A Linked Data Competency Framework for Educators and Learners

Marcia Lei Zeng
Kent State University, USA

On behalf of
LD4PE (Linked Data for Professional Education) Project Team
Outline

• Part I. Background
  • Linked Data for Professional Education (LD4PE) project
  • LD4PE Major Products

• Part II. The *Competency Index for Linked Data* (a.k.a. Linked Data Competency Index, LDCI)

• Part III. Learning Resources Connected with the Competencies

• Part IV. Using the *Competency Index for Linked Data* in Self-Learning, Teaching, and Training
Part I. Background

Linked Data for Professional Education (LD4PE) project

http://explore.dublincore.net/

(a.k.a. Linked Data Competency Index, LDCI)
Linked Data for Professional Education (LD4PE) Project

- Funded by the Institute of Museum and Library Services (IMLS)
  - LD4PE. December 2014 - November 2017
  - [Planning project “Learning Linked Data”: October 2011 - September 2012]

- A project under the jurisdiction of the DCMI Education & Outreach Committee

- Led by:
  - Kent State University, School of Information.
  - Dublin Core Metadata Initiative (DCMI).

- Content Partners:
  - Sungkyunkwan University (Korea)
  - Access Innovations
  - Synaptica
  - Elsevier
  - OCLC

- Technical development:
  - DCMI. Joseph Chapman
  - Univ. Washington. David Talley
Competency Index for Linked Data
-- defines a set of assertions of the knowledge, skills, and habits of mind required for professional practice in the area of Linked Data.

Learning Resource Descriptions
-- A set of learning resources
  • open sources
  • described in metadata
  • mapped to competencies

http://explore.dublincore.net/
Explore Learning Resources by Competency

To Explore Linked Data learning resources, select a competency assertion or topic statement in the adjacent panel to view a listing of associated learning resources.

The Competency Index for Linked Data (CI) constitutes a set of topically arranged assertions of the knowledge, skills, and habits of mind required for professional practice in the area of Linked Data.

This structure is illustrated in the adjacent panel. CI development is expected to openly crowd-source expertise in the development processes under the guidance of the project’s CI Editorial Board (CIEB). Learn more about the Competency Index here.

IMPORTANT NOTES:

1. The CI development work is being partially funded through an IMLS National Leadership Grant for Libraries.
2. Those interested in more detail on the Competency Index development and maintenance process, or who would like to contribute to future development can see more here. A fully translated Chinese version of the CI and associated documentation is also available here.

http://explore.dublincore.net/
Explore Learning Resources by Competency

Browse by Competency

- How does this work?
  - New Comp Index (621)
    - Fundamentals of Resource Description Framework (218)
  - Fundamentals of Linked Data (135)
    - Web technology (93)
  - Linked Data principles (66)
    - Knows Tim Berners-Lee's principles of Linked Data: use URIs to name things, use HTTP URIs that can be resolved to useful information, and create links to URIs of other things. (0)
    - Knows the "five stars" of Open Data: put data on the Web, preferably in a structured and preferably non-proprietary format, using URIs to name things, and link to other data. (66)
  - Linked Data policies and best practices (16)

To Explore Linked Data learning resources, select a competency assertion or topic statement in the adjacent panel to view a listing of associated learning resources.

The Competency Index for Linked Data (CI) constitutes a set of topically arranged assertions of the knowledge, skills, and habits of mind required for professional practice in the area of Linked Data.

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Explore Learning Resources by Competency

Browse by Competency

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  + New Comp Index (621)
  + Fundamentals of Resource Description Framework (218)
  + Fundamentals of Linked Data (135)
    + Web technology (93)
    - Linked Data principles (66)
      Knows Tim Berners-Lee’s principles of Linked Data: use URIs to name things, use HTTP URIs that can be resolved to useful information, and create links to URIs of other things. (0)
      Knows the “five stars” of Open Data: put data on the Web, preferably in a structured and preferably non-proprietary format, using URIs to name things, and link to other data. (66)
  + Linked Data policies and best practices (16)

<table>
<thead>
<tr>
<th>Competency</th>
<th>Resource</th>
</tr>
</thead>
</table>
| Knows The "Five Stars" Of Open Data: Put Data On The Web, Preferably In A Structured And Preferably Non-proprietary Format, Using URIs To Name Things, And Link To Other Data. | An Introduction To Linked Open Data
An extensive slide presentation covering the key components that support RDF: the graph model, the triple statement, and URIs. Also discusses the Web of Data [...]

