

Introduction to Linked Open Data

github.com/cmh2166/SWIB18LODintro

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Bonn, Germany

Workshop Resources:
github.com/cmh2166/SWIB18LODintro

Workshop Etiquette (influenced by the Hacker School Rules)

- Feel free to ask questions
- Help others where you can
- Be open to different domain expertise & experiences
- Be kind

More info on the “Hacker School Rules”:

<https://www.recurse.com/blog/38-subtle-isms-at-hacker-school>

<https://www.recurse.com/manual#sub-sec-social-rules>

Schedule

| | |
|---------------|--|
| 13:00 - 13:15 | General Workshop Introduction |
| 13:15 - 14:00 | RDF Introduction: Create Your Graph |
| 14:00 - 14:30 | Linked Data Intro.: Link Your Graph |
| 14:30 - 15:30 | Linked Data & Semantic Web: Expand Your Graph |
| 15:30 - 16:00 | <i>30 minute break, cake served in the foyer</i> |
| 16:00 - 16:15 | Linked Open Data & Licensing: License Your Graph |
| 16:15 - 17:15 | Linked Data Experimentation: SPARQL & Vis. |
| 17:15 - 18:00 | Linked Data Examples, Resources & Questions |

Our Goals for this Workshop

- Introduce & Leverage the RDF data model
- Create & Refine RDF Documents
- Explain Fundamentals of Linked Data Technologies
- Introduce & Discuss Basic Issues of Linked **Open** Data
- Apply Open Data Principles to RDF data
- Understand Pros & Cons of Modeling in RDF
- Understand Pros & Cons of Publishing Linked Data
- Share LOD Tools, Projects, Resources, Examples

Your goals for this Workshop?

- Why are you attending this workshop?
- What are your goals - immediate or long-term?
- What's your level of comfort & experience with any aspect of Linked Data?

RDF Introduction: Create Your Graph

Facilitator's Starter RDF

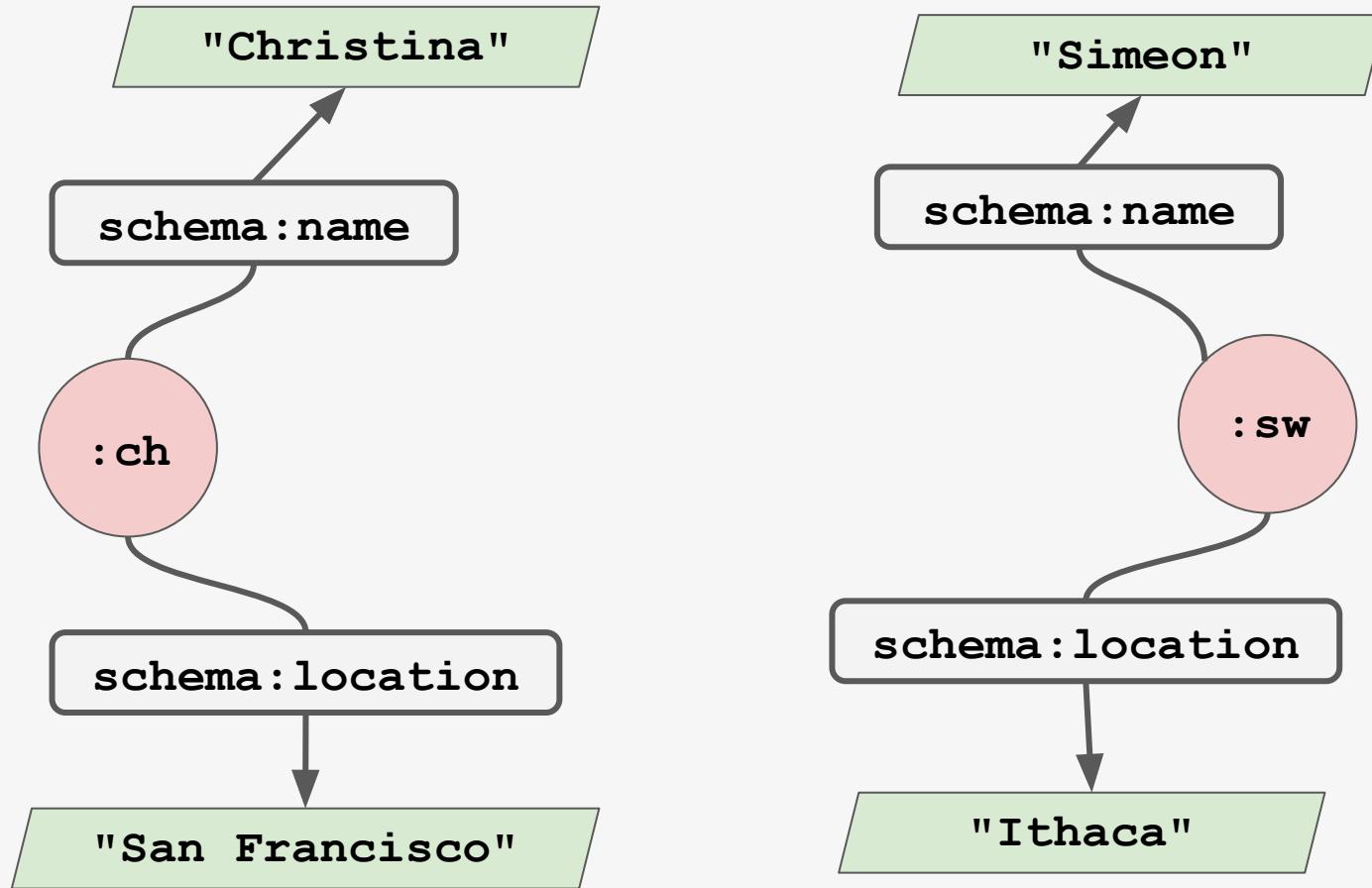
```
@prefix z: <https://pad.riseup.net/p/swib-18-ws-z#> .  
@prefix schema: <http://schema.org/> .  
  
z:ch schema:name "Christina" .  
z:ch schema:location "San Francisco" .  
  
z:sw schema:name "Simeon" .  
z:sw schema:location "Ithaca" .
```

Resource Description Framework (RDF)

The Resource Description Framework (RDF) is used to describe arbitrary things.

RDF is based on the concept of **triples**, which consist of **subject**, **predicate** and **object**. It is an abstract model for which several notations exist.

Today we will be using [Turtle](#) for our RDF serialization.



Your turn!

