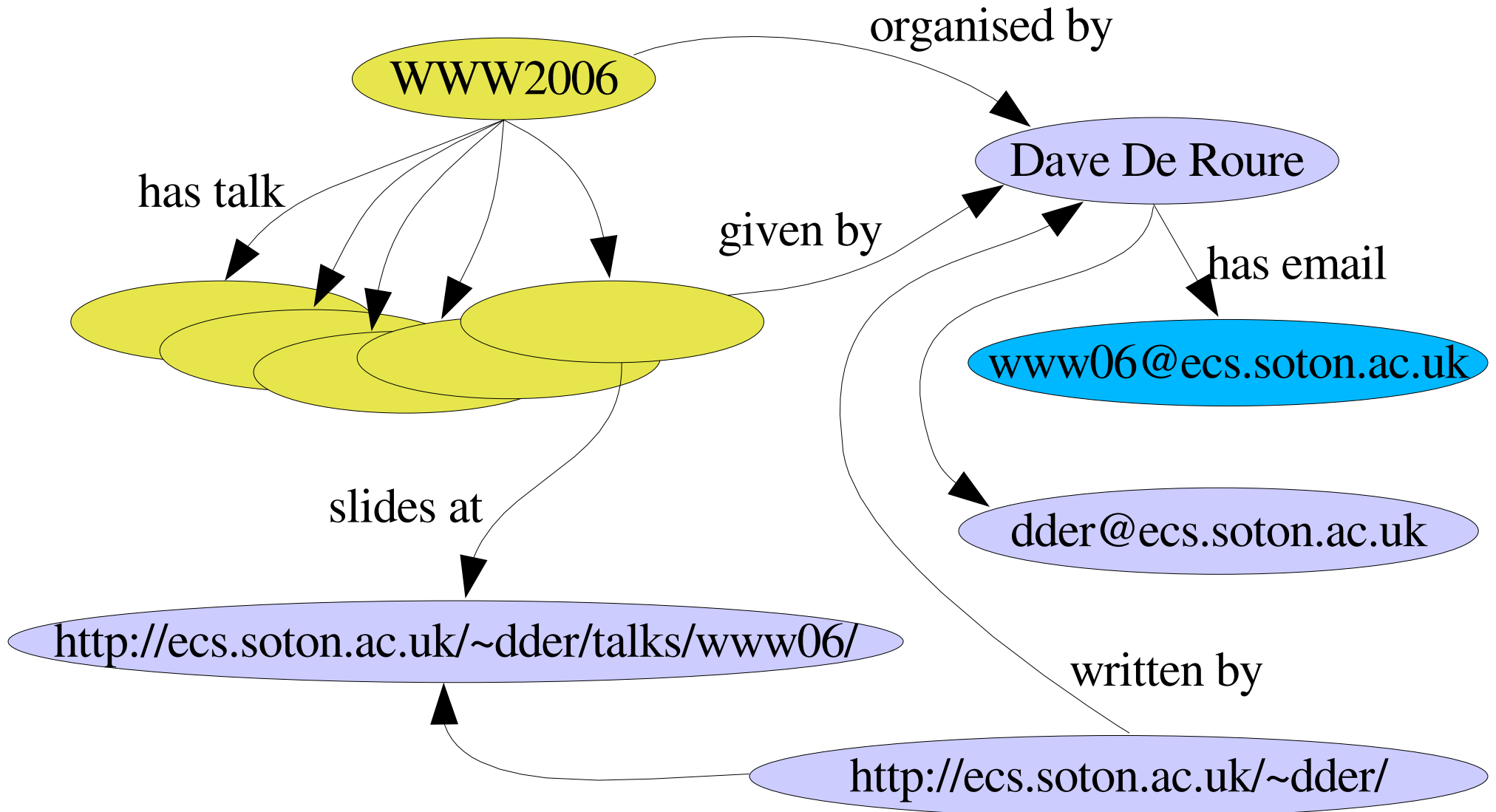


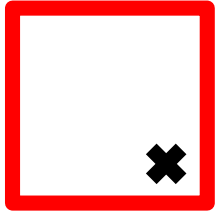
Combining RDF information





Combining RDF information

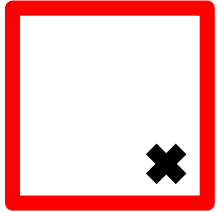




RDF file formats

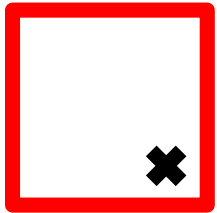
- **RDF/XML**

- ```
<rdf:Description
rdf:about="http://semweb.carfax.org.uk/iceandfire/1/iceandfire#Vale_of_Arryn">
 <rdf:type
rdf:resource="http://semweb.carfax.org.uk/carfixion/1/carfixion#GeographicalLocation"/>
 <c:part-of
rdf:resource="http://semweb.carfax.org.uk/iceandfire/1/iceandfire#Mountains_of_the_Moon
"/>
 <c:part-of rdf:resource="http://semweb.carfax.org.uk/iceandfire/1/iceandfire#Westeros"/>
 <rdf:type rdf:resource="http://semweb.carfax.org.uk/carfixion/1/carfixion#Region"/>
 <c:has-name>Vale of Arryn</c:has-name>
</rdf:Description>
```