4.00 stars (1 user rating)

Introduction To Linked Data
This slide presentation was used as part of a training module aiming to answer the following questions: What is Linked Data; What is Open Data; [...] 4.00 stars (1 user rating)

Providing Linked Data

Introduction To Linked Data

Multi-Agent And Semantic Web Systems: Linked Open Data
This slide presentation of lecture material was used as part of a course given at The University of Edinburgh School of Informatics. This lecture looked [...] 4.00 stars (1 user rating)

Linked Data At The National Library Of Sweden
Part II. Introducing the *Competency Index for Linked Data*

The *Competency Index* provides:
- a concise and readable map of concepts and skills
- related to practices and technologies of Linked Data
- for the benefit of interested learners and teachers.
“Competency Index”
- A thematic set of competencies organized by:

- **Topic**

- **Competency**
  - *a tweet-length phrase about knowledge or skills that can be learned*

- **Benchmark**
  - *an action that demonstrates accomplishment in a given competency*

Topical Cluster » Topic » Competency » Benchmark
**Topic cluster:** Interacting with RDF Data

**Topic:** Querying RDF Data

**Competency:** Understands that a SPARQL query matches an RDF graph against a pattern of triples with fixed and variable values

**Competency:** Understands the basic syntax of a SPARQL query

**Benchmark:** Uses angle brackets for delimiting URIs.

**Benchmark:** Uses question marks for indicating variables.

**Benchmark:** Uses PREFIX for base URIs.

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**SPARQL query example**

```sparql
PREFIX dataset: <http://dbpedia.org/ontology/>

SELECT ?uri ?influencedBy
WHERE
{
  ?uri a dataset:Artist .
  ?uri dataset:influencedBy ?influencedBy .
  filter regex(?influencedBy, 'Pablo Picasso', 'i') .
}
```
<table>
<thead>
<tr>
<th>Understanding</th>
<th>Doing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competencies</td>
<td>Benchmarks</td>
</tr>
<tr>
<td>• Understands</td>
<td>• Uses</td>
</tr>
<tr>
<td>• Knows</td>
<td>• Expresses</td>
</tr>
<tr>
<td>• Recognizes</td>
<td>• Demonstrates</td>
</tr>
<tr>
<td>• Differentiates ...</td>
<td>• Distills</td>
</tr>
<tr>
<td>understanding (learning)</td>
<td>• Converts ...</td>
</tr>
<tr>
<td>doing (exam questions, homework assignments)</td>
<td></td>
</tr>
</tbody>
</table>

Followed guidelines for stylistic consistency when competencies were developed.
The development of the *Competency Index for Linked Data*

Editorial Board met monthly over a period of approximately 18 months. *Tom Baker*, chair
- Expert input
- User testing

Tries to cover:
- **Enough topics** to convey a map of the domain
- **Enough detail** on domain competency

Does NOT cover:
- **NOT:** Levels of difficulty
  - “Basic” for a library scientist may be “difficult” for a computer scientist (and vice versa)
- **NOT:** Ranking or ordering topics
  - for the same reasons

---

**Browse by Competency**

- New Comp Index (564)
  - Fundamentals of Resource Description Framework (208)
  - Fundamentals of Linked Data (112)
  - RDF vocabularies and application profiles (163)
  - Creating and transforming Linked Data (65)
  - Interacting with RDF data (346)
  - Creating Linked Data applications (0)

View the full Competency Index

Saved Sets of Learning Resources

Competency-based Learning Maps

---

6 clusters  
30 topics  
95 competencies

M.Zeng & LD4PE Team
Competency Index for Linked Data

1. Fundamentals of Resource Description Framework
   - Identity in RDF
   - RDF data model
   - Related data models
   - RDF serialization

