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

LIBRIS

http://libris.kb.se/

berners

draw | laga mat | Robot | iPhone | SemWeb | Outlook | webbserier | blogs (377) | post to del.icio.us | inbox | my del.icio.us

LIBRIS

LIBRIS SEARCH FACILITIES | HELP | PÅ SVENSKA | PREFERENCES | CLEAR HISTORY

Start | Extended search | Index A–Ö | Boolean | Subdatabases | Search history

the difference engine

Search

Explore

You can find books, theses, journals, music, e-books etc.

We guide you through LIBRIS

Customize

A LIBRIS as you like it – favourite library, contrast ....

Contrast | Views | My libraries

What is LIBRIS?

The Swedish university and research libraries search service

Read more | Give us feedback

Latvia (in focus at Gothenburg Book Fair)

Latest news | Swedish Official Publications | Latvia | New Swedish books

About LIBRIS
- Give us feedback
- Privacy

Help
- Contact
- Ask the Library
- Technical information

On your site
- Search boxes
- Plug-ins
- Bookmarklet

Customize
- Text size
- Contrast
- Views

Search facilities
- bibliotek.se (in Swedish)
- Uppsök (in Swedish)
- Samsök (in Swedish)

Copyright © LIBRIS – National Library Systems

LIBRIS – search: the difference engine

http://libris.kb.se/hitlist?d=libris&q=the+difference+engine&f=simp&spe

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Start | Extended search | Index A–Ö | Boolean | Subdatabases | Search history

the difference engine

Search

Search: the difference engine

Result 1–6 of 6

Sort by: relevancy Group by: none Hits per page: 10

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, 194 ... (2)
- Sterling, Bruce, 195 ... (2)
- Lindgren, Michael, 1 ... (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)
- Poetry and Fiction (1)

LIBRIS – The difference engine /

http://libris.kb.se/bib/5060570

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LIBRIS

LIBRIS SEARCH FACILITIES | HELP | PÅ SVENSKA | PREFERENCES | CLEAR HISTORY

Start | Extended search | Index A–Ö | Boolean | Subdatabases | Search history

the difference engine

Search

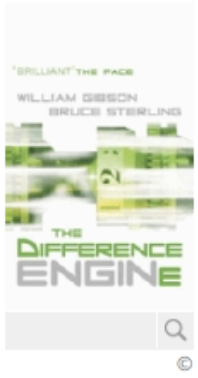
Search: the difference engine > The difference engi...

2 of 6 Previous record | Next record | To hitlist

Overview | Details

The difference engine / William Gibson and Bruce Sterling

Gibson, William, 1948– (author)
Sterling, Bruce, 1954– (author)
ISBN 0-575-60029-2 (pbk)
London : Vista, 1996
English 383 s.
Book



Abstract | Subject headings

SAVE | CITE | EMAIL | Permalink

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 engi...

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

Wikipedia about the author:
- William Gibson

BOOKMARK

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http://libris.kb.se/bib/5060570

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LIBRIS

LIBRIS SEARCH FACILITIES | HELP | PÅ SVENSKA | PREFERENCES | CLEAR HISTORY

Start | Extended search | Index A–Ö | Boolean | Subdatabases | Search history

the difference engine

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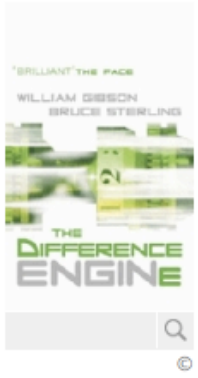

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- Google Scholar
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- LibraryThing

Wikipedia about the author:
- William Gibson

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Sterling, Bruce, 1954– (author)
ISBN 0-575-60029-2 (pbk)
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English 383 s.
Book

▸ **Abstract** ▸ **Subject headings**

SAVE CITE EMAIL ▸ Permalink

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Loan | ILL

Title available at 1 library. • Expand list

▾ **Southern Sweden** (1) ADD AS FAVOURITE

Folkbiblioteken i Lund (Ld) ADD AS FAVOURITE
Local library catalogue
Shelf mark: (Skönlitteratur. Annan uppl. kan finnas vid biblioteket)
▸ **Loan status** ▸ **Opening hours, address etc.**

1 of 1 ◂ Previous record | Next record ▸ To hitlist

▸ Steampunk

▾ **Search outside LIBRIS**

Title in Google Book Search:
• The difference engi...
Extend your search to:
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• Google Scholar
• Scirus
• LibraryThing
Wikipedia about the author:
• William Gibson

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	• Technical information	• Bookmarklet	• Views	• Samsök (in Swedish)

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Sterling, Bruce, 1954– (author)
ISBN 0-575-60029-2 (pbk)
London : Vista, 1996
English 383 s.
Book

Abstract Subject headings

SAVE CITE EMAIL Permalink

Get it | Other editions

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

English (2)

English (2)

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

2 of 6 Previous record | Next record To hitlist

More titles about
American fiction
Steampunk

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Google Book Search
Google Scholar
Scirus
LibraryThing

Wikipedia about the author:
William Gibson

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Give us feedback	Error in the record?	Search boxes	Text size	bibliotek.se (in Swedish)
Privacy	Contact	Plug-ins	Contrast	Uppsök (in Swedish)
	Technical information	Bookmarklet	Views	Samsök (in Swedish)

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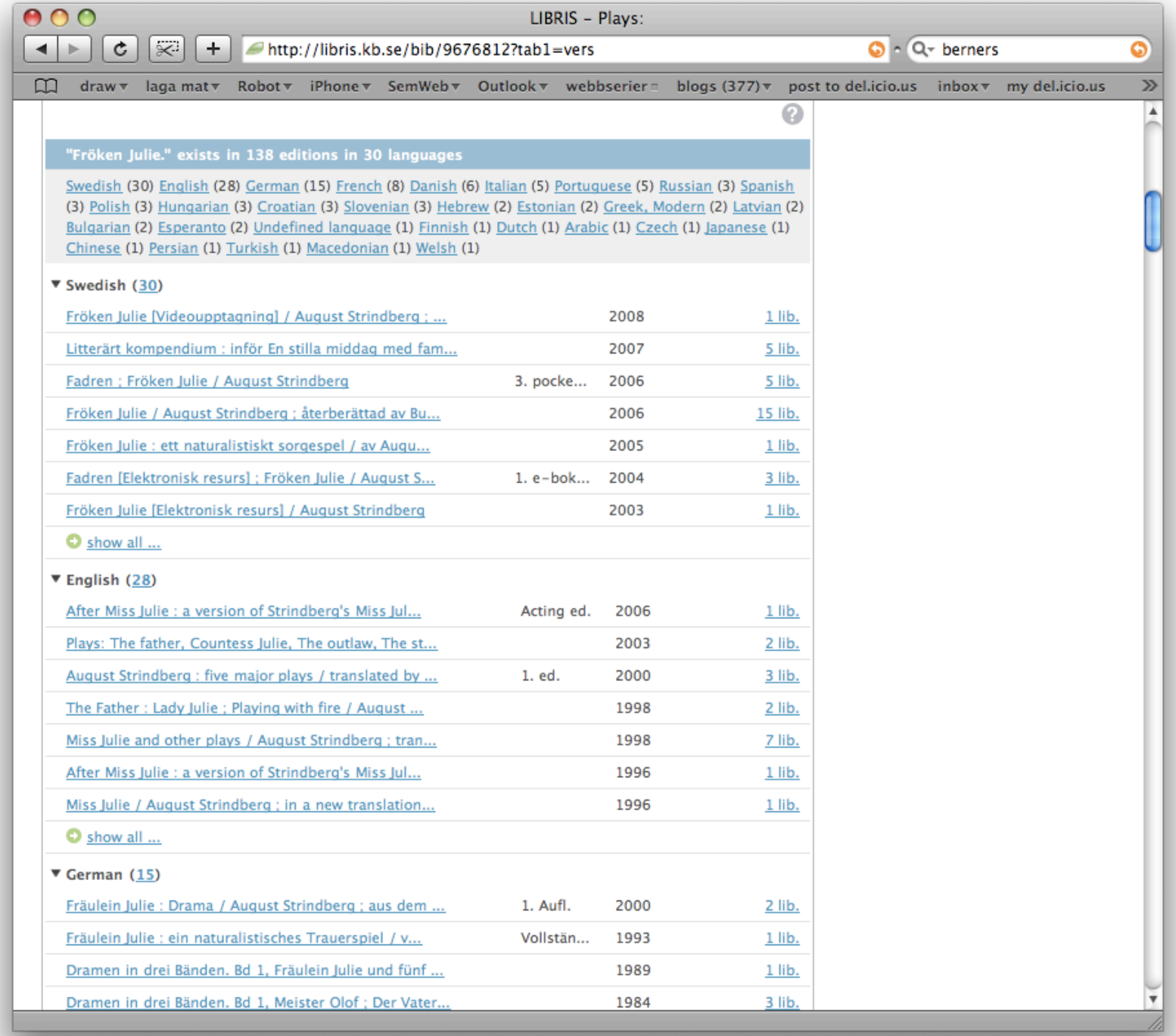