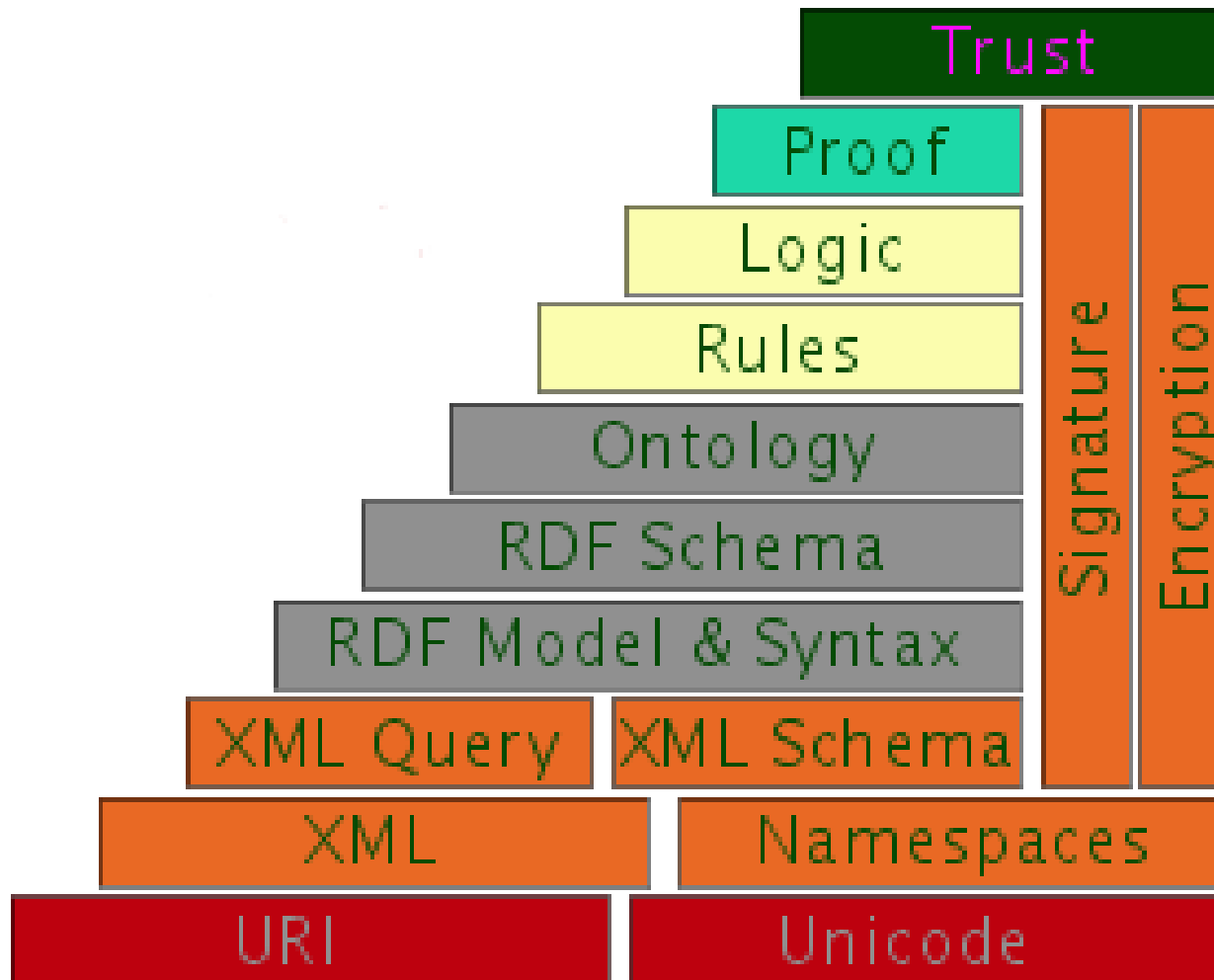


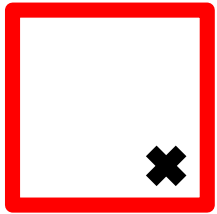
# RDF file formats

- N3 / Turtle
  - `:Vale_of_Arryn`  
a `cfxn:Region`,  
    `cfxn:Geographical Location`;  
`cfxn:has-name "Vale of Arryn"`;  
`cfxn:part-of :Westeros`,  
                  `:Mountains_of_the_Moon`.