1. Get assigned your group.
2. Create your introductory RDF in your group's etherpad.
3. Bookmark your group's etherpad.

Linked Data Introduction: Link Your Graph, pt. 1

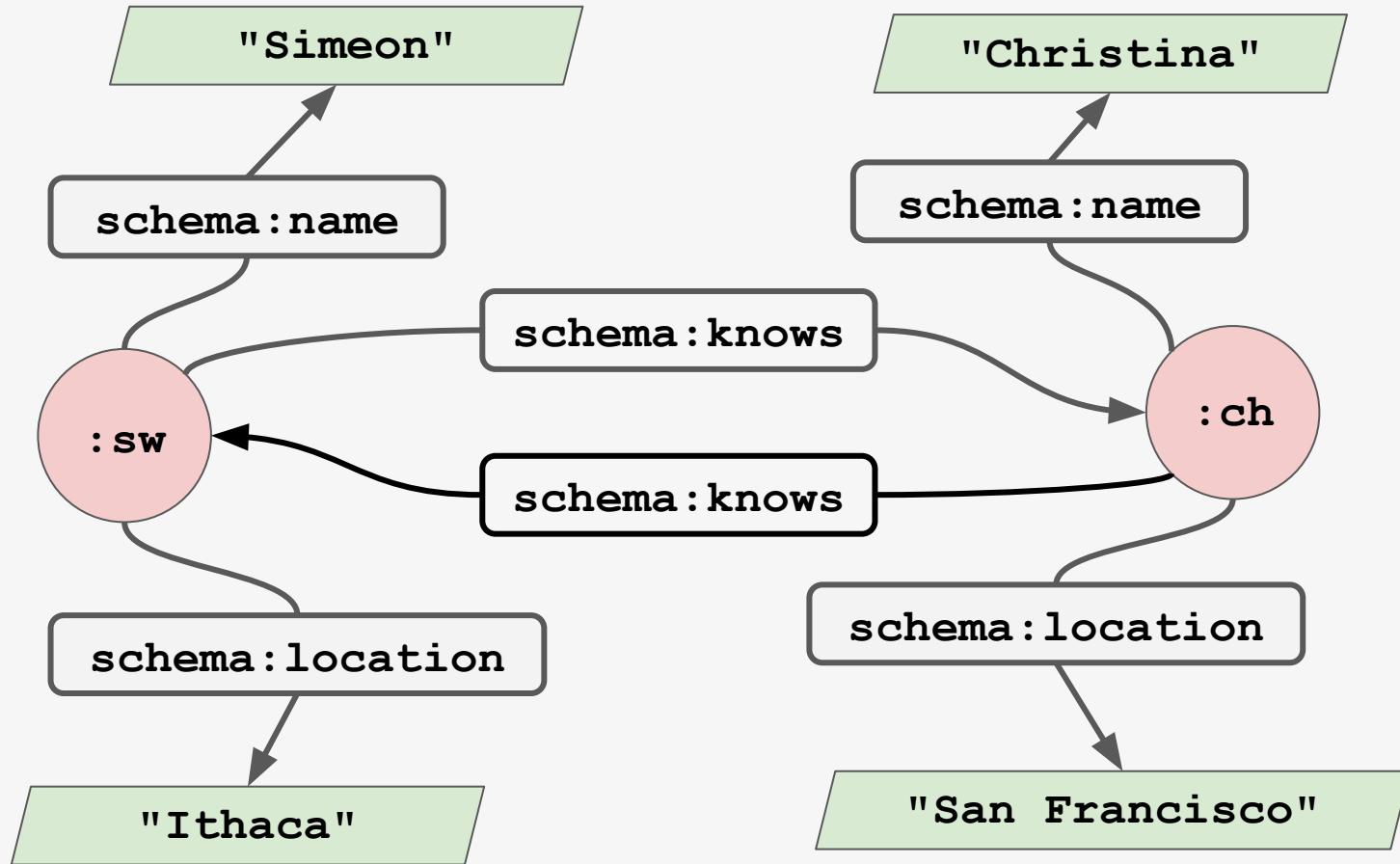
Facilitator's Example

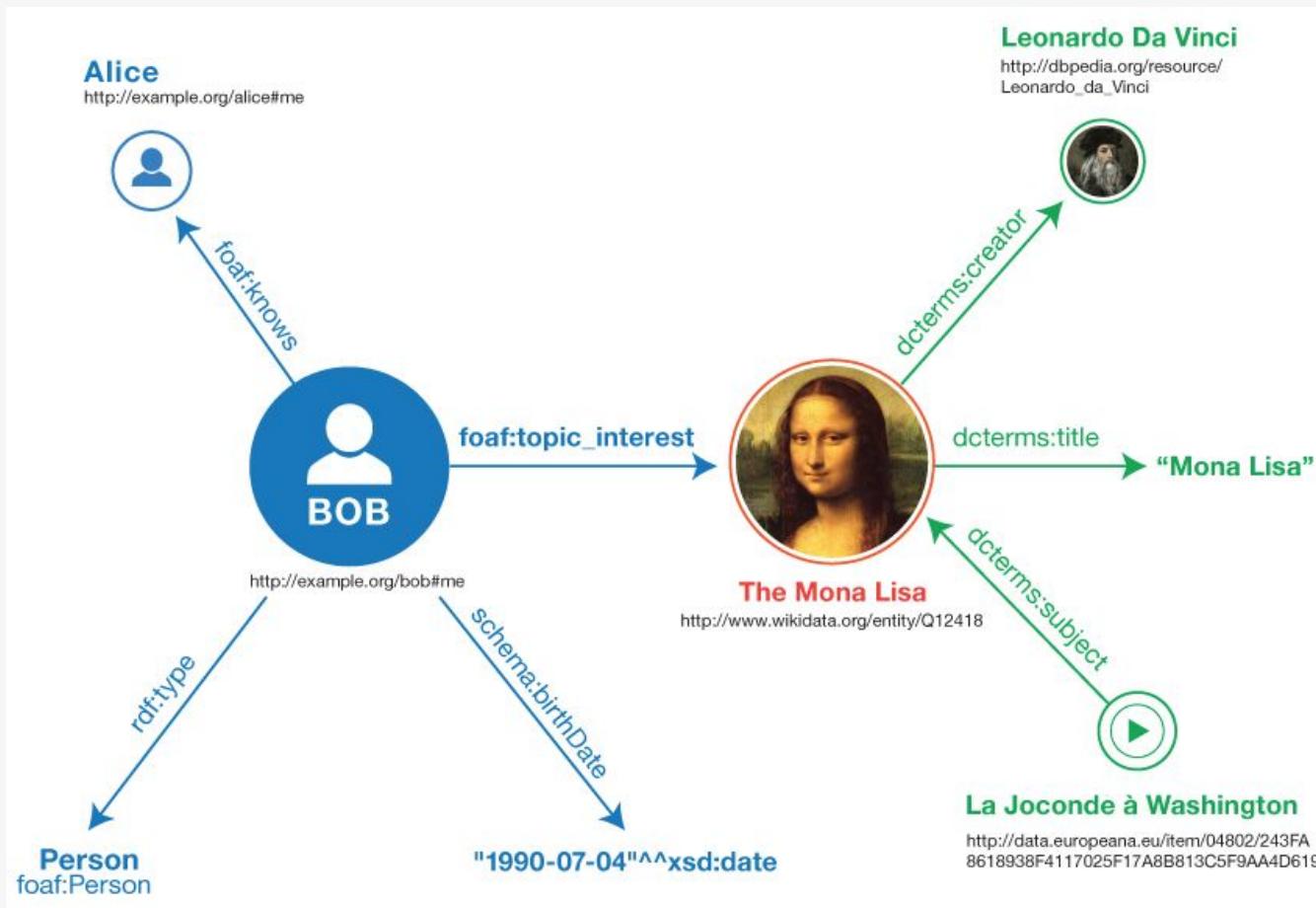
```
@prefix z: <https://pad.riseup.net/p/swib-18-ws-z#> .  
@prefix schema: <http://schema.org/> .  
  
z:sw schema:name "Simeon" .  
z:sw schema:location "Ithaca" .  
z:sw schema:knows z:ch .  
  
z:ch schema:name "Christina" .  
z:ch schema:location "San Francisco" .  
z:ch schema:knows z:sw .
```

Linked Data

When using RDF, things are **named** by **Uniform Resource Identifiers** (URIs). By describing and linking things, **graphs** emerge - each statement is a graph edge.

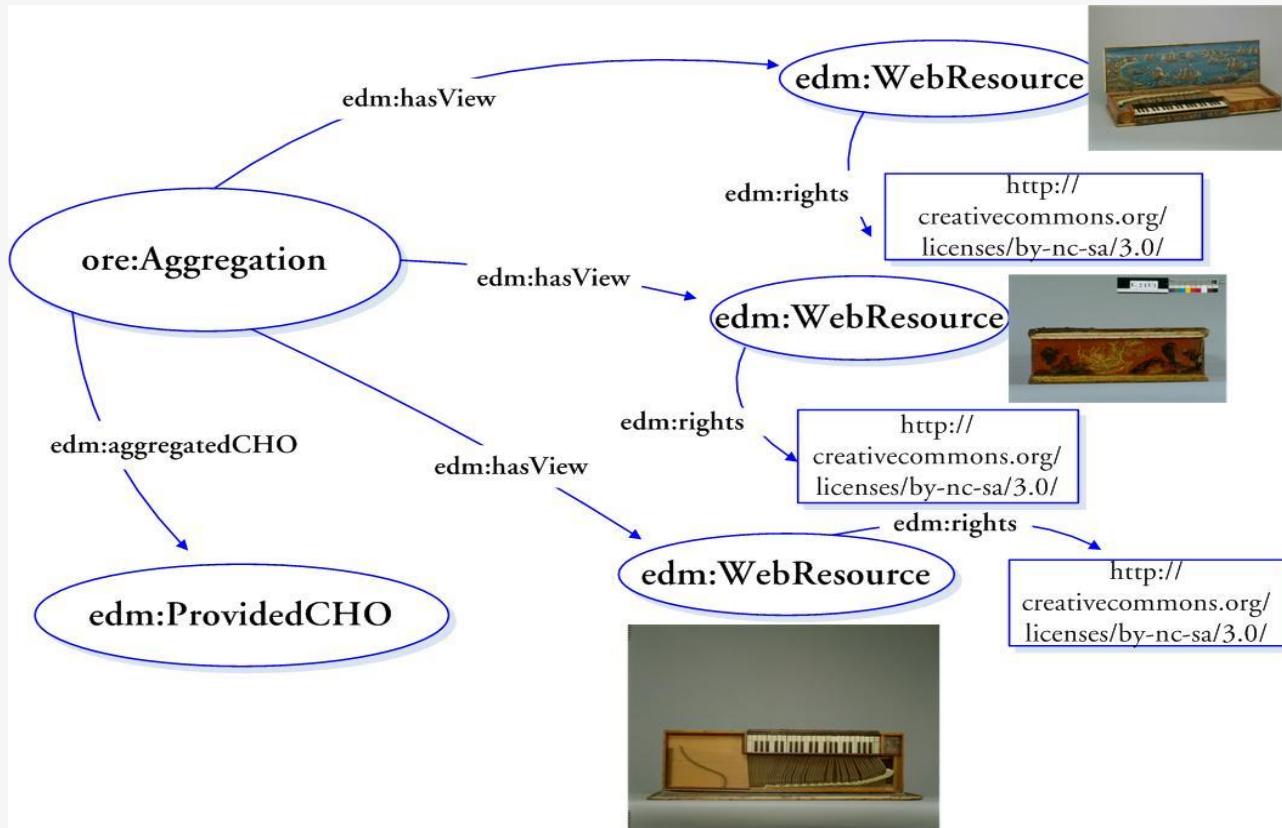
Social **networks** such as Facebook or LinkedIn are well-known examples of the graph approach.





RDF 1.1 Primer - Copyright © 2003-2014 W3C
<http://www.w3.org/TR/rdf11-primer/>

Graphs Let Europeana Grow...



Your turn!

Introduce yourself to the other members of your group. After doing so, document your new acquaintances in the Etherpad data using schema:knows.

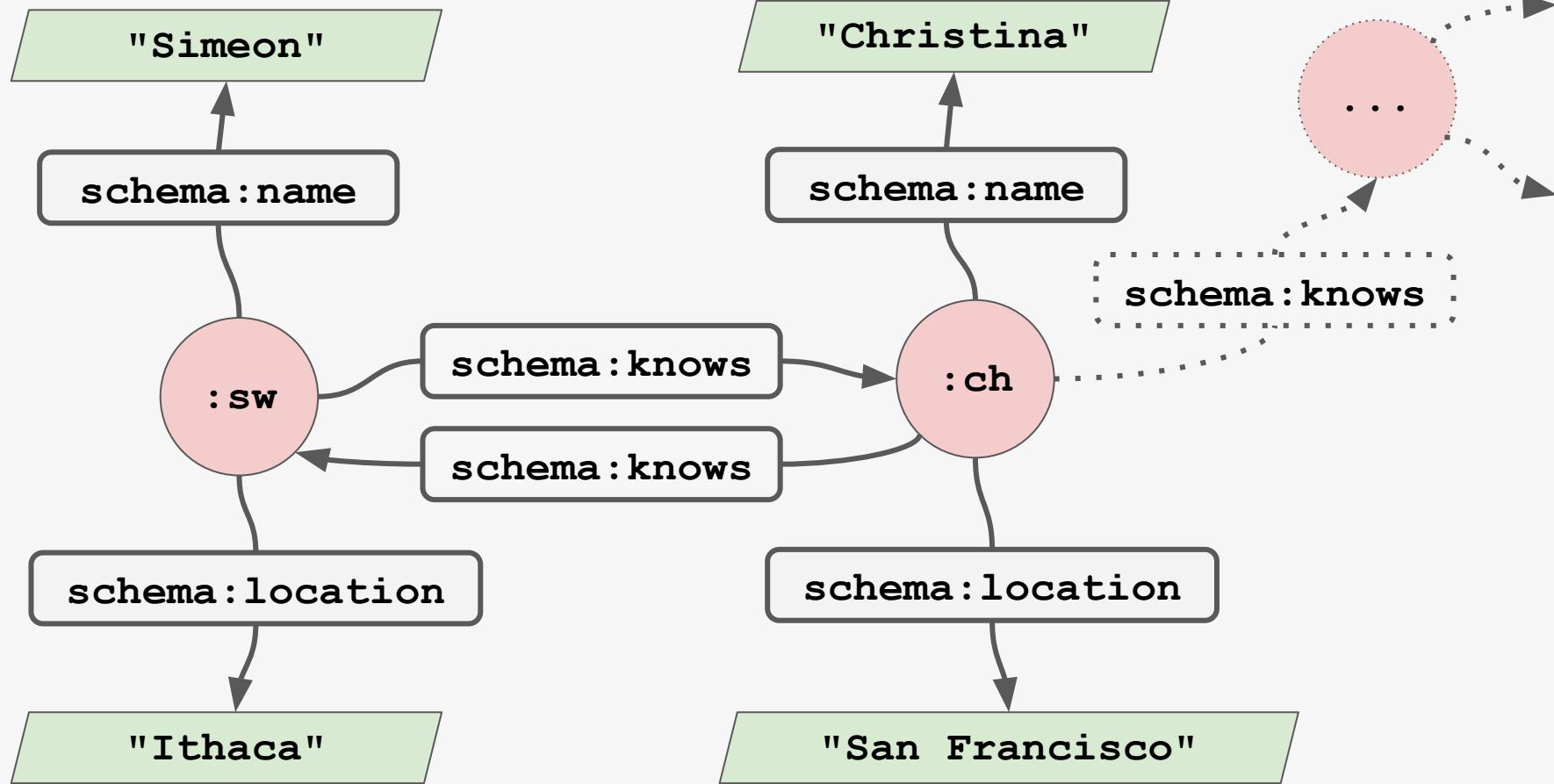
Linked Data Introduction: Link Your Graph, pt. 2

Facilitator's Example

```
@prefix z: <https://pad.riseup.net/p/swib-18-ws-z#> .  
@prefix a: <https://pad.riseup.net/p/swib-18-ws-a#> .  
@prefix schema: <http://schema.org/> .  
  
z:sw schema:name "Simeon" .  
z:sw schema:location "Ithaca" .  
z:sw schema:knows z:ch .  
z:sw schema:knows a:?? .  
  
z:ch schema:name "Christina" .  
z:ch schema:location "San Francisco" .  
z:ch schema:knows z:sw .  
z:ch schema:knows a:?? .
```

The simple power of the Link

Even a **single link** can greatly **expand** a graph,
because many new connections can join the
network.



Your turn!

Extend your set of acquaintances linking out to people beyond your group. As before, document these new connections in the Etherpad.

Turtle Serialization & Syntax Notes

- **Turtle (Terse RDF Triple Language)**: format for expressing data in RDF.
- Each RDF triple starts on new line & ends with a full stop (.).
- **URIs**: Enclosed in angle brackets, i.e. <<http://www.ex.com/ex>>
- **Literals** are written *usually* using double-quotes ("").
- Blank spaces / white spaces (outside of Literal quotes) are only to separate components of RDF statement.
- **Comments**: Preceded by '#' & continue to end of line.
- **Prefixes**: Letters preceding colon that are an abbreviation for an ontology namespace URI defined above in the Turtle document.
- **Online Turtle Validator**: <http://ttl.summerofcode.be/>

Linked Data & the Semantic Web: Expand Your Graph, pt. 1

Facilitator's Example

W Ithaca, New York - Wikipedia

https://en.wikipedia.org/wiki/Ithaca,_New_York

Not logged in Talk Contributions Create account Log in

Article Talk Read Edit View history Search Wikipedia

Ithaca, New York

From Wikipedia, the free encyclopedia

Coordinates: 42°26'36"N 76°30'0"W

This article is about the city of Ithaca. For the legally distinct town, see [Ithaca \(town\), New York](#). For other uses, see [Ithaca \(disambiguation\)](#).

Parts of this article (those related to date) need to be **updated**. Please update this article to reflect recent events or newly available information.

