

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/ Search: berners

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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

 **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

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 **What is LIBRIS?**

The Swedish university and research libraries search service

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[Latvia](#) (in focus at Gothenburg Book Fair)

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

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LIBRIS - search: the difference engine

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

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

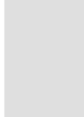

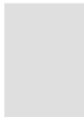


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the difference engine Search

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 Search: berners

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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



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Wikipedia about the author:

- William Gibson

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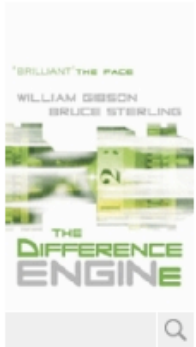
Search: [the difference engine](#) > The difference engi...

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- ▶ [William Gibson](#)

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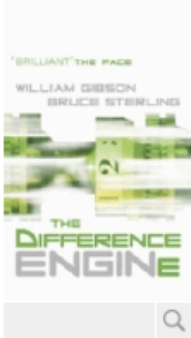
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"The difference engine" exists in 2 editions in 1 languages

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.

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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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http://libris.kb.se/bib/5060570?vw=full&tab3=marc

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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 90575600292
 040 a Li
 082 a 813.542 20
 082 a 813.542 20
 084 a Heq.012 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 |000000e 1
 852 5 Ld b Ldz Skönlitteratur. Annan uppl. kan finnas vid biblioteket

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 • William Gibson

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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](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 Search: berners

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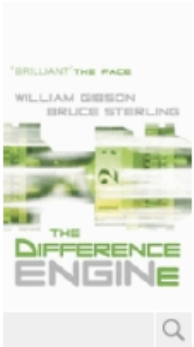
Search: [the difference engine](#) > The difference engi...

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 ISBN 0-575-60029-2 (pbk)
 London : Vista, 1996
 English 383 s.
 Book



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- LibraryThing

Wikipedia about the author:

- William Gibson

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Link-tag

```
<!--libris.kb.se-->  
<script src="http://maps.google.com/maps?file=api&v=2&key=ABQIAAAA7fEQxiquYckwtSpHsnjFsRTevPMz12FSxh_JAlnkvhbFivH9chR6KRcNodCNId8q" >  
</script>  
<script type="text/javascript" src="js/se/getitMap.js"></script>  
<link rel="alternate" type="text/rdf+n3" title="RDF Representation" href="http://libris.kb.se/data/bib/5060570?format=text%2Frdf%2Bn3" >  
<link rel="alternate" type="application/rdf+xml" title="RDF Representation" href="http://libris.kb.se/data/bib/5060570?format=application%2Brdf+xml" >  
<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> .
```

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  rdfs:isDefinedBy <http://libris.kb.se/data/bib/5059476>;  
  