"Fröken Julie." exists in 138 editions in 30 languages

Swedish (30) English (28) German (15) French (8) Danish (6) Italian (5) Portuguese (5) Russian (3) Spanish (3) Polish (3) Hungarian (3) Croatian (3) Slovenian (3) Hebrew (2) Estonian (2) Greek, Modern (2) Latvian (2) Bulgarian (2) Esperanto (2) Undefined language (1) Finnish (1) Dutch (1) Arabic (1) Czech (1) Japanese (1) Chinese (1) Persian (1) Turkish (1) Macedonian (1) Welsh (1)

Swedish (30)

Fröken Julie [Videoupptagning] / August Strindberg ; ...		2008	1 lib.
Litterärt kompendium : inför En stilla middag med fam...		2007	5 lib.
Fadren ; Fröken Julie / August Strindberg	3. pocke...	2006	5 lib.
Fröken Julie / August Strindberg ; återberättad av Bu...		2006	15 lib.
Fröken Julie : ett naturalistiskt sorgespel / av Augu...		2005	1 lib.
Fadren [Elektronisk resurs] ; Fröken Julie / August S...	1. e-bok...	2004	3 lib.
Fröken Julie [Elektronisk resurs] / August Strindberg		2003	1 lib.

show all ...

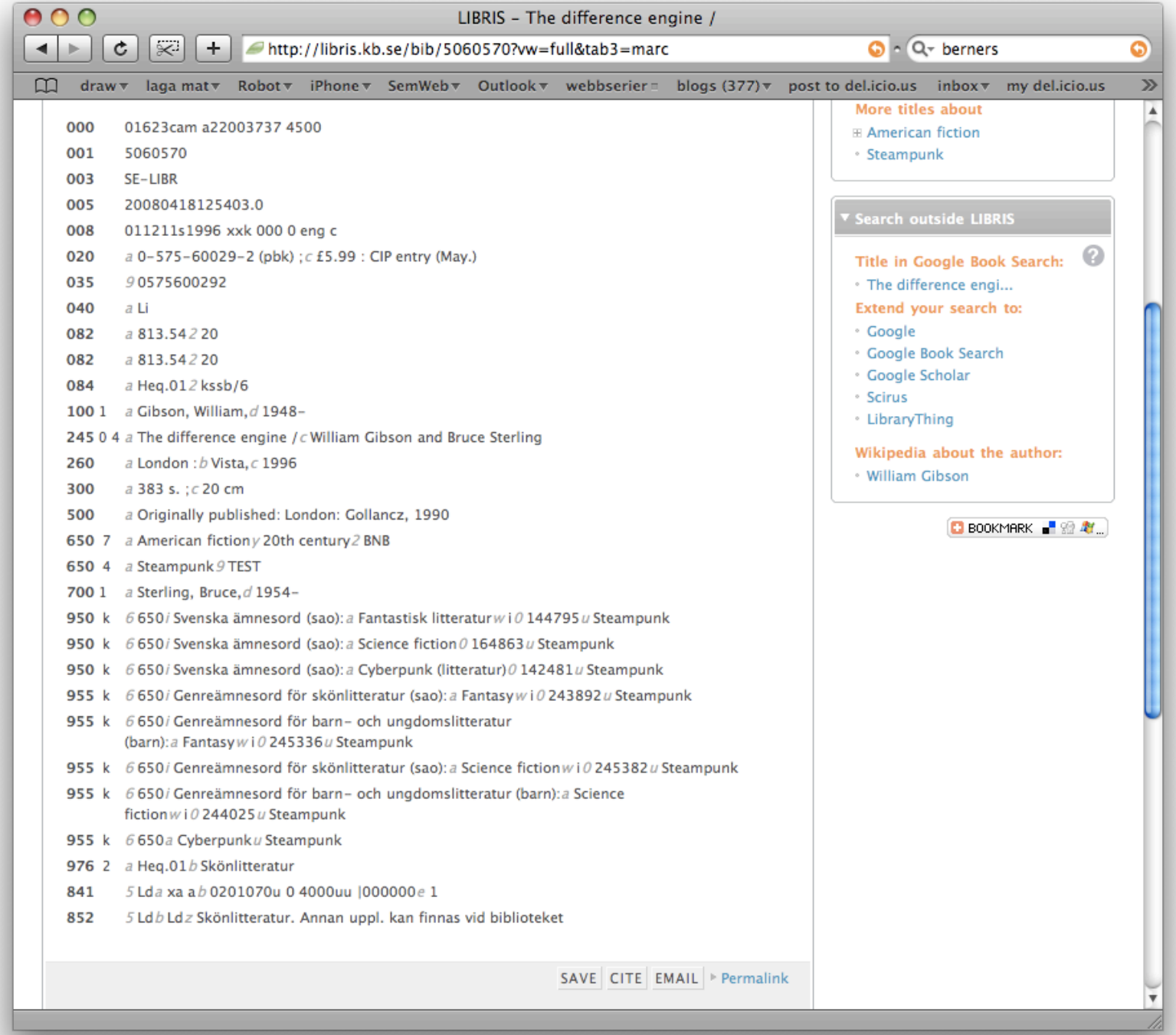
English (28)

After Miss Julie : a version of Strindberg's Miss Jul...	Acting ed.	2006	1 lib.
Plays: The father, Countess Julie, The outlaw, The st...		2003	2 lib.
August Strindberg : five major plays / translated by ...	1. ed.	2000	3 lib.
The Father : Lady Julie ; Playing with fire / August ...		1998	2 lib.
Miss Julie and other plays / August Strindberg ; tran...		1998	7 lib.
After Miss Julie : a version of Strindberg's Miss Jul...		1996	1 lib.
Miss Julie / August Strindberg ; in a new translation...		1996	1 lib.

show all ...

