

What is this thing called Linked Data?

Part II - Hands-on session

Manuel Atencia, Jérôme David and Philippe Genoud
DocEng 2015, September 8, Lausanne, Switzerland

- Part I: From an Excel data file to linked open data
 - you will learn how to
 - create "cool" URIs
 - describe things with RDF
 - make links to other datasets
 - we will use the OpenRefine tool + RDF extension
- Part II: Querying linked data with SPARQL
 - you will learn how to make queries with SPARQL
 - we will use Apache Jena - ARQ command line applications

Hands-on session

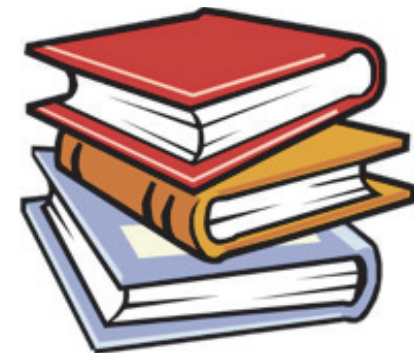
Introduction Organization and Goals

- Part I: From an Excel data file to linked open data
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Part I: 14:00 - 15:30
Coffee break: 15:30 - 16:00
Part II: 16:00 - 17:30

- Artemis owns a bookstore. She has heard of the Linked Data technologies, but she is not fully convinced of the benefits of using these technologies.
- Artemis has provided you with a sample of her data in an Excel file: `artemisBookstoreData.xlsx`
- Let's convince Artemis to join Linked Open Data!

**Artemis
Bookstore**



Hands-on session (I)

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Hands-on session (I)

Artemis' bookstore data

- Let's have a look at `artemisBookstoreData.xlsx`
- There are two kinds of data: authors and books

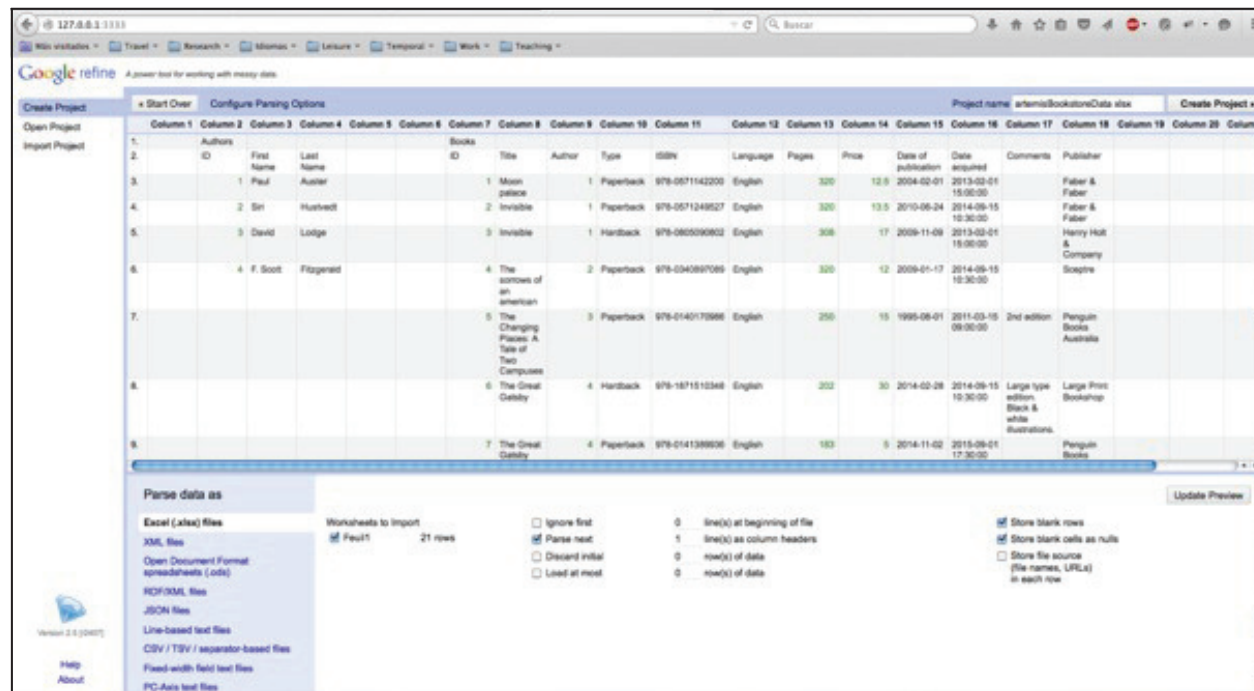
Authors		
ID	First Name	Last Name
1	Paul	Auster
2	Siri	Hustvedt
3	David	Lodge
4	F. Scott	Fitzgerald

Authors have an ID, a first name and a second name. Books have an ID, a title, author(s), a type, an ISBN, a language, pages, a price, a date of publication, a date of acquirement, comments and a publisher

Books											
ID	Title	Author	Type	ISBN	Language	Pages	Price	Date of publication	Date acquired	Comments	Publisher
1	Moon palace	1	Paperback	571142200	English	320	12.5	2004-02-01	2013-02-01 15:00:00		Faber & Faber
2	Invisible	1	Paperback	571249527	English	320	13.5	2010-06-24	2014-09-15 10:30:00		Faber & Faber
3	Invisible	1	Hardback	805090802	English	308	17	2009-11-09	2013-02-01 15:00:00		Henry Holt & Company
4	The sorrows of an american	2	Paperback	340897089	English	320	12	2009-01-17	2014-09-15 10:30:00		Sceptre
5	The Changing Places: A Tale	3	Paperback	140170986	English	250	15	1995-08-01	2011-03-15 09:00:00	2nd edition	Penguin Books Australia
6	The Great Gatsby	4	Hardback	1871510348	English	202	30	2014-02-28	2014-09-15 10:30:00	Large type e	Large Print Bookshop
7	The Great Gatsby	4	Paperback	141389936	English	183	5	2014-11-02	2015-09-01 17:30:00		Penguin Books
8	The Great Gatsby	4	Hardback	1857150193	English	176	15	1991-09-26	2011-03-15 09:00:00		Everyman's library

Hands-on session (I)

- Our goal is to convert Artemis' raw data into linked open data and for this we will use OpenRefine tool and its RDF extension developed by DERI
- Open OpenRefine and create a new project by uploading `artemisBookstoreData.xlsx`

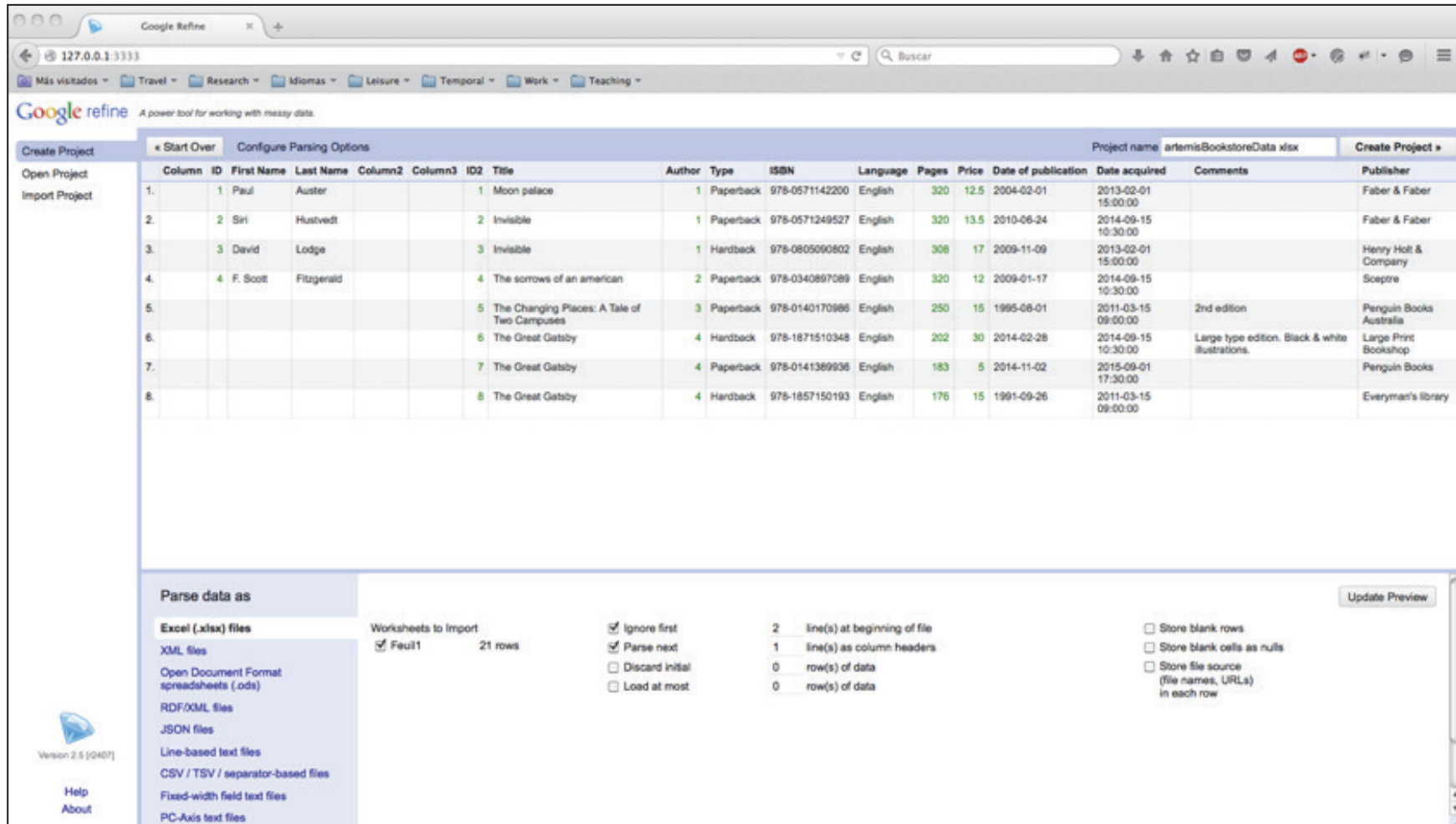


you can download OpenRefine at <http://openrefine.org/download.html>

Hands-on session (I)

OpenRefine Preprocessing data

- Let's start by doing some preprocessing of the data



Google Refine A power tool for working with messy data.