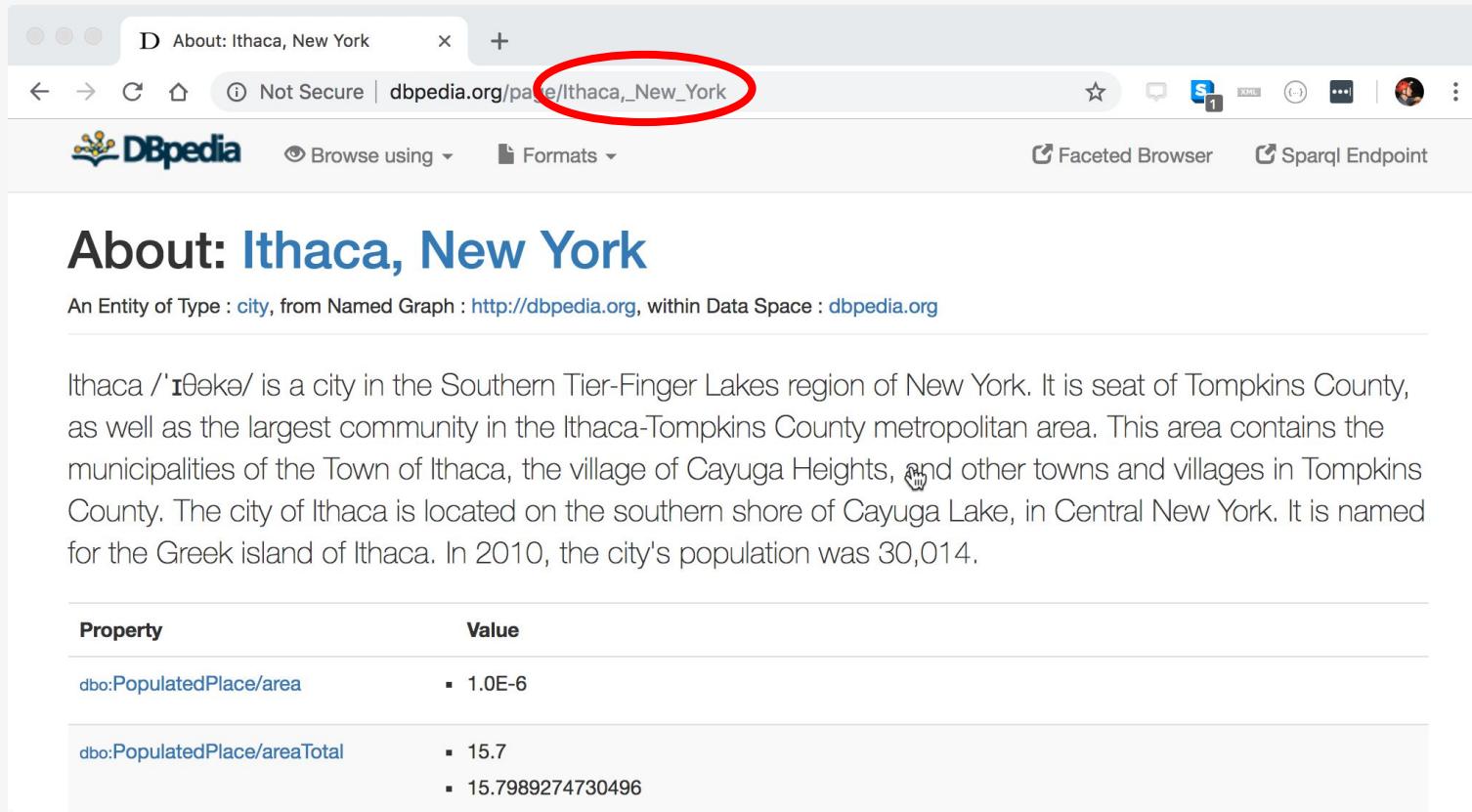
Last update: August 2015 (August 2015)

Ithaca /ɪθəkə/ is a city in the Finger Lakes region of New York. It is the seat of Tompkins County, as well as the largest community in the Ithaca–Tompkins County metropolitan area. This area contains the municipalities of the Town of Ithaca, the village of Cayuga Heights, and other towns and villages in Tompkins County. The city of Ithaca is located on the southern shore of Cayuga Lake, in Central New York. It

| |
|---|
| Ithaca |
| City |
|  |
|  |

https://en.wikipedia.org/wiki/Ithaca,_New_York

Facilitator's Example



D About: Ithaca, New York x +

Not Secure | dbpedia.org/page/Ithaca,_New_York

DBpedia Browse using Formats Faceted Browser Sparql Endpoint

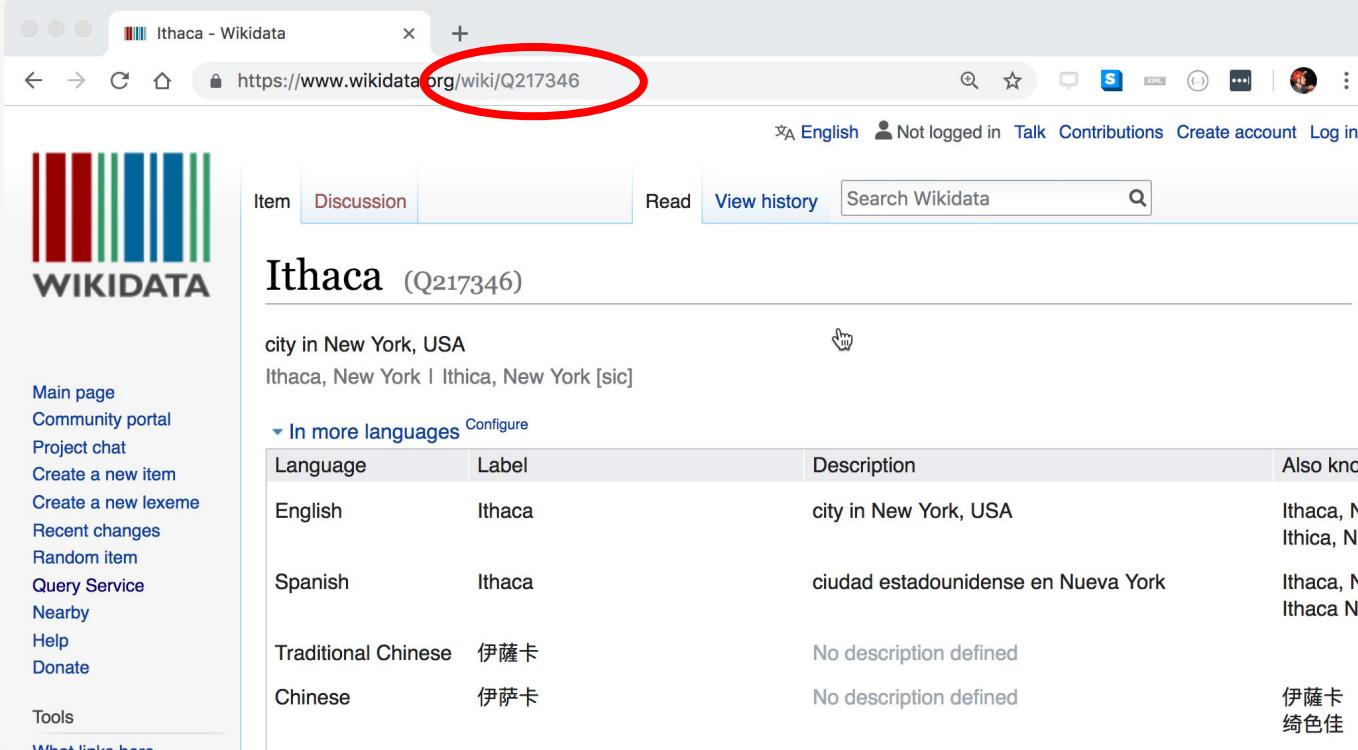
About: Ithaca, New York

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

Ithaca /'ɪθəkə/ is a city in the Southern Tier-Finger Lakes region of New York. It is seat of Tompkins County, as well as the largest community in the Ithaca-Tompkins County metropolitan area. This area contains the municipalities of the Town of Ithaca, the village of Cayuga Heights, and other towns and villages in Tompkins County. The city of Ithaca is located on the southern shore of Cayuga Lake, in Central New York. It is named for the Greek island of Ithaca. In 2010, the city's population was 30,014.

| Property | Value |
|--|------------------------------|
| dbo:PopulatedPlace/area | ▪ 1.0E-6 |
| dbo:PopulatedPlace/areaTotal | ▪ 15.7 ▪ 15.7989274730496 |

Facilitator's Example



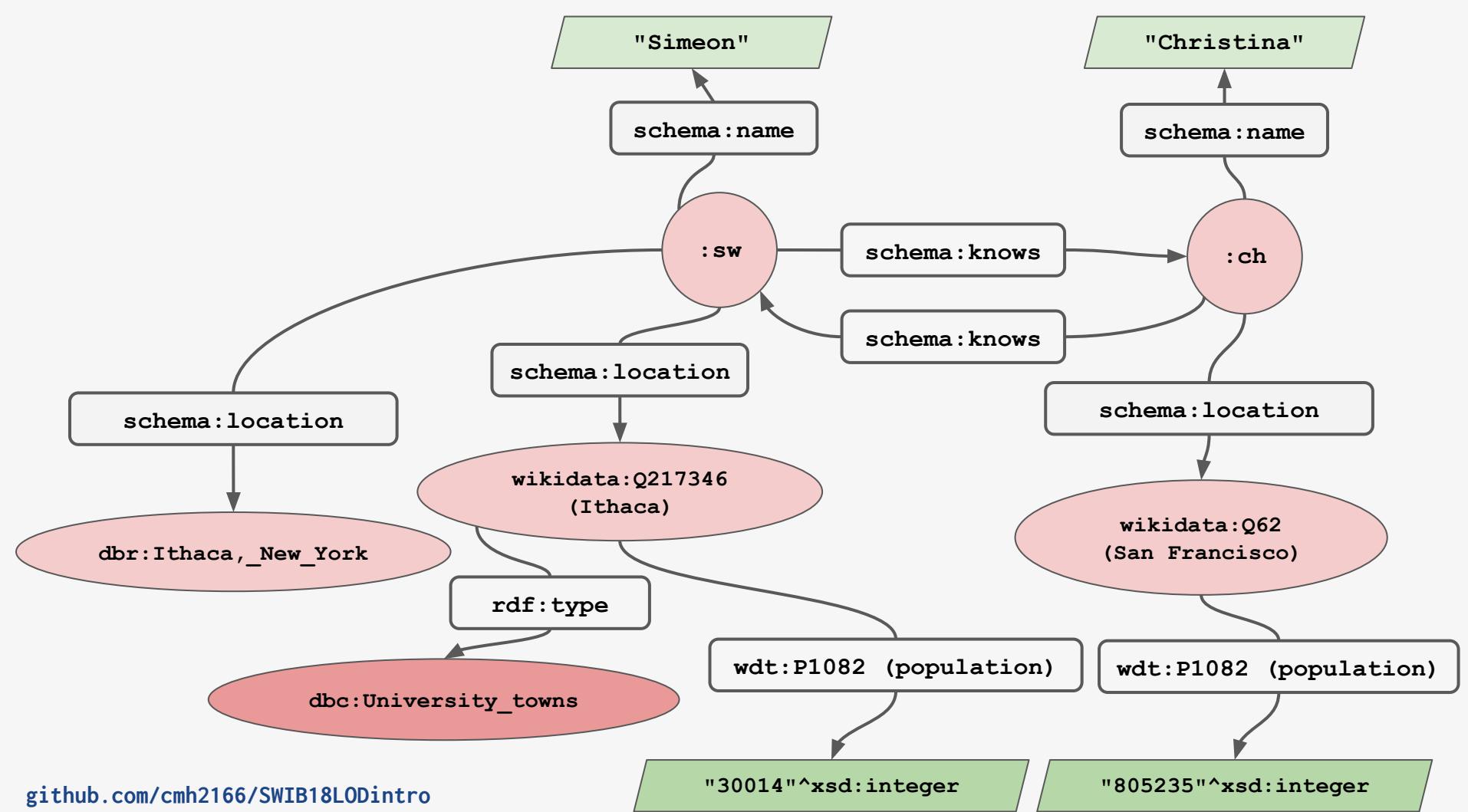
The screenshot shows a web browser window with the title "Ithaca - Wikidata". The URL bar contains the link <https://www.wikidata.org/wiki/Q217346>, which is circled in red. The page content is the Wikidata item for Ithaca (Q217346). The main heading is "Ithaca (Q217346)". Below it, the label "city in New York, USA" is followed by a small edit icon. A note says "Ithaca, New York | Ithica, New York [sic]". A "Configure" link is next to a "In more languages" dropdown. A table lists labels in English, Spanish, Traditional Chinese, and Chinese, along with their descriptions and "Also know" terms. The sidebar on the left includes links for Main page, Community portal, Project chat, Create a new item, Create a new lexeme, Recent changes, Random item, Query Service, Nearby, Help, Donate, Tools, and What links here.

| Language | Label | Description | Also know |
|---------------------|--------|-------------------------------------|---------------------------|
| English | Ithaca | city in New York, USA | Ithaca, Ne Ithica, Nev |
| Spanish | Ithaca | ciudad estadounidense en Nueva York | Ithaca, Ne Ithaca Nev |
| Traditional Chinese | 伊薩卡 | No description defined | |
| Chinese | 伊萨卡 | No description defined | 伊薩卡 绮色佳 |

<https://www.wikidata.org/wiki/Q217346>

Facilitator's Example

```
@prefix z: <https://pad.riseup.net/p/swib-18-ws-z#> .  
@prefix schema: <http://schema.org/> .  
@prefix dbr: <http://dbpedia.org/resource/> .  
@prefix wikidata: <http://www.wikidata.org/entity/> .  
  
z:sw schema:name "Simeon" .  
...  
z:sw schema:location dbr:Ithaca\,_New_York .  
z:sw schema:location wikidata:Q217346 .  
  
... [truncated example data]
```



The Giant Global Graph

By using **HTTP-URIs**, Linked Data builds upon a technology that is proven to **scale** globally. With reference to the World Wide Web, the term **Giant Global Graph** is sometimes used. What is true for the WWW is also true for the GGG:
Anyone can say anything about anything.