German (15)

Fräulein Julie : Drama / August Strindberg ; aus dem ...	1. Aufl.	2000	2 lib.
Fräulein Julie : ein naturalistisches Trauerspiel / v...	Vollstän...	1993	1 lib.
Dramen in drei Bänden. Bd 1, Fräulein Julie und fünf ...		1989	1 lib.
Dramen in drei Bänden. Bd 1, Meister Olof ; Der Vater...		1984	3 lib.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post to del.icio.us
inbox
my del.icio.us
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001 5060570
003 SE-LIBR
005 20080418125403.0
008 011211s1996 xxk 000 0 eng c
020 a 0-575-60029-2 (pbk) ;c £5.99 : CIP entry (May.)
035 9 0575600292
040 a Li
082 a 813.54 2 20
082 a 813.54 2 20
084 a Heq.01 2 kssb/6
100 1 a Gibson, William, d 1948-
245 0 4 a The difference engine / c William Gibson and Bruce Sterling
260 a London : b Vista, c 1996
300 a 383 s. ;c 20 cm
500 a Originally published: London: Gollancz, 1990
650 7 a American fiction y 20th century 2 BNB
650 4 a Steampunk 9 TEST
700 1 a Sterling, Bruce, d 1954-
950 k 6 650 i Svenska ämnesord (sao): a Fantastisk litteratur w i 0 144795 u Steampunk
950 k 6 650 i Svenska ämnesord (sao): a Science fiction 0 164863 u Steampunk
950 k 6 650 i Svenska ämnesord (sao): a Cyberpunk (litteratur) 0 142481 u Steampunk
955 k 6 650 i Genreämnesord för skönlitteratur (sao): a Fantasy w i 0 243892 u Steampunk
955 k 6 650 i Genreämnesord för barn- och ungdomslitteratur (barn): a Fantasy w i 0 245336 u Steampunk
955 k 6 650 i Genreämnesord för skönlitteratur (sao): a Science fiction w i 0 245382 u Steampunk
955 k 6 650 i Genreämnesord för barn- och ungdomslitteratur (barn): a Science fiction w i 0 244025 u Steampunk
955 k 6 650 a Cyberpunk u Steampunk
976 2 a Heq.01 b Skönlitteratur
841 5 Ld a xa a b 0201070u 0 4000uu |000000 e 1
852 5 Ld b Ld z Skönlitteratur. Annan uppl. kan finnas vid biblioteket
SAVE
CITE
EMAIL
Permalink
More titles about
American fiction
Steampunk
Search outside LIBRIS
Title in Google Book Search:
The difference engi...
Extend your search to:
Google
Google Book Search
Google Scholar
Scirus
LibraryThing
Wikipedia about the author:
William Gibson
BOOKMARK

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

LIBRIS – The difference engine /

http://libris.kb.se/bib/5060570

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Search

Search: the difference engine > The difference engi...

2 of 6 Previous record | Next record | To hitlist

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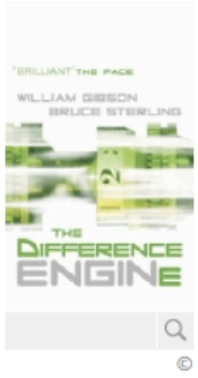
Book



Abstract | Subject headings

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- Sterling, Bruce, 195 ...

More titles about
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Extend your search to:
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- Google Book Search
- Google Scholar
- Scirus
- LibraryThing

Wikipedia about the author:
- William Gibson

BOOKMARK

Link-tag

```
<!--libris.kb.se-->
<script src="http://maps.google.com/maps?file=api&amp;v=2&amp;key=ABQIAAAA7fEQxiquYckwtSpHsnjFsRTevPMzl2FSxh_JAlnkvHbFivH9chR6KRcNodCNId8q
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<link rel="icon" href="/images/favicon.ico" type="image/x-icon" >
<link rel="shortcut icon" href="/images/favicon.ico" type="image/x-icon" >
```

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";
       dc:identifier       <URN:ISBN:0-575-04762-3>;
       ...

       # 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
       annotea: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>;
       libris:held_by    <http://libris.kb.se/resource/library/Vvt> .
```

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";
        dc:identifier       <URN:ISBN:0-575-04762-3>;
        ...

        # 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
        annotea: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>;
        libris:held_by    <http://libris.kb.se/resource/library/Vvt> .
```

