Making a Library Catalogue Part of the Semantic Web
Making a Library Catalogue Part of the Semantic Web

or

If Tim Berners-Lee says HTTP URIs are OK then ...
What, how, why

• What we did
• How we did it
• Why we did it
LIBRIS

• Swedish Union Catalogue
• Created cooperatively by around 200 member libraries
• Hosted by the Royal Library
• 6.5M bibliographic records
• ~200k authority records
LIBRIS

• New web OPAC in 2007-2008
• Built from the ground up
• We use iterative development techniques, agile development, user centered design
• Open and collaborative development
• We are in control of almost everything, very few dependencies
Search for "the difference engine" on LIBRIS.
Search: the difference engine

Result 1–6 of 6

Sort by: relevancy

1. Gibson, William, 1948– (author)
The difference engine / William Gibson & Bruce Sterling
1990
Book
2 libraries

2. Gibson, William, 1948– (author)
The difference engine / William Gibson and Bruce Sterling
1996
Book
1 library

3. Babbage, Charles (author)
The works of Charles Babbage. Vol. 2. The difference engine and table making / edited by Martin Campbell-Kelly
1989
Book
2 libraries

4. History of the Internet: a chronology, 1843 to the present / Christos J.P. Moschovitis ...
1999
Book
11 libraries

5. Lindgren, Michael 1953– (author)

Refine your search

Author
- Gibson, William, 1948– (2)
- Sterling, Bruce, 1955– (2)
- Lindgren, Michael, 1953– (2)
- McKay, Craig G. (2)
- Babbage, Charles (1)
- Campbell-Kelly, Mart (1)
- show more...

Type
- book (6)
- e-resource
- theses

Language
- English (6)

Year
- 1999 (1)
- 1996 (1)
- 1990 (2)
- 1989 (1)
- 1987 (1)

Subject (SAB)
- Technology, Manufacturing... (4)
- Biography and Genealogy (2)
- Business and Economics (1)
The difference engine / William Gibson and Bruce Sterling

Gibson, William, 1948- (author)
Sterling, Bruce, 1954- (author)
London : Vista, 1996
English 383 p.

Abstract  Subject headings
The difference engine / William Gibson and Bruce Sterling

Gibson, William, 1948-- (author)
Sterling, Bruce, 1954- (author)
London : Vista, 1996
English 383 s.
Book

Abstract Subject headings

Get it Other editions

Loan ILL

Title available at 1 library. Expand list

Find similar
- More titles by
  - Gibson, William, 194...
  - Sterling, Bruce, 195...
- More titles about
  - American fiction
  - Steampunk

Search outside LIBRIS
- Title in Google Book Search:
  - The difference engin...
- Extend your search to:
  - Google
  - Google Book Search
  - Google Scholar
  - Scirus
  - LibraryThing

Wikipedia about the author:
- William Gibson
The difference engine / William Gibson and Bruce Sterling

Gibson, William, 1948- (author)
Sterling, Bruce, 1954- (author)
ISBN 0-575-06029-2 (pbk)
London : Vista, 1996
English 383 s.

"The difference engine" exists in 2 editions in 1 languages

English (2)

The difference engine / William Gibson and Bruce Ster... 1996 1 lib.
The difference engine / William Gibson & Bruce Ster... 1990 2 lib.

2 of 6 Previous record Next record To hitlist
"Fröken Julie." exists in 138 editions in 30 languages

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<th>Language</th>
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### Swedish (39)

- Fröken Julie (Viddecoppstavg) / August Strindberg
- Liteväxt kompendium: Inför En stilla middag med fam... 2007
- Fadren: Fröken Julie / August Strindberg 2006
- Fröken Julie / August Strindberg, återbearbetad av Bu... 2006
- Fröken Julie: ett naturalistiskt sorgspel / av Aug... 2005
- Fadren (Elektronisk resurs) / Fröken Julie / August S... 2004
- Fröken Julie (Elektronisk resurs) / August Strindberg 2003

### English (28)

- After Miss Julie: a version of Strindberg’s Miss Jul...
- Plays: The father, Countess Julie, The outlaws, The st... 2003
- August Strindberg: Five major plays / translated by ... 2000
- The Father: Lady Julie: Playing with fire / August ... 1998
- Miss Julie and other plays / August Strindberg, tran... 1998
- After Miss Julie: a version of Strindberg’s Miss Jul... 1996
- Miss Julie / August Strindberg, in a new translation... 1996

### German (13)

- Fräulein Julie: Drama / August Strindberg; aus dem ... 2000
- Fräulein Julie: ein naturalistisches Trauerspiel / ... 1993
- Dramen in drei Bänden, Bd. 1, Fräulein Julie und fünf ... 1989
- Dramen in drei Bänden, Bd. 1, Meister Olaf, Der Vater... 1984
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</table>
Why search/retrieve protocols ...

