

Introduction to linked open data in libraries, archives and museums (LODLAM)

Alison Hitchens, University of Waterloo Library

Linked Data in Cultural Institutions Workshop

May 12-13, 2016

Based on presentations given at OLITA and OLA 2014-2016 and ideas gained from many great
linked data presenters and twitterers!

Introduction, assumptions, objectives

Assumptions

- many participants have little or no knowledge of linked data
- participants know a little bit about descriptive catalogue records and/or citations
- participants have some awareness of controlled vocabularies
- participants may not have knowledge of web technologies

Objectives

- participants will be motivated to learn more about LODLAM
- participants will be aware of some of the LODLAM use cases
- participants will have some understanding of human-readable vs. machine-actionable
- participants will understand some building blocks of LOD: RDF triples, URIs, linking to external datasets

Fostering a safe learning environment

- Assumptions:
 - everyone comes in with different background knowledge
 - people learn and work at different speeds
 - if you have a question chances are someone else is wondering the same thing!
- Please be respectful and encouraging of your fellow learners
- Use our helpers!
 - post a pink sticky note on your laptop to indicate that you have a question or need help
 - post a green sticky note if finished an exercise or if you had a question but figured it out

Agenda

Time (9:30-12:30)	Description
9:30-9:50 (20 min.)	Introduction; Exercise 1: Playing with Linked Data Projects
9:50-10:15 (25 min.)	LODLAM use cases and examples
10:15-10:40 (25 min.)	What is LOD
10:40-11:00 (20 min.)	Exercise 2: Structured Data and Entities
11:00-11:15 (15 min.)	BREAK
11:15-11:30 (15 min.)	RDF, Graphs, URIs
11:30-12:15 (45 min.)	Exercise 3: Yarn Game
12:15-12:30 (15 min.)	Serializations & Microdata

Exercise One

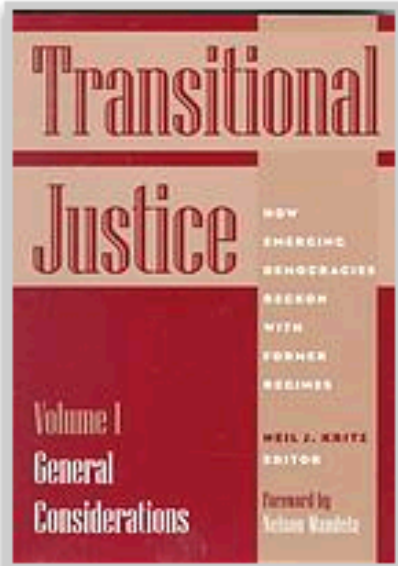
Playing with linked open data examples in libraries and archives

Linked open data in libraries, archives and museums

LAM as creators of data

LAM as consumers of data

Sharing controlled vocabularies: VIAF



Mandela, Nelson, 1918-2013



Mandela, Nelson (Nelson Rolihlahla), 1918-



Mandela, Nelson



1918 -مانديلا، نيلسون،



مانديلا، نيلسون



1918-2013, מנדלה, נלסון,



Mandela, Nelson, 1918-



Mandela, Nelson (South African artist, born 1918, active 2003)




VIAF ID: 98029748 (Personal)

Permalink: <http://viaf.org/viaf/98029748>

ISNI-test: [0000_0001_2144_7715](https://isni.org/isni/0000_0001_2144_7715)

- Virtual International Authority File ([VIAF](https://viaf.org/))


Sharing controlled vocabularies: AAT

Click the  icon to view the hierarchy.










[Semantic View](#) ([JSON](#), [JSONLD](#), [RDF](#), [N3/Turtle](#), [N-Triples](#))

ID: 300395634

Record Type: [concept](#)

 **pocket statues** (statues, <sculpture by subject type>, ... Visual and Verbal Communication (hierarchy name))

Hierarchical Position:

-  Objects Facet
-  Visual and Verbal Communication (hierarchy name) (G)
-  Visual Works (hierarchy name) (G)
-  visual works (works) (G)
-  <visual works by material or technique> (G)
-  sculpture (visual works) (G)
-  <sculpture by subject type> (G)
-  statues (G)
-  pocket statues (P,U)

Sharing unique resources (via OCLC)

A catalogue of the Lady Aberdeen Library on the History of Women in the University of Waterloo Library

schema: name “A catalogue of the Lady Aberdeen Library on the History of Women in the University of Waterloo Library”

schema: creator <http://viaf.org/viaf/265365743>

rdf:type **schema: Organization**

schema:Name “University of Waterloo. Library. Lady Aberdeen Collection”

Sharing holdings information

Holdings for “[The unofficial Harry Potter cookbook](#)” at Merrimack Valley Library Consortium

Available copies	Current holds
<ul style="list-style-type: none">• 10 copies at Merrimack Valley Library Consortium. (Show)• 1 copy at Amesbury Public Library.	0 current holds with 12 total copies.

Sharing holdings information

Holdings for “The unofficial Harry Potter cookbook” at Merrimack Valley Library Consortium

```
property="offers" typeof="Offer"  
property="seller" typeof="Library"  
<meta property="price" content="0.00">  
<span property="sku">j641.59 BUC</span>  
<link property="availability"  
  href="http://schema.org/InStock" />Available</>
```

Imagine use of our holdings data

The Handmaid's Tale

Book by Margaret Atwood

★★★★☆ 4/5 - [Goodreads](#)

The Handmaid's Tale is a dystopian novel, a work of science fiction or speculative fiction, written by Canadian author Margaret Atwood and first published by McClelland and Stewart in 1985. [Wikipedia](#)

Published: 1985

Author: [Margaret Atwood](#)

Original language: English

Characters: Offred, Serena Joy, Ofglen, Professor Pieixoto, Nick, Moira, Luke

Adaptations: [The Handmaid's Tale \(1990\)](#), [The Handmaid's Tale](#)

Genres: Novel, Science Fiction, Feminist science fiction, Dystopia, Speculative fiction, Utopian and dystopian fiction



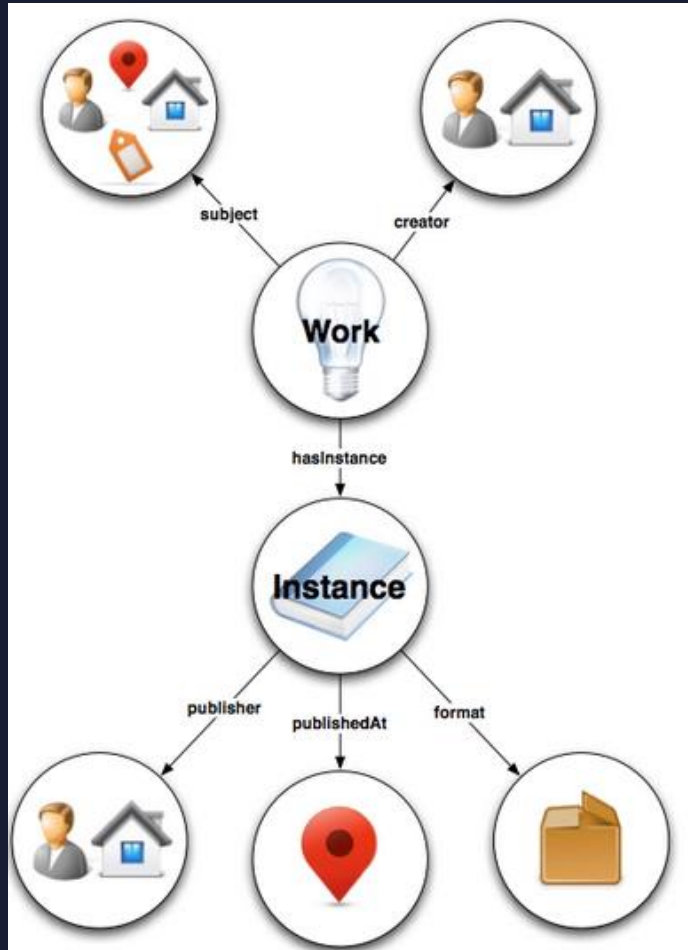
1 copy available from [University of Waterloo Library](#)

2 copies available from [Laurier Library](#)

1 copy available from [Waterloo Public Library](#)

Inspired by
a Karen
Coyle [blog
post](#)

Replacing MARC



bf:BIBFRAME

- Creative Work
- Instance
- Authority
- Annotation



Image source: Library of Congress. Overview of the BIBFRAME Model
<http://www.loc.gov/bibframe/docs/model.html>

LODLAMTO 2016 - Introducing LOD

Libhub logo used with permission. Source:
<http://www.libhub.org/>

Beyond metadata: sharing our documentary heritage



The Muninn Project

- millions of records pertaining to the First World War in archives around the world
- extract the written data using massive amount of computing power and turn the resulting information into structured databases

WWI Letter from Canadian Great War Project

4th Reserve

Witley Camp

Surrey , Eng

25-11-18

Dear Folks at Home:-

Well I actually got one letter last week from home dated Oct 20th . I also received the magazine and the Mt. F. papers this morning so I should be getting some more soon. I haven't received a box since leaving France and I have just heard of one box which they got at the battalion .

We are doing very little in the nature of parades etc. these days. There are many wild rumours flying around about what they are going to do with us now that the war is over. I suppose the married men and men with the longest service in France will be the first to go on the boat.

Ivy Mcfadyn¹ and **Wat Buschlen** left here yesterday for Liverpool. They are sending the unfit men home first whether they have been to France or not.

Harvey Davidson is here now. I saw him yesterday and he looks fine and doesn't seem to be suffering from the effects of the gas.


I was very sorry to hear about the deaths of **Charlie Wilson** and **Russell Webster** . It seems to me that nearly all the 153rd boys seem to have figured in the casualty lists.

My long overdue sick furlough is coming through at last and I expect to leave on Wednesday. Edinburgh is my destination but I intend dropping in on **Bill Kerr's** cousin for a day or so as she has some socks etc. of mine.


Well I must close now as there isn't much news from this place.

Hope you are all well as this leaves me.


Making library people visible on the web


**MONTANA**
STATE UNIVERSITY

LIBRARY

Ask A Librarian 

HomeFindRequestServicesHelpSite Search





 Scott W. H. Young - People at MSU Library



Scott W. H. Young
Title Digital Initiatives Librarian
[Assistant Professor]
Department Library Informatics and
Computing, Montana State
University (MSU)
Phone 406-994-6429
Email swyoung@montana.edu
Room 148

