

Lecture 3

Knowledge Graphs: Vocabularies & Ontologies

COMP 474/6741, Winter 2024

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

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1 Introduction

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

2 RDF Schema

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

3 Vocabularies

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

4 Example: schema.org

[Example: schema.org](#)

5 Notes and Further Reading

[Notes and Further Reading](#)

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Slides Credit

- Includes slides from Jay Pujara & Sameer Singh, *Mining Knowledge Graphs from Text*, <https://kgtutorial.github.io/>
- Includes slides by Ivan Herman, W3C [Her]

1 Introduction

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

2 RDF Schema

Introduction

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

RDF Schema

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

Vocabularies

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

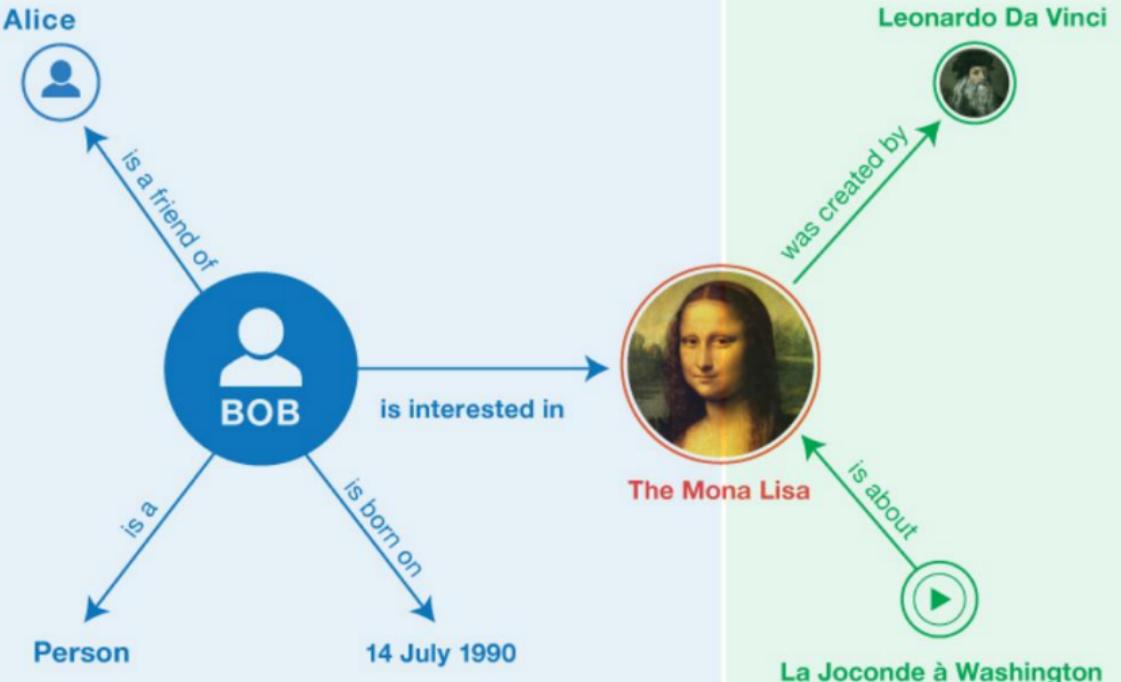
Example: schema.org

[Notes and Further Reading](#)

5 Notes and Further Reading

<http://example.org/bob>

<https://www.wikidata.org/wiki/Special:EntityData/Q12418>



Introduction

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

RDF Schema

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

Vocabularies

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Why knowledge graphs?

- Humans:

- Combat information overload
- Explore via intuitive structure
- Tool for supporting knowledge-driven tasks

- AIs:

- Key ingredient for many AI tasks
- Bridge from data to human semantics
- Use decades of work on graph analysis

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

RDF triples (cont.)

- ▶ An **RDF Triple (s,p,o)** is such that:
 - “s”, “p” are URI-s, ie, resources on the Web; “o” is a URI or a literal
 - “s”, “p”, and “o” stand for “subject”, “property”, and “object”
 - here is the complete triple:

```
(<http://...isbn...6682>, <http://.../original>, <http://...isbn...409X>)
```

- ▶ RDF is a general model for such triples (with machine readable formats like RDF/XML, Turtle, N3, RDFa, Json, ...)

Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

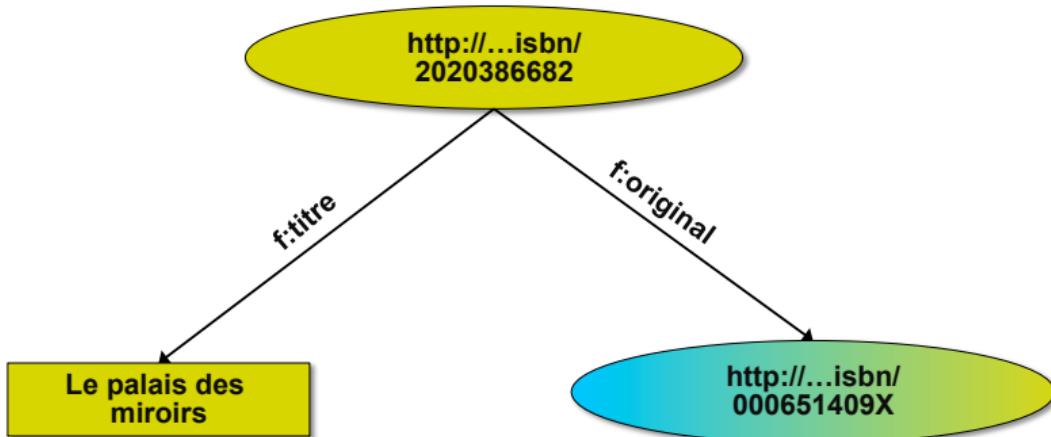
SKOS

Summary

Example: schema.org

Notes and Further Reading

A simple RDF example (in Turtle)



```
<http://.../isbn/2020386682>
  f:titre "Le palais des miroirs"@fr ;
  f:original <http://.../isbn/000651409X> .
```

Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading

Anatomy of a URI

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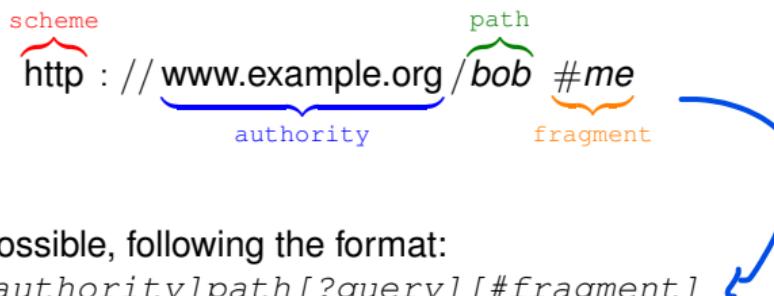
- A **URI (Uniform Resource Identifier)** uniquely identifies a resource (e.g., person, book, class of things) on the Web.

- A URI is not always a URL (*Uniform Resource Locator*)

- URNs (*Uniform Resource Names*) are URIs that name resources without specifying how to retrieve them, e.g., `urn:isbn:0451450523`.
- It's possible URLs are not available, e.g.,

`http://www.concordia.ca/comp474/lecture03/slides5`
is a valid URL, but nothing can be (currently?) retrieved from this address

- URIs have a generic syntax:



- Queries are also possible, following the format:

`scheme : [//authority]path[?query][#fragment]`

- Namespaces are used to shorten URIs and prevent name clashes, e.g., `ex:me`
- IRIs (*Internationalized Resource Identifiers*) are URIs with Unicode characters