- SRU/Z39.50/... does not give the user access to extended information ....
- ... without extensive knowledge about the indices, the server, how the data is structured, etc., etc.
You could ...

- expose this information in the response of a search/retrieve operation
- build protocols for missing resources, resources that have moved, etc.
- perhaps with multiple access mechanisms
But ...

• you’d end up re-implementing HTTP within another protocol

• for the library community
Linked Data

• Use URIs as names for things
• Use HTTP URIs so that people can look up those names
• When someone looks up a URI, provide useful information
• Include links to other URIs, so that they can discover more things
URIs as names

- libris-bib:123
- libris-auth:456
- libris-hold:789
Use HTTP URIs

• http://libris.kb.se/resource/bib/123 is a URI for a book

• http://libris.kb.se/bib/123 is a URI for page (about a book)
Provide useful information

• Most OPACs do this ...
• ... just not in a machine readable way
• LIBRIS provides RDF through content negotiation
Include links

• Most OPACs do this ...
• ... just not in a machine readable way
• LIBRIS RDF includes links to other resources, internal and external
The difference engine / William Gibson and Bruce Sterling

Gibson, William, 1948- (author)
Sterling, Bruce, 1954- (author)
London : Vista, 1996
English 383 s.

More titles by
- Gibson, William, 194...  
- Sterling, Bruce, 195...

More titles about
- American fiction
- Steampunk

Title in Google Book Search:
- The difference engi...

Extend your search to:
- Google
- Google Book Search
- Google Scholar
- Sciurus
- LibraryThing

Wikipedia about the author:
- William Gibson
Link-tag
Other ways

- GRDDL (Gleaning Resource Descriptions from Dialects of Language)
- RDFa
- Hash URIs
- Cool URIs for the Semantic Web
Example - book

# RDF in Turtle/N3 created for the bibliographic record 5059476
<http://libris.kb.se/resource/bib/5059476>
  foaf:page <http://libris.kb.se/bib/5059476>;
  rdfs:isDefinedBy <http://libris.kb.se/data/bib/5059476>;

# short bibliographic description
  dc:title "The difference engine";
  dc:creator "Gibson, William, 1948-";
  dc:creator "Sterling, Bruce, 1954-";
  dc:subject "Steampunk";
...

# links to authors with authority records
  dc:creator <http://libris.kb.se/resource/auth/220040>;
  dc:creator <http://libris.kb.se/resource/auth/307779>;

# links to subjects with authority records
  dc:subject <http://libris.kb.se/resource/auth/308073>;
  dc:subject <http://libris.kb.se/resource/auth/308074>;

# links to other editions of the same work
  libr:frbr_related <http://libris.kb.se/resource/bib/5060570>;

# user annotations
  annotate:hasAnnotation <http://libris.kb.se/resource/annotation/123>;

# book is held by the following libraries
  libr:held_by <http://libris.kb.se/resource/library/Sk>;
# RDF in Turtle/N3 created for the bibliographic record 5059476
<http://libris.kb.se/resource/bib/5059476>
  foaf:page <http://libris.kb.se/bib/5059476>;
  rdfs:isDefinedBy <http://libris.kb.se/data/bib/5059476>;

# short bibliographic description
  dc:title "The difference engine";
  dc:creator "Gibson, William, 1948-";
  dc:creator "Sterling, Bruce, 1954-";
  dc:subject "Steampunk";
...

# links to authors with authority records
  dc:creator <http://libris.kb.se/resource/auth/220040>;
  dc:creator <http://libris.kb.se/resource/auth/307779>;

# links to subjects with authority records
  dc:subject <http://libris.kb.se/resource/auth/308073>;
  dc:subject <http://libris.kb.se/resource/auth/308074>;

# links to other editions of the same work
  libriss:frbr_related <http://libris.kb.se/resource/bib/5060570>;

# user annotations
  annotatea:hasAnnotation <http://libris.kb.se/resource/annotation/a23>;

# book is held by the following libraries
  libriss:held_by <http://libris.kb.se/resource/library/Sk>;
Example - book

# RDF in Turtle/N3 created for the bibliographic record 5059476
<http://libris.kb.se/resource/bib/5059476>
foaf:page <http://libris.kb.se/bib/5059476>;
rdfs:isDefinedBy <http://libris.kb.se/data/bib/5059476>;

# short bibliographic description
dc:title "The difference engine";
dc:creator "Gibson, William, 1948-";
dc:creator "Sterling, Bruce, 1954-";
dc:subject "Steampunk";
...