Fundamentals of Resource Description Framework (218)
- Identity in RDF (38)
- RDF data model (148)
- Related data models (52)
  - RDF serialization (66)
    - Understands RDF serializations as interchangeable encodings of a given set of triples (RDF graph). (30)
      - Uses tools to convert RDF data between different serializations. (7)
    - Distinguishes the RDF abstract data model and concrete serializations of RDF data. (41)
      - Expresses data in serializations such as RDF/XML, N-Triples, Turtle, N3, Trig, JSON-LD, and RDFa. (33)

M. Zeng & LD4PE Team
Competency Index for Linked Data

1. Fundamentals of Resource Description Framework

2. Fundamentals of Linked Data
   - Web technology
   - Linked data principles
   - Linked Data policies and best practices
   - Non-RDF Linked Data

Fundamentals of Linked Data (135)
+ Web technology (93)
- Linked Data principles (66)
   - Knows Tim Berners-Lee's principles of Linked Data: use URIs to name things, use HTTP URIs that can be resolved to useful information, and create links to URIs of other things. (0)
   - Knows the "five stars" of Open Data: put data on the Web, preferably in a structured and preferably non-proprietary format, using URIs to name things, and link to other data. (66)
+ Linked Data policies and best practices (16)
Non-RDF linked data (0)
Competency Index for Linked Data

1. Fundamentals of Resource Description Framework
2. Fundamentals of Linked Data

3. RDF vocabularies and application profiles
   - Finding RDF-based vocabularies
   - Maintaining RDF vocabularies
   - Versioning RDF vocabularies
   - Publishing RDF vocabularies
   - Mapping RDF vocabularies
   - RDF application profiles
   - Designing RDF-based vocabularies
Competency Index for Linked Data

1. Fundamentals of Resource Description Framework
2. Fundamentals of Linked Data
3. RDF vocabularies and application profiles
4. Creating and transforming RDF Data
   - Managing identifiers (URIs)
   - Creating RDF data
   - Versioning RDF data
   - RDF data provenance
   - Cleaning and reconciling RDF data
   - Mapping and enriching RDF data

- Creating and transforming Linked Data (82)
  + Managing identifiers (URI) (19)
  + Creating RDF data (44)
    - Generates RDF data from non-RDF sources. (13)
    - Knows methods for generating RDF data from tabular data in formats such as Comma-Separated Values (CSV). (14)
    - Knows methods such as Direct Mapping of Relational Data to RDF (2012) for transforming data from the relational model (keys, values, rows, columns, tables) into RDF graphs. (23)
  + Versioning RDF data (0)
  + RDF data provenance (0)
  + Cleaning and reconciling RDF data (17)
  + Mapping and enriching RDF data (32)

6 clusters
30 topics
95 competencies

M. Zeng & LD4PE Team
Competency Index for Linked Data

1. Fundamentals of Resource Description Framework
2. Fundamentals of Linked Data
3. RDF vocabularies and application profiles
4. Creating and transforming RDF Data

5. Interacting with RDF Data
   - Processing RDF data using programming languages
   - Querying RDF Data
   - Visualizing RDF Data
   - Reasoning over RDF data
   - Assessing RDF data quality
   - RDF Data analytics
   - Finding RDF Data
   - Manipulating RDF Data
Competency Index for Linked Data

1. Fundamentals of Resource Description Framework
2. Fundamentals of Linked Data
3. RDF vocabularies and application profiles
4. Creating and transforming RDF Data
5. Interacting with RDF Data
6. Creating Linked Data applications
   - Storing RDF data