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

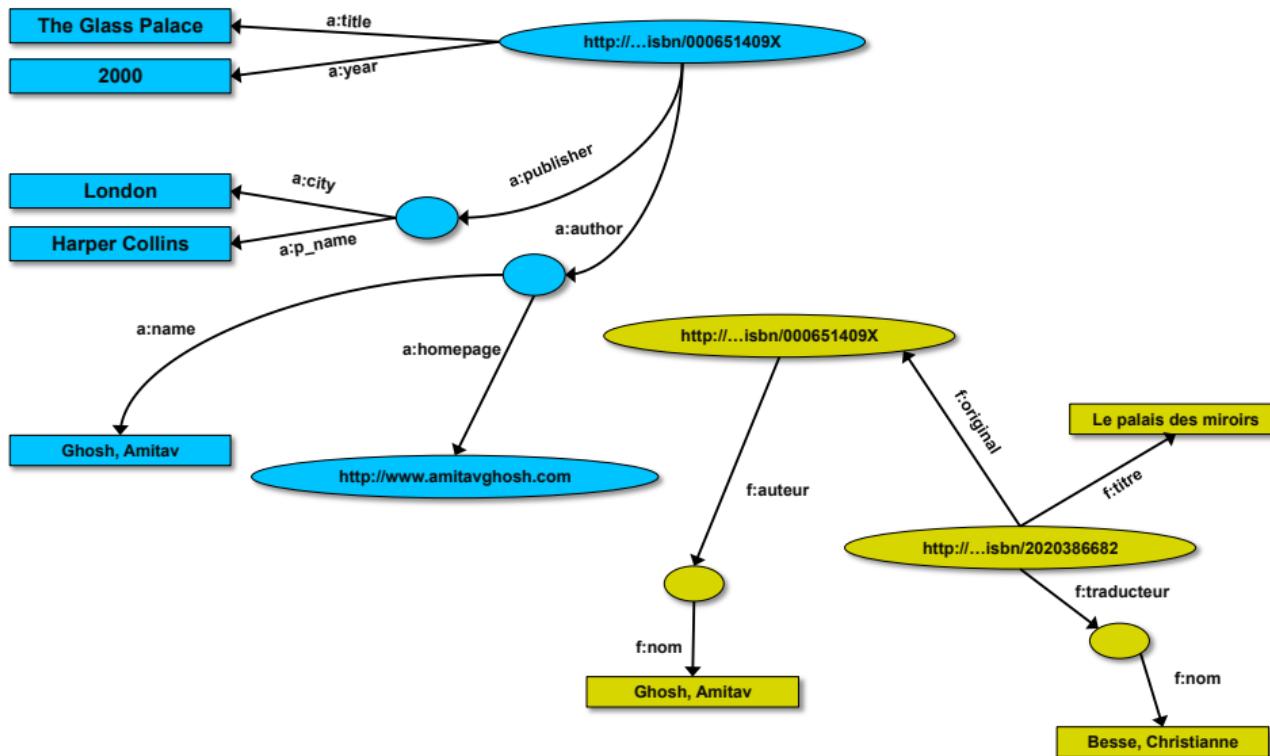
[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

3rd: start merging your data

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Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading

From the first week's lecture...

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Common Issue

- Data in Information Silos
Documents, databases,
spreadsheets, emails, ...
- Disconnected, missing knowledge

Knowledge Integration

- Connect silo-ed knowledge
- Leverage existing, external
Knowledge Bases
- Freely available, many domains
- Continuously updated



WIKIDATA

Main page
Community portal
Project chat
Create a new item
Create a new lexeme
Recent changes
Random item
Query Service
Nearby
Help
Donate
Tools
What links here
Related changes
Special pages
Permanent link
Page information

Item Discussion

support vector machine (Q282453)

set of methods for supervised statistical learning
SVM | support vector machines

► In more languages

Statements

Instance of algorithm
0 references

subclass of supervised learning
1 reference



Introduction

Review

Anatomy of a URI

Back to the bookstore
example

RDF Schema

Introduction
Class and Instance
Label & Comment
Subclass
Property
RDFS Utility Vocabulary
Summary

Vocabularies

Introduction
FOAF
Dublin Core
SKOS
Summary

Example: schema.org

Notes and Further
Reading

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

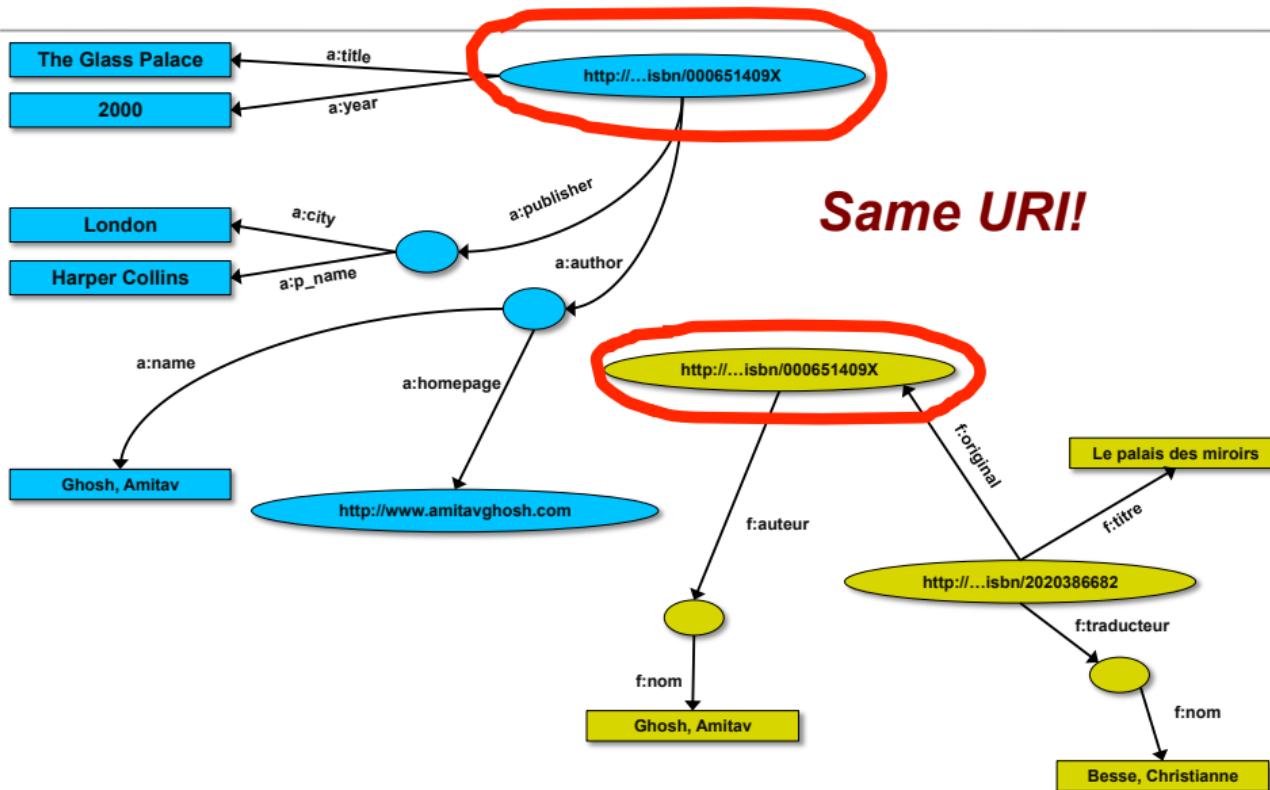
[Notes and Further Reading](#)



But: we do not want that!

3rd: start merging your data (cont)

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Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

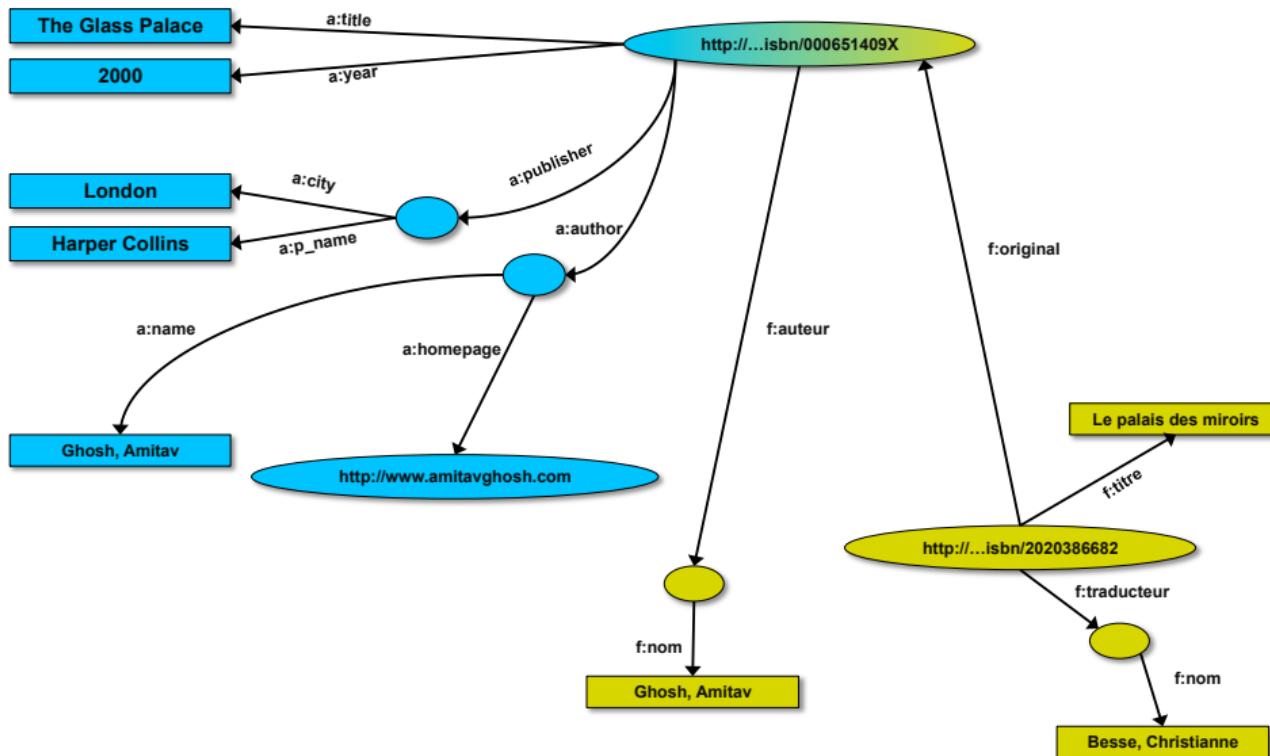
Summary

Example: schema.org

Notes and Further Reading

3rd: start merging your data

René Witte



Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading

What's an "author"?