  # short bibliographic description  
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  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  
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  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> .
```

bibliographic

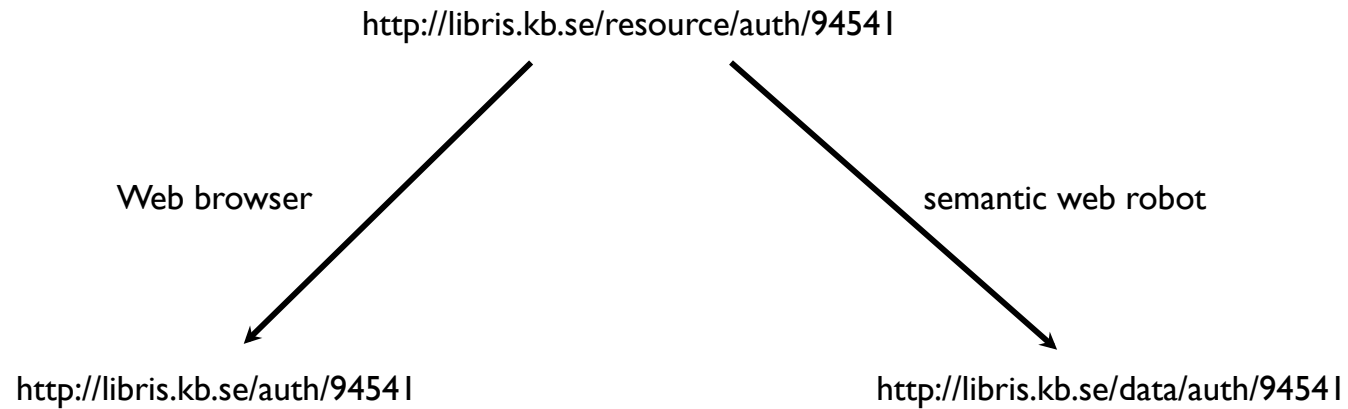
authority links

search

annotations

holdings

Content negotiation



Authority record

http://libris.kb.se/auth/220040

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*** 