M.Zeng & LD4PE Team
## Competency Index for Linked Data

### Overview

**6 clusters**

**30 topics**

- **Fundamentals of Resource Description Framework (208)**
  - Identity in RDF (35)
  - RDF data model (142)
  - Related data models (52)
  - RDF serialization (60)
- **Fundamentals of Linked Data (112)**
  - Web technology (76)
  - Linked Data principles (53)
  - Linked Data policies and best practices (38)
  - Non-RDF linked data (0)
- **RDF vocabularies and application profiles (163)**
  - Finding RDF-based vocabularies (14)
  - Maintaining RDF vocabularies (0)
  - Versioning RDF vocabularies (1)
  - Publishing RDF vocabularies (32)
  - Mapping RDF vocabularies (18)
  - RDF application profiles (17)
  - Designing RDF-based vocabularies (1)
- **Creating and transforming Linked Data (157)**
  - Creating RDF data (36)
  - Versioning RDF data (0)
  - RDF data provenance (0)
  - Cleaning and reconciling RDF data (12)
  - Mapping and enriching RDF data (25)
- **Interacting with RDF data (346)**
  - Processing RDF data using programming languages (80)
    - Querying RDF data (181)
    - Visualizing RDF data (25)
    - Reasoning over RDF data (81)
    - Assessing RDF data quality (0)
    - RDF data analytics (15)
    - Finding RDF data (36)
    - Manipulating RDF data (64)
- **Creating Linked Data applications (0)**
- **Storing RDF data (0)**

Competency Index full version available from [http://explore.dublincore.net](http://explore.dublincore.net) → Explore → View the full CI

M.Zeng & LD4PE Team
The Competency Index for Linked Data (CI) is a set of topically arranged assertions of the knowledge, skills and habits of mind required for professional practice in the area of Linked Data. Its primary goal is to provide a means for mapping learning resource descriptions to the competencies those resources address to assist in finding, identifying, and selecting resources appropriate to specific learning needs.

Learn More

New Comp Index (621)

Fundamentals of Resource Description Framework (218)

Identity in RDF (38)

Knows that Uniform Resource Identifiers, or URLs (1994), include Uniform Resource Locators (URLs, which locate web pages) as well as location-independent identifiers for physical, conceptual, or web r (18)

Knows that anything can be named with Uniform Resource Identifiers (URIs), such as agents, places, events, artifacts, and concepts. (17)

Understands that a "real-world" thing may need to be named with a URI distinct from the URI for information about that thing. (8)

Recognizes that URIs are "owned" by the owners of their respective Internet domains. (3)

RDF data model (148)

Understands the difference between literals and non-literall resources. (14)

Knows the subject-predicate-object component structure of a triple. (46)

Understands that URLs and literals denote things in the world ("resources") real, imagined, or conceptual. (28)

Understands that resources are declared to be members (instances) of classes using the property rdf:type. (26)
Topical Cluster » Topic » Competency » Benchmark

RDF vocabularies and application profiles (163)

Designing RDF-based vocabularies (127)

- Uses RDF Schema to express semantic relationships within a vocabulary. (51)
  Correctly uses sub-class relationships in support of inference. (20)
  Correctly uses sub-property relationships in support of inference. (23)

Knows the naming conventions for RDF properties and classes. (8)

Reuses published properties and classes where available. (23)

- Coins namespace URIs, as needed, for any new properties and classes required. (14)
  Drafts a policy for coining URIs for properties and classes. (1)

Competency Index for Linked Data

Structure

- 6 clusters
- 30 topics
- 95 competencies
- 75 benchmarks
Part III. Learning Resources
Connected with the Competencies

• Demo: Finding related learning resources
• Explanation: How a learning resource is described and mapped to CI
Where should I start?

1. Start at the top of the hierarchy and drill down.
2. Select a topic cluster and expand the menu to look through the sub-options.
Clicking on the competency’s text --

Descriptions help individuals make decisions about which resources to investigate further.

An Introduction To Linked Open Data

An extensive slide presentation covering the key components that support RDF: the graph model, the triple statement, and URIs. Also discusses the Web of Data [...]

Introduction To Linked Data

This slide presentation was used as part of a training module aiming to answer the following questions: What is Linked Data; What is Open Data; [...]
An Introduction To Linked Open Data

An extensive slide presentation covering the key components that support RDF: the graph model, the triple statement, and URIs. Also discusses the Web of Data and the principles behind Linked Data (including Open Data). The SPARQL query language is given a high-level overview, as is how inferencing can be achieved using RDF Schema and Web Ontology Language (OWL) or Simple Knowledge Organization System (SKOS). At key points the presentation stops so that the audience can engage in group exercises (prompts included).