Linked Data Principles

Tim Berners-Lee

1. Use URIs as names for things
2. Use HTTP URIs so that things can be looked up
3. When someone looks up a URI, provide useful information, using the standards (RDF*, SPARQL)
4. Include links to other things so that they can discover more things.

<https://www.w3.org/DesignIssues/LinkedData.html>

Your turn!

First, find your location in Wikipedia.

Then, replace the name of your location in your RDF with a reference to DBpedia (or other vocabulary) using the Wikipedia ****URI****.

Linked Data & the Semantic Web: Expand Your Graph, pt. 2

Facilitator's Example

https://en.wikipedia.org/wiki/Music

Apps Bookmarks weather Cornell Documentation Conferences Tools To Read Financial

Not logged in Talk Contributions Create account Log in

Article Talk Read View source View history Search Wikipedia

Music

From Wikipedia, the free encyclopedia

For other uses, see [Music \(disambiguation\)](#).

Music is an art form and cultural activity whose medium is sound and silence, which exist in time. The common elements of music are pitch (which governs melody and harmony), rhythm (and its associated concepts tempo, meter, and articulation), dynamics (loudness and softness), and the sonic qualities of timbre and texture (which are sometimes termed the "color" of a musical sound). Different styles or types of music may emphasize, de-emphasize or omit some of these elements. Music is performed with a vast range of instruments and vocal techniques ranging from singing to rapping; there are solely instrumental pieces, solely vocal pieces (such as songs without instrumental accompaniment) and pieces that combine singing and instruments. The word derives from Greek μουσική (*mousike*; "art of the Muses").^[1] In its most general form, the activities describing music as an art form include the production of works of music (songs, tunes, symphonies, and so on), the criticism of music, the study of the history of music, and the aesthetic examination of music. Ancient Greek and Indian philosophers defined music as tones ordered horizontally as melodies and vertically as harmonies. Common sayings such as "the **harmony of the spheres**" and "it is music to my ears" point to the notion that music is often ordered and pleasant to listen to. However, 20th-century composer John Cage thought that any sound can be music, saying, for example, "There is no noise, only sound."^[2]



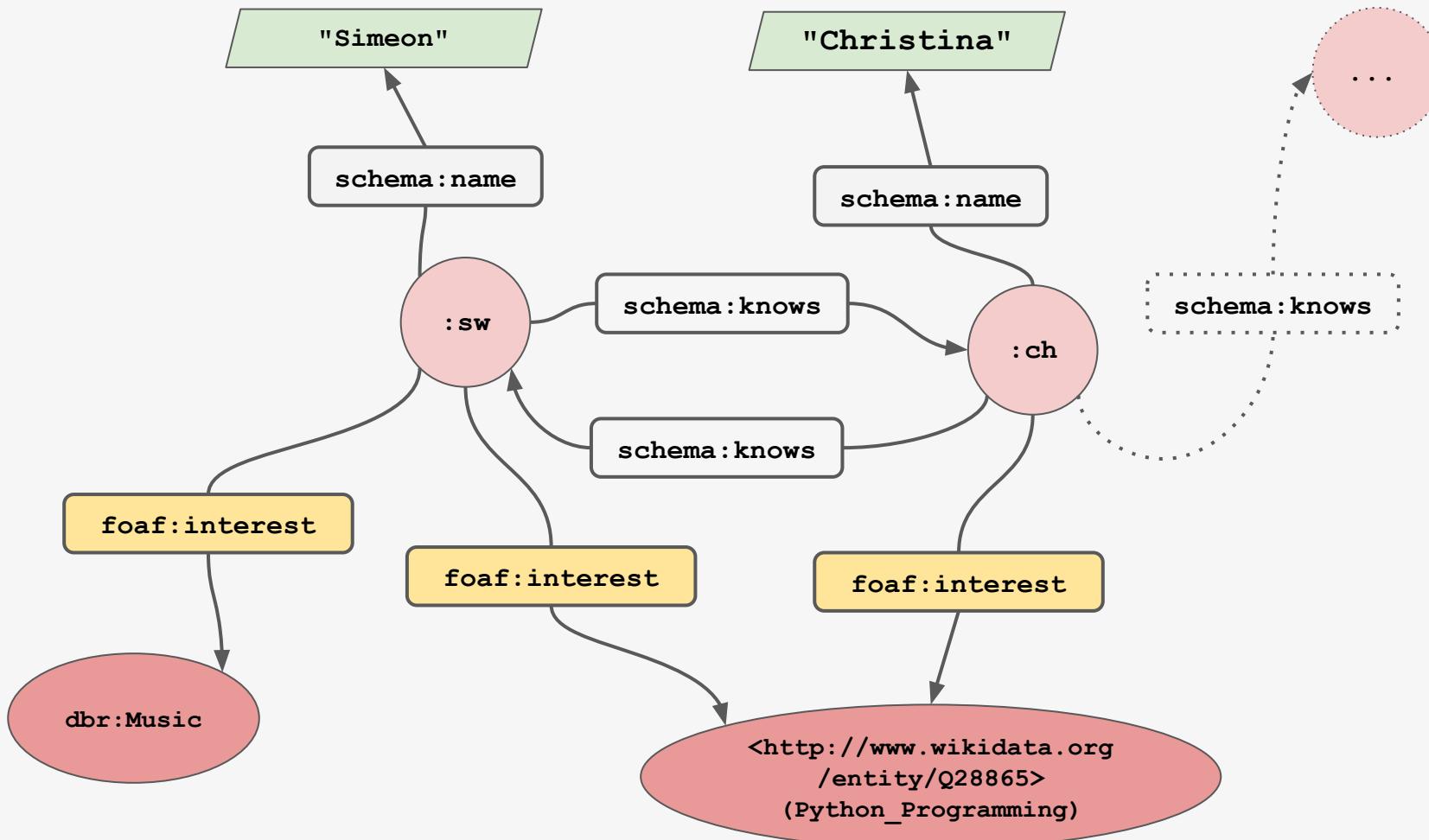
A painting on an ancient Greek vase depicts a music lesson (c. 510 BCE).

| Medium | Sound, silence, time |
|---------------------|----------------------|
| Originating culture | Various |
| Originating era | Paleolithic era |

Facilitator's Example

```
@prefix z: <https://pad.riseup.net/p/swib-18-ws-z#> .  
@prefix schema: <http://schema.org/> .  
@prefix dbr: <http://dbpedia.org/resource/> .  
@prefix foaf: <http://xmlns.com/foaf/0.1/> .  
  
z:sw schema:name "Simeon" .  
z:sw schema:location wikidata:Q217346Ithaca\,_New_York .  
z:sw schema:knows z:ch .  
z:sw foaf:interest dbr:Music .  
z:sw foaf:interest dbr:Caving .  
Z:sw foaf:interest dbr:IIIF .
```

... [truncated example data]



Your turn!

Enhance your profile with interest you have.
Again, refer to DBpedia or Wikidata (or other)
entries to do so, remembering to use entity
URIs, not page URLs.

validate: <http://ttl.summerofcode.be>

Linked Data & the Semantic Web: Expand Your Graph, pt. 3

Element Sets

- [FOAF \(Friend of a Friend\)](#)
- [vcard](#) (people and organisations)
- [schema.org](#)
- [geo](#) (to express geo-coordinates)
- [Void](#) (to describe datasets)
- [Prov](#) (provenance information)
- ... and many more.
- See:
 - [Linked Open Vocabularies \(LOV\)](#) to look up ontologies & vocabularies
 - [prefix.cc](#) to look up namespaces

Library-Related Element Sets

- Dublin Core Metadata Terms
- Simple Knowledge Organisation System (SKOS)
 - Examples of Vocabularies using SKOS: [Agrovoc](#), [STW Thesaurus for Economics](#), many small controlled vocabularies (for example, [RDA value vocabularies](#))
 - SKOS schemas in BARTOC: [http://bartoc.org/en/search/advanced?f\[0\]=field_format%3A24](http://bartoc.org/en/search/advanced?f[0]=field_format%3A24)
- GND Ontology, Getty Authorities Ontology
- RDA Elements sets
- EDM (Europeana Data Model)
- BIBFRAME (Version 2.0)
- And a growing number more...

Instance Datasets & Vocabularies

- [DBpedia](#), [Wikidata](#)
- [BNF](#), [BL](#), [BNE](#), [DNB](#), [LoC](#), ...
- [GeoNames](#)
- [VIAF](#), [ORCID](#)

See [datahub.io](#) for many more ...

**30 minutes Break
(Return at 16:00)**

Linked Open Data & Data Licensing: License Your Graph

“Open”?

*“Open data and content can be **freely used, modified, and shared by anyone for any purpose**”*

[*The Open Definition*](#)

Openness involves...

- **Access:** no passwords, API keys, quantity restrictions, etc.
- **License:** restrictions inhibit reuse
 - CC0, PDDL
 - ODC-BY, ODbL, CC-BY, CC-BY-SA
 - no non-commercial (NC) licenses
- **Formats:** no proprietary formats without freely accessible specification. Supports reuse of data

Some Data License Options

- CC0 1.0 Universal: “Creative Commons public domain waiver”, creativecommons.org/publicdomain/zero/1.0/
- Public Domain Dedication and License (PDDL): “Public Domain for data/databases”, opendatacommons.org/licenses/pddl/
- Open Data Commons Attribution (ODC-By): “Attribution for data/databases”, opendatacommons.org/licenses/by/
- Open Database License (ODC-ODbL): “Attribution Share-Alike for data/databases”, opendatacommons.org/licenses/odbl/

Licensing data

STW Thesaurus for Economics (v 9.0, 2015-06-15) • Suggestions and comments to the [thesaurus team](#) •
Mailing lists: [stw-announce](#), [stw-user](#)
ZBW - Leibniz Information Centre for Economics - [Imprint](#)



The STW Thesaurus for Economics is licensed under an [Open Database License \(ODbL\) 1.0](#). Permissions beyond the scope of this license are available at [ZBW](#).

```
@prefix cc: <http://creativecommons.org/ns#> .  
  
<http://zbw.eu/stw>  
cc:attributionName "ZBW - Leibniz Information Centre for  
Economics"@en, "ZBW - Leibniz-Informationszentrum Wirtschaft"@de ;  
cc:attributionURL "http://zbw.eu" ;  
dcterms:rights "see cc:license"@en, "siehe cc:license"@de ;  
cc:license <http://opendatacommons.org/licenses/odbl/1-0/> ;  
...  
...
```

Other GLAM-focused Open Data/Licenses

- RightsStatement.org (for Digital Objects)
- Europeana Dataset
- DPLA (Digital Public Library of America) Dataset
- Getty Vocabularies & Ontology
- Data on the Web Best Practices W3C Recommendation
Section on Licensing
- Share-PSI (Public Sector Information) Localised Guide
Pages for Open Data

Moving towards 5 Star Linked Data

- ★ make your stuff available on the Web (whatever format) under an open license
- ★★ make it available as structured data (e.g., Excel instead of image scan of a table)
- ★★★ make it available in a non-proprietary open format (e.g., CSV as well as of Excel)
- ★★★★ use URIs to denote things, so that people can point at your stuff
- ★★★★★ link your data to other data to provide context

Facilitator's Example

```
@prefix z: <https://pad.riseup.net/p/swib-18-ws-z#> .  
@prefix dbr: <http://dbpedia.org/resource/> .  
@prefix wikidata: <http://www.wikidata.org/entity/> .  
@prefix schema: <http://schema.org/> .  
@prefix foaf: <http://xmlns.com/foaf/0.1/> .  
@prefix dcterms: <http://purl.org/dc/terms/> .  
  
<> dcterms:creator z:sw .  
<> dcterms:creator z:ch .  
<> schema:license <https://creativecommons.org/publicdomain/zero/1.0/>. .  
... [truncated example data]
```

Your turn!