# links to authors with authority records
dc:creator <http://libris.kb.se/resource/auth/220040>;
dc:creator <http://libris.kb.se/resource/auth/307779>;

# links to subjects with authority records
dc:subject <http://libris.kb.se/resource/auth/308073>;
dc:subject <http://libris.kb.se/resource/auth/308074>;

# links to other editions of the same work
libris:frbr_related <http://libris.kb.se/resource/bib/5060570>;

# user annotations
annotate:hasAnnotation <http://libris.kb.se/resource/annotation/123>;

# book is held by the following libraries
libris:held_by <http://libris.kb.se/resource/library/Sk>;
Content negotiation

http://libris.kb.se/resource/auth/94541

http://libris.kb.se/data/auth/94541

Web browser

semantic web robot
Person: Gibson, William, 1948-

DBPedia
http://dbpedia.org/data/William_Gibson

Wikipedia

misc.
text/rdf+n3
application/rdf+xml
OpenLink RDF browser
Example - person

(FOAF)

# RDF in Turtle/N3 created for the authority record 220040
<http://libris.kb.se/resource/auth/220040>
    rdfs:isDefinedBy <http://libris.kb.se/data/auth/220040> ;

    # type of authority record
    rdf:type <http://xmlns.com/foaf/0.1/Person> ;

    # description
    foaf:name "Gibson, William, 1948-" ;
    foaf:name "William Gibson" ;
    ...

    # links to external resources
    owl:sameAs <http://dbpedia.org/data/William_Gibson> ;

    # links to books by this author
Example - person (FOAF)

```turtle
# RDF in Turtle/N3 created for the authority record 220040
<http://libris.kb.se/resource/auth/220040>  
  rdfs:isDefinedBy <http://libris.kb.se/data/auth/220040> ;

# type of authority record
  rdf:type <http://xmlns.com/foaf/0.1/Person> ;

# description
  foaf:name  "Gibson, William, 1948-" ;
  foaf:name  "William Gibson" ;
  ...

# links to external resources
  owl:sameAs  <http://dbpedia.org/data/William_Gibson> ;

# links to books by this author
```
Example - subject heading (SKOS)

```turtle
# RDF in Turtle/N3 created for the authority record 308074
<http://libris.kb.se/resource/auth/308074>  
  rdfs:isDefinedBy <http://libris.kb.se/data/auth/308074> ;

# type of authority record
rdfs:type skos:Concept ;

# description
skos:prefLabel "Steampunk" ;
skos:related "Science fiction" ;
skos:related "Cyberpunk" ;

# links to other subjects
skos:related <http://libris.kb.se/resource/auth/243892> ;
skos:related <http://libris.kb.se/resource/auth/142481> ;

# links to external resources
owl:sameAs <http://dbpedia.org/page/Steampunk> .

# links to books with this subject
```
Example - library
(FOAF)

@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> . @prefix foaf: <http://xmlns.com/foaf/0.1/> . @prefix geo: <http://www.w3.org/2003/01/geo/wgs84_pos#> . @prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
Example - library (FOAF)

@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix geo: <http://www.w3.org/2003/01/geo/wgs84_pos#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .

Links, links, links
External links

- ~12,000 links to LCSH.INFO
- A handful of links to Wiki/DBPedia
- ... ~30,000 on the way in
External links

Mothers  skos:exactMatch  Mödrar

Lesbian mothers  skos:exactMatch  Lesbiska mödrar
External links

Mothers \(\text{skos:exactMatch}\) Mödrar

Lesbian mothers \(\text{skos:narrower}\) Lesbiska mödrar
External links

Mothers skos:exactMatch Mödrar

Lesbian mothers skos:exactMatch Lesbiska mödrar
External links

http://lcsh.info/sh123456#concept
External links

http://lcsh.info/sh123456#concept

http://loc.gov/..../1234
External links

LIBRIS

http://libris.kb.se/...

NAD

http://ra.se/...
External links

http://dbpedia.org/

http://libris.kb.se/
http://ra.se/

LIBRIS
NAD
External links

- http://dbpedia.org/...
- http://libris.kb.se/...
- http://ra.se/...

LIBRIS

NAD
External links

“Virtual Internet Authority File”

http://libris.kb.se/...

http://ra.se/...

LIBRIS

NAD
How
How

• RDF server exposes LIBRIS as Linked Data
• “Library Database” can deliver RDF
• Search engine can output RDF for FRBR-relations
• Everything gets mashed up when delivering the complete RDF
• Records can be tagged with properties without changing the record
Why?

• The Semantic Web could be the technology that bridges the gap between “library technology” and the rest of it

• We get more eyes looking at our data

• Eyes are connected to brains ...

• Sometimes we are “just” data providers
Why?

• A good building block for future applications

• You get to use SPARQL

• http://libris.kb.se/sprot/skostest.jsp?query=Historia
Why?

• Libraries are about openness, but that was somehow forgotten when it came to sharing metadata.

• Why are there not (at least) ten search engines containing the majority of the worlds library data?
• Search/retrieve access to library data is to Linked Data what Gopher was to the web
• Search/retrieve access to library data is to Linked Data what Gopher was to the web
It’s the semantic WEB!