- author
- auteur
- Autor
- book author
- writer
- editor
- ghostwriter
- co-author
- blogger
- ...

How can we define their meaning? And relations?

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Authors and publishers

Here are entered works on the relations between author and publisher.

URI(s)

- <http://id.loc.gov/authorities/subjects/sh85010023>
- [info:lc/authorities/sh85010023](#)
- [http://id.loc.gov/authorities/sh85010023#concept](#)

Instance Of

- MADS/RDF Topic
- MADS/RDF Authority
- SKOS Concept ↗

Scheme Membership(s)

- [Library of Congress Subject Headings](#)

Collection Membership(s)

- [LCSH Collection - Authorized Headings](#)
- [LCSH Collection - General Collection](#)
- [LCSH Collection - May Subdivide Geographically](#)

Variants

- Author and publisher
- Authors and publishers--Law and legislation
- Publishers and authors
- Publishing contracts

Broader Terms

- [Authorship](#)
- [Contracts](#)

Narrower Terms

- [Queries \(Authorship\)](#)

Related Terms

- [Book proposals](#)
- [Commission](#)

Everything



Subject Of Works

243 resources

◀ Page 1 of 5 ▶

Alden, Chevy. How to get published, guaranteed
Alden, Chevy. How to get published-guaranteed
Allen, Marilyn. complete idiot's guide to book
proposals & query letters

Allfeld, Philipp, 1852- gesetze betreffend das
urheberrecht an werken der literatur und der
tonkunst und über das verlagsrecht

Allfeld, Philipp, 1852- verlagsrecht

Allison, Alida. Grad student's guide to getting
published

Amir, Nina, How to blog a book

Amir, Nina, author training manual

Amir, Nina. How to blog a book

Anderson, Rick, 1965- Scholarly communication

Anderson, Rick, 1965- Scholarly communication

Appelbaum, Judith. How to get happily published

Anneliemi, Judith. How to get happily published

Suggest Alternative Terminology

Introduction

Review

Anatomy of a URI

Back to the bookstore
example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further
Reading

RDF Triples (SKOS vocabulary, introduced later)

```
<http://id.loc.gov/authorities/subjects/sh85010023>
  <http://www.w3.org/1999/02/22-rdf-syntax-ns#type>
  <http://www.w3.org/2004/02/skos/core#Concept> .

<http://id.loc.gov/authorities/subjects/sh85010023>
  <http://www.w3.org/2004/02/skos/core#prefLabel>
  "Authors and publishers"@en .

<http://id.loc.gov/authorities/subjects/sh85010023>
  <http://www.w3.org/2004/02/skos/core#broader>
  <http://id.loc.gov/authorities/subjects/sh85031620> .

<http://id.loc.gov/authorities/subjects/sh85010023>
  <http://www.w3.org/2004/02/skos/core#narrower>
  <http://id.loc.gov/authorities/subjects/sh85109817> .

...
http://id.loc.gov/authorities/subjects/sh85010023.html
```

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)



Photo credit "kxly", Flickr

TBL at TED on “The year open data went worldwide” (2010)

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A globe showing the Earth from space, with city lights visible, illustrating the global reach of open data.

F M A M J J A S O N D 2009

4.00 / 6.03

OpenStreetMap TED

Map data © OpenStreetMap contributors CC-BY-SA www.openstreetmap.org

CC BY SA

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Tim Berners-Lee: The year open data went worldwide