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)

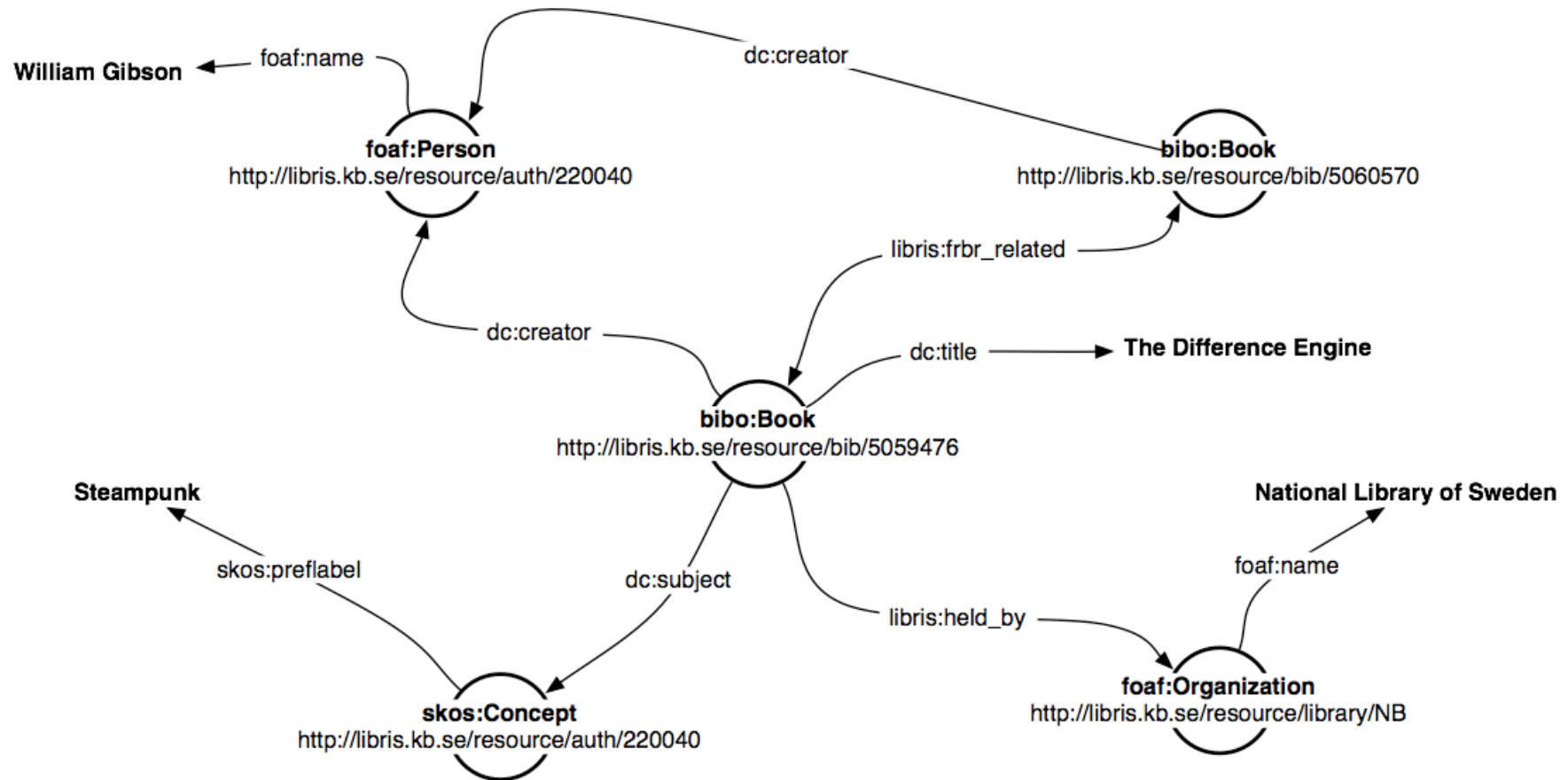
```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .@prefix foaf:
<http://xmlns.com/foaf/0.1/> .@prefix geo: <http://www.w3.org/2003/01/geo/