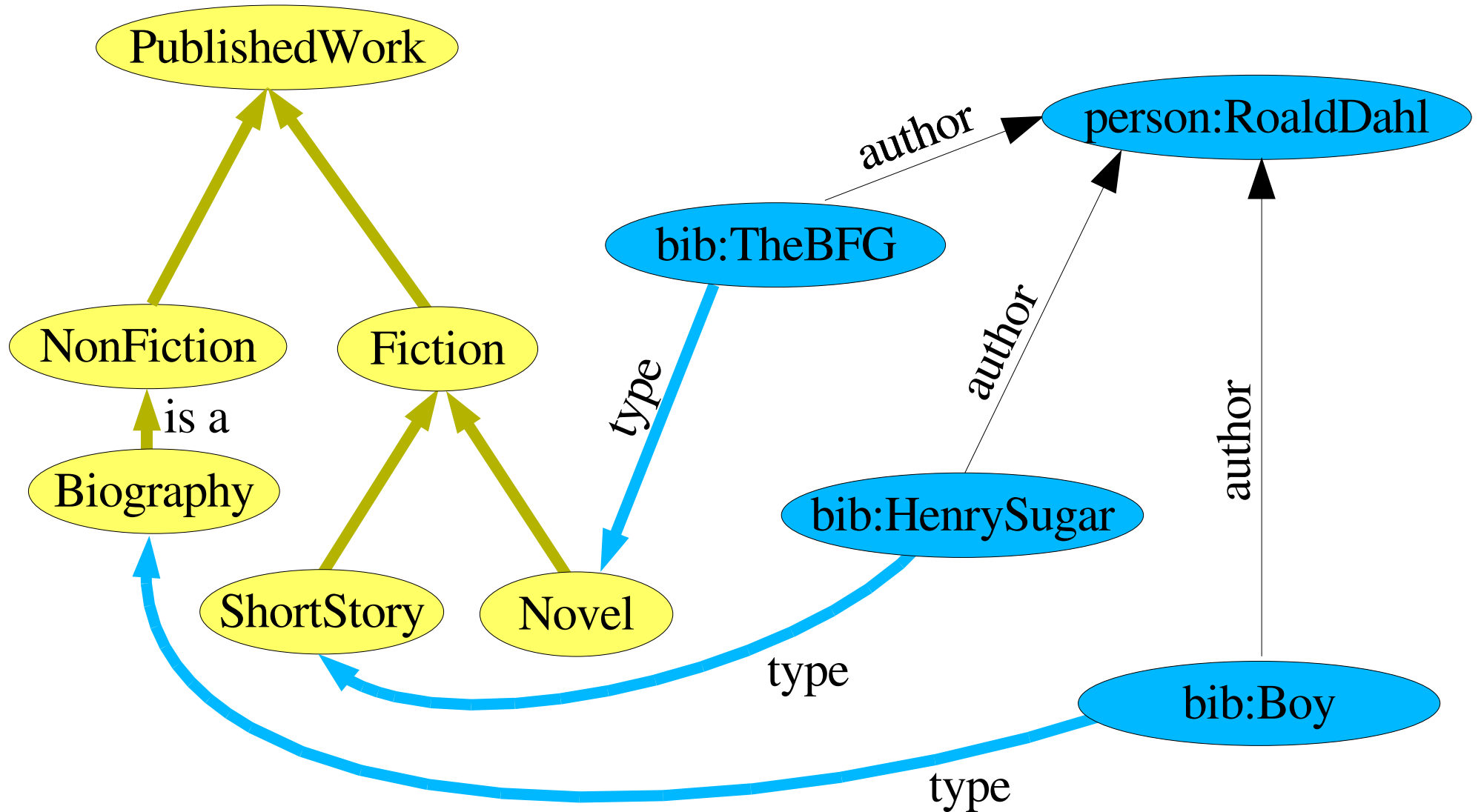


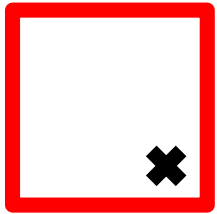
# The Technology Stack



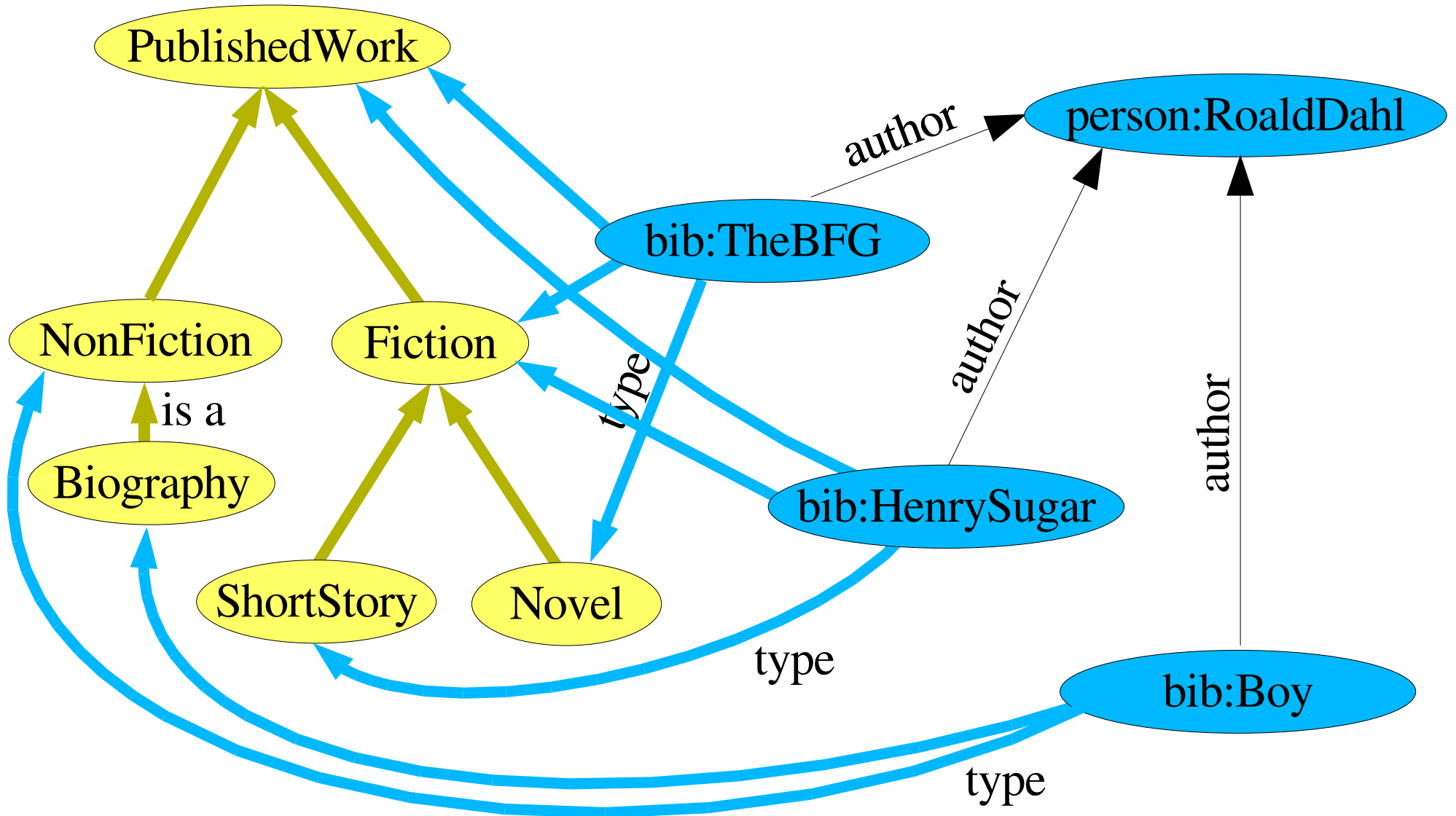


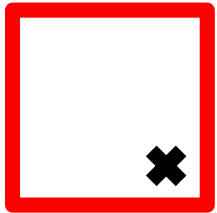
# RDF Schema



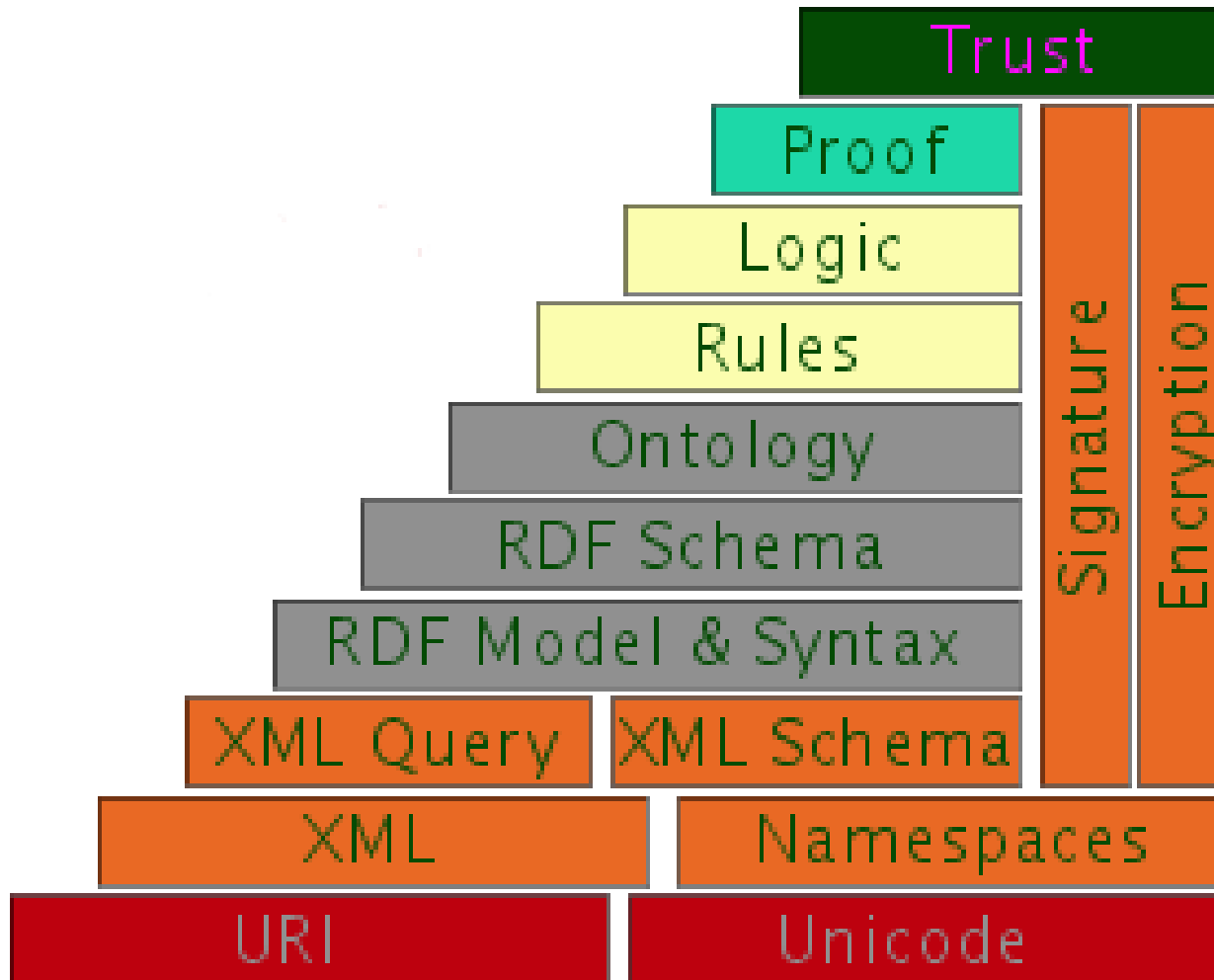


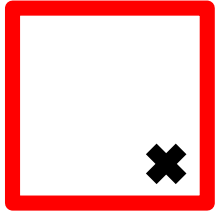
# Automated Reasoning





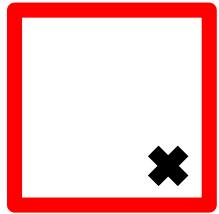
# The Technology Stack





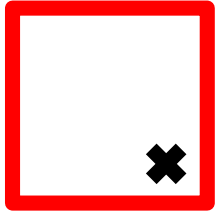