<https://www.youtube.com/watch?v=3YcZ3Zqk0a8>

1 Introduction

Introduction

Review

Anatomy of a URI

Back to the bookstore example

2 RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading

3 Vocabularies

4 Example: schema.org

5 Notes and Further Reading

Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

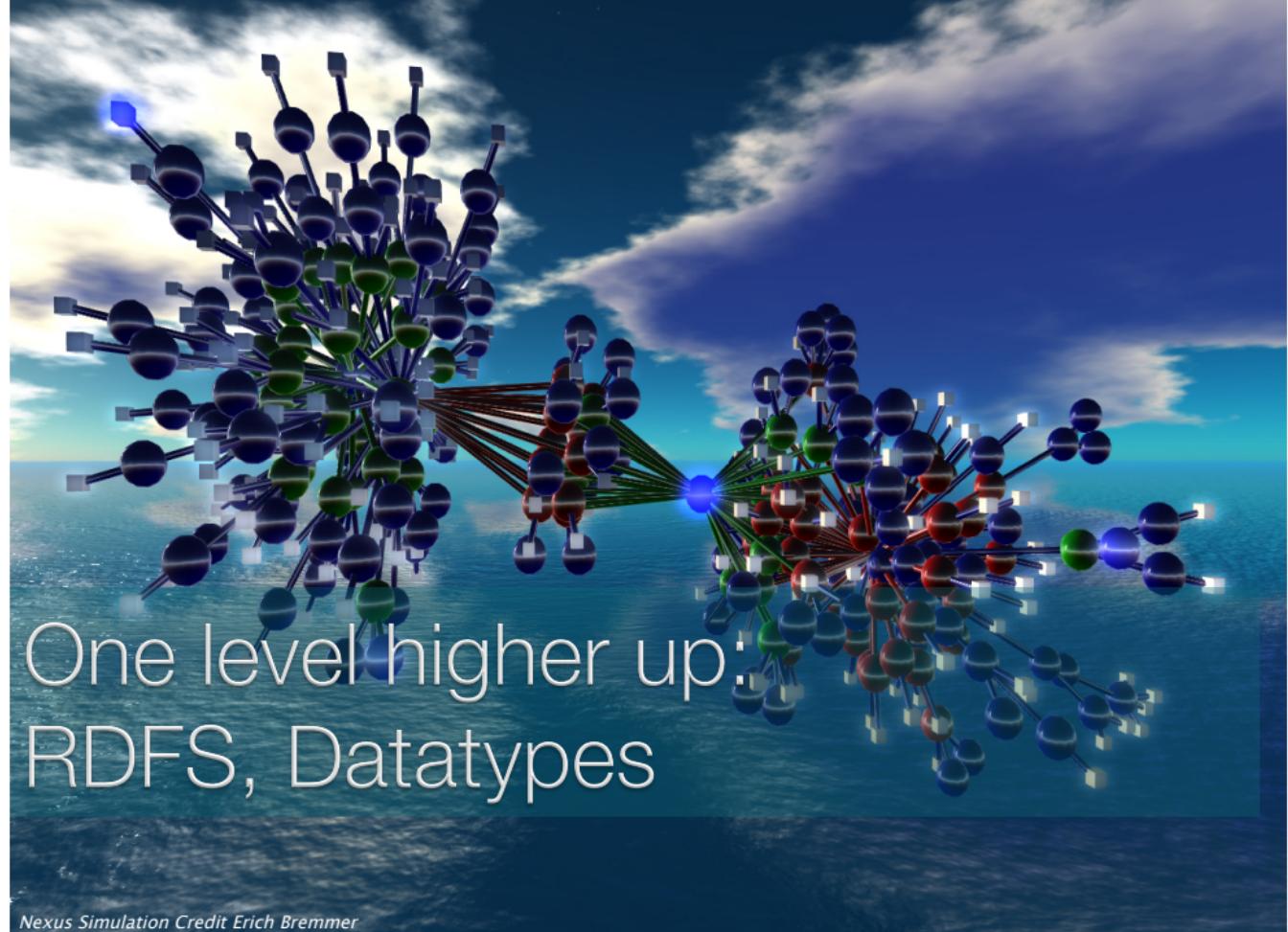
Dublin Core

SKOS

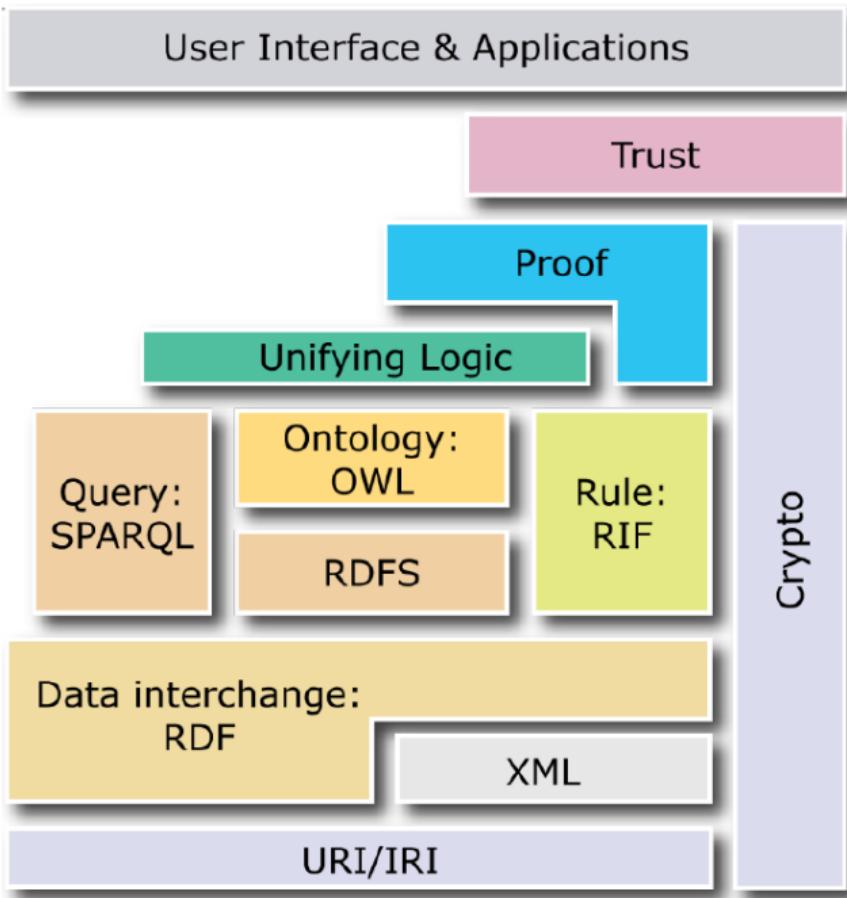
Summary

Example: schema.org

Notes and Further Reading



One level higher up:
RDFS, Datatypes



[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

W3C Recommendation

- “RDF Vocabulary Description Language 1.0: RDF Schema” (RDFS 1.0)
- Current version (2014): “RDF Schema 1.1”

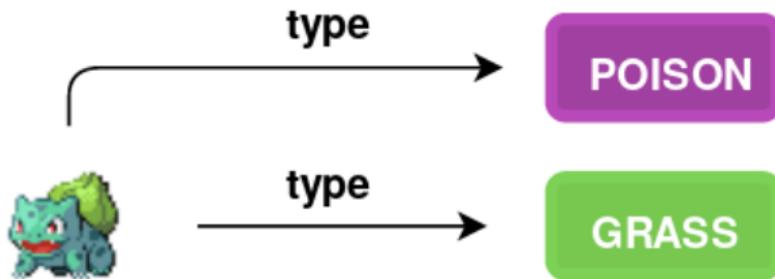
Used together with RDF

- RDF provides “a way to make statements about resources” (IRIs)
- RDFS provides *semantics* about what the IRIs stand for
(Schemas aka Vocabularies aka Ontologies aka . . .)

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Classes

- Resources may be divided into groups called **classes**
- The members of a class are known as **instances** of the class
- An instance can be member of **more than one class**



What is a knowledge graph – Pokémon edition: <https://pieterheyvaert.com/blog/2019/12/27/kg-pkmn/>

Defining Classes

We define that an URI in a triple is a class using ... a triple!
(sounds weird the first time you hear it, but you get used to it)

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

Class and Instance

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Defining Classes

To define that **C** (a resource) is an RDFS `class`, write:

C `rdf:type rdfs:Class`

with `rdfs` defined as <http://www.w3.org/2000/01/rdf-schema#>

Example

`ex:Novel rdf:type rdfs:Class`

Turtle

In Turtle, `rdf:type` can be abbreviated as `a`

→ **Worksheet #2: Task 2**

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

Class and Instance

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Instances

To define that **I** (a resource) is an instance of **C** (a class), write:

I `rdf:type C`

(or a instead of `rdf:type` in Turtle.)

Example

`<http://...isbn/000651409X> rdf:type ex:Novel`

Note

This is just another triple, so we can read both *data* and *schema* at run-time!

→ Worksheet #2: Task 3

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

Class and Instance

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

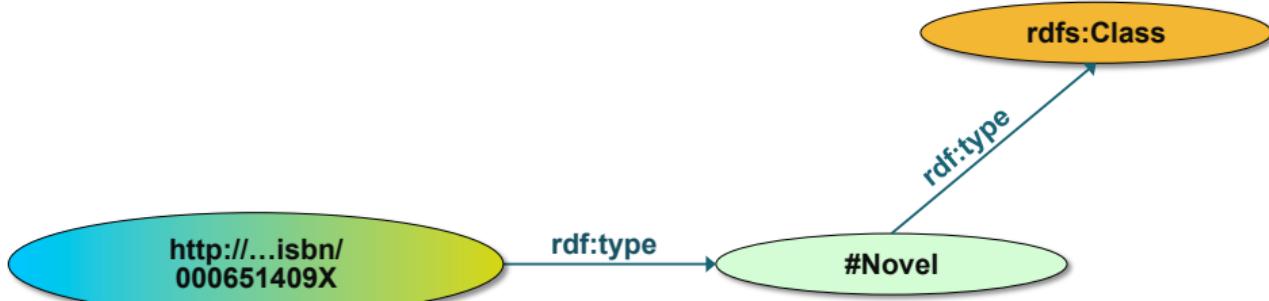
[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Classes, resources in RDF(S)



- ▶ RDFS defines the meaning of these terms
 - (these are all special URI-s, we just use the namespace abbreviation)

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Human-Readable Content

By convention, always provide:

rdfs:label a human-readable label

rdfs:comment a short (one paragraph) description

using language tags for multiple languages.

URI

Examples (dbpedia:The_Glass_Palace)

```
<http://dbpedia.org/resource/The_Glass_Palace>
    rdfs:label      "The Glass Palace"@en ,
                    "Le Palais des miroirs"@fr ;
    rdfs:comment   "The Glass Palace is a 2000 historical novel..."@en ,
                    "Le Palais des miroirs est un roman..."@fr ;
```

Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading

→ Worksheet #2: Task 4

Defining a subclass

To define that **C1** (a class) is a **subclass** of **C2** (a class), write:

C1 *rdfs:subClassOf* **C2**

Semantics

This states that all the instances of C1 are also instances of C2.

The *rdfs:subClassOf* property is **transitive**.

→ **Worksheet #2: Task 5**

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

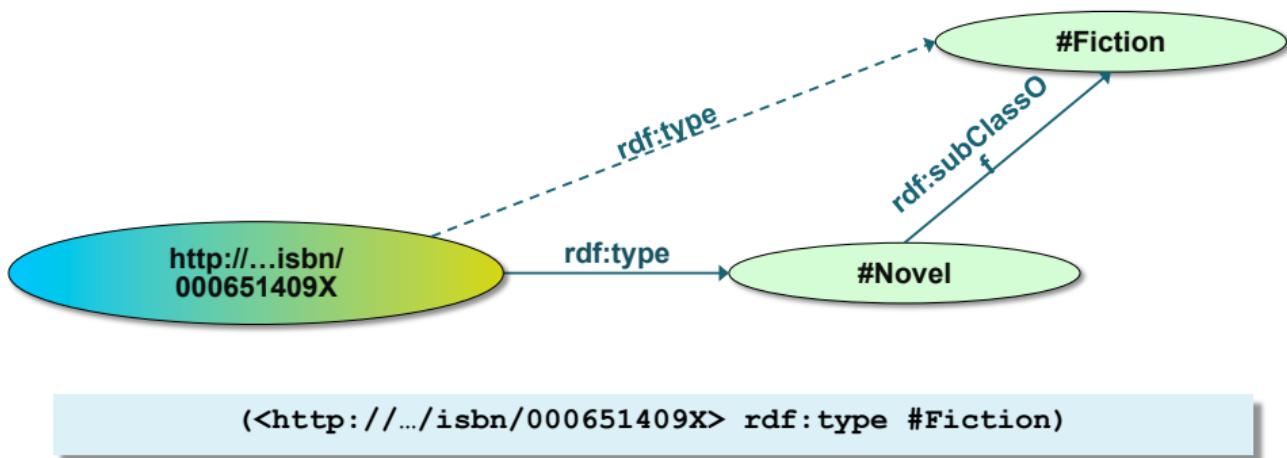
[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Inferred properties



- ▶ is not in the original RDF data...
- ▶ ...but can be inferred from the RDFS rules
- ▶ RDFS environments return that triple, too

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Inference: let us be formal...

- ▶ The RDF Semantics document has a list of (33) entailment rules:
 - “if such and such triples are in the graph, add this and this”
 - do that recursively until the graph does not change
- ▶ The relevant rule for our example:

```
If:  
  uuu rdfs:subClassOf xxx .  
  vvv rdf:type uuu .  
Then add:  
  vvv rdf:type xxx .
```

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Example

```
<studies at> <type> <Property>
```

Defining a Property

To define that **P** (a resource) is a property, write:

P *rdf:type rdf:Property*

Properties are used to define **relations** between subject resources and object resources.

→ Worksheet #2: Task 7

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

Property

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Domain

To define a class **C** as the **domain** of a property **P**, write:

P rdfs:domain C

This states that resources denoted by the subjects of triples whose predicate is **P** are instances of the class **C**.

Range

To define a class **C** as the **range** of a property **P**, write:

P rdfs:range C

This states that the resources denoted by the objects of triples whose predicate is **P** are instances of the class **C**.