wgs84_pos#> .@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
<http://libris.kb.se/resource/library/S> # type of record    rdf:type
foaf:Organization ;          # 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" .
```



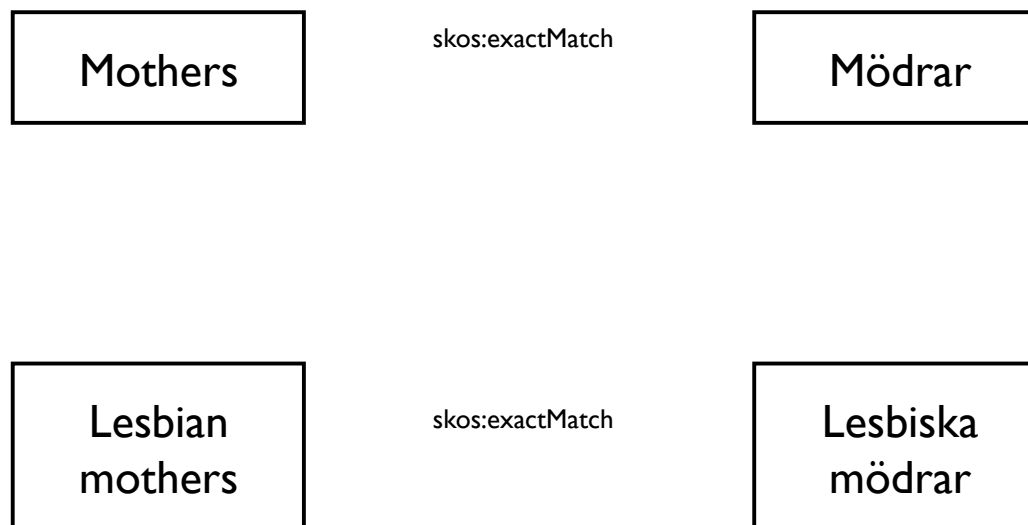