# Schemas and the O-word

- **Ontology**
  - “... a specification of a conceptualisation.”
  - Vocabulary and relationships
- **RDFS**
  - Classes and subclass relationships
  - Properties and subproperty relationships
    - Range and domain of properties



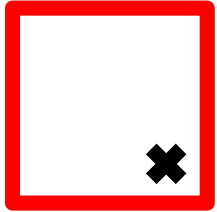
# OWL: Web Ontology Language

- Identity (owl:sameAs)
- Disjunction
  - something can be in one or other class but not both
- Number restrictions
  - at least  $n$  of some property
  - no more than  $n$  of some property
- Flavours: OWL-Lite, OWL-DL, OWL-Full



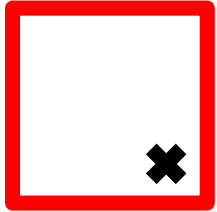
# What you can do

- Mark up web pages
- Present databases as RDF
- Use and develop new ontologies



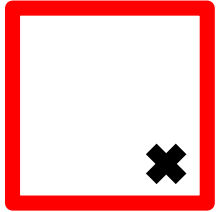
# Tools

- Ontology editor – Protégé
- Libraries
  - Redland / librdf (C/C++/Perl/Python/...)
  - RAP: RDF API for PHP
  - Jena (Java)
- Storage (triplestores)
  - 3store
  - Jena / Joseki



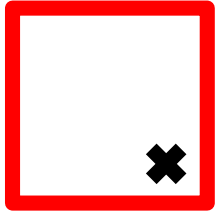
# Tools

- Reasoners
  - 3store
  - Jena
  - Pellet



## More information

- <http://w3.org/>
- <http://www.w3.org/TR/rdf-concepts/>
- <http://www.iam.ecs.soton.ac.uk/>
- <http://jena.sf.net/>
- <http://aktors.org/>
- <http://www.mindswap.org/>



# Schemas

- <http://www.w3.org/2004/OWL/>
- <http://www.foaf-project.org/>
- <http://dublincore.org/>
- <http://www.daml.org/ontologies/>