Example - book

bibliographic

authority links

search

annotations

holdings

```
# 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
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        dc:creator            "Gibson, William, 1948-";
        dc:creator            "Sterling, Bruce, 1954-";
        dc:subject            "Steampunk";
        dc:identifier         <URN:ISBN:0-575-04762-3>;
        ...

        # 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
        annotea: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>;
        libris:held_by    <http://libris.kb.se/resource/library/Vvt> .
```
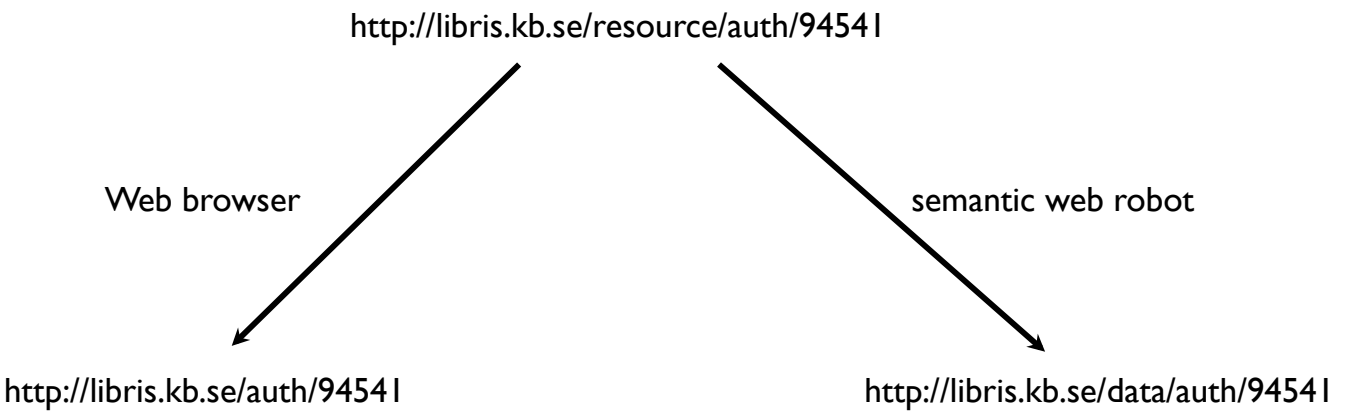
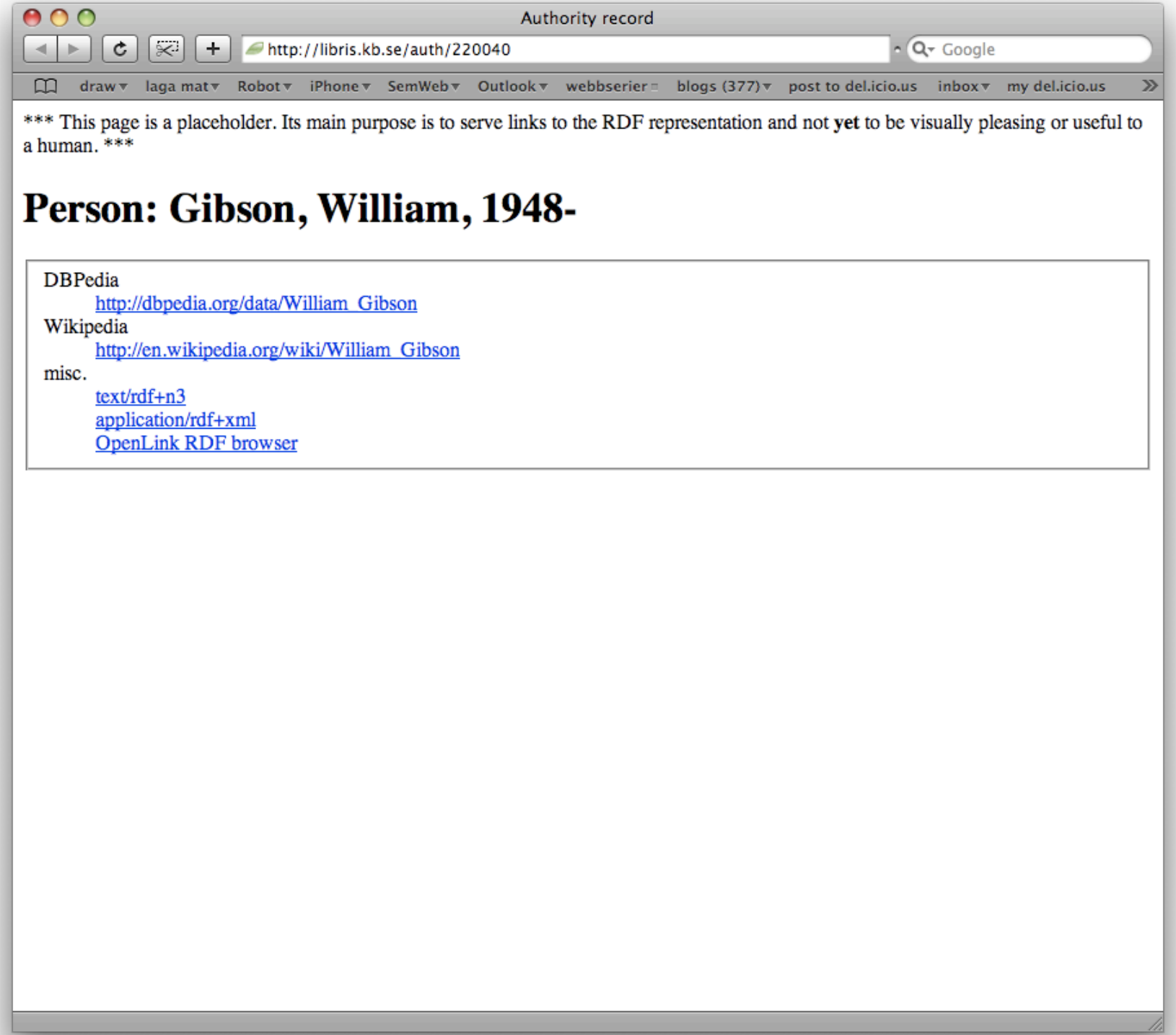

Content negotiation





*** This page is a placeholder. Its main purpose is to serve links to the RDF representation and not **yet** to be visually pleasing or useful to a human. ***

Person: Gibson, William, 1948-

DBPedia
http://dbpedia.org/data/William_Gibson
Wikipedia
http://en.wikipedia.org/wiki/William_Gibson
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> ;
         rdfs:seeAlso      <http://en.wikipedia.org/wiki/William_Gibson> .

# links to books by this author
<http://libris.kb.se/resource/bib/2716178>  dc:creator  <http://libris.kb.se/resource/auth/220040> .
<http://libris.kb.se/resource/bib/2793076>  dc:creator  <http://libris.kb.se/resource/auth/220040> .
<http://libris.kb.se/resource/bib/4465470>  dc:creator  <http://libris.kb.se/resource/auth/220040> .
<http://libris.kb.se/resource/bib/4574314>  dc:creator  <http://libris.kb.se/resource/auth/220040> .
...
```

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> ;
         rdfs:seeAlso      <http://en.wikipedia.org/wiki/William_Gibson> .

# links to books by this author
<http://libris.kb.se/resource/bib/2716178>  dc:creator  <http://libris.kb.se/resource/auth/220040> .
<http://libris.kb.se/resource/bib/2793076>  dc:creator  <http://libris.kb.se/resource/auth/220040> .
<http://libris.kb.se/resource/bib/4465470>  dc:creator  <http://libris.kb.se/resource/auth/220040> .
<http://libris.kb.se/resource/bib/4574314>  dc:creator  <http://libris.kb.se/resource/auth/220040> .
...
```

Example - subject heading (SKOS)

```
# 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
       rdf: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
<http://libris.kb.se/resource/bib/5059476>  dc:subject  <http://libris.kb.se/resource/auth/308074> .
<http://libris.kb.se/resource/bib/5060570>  dc:subject  <http://libris.kb.se/resource/auth/308074> .
```