Allow the reuse of your data. To do so, document your authorship (add [dcterms:creator](#)) and apply a CC0 or another license as you see fit (add [schema:license](#)). Also try dates (add [dcterms:created](#) and/or [dcterms:modified](#))

Linked Data Experimentation: SPARQL & Visualization(s)

SPARQL

Triplestores & SPARQL

Scattered machine readable descriptions are useful, but we can do better! RDF is a **distributed data** model which makes it easy to **combine descriptions**. Special databases called **triplestores** exist that allow to query the aggregated data using the query language **SPARQL**.

SPARQL Query General Form

```
PREFIX wd: <http://www.wikidata.org/entity/>
PREFIX wdt: <http://www.wikidata.org/prop/direct/>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

# House cats with pictures and labels in German on Wikidata
SELECT ?item ?itemLabel ?pic
WHERE {
    ?item wdt:P31 wd:Q146 .
    ?item wdt:P18 ?pic .
    ?item rdfs:label ?itemLabel .
    FILTER langMatches( lang(?itemLabel) , "DE" )
}
```

Names of Participants

SPARQL ENDPOINT: swib
CONTENT TYPE (SELECT): JSON
CONTENT TYPE (GRAPH): Turtle

```
1 # Names of Workshop Participants
2
3 PREFIX schema: <http://schema.org/>
4
5 SELECT * WHERE {
6   ?person schema:name ?name .
7 }
```



QUERY RESULTS

Table Raw Response 

Showing 1 to 50 of 50 entries

Search: Show 50 entries

| person | name |
|---|----------|
| 1 <http://etherpad.lobid.org/p/swib16-ws-f#hs> | "Helena" |
| 2 <https://pad.riseup.net/p/swib-18-ws-facilitators#ub> | "Uldis" |

Acquaintances

SPARQL ENDPOINT: swib
CONTENT TYPE (SELECT): JSON
CONTENT TYPE (GRAPH): Turtle

```
1 # Acquaintances of workshop participants
2
3 PREFIX schema: <http://schema.org/>
4
5 SELECT * WHERE {
6   ?who schema:knows ?whom .
7 }
```

Share, Copy, Run

QUERY RESULTS

Table Raw Response [Download](#)

Showing 1 to 50 of 252 entries

Search: Show 50 entries

| who | whom |
|---|---|
| 1 < https://pad.riseup.net/p/swib-17-ws-facilitators#ch > | < http://etherpad.lobid.org/p/swib16-ws-b#aj > |
| 2 < https://pad.riseup.net/p/swib-17-ws-3#mb > | < https://pad.riseup.net/p/swib-17-ws-facilitators#uk > |
| 3 < http://etherpad.lobid.org/p/swib16-ws-c#va > | < http://etherpad.lobid.org/p/swib16-ws-c#rr > |
| 4 < https://pad.riseup.net/p/swib-17-ws-facilitators#ch > | < http://etherpad.lobid.org/p/swib16-ws-c#rr > |

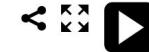
Acquaintances by Name

SPARQL ENDPOINT: swib

CONTENT TYPE (SELECT): JSON

CONTENT TYPE (GRAPH): Turtle

```
1 # Acquaintances of workshop participants by name
2
3 PREFIX schema: <http://schema.org/>
4
5 SELECT ?namewho ?namewhom WHERE {
6   ?who schema:knows ?whom .
7   ?who schema:name ?namewho .
8   ?whom schema:name ?namewhom .
9 }
```



QUERY RESULTS

Table Raw Response

Showing 1 to 50 of 238 entries

Search: Show 50 entries

| namewho | namewhom |
|---------------|----------|
| 1 "Volker" | "Renee" |
| 2 "Christina" | "Renee" |

Localities and Countries

SPARQL ENDPOINT: swib
CONTENT TYPE (SELECT): JSON
CONTENT TYPE (GRAPH): Turtle

```
1 # Localities and Countries of workshop participants
2
3 PREFIX schema: <http://schema.org/>
4 PREFIX dbo: <http://dbpedia.org/ontology/>
5
6 SELECT * WHERE {
7   ?person schema:location ?place .
8   ?place dbo:country ?country .
9 }
```



QUERY RESULTS

Table Raw Response

Showing 1 to 11 of 11 entries

| person | place | country |
|---|---|---|
| 1 < http://etherpad.lobid.org/p/swib16-ws-g#ls > | < http://dbpedia.org/resource/Gothenburg > | < http://dbpedia.org/resource/Sweden > |
| 2 < https://pad.riseup.net/p/swib-18-ws-facilitators#ub > | < http://dbpedia.org/resource/Riga > | < http://dbpedia.org/resource/Latvia > |

Search: Show 50 entries

Shared Interests

SPARQL ENDPOINT

swib

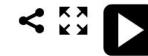
CONTENT TYPE (SELECT)

JSON

CONTENT TYPE (GRAPH)

Turtle

```
1 # Shared Interests of workshop participants
2 ▼ PREFIX schema: <http://schema.org/>
3 PREFIX dbo: <http://dbpedia.org/ontology/>
4 PREFIX z: <https://pad.riseup.net/p/swib-17-ws-facilitators#>
5 PREFIX foaf: <http://xmlns.com/foaf/0.1/>
6 ▼ SELECT * WHERE {
7   z:ub foaf:interest ?interest .
8   ?person foaf:interest ?interest .
9   FILTER (?person != z:ub)
10 }
11
```



QUERY RESULTS



Table

Raw Response



Showing 1 to 13 of 13 entries

Search: Show entries

| interest | person |
|---|---|
| 1 < http://dbpedia.org/resource/Music > | < http://etherpad.lobid.org/p/swib16-ws-c#rr > |
| 2 < http://dbpedia.org/resource/Music > | < https://pad.riseup.net/p/swib-18-ws-facilitators#sw > |

Metropolitans (Cities of certain size)

SPARQL ENDPOINT: swib CONTENT TYPE (SELECT): JSON CONTENT TYPE (GRAPH): Turtle

```
1 # Home cities with population greater than 100.000 people of workshop participants
2
3 PREFIX schema: <http://schema.org/>
4 PREFIX dbo: <http://dbpedia.org/ontology/>
5
6 SELECT * WHERE {
7   ?person schema:location ?place .
8   ?place dbo:populationTotal ?population .
9   FILTER (?population > 100000) .
10 }
11
12
```

QUERY RESULTS

Table Raw Response ⬇

Showing 1 to 11 of 11 entries

| person | place | population |
|---|--|----------------------------------|
| 1 <http://etherpad.lobid.org/p/swib16-ws-g#ls> | <http://dbpedia.org/resource/Gothenburg> | "549789"^^xsd:nonNegativeInteger |
| 2 <https://pad.riseup.net/p/swib-18-ws-facilitators#ub> | <http://dbpedia.org/resource/Riga> | "696593"^^xsd:nonNegativeInteger |

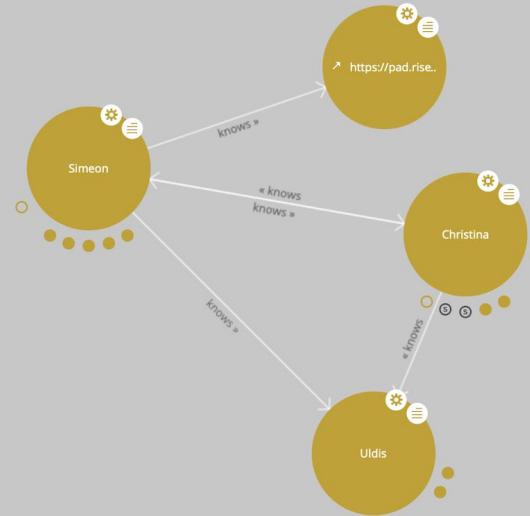
Search: Show 50 entries

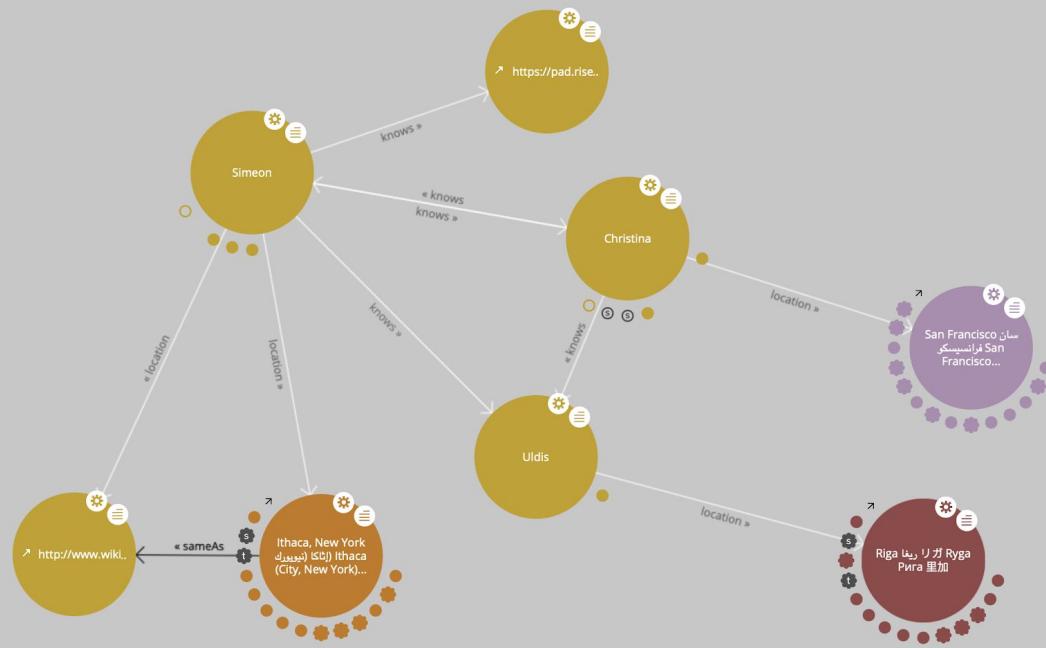
LODLive Visualization

About LODLive

- Uses Linked Data standards (RDF, SPARQL) to browse RDF data.
- Spread Linked Data Ideas through Easy & Reusable Interface.
- Browse by Querying Endpoint for Specific Resource or Start from a Given Example URI.
- LODLive built with:
 - jQuery plug-in (`lodlive-core.js`)
 - JSON configuration map (`lodlive-profile.js`)
 - HTML page with a few images (sprites)
 - Few other jQuery public plug-ins
- <http://en.lodlive.it/> & <https://github.com/dvcama/LodLive>