Project name: artemisBookstoreData.xlsx

Column	ID	First Name	Last Name	Column2	Column3	ID2	Title	Author	Type	ISBN	Language	Pages	Price	Date of publication	Date acquired	Comments	Publisher	
1.	1	Paul	Auster			1	Moon palace		1	Paperback	978-0571142200	English	320	12.5	2004-02-01	2013-02-01 15:00:00		Faber & Faber
2.	2	Siri	Hustvedt			2	Invisible		1	Paperback	978-0571249527	English	320	13.5	2010-06-24	2014-09-15 10:30:00		Faber & Faber
3.	3	David	Lodge			3	Invisible		1	Hardback	978-0805090802	English	308	17	2009-11-09	2013-02-01 15:00:00		Henry Holt & Company
4.	4	F. Scott	Fitzgerald			4	The sorrows of an american		2	Paperback	978-0340897089	English	320	12	2009-01-17	2014-09-15 10:30:00		Sceptre
5.						5	The Changing Places: A Tale of Two Campuses		3	Paperback	978-0140170986	English	250	15	1995-08-01	2011-03-15 09:00:00	2nd edition	Penguin Books Australia
6.						6	The Great Gatsby		4	Hardback	978-1871510348	English	202	30	2014-02-28	2014-09-15 10:30:00	Large type edition. Black & white illustrations.	Large Print Bookshop
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Parse data as

Excel (.xlsx) files

XML files

Open Document Format spreadsheets (.ods)

RDF/XML files

JSON files

Line-based text files

CSV / TSV / separator-based files

Fixed-width field text files

PC-Axis text files

Worksheets to import

Feul1 21 rows

Ignore first 2 line(s) at beginning of file

Parse next 1 line(s) as column headers

Discard initial 0 row(s) of data

Load at most 0 row(s) of data

Store blank rows

Store blank cells as nulls

Store file source (file names, URLs) in each row

Update Preview

Version 2.5 [2407]

Help About

Hands-on session (I)

OpenRefine Preprocessing data

- Let's start by doing some preprocessing of the data

1. Preprocessing the data

- 1.1. Ignore the first 2 lines (so the data attributes become the column headers)
- 1.2. Do not store blank rows
- 1.3. Do not store blank cells as nulls
- 1.4. Update the preview
- 1.5. Change, if you want, the name of the project
- 1.6. Create a project

Row	Date of publication	Date acquired	Comments	Publisher
2.5	2004-02-01	2013-02-01 15:00:00		Faber & Faber
3.5	2010-06-24	2014-09-15 10:30:00		Faber & Faber
17	2009-11-09	2013-02-01 15:00:00		Henry Holt & Company
12	2009-01-17	2014-09-15 10:30:00		Sceptre
15	1995-08-01	2011-03-15 09:00:00	2nd edition	Penguin Books Australia
30	2014-02-28	2014-09-15 10:30:00	Large type edition. Black & white illustrations.	Large Print Bookshop
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Store blank rows

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1.3

Store file source (file names, URLs) in each row

Update Preview

1.4

Hands-on session (I)

OpenRefine Preprocessing data

- Let's start by doing some preprocessing of the data

	Author ID	First Name	Last Name	Column3	Book ID	Title	Author	Type	ISBN	Language	Pages	Price	Date of publication	Date acquired	Comments
1.	Facet	Auster			1	Moon palace	1	Paperback	978-0571142200	English	320	12.5	2004-02-01	2013-02-01 15:00:00	
2.	Text filter	Hustvedt			2	Invisible	1	Paperback	978-0571249527	English	320	13.5	2010-06-24	2014-09-15 10:30:00	
3.	Edit cells	Lorine			3	Invisible	1	Hardback	978-0805090802	English	308	17	2009-11-09	2013-02-01 15:00:00	
4.	Edit column				4	The sorrows of an american	2	Paperback	978-0340897089	English	320	12	2009-01-17	2014-09-15 10:30:00	
5.	Transpose				5	The Changing Places: A Tale of Two Campuses	3	Paperback	978-0140170986	English	250	15	1995-08-01	2011-03-15 09:00:00	2nd edition
6.	Sort...				6	The Great Gatsby	4	Hardback	978-1871510348	English	202	30	2014-02-28	2014-09-15 10:30:00	Large type edition. Black white illustrations.
7.	View				7	The Great Gatsby	4	Paperback	978-0141389936	English	183	5	2014-11-02	2015-09-01 17:30:00	
8.	Reconcile				8	The Great Gatsby	4	Hardback	978-1857150193	English	176	15	1991-09-26	2011-03-15 09:00:00	

1. Preprocessing the data (cont.)
1.7. Remove empty columns
1.8. Change column names if they are not appropriate (e.g. IDs to Author ID and Book ID)

Hands-on session (I)

Creating RDF data

Hands-on session (I)

- Now, let's create RDF data!

Hands-on session (I)

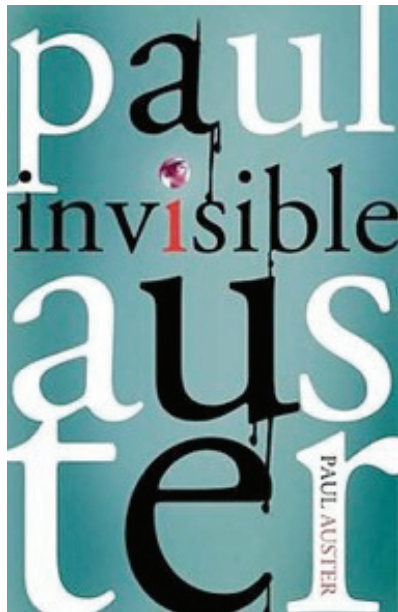
- Now, let's create RDF data!
- But before, let's recall the Linked Data principles:
 1. Use URIs as names for things.
 2. Use HTTP URIs, so that people can look up those names.
 3. When someone looks up a URI, provide useful information using the standards (RDF, SPARQL).
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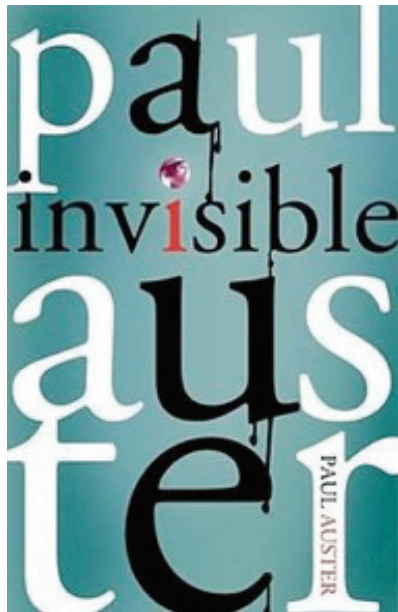
- Let's consider the paperback book "Invisible" written by Paul Auster. Can you find a cool URI for this resource?



Hands-on session (I)

Creating RDF data Cool URIs

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REMEMBER!

web document \neq web resource

Actually, you should find

- A URI for the real object itself.
- A URI for the related information resource that describes the real-world object and has an HTML representation.
- A URI for a related information resource that describes the real-world object and has an RDF/XML representation.

Hands-on session (I)

Creating RDF data
Cool URIs

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<http://www.amazon.com/Invisible-Paul-Auster/dp/0312429827>

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<http://artemisbookstore.com/id/book/0571249527>

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<http://artemisbookstore.com/page/book/0571249527>

<http://artemisbookstore.com/data/book/0571249527>

more info at <http://www.w3.org/TR/cooluris/>

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Hands-on session (I)

Creating RDF data
Describing things with RDF

Hands-on session (I)

Creating RDF data Describing things with RDF

- Which kind of information should we include in the description of the book "Invisible" written by Paul Auster?

Hands-on session (I)

Creating RDF data Describing things with RDF

- Which kind of information should we include in the description of the book "Invisible" written by Paul Auster?
 - triples that describe the resource with literals (e.g. title)

Hands-on session (I)

Creating RDF data

Describing things with RDF

- Which kind of information should we include in the description of the book "Invisible" written by Paul Auster?
 - triples that describe the resource with literals (e.g. title)
 - triples that describe the resource by linking *to* other resources, or *incoming links* (e.g. author)

Hands-on session (I)

Creating RDF data Describing things with RDF

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 - triples describing related resources (e.g. the name of the resource's creator)

Hands-on session (I)

Creating RDF data

Describing things with RDF

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 - triples describing related resources (e.g. the name of the resource's creator)
 - triples describing the description itself (e.g. licensing terms)

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 - triples describing related resources (e.g. the name of the resource's creator)
 - triples describing the description itself (e.g. licensing terms)
 - triples about the broader dataset of which this description is a part

Hands-on session (I)

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Creating RDF data Describing things with RDF

- Which kind of information should we include in the description of the book "Invisible" written by Paul Auster?
 - triples that describe the resource with literals (e.g. title)
 - triples that describe the resource by linking to other resources, or *incoming links* (e.g. author)
 - triples that describe the resource by linking to other resources, or *outgoing links* (e.g. publisher)
 - triples describing the resource's creation (e.g. date)
 - triples describing the resource's location (e.g. library)
 - triples about the resource's parts (e.g. chapters)
- and, for writing this description, you can use:
- terms from existing vocabularies
 - Dublin Core (e.g. dcterms:title)
 - FOAF (e.g. foaf:name)
 - ...
 - your own defined terms
 - RDFS (rdfs:comment and rdfs:label for annotations), OWL (owl:sameAs for links)

Hands-on session (I)

Reusing Existing Terms FOAF vocabulary

- The FOAF ("Friend of a Friend") vocabulary can be used for describing persons, their activities and their relations to other people and objects.
- FOAF = RDF + Social Web
- namespace:

foaf: <<http://xmlns.com/foaf/0.1>>



Hands-on session (I)

Reusing Existing Terms FOAF vocabulary

- An example:

```
@base <http://exmo.inrialpes.fr/about> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .

<#j david>
  a foaf:Person ;
  foaf:name "Jérôme David"@fr ;
  foaf:nick "JD" ;
  foaf:mbox <mailto:jerome.david@inria.fr> ;
  foaf:homepage "http://exmo.inrialpes.fr/~j david/" ;
  foaf:depiction <http://exmo.inrialpes.fr/j david_img_small.jpg> ;
  foaf:knows <http://exmo.inrialpes.fr/about#matencia> ,
             <http://www.imag.fr/id/pgenoud> ,
             [ a foaf:Person ;
               foaf:name "Ewan David" ;
               foaf:age "5" ] .
```

Hands-on session (I)

Reusing Existing Terms FOAF vocabulary

- An example:

```
@base <http://exmo.inrialpes.fr/about> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .

<#j david>
  a foaf:Person ;
  foaf:name "Jérôme David"@fr ;
  foaf:nick "JD" ;
  foaf:mbox <mailto:jerome.david@inria.fr> ;
  foaf:homepage "http://exmo.inrialpes.fr/~j david/" ;
  foaf:depiction <http://exmo.inrialpes.fr/j david_img_small.jpg> ;
  foaf:knows <http://exmo.inrialpes.fr/about#matencia> ,
             <http://www.imag.fr/id/pgenoud> ,
             [ a foaf:Person ;
               foaf:name "Ewan David" ;
               foaf:age "5" ] .
```

Hands-on session (I)

Reusing Existing Terms FOAF vocabulary

- An example:

```
@base <http://exmo.inrialpes.fr/about/>  
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>  
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>  
@prefix foaf: <http://xmlns.com/foaf/0.1/>
```

```
<#jddavid>  
  a foaf:Person ;  
  foaf:name "Jérôme David"@fr ;  
  foaf:nick "JD" ;  
  foaf:mbox <mailto:jerome.david@inria.fr> ;  
  foaf:homepage "http://exmo.inrialpes.fr/~jddavid/" ;  
  foaf:depiction <http://exmo.inrialpes.fr/jddavid_img_small.jpg> ;  
  foaf:knows <http://exmo.inrialpes.fr/about#matencia> ,  
            <http://www.imag.fr/id/pgenoud> ,  
            [ a foaf:Person ;  
              foaf:name "Ewan David" ;  
              foaf:age "5" ] .
```

jddavid is a person, with the name of "Jérôme David" and the nickname of "JD", who has an email address of "jerome.david@inria.fr". His homepage is... He is depicted in the image... He knows... He also knows a person whose name is "Ewan David" and who is 5 years old.