Links, links, links



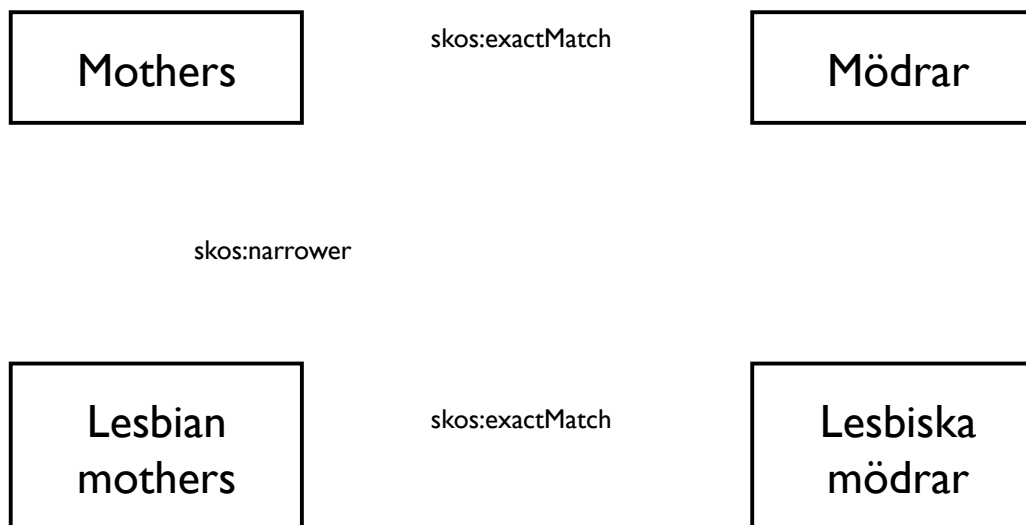
External links

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

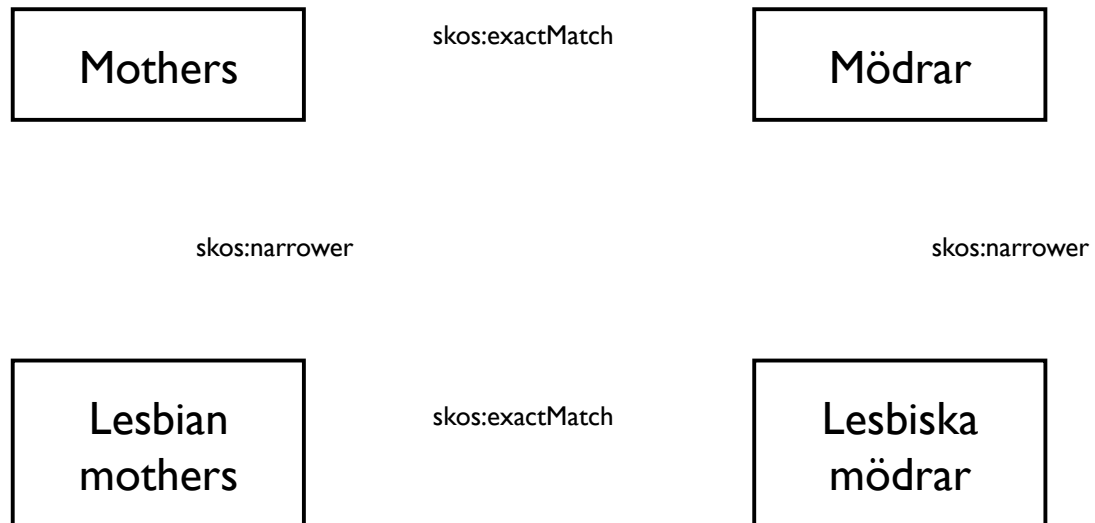
External links



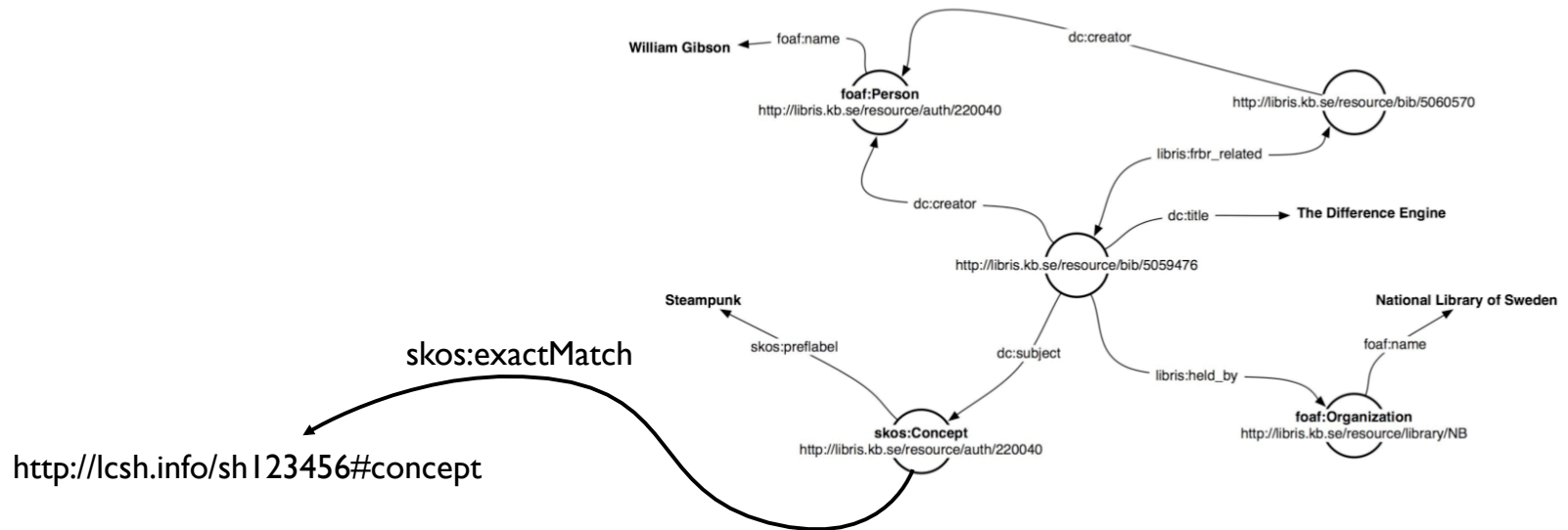