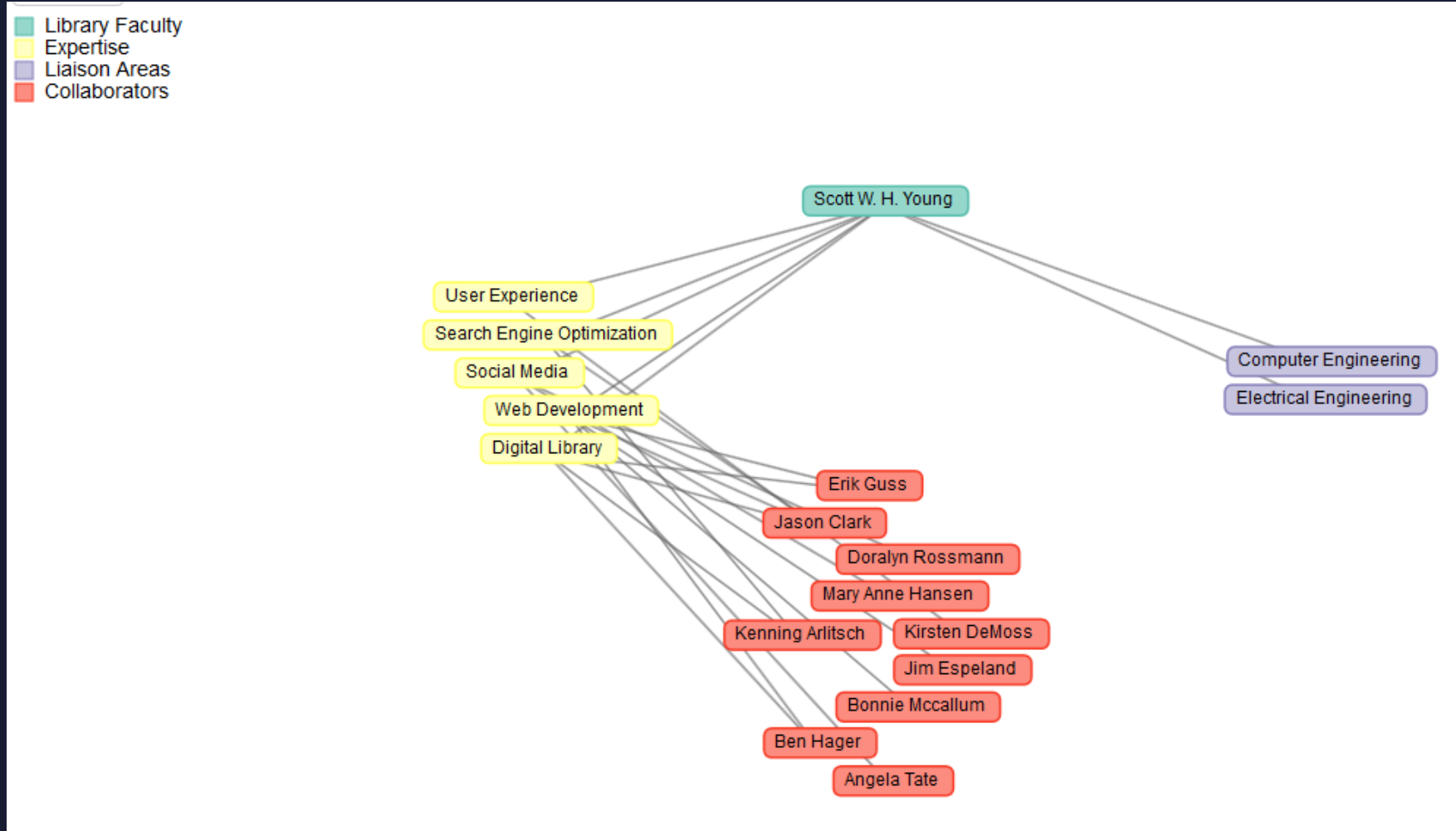
Liaison Role(s)
Electrical engineering
Computer engineering

Expertise and Skill(s)
Web development
Digital library
Search engine optimization
User experience
Social media

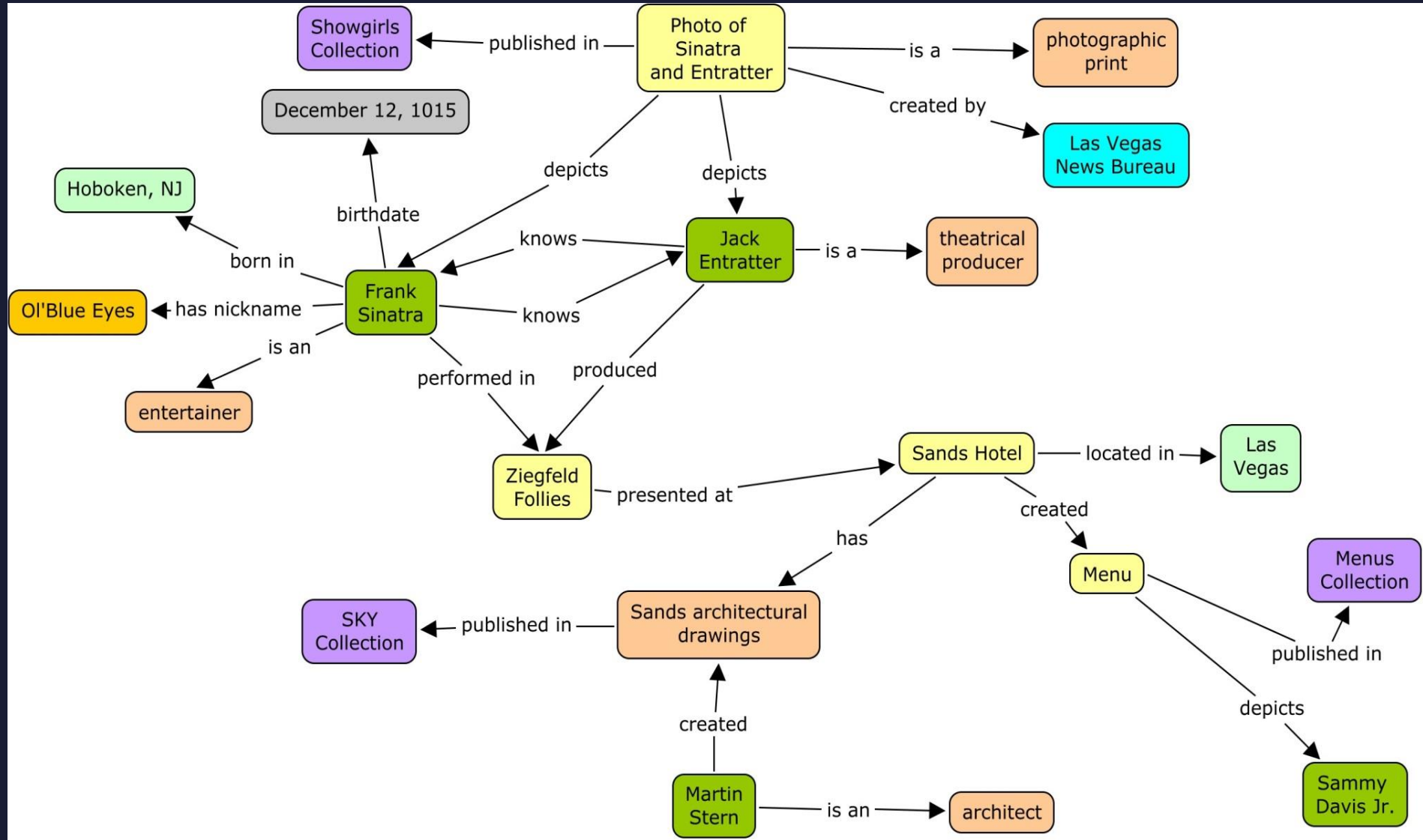
More Information
 Graph
Visualization
 Vita
 Homepage
 RDF

Source: <http://www.lib.montana.edu/people/about.php?id=99>

Visualizing library people



Connecting local digital libraries



Slide from: Unleashing Expressivity / Cory Lampert. Used with permission.

Connecting across libraries & archives




Source: Pan-Canadian Documentary Heritage Network [Linked Open Data Visualization "Proof-of-Concept" Out of the trenches: linked open data of the first world war: final report](#). Image from p. 11

LODLAMTO 2016 - Introducing LOD


Crowdsourcing Relationships

Let's get started!


33% of Relationships Defined




choose a musician



explore the conversation




uncover relationships




grow our network


Buddy DeFranco




Sam Rivers




Toshiko Akiyoshi




John Levy




Bob Haggart




Louie Bellson




Vi Redd




Melba Liston



Annie Ross



Danny Barker



Augment our catalogues

DEUTSCHE DIGITALE BIBLIOTHEK
Kultur und Wissen online






HOME PAGE ABOUT US ▼ HELP DISCOVER ▼

Link to this page

Johann Sebastian Bach

Komponist, Musiker
Born: 21. März 1685, [Eisenach](#)
Died: 28. Juli 1750, [Leipzig](#)

Objects: ?



Porträt Johann Sebastian Bach
Johannespassion : für Soli, Chor, ...
Bach, Johann Sebastian (geb. 21.3.1685, ...
Orgel-Büchlein <In dulci jubilo>
Orgel-Büchlein <In dulci jubilo>


[All Pictures \(249\)](#) | [All Audios \(152\)](#)

Involved in:

- **Johann Sebastian Bach's Leben, Wirken und Werke : ein Beitrag zur Kunstgeschichte des achtzehnten Jahrhunderts ; ; als Programm zu dem am 28. Julius 1850 eintretenden Säculartage des Todes von Johann...**
Hilgenfeldt, Carl L. - Leipzig : Hofmeister, 1850
- **Als die von I. Hoch-Edlen und Hoch-Weisen Rathe der Stadt Leipzig neugebaute und eingerichtete Schule zu S. Thoma den 5. Jun. durch etliche Reden eingeweyhet wurde, ward folgende Cantata dabey...**
Bach, Johann Sebastian. - Leipzig : Breitkopf, [ca. 1730]
- **Präludien und Fugen/Es-Dur BWV 552. Bearb. - BSB Mus.coll. 4.323**
Bach, Johann Sebastian. - 1896
- **Text zur grossen Messe in H moll**
Bach, Johann Sebastian (1685-1750). - Berlin : 1834


[All Objects \(41\)](#)







Subject of:



Johann Sebastian Bach
Source: [Wikimedia](#)

Information regarding the license status of embedded media files (e.g., images or videos) may be retrieved by clicking the respective file.

Search:
 "Johann Sebastian Bach" in the DDB

External links:
 Wikipedia (Deutsch)
 Internet Movie Database (IMDb)
 Bibliothèque nationale de France | National Library of France
 Wikipedia (Englisch)
 Library of Congress / NACO
 VIAF - Virtual International Authority

People page
option when
you search for
Johann
Sebastian
Bach in the
[Deutsche
Digitale
Bibliothek](#)

Augment our catalogues

Johann Sebastian Bach

Komponist, Musiker

Born: 21. März 1685, [Eisenach](#)

Died: 28. Juli 1750, [Leipzig](#)

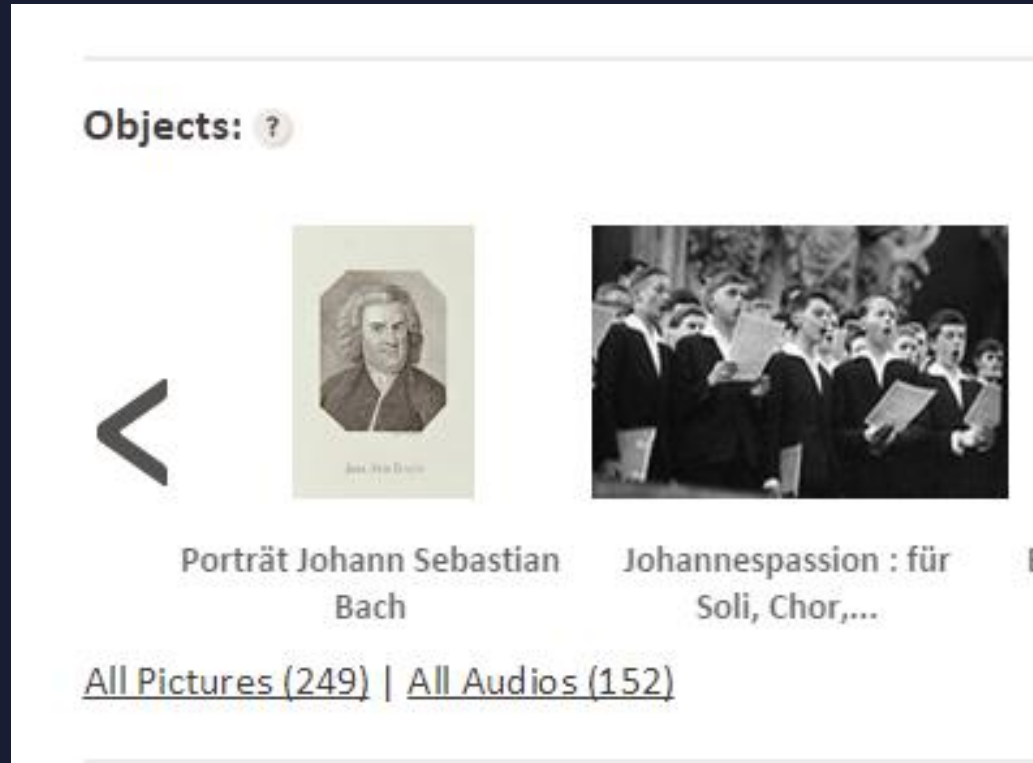
People page
option when
you search for
Johann
Sebastian
Bach in the
[Deutsche
Digitale
Bibliothek](#)