URL: http://swib.org/swib14/slides/ostrowski_swib14_45.pdf

Keywords: Simple Knowledge Organization System (SKOS), Graph, Triple, HTTP, URIs, Web Ontology Language (OWL), RDF Schema, Linked Open Data, Web of Data, Linked Data Principles

Author: Ostrowski, Felix
Publisher: Hbz
Date created: 2014-12-01 07:00:00.000
Language: http://id.loc.gov/vocabulary/iso639-2/eng
Time required: P90M
Interactivity type: mixed

- Competencies
  
  Knows Simple Knowledge Organization System, or SKOS (2009), an RDF vocabulary for expressing concepts that are labeled in natural languages, organized into informal hierarchies, and aggregated into co

  Knows that anything can be named with Uniform Resource Identifiers (URIs), such as agents, places, events, artifacts, and concepts.

  Knows the "five stars" of Open Data: put data on the Web, preferably in a structured and preferably non-proprietary format, using URIs to name things, and link to other data.
Publishing Data From The Smithsonian American Art Museum As Linked Open Data

This video discusses the challenges faced when publishing museum data as Linked Data: the databases are large and complex; the information is richly structured and varies from museum to museum; it is difficult to link the data to other datasets. The speaker demonstrates the end-to-end process of starting with the original source data, modeling the data with respect to an ontology of cultural heritage data, linking the data to DBpedia, and then publishing the information as Linked Open Data.

URL: https://www.youtube.com/watch?v=1Vaytr09H1w
Keywords: Ontology, Karma, R2RML, DBpedia
Author: Szekely, Pedro
Date created: 2013-07-24 07:00:00.000
Language: http://id.loc.gov/vocabulary/iso639-2/eng
Time required: PIOM
Educational use: instruction
Educational audience: student
Interactivity type: expositive

• Resources are indexed at the topic and competency Level

600+ openly available learning resources [webinars, podcasts, lectures, web pages, readings ...]

• Mover mouse over the competency to see its location in the index.

Competencies

Knows methods for generating RDF data from tabular data in formats such as Comma-Separated Values (CSV).

Uses available resources for named entity recognition, extraction, and reconciliation.
Try it! Go to: [http://explore.dublincore.net/](http://explore.dublincore.net/) Choose “Explore”

To Explore Linked Data learning resources, select a competency assertion or topic statement in the adjacent panel to view a listing of associated learning resources.

**Explore Learning Resources by Competency**

**Browse by Competency**
- How does this work?
  - New Comp Index (600)
    - Fundamentals of Resource Description Framework (218)
    - Fundamentals of Linked Data (135)
    - RDF vocabularies and application profiles (181)
    - Creating and transforming Linked Data (82)
    - Interacting with RDF data (367)
    - Creating Linked Data applications (0)

**Related Materials**
- View the full Competency Index
- Saved Sets of Learning Resources
- Competency-based Learning Maps
- Competency Index Development Process

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- Start at the top of the hierarchy and drill down.
- Select a topic cluster and expand the menu to look through the sub-options.
Part IV. Using the Competency Index for Linked Data in self-learning, teaching, and training

1. Learning maps -- competencies
2. Saved sets – resources
3. The OCLC Dataset
1. Learning Maps

- Lay out a path to follow
- List competencies targeted to specific audience or theme
- Link each competency to a list of resources which teach the competency
Examples of Learning Maps

See a list of the learning maps at http://explore.dublincore.net/explore-learning-resources-by-competency/learning-maps/