External links



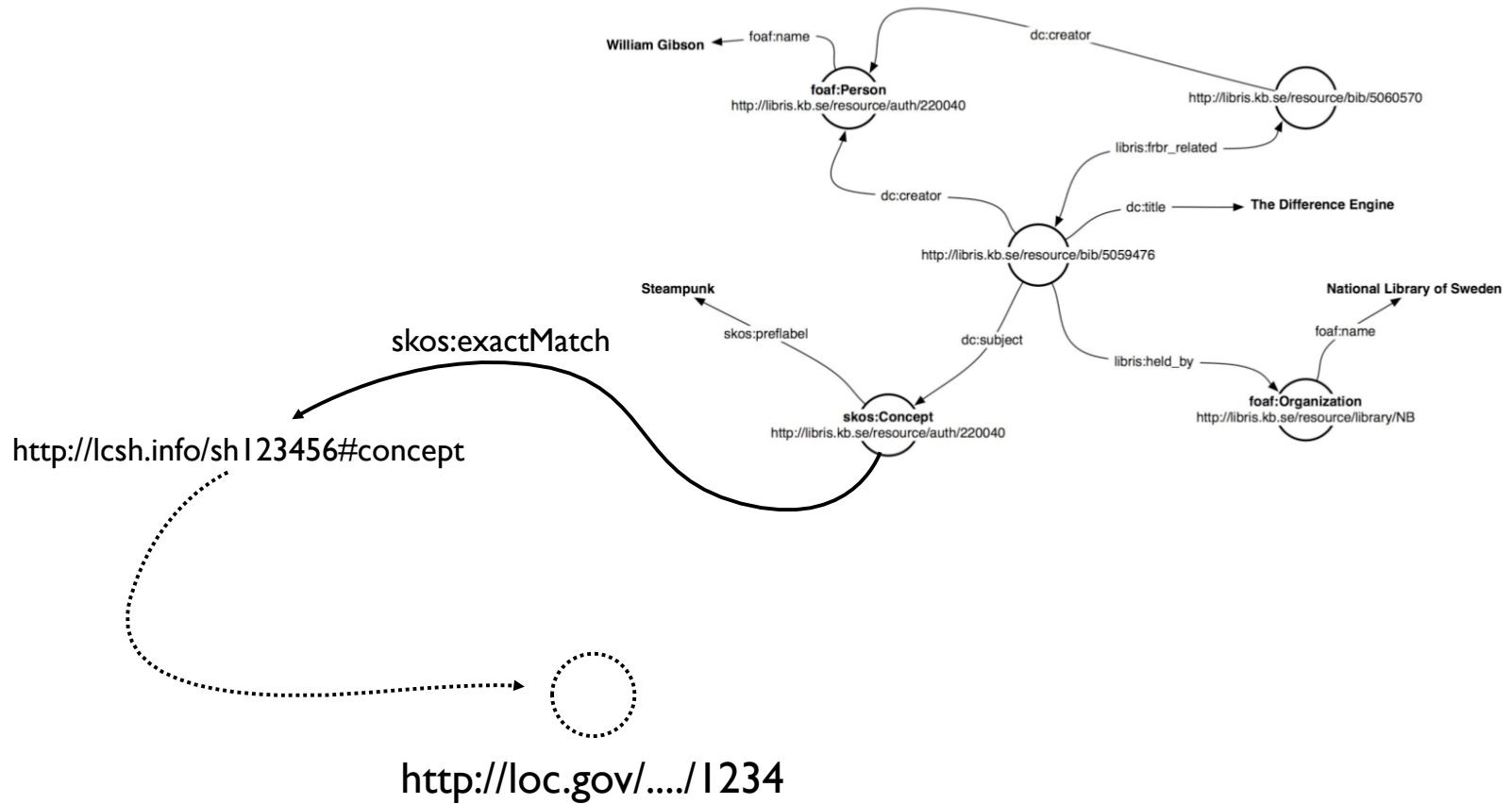
External links



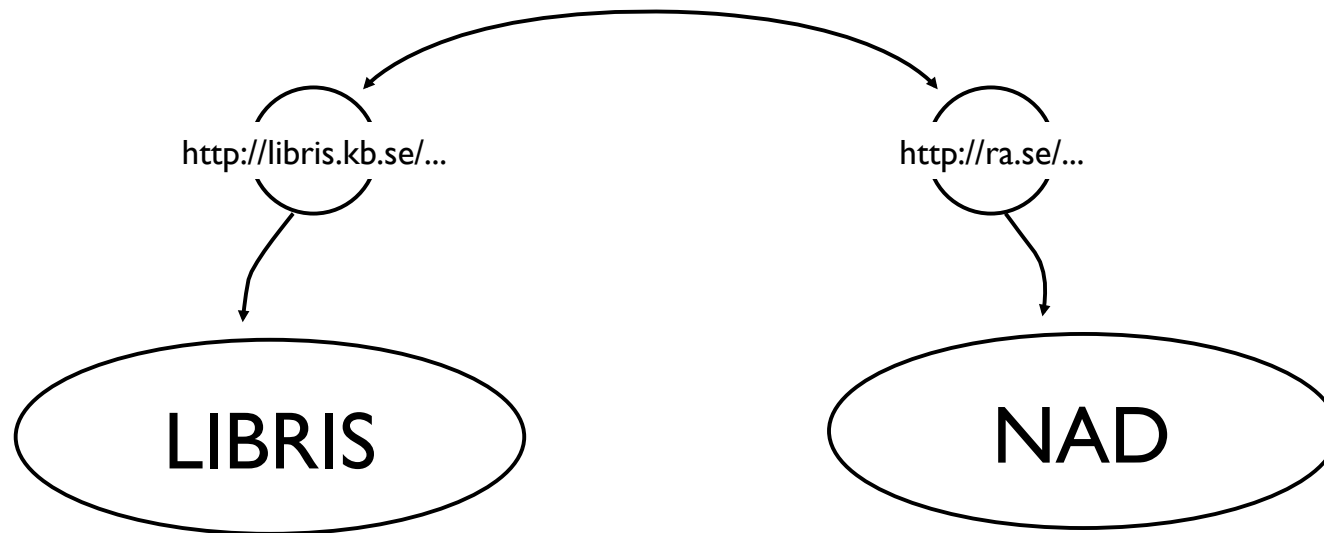
External links



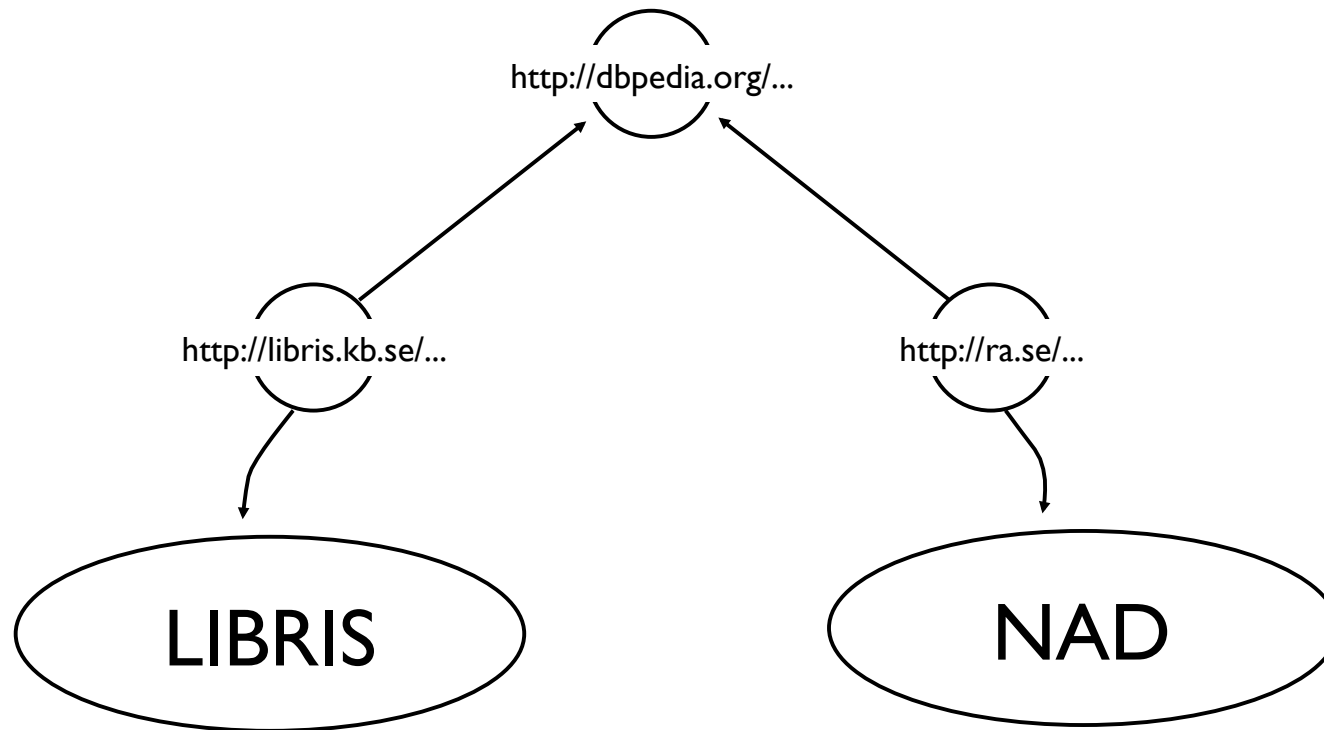
External links



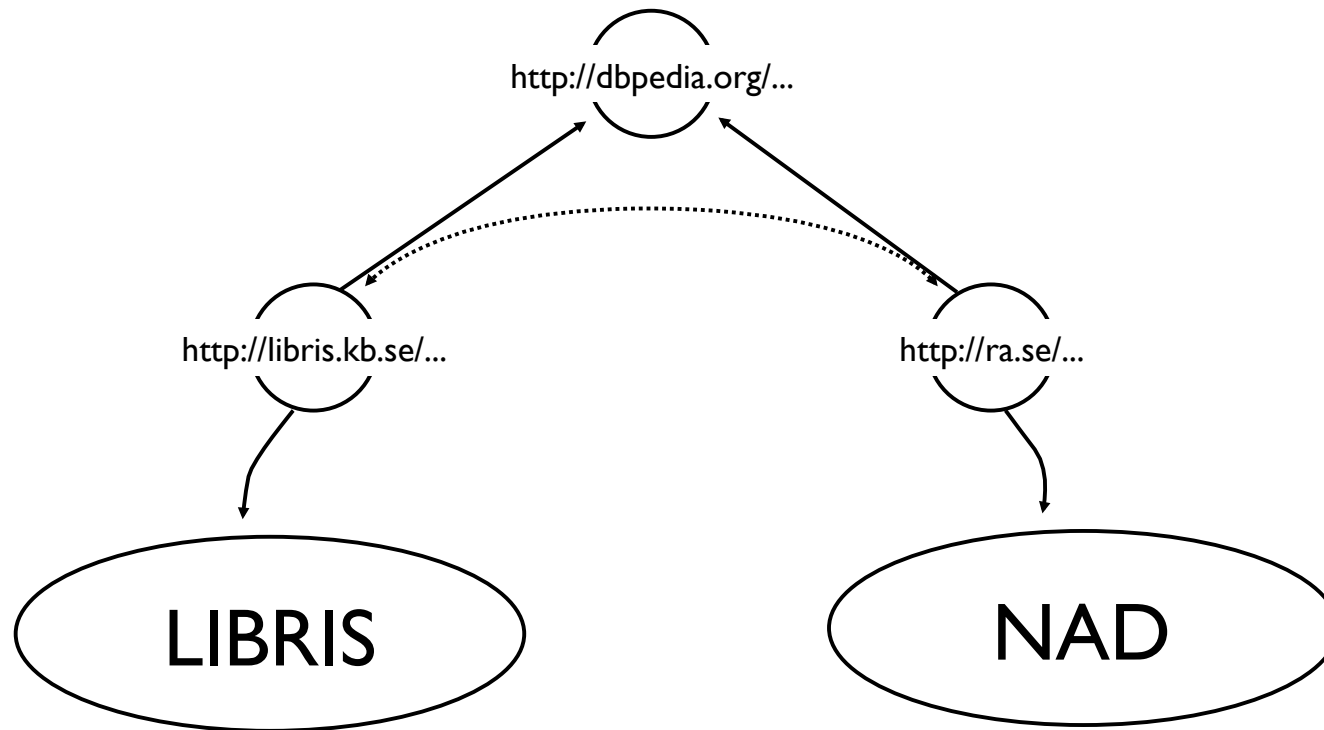
External links