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People page
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Johann
Sebastian
Bach in the
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Bibliothek](#)

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People page
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you search for
Johann
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Bach in the
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Augment our catalogues

Involved in:

- **Johann Sebastian Bach's Leben, Wirken und Werke : ein Beitrag zur Kunst**
Programm zu dem am 28. Julius 1850 eintretenden Säculartage des Todes v
Hilgenfeldt, Carl L.. - Leipzig : Hofmeister, 1850
- **Als die von I. Hoch-Edlen und Hoch-Weisen Rathe der Stadt Leipzig neuge**
durch etliche Reden eingeweyhet wurde, ward folgende Cantata dabey...
Bach, Johann Sebastian. - Leipzig : Breitkopf, [ca. 1730]
- **Präludien und Fugen/Es-Dur BWV 552. Bearb. - BSB Mus.coll. 4.323**
Bach, Johann Sebastian. - 1896
- **Text zur grossen Messe in H moll**
Bach, Johann Sebastian (1685-1750). - Berlin : 1834

[All Objects \(41\)](#)

Subject of:

- **J. S. Bach**
Arnold, Denis Midgley. - Göttingen : Vandenhoeck & Ruprecht, 1989
- **Bach als Ausleger der Bibel : theologische und musikwissenschaftliche St**
Petzoldt, Martin. - Göttingen : Vandenhoeck & Ruprecht, 1985
- **Hoch-Johann Sebastian Bachs Leben, Kunst und Kunstwerke - für nat**

People page
option when
you search for
Johann
Sebastian
Bach in the
[Deutsche](#)
[Digitale](#)
[Bibliothek](#)

Mash-up external resources: FAO

**Food and Agriculture Organization
of the United Nations**

English
中文

Español
Русский

Français

العربية

AGRIS

Find resources...

About

Feedback

Economic advantage of Bt corn over hybrid varieties

[RDF](#) [lod:live](#)

Anon.

Abstract:
With the support of the government, Bt corn was introduced to increase production and productivity among corn farms in the country. The first commercial release of Bt corn was approved by DA [Department of Agriculture] in 2002. Earlier assessment study showed 30 percent yield advantage of Bt corn over the non-Bt (hybrid and inbred) varieties and their resistance to the common corn pest, the Asian corn borer. One methodological issue in previous studies was the wide use of non-Bt corn, including hybrid and inbred varieties, which served as basis in estimating the economic advantage of Bt corn. It is a fact that the yield potential of various inbred and hybrid corn varieties differ from each other. Since these varieties were grouped as non-Bt corn, there is a possibility of positively or negative bias in the yield potential of non-Bt corn. Thus another study was conducted by Domingo et al. (ISU) to evaluate the economic impact of Bt corn in Isabela corn farms. Specifically, the study estimated the production and yield per hectare of Bt corn and determine its economic advantage over hybrid varieties. The data were gathered through survey of 66 Bt corn farmers and 101 hybrid corn farmers in ten corn-producing municipalities of Isabela. The samples were specifically corn farmers who planted DK818YG and 30Y80 to represent Bt corn, and farmers who planted DK818 and 30B80 to represent hybrid corn.

[Read More](#)

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Read the article
and/or related
articles:

Managing Corn
Pests with Bt Corn

New technology
allows us to
improve crop
varieties by
adding genes
from other
species. This
is ... Bt corn
hybrids are a
highly effective
and
economical
alternative to
... tend to
maintain a
performance
advantage
over
conventional
treatments.

Go to the page

[PDF] Economic
Impact of Bt Corn
in the Philippines

Bt corn and
European corn
borer : Pest
management :
Corn ...

[PDF] When Does
It Pay To Plant Bt
Corn?

Data from [collecting
missions supported by](#)

Data from World Bank (double-click an area to zoom)
Cereal yield (kg per hectare)

Cereal yield (kg per hectare)
178 74,210

**Zea mays distribution map. Data from Global
Biodiversity Information Facility (GBIF)**

[View a larger map](#)

Statistics from FAO Country Profiles and IFPRI
[the Republic of the Philippines](#)

What is linked open data

Understanding structured data, entities, linking to other data

What is linked data?

- method of **publishing structured data** so that it can be **interlinked** and become more useful
- builds upon **standard Web technologies** such as hyper-text transfer protocol (HTTP), resource description framework (RDF) and uniform resource identifiers (URIs)
- rather than using them to serve web pages solely for **human readers**, it extends them to share information in a way that can **be read automatically by computers**

Massaged from [Wikipedia linked data](#) page

Is your information machine-actionable? Web Page

Margaret Atwood

From Wikipedia, the free encyclopedia



This **biographical article** **needs additional citations for verification**. Please help by adding **reliable sources**. Contentious material about living persons that is unsourced or poorly sourced **must be removed immediately**, especially if potentially **libelous** or harmful. *(November 2013)*

Margaret Eleanor Atwood, CC 0Ont FRSC (born November 18, 1939) is a Canadian poet, novelist, literary critic, essayist, and environmental activist. She is a winner of the [Arthur C. Clarke Award](#) and [Prince of Asturias Award](#) for Literature, has been shortlisted for the [Booker Prize](#) five times, winning once, and has been a finalist for the [Governor General's Award](#) several times, winning twice.^[*citation needed*] She is also a founder of the [Writers' Trust of Canada](#), a non-profit literary organization that seeks to encourage Canada's writing community.^[*citation needed*]

While she is best known for her work as a novelist, she has also published fifteen books of poetry.^[1]^[2] Many of her poems have been inspired by myths and fairy tales, which have been interests of hers from an early age.^[3] Atwood has published short stories in [Tamarack Review](#), [Alphabet](#), [Harper's](#), [CBC Anthology](#), *Ms.*, *Saturday Night*, and many other magazines. She has also published four collections of stories and three collections of unclassifiable short prose works.

Contents [hide]

Margaret Atwood



Atwood at [Eden Mills Writers' Festival 2006](#),
Blackwattle Bay

Traditional web page mark-up (simplified)

- `<p>Margaret Eleanor Atwood (born November 18, 1939) is a Canadian poet, novelist, literary critic, essayist, and environmental activist. She is a winner of the`
- ``
 - Program knows where the paragraph begins and ends
 - Program knows which words to put in bold
 - Program knows that if the user clicks on “Arthur C. Clarke Award” to take the user to another Wikipedia page at the address [https://en.wikipedia.org/wiki/Arthur C. Clarke Award](https://en.wikipedia.org/wiki/Arthur_C._Clarke_Award)
 - Program knows where to find the image Margaret_Atwood_2015.jpg and what alternative text to display

Web page with structured data

```
<div itemscope itemtype="http://schema.org/Person">
<a itemprop="url" href="http://margaretatwood.ca/"><div
  itemprop="name"><strong>Margaret Eleanor Atwood</strong></div>
</a>
<div itemprop="jobtitle">Novelist</div>
<div itemprop="description"><b>Margaret Eleanor Atwood</b> (born
  November 18, 1939) is a Canadian poet, novelist, literary critic, essayist, and
  environmental activist. She is a winner of the <a
    href="/wiki/Arthur_C._Clarke_Award" title="Arthur C. Clarke Award">Arthur
    C. Clarke Award</a> and Prince of Asturias Award for Literature, has been
    shortlisted for the Booker Prize five times, winning once, and has been a
    finalist for the Governor General's Award several times, winning twice</div>
<div><meta itemprop="birthDate" content="1939-11-18">DOB:
  11/18/1939</div>
</div>
```

Use structured, machine-actionable data

Textual data

	A	B	C	D	E	F	G	H	I
1	Prices for trip to Holguin on Selloffvacations.com								
2									
3	Regular Service	2-Apr-11	9-Apr-11	1-Apr-16	1-Apr-23	1-Apr-30	7-May-11	14-May-11	21-May-11
4	26-Mar-11	\$1,435.00	\$1,495.00	\$1,575.00	\$1,535.00	\$1,455.00	\$1,398.00	\$1,295.00	\$1,155.00
5	2-Apr-11	\$1,335.00	\$1,535.00	\$1,495.00	\$1,535.00	\$1,468.00	\$1,215.00	\$1,278.00	\$1,068.00
6	9-Apr-11		\$1,285.00	\$1,418.00	\$1,425.00	\$1,515.00	\$1,145.00	\$935.00	\$938.00
7	16-Apr-11			\$1,595.00	\$1,655.00	1625(s)	\$1,275.00	\$1,178.00	\$978.00
8	23-Apr-11				N/A	1545(s)	\$1,305.00	\$1,115.00	\$1,098.00
9	30-Apr-11					NA	\$1,355.00	NA	\$1,055.00
10	7-May-11								
11	14-May-11								
12	21-May-11								
13	28-May-11								

Date

Currency

Identify your data

- Type of resource: person
- Name: “Margaret Atwood”
- Birth date: 19391118
- Place of birth: Ottawa, Ontario
- Occupation: novelist
- Author of: “The Handmaid’s Tale”

- Margaret Atwood is a person
- Margaret Atwood’s name is Margaret Atwood
- Margaret Atwood was born on November 18, 1939
- Margaret Atwood was born in Ottawa, Ontario
- Margaret Atwood’s occupation is novelist
- Margaret Atwood wrote “The Handmaid’s Tale”

Structured data in DBpedia

About: Margaret Atwood

An Entity of Type : [artist](#), from Named Graph : <http://dbpedia.org>, within Data Space : dbpedia.org



Margaret Eleanor Atwood, CC OOnt FRSC (born November 18, 1939) is a Canadian poet, novelist, literary critic, essayist, and environmental activist. She is a winner of the Arthur C. Clarke Award and Prince of Asturias Award for Literature, has been shortlisted for the Booker Prize five times, winning once, and has been a finalist for the Governor General's Award several times, winning twice.

Property	Value
dbpedia-owl:abstract	<ul style="list-style-type: none">■ Margaret Eleanor Atwood, CC OOnt FRSC (born November 18, 1939) is a Canadian poet, novelist, literary critic, essayist, and environmental activist. She is a winner of the Arthur C. Clarke Award and Prince of Asturias Award for Literature, has been shortlisted for the Booker Prize five times, winning once, and has been a finalist for the Governor General's Award several times, winning twice. She has also published four books of poetry. Many of her interests have been of hers from an early age. Atwood has published short stories in Saturday Night, and many other magazines. She has also published four books of poetry.
dbpedia-owl:activeYearsEndYear	<ul style="list-style-type: none">■ 1953-01-01 (xsd:date)
dbpedia-owl:activeYearsStartYear	<ul style="list-style-type: none">■ 1953-01-01 (xsd:date)
dbpedia-owl:almaMater	<ul style="list-style-type: none">■ dbpedia:Victoria_University,_Toronto
dbpedia-owl:birthDate	<ul style="list-style-type: none">■ 1939-11-18 (xsd:date)
dbpedia-owl:birthName	<ul style="list-style-type: none">■ Margaret Eleanor Atwood
dbpedia-owl:birthPlace	<ul style="list-style-type: none">■ dbpedia:Ottawa

Smarter browser results



Margaret Atwood

Poet

Margaret Eleanor Atwood, CC OOnt FRSC is a Canadian poet, novelist, literary critic, essayist, and environmental activist. [Wikipedia](#)

Born: November 18, 1939 (age 75), [Ottawa](#)

Partner: [Graeme Gibson](#)

Spouse: [Jim Polk](#) (m. 1968–1973)

Awards: [Man Booker Prize](#), [Arthur C. Clarke Award](#), [more](#)

Movies: [The Handmaid's Tale](#), [Payback](#), [In the Wake of the Flood](#), [Margaret Atwood: Once in August](#), [The Robber Bride](#), [Yesno](#)

Is your information machine-actionable?