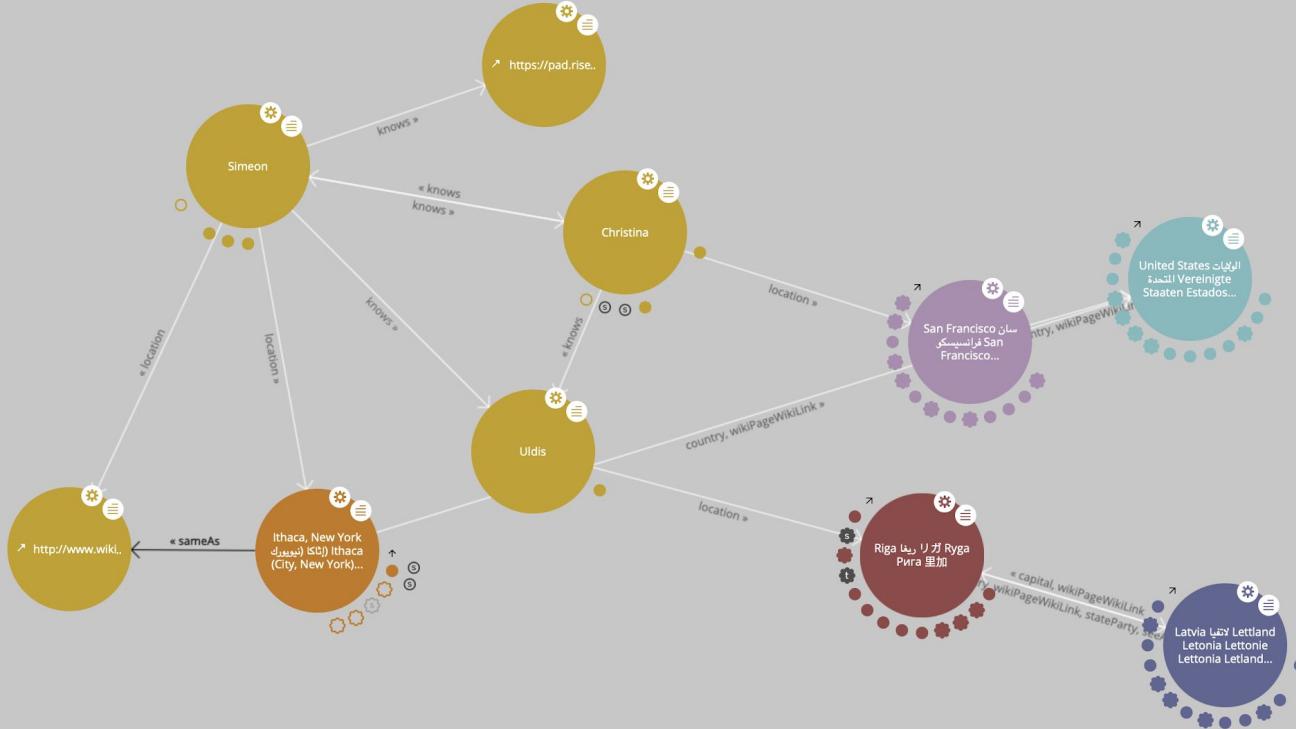




<http://ec2-3-120-108-78.eu-central-1.compute.amazonaws.com:8080/fuseki/swib/query>

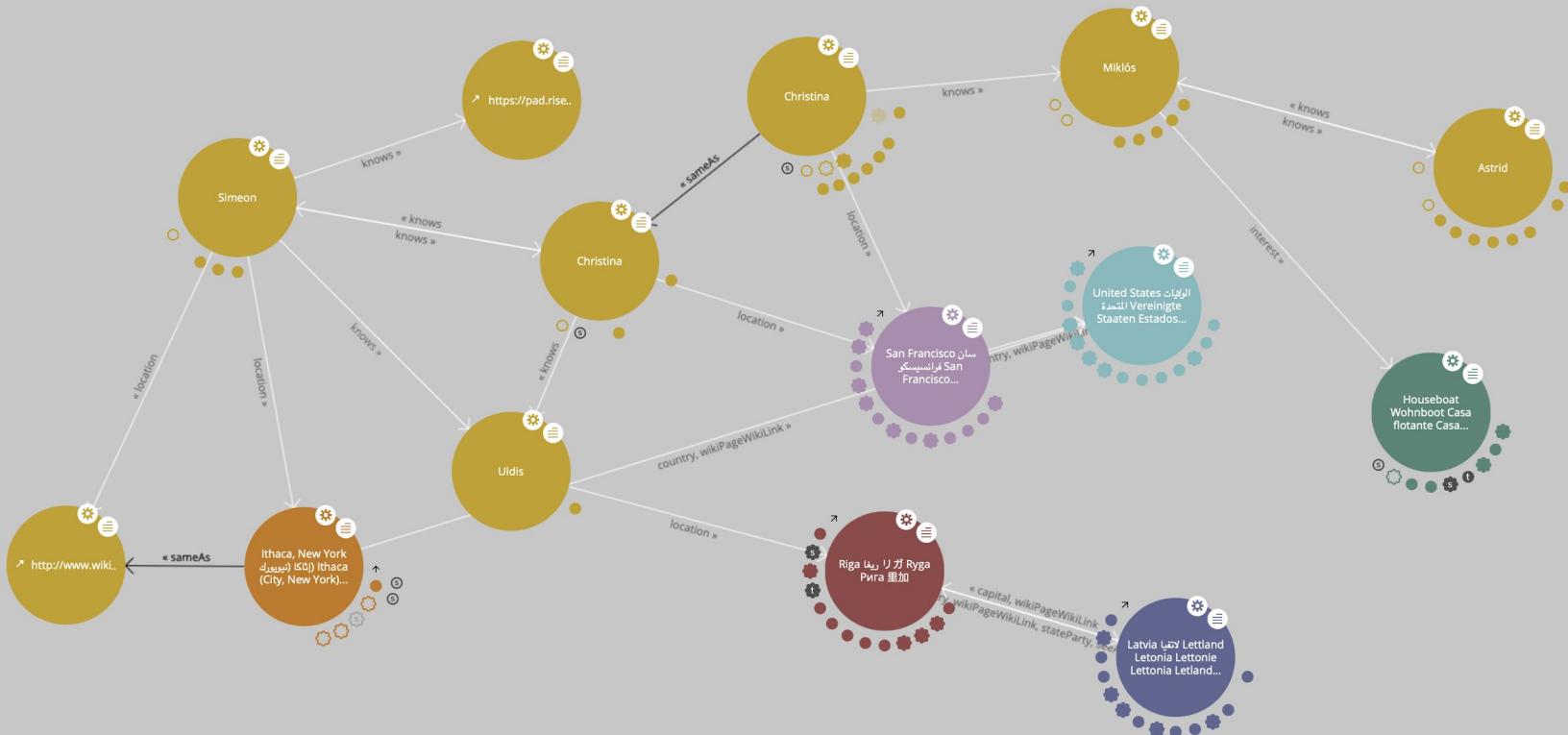
Christina

<https://pad.riseup.net/p/swib-18-ws-z#ch>





?



Your turn!

Explore your social network using the SPARQL Endpoint and the LodLive visualization.

Links & queries here:

[github.com/cmh2166/SWIB18LODintro/blob/master/
Resources.md](https://github.com/cmh2166/SWIB18LODintro/blob/master/Resources.md)

Linked Data Examples, Resources & Projects

Overview of Some (More) Linked Data Technologies

SPARQL & Triplestores

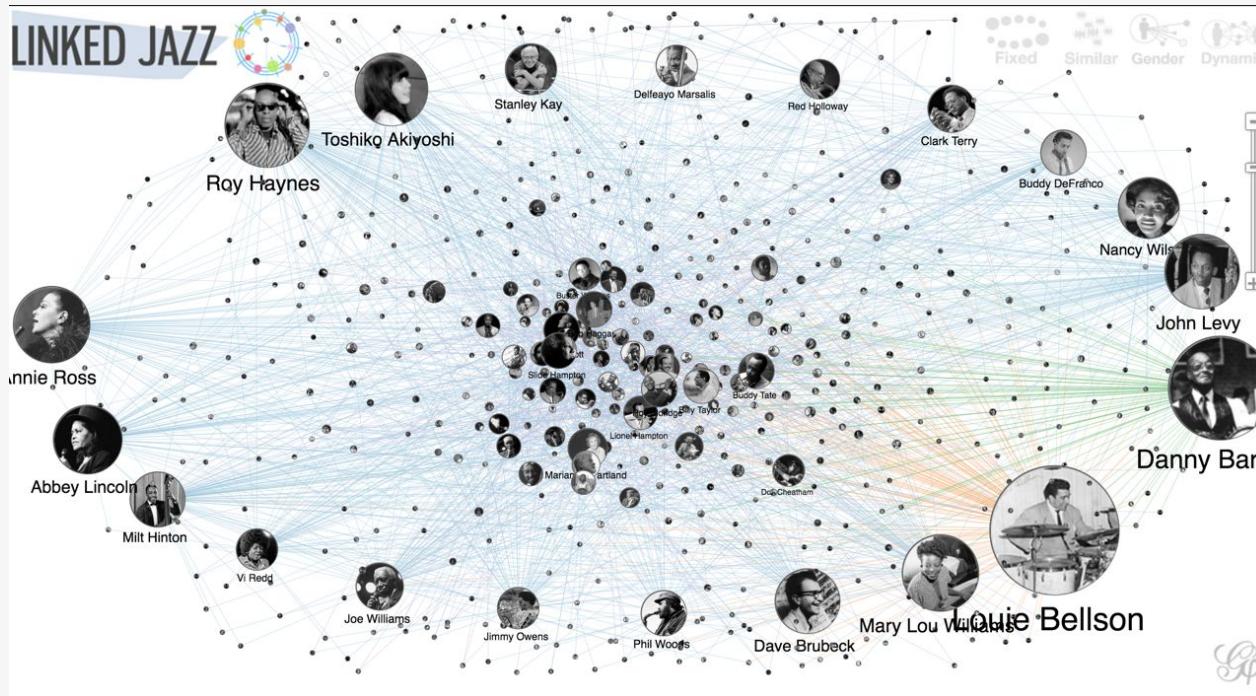
- Triplestores are like SQL databases, but Optimised to manage Triples or RDF statements
- SPARQL isn't just for Querying - e.g. SPARQL update
- Triplestores versus Graph Stores
- Some Triplestores:
 - [Apache Jena Fuseki](#) (easy to set up and play)
 - [Apache Jena TDB](#)
 - [Blazegraph](#) and [AWS Neptune](#)
 - Virtuoso, Stardog, Marmotta, ...

Random Other RDF Tech

- [W3C RDF Validator](#) (expects RDF/XML)
- [Turtle Validator](#)
- [SHACL](#) (Shapes Constraint Language), [ShEx](#) (Shapes Expr.)
- [Structured Data \(RDFa\) Linter](#) (See what structured data machines can pick up from your website)
- [Python RDFLib](#) (Library for working with RDF in Python)
- [Ruby RDF.rb](#) (Library for working with RDF in Ruby)
- [Raptor](#) (RDF Parsers written in C that are used in many other programming libraries with RDF)

Overview of Some Linked Data Projects & Tools

Linked Jazz: Network Viz



linkedjazz.org/network/

Linked Jazz: Ecco!



Bruce, Kate, 1858-1946 | Bruce, Kate [Personal]

Titles:

- A child of the ghetto
- Judith of Bethulia
- Through the breakers
- Unidentified Paper Print box V
- Unidentified Tayler no. 10: Those who pay

Description: Silent film actress

American silent film actresses People from Columbus, Indiana 1868 births Actresses from

Use Term [A key] Back [space key]

linkedjazz.org/tools/ecco/

NYPL Labs B.I.L.L.I.

(Bibliographic Identifiers for Library Location Information)

AM1-501
Museums. Collectors and collecting

Wiki

A museum is an institution that cares for (conserves) a collection of artifacts and other objects of scientific, artistic, cultural, or historical importance and makes them available for public viewing through exhibits that may be permanent or temporary. Most large museums are located in major cities throughout the world and more local ones exist in smaller cities, towns and even the countryside. Museums have varying aims, ranging from serving researchers and specialists to

[Expand](#)

[From Wikipedia](#)



Image source.

Holdings Count

Thousands of resources.

Note

No Notes found.

Broader Classmarks

[General Works](#)

└ Museums. Collectors and collecting

billi.nypl.org

ls.ext RDF Cataloging Client

vimeo.com/192831354 / github.com/digibib/ls.ext

LD4P Project (and previous LD4L Labs)

Exploring the path
to linked data for
library catalogs...