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- An example:

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@base <http://exmo.inrialpes.fr/about#> ;
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<#jddavid>
  a foaf:Person ;
  foaf:name "Jérôme David"@fr ;
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  foaf:homepage "http://exmo.inrialpes.fr/~jddavid/" ;
  foaf:depiction <http://exmo.inrialpes.fr/jddavid_img_small.jpg> ;
  foaf:knows <http://exmo.inrialpes.fr/about#matencia> ,
             <http://www.imag.fr/id/pgenoud> ,
             [ a foaf:Person ;
               foaf:name "Ewan David" ;
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Hands-on session (I)

Reusing Existing Terms FOAF vocabulary

- An example:

```
@base <http://exmo.inrialpes.fr/about#matencia> ;
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> ;
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> ;
@prefix foaf: <http://xmlns.com/foaf/spec/#term_
```

```
<#jddavid>
  a foaf:Person ;
  foaf:name "Jérôme David"@fr ;
  foaf:nick "JD" ;
  foaf:mbox <mailto:jerome.david@inria.fr> ;
  foaf:homepage "http://exmo.inrialpes.fr/~jddavid/" ;
  foaf:depiction <http://exmo.inrialpes.fr/jddavid_img_small.jpg> ;
  foaf:knows <http://exmo.inrialpes.fr/about#matencia> ,
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jddavid is a person, with the name of "Jérôme David" and the nickname of "JD", who has an email address of "jerome.david@inria.fr". His homepage is... He is depicted in the image... He knows... He also knows a person whose name is "Ewan David" and who is 5 years old.

Property: foaf:knows

knows - A person known by this person (indicating some level of reciprocated interaction between the parties).

Status: stable

Domain: having this property implies being a [Person](#)

Range: every value of this property is a [Person](#)

from http://xmlns.com/foaf/spec/#term_knows

The [knows](#) property relates a [Person](#) to another [Person](#) that he or she knows.

Hands-on session (I)

Reusing Existing Terms The Dublin Core Schema

- The Dublin Core Schema is a vocabulary of terms that can be used to describe web resources (videos, images, web pages) and physical resources (books, publications, CDs).
- Dublin Core Metadata Initiative (DCMI)
- two namespaces:
 - Dublin Core Metadata Set version 1.1
dc: <<http://purl.org/elements/1.1/>>
 - DCMI Metadata Terms
dcterms: <<http://purl.org/dc/terms/>>



Hands-on session (I)

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domains and ranges are not specified (e.g. dc:creator may be used with both literal and non-literal values)

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dcterms: <<http://purl.org/dc/terms/>>

domains and ranges are specified (e.g. the range of dcterms:creator is the class dcterms:Agent)

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dcterms:creator is a subproperty of dc:creator

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@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix dcterms: <http://purl.org/dc/terms/> .
@prefix ex: <http://www.example.org/> .

ex:myPaper a dcterms:BibliographicResource ;
    dcterms:title "What is this thing called Linked Data?" ;
    dcterms:creator ex:matencia, ex:j david , ex:p genoud ;
    dcterms:subject "Linked Data", "Semantic Web" ;
    dcterms:issued "2015" ;
    dcterms:publisher "ACM Digital Library" ;
    dcterms:bibliographicCitation "Proceedings of the " .

ex:matencia a foaf:Person ;
    foaf:familyName "Atencia" ;
    foaf:givenName "Manuel" .

...
```

Hands-on session (I)

Reusing Existing Terms The Dublin Core Schema

- An example:

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
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@prefix foaf: <http://xmlns.com/foaf/0.1/> .
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@prefix ex: <http://www.example.org/> .

ex:myPaper a dcterms:BibliographicResource ;
  dcterms:title "What is this thing called Linked Data?" ;
  dcterms:creator ex:matencia, ex:j david , ex:p genoud ;
  dcterms:subject "Linked Data", "Semantic Web" ;
  dcterms:issued "2015" ;
  dcterms:publisher "ACM Digital Library" ;
  dcterms:bibliographicCitation "Proceedings of the " .

ex:matencia a foaf:Person ;
  foaf:familyName "Atencia" ;
  foaf:givenName "Manuel" .
```

...

Hands-on session (I)

Reusing Existing Terms The Dublin Core Schema

- An example:

```
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ex:matencia a foaf:Person ;
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...
```

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@prefix foaf: <http://xmlns.com/foaf/0.1/> .  
@prefix dcterms: <http://purl.org/dc/terms/> .  
@prefix ex: <http://www.example.org/> .
```

```
ex:myPaper a dcterms:BibliographicResource ;  
    dcterms:title "What is this thing called Linked Data?" ;  
    dcterms:creator ex:matencia, ex:j david , ex:p genoud ;
```

ex:matencia

Term Name:	creator
URI:	http://purl.org/dc/terms/creator
Label:	Creator
Definition:	An entity primarily responsible for making the resource.
Comment:	Examples of a Creator include a person, an organization, or a service.
Type of Term:	Property
Refines:	http://purl.org/dc/elements/1.1/creator
Refines:	http://purl.org/dc/terms/contributor
Has Range:	http://purl.org/dc/terms/Agent
Version:	http://dublincore.org/usage/terms/history/#creatorT-002
EquivalentProperty:	http://xmlns.com/foaf/0.1/maker

from <http://dublincore.org/documents/2012/06/14/dcmi-terms/?v=terms#creator>

...

Hands-on session (I)

Creating RDF data Reusing existing terms

- Which properties/classes could we use for describing Artemis' bookstore data?

Hands-on session (I)

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Author ID	First Name	Last Name	Book ID	Title	Author	Type	ISBN
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foaf vocabulary



Classes: | [Agent](#) | [Document](#) | [Group](#) | [Image](#) | [LabelProperty](#) | [OnlineAccount](#) | [OnlineChatAccount](#) | [OnlineEcommerceAccount](#) | [OnlineGamingAccount](#) | [Organization](#) | [Person](#) | [PersonalProfileDocument](#) | [Project](#) |

Properties: | [account](#) | [accountName](#) | [accountServiceHomepage](#) | [age](#) | [aimChatID](#) | [based_near](#) | [birthday](#) | [currentProject](#) | [depiction](#) | [depicts](#) | [dnaChecksum](#) | [familyName](#) | [family_name](#) | [firstName](#) | [focus](#) | [fundedBy](#) | [geekcode](#) | [gender](#) | [givenName](#) | [givenname](#) | [holdsAccount](#) | [homepage](#) | [icqChatID](#) | [img](#) | [interest](#) | [isPrimaryTopicOf](#) | [jabberID](#) | [knows](#) | [lastName](#) | [logo](#) | [made](#) | [maker](#) | [mbox](#) | [mbox_sha1sum](#) | [member](#) | [membershipClass](#) | [msnChatID](#) | [myersBriggs](#) | [name](#) | [nick](#) | [openid](#) | [page](#) | [pastProject](#) | [phone](#) | [plan](#) | [primaryTopic](#) | [publications](#) | [schoolHomepage](#) | [sha1](#) | [skypeID](#) | [status](#) | [surname](#) | [theme](#) | [thumbnail](#) | [tipjar](#) | [title](#) | [topic](#) | [topic_interest](#) | [weblog](#) | [workInfoHomepage](#) | [workplaceHomepage](#) | [yahooChatID](#) |

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dublin core vocabulary



Properties in the <i>/terms/</i> namespace	abstract , accessRights , accrualMethod , accrualPeriodicity , accrualPolicy , alternative , audience , available , bibliographicCitation , conformsTo , contributor , coverage , created , creator , date , dateAccepted , dateCopyrighted , dateSubmitted , description , educationLevel , extent , format , hasFormat , hasPart , hasVersion , identifier , instructionalMethod , isFormatOf , isPartOf , isReferencedBy , isReplacedBy , isRequiredBy , issued , isVersionOf , language , license , mediator , medium , modified , provenance , publisher , references , relation , replaces , requires , rights , rightsHolder , source , spatial , subject , tableOfContents , temporal , title , type , valid
--	--

Classes	Agent , AgentClass , BibliographicResource , FileFormat , Frequency , Jurisdiction , LicenseDocument , LinguisticSystem , Location , LocationPeriodOrJurisdiction , MediaType , MediaTypeOrExtent , MethodOfAccrual , MethodOfInstruction , PeriodOfTime , PhysicalMedium , PhysicalResource , Policy , ProvenanceStatement , RightsStatement , SizeOrDuration , Standard
---------	---

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dublin core vocabulary



Properties in the <i>/terms/</i> namespace	abstract , accessRights , accrualMethod , accrualPeriodicity , accrualPolicy , alternative , audience , available , bibliographicCitation , conformsTo , contributor , coverage , created , creator , date , dateAccepted , dateCopyrighted , dateSubmitted , description , educationLevel , extent , format , hasFormat , hasPart , hasVersion , identifier , instructionalMethod , isFormatOf , isPartOf , isReferencedBy , isReplacedBy , isRequiredBy , issued , isVersionOf , language , license , mediator , medium , modified , provenance , publisher , references , relation , replaces , requires , rights , rightsHolder , source , spatial , subject , tableOfContents , temporal , title , type , valid
--	--

Classes	Agent , AgentClass , BibliographicResource , FileFormat , Frequency , Jurisdiction , LicenseDocument , LinguisticSystem , Location , LocationPeriodOrJurisdiction , MediaType , MediaTypeOrExtent , MethodOfAccrual , MethodOfInstruction , PeriodOfTime , PhysicalMedium , PhysicalResource , Policy , ProvenanceStatement , RightsStatement , SizeOrDuration , Standard
---------	---

Hands-on session (I)

Creating RDF data Reusing existing terms

- Which properties/classes could we use for describing Artemis' bookstore data?

Author ID	First Name	Last Name	Book ID	Title	Author	Type	ISBN
1	Paul	Auster	1	Moon palace	1	Paperback	571142200
2	Siri	Hustvedt	2	Invisible	1	Paperback	571249527

Language	Pages	Price	Date of publication	Date acquired	Comments	Publisher
English	320	12.5	2004-02-01	2013-02-01 15:00:00		Faber & Faber
English	320	13.5	2010-06-24	2014-09-15 10:30:00		Faber & Faber