<table>
<thead>
<tr>
<th>Competencies for Catalogers</th>
<th>Created: 8/29/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Considers the paradigm shift necessary to catalog in an expanded era of digital resources and data sharing.</td>
<td>Set Creator: Sean Dolan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competencies for Data Scientists</th>
<th>Created: 8/11/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognizing Linked Data as a valuable resource and dealing with the challenges of transitioning from traditional bibliographic tools to new tools and techniques.</td>
<td>Set Creator: Sean Dolan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competencies for Web Developers</th>
<th>Created: 7/24/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topics include RDF serializations, microdata for HTML marking, and Linked Data principles.</td>
<td>Set Creator: Sean Dolan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competencies for Librarians</th>
<th>Created: 7/22/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deals with the challenges of transitioning from traditional bibliographic tools to new tools and techniques.</td>
<td>Set Creator: Sean Dolan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competencies for Archivists</th>
<th>Created: 7/15/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>For quickly getting archivists up-to-speed with Linked Data standards.</td>
<td>Set Creator: Sean Dolan</td>
</tr>
</tbody>
</table>
E.g., for Catalogers, what are the key competencies?

- Understands the use of datatypes and language tags with literals. 15 resources
- Knows graphic conventions for depicting RDF-based models. 10 resources
- Distinguishes the RDF abstract data model and concrete serializations of RDF data. 41 resources
- Recognizes that owl:sameAs is independent formal semantics that can be used with any formal RDF syntax. 13 resources
- Identifies resource attributes that are potential candidates for RDF properties. 9 resources
- Uses RDF Schema to express the logical structure of a problem. 53 resources
- Coins namespace URIs required. 14 resources
- Knows Simple Knowledge Organization System (SKOS) vocabulary for expressing descriptive thesauri, organized into information blocks. 24 resources
- Knows SKOS eXtension for Labels, or SKOS-XL (2009), a small set of additional properties for describing and linking lexical labels as instances of the class Label. 4 resources
- Managing identifiers (URI). 19 resources
- Creating RDF data. 44 resources
- Cleaning and reconciling RDF data. 17 resources
- Mapping and enriching RDF data. 32 resources
- Knows the SPARQL 1.1 Update language for updating, creating, and removing RDF graphs in a Graph Store. 32 resources
- Understands the difference between SQL query language (which operates on database tables) and SPARQL (which operates on RDF graphs). 43 resources

Below each competency, the number of tagged resources are listed.

Clicking this link will take you to these resources.
2. Saved Sets – resources

- Curated collection of learning resources
- Targeted to a specific audience or theme
- Each item links to a resource’s description page

http://explore.dublincore.net/explore-learning-resources-by-competency/all-saved-sets
Resources for Catalogers
Created: 6/10/2017

Resources for Data Scientists
Created: 6/10/2017
Recognizing Linked Data as a valuable resource and dealing with unfamiliar domains.
Set Creator: Sean Delen

Resources for Web Developers
Created: 7/9/2017
Emphasizing how Linked Data affects page markup and search engine optimization.
Set Creator: Sean Delen

Resources for Librarians
Created: 7/9/2017
These resources focus on transitioning from traditional bibliographic records to Linked Data.
Set Creator: Sean Delen

Resources for Archivists
Created: 7/9/2017
Some of these resources present Linked Data in the context of library and archival data that are invaluable to this audience.
Set Creator: Sean Delen

SKOS
Created: 3/1/2017
Learning SKOS for transferring thesauri into LOD
Set Creator: mephy

PCC Standing Committee on Training Recommended
Created: 10/31/2016
Set Creator: mephy

Learning Resources in Saved Set: Resources for Catalogers (13 resources)

The Academy Unbound Linked Data as Revolution
Much has been said about Linked Data, its ties to the Semantic Web, and its application for libraries, but what is it exactly and how...

Metadata Crosswalks
This slide presentation focuses on search interoperability, which the author defines as the “ability to perform a search over diverse sets of metadata records to...”

Linked Data at the National Library of Sweden
This talk explains how LIBRIS, the National Library of Sweden’s union catalog, has been linked via an interface to RDF datasets. The first speaker discussed...

Free Your Metadata: Clean up your metadata
A brief tutorial containing both a screencast and text instructions for cleaning an example dataset (from the Powerhouse Museum) using Open Refine (formerly Google Refine)..."

The Vocabulary Mapping Framework (VMF): An Introduction v1.0
This document provides an introduction to the structure and development of the Vocabulary Mapping Framework (VMF) up to the end of the first stage of...