Bibliographic/Authority records

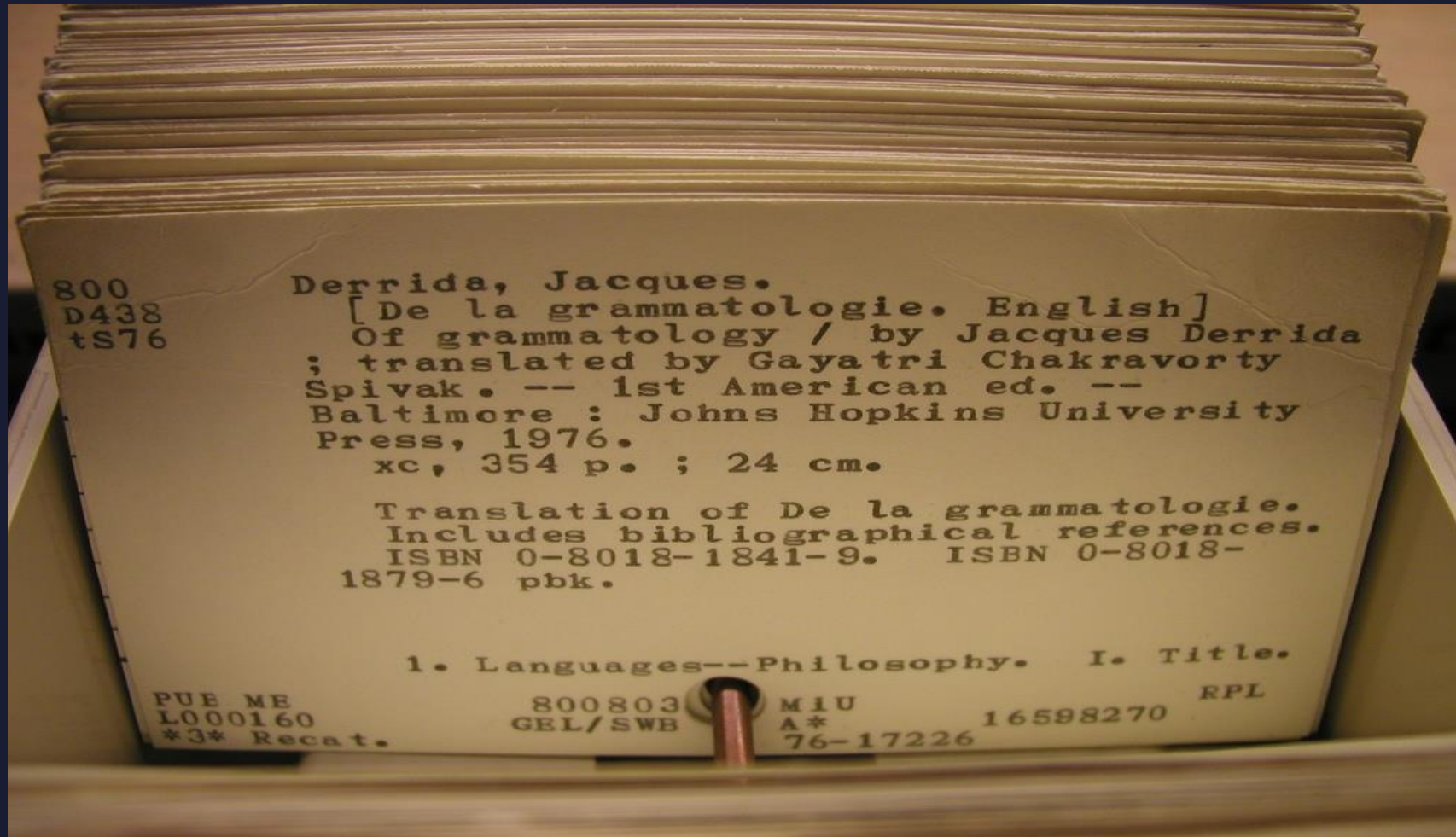


Photo credit: David Fulmer. CC BY 2.0

<https://www.flickr.com/photos/annarbor/4349879701/> LODLAMTO 2016 - Introducing LOD

Catalogue cards - Authority

An authority record

O'Brien, Flann, 1911-1966

← **Heading**

Na Gopaleen, Myles, 1911-1966

Knowall, George

Na gCopaleen, Myles, 1911-1966

← **Cross-references**

← **Statements of justification**

His At Swim-Two-Birds ... 1939.

His The best of Myles, 1983; CIP t.p. (Myles na Gopaleen (Flann O'Brien))

His Myles away from Dublin, 1985: t.p. (Myles na Gopaleen (Flann O'Brien) selection written from the column written for ... under the name George Knowall)

Image credit: [Tomwsulcer](#). CC0

MARC – Cataloguer View

=LDR 00766cam a2200241 a 4500
=001 2588334
=008 760618s1976\\mdu\\b\\0001\\eng\\l
=010 \\\$a 76017226
=020 \\\$a0801818419
=040 \\\$aDLC\$beng\$cCaOONL
=090 \\\$aP105\$b.D5313 1976\$5CaOWtL
=100 1\\\$aDerrida, Jacques.
=240 10\$aDe la grammatologie.\$lEnglish
=245 10\$aOf grammatology /\$cby Jacques Derrida ; translated by Gayatri Chakravorty Spivak.
=250 \\\$a1st American ed.
=260 \\\$aBaltimore :\$bJohns Hopkins University Press,\$c1976.
=300 \\\$axc, 354 p. ;\$c24 cm.
=504 \\\$aIncludes bibliographical references.
=650 \\0\$aLanguage and languages\$xPhilosophy.

MARC – Machine View

00766cam a2200241 a
4500001000800000005001700008007000300025008004100028010001600
0690200015000850350013001000400021001130900030001341000022001
6424000400018624500860022625000210031226000560033330000250038
9500002900414504004100443650004000484-2588334-20060928112954.0-
ta-760618s1976 mdu b 0001 eng l- a 76017226- a0801818419- -
9LM030272- aDLCbengcCaOONL- aP105b.D5313 19765CaOWtL-1 aDerrida,
Jacques.-10aDe la grammatologie.lEnglish. 1976-10aOf grammatology /cby
Jacques Derrida ; translated by Gayatri Chakravorty Spivak.- a1st American
ed.- aBaltimore :bJohns Hopkins University Press,c1976.- axc, 354 p. ;c24
cm.- aFirst published in 1974.- aIncludes bibliographical references.- 0-
aLanguage and languagesxPhilosophy.-

Linked Data Concepts:

Use structured data

- Type of resource: work
- Content type: text
- Creator: Jacques Derrida
- Translator: Gayatri Chakravorty Spivak
- Subject (LCSH): Language and languages—Philosophy
- Published (year): 1976

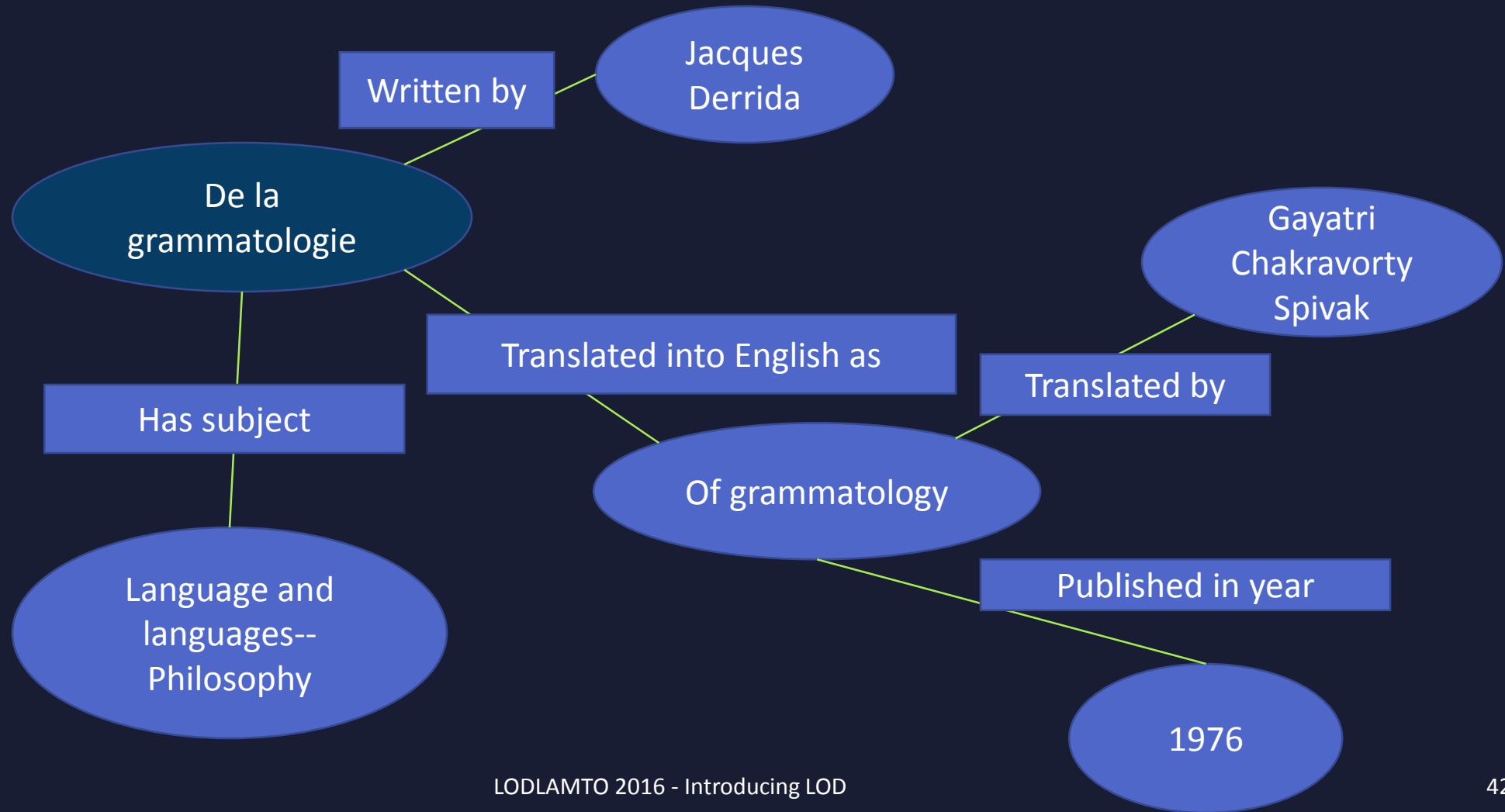
Linked Data Concepts:

Data as simple statements

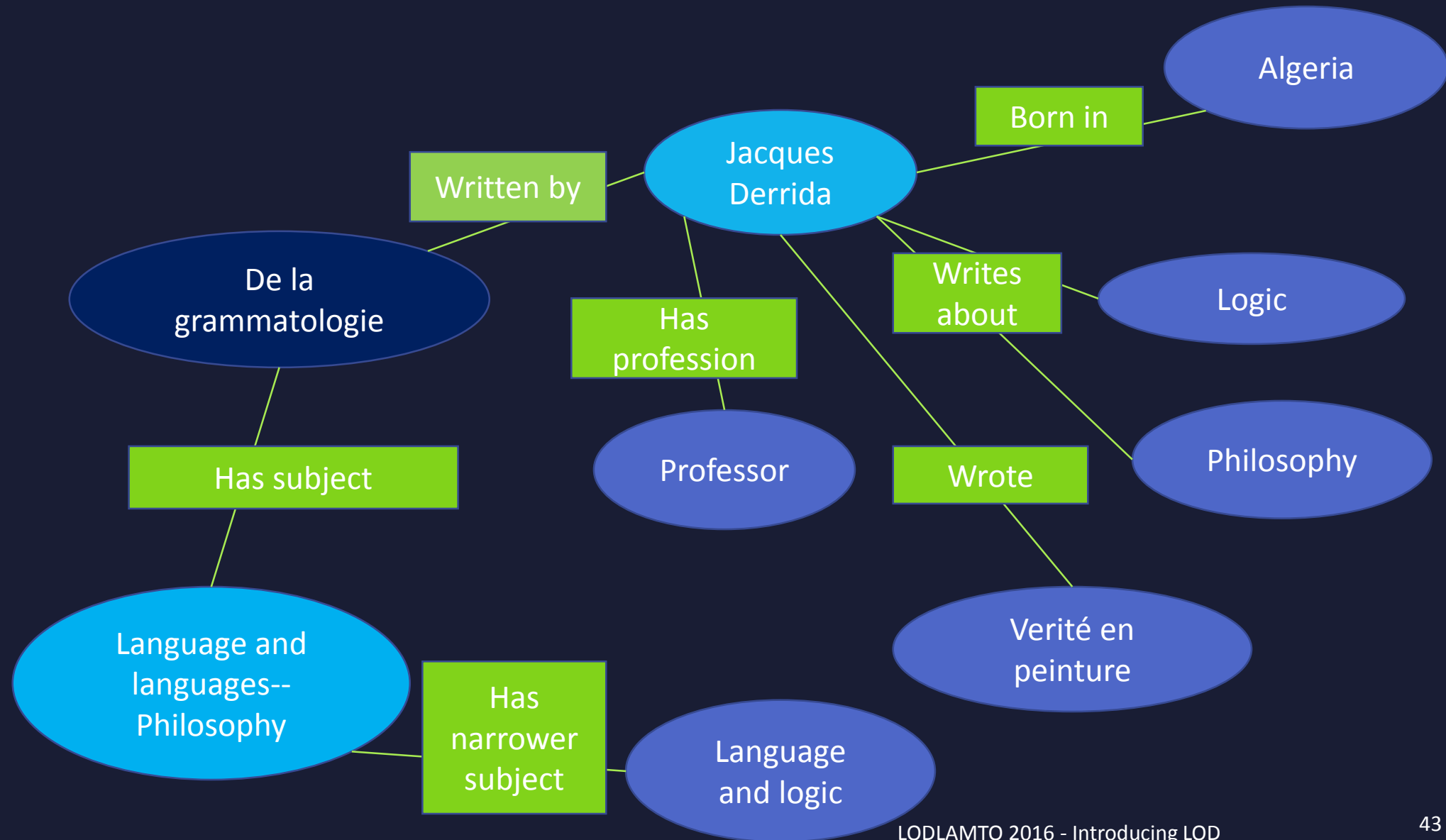
- De la grammatologie was written by Jacques Derrida
- De la grammatologie was translated into English as Of grammatology
- De la grammatologie was translated by Gayatri Chakravorty Spivak
- Of grammatology was published in Baltimore
- Of grammatology was published by John Hopkins University Press
- Of grammatology was published in 1976
- Of grammatology is about Language and languages--Philosophy

Linked Data concepts:

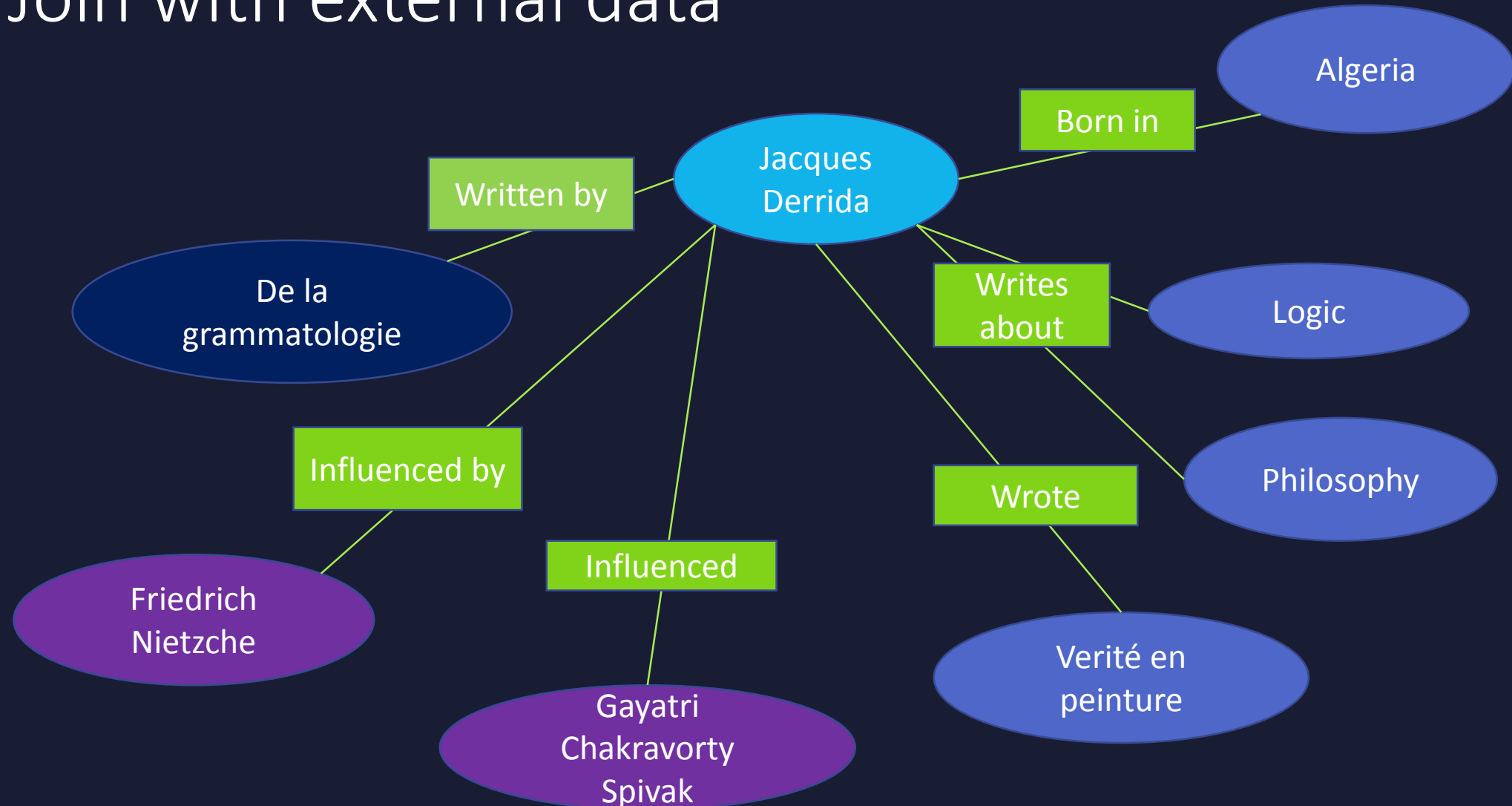
Join statements together; show relationships



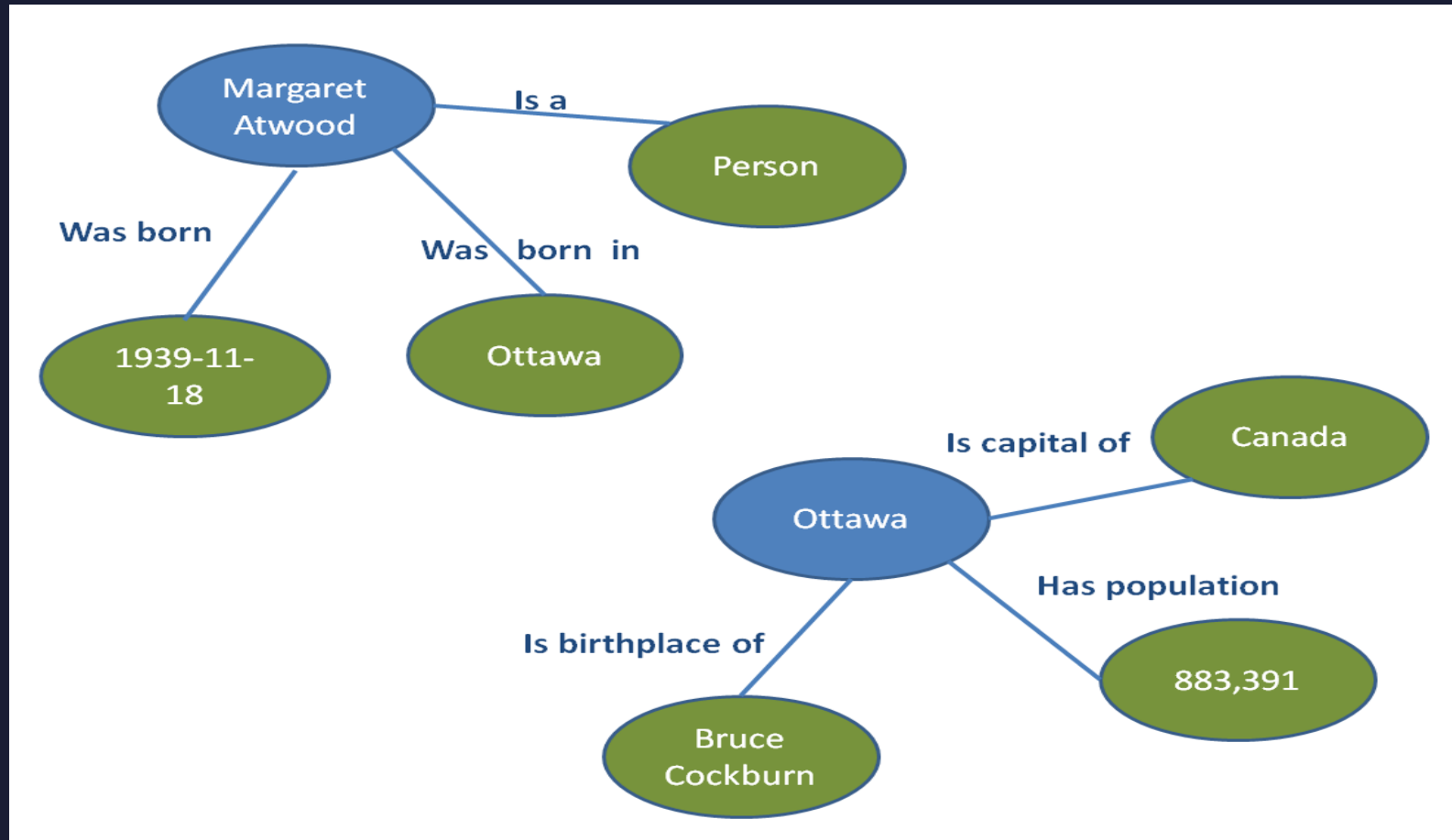
Join with authority statements



Linked data concepts: Join with external data



Using our Margaret Atwood example



Things in our records and documents

001 26132811
008 920608s1992 nyu 0 eng
010 \$a92021087
020 \$a1555701205
040 \$aDLC\$cDLC\$dAGL
049 \$aHNKA
050 00 \$aZ678.9\$b.C58 1992
082 00 \$a025/.00285\$220
1 \$aCohn, John M
10 \$aPlanning for automation :\$ba how-to-do it manual for librarians /\$cJohn M. Cohn, Ann L. Kelsey, Keith Michael Fields
260 \$aNew York :\$bNeal Schuman Publishers,\$cc1992
300 \$avi, 116 p. ;\$c28 cm
440 0 \$aHow-to-do it manuals for libraries ;\$uno. 25
504 \$aIncludes bibliographical references and index
650 0 \$aLibraries\$xAutomation\$XManagement\$XHandbooks, manuals, etc
650 0 \$aLibrary planning\$XHandbooks manuals, etc
700 10 \$aKelsey, Ann L
700 10 \$aFields, Keith Michael

Source: Eric Miller. “[Moving from MARC](#): How BIBFRAME moves the Linked Data in Libraries conversation to large-scale action.” SWIB 2014. slide 19