Note

- Properties are also resources (named with URIs)
- So we define properties of properties using... RDF properties!
- Again, you'll get used to it...

→ **Worksheet #2: Task 8**

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

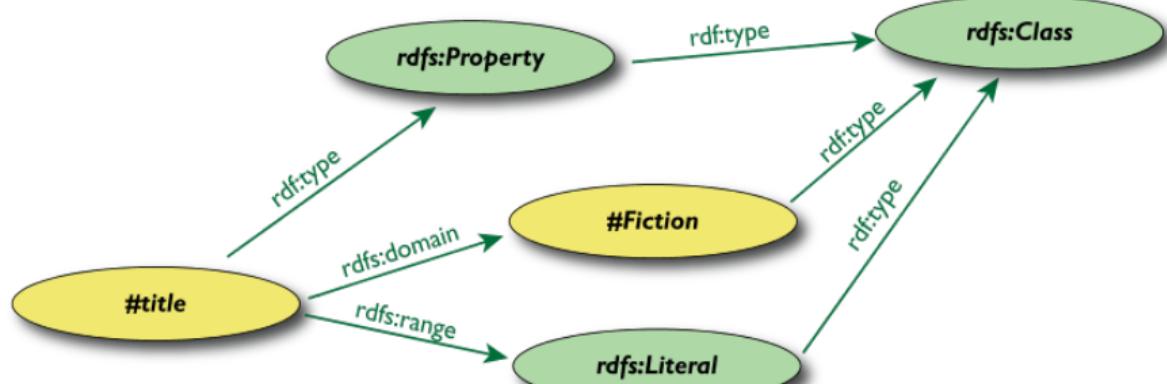
[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Property specification example

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Property specification serialized

► In RDF/XML:

```
<rdf:Property rdf:ID="title">
  <rdfs:domain rdf:resource="#Fiction"/>
  <rdfs:range rdf:resource="http://...#Literal"/>
</rdf:Property>
```

► In Turtle:

```
:title
  rdf:type    rdf:Property;
  rdfs:domain :Fiction;
  rdfs:range  rdfs:Literal.
```

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Defining a Subproperty

To define that **P1** (a property) is a **subproperty** of **P2** (a property), write:

P1 rdfs:subPropertyOf P2

With a subproperty, we can state that all resources related by one property are also related by another.

Example

Like inheritance for classes, we can have inheritance for properties:

<is father of> <subPropertyOf> <is parent of>

Some “helper” constructs

`rdfs:seeAlso` a property that links a resource to another for more information (can be in any format)

`rdfs:isDefinedBy` a property typically used to refer to a vocabulary (RDF Schema) defining the subject IRI

There are also some datastructures (bag, list etc.) – read more before using!



RDF Schema Constructs: Summary

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Introduction

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

RDF Schema

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

Vocabularies

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Construct	Syntactic form	Description
Class (a class)	C <code>rdf:type rdfs:Class</code>	C (a resource) is an RDF class
Property (a class)	P <code>rdf:type rdf:Property</code>	P (a resource) is an RDF property
type (a property)	I <code>rdf:type C</code>	I (a resource) is an instance of C (a class)
subClassOf (a property)	C1 <code>rdfs:subClassOf C2</code>	C1 (a class) is a subclass of C2 (a class)
subPropertyOf (a property)	P1 <code>rdfs:subPropertyOf P2</code>	P1 (a property) is a sub-property of P2 (a property)
domain (a property)	P <code>rdfs:domain C</code>	domain of P (a property) is C (a class)
range (a property)	P <code>rdfs:range C</code>	range of P (a property) is C (a class)

Outline

René Witte



1 Introduction

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

2 RDF Schema

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

3 Vocabularies

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

4 Example: schema.org

[Example: schema.org](#)

[Notes and Further Reading](#)

5 Notes and Further Reading

Goal: Knowledge Integration

Two major principles:

① Reuse of vocabularies

E.g., always use FOAF to describe names, emails, etc., instead of making up your own schema

② Make your data self-describing

Embed metadata using RDF to ensure data can be understood and processed independently.

Adhering to these principles supports interoperability and semantic understanding across different systems.

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Provide useful information about new terms

For example, if we create our own proprietary term, like **SmallMediumEnterprise**, we could describe it as [HB11]:

```
1 @prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .  
2 @prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .  
3 @prefix owl: <http://www.w3.org/2002/07/owl#> .  
4 @prefix co: <http://biglynx.co.uk/vocab/sme#> .  
5  
6 <http://biglynx.co.uk/vocab/sme#SmallMediumEnterprise>  
7   rdfs:type rdfs:Class ;  
8   rdfs:label "Small or Medium-sized Enterprise" ;  
9   rdfs:subClassOf <http://dbpedia.org/ontology/Company> .  
10  rdfs:subClassOf <http://umbel.org/umbel/sc/Business> ;  
11  rdfs:subClassOf <http://sw.opencyc.org/concept/Mx4rvVjQNpwpEbGdrcN5Y29ycA> ;  
12  rdfs:subClassOf <http://rdf.freebase.com/ns/m/0qb7t> .
```

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Reuse vocabularies whenever possible

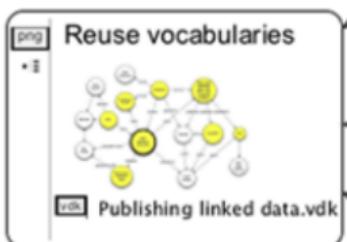
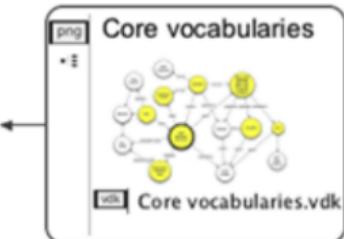
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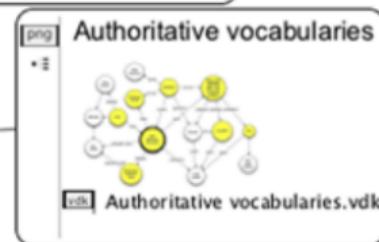
Use well-known and authoritative vocabularies to describe things whenever possible.



Describe common types of data by using terms from core vocabularies.



Use authoritative vocabularies for terms not defined by the core vocabularies.



Create your own vocabulary if necessary.



Use RDFS and OWL.



Be prepared to maintain it.

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

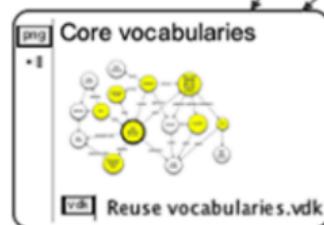
[Notes and Further Reading](#)

Core Vocabularies

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Use terms from these core vocabularies to describe commonly understood data.



- ? Naming things? ← Use rdfs:label, foaf:name, skos:prefLabel.
- ? Describing people? ← Use FOAF, vCard.
- ? Describing addresses? ← Use vCard.
- ? Describing projects? ← Use Description of a Project (DOAP).
- ? Describing web pages and other publications? ← Use dc:creator and dc:description.
- ? Describing an RDF vocabulary? ← Use a VoID description.
- ? Describing existing taxonomies? ← Use SKOS.

- See also
- Authoritative vocabularies.vdk
- Links to core vocabularies
- DOAP
 - Dublin Core
 - FOAF
 - SKOS
 - vCard
 - VoID

Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading

FOAF (Friend-of-a-Friend) Vocabulary

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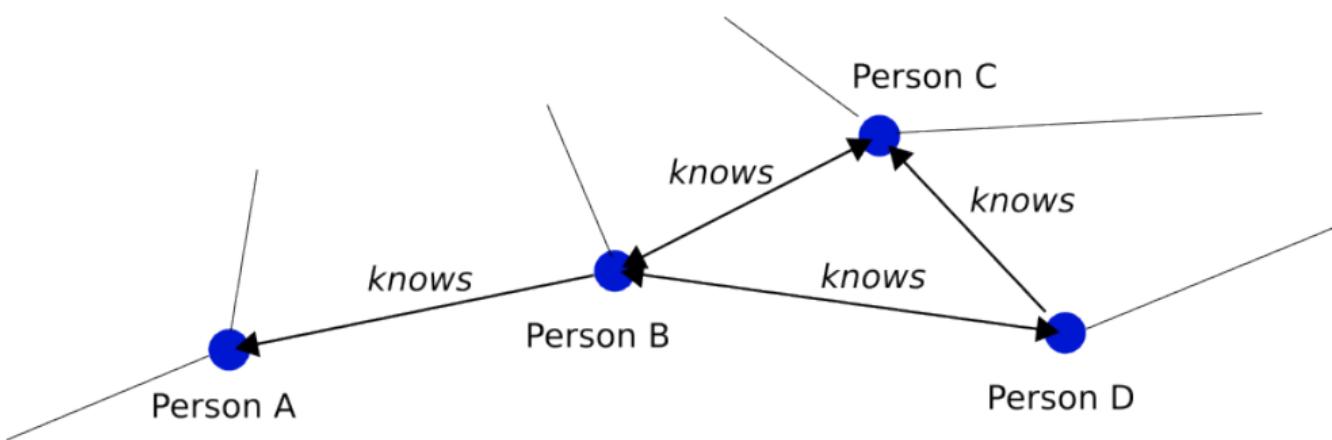
FOAF

Model people and their connections in a social network.



```
@prefix foaf: <http://xmlns.com/foaf/0.1/>.
```

```
<http://example.org/joe> a foaf:Person ;  
    foaf:name "Joe_Doe" ;  
    foaf:mbox <mailto:joe.doe@example.com> .
```



→ Worksheet #2: Task 9

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

FOAF

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Dublin Core® Metadata Initiative

Making it easier to find information.