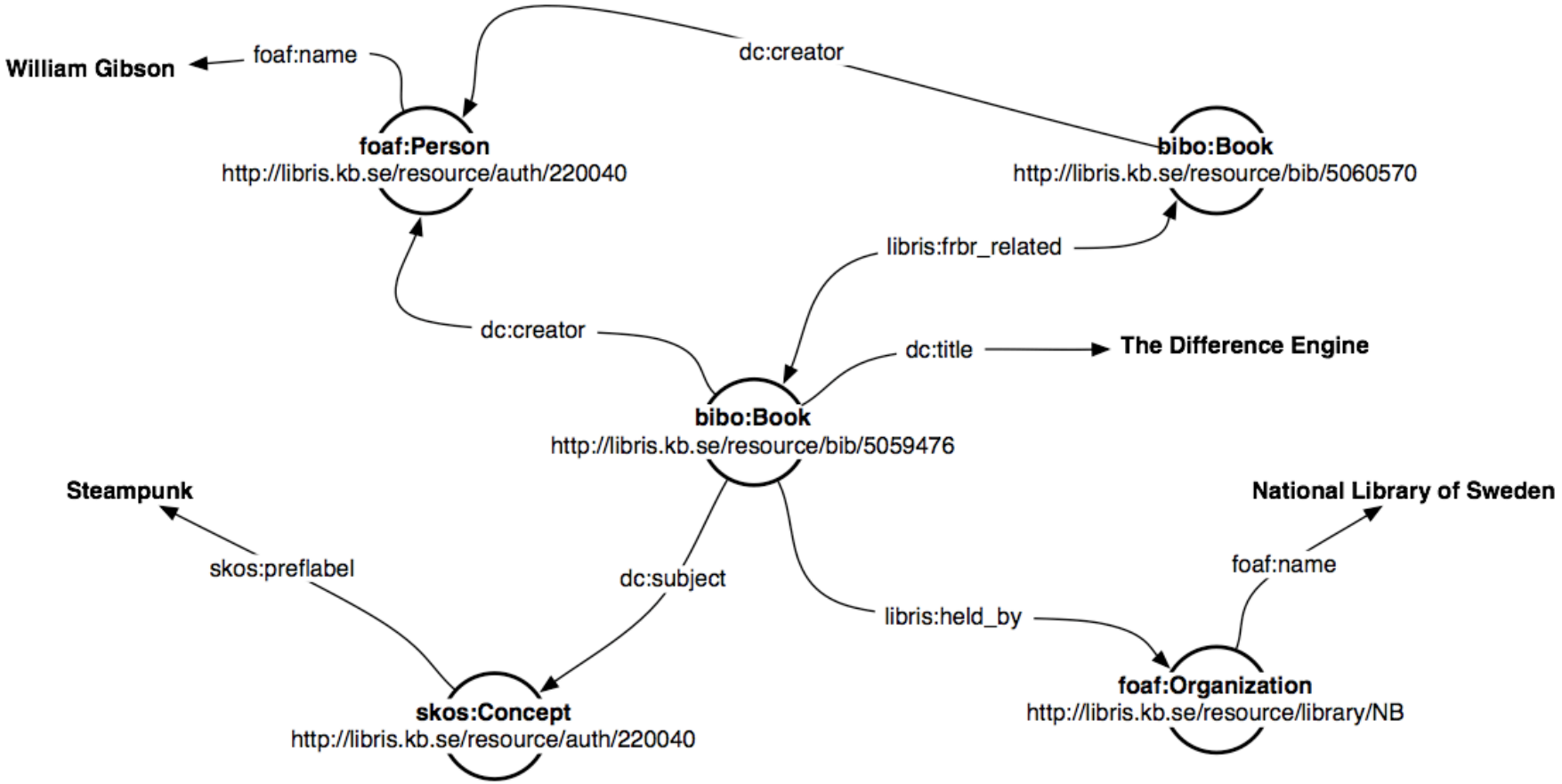
Example - library (FOAF)

```
@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#> .
<http://libris.kb.se/resource/library/S>    # type of record    rdf:type
foaf:Organization ;        # description    foaf:name   "Kungl.
biblioteket" ;        geo:lat 59.337534 ;    geo:long 18.071651 ;
foaf:homepage "http://www.kb.se" .
```