dublin core vocabulary



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dublin core vocabulary



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dublin core vocabulary

well... not so optimal



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your own vocabulary/ontology

```
http://artemisBookstore.com/ontology#author
http://artemisBookstore.com/ontology#type
http://artemisBookstore.com/ontology#isbn
http://artemisBookstore.com/ontology#pages
http://artemisBookstore.com/ontology#price
http://artemisBookstore.com/ontology#datePublication
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<http://artemisBookstore.com/ontology#author>
<http://artemisBookstore.com/ontology#type>
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<http://artemisBookstore.com/ontology#pages>
<http://artemisBookstore.com/ontology#price>
<http://artemisBookstore.com/ontology#datePublication>
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use hash URIs for small datasets (e.g. ontologies)

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your own vocabulary/ontology

`http://artemisBookstore.com/ontology#author` `rdfs:subPropertyOf` `dcterms:creator`

`http://artemisBookstore.com/ontology#type`

`http://artemisBookstore.com/ontology#isbn`

`http://artemisBookstore.com/ontology#pages`

`http://artemisBookstore.com/ontology#price`

`http://artemisBookstore.com/ontology#datePublication` `rdfs:subPropertyOf` `dcterms:date`

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rdfs 
rdfs:comment

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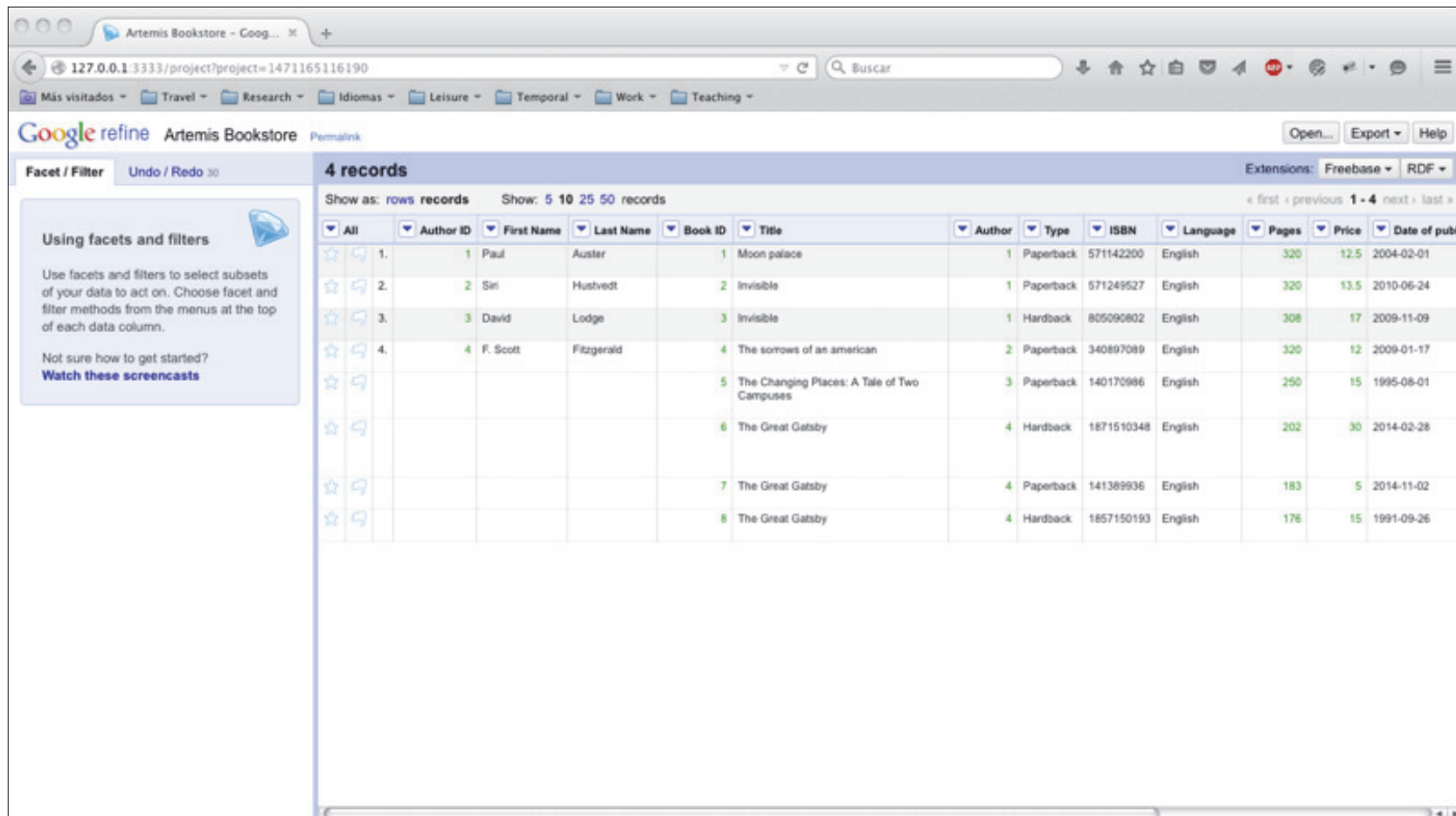
use hash URIs for small datasets (e.g. ontologies)

 protégé out of scope

Hands-on session (I)

OpenRefine RDF extension

- Let's create RDF data with OpenRefine + RDF extension (developed at DERI)



The screenshot shows the OpenRefine interface with the 'Artemis Bookstore' project. The main area displays a table of 8 records. The table has columns for Book ID, Author, Type, ISBN, Language, Pages, Price, and Date of publication. The first four records are highlighted in blue, indicating they are selected. The interface also shows a sidebar with 'Using facets and filters' and a top navigation bar with 'Open...', 'Export', and 'Help' buttons.

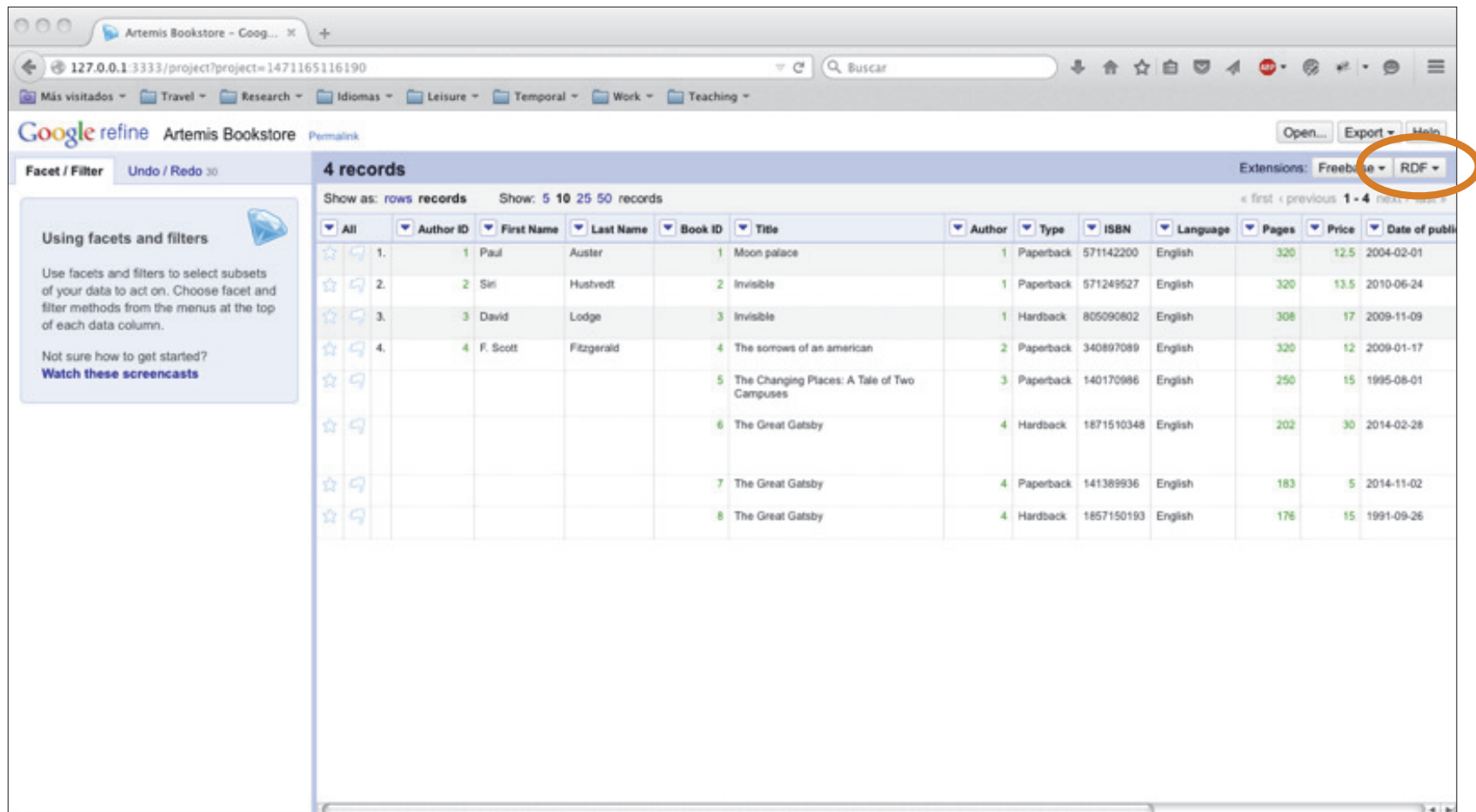
Book ID	Author	Type	ISBN	Language	Pages	Price	Date of publication
1	Paul Auster	Paperback	571142200	English	320	12.5	2004-02-01
2	Sin Hustedt	Paperback	571249527	English	320	13.5	2010-06-24
3	David Lodge	Hardback	805090802	English	308	17	2009-11-09
4	F. Scott Fitzgerald	Paperback	340897089	English	320	12	2009-01-17
5		Paperback	140170986	English	250	15	1995-08-01
6		Hardback	1871510348	English	202	30	2014-02-28
7		Paperback	141389936	English	183	5	2014-11-02
8		Hardback	1857150193	English	176	15	1991-09-26

you can download OpenRefine RDF extension at <http://refine.deri.ie/>

Hands-on session (I)

OpenRefine RDF extension

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The screenshot shows the OpenRefine interface for a project named 'Artemis Bookstore'. The main area displays a table of 8 records. The 'Extensions' dropdown menu is open, and the 'RDF' option is highlighted with an orange circle. The table columns include Author ID, First Name, Last Name, Book ID, Title, Author, Type, ISBN, Language, Pages, Price, and Date of publication.

	Author ID	First Name	Last Name	Book ID	Title	Author	Type	ISBN	Language	Pages	Price	Date of publication
1.	1	Paul	Auster	1	Moon palace	1	Paperback	571142200	English	320	12.5	2004-02-01
2.	2	Sin	Hustvedt	2	Invisible	1	Paperback	571249527	English	320	13.5	2010-06-24
3.	3	David	Lodge	3	Invisible	1	Hardback	80509802	English	308	17	2009-11-09
4.	4	F. Scott	Fitzgerald	4	The someros of an american	2	Paperback	340897089	English	320	12	2009-01-17
				5	The Changing Places: A Tale of Two Campuses	3	Paperback	140170986	English	250	15	1995-08-01
				6	The Great Gatsby	4	Hardback	1871510348	English	202	30	2014-02-28
				7	The Great Gatsby	4	Paperback	141389936	English	183	5	2014-11-02
				8	The Great Gatsby	4	Hardback	1857150193	English	176	15	1991-09-26

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Hands-on session (I)

- Let's create RDF data!

Hands-on session (I)

- Let's create RDF data!

2.1

RDF Schema Alignment

The RDF schema alignment skeleton below specifies how the RDF data that will get generated from your grid-shaped data. The cells in each record of your data will get placed into nodes within the skeleton. Configure the skeleton by specifying which column to substitute into which node.

Base URI: <http://localhost:3333/> edit

RDF Skeleton RDF Preview

Available Prefixes: [rdf](#) [foaf](#) [owl](#) [rdf](#) [+](#) add prefix [manage prefixes](#)

(row index) URI	> property? →	Cell
add rdf type	> property? →	Author ID cell
	> property? →	First Name cell
	> property? →	Last Name cell
	> property? →	Book ID cell
	> property? →	Title cell
	> property? →	Author cell
	> property? →	Type cell
	> property? →	ISBN cell

Save

2. Creating RDF data
2.1. Click on the RDF drop-down menu and then click on "Edit RDF skeleton".

Hands-on session (I)

Creating RDF data

- Let's create RDF data!

RDF Schema Alignment

The RDF schema alignment skeleton below specifies how the RDF data that will get generated from your grid-shaped data. The cells in each record of your data will get placed into nodes within the skeleton. Configure the skeleton by specifying which column to substitute into which node.

Base URI: <http://artemisBookstore.com/> [edit](#)

RDF Skeleton **RDF Preview**

Available Prefixes: `rdfs foaf owl rdf` [+add prefix](#) [manage prefixes](#)

(row index) URI	X >property?→	Author ID cell
add rdf:type	X >property?→	First Name cell
	X >property?→	Last Name cell
	X >property?→	Book ID cell
	X >property?→	Title cell
	X >property?→	Author cell
	X >property?→	Type cell
	X >property?→	ISBN cell
	X >property?→	Language cell
	X >property?→	Pages cell

2.3 [Add another root node](#)

[Save](#)

[OK](#) [Cancel](#)

2. Creating RDF data (cont.)
2.2. Choose a cool base URI
2.3. Add another root node (one will be used for books and another one for authors)

Hands-on session (I)

Creating RDF data

- Let's create RDF data!

The screenshot shows the 'RDF Schema Alignment' interface. On the left, the 'RDF Skeleton' tab is active, displaying a table with columns for '(row index) URI', 'property', and 'cell'. The first row is selected, and the 'Author ID cell' is highlighted. A blue arrow points from this cell to the 'RDF Node' dialog box on the right. In the dialog, the 'Use content from cell...' section has '2.4' next to the '(row index)' option. The 'The cell's content is used ...' section has '2.5' next to the 'as a URI' option. The dialog also includes 'OK' and 'Cancel' buttons at the bottom.

2. Creating RDF data (cont.)

2.4. For each RDF node (root or not), choose the cell content you want it to embody (e.g. Author ID).

2.5. Specify if the content will be used as a URI (e.g. Author ID) or a literal (e.g. First Name).

Hands-on session (I)

Creating RDF data

- Let's create RDF data!

RDF Schema Alignment

The RDF schema alignment skeleton below specifies how the RDF data that will get placed into nodes within the skeleton. Configure the skeleton by specifying which column...

Base URI: <http://artemisBookstore.com/> edit

RDF Skeleton **RDF Preview**

Available Prefixes: `rdfs foaf owl rdf` +add prefix manage prefixes

(row index) URI	add rdf.type	>-property?->	cell
		>-property?->	Author ID cell
		>-property?->	First Name cell
		>-property?->	Last Name cell
		>-property?->	Book ID cell
		>-property?->	Title cell
		>-property?->	Author cell
		>-property?->	Type cell

RDF Node

Use content from cell...

- (row index)
- Author ID
- First Name
- Last Name
- Book ID
- Title
- Author
- Type
- ISBN
- Language
- Pages
- Price
- Date of publication
- Date acquired
- Comments
- Publisher

The cell's content is used ...

- as a URI
- as text
- as language-tagged text
- as integer number
- as non-integer number
- as date (YYYY-MM-DD)
- as dateTime (YYYY-MM-DD HH:MM:SS)
- as boolean
- as custom datatype (specify type URI)
- as a blank node

Use custom expression...
value
preview/edit

Preview URI values

Expression: `"/id/author/" + cells["Author ID"].value` Language: Google Refine Expression Language (GREL) No syntax error.

row	value	resolved against the base URI
1.	1	/id/author/1
2.	2	/id/author/2
3.	3	/id/author/3
4.	4	/id/author/4
5.		/id/author/
6.		/id/author/
7.		/id/author/

2. Creating RDF data (cont.)

2.6. If the cell's content will be used as a URI, find a cool URI. For this, you may need to have a look at GREL - General Refine Expression Language)

Hands-on session (I)

- General Refine Expression Language (GREL)

Preview URI values

Expression: `"/id/author/" + cells["Author ID"].value` Language: Google Refine Expression Language (GREL) No syntax error.

Preview History Starred Help

row	value	resolved against the base URI
1.	1	<code>/id/author/1</code> http://artemisBookstore.com/id/author/1
2.	2	<code>/id/author/2</code> http://artemisBookstore.com/id/author/2
3.	3	<code>/id/author/3</code>
4.	4	<code>/id/author/4</code>
5.		<code>/id/author/</code>
6.		<code>/id/author/</code>
7.		<code>/id/author/</code>

variable name	meaning
value	the value of the cell in the base column of the current row; can be null
row	the current row; an object with more fields, with details below
cells	the cells of the current row, with fields that correspond to the column names; more details below

OK Cancel

more info at <https://github.com/OpenRefine/OpenRefine/wiki/Variables>

<https://github.com/OpenRefine/OpenRefine/wiki/General-Refine-Expression-Language>

Hands-on session (I)

Creating RDF data

- Let's create RDF data!

RDF Schema Alignment

The RDF schema alignment skeleton below specifies how the RDF data that will get generated from placed into nodes within the skeleton. Configure the skeleton by specifying which column to substitute

Base URI: <http://artemisB.com/edit>

RDF Skeleton | **RDF Preview**

Available Prefixes: rdfs foaf owl rdf dcterms + add prefix manage prefixes

Author ID URI	> foaf:firstName	First Name cell
foaf:Person	> property? →	Last Name cell
add rdf:type	> property? →	Book ID cell
	> property? →	Title cell
	> property? →	Author cell
	> property? →	Type cell
	> property? →	ISBN cell
	> property? →	Language cell
	> property? →	Pages cell
	> property? →	Price cell

Add another root node

OK Cancel

New Prefix

prefix: dcterms

URI: <http://purl.org/dc/terms/>
(suggested by prefix.cc)

OK Cancel Advanced...

2. Creating RDF data (cont.)

2.6. Declare the type of each RDF node

2.7. Add/remove properties specifying the property values (as URIs or literals).

2.8. Add new prefixes and import vocabularies if necessary (e.g. Dublin Core).

2.9. At any time, see the RDF preview to spot possible mistakes

Hands-on session (I)

- You should end up with something like this:

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix abo: <http://artemisBookstore.com/ontology#> .
@prefix dcterms: <http://purl.org/dc/terms/> .

<http://artemisBookstore.com/id/author/1> a foaf:Person ;
    foaf:firstName "Paul" ;
    foaf:lastName "Auster" .

<http://artemisBookstore.com/id/book/571142200> a dcterms:BibliographicResource ;
    dcterms:title "Moon palace" ;
    abo:author <http://artemisBookstore.com/id/author/1> ;
    abo:bookType "Paperback" ;
    abo:isbn "571142200" ;
    abo:language "English" ;
    abo:pages "320"^^<http://www.w3.org/2001/XMLSchema#int> ;
    abo:price "12.5"^^<http://www.w3.org/2001/XMLSchema#double> ;
    abo:datePublication "2004-02-01" ;
    abo:dateAcquired "2013-02-01 15:00:00" ;
    dcterms:publisher "Faber & Faber" .

<http://artemisBookstore.com/id/author/2> a foaf:Person ;
    foaf:firstName "Siri" ;
    foaf:lastName "Hustvedt" .
```