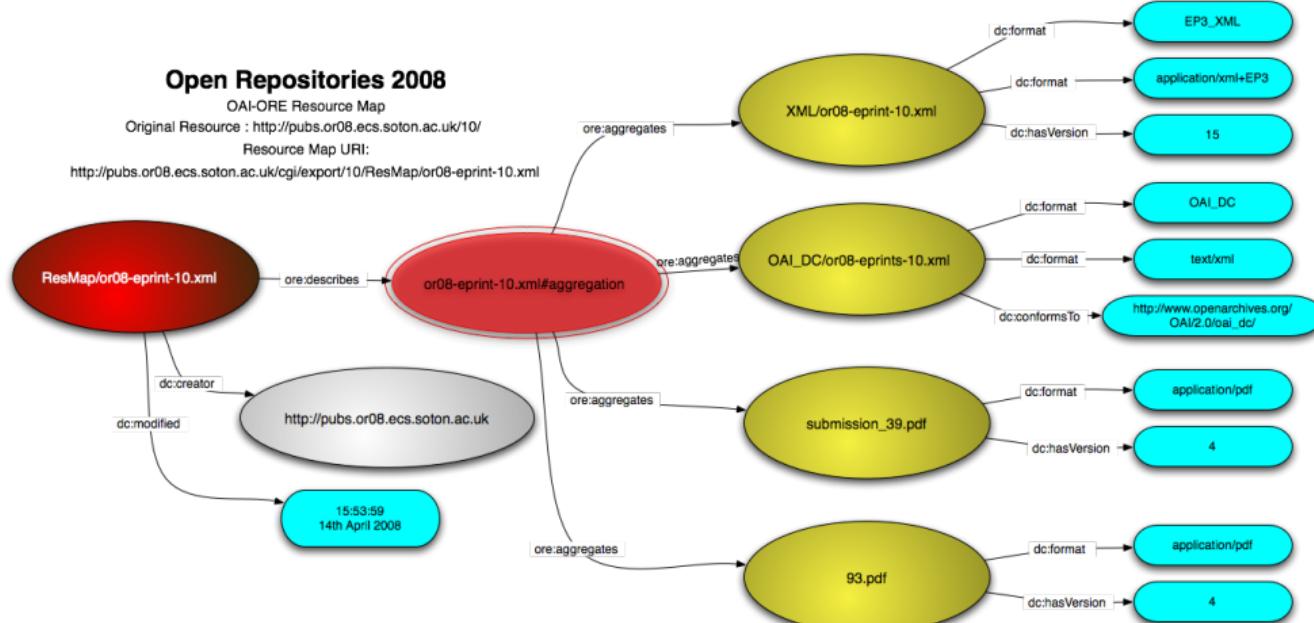
Open Repositories 2008

OAI-ORE Resource Map

Original Resource : <http://pubs.or08.ecs.soton.ac.uk/10/>

Resource Map URI:

<http://pubs.or08.ecs.soton.ac.uk/cgi/export/10/ResMap/or08-eprint-10.xml>



[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Thesauri, glossaries (SKOS)

Photo credit "scarletgreen", Flickr

Introduction

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

RDF Schema

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

Vocabularies

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

SKOS

- ▶ Represent and share classifications, glossaries, thesauri, etc
 - for example:
 - Dewey Decimal Classification, Art and Architecture Thesaurus, ACM classification of keywords and terms...
 - classification/formalization of Web 2.0 type tags
- ▶ Define classes and properties to add those structures to an RDF universe
 - allow for a quick port of this traditional data, combine it with other data

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Example: the term “Fiction”, as defined by the Library of Congress

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Authorities & Vocabularies (Library of Congress): Fiction

http://id.loc.gov/authorities/sh85048050

Netvibes Feedly Social Private Mailing lists SW Python RDFa It! Bookmarks Add Zemanta bitly To Mendeley TinyURL To Faviki Dokuwiki

LIBRARY OF CONGRESS ASK A LIBRARIAN DIGITAL COLLECTIONS LIBRARY CATALOGS

The Library of Congress > Authorities & Vocabularies > Fiction

Authorities & Vocabularies

[Return](#)

Search

Enter search terms...

[Details](#) [Visualize](#)

Fiction

URI: <<http://id.loc.gov/authorities/sh85048050#concept>>

Type: Topical Term

Alternate Labels: Fiction--Philosophy; Metafiction; Novellas (Short novels); Novels; Stories

Broader Terms:

- [Literature](#)
- [Prose literature](#)

Narrower Terms:

- [Adventure stories](#)
- [Allegories](#)
- [Alternative histories \(Fiction\)](#)
- [Bildungsromans](#)
- [Biographical fiction](#)

Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading

Example: the term “Fiction”, as defined by the Library of Congress

René Witte



Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading

The screenshot shows a web browser window with the URL <http://id.loc.gov/authorities/sh85048050>. The page title is "Authorities & Vocabularies (Library of Congress): Fiction". The main content area is titled "Authorities & Vocabularies" and shows the term "Fiction" highlighted with a red oval. Below it, the term's URI is listed as [<http://id.loc.gov/authorities/sh85048050#concept>](http://id.loc.gov/authorities/sh85048050#concept). The term is categorized as a "Topical Term". It has several "Alternate Labels": "Fiction--Philosophy; Metafiction; Novellas (Short novels); Novels; Stories". Under "Broader Terms", there are two items: "Literature" and "Prose literature". Under "Narrower Terms", there are five items: "Adventure stories", "Allegories", "Alternative histories (Fiction)", "Bildungsromans", and "Biographical fiction". At the bottom of the page, there are links for "Details" and "Visualize".

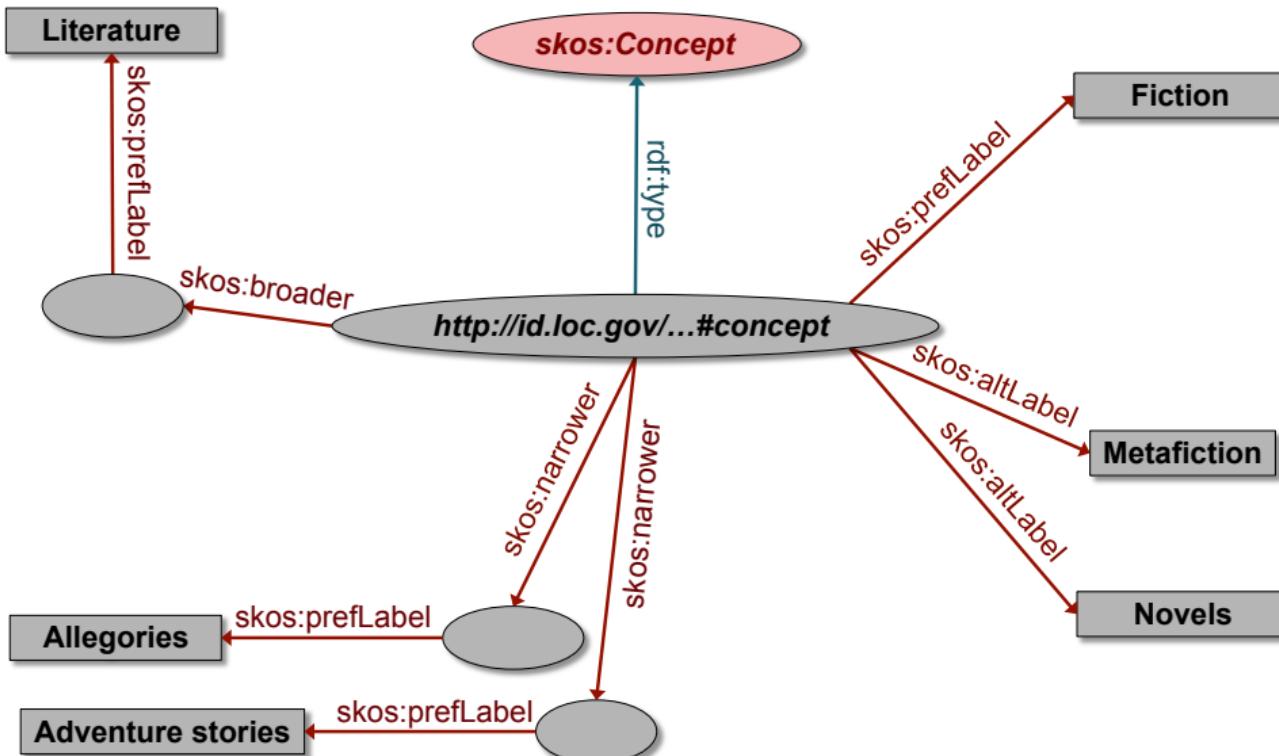
Thesauri have identical structures...