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#> .
<http://libris.kb.se/resource/library/S>    # type of record    rdf:type
foaf:Organization ;        # description    foaf:name   "Kungl.
biblioteket" ;        geo:lat 59.337534 ;    geo:long 18.071651 ;
foaf:homepage "http://www.kb.se" .
```

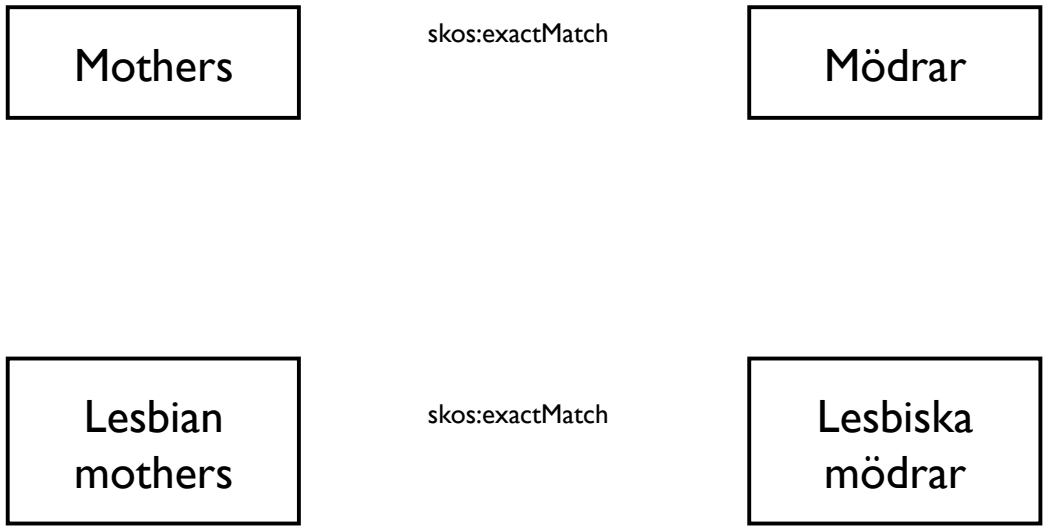
Links, links, links



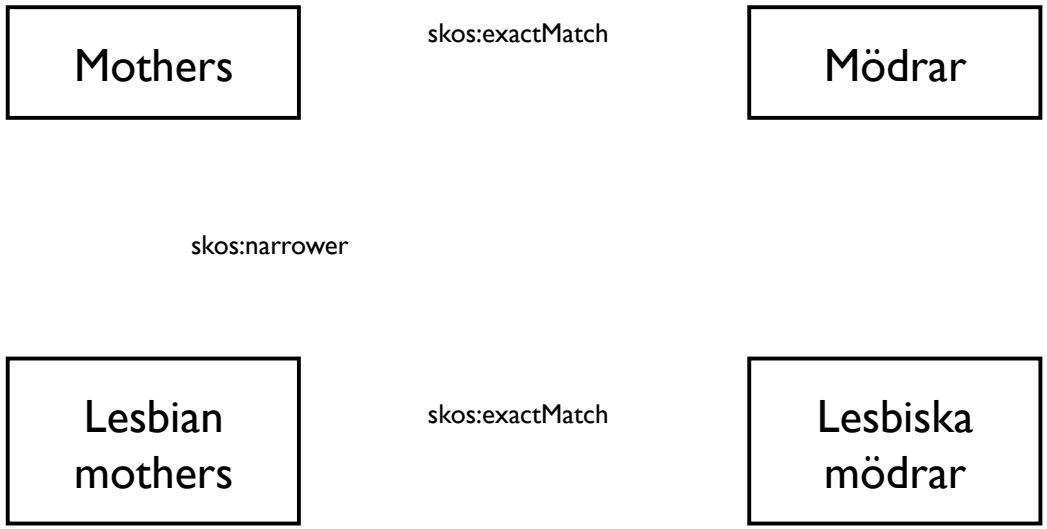