Presentation:
11:00-11:25 Tuesday

Capturing Cataloger Expectations in an RDF Editor

SHACL, Lookups, and VitroLib

Steven Folsom / Huda Khan / Lynette Rayle / Jason Kovari / Rebecca Younes / Simeon Warner



Linked Data for Production

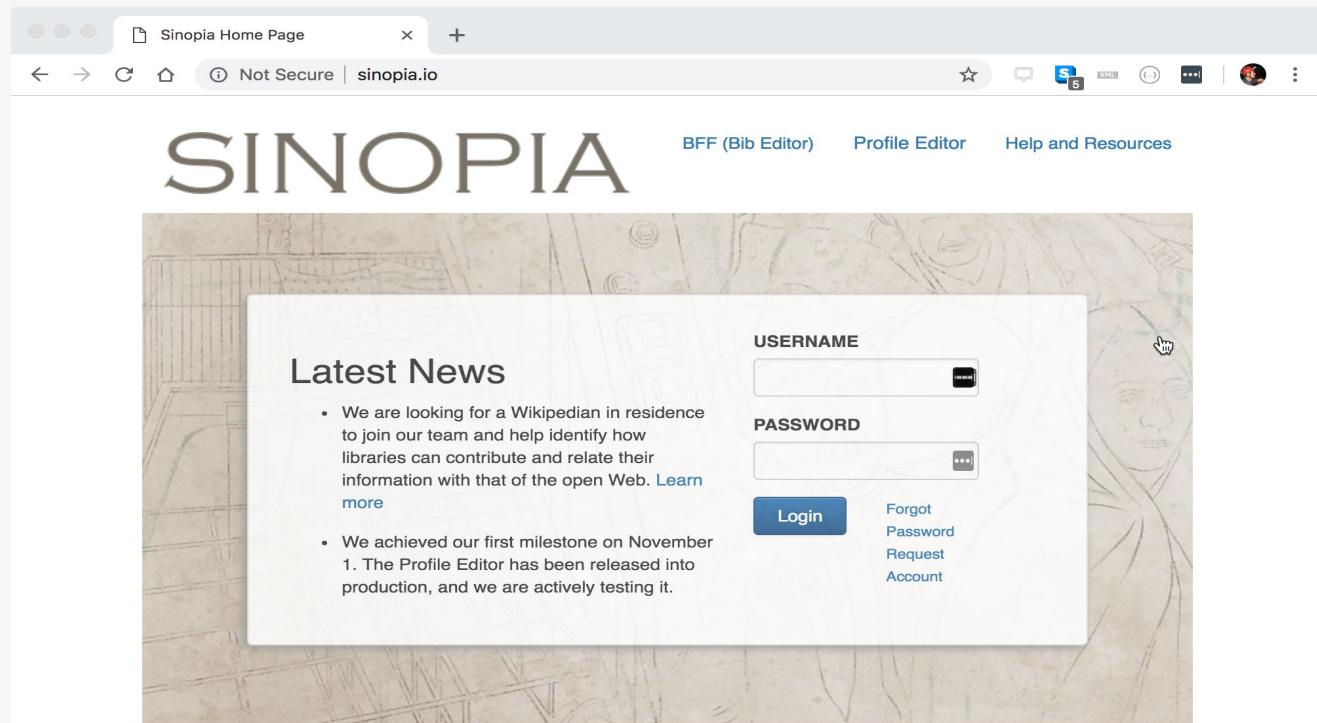


Linked Data for Libraries

LD4P Project - Sinopia

Based on the Library of Congress's BIBFRAME Editor (BFE) and BIBFRAME Profile Editor projects, Sinopia is a linked data platform for original and cooperative cataloging using BIBFRAME and other vocabularies.

Minimal viable product (MVP) release scheduled in April 2019.



The underdrawing for the new world of linked data in libraries

With the support of a \$1.5 million dollar grant from the Andrew W. Mellon Foundation, Linked Data for

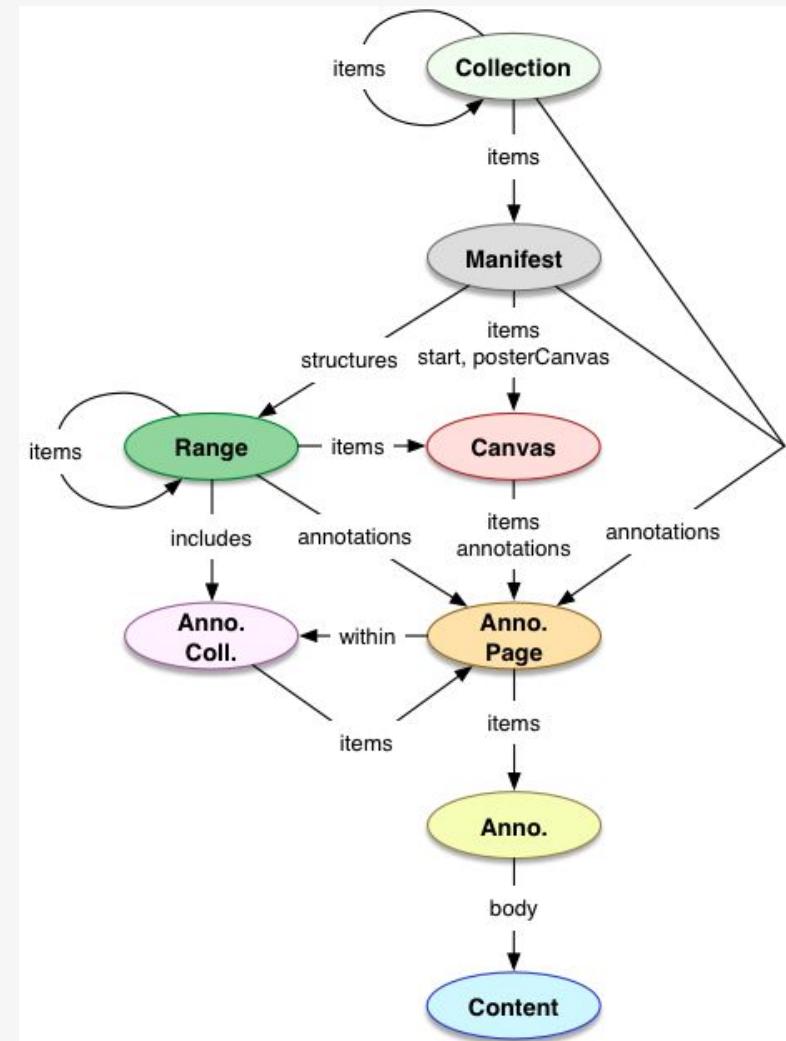
IIIF

A framework for interoperable and reusable images, audio and video.

All data except content datastreams is RDF using JSON-LD with a specific context and framing:

- linked open data
- convenient for viewer developers who can treat as JSON.

See: <https://iiif.io/api/>



Linked Art Data Model

The desired target model for Linked Open Data in the Art domain is one with the following properties:

- Captures as much of the information that we know about the resources as possible
- Can be productively used via easy to implement [services](#)
- Provides interoperability with other related data sets
- Solves actual challenges, which are documented as use cases

Successful models are developed:

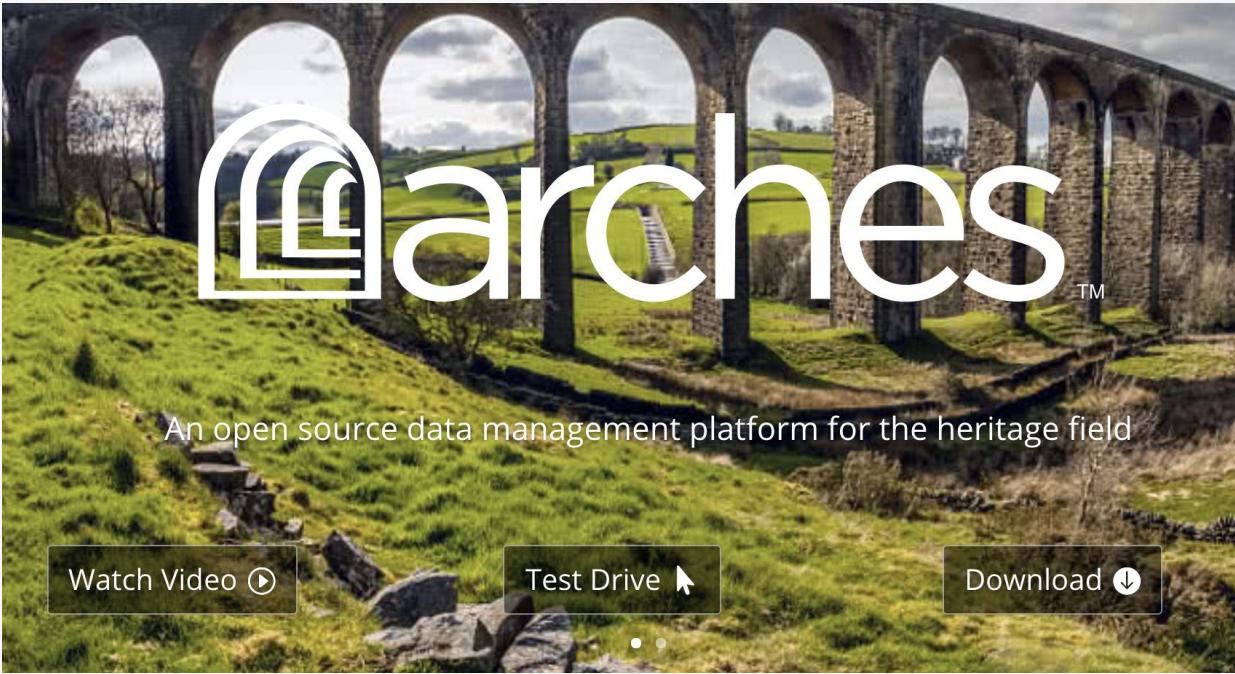
- iteratively (we will not get it right the first time)
- responsively (we will change the model in response to feedback and concerns)
- responsibly (we will consider changes and features carefully with respect to complexity and value)
- collaboratively (we will engage with the community, projects and individuals early and often)

Model Fundamentals

Following the existing norms of the community, our starting point consists of:

- [CIDOC-CRM](#) as the core ontology, giving an event-based paradigm
 - We use a streamlined [profile](#) of CIDOC-CRM to ensure consistency and comprehension.
- The [Getty Vocabularies](#) as core sources of identity
 - Please see the [vocabularies best practice](#) discussion.
- [JSON-LD](#) as the primary target serialization
 - We use a specific [context](#) designed to be easy to implement.

<http://linked.art/>



<http://v4demo.archesproject.org/> &

<https://www.archesproject.org>

LDF Server: OrgRef to VIVOs

Linked Data Fragments server

OrgRef to VIVOs

Query OrgRef to VIVOs by triple pattern

subject: <http://www.wikidata.org/entity/Q1012699>

predicate: _____

object: _____

Find matching triples

Matches in OrgRef to VIVOs for { <<http://www.wikidata.org/entity/Q1012699>> ?p ?o }

Showing triples 1 to 6 of 6 with 100 triples per page.

```
Q1012699  isniId    "0000000404647119".  
Q1012699  viafId    "244777805".  
Q1012699  wikiPageID  "1680840".  
Q1012699  label      "Bryant University".  
Q1012699  sameAs     unitid_217165.  
Q1012699  url        "http://www.bryant.edu".
```



ldf-vivo.herokuapp.com/orgref

Opaque Namespace

opaquenamespace.org

Vocabularies

Predicates

Login

Box Name

<http://opaquenamespace.org/ns/boxName>

Sub Property Of:

isPartOf

<http://opaquenamespace.org/ns/boxName>

Range:

Domain:

Label:

Box Name [English \[en\]](#)

Alternate Name:

Date:

Comment:

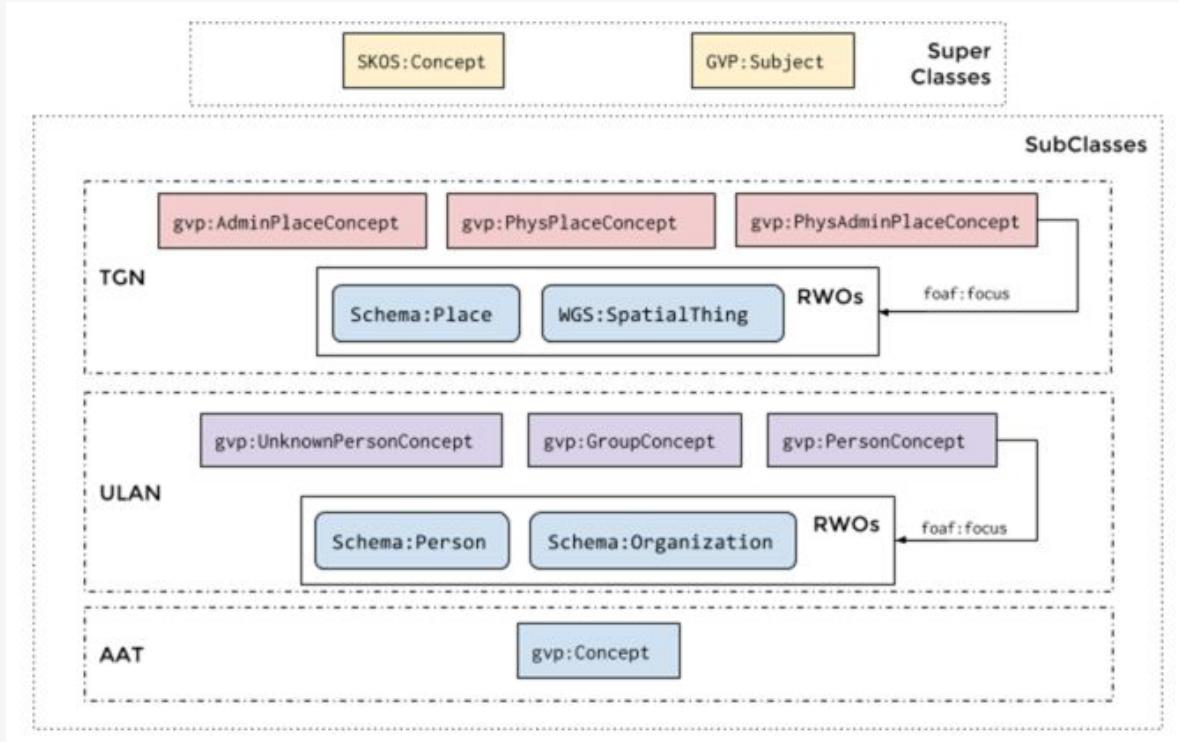
Identifier on the box holding the physical archival item. [English \[en\]](#)

Is Replaced By:

opaquenamespace.org

github.com/cmh2166/SWIB18LODIntro

Getty Vocab Model



vocab.getty.edu

Getty Vocababs SPARQL Endpoint

Getty Vocabularies: LOD SPARQL Queries Any ▾ Search... Search Brief ▾

1.2 Revisions

1.2.1 Version 3.0
1.2.2 Version 3.1
1.2.3 Version 3.2
1.2.4 Version 3.3

2 Finding Subjects

2.1 Top-level Subjects
2.2 Descendants of a Given Parent
2.3 Subjects by Contributor Id
2.4 Subjects by Contributor Abbrev
2.5 Preferred Ancestors
2.6 Full Text Search Query
2.7 Stop-Word Removal
2.8 Case-insensitive Full Text Search Query
2.9 Exact-Match Full Text Search Query
2.10 Find Person Occupations by broaderExtended
2.11 Find Person Occupations by Double FTS
2.12 Find Quartz Timepieces by Double FTS
2.13 Find Subject by Exact English PrefLabel
2.14 Find Subject by Language-Independent PrefLabels
2.15 Combination Full-Text and Exact String Match
2.16 Find Subject by Any Label
2.17 Find Ordered Subjects
2.18 Find Ordered Collections

Query:

```
1 select * {  
2   ?x a gvp:Subject; dct:contributor aat_contrib:10000088;  
3   gvp:broaderExtended aat:300033618;  
4   gvp:prefLabelGVP/xl:literalForm ?1}
```

Include inferred
 Expand results over equivalent URIs

Submit

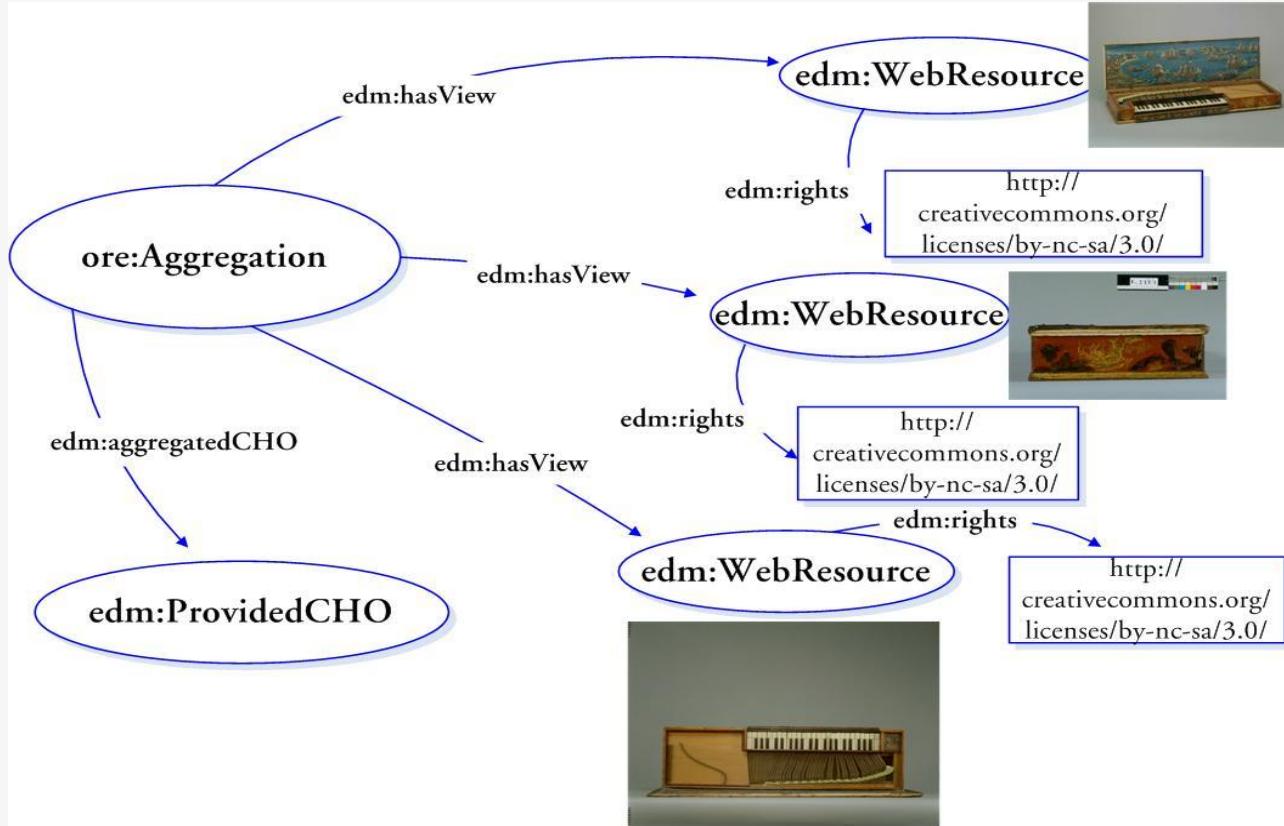
2.2 Descendants of a Given Parent

Let's look for AAT descendants of 300194567 "drinking vessels". This finds "rhyta" and other interesting records, including "Fichtelgebirgehumpen":

```
select * {?x gvp:broaderExtended aat:300194567; skos:inScheme aat: ; gvp:prefLabelGVP/xl:literalForm ?1}
```

vocab.getty.edu

Europeana Data Model



Europeana SPARQL Endpoint

Virtuoso SPARQL Query Editor

Default Data Set Name (Graph IRI)

[About](#) | [Namespace Prefixes](#) | [Inference rules](#)

Query Text

```
PREFIX edm: <http://www.europeana.eu/schemas/edm/> SELECT ?DataProvider WHERE { ?Aggregation edm:dataProvider ?DataProvider }
```

Sponging:

Use only local data (including data retrieved before), but do not retrieve more

Results Format:

HTML

Execution timeout:

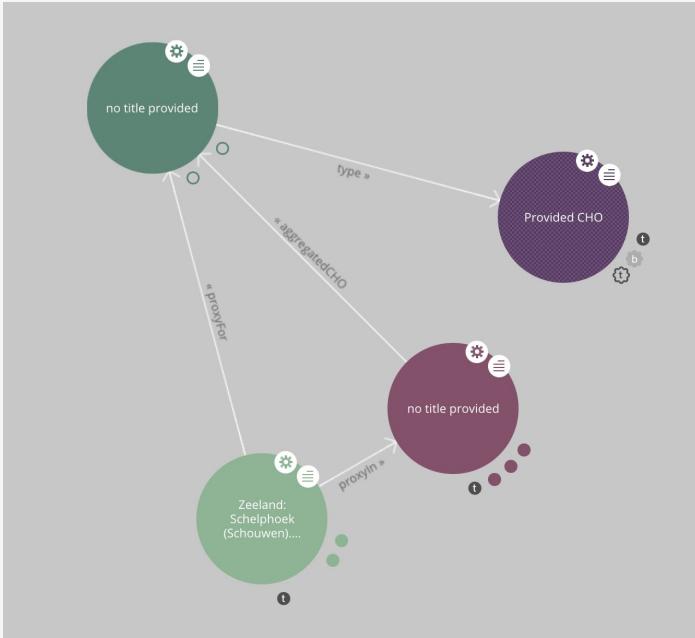
0 milliseconds (values less than 1000 are ignored)

Options:

Strict checking of void variables Log debug info at the end of output (has no effect on some queries and output formats)

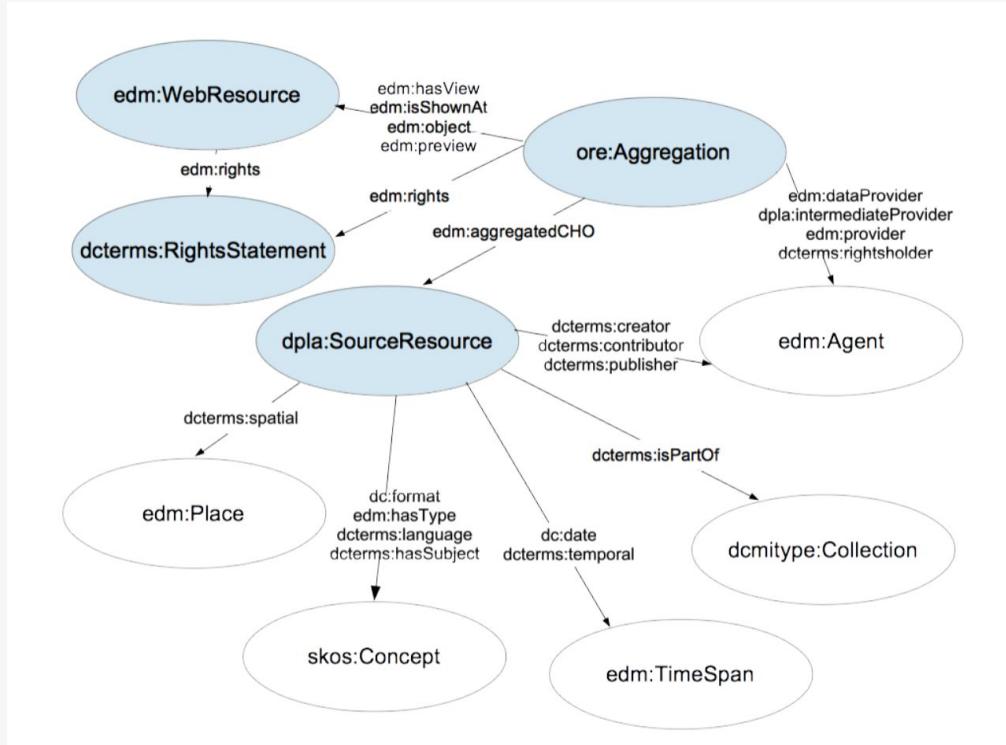
sparql.europeana.eu/

Europeana Exploration



Visit our LodLive instance

DPLA Model & MAP v.5



pro.dp.la/hubs/metadata-application-profile

DPLA Ingestion3

github.com/dpla/ingestion3

Moving Forward with Linked Open Data

Our turn!

Let's discuss your potential uses of LOD. What projects could you see for using this? What support would you need to make it happen?

Checking Back In...

Returning to the Goals from the
Introduction...

Do you feel like you learned what you
expected? Needed? Remaining questions?

Mini Workshop Retrospective

Pros

Cons

Thank you!

Questions? Now and here or anytime to:

simeon.warner@cornell.edu

cmharlow@stanford.edu



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