Exercise 2

Structured data and entities

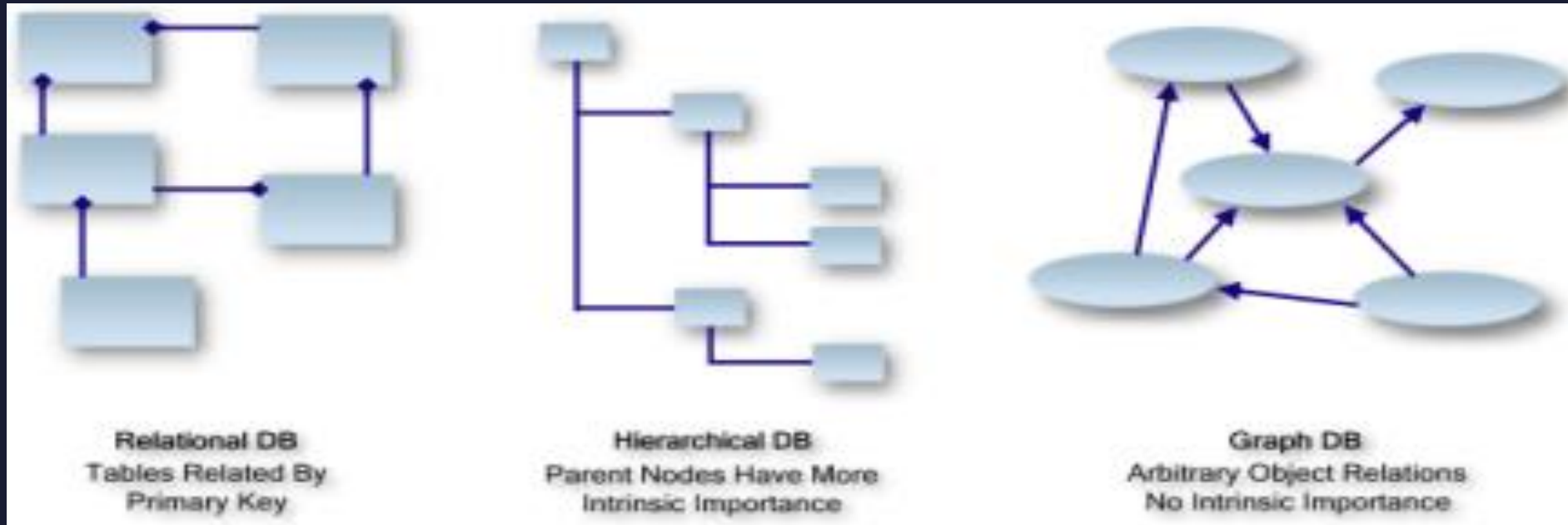
RDF, URIs, Ontologies

Building blocks of LOD

Linked data concepts: Data as simple statements

- De la grammatologie was written by Jacques Derrida
- De la grammatologie was translated into English as Of grammatology
- De la grammatologie was translated by Gayatri Chakravorty Spivak
- Of grammatology was published in Baltimore
- Of grammatology was published by John Hopkins University Press
- Of grammatology was published in 1976
- Of grammatology is about Language and languages--Philosophy

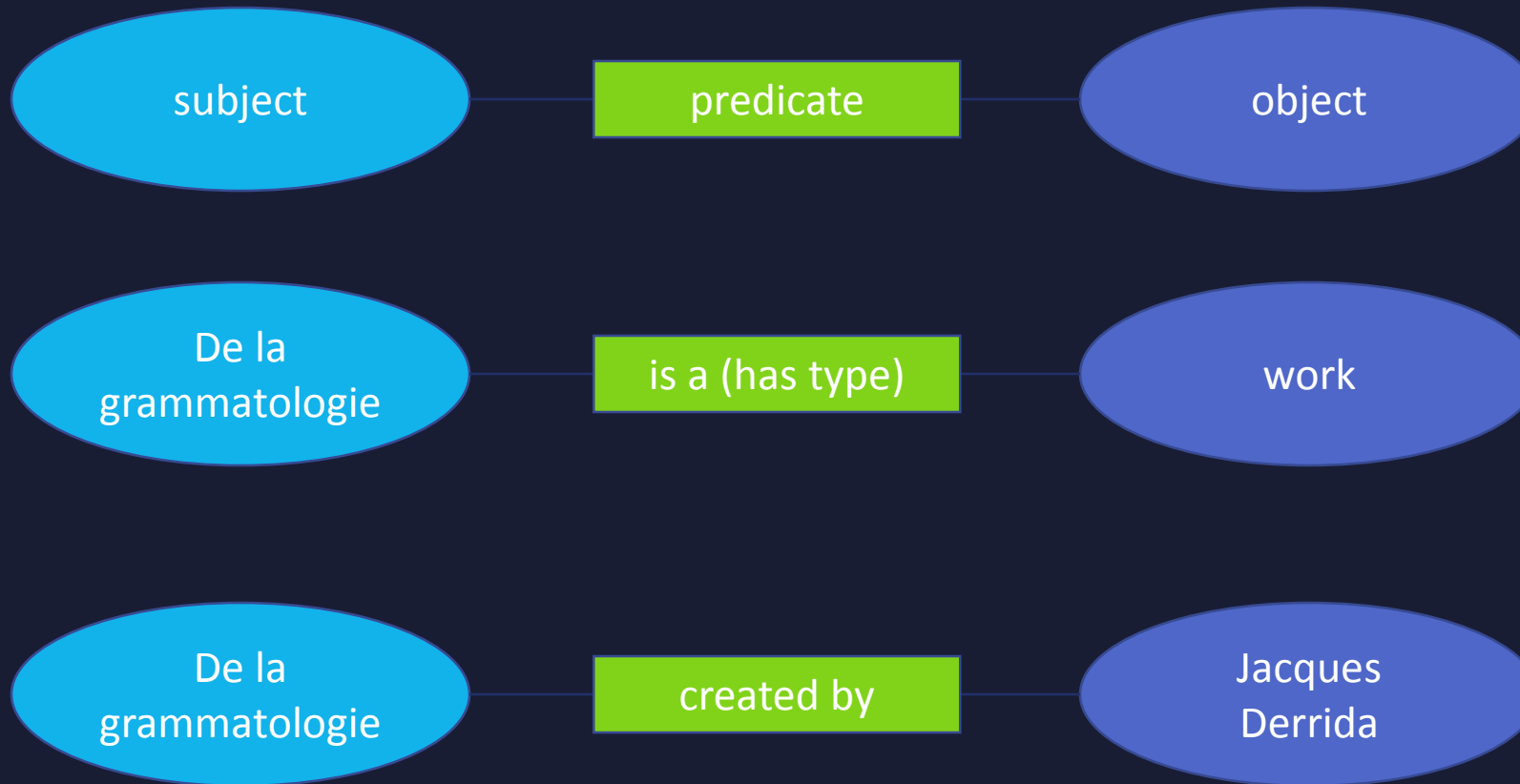
Linked data concepts: Data in graphs



Modified slide from: Amber Billey “BIBFRAME Basics”

Image source: <http://www.linkeddatatools.com/introducing-rdf/>

Resource Description Framework (RDF) for statements



What about competing statements?

- Pluto is a planet
- Pluto is a dwarf planet
- Pluto is a dog

How account for this?

- What is the domain?
- Which plutos are the same entity?
- **Use uniform resource identifiers (URIs)!**



Photo credits:

<https://www.flickr.com/photos/greentleaf/9204546932/> CC BY-NC-ND 2.0

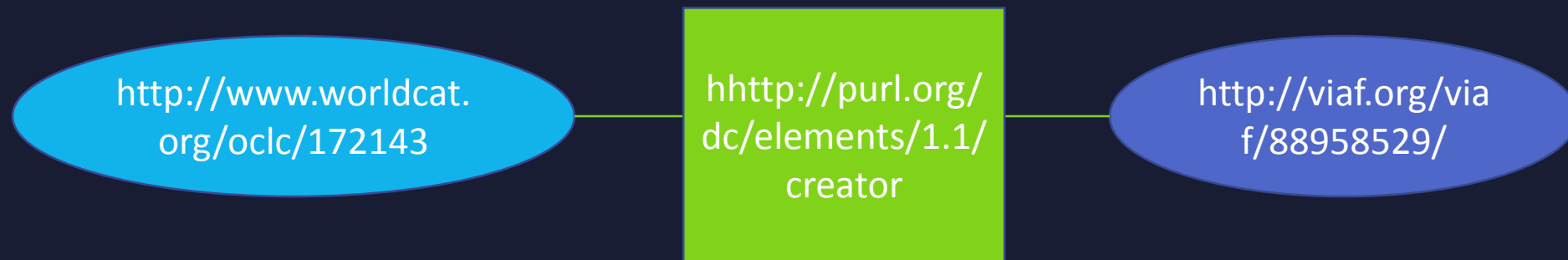
<https://www.flickr.com/photos/hansschnier/399242172/> CC BY-NC 2.0

What are some of the (mostly uniform) identifiers we are familiar with?

- ISBN
- ISSN
- LCCN (for names, subjects, bibliographic records)
- Publisher numbers
- Manuscript numbers
- Etc.

Linked data concepts: use URIs that have a location on the web

- Identify everything with an **HTTP** URI, that is, a URL
- Provide useful information about things using web standards
 - For example, Pluto is a dog; Pluto is trademarked by Disney
- Include links to other URIs for expanded discovery
 - For example, link to the resource Disney




Identify everything with URI

- **WorldCat** URI for “De la grammatologie”: <http://www.worldcat.org/oclc/172143>
- Creator URI from **Dublin Core** schema: <http://purl.org/dc/elements/1.1/creator>
- **VIAF** identifier for Jacques Derrida: <http://viaf.org/viaf/88958529/>



Provide useful information about things (subject/object)

- Language and languages:
<http://id.loc.gov/authorities/subjects/sh85074518.html>
- Includes:
 - Other IDs
 - Identifies it as a Concept (SKOS) and Topic (MADS/RDF)
 - Variant names, broader terms, narrower terms, related terms, scope notes
 - Dates created and revised
- For [Language and languages—Philosophy](#), includes links to closely matching concepts in other schemes such as BNF



Sometimes our
identifiers translate
to URIs!

Provide useful information about things (property)

Label:	Creator
Definition:	An entity primarily responsible for making the resource.
Comment:	Examples of a Creator include a person, an organization, or a service. Typically, the name of a Creator should be used to indicate the entity.
Type of Term:	Property
Version:	http://dublincore.org/usage/terms/history/#creator-006
Note:	A second property with the same name as this property has been declared in the dcterms: namespace (http://purl.org/dc/terms/). See the Introduction to the document "DCMI Metadata Terms" (http://dublincore.org/documents/dcmi-terms/) for an explanation.

Include links to other URIs for expanded discovery

- VIAF links to [WorldCat Identities](#)



Re-use vocabularies/ontologies

- Need to define “person”? [Friend of a Friend \(FOAF\)](#) has already done that!
- Need to define “subject”? The [Dublin Core Metadata Initiative \(DCMI\)](#) has already done that!
- Need to define “genre”? [Schema.org](#) has already done that!

Ontologies: what is a person? (according to FOAF)

Class: foaf:Person

Person - A person.

Status: [stable](#)

Properties include: [plan](#) [surname](#) [geekcode](#) [pastProject](#) [lastName](#)
[family_name](#) [publications](#) [currentProject](#)
[familyName](#) [firstName](#) [workInfoHomepage](#)
[myersBriggs](#) [schoolHomepage](#) [img](#)
[workplaceHomepage](#) [knows](#)

Used with: [knows](#)

Subclass Of [Agent](#) [Spatial Thing](#)

Disjoint With: [Project](#) [Organization](#)

The [Person](#) class represents people. Something is a [Person](#) if it is a person. We don't nitpick about whether they're alive, dead, real, or imaginary. The [Person](#) class is a sub-class of the [Agent](#) class, since all people are considered 'agents' in FOAF.

[\[#\]](#) [\[back to top\]](#)

Ontologies: what can we infer?