External links

- ~12.000 links to LCSH.INFO
- A handful of links to Wiki/DBPedia
- ... ~30.000 on the way in

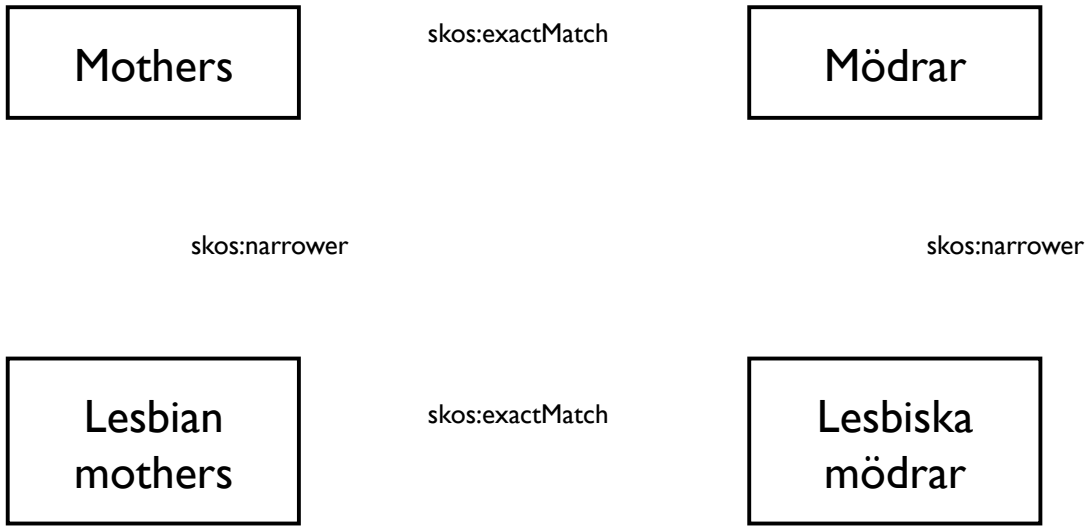
External links



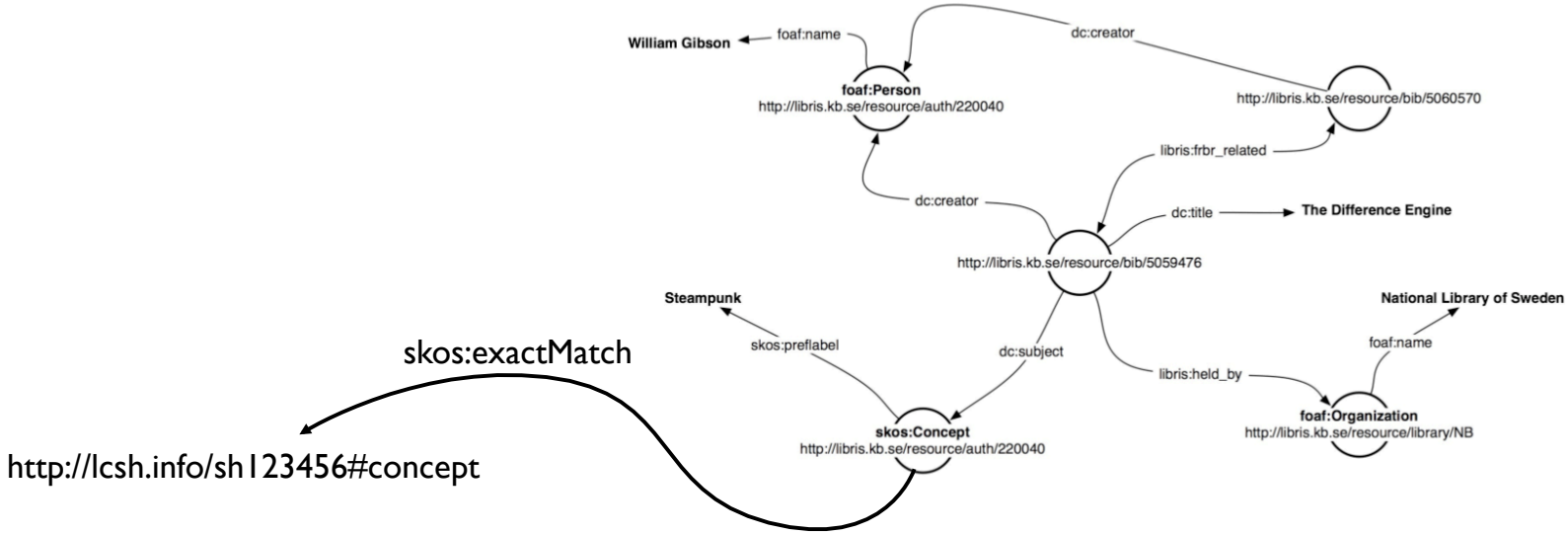
External links



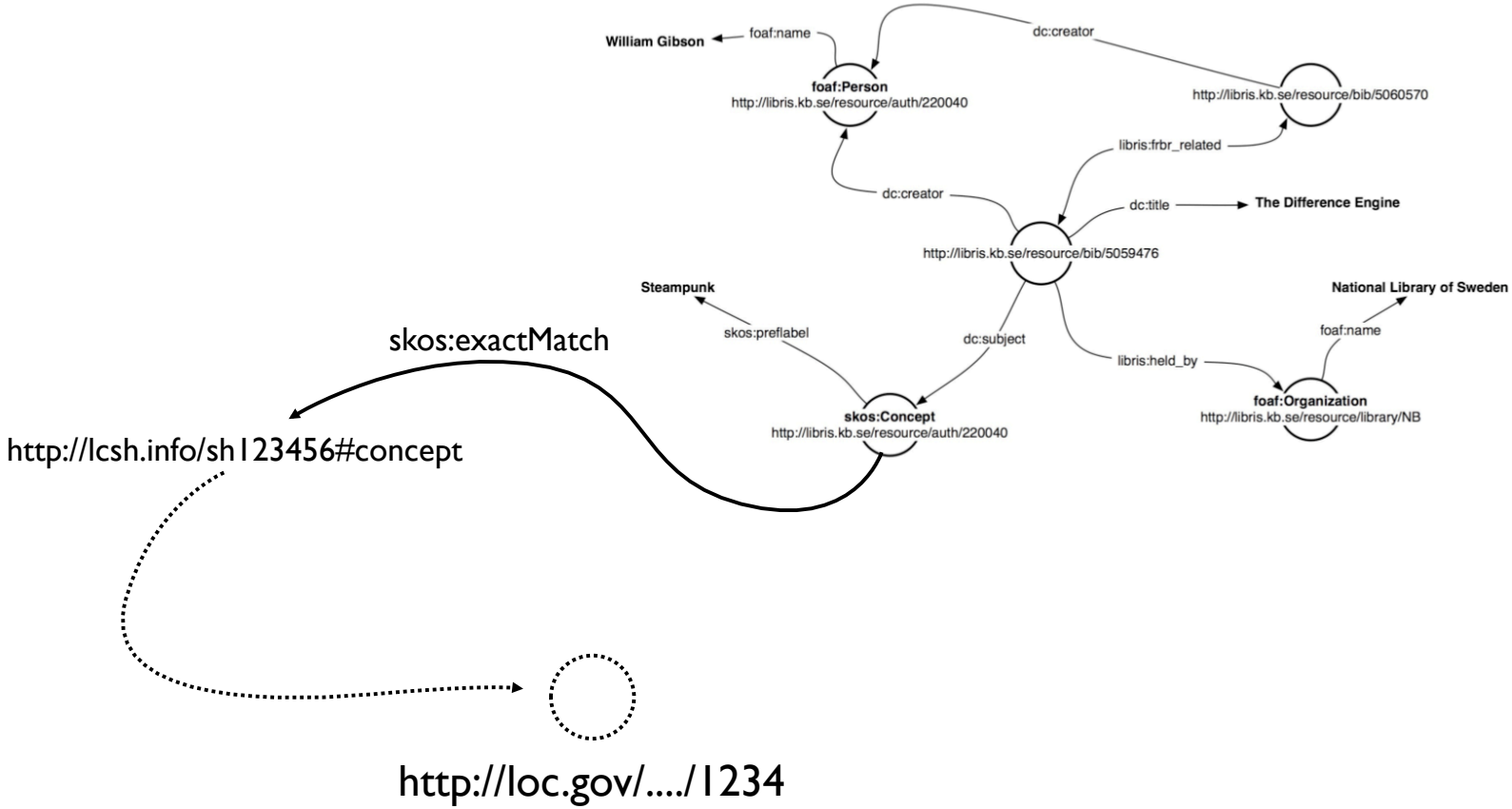
External links



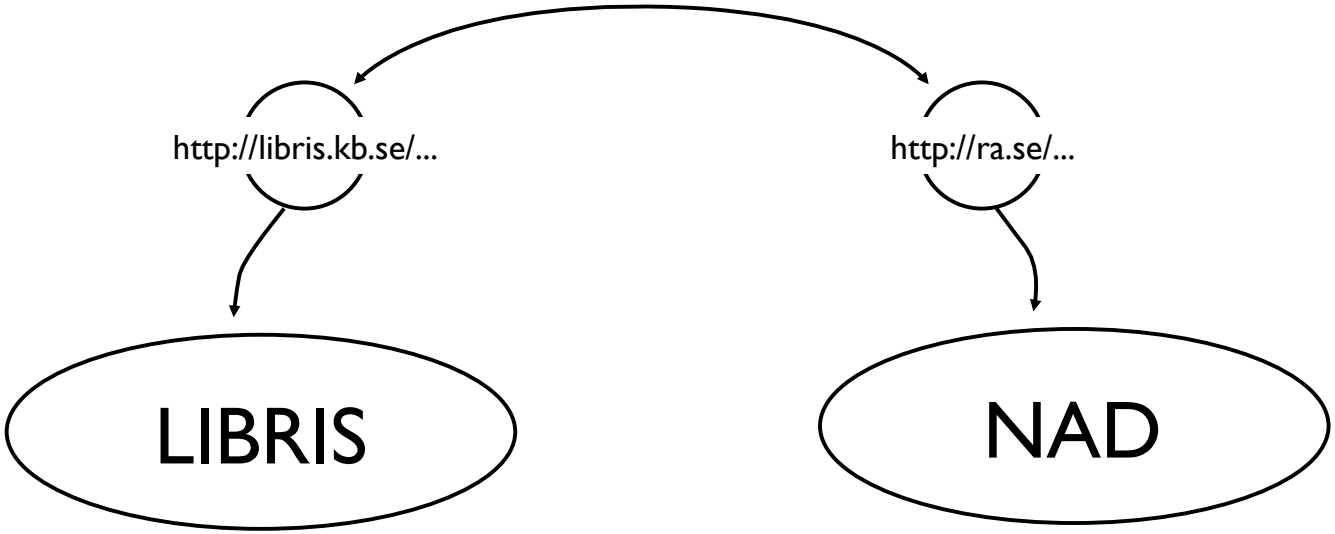
External links



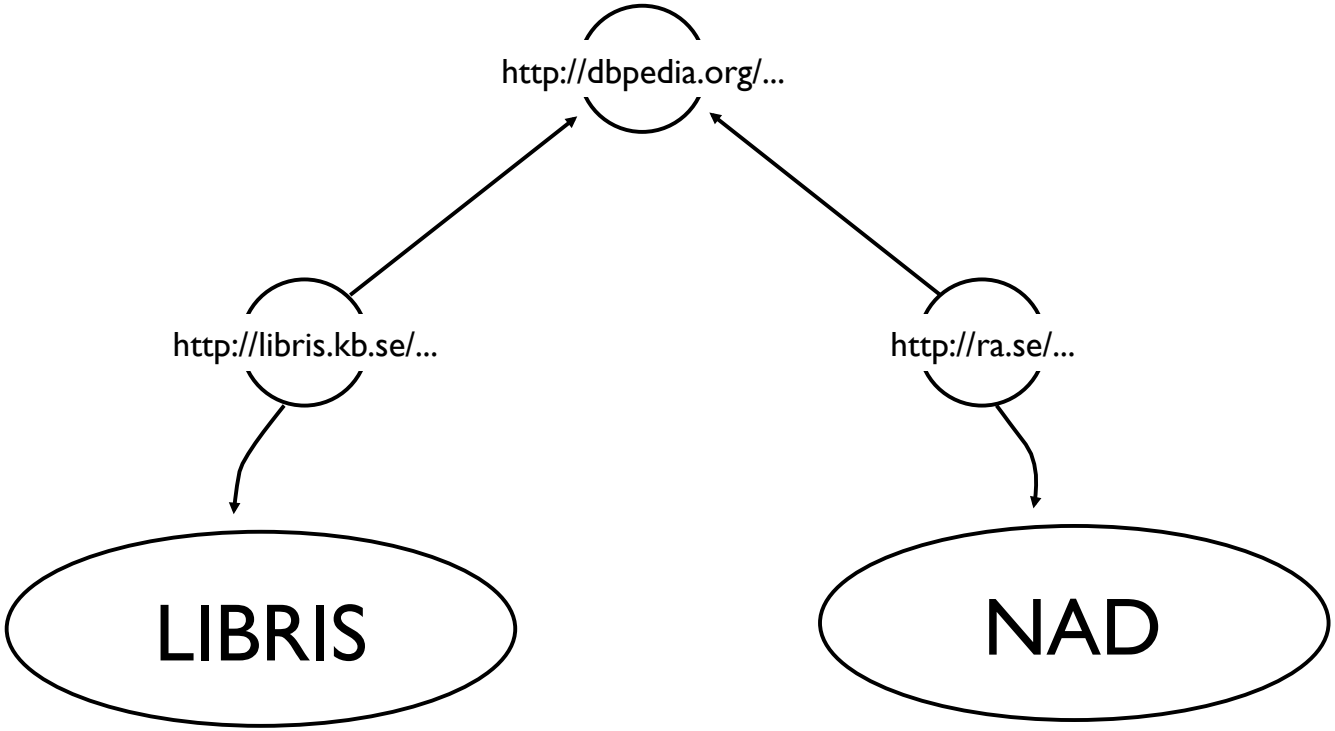