- ▶ The structure of the LOC page is fairly typical
 - label, alternate label, narrower, broader, ...
 - there is even an ISO standard for these
- ▶ SKOS provides a basic structure to create an RDF representation of these

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

LOC's “Fiction” in SKOS/RDF

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Introduction

- Review
- Anatomy of a URI
- Back to the bookstore example

RDF Schema

- Introduction
- Class and Instance
- Label & Comment
- Subclass
- Property
- RDFS Utility Vocabulary
- Summary

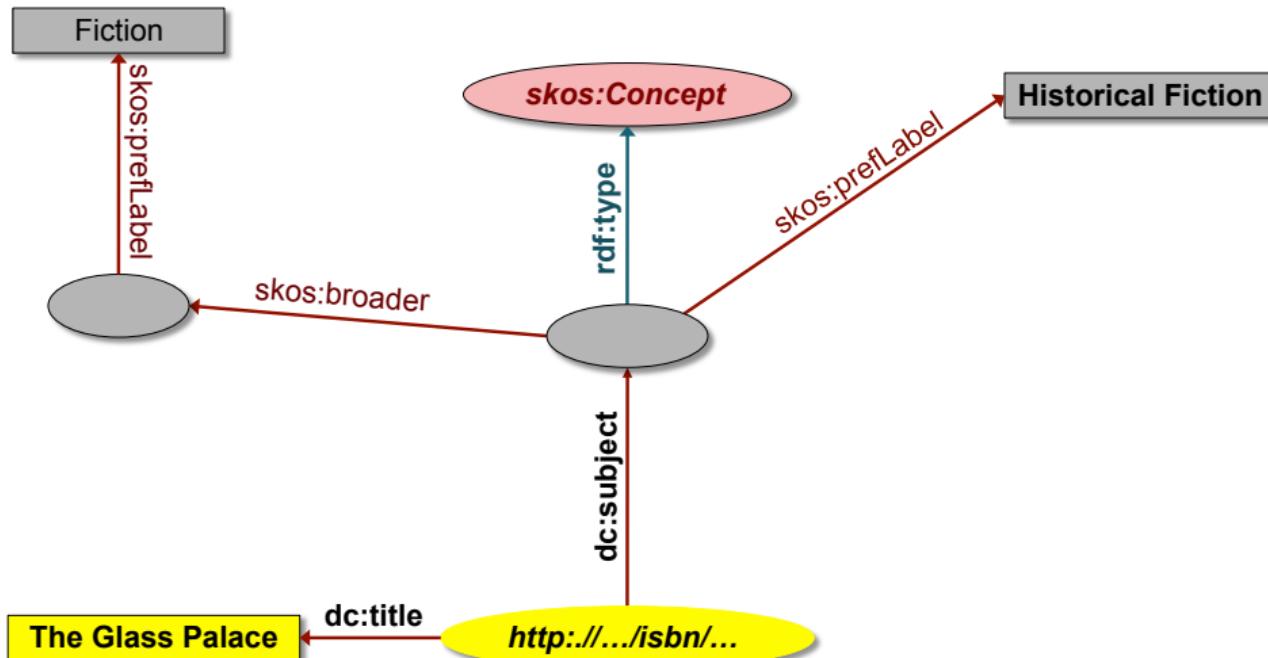
Vocabularies

- Introduction
- FOAF
- Dublin Core
- SKOS
- Summary

Example: schema.org

- Notes and Further Reading

Usage of the LOC graph



[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

Same serialized

```
<http://.../isbn/000651409X>
  dc:title "The Glass Palace"@en;
  dc:subject <http://id.loc.gov/authorities/sh85061165#concept>;
  ...

<http://id.loc.gov/authorities/sh85061165#concept>
  a      skos:Concept;
  skos:prefLabel "Historical Fiction"@en;
  skos:broader <http://id.loc.gov/authorities/sh85048050#concept>;
  ...

<http://id.loc.gov/authorities/sh85048050#concept>
  a      skos:Concept;
  skos:prefLabel "Fiction"@en;
  skos:narrower <http://id.loc.gov/authorities/sh85061165#concept>;
  ...
```

Introduction

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

RDF Schema

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

Vocabularies

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

[Example: schema.org](#)

[Notes and Further Reading](#)

SKOS terms overview

► Classes and Properties:

- Basic description (Concept, ConceptScheme,...)
- Labeling (prefLabel, altLabel,...)
- Documentation (definition, historyNote,...)
- Semantic relations (broader, narrower, related,...)
- Collections (Collection, OrderedCollection,...)
- Concept mappings (broadMatch, narrowMatch,...)

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Importance of SKOS

- ▶ SKOS provides a simple bridge between the “print world” and the (Semantic) Web
- ▶ Thesauri, glossaries, etc, from the library community can be made available
 - LOC is a good example
- ▶ SKOS can also be used to organize, eg, tags, annotate other vocabularies, ...

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

Importance of SKOS

- ▶ Anybody in the World can refer to common concepts
 - they mean the same for everybody
- ▶ Applications may exploit the relationships among concepts
 - eg, SPARQL queries may be issued on the library data+LOC

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

More authoritative vocabularies

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Use these authoritative vocabularies to describe data you couldn't describe with the core vocabularies.

Authoritative vocabularies



Reuse vocabularies.vdk

See also

Core vocabularies.vdk

- Specifying the geographical location of something? ← Use Geo.
- Describing citations and bibliographic references? ← Use BIBO.
- Describing copyright licenses? ← Use the Creative Commons Rights Expression Language
- Describing a place? ← Use GeoNames.
- Describing product, price, or company data? ← Use Good Relations.
- Describing web resources that are compound digital objects? ← Use Object Reuse and Exchange.
- Describing information about an online community? ← Use SIOC.

Links to authoritative vocabularies

- BIBO
- Creative Commons Rights Expression Language.
- Geo
- GeoNames
- Good Relations
- Object Reuse and Exchange
- SIOC

Introduction

- Review
- Anatomy of a URI
- Back to the bookstore example

RDF Schema

- Introduction
- Class and Instance
- Label & Comment
- Subclass
- Property
- RDFS Utility Vocabulary
- Summary

Vocabularies

- Introduction
- FOAF
- Dublin Core
- SKOS
- Summary

Example: schema.org

- Notes and Further Reading

Outline

René Witte



1 Introduction

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

2 RDF Schema

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

3 Vocabularies

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

4 Example: schema.org

[Example: schema.org](#)

5 Notes and Further Reading

[Notes and Further Reading](#)

Typical usage of structured data

the artist movie – Google Search

https://www.google.nl/#hl=en&sugexp=frgbld&gs_nf=1&cp=11&gs_id=50&xhr=t&q=the+artist+movie+database

Delicious LocalData TR 2012 My Mercurial Private Mailing lists Social SW Python RDFa It! Bookmarks To... Web Data Inspector

Everything

The Artist showtimes for Amsterdam

Pathé Tuschinski - Reguliersbreestraat 26-34, Amsterdam - Map
11:50 - 14:05 - 19:10

Filmtheater "De Uitkijk" - Prinsengracht 452, Amsterdam - Map
12:15 - 19:00 - 21:15

Filmtheater Rialto - Ceintuurbaan 338, Amsterdam - Map
12:45

+ Show more theaters

The Artist (2011) - IMDb
www.imdb.com/title/tt165542/
Silent movie star George Valentin bemoans the coming era of talking ... Still of Jean Dujardin and Missi Pyle in **The Artist** Still of Bérénice Bejo in **The Artist** Reem ...
→ Full cast and crew - **The Artist** Trailer (Official ... - Bérénice Bejo - Jean Dujardin

More

Amsterdam
Change location

Any time

Past hour
Past 24 hours
Past week
Past month
Past year
Custom range...
More search tools

The Artist (film) - Wikipedia, the free encyclopedia
[en.wikipedia.org/wiki/The_Artist_\(film\)](http://en.wikipedia.org/wiki/The_Artist_(film))
The Artist is a 2011 French romantic comedy drama in the style of a black-and-white silent film written and directed by Michel Hazanavicius, starring Jean ...
→ Jean Dujardin - Bérénice Bejo - Uggie - Diegesis

The Artist Trailer 2011 HD - YouTube
www.youtube.com/watch?v=O8K9AzcSQJE
 25 Aug 2011 - 3 min · Uploaded by TrailersApplecom
I love how George Clooney, and Brad Pitt, lost the Best actor catogory to this film. It just shows that there is ...
More videos for the **artist** movie *

Oscar 2012: The Artist, review - Telegraph
www.telegraph.co.uk/Culture/Film/Film_reviews/news/7777777/Oscar-2012-The-Artist-review.html
★★★★★ Review by Robbie Collin
27 Feb 2012 – **The Artist**, the final film to be released in 2011 and also the most heart-swellingly joyful movie is a silent movie, screened in black and white and ...

The Artist is the perfect film about Hollywood | Harvey Freeman

Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

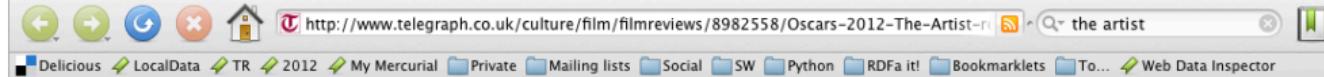
Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading



René Witte

**Introduction**[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)**RDF Schema**[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)**Vocabularies**[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)**Example: schema.org**[Notes and Further Reading](#)

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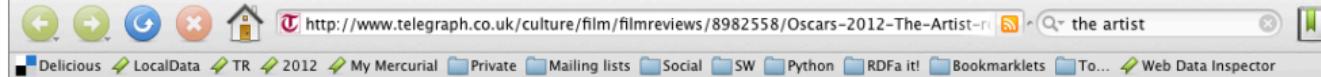
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HOME NEWS SPORT FINANCE COMMENT BLOGS CULTURE TRAVEL LIFESTYLE FASHION TECH

Film Music Art Books TV and Radio Theatre Hay Festival Dance Opera Photography Comedy Video In the Know

Oscars Film Reviews Cinema Trailers Coming Soon Talking Movies Interviews DVDs Film Life Film Video

HOME > CULTURE > FILM > FILM REVIEWS

Oscars 2012: The Artist, review

The Artist, an utterly beguiling silent, black-and-white celebration of early Hollywood won Best Picture at the Oscars 2012.



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René Witte



Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary

Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading

Introduction

Review
 Anatomy of a URI
[Back to the bookstore example](#)

RDF Schema

Introduction
 Class and Instance
 Label & Comment
 Subclass
 Property
 RDFS Utility Vocabulary
[Summary](#)

Vocabularies

Introduction
 FOAF
 Dublin Core
 SKOS
[Summary](#)

Example: schema.org

Notes and Further Reading

Source of http://www.telegraph.co.uk/culture/film/filmreviews/8982558/Oscars-2012-The-Artist-review.html

Oscars 2012: The Artist, review – Telegraph

<http://www.telegraph.co.uk/culture/film/filmreviews/8982558/Oscars-2012-The-Artist-review.html>

The Telegraph

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The Artist, review

Oscars 2012: The Artist, review

h1 itemprop="name">Oscars 2012: The Artist, review

h2 itemprop="description">The Artist, an utterly beguiling silent, black-and-white celebration of early Hollywood won Best Picture at the Oscars. Hollywood won Best Picture at the Oscars 2012

h2

div class="rating" itemprop="reviewRating">**span** itemprop="ratingValue">1

div class="artIntro">**div** id="storyEmi... **div** class="slideshow ssIntro">**div** class="nextPrevLayer">**div** class="oneHalf gutter">**div** class="story">**div** class="cl">

The image shows a screenshot of a web browser displaying the Telegraph's review of "The Artist". The page includes the newspaper's masthead, navigation links for various sections like Culture, Travel, Lifestyle, Fashion, and Tech, and a sidebar for Dating, Offers, and Jobs. The main content is about the 2012 Oscar winner, with a large image of the film's lead actor, Jean Dujardin, in his iconic silent film costume. The page also features a green sidebar for INSEAD's Global Executive MBA program and a section for Telegraph tickets.

```

    <li class="first"><a href="/">Home</a><span>&raquo;</span></li>
    <li><a href="http://www.telegraph.co.uk/culture/">Culture</a><span>&raquo;</span></li>
      <li><a href="http://www.telegraph.co.uk/culture/film/">Film</a><span>&raquo;</span></li>
    <li class="styleSix"><a href="http://www.telegraph.co.uk/culture/film/filmreviews/">Film reviews</a></li>
  </div>
</div>

<!-- googleon: all -->
<div id="tmglBody" >
  <div class="access"><a name="article"></a></div>

  <div class="twoThirdsThird2 gutterUnder">
    <div class="twoThirds gutter" itemscope itemtype="http://schema.org/Review">
      <div class="storyHead">
        <h1 itemprop="name">Oscars 2012: The Artist, review</h1>
        <h2 itemprop="description">
          The Artist, an utterly beguiling silent, black-and-white celebration of early Hollywood won Best Picture at the Oscars 2012.
        </h2>
        <div class="rating" itemprop="reviewRating" itemscope itemtype="http://schema.org/Rating">
          <meta itemprop="worstRating" content = "0.5">
          <meta itemprop="bestRating" content = "5">
          <span itemprop="ratingValue" class="hidden">5</span>
          
        </div>
        <div class="artIntro">
          <div id="storyEmbSlide">
            <div class="slideshow ssIntro">
              <div class="nextPrevLayer">
                <div class="ssImg">
                  
                <div class="artImageExtras" >
                  <div class="imgCaptionCredit">
                    <span class="caption">Bérénice Bejo as Rita in The Artist</span>
                  </div>
                </div>
              </div>
            </div>
          </div>
        </div>
      </div>
    </div>
  <div class="oneHalf gutter">
    <div class="story">
      <div class="cl"></div>
    <!-- remove the whitespace added by escenic before end of </a> tag -->
  </div>
</div>

```

Introduction[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)**RDF Schema**[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)**Vocabularies**[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)**Example: schema.org**[Notes and Further Reading](#)

In a slightly more readable format...

```
<div itemscope itemtype="http://schema.org/Review">
  ...
  <h1 itemprop="name">Oscars 2012: The Artist, review</h1>
  <h2 itemprop="description">The Artist, an utterly beguiling...</h2>
  ...
  <span itemprop="ratingValue" class="hidden">5</span>
  ...
```

Introduction

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

RDF Schema

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

Vocabularies

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

Example: schema.org

[Notes and Further Reading](#)

Yielding...

```
[ rdf:type schema:Review ,  
schema:name "Oscars 2012: The Artist, review" ,  
schema:description "The Artist, an utterly beguiling..." ,  
schema:ratingValue "5" ;  
...  
]
```

René Witte



Introduction

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

RDF Schema

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

Vocabularies

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

Example: schema.org

[Notes and Further Reading](#)

Outline

René Witte



1 Introduction

[Introduction](#)

[Review](#)

[Anatomy of a URI](#)

[Back to the bookstore example](#)

2 RDF Schema

[RDF Schema](#)

[Introduction](#)

[Class and Instance](#)

[Label & Comment](#)

[Subclass](#)

[Subclass](#)

[Property](#)

[RDFS Utility Vocabulary](#)

[Summary](#)

3 Vocabularies

[Vocabularies](#)

[Introduction](#)

[FOAF](#)

[Dublin Core](#)

[SKOS](#)

[Summary](#)

4 Example: schema.org

[Example: schema.org](#)

5 Notes and Further Reading

[Notes and Further Reading](#)

Required

- [Yu14, Chapter 4] (RDFS)
- [Yu14, Chapter 7] (FOAF)

Supplemental

- [Wor14] (RDF Primer)
- [Yu14, Chapter 10] (Schema.org)
- [WZRH14, Chapters 2, 4] (RDF, FOAF)

[Introduction](#)[Review](#)[Anatomy of a URI](#)[Back to the bookstore example](#)[RDF Schema](#)[Introduction](#)[Class and Instance](#)[Label & Comment](#)[Subclass](#)[Property](#)[RDFS Utility Vocabulary](#)[Summary](#)[Vocabularies](#)[Introduction](#)[FOAF](#)[Dublin Core](#)[SKOS](#)[Summary](#)[Example: schema.org](#)[Notes and Further Reading](#)

References

René Witte



- [HB11] Tom Heath and Christian Bizer.
Linked Data: Evolving the Web into a Global Data Space.
Morgan & Claypool, 2011.
<https://concordiauniversity.on.worldcat.org/oclc/704257552>.
- [Her] Ivan Herman.
Tutorial on Semantic Web Technologies.
<http://www.w3.org/People/Ivan/CorePresentations/RDFTutorial/>.
- [Wor14] World Wide Web Consortium (W3C).
RDF 1.1 Primer.
<http://www.w3.org/TR/rdf11-primer/>, 24 June 2014.
- [WZRH14] David Wood, Marsha Zaidman, Luke Ruth, and Michael Hausenblas.
Linked Data: Structured Data on the Web.
Manning, 2014.
<https://concordiauniversity.on.worldcat.org/oclc/871683907>.
- [Yu14] Liyang Yu.
A Developer's Guide to the Semantic Web.
Springer-Verlag Berlin Heidelberg, 2nd edition, 2014.
<https://concordiauniversity.on.worldcat.org/oclc/897466408>.

Introduction

Review

Anatomy of a URI

Back to the bookstore example

RDF Schema

Introduction

Class and Instance

Label & Comment

Subclass

Property

RDFS Utility Vocabulary
Summary

Vocabularies

Introduction

FOAF

Dublin Core

SKOS

Summary

Example: schema.org

Notes and Further Reading