Linked Data Patterns
This resource is a pattern catalogue for modelling, publishing, and consuming Linked Data which adapts a tried and tested means of communicating knowledge and experience...

BIBFRAME Training at the Library of Congress: Introduction to the Semantic Web and Linked Data
This resource was developed by the Library of Congress as one part of a pilot training project which tested the use of BIBFRAME for bibliographic...

An Introduction to RDF Schema
This slide presentation discusses RDF Schema, including classes, subclasses, and instances. Concepts such as domain and range, datatypes and literals, labels and comments are also...

Joining the Linked Data Cloud in a Cost-Effective Manner
Linked Data holds the promise to derive additional value from existing data throughout different sectors, but practitioners currently lack a straightforward methodology and the tools...

Publishing Relational Databases as Linked Data
These slides appear to have been used for a course in Database Management Systems at the University of Toronto, but contain material which the creator...

http://explore.dublincore.net/explore-learning-resources-by-competency/all-saved-sets

M.Zeng & LD4PE Team
3. The OCLC Dataset

WorldCat Linked Data (Library Science Subset)

Extracted from the original MARC records based on:
- FAST headings
- DDC classes
- LCC subclasses

Why provide a dataset?

- You have static data to test skills on or to use in creating new learning resources
- Ensures that consistent results can be obtained from queries and that access will not suddenly disappear

Access the static dataset at: http://purl.org/dataset/WorldCat/LibraryScienceSubset

A tutorial and some example queries are available for those interested in getting started in using this resource.

This dataset identifies and describes bibliographic resources gleaned from library, archives, and museum data from around the world. This subset is focused on bibliographic resources broadly related to the theme of library science. Specifically, resource descriptions were extracted from the original MARC records if they met at least one of the following criteria:

- FAST headings "library", "libraries", "librarian", or "librarianship" in field 650
- DDC classes "Library & information sciences" (020 through 028) in field 082
- LCC subclasses for "Libraries" (Z662 through Z1000.6)
- "Information resources (General)" (ZA 3038 through ZA 5190) in field 050.

Records with "N@F" in the 040 field (name of the organization that created the original record) were excluded. Download more detailed information at (PDF 42KB)
The OCLC Dataset

DOWNLOAD as:
N-TRIPLES
MARC/XML

LICENSE:
ODC-BY

AVAILABILITY:
through December 2027

WorldCat Linked Data (Library Science Subset)

VoID Dataset Description

<http://purl.org/dataset/WorldCat/LibraryScienceSubset>

<table>
<thead>
<tr>
<th>cc attributionName</th>
<th>WorldCat Linked Data (Library Science Subset)</th>
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<td>cc attribution URL</td>
<td><a href="http://purl.org/dataset/WorldCat/LibraryScienceSubset">http://purl.org/dataset/WorldCat/LibraryScienceSubset</a></td>
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<tr>
<td>cc morePermission</td>
<td>&lt;mailto: <a href="mailto:data@oclc.org">data@oclc.org</a>&gt;</td>
</tr>
</tbody>
</table>

Attribution
The preferred form of attribution is:

"Contains OCLC WorldCat Linked Data (Library Science Subset) information made available under the ODC Attribution license. The OCLC cooperative requests that users of WorldCat derived data contained in this work conform with the WorldCat Community Norms."

Special cases: In circumstances where providing the full attribution statement above is not technically feasible, the use of canonical WorldCat Work URLs is adequate to satisfy Section 4.3 of the ODC Attribution license.

schema description
"WorldCat Linked Data (Library Science Subset) is a dataset that identifies and describes bibliographic resources that are gleaned from library, archives, and museum data from around the world. This subset is focused on bibliographic resources broadly related to the theme of library science. WorldCat is a registered trademark of OCLC Online Computer Library Center, Inc."

creativecommons
<http://creativecommons.org/licenses/by/1.0/>

schema publisher
<http://viaf.org/viaf/16560870>

schema homepage
<http://www.oclc.org>

schema page
<http://worldcat.org/identities/lccn-n78-15781>

schema nameAs
<http://dbpedia.org/resource/Online_Computer_Library_Center>

ACCESS THE DATASET AT:
http://purl.org/dataset/WorldCat/LibraryScienceSubset

M.Zeng & LD4PE Team
A tutorial and some example queries are available for those interested in getting started in using this resource.
TUTORIAL:

- **DOWNLOAD DATASET**
  - N-Triples

- **STORE PERSISTENTLY**
  - Apache Jena’s TDB (Triple Store)

- **Query using SPARQL**
  - Command Line using TDBQUERY (similar to ARQ)
  - Interpreting and storing results

---

**Accessing the Dataset**

Let's say that a colleague has given you a link to a dataset: [example dataset link]

**Storing the Data**

Before you can start querying the data, we need to load it into Apache Jena's TDB.

**Querying the Data**

When faced with a new and unfamiliar dataset, it is helpful to first describe the data. Without this knowledge, writing queries is difficult and can quickly give you an idea what a dataset is all about.

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**Simple Queries**

The following sections contain walkthroughs of some simpler SPARQL queries for users new to the SPARQL query language.

**Simple Query 1: Union and Shared Subjects**

Start with this query. What languages are represented in the dataset?

To write this query, you need to determine one vital piece of information: what classes and properties are in the dataset.

**Simple Query 2: Optional and Turning an Object into a Node**

Now that we know which properties are used to describe the dataset, let's limit the type of CreativeWorks we are looking for to random samples of data.

**Simple Query 3: Negation Using Not Exists and Minus**

What if, on the hand, we had wanted to write a query specifying data in other languages (i.e., works originally written in French) or topic of NEGATION?

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**Download exercises for Simple Query 1**

Download detailed introductory information [PDF, 274KB]

Download exercises for Simple Query 2 [PDF, 203KB]

Download exercises for Simple Query 3 [PDF, 118KB]

Additional SPARQL Exercises

You are now ready to try writing some queries on your own which accomplish each task (answers).

Download SPARQL exercises [PDF, 128KB]

Download exercise answer walkthrough [PDF, 169KB]
Summary (1)

*Competency Index for Linked Data*

What is a competency index used for?

- Describes what a learner can learn.
- Describes skills that demonstrate understanding.
- Basis for:
  - job descriptions
  - course syllabi
  - university degrees
  - micro-credentials
  - digital badges
- Tags descriptions of learning resources.
- ...

M.Zeng & LD4PE Team
Who can benefit from it?

- **Students**: help choose courses that cover what you want to learn.
- **Instructors**: design a course, syllabus, homework, quizzes, exams.
- **Self-learners**: explore technologies and methods related to Linked Data.
- **Employers**: write a job description.
Competency Index for Linked Data is a work in progress!

Follow us on Github!

https://dcmi.github.io/ldci/D2695955/

Editoral Board
- Tom Baker, chair
- Debbie Maron
- Kai Eckert
- Magnus Pfeffer
- Stuart Sutton

A: Fundamentals of Resource Description Framework
- B: Identity in RDF
  - C: Knows that anything can be named with Uniform Resource Identifiers (URIs), such as agents, places, events, artifacts, and concepts.
## Competency Index for Linked Data Websites

<table>
<thead>
<tr>
<th>Available at:</th>
<th>Contents</th>
</tr>
</thead>
</table>
| LD4PE Project site: [http://explore.dublincore.net/](http://explore.dublincore.net/) | • Competencies  
• Learning resources (aligned with competencies)  
• Roadmaps  
• Practice dataset and instruction |
| Maintenance at GitHub: [https://dcmi.github.io/ldci/](https://dcmi.github.io/ldci/) | • Competencies  
• Updates from the editorial board  
• Contribution by anyone is welcome |
| Registered at: Achievement Standards Network (ASN) [http://asn.desire2learn.com/resources/D2695955](http://asn.desire2learn.com/resources/D2695955) | • Competencies  
• Definition, URI of each competency  
• Specification |
References

- Linked Data for Professional Education (LD4PE); Explore Learning Resources by Competency http://explore.dublincore.net/

- Linked Data Competency Index https://dcmi.github.io/ldci/D2695955/


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