External links



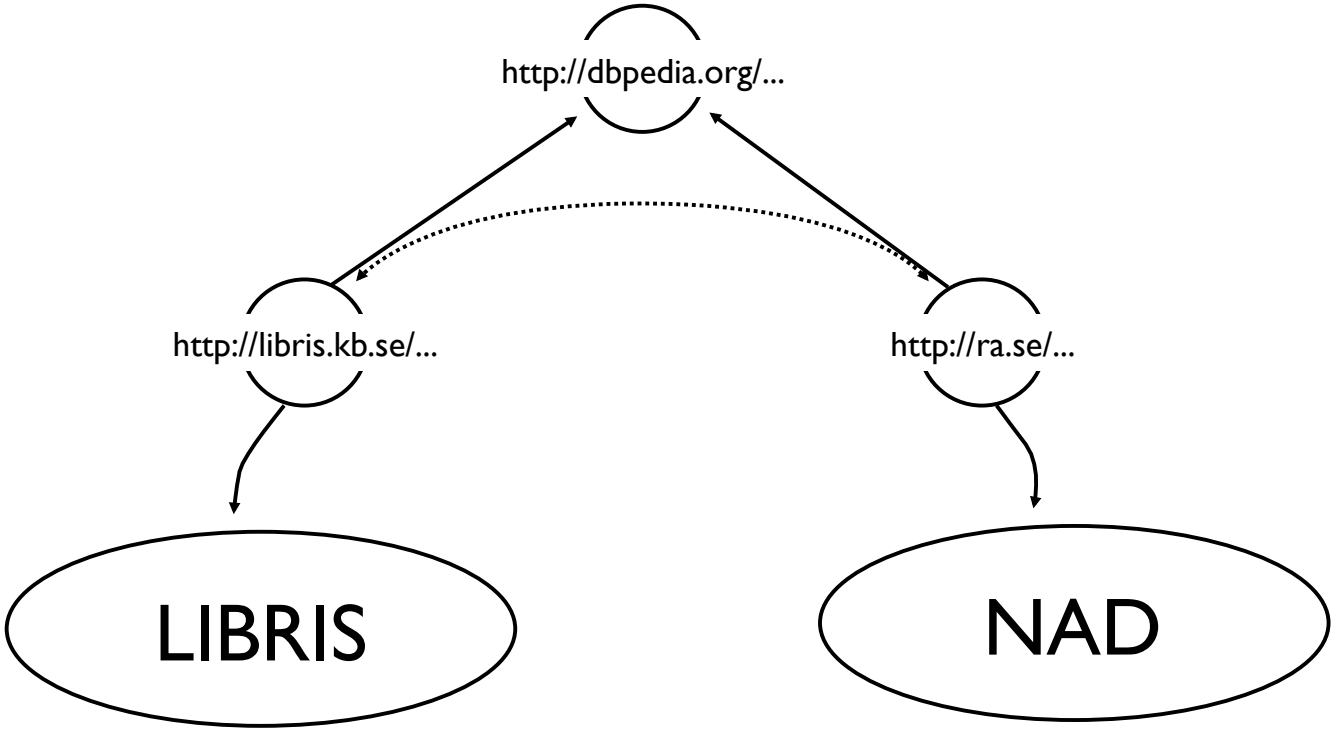
External links



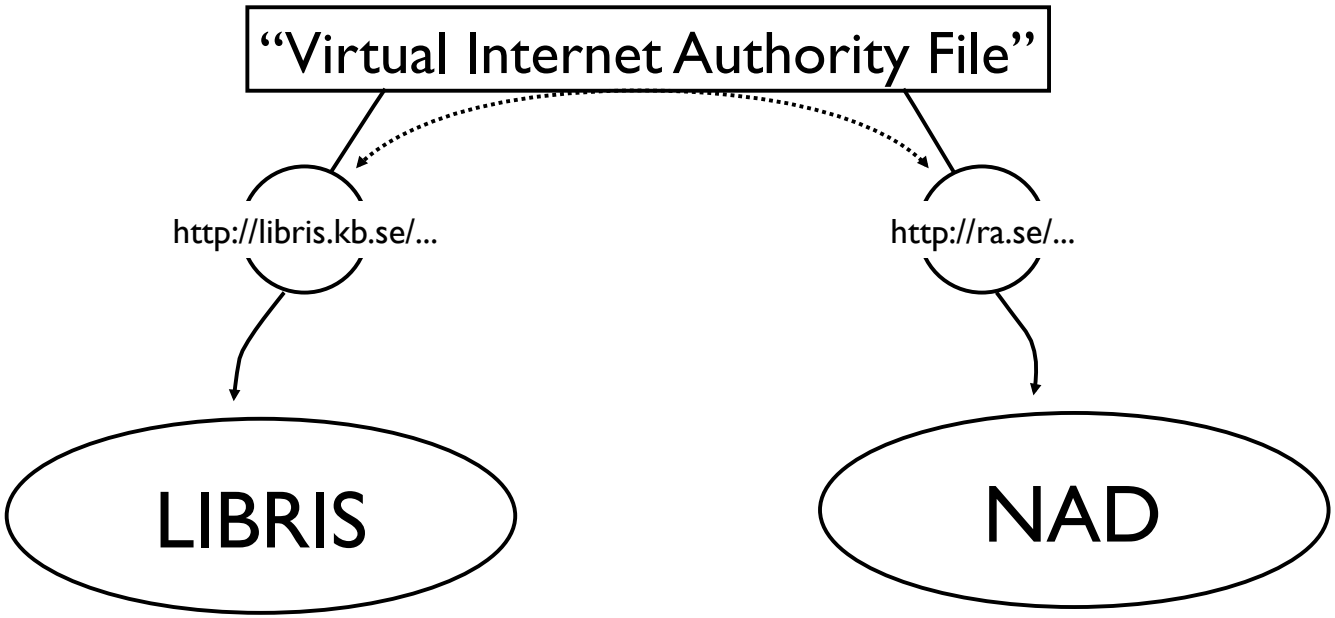
External links



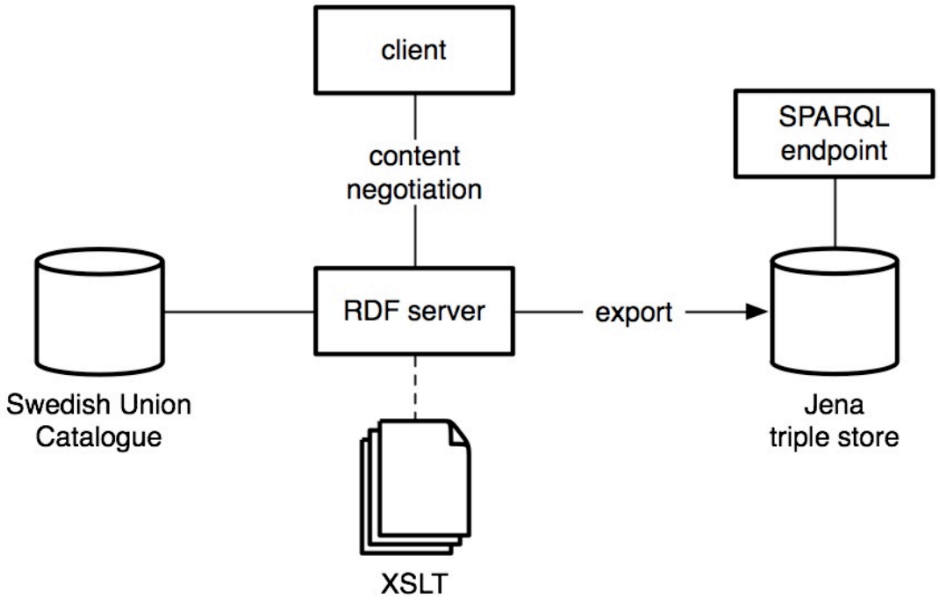
External links



External links



How


client
content
negotiation
SPARQL
endpoint
RDF server
export
Swedish Union
Catalogue
Jena
triple store
XSLT

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!