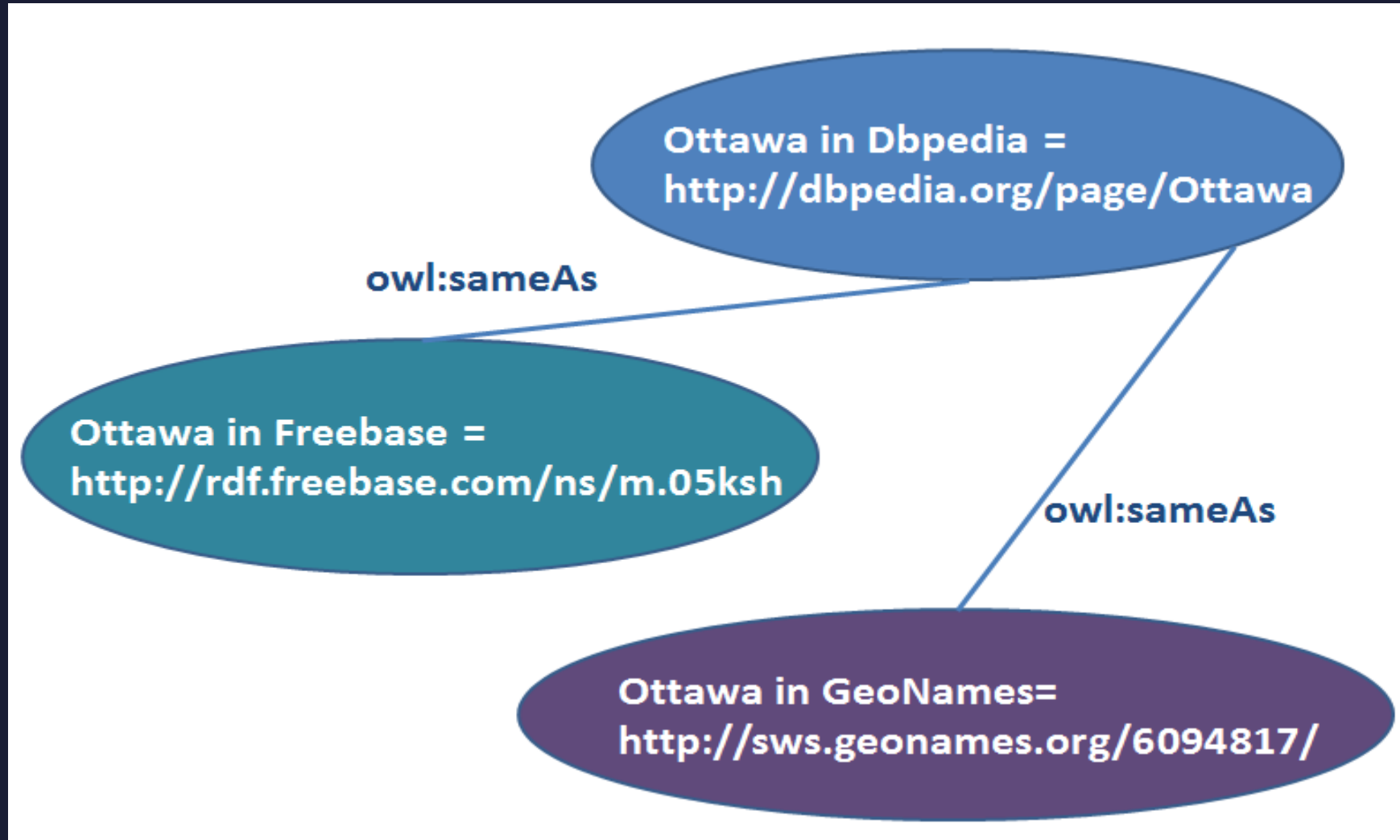
Property: foaf:member

Domain: having this property implies being a Group

Range: every value of this property is a Agent



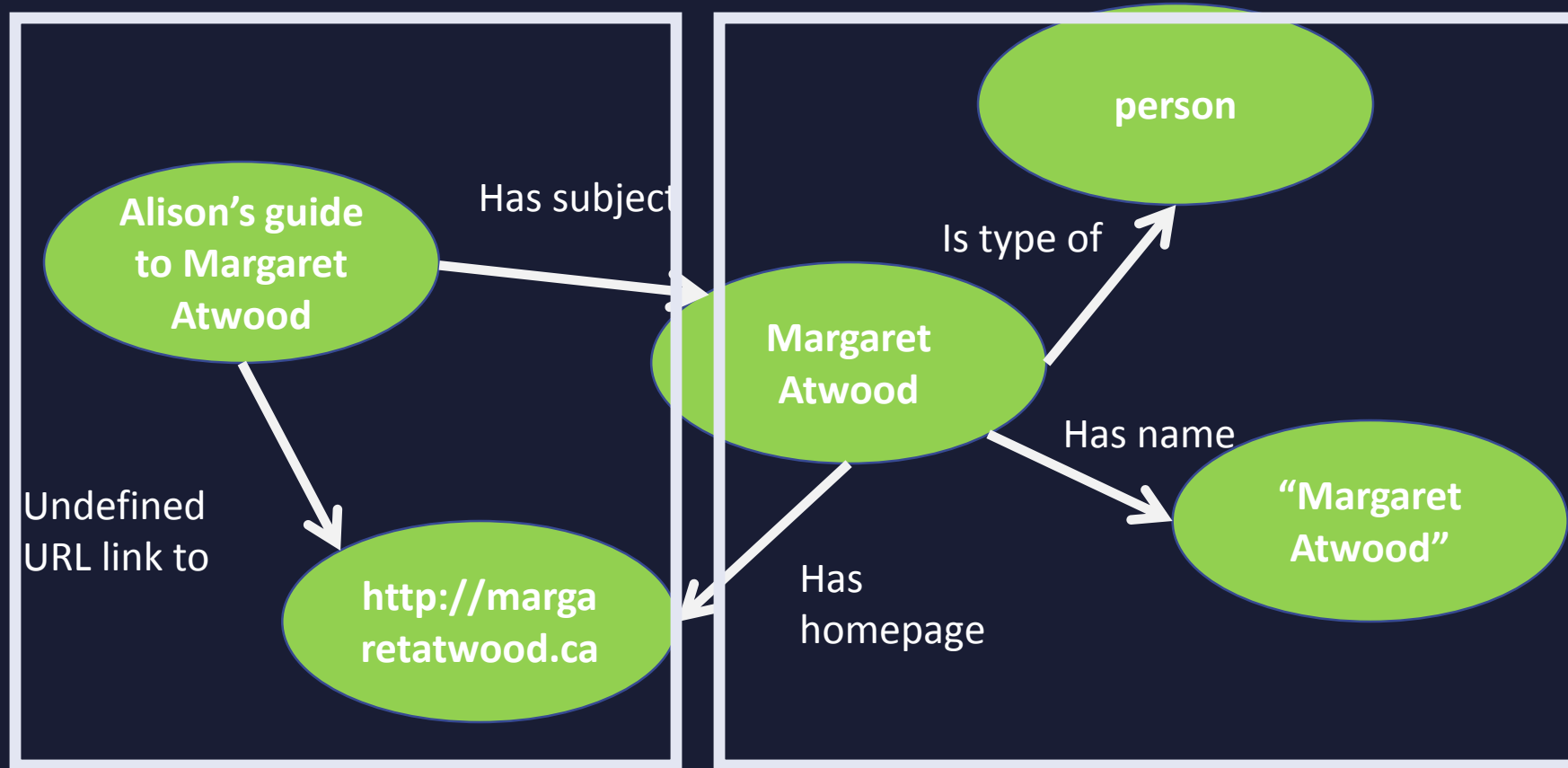
Connect your entities to matching/similar entities



Some things don't have URIs: literals

- Dates “1998”
- Names “Margaret Atwood”
 - “Margaret Atwood” the name is different than Margaret Atwood the person
- Notes/Captions/Abstracts: “Here are entered works on language in general, works on the origin and history of language, and surveys of languages. Works dealing with the scientific study of human speech, including phonetics, phonemics, morphology and syntax, are entered under [Linguistics.]”

The web of data



Exercise 3

The [Yarn Game](#): An Introduction to RDF Graphs. Created by Dorothea Salo

RDF Data on the Web

Serializations, microdata, SPARQL end points

Serialization – Formatting your LOD

- From Wikipedia: In computer science, in the context of data storage, **serialization** is the process of translating data structures or object state into a format that can be stored and reconstructed later in the same or another computer environment.
- Examples:
 - XML (Extensible Mark-up Language)
 - Turtle (Terse RDF Triple Language)
 - N-Triples
 - JSON-LD (Java Script Object Notation- Linked Data)

RDF in XML

```
<?xml version="1.0" encoding="utf-8" ?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dbo="http://dbpedia.org/ontology/"
  xmlns:owl="http://www.w3.org/2002/07/owl#" >

  <rdf:Description
    rdf:about="http://dbpedia.org/resource/Margaret_Atwood">
    <rdf:type rdf:resource="http://schema.org/Person" />
    <dbo:birthPlace rdf:resource="http://dbpedia.org/resource/Ottawa" />
    <owl:sameAs rdf:resource="http://viaf.org/viaf/109322990" />
  </rdf:Description>
</rdf:RDF>
```

RDF in XML

```
<?xml version="1.0" encoding="utf-8" ?>
```

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:xml="http://www.w3.org/XML/1998/01/xml"
  xmlns:xmli="http://www.w3.org/2001/XMLSchema-instance">
```

```
<rdf:Description
  rdf:about="http://dbpedia.org/resource/Margaret_Atwood">
  <rdf:type rdf:resource="http://schema.org/Person" />
  <dbo:birthPlace rdf:resource="http://dbpedia.org/resource/Ottawa" />
  <owl:sameAs rdf:resource="http://viaf.org/viaf/109322990" />
</rdf:Description>
```

```
</rdf:RDF>
```

RDF in N3/Turtle

@prefix **dbpedia**: <http://dbpedia.org/resource/> .

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

@prefix **ns16**: <http://en.wikipedia.org/wiki/> .

**ns16:Margaret_Atwood foaf:primaryTopic
dbpedia:Margaret_Atwood .**

The Wikipedia *page* Margaret Atwood has as its
primary topic the DBpedia *resource* Margaret Atwood.

Example from transforming MARC to BIBFRAME

@prefix bf: <http://bibframe.org/vocab/> .

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

<http://id.loc.gov//resources/bibs/6621574> a bf:Text,
bf:Work ;

Resource De la grammatologie has type Text

Resource De la grammatologie has type Bibframe Work

Finding and using linked open data

- Publishers of linked data may just provide files for download
- Publishers of linked data may set up a service that accepts queries in the SPARQL query language and returns results sets
 - You can see example queries using the [Linked Data Fragments](#) web client
- Linked data may be embedded into websites

SPARQL Example: members of Queen and their associated bands (querying Dbpedia)

QUERY