Hands-on session (I)

Creating links to external datasets

- Now, let's create RDF data! But before
- Let's recall the Linked Data principles:
 1. Use URIs as names for things.
 2. Use HTTP URIs, so that people can look up those names.
 3. When someone looks up a URI, provide useful information using the standards (RDF, SPARQL).
 - 4. Include links to other URIs, so that they can discover more things.**

Hands-on session (I)

- Data interlinking
 - Not an easy task
 - a large quantity of data
 - semantic heterogeneity
 - noisy data
 - Performed manually or (semi-)automatically
 - Key-based approaches vs similarity-based approaches
 - Data interlinking tools:
 - Silk - Link Discovery Framework
 - LiMES - Link Discovery Framework for Metric Spaces
 - Link Keys
 - OpenRefine + Reconciliation services

Hands-on session (I)

- Data interlinking
 - Not an easy task
 - a large quantity of data
 - semantic heterogeneity
 - noisy data
 - Performed manually or (semi-)automatically
 - Key-based approaches vs similarity-based approaches
 - Data interlinking tools:
 - Silk - Link Discovery Framework
 - LiMES - Link Discovery Framework for Metric Spaces
 - Link Keys
 - **OpenRefine + Reconciliation services**

Hands-on session (I)

OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints

Hands-on session (I)

OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



<http://artemisBookstore.com/id/book/0571249527>

Hands-on session (I)

OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



<http://artemisBookstore.com/id/book/0571249527>



Hands-on session (I)

OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



<http://artemisBookstore.com/id/book/0571249527>

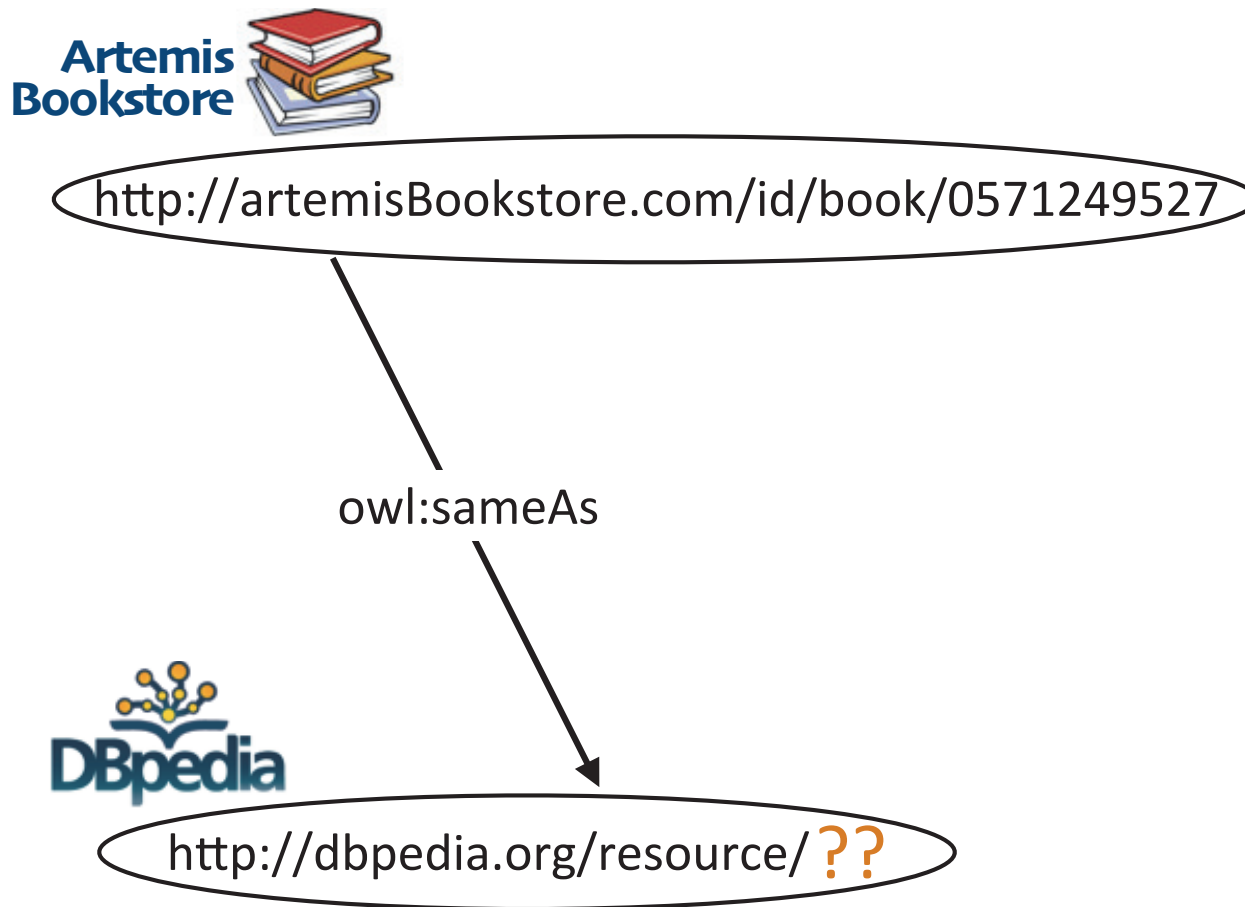


<http://dbpedia.org/resource/??>

Hands-on session (I)

OpenRefine Reconciliation services

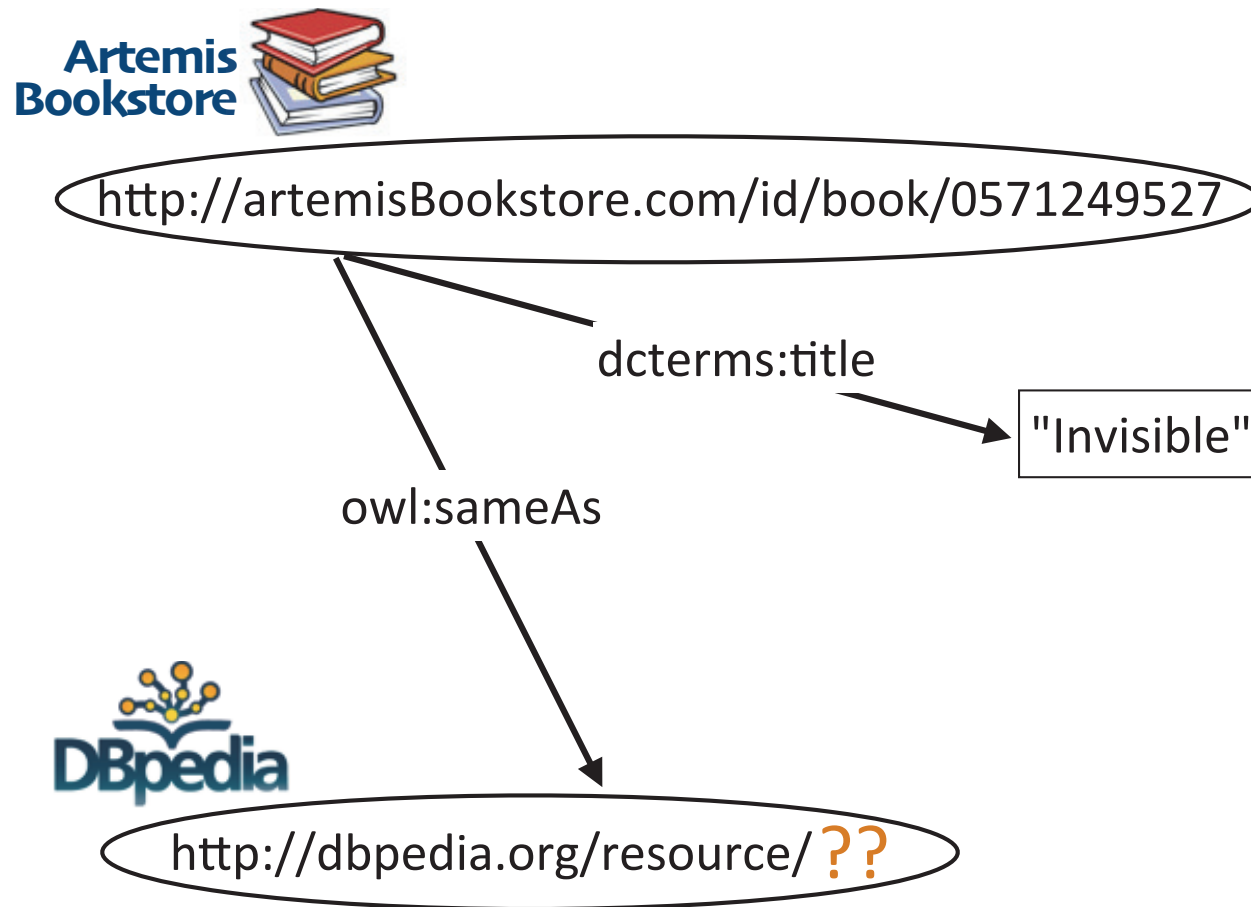
- Reconciliation services based on SPARQL endpoints



Hands-on session (I)

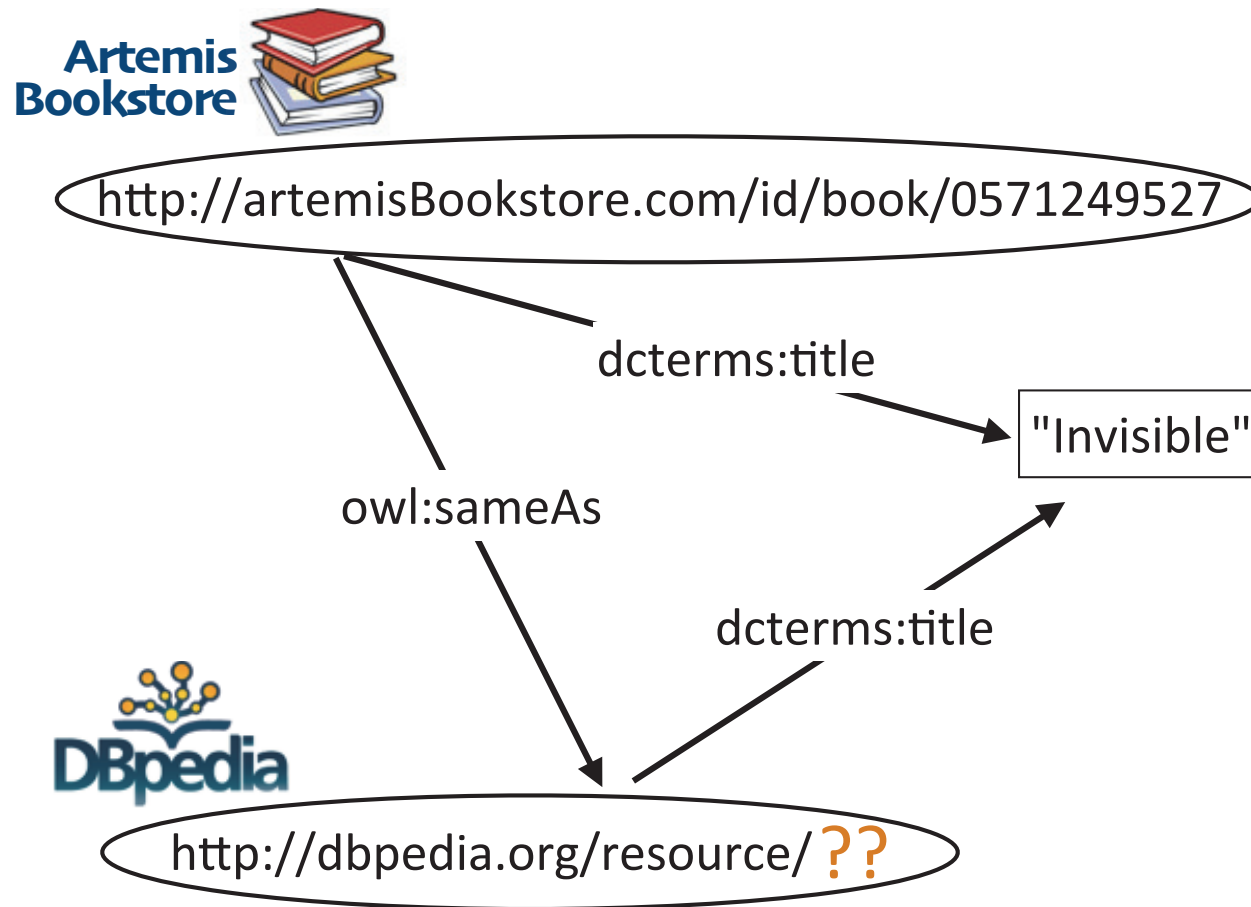
OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



Hands-on session (I)

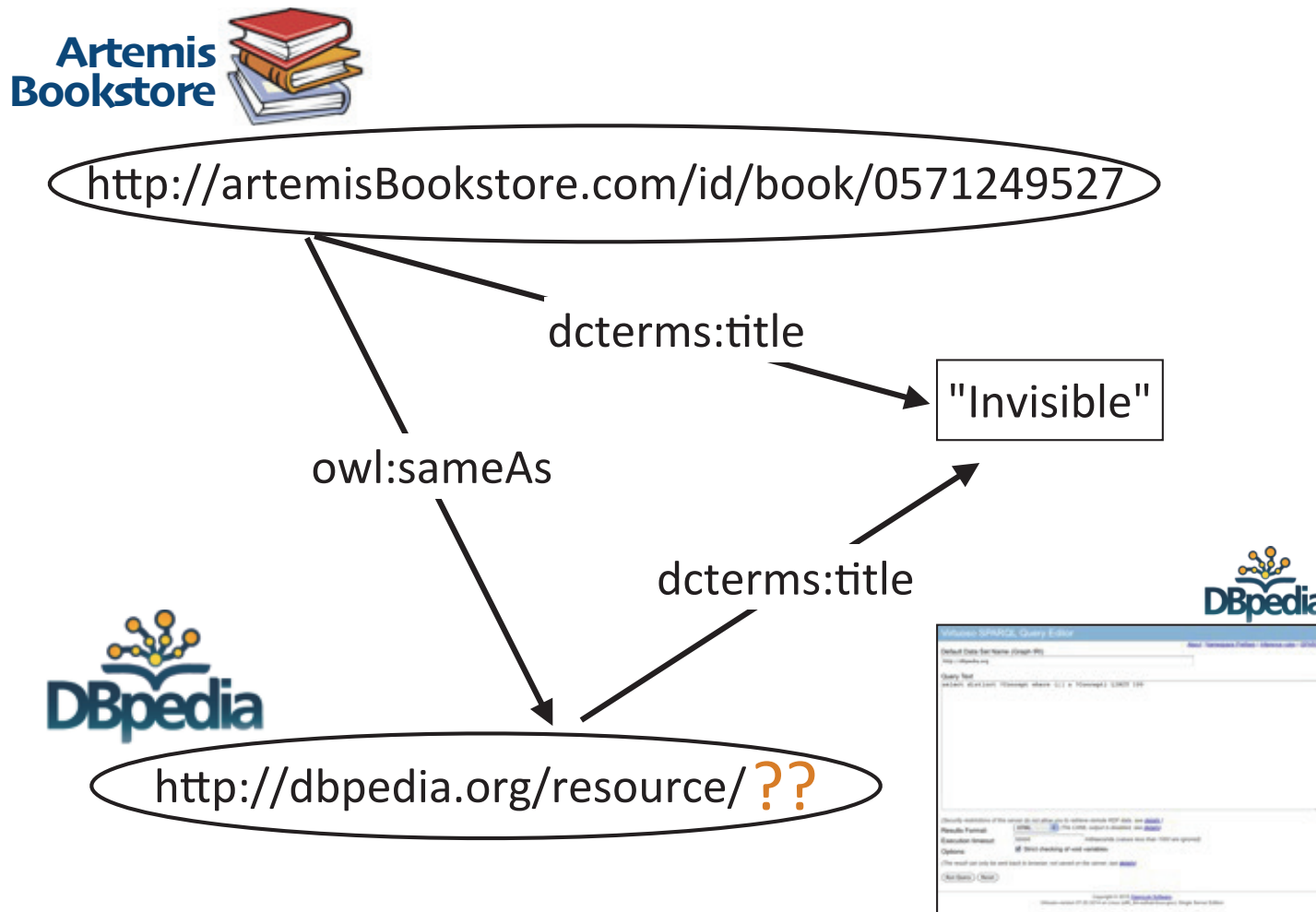
- Reconciliation services based on SPARQL endpoints



Hands-on session (I)

OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



Hands-on session (I)

OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



<http://artemisBookstore.com/id/book/0571249527>

dcterms:title

"Invisible"

owl:sameAs

dcterms:title



<http://dbpedia.org/resource/??>



find DBpedia resources having "Invisible" as a value for the property dcterms:title

Hands-on session (I)

OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



<http://artemisBookstore.com/id/book/0571249527>

dcterms:title

"Invisible"

owl:sameAs

dcterms:title



<http://dbpedia.org/resource/??>

we can refine our search:
-or dc:title, rdfs:label...
-similar to "Invisible"
-resources of type dbo:Book



find DBpedia resources
having "Invisible" as a
value for the property
dcterms:title

Hands-on session (I)

OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



<http://artemisBookstore.com/id/book/0571249527>

dcterms:title

"Invisible"



Hands-on session (I)

OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



<http://artemisBookstore.com/id/book/0571249527>

dcterms:title

"Invisible"

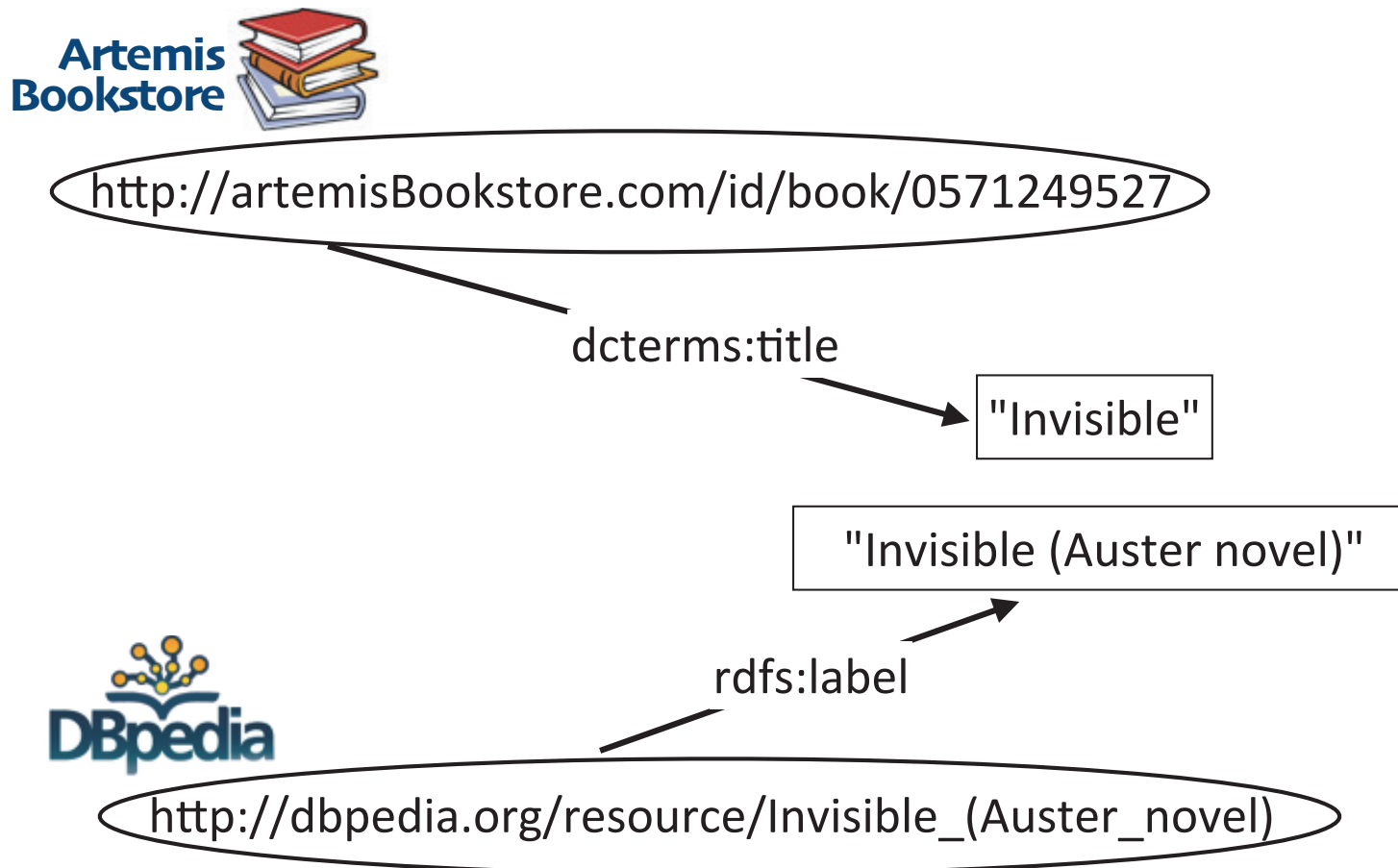


[http://dbpedia.org/resource/Invisible_\(Auster_novel\)](http://dbpedia.org/resource/Invisible_(Auster_novel))

Hands-on session (I)

OpenRefine Reconciliation services

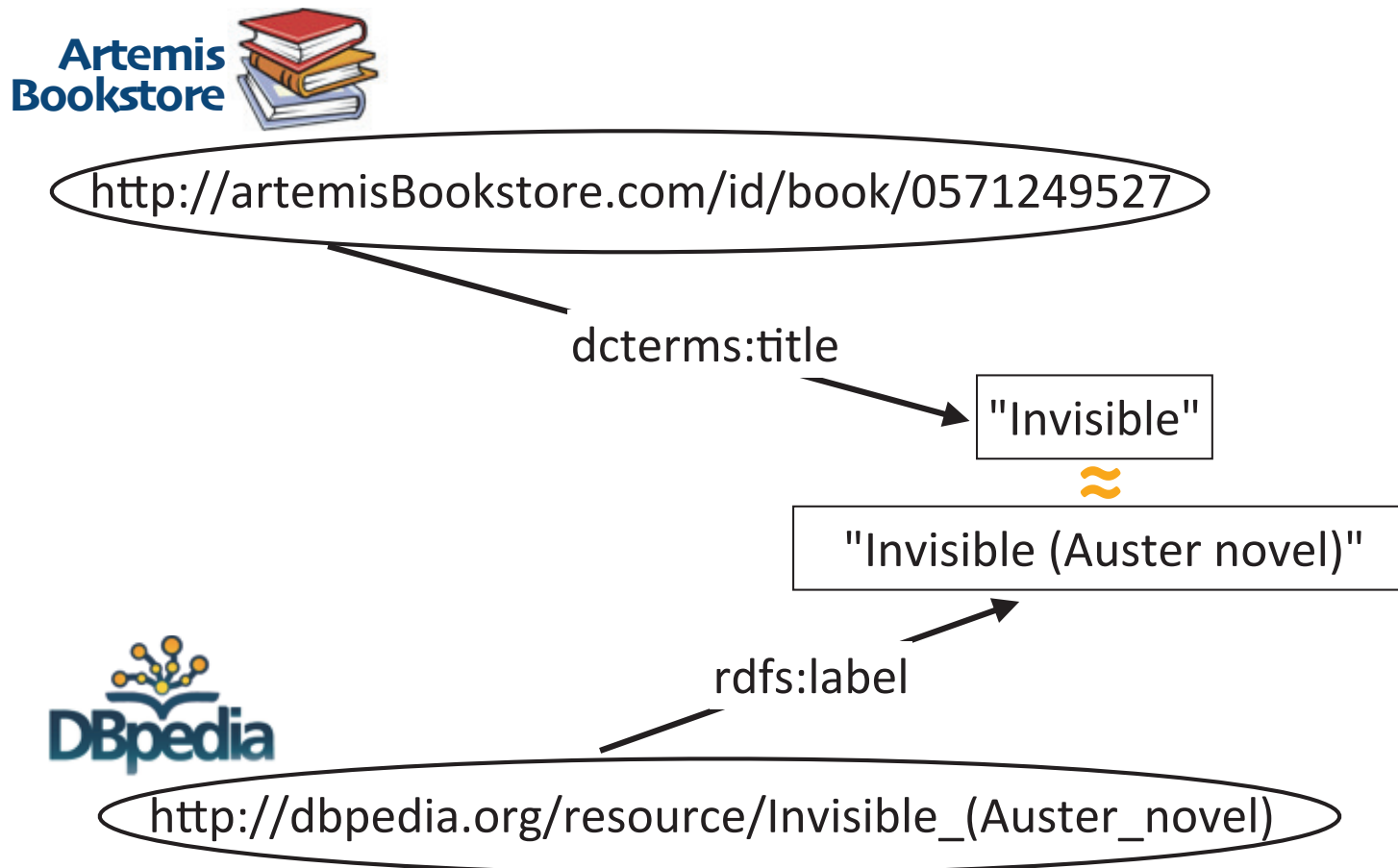
- Reconciliation services based on SPARQL endpoints



Hands-on session (I)

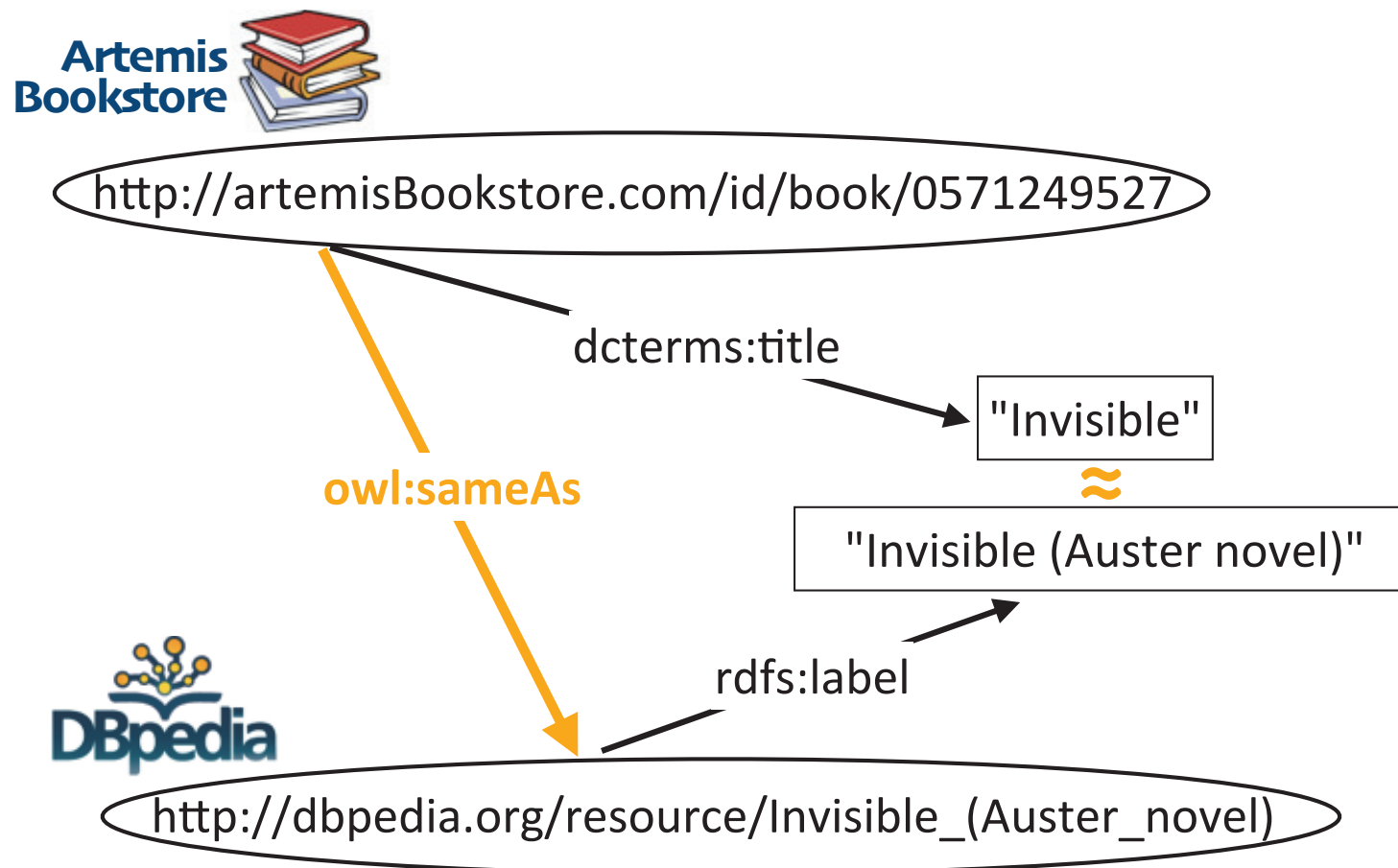
OpenRefine Reconciliation services

- Reconciliation services based on SPARQL endpoints



Hands-on session (I)

- Reconciliation services based on SPARQL endpoints



Hands-on session (I)

Creating links to external datasets

- Let's create links to DBpedia!

The screenshot shows the 'Add SPARQL-based reconciliation service' dialog box. The 'Name' field is set to 'DBpedia'. The 'Endpoint URL' is 'http://dbpedia.org/sparql'. The 'Graph URI' is empty. The 'Type' is set to 'Virtuoso'. The 'Label properties' section has 'rdfs:label' checked. The dialog box is annotated with blue boxes containing the numbers 3.1, 3.1.1, 3.1.2, 3.1.3, and 3.1.3.

3. Creating links to external datasets

3.1. Add a reconciliation service based on DBpedia SPARQL endpoint.

3.1.1. Choose a name (e.g. DBpedia)

3.1.2. Provide the endpoint URL (<http://dbpedia.org/sparql>)

3.1.3. Select the type virtuoso

3.1.4. Select the properties that will be used to match resources (e.g. rdfs:label)



Hands-on session (I)

Creating links to external datasets

- Let's create links to DBpedia!

The screenshot shows a data table with columns: Book ID, Title, Author, Type, and ISBN. A context menu is open over the 'Title' column, with the 'Reconcile' option selected. A dialog box titled 'Reconcile column "Title"' is overlaid on the table. The dialog has three main sections: 1. 'Reconcile against type:' with a list of ontologies including 'DBpedia' (selected). 2. 'Also use:' with a list of properties to include for interlinking. 3. 'Start Reconciling' and 'Cancel' buttons.

Book ID	Title	Author	Type	ISBN
1			Paperback	978-0571142200
2				
3				
4				
5	Tale of Two Campuses			
6				
7				
8				

3.2 (Context menu options): Facet, Text filter, Edit cells, Edit column, Transpose, Sort..., View, Reconcile (Start reconciling...)

3.3 (Reconcile column "Title" dialog):
Reconcile against type:
 Freebase Query-based Reconciliation
 Sindice
 DBpedia

3.4 (Also use dialog):
Column: Author ID, First Name, Last Name, Book ID, Author, Type, ISBN, Language, Pages, Price
Include? As Property: [checkboxes]

3.5 (Buttons): Start Reconciling, Cancel

3. Creating links to external datasets (cont.)
3.2. Choose the data values you want to use for interlinking (e.g. book titles) and start reconciling
3.3. Specify the type of the resources you want to link your data with
3.4. You also can select other properties, to be used for interlinking
3.5. Start reconciling!

Hands-on session (I)

Creating links to external datasets

- Let's create links to DBpedia!

A screenshot of a reconciliation interface. It shows a list of items with checkboxes and scores. The items are: Moon Palace (score 3.6.1), Invisible! (0.9) (score 3.6.2), Invisible Man (0.692), Invisible (roman) (0.529), Create new topic, The Sorrows of an American, The Changing Places: A Tale of Two Campuses (score 3.6.3), and The Great Gatsby.

A screenshot of a search for match dialog box. The search term is "The Changing Places: A Tale of Two Campuses". The dialog box shows a search for "Changing Places" and a dropdown menu with the following items: Changing Places, Changing Places, Changing places, and Changing Places (album). The dialog box also has buttons for Match, New Topic, and Don't Reconcile. A preview of a DBpedia resource is shown on the right, with the URL http://dbpedia.org/resource/Changing_Places and a description of the novel by David Lodge.

3. Creating links to external datasets (cont.)

3.6. Once the reconciliation process is finished

3.6.1. Some links will be correctly found, but

3.6.2. You may need to validate other links, and

3.6.3. You may need to find links manually

Hands-on session (I)

Creating links to external datasets

- Let's create links to DBpedia!

The screenshot shows a data table with columns: Title, Author, Type, ISBN, and Language. A context menu is open over the 'Title' column, with the option 'Add column based on this column...' selected. A blue box with the number '3.7' is next to this option. An arrow points from this option to a dialog box titled 'Add column based on column Title'. The dialog box has 'New column name' set to 'DBpedia link', 'On error' set to 'set to blank', and 'Expression' set to 'cell.recon.match.id'. A blue box with the number '3.8' is next to the expression field. Below the dialog box is a preview table showing the results of the GREL expression.

row	value	cell.recon.match.id
1.	Moon palace	http://dbpedia.org/resource/Moon_Palace
2.	Invisible	http://dbpedia.org/resource/Invisible!
3.	Invisible	http://dbpedia.org/resource/Invisible!
4.	The sorrows of an american	http://dbpedia.org/resource/The_Sorrows_of_an_American
5.	The Changing Places: A Tale of Two Campuses	http://dbpedia.org/resource/Changing_Places
6.	The Great Gatsby	http://dbpedia.org/resource/The_Great_Gatsby

3. Creating Links to external datasets (cont.)

3.7. Add a new column based on the column used for interlinking.

3.8. Retrieve the links found using GREL.

Hands-on session (I)

Creating links to external datasets

- Let's create links to DBpedia!

The image shows a data table with columns: Title, Author, Type, ISBN, and Language. A context menu is open over the 'Title' column, with the option 'Add column based on this column...' selected. A blue box with the number '3.7' is next to this option. An arrow points from this option to a dialog box titled 'Add column based on column Title'. The dialog box has 'New column name' set to 'DBpedia link', 'On error' set to 'set to blank', and 'Expression' set to 'cell.recon.match.id'. A blue box with the number '3.8' is next to the expression field. Below the dialog box is a preview table with the following data:

row	value	cell.recon.match.id
1.	Moon palace	http://dbpedia.org/resource/Moon_Palace
2.	Invisible	http://dbpedia.org/resource/Invisible!
3.	Invisible	http://dbpedia.org/resource/Invisible!
4.	The sorrows of an american	http://dbpedia.org/resource/The_Sorrows_of_an_American
5.	The Changing Places: A Tale of Two Campuses	http://dbpedia.org/resource/Changing_Places
6.	The Great Gatsby	http://dbpedia.org/resource/The_Great_Gatsby

The preview table has a blue box around the 'cell.recon.match.id' column, and the text 'DBpedia links' is written below it.

3. Creating Links to external datasets (cont.)

3.7. Add a new column based on the column used for interlinking.

3.8. Retrieve the links found using GREL.

Hands-on session (I)

- General Refine Expression Language (GREL)

Add column based on column Title

New column name:

On error: set to blank store error copy value from original column

Expression: Language: No syntax error.

Preview History Starred Help

row	value	cell.recon.mat
1.	Moon palace	http://dbpedia.c
2.	Invisible	http://dbpedia.c
3.	Invisible	http://dbpedia.c
4.	The sorrows of an american	http://dbpedia.c /The_Sorrows
5.	The Changing Places: A Tale of Two Campuses	http://dbpedia.c
6.	The Great Gatsby	http://dbpedia.c

OK Cancel

recon the recon object of a cell returned from a reconciliation service or provider; an object with more fields, with details below

Recon
A recon object has a few fields

field name	meaning	deeper fields
recon.judgment	a string that is one of: "matched", "new", "none"	
recon.matched	a boolean, true iff judgment is "matched"	
recon.match	null, or the recon candidate that has been matched against this cell	.id .name .type

more info at <https://github.com/OpenRefine/OpenRefine/wiki/Variables>

<https://github.com/OpenRefine/OpenRefine/wiki/General-Refine-Expression-Language>

Hands-on session (I)

Creating links to external datasets

- Let's create links to DBpedia!

Last Name	Author's DBpedia link	Book ID	Title	Book's DBpedia link
Auster, Paul <small>Choose new match</small>	http://dbpedia.org/resource/Auster_Paul	1	Moon Palace <small>Choose new match</small>	http://dbpedia.org/resource/Moon_Palace
Siri Hustvedt <small>Choose new match</small>	http://dbpedia.org/resource/Siri_Hustvedt			
David Lodge <small>Choose new match</small>	http://dbpedia.org/resource/David_Lodge			
F. Scott Fitzgerald <small>Choose new match</small>	http://dbpedia.org/resource/F._Scott_Fitzgerald			

RDF Schema Alignment

The RDF schema alignment skeleton below specifies how the RDF data that will get generated from your grid-shaped data. The cells in each record of your data will get placed into nodes within the skeleton. Configure the skeleton by specifying which column to substitute into which node.

Base URI: <http://artemisBookstore.com/> edit

RDF Skeleton RDF Preview

Available Prefixes: [rdfs](#) [foaf](#) [owl](#) [rdf](#) [abo](#) [dcterm](#) [+ add prefix](#) [manage prefixes](#)

Author ID URI
[foaf:Person](#)
add rdf.type

Book ID URI
[dcterm:BibliographicResource](#)
add rdf.type

First Name cell

Last Name cell

Author's DBpedia link URI
add rdf.type

Title cell

Author URI
add rdf.type

Type cell

ISBN cell

Save

3.9

3. Creating links to external datasets (cont.)
3.9. Now you can update the RDF skeleton with the DBpedia links using owl:sameAs.

Hands-on session (I)

Creating links to external datasets

- You should end up with something like this

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix abo: <http://artemisBookstore.com/ontology#> .
@prefix dcterms: <http://purl.org/dc/terms/> .

<http://artemisBookstore.com/id/author/1> a foaf:Person ;
    foaf:firstName "Paul" ;
    foaf:lastName "Auster" ;
    owl:sameAs <http://dbpedia.org/resource/Auster,_Paul> .


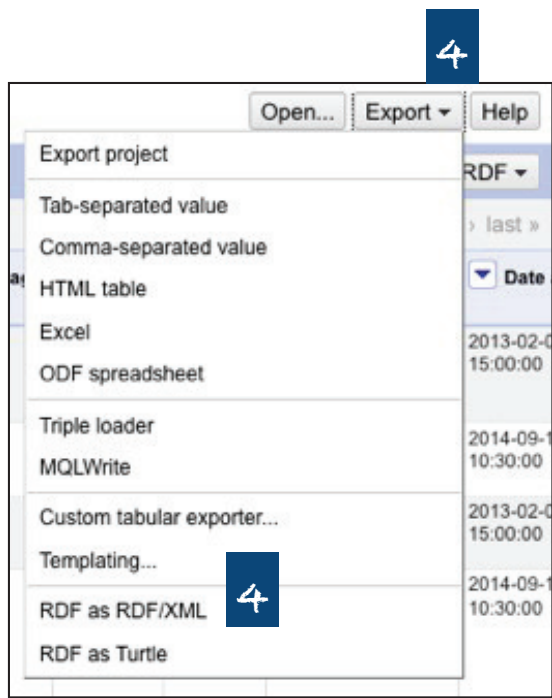
<http://artemisBookstore.com/id/book/571142200> a dcterms:BibliographicResource ;
    dcterms:title "Moon palace" ;
    abo:author <http://artemisBookstore.com/id/author/1> ;
    abo:bookType "Paperback" ;
    abo:isbn "571142200" ;
    abo:language "English" ;
    abo:pages "320"^^<http://www.w3.org/2001/XMLSchema#int> ;
    abo:price "12.5"^^<http://www.w3.org/2001/XMLSchema#double> ;
    abo:datePublication "2004-02-01" ;
    abo:dateAcquired "2013-02-01 15:00:00" ;
    dcterms:publisher "Faber & Faber" ;
    owl:sameAs <http://dbpedia.org/resource/Moon_Palace> .

<http://artemisBookstore.com/id/author/2> a foaf:Person ;
    foaf:firstName "Siri" ;
    foaf:lastName "Hustvedt" ;
    owl:sameAs <http://dbpedia.org/resource/Siri_Hustvedt> .
```


Hands-on session (I)

Artemis' RDF data

- Artemis' data is now available in RDF. Well done!



```
- <rdf:RDF>
- <rdf:Description rdf:about="http://artemisBookstore.com/id/author/1">
  <rdf:type rdf:resource="http://xmlns.com/foaf/0.1/Person"/>
  <foaf:firstName>Paul</foaf:firstName>
  <foaf:lastName>Auster</foaf:lastName>
  <owl:sameAs rdf:resource="http://dbpedia.org/resource/Auster_Paul"/>
</rdf:Description>
- <rdf:Description rdf:about="http://artemisBookstore.com/id/book/571142200">
  <rdf:type rdf:resource="http://purl.org/dc/terms/BibliographicResource"/>
  <dcterms:title>Moon palace</dcterms:title>
  <abo:author rdf:resource="http://artemisBookstore.com/id/author/1"/>
  <abo:bookType>Paperback</abo:bookType>
  <abo:isbn>571142200</abo:isbn>
  <abo:language>English</abo:language>
  <abo:pages r...>320</abo:pages r...>
  <abo:price rd...>12.5</abo:price rd...>
  <abo:datePubl...>2004-02-01</abo:datePubl...>
  <abo:dateAcq...>2013-02-01 15:00:00</abo:dateAcq...>
  <dcterms:publ...>Faber & Faber</dcterms:publ...>
  <owl:sameAs...>http://dbpedia.org/resource/Moon_Palace</owl:sameAs...>
</rdf:Description>
- <rdf:Description...>
  <rdf:type rdf...>
  <foaf:firstNa...>
  <foaf:lastName...>
  <owl:sameAs...>
</rdf:Description...>
```

4. You can export Artemis' RDF data as RDF/XML or Turtle.

- Part I: From an Excel data file to linked open data
 - you will learn how to
 - create "cool" URIs
 - describe things with RDF
 - make links to other datasets
 - we will use the OpenRefine + RDF extension
- Part II: Querying linked data with SPARQL
 - you will learn how to make queries with SPARQL
 - we will use Apache Jena - ARQ command line applications