```
SELECT DISTINCT ?artist ?band WHERE {  
  {  
    <http://dbpedia.org/resource/Queen_(band)> dbpedia-owl:bandMember ?artist. }  
  UNION  
  {  
    <http://dbpedia.org/resource/Queen_(band)> dbpedia-owl:formerBandMember  
    ?artist. }  
  ?artist dbpedia-owl:associatedBand ?band.  
}
```

RESULT

- ?artist:
http://dbpedia.org/resource/Brian_May
- ?band:
http://dbpedia.org/resource/Anita_Dobson
- ?artist:
http://dbpedia.org/resource/John_Deacon
- ?band:
http://dbpedia.org/resource/Queen_(band)

Microdata and RDFa

- Used to place structured data within web pages which can then be processed by search engines, web crawlers and browsers
- RDFa allows the embedding of RDF into web pages in a way that allows programs to extract the triples

Microdata in catalogue records

Holdings for “[The unofficial Harry Potter cookbook](#)” at Merrimack Valley Library Consortium

Available copies	Current holds
<ul style="list-style-type: none">• 10 copies at Merrimack Valley Library Consortium. (Show)• 1 copy at Amesbury Public Library.	0 current holds with 12 total copies.

Microdata in catalogue records

Holdings for “The unofficial Harry Potter cookbook” at Merrimack Valley Library Consortium

property="offers" typeof="Offer"

property="seller" typeof="Library"

<meta property="price" content="0.00">

j641.59 BUC

<link property="availability"

href="http://schema.org/InStock" />Available</>

Tim Berners-Lee's 5 stars of LOD

- | | |
|-------|--|
| ★ | make your stuff available on the web (whatever format) |
| ★★ | make it available as structured data (e.g. excel instead of image scan of a table) |
| ★★★ | non-proprietary format (e.g. csv instead of excel) |
| ★★★★ | use URLs to identify things, so that people can point at your stuff |
| ★★★★★ | link your data to other people's data to provide context |

The Linked Open Data Cloud Diagram

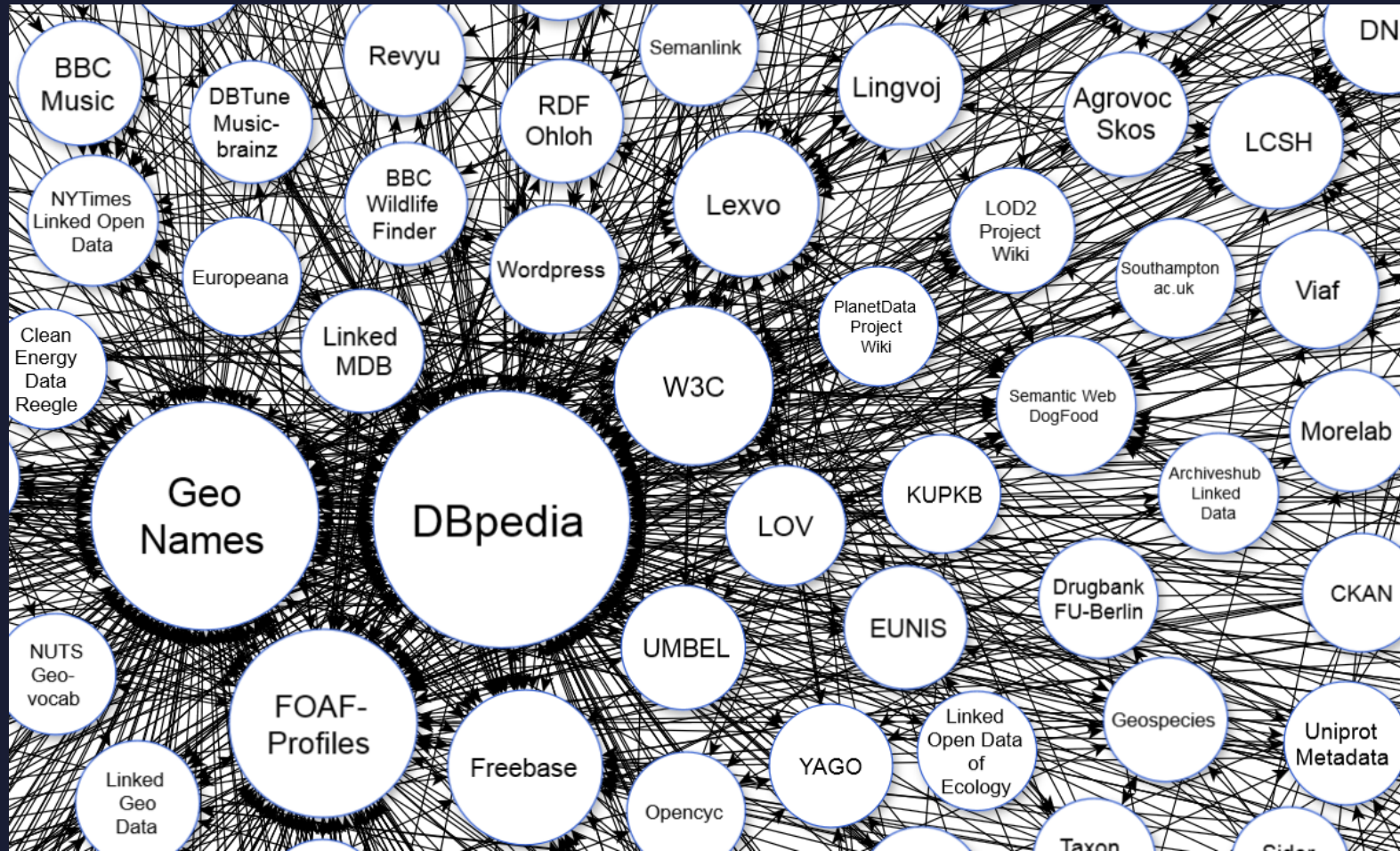


Image taken from: "[Linking Open Data cloud diagram 2014](#), by Max Schmachtenberg, Christian Bizer, Anja Jentzsch and Richard Cyganiak.

LODLAMTO 2016 - Introducing LOD

What next?

- Start with what you know
- Find a partner to learn with
- Think about identifiers (URIs) for your data
- Check out existing data sets
- See what other cultural institutions are doing and see if you can collaborate
- Check if any of your existing tools support linked data
- Check out some online [guides and tutorials](#)
- Borrow some resources:
 - [Semantic Web for the Working Ontologist](#)
 - [Linked Data for Libraries, Archives and Museums: How to Clean, Link and Publish your Metadata](#)

Thank you!

Thank you to fellow #mashcat folks, especially Galen Charlton and Ruth Tillman (for slide review) and Dorothea Salo (for the yarn game)

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[Slideshare](#) (aehitchens)



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Some General Linked Data Resources

Tim Berners-Lee (2009) The next web. A TED talk, February 2009. access at http://www.ted.com/talks/tim_berniers_lee_on_the_next_web.html (open access)

Karen Coyle (2012). “Is linked data the answer?” Coyle’s Information Thurs. Oct. 18, 2012. <http://kcoyle.blogspot.ca/2012/10/is-linked-data-answer.html> (open access)

Karen Coyle (2010). Understanding the semantic web: bibliographic data and metadata. Chicago: American Library Association (Library Technology reports ; v. 46, no. 1) <https://journals.ala.org/ltr/issue/view/177> (subscription required)

Tom Heath and Christian Bizer (2011) Linked Data: Evolving the Web into a Global Data Space (1st edition). Synthesis Lectures on the Semantic Web: Theory and Technology, 1:1, 1-136. Morgan & Claypool. <http://linkeddatabook.com/editions/1.0/> (open access)

Linked Data: Connect Distributed Data Across the Web <http://linkeddata.org/>
(open access) (includes the LOD Cloud diagram)

W3C Working Group (2014). RDF 1.1 Primer. <http://www.w3.org/TR/rdf11-primer/> (open access)

Some LODLAM Projects

Sean Aery (2014) Schema.org and Google for Local Discovery: Some Key Takeaways. Blog post 2014-03-27 <http://blogs.library.duke.edu/bitstreams/2014/03/27/schema-org-and-google-for-local-discovery-some-key-takeaways/> (open access)

Jennifer Bowen, Philip E Schreur (2012). Linked Data for Libraries: Why should we care? Where should we start? CNI, April 2-3 2012 Baltimore, Maryland <http://www.cni.org/topics/information-access-retrieval/linked-data-for-libraries/> (open access video)

Case Study: King's College London Boosts Access to its Archives with Linked Open Data (2014) <http://www.theeuropeanlibrary.org/tel4/newsitem/5700> (open access)

Jason Clark and Scott W.H. Young. Linked Data is People: using linked data to reshape the library staff directory. Presented at ACCESS 2014, Calgary, Alberta
<http://slides.com/swyoung/access-2014-linked-data-is-people/embed?style=light> (open access)

James Cuno. Art & Architecture Thesaurus Now Available as Linked Open Data. Blog post 2014/02/14 <http://blogs.getty.edu/iris/art-architecture-thesaurus-now-available-as-linked-open-data/> (open access)

Some LODLAM Projects

Food and Agriculture Organization of the United Nations (2014). AGRIS 2.0
<http://aims.fao.org/openagris> (open access)

Mark Jordan. easyLOD <https://github.com/mjordan/easyLOD> (open access software)

IGeLU/ELUNA Special Interest Working Group on Linked Open Data <http://igelu.org/special-interests/lod> (partially open access)

Lukas Koster (2013). “The Poor Person’s Linked Open Data Workbench: Using Discovery Tools for Presenting Integrated Information” in Commonplace.net Nov. 11, 2013
<http://commonplace.net/2013/11/the-poor-persons-linked-open-data-workbench/> (open access)

Ulrike Krabo (2011). Exploiting DBPedia for use in Primo. Presentation at IGeLU 2011 Haifa
http://igelu.org/wp-content/uploads/2011/09/igelu11_dbpedia_integration_in_primo-Krabo.pdf
(open access)

Some more LODLAM projects

LiAM: Linked Archival Metadata <http://sites.tufts.edu/liam/2013/09/03/what-is-ld/> (open access)

Libhub <http://www.libhub.org/> (open access)

Library and Archives Canada (2012). Canadian Subject Headings in SKOS/RDF Format <http://www.bac-lac.gc.ca/eng/news/Pages/canadian-subject-headings-skos-rdf-format.aspx> (open access)

Library of Congress. Bibliographic Framework Initiative <http://www.loc.gov/bibframe/> (open access)

Library of Congress. LC Linked Data Service: Authorities and Vocabularies <http://id.loc.gov/> (open access)

Even more LODLAM projects

Linked Data for Libraries (LD4L) wiki (project of Cornell, Harvard, Stanford) (2014)
<https://wiki.duraspace.org/pages/viewpage.action?pageId=41354028> (open access)

Linked Jazz <http://vimeo.com/68308675> (open access video)

Meaningful Concept Displays <http://mcd.ischool.drexel.edu/> (open access)

Erik T. Mitchell (2013). "Library Linked Data: Research and Adoption. Chicago: American Library Association. (Library Technology Reports v. 49, no. 5) <https://journals.ala.org/ltr/issue/view/187> (subscription required)

H.L. Moulaison and S. N. Stanley (2013). "Beyond Failure: Potentially Mitigating Failed Author Searches in the Online Library Catalog Trough the Use of Linked Data" Journal of Web Librarianship (v. 7, no. 1) p. 37-57. http://resolver.scholarsportal.info/resolve/19322909/v07i0001/37_bfpmfattuold.xml (subscription required)

Even more LODLAM projects

The Muninn Project <http://blog.muninn-project.org/node/3> (open access)

Peter Neish (2014). Linked Data: Thinking Big, Starting Small. VALA 2014 Proceedings.
<http://peter.neish.net/wp-content/uploads/sites/6/2014/02/VALA2014-Session-10-Neish-Paper.pdf>
(open access)

OCLC (2013). Linked Data at OCLC <http://www.oclc.org/data.en.html> (open access)

Pan-Canadian Documentary Heritage Network Linked Open Data Visualization “Proof-of-Concept” Out of the trenches: linked open data of the first world war: final report. http://www.canadiana.ca/sites/pub.canadiana.ca/files/PCDHN%20Proof-of-concept_Final-Report-ENG_0.pdf (open access)

Stefanie Rühle, Francesca Schulze & Michael Bűchner. Applying a Linked Data Compliant Model: The Usage of the Europeana Data Model by the Deutsche Digitale Bibliothek. Presented at International Conference on Dublin Core and Metadata Applications DC-2014, Austin, Texas, October 2014

<http://dcevents.dublincore.org/IntConf/dc-2014/paper/view/231> (open access)

And even more LODLAM projects

Dan Scott. schema.org: machine-readable cataloguing for the open web. Presented at SWIB14, Bonn, Germany, December 2014 <http://swib.org/swib14/programme.php> (open access slides & video)

UNLV's Linked Data Project (2014) <http://www.library.unlv.edu/linked-data> (open access)

VIAF: Virtual International Authority File <http://viaf.org/> (open access)

Richard Wallis (2013). Linked Data Progress with OCLC and Others. At OCLC Linked Data Round Table, IFLA Conference, Aug. 19, 2013, Singapore. <http://www.slideshare.net/rjw/linked-data-progress-ifla-2013> (open access)

Neil Wilson (2014) The Linked Open British National Bibliography <http://data.gov.uk/blog/linked-open-british-national-bibliography> blog post 22/04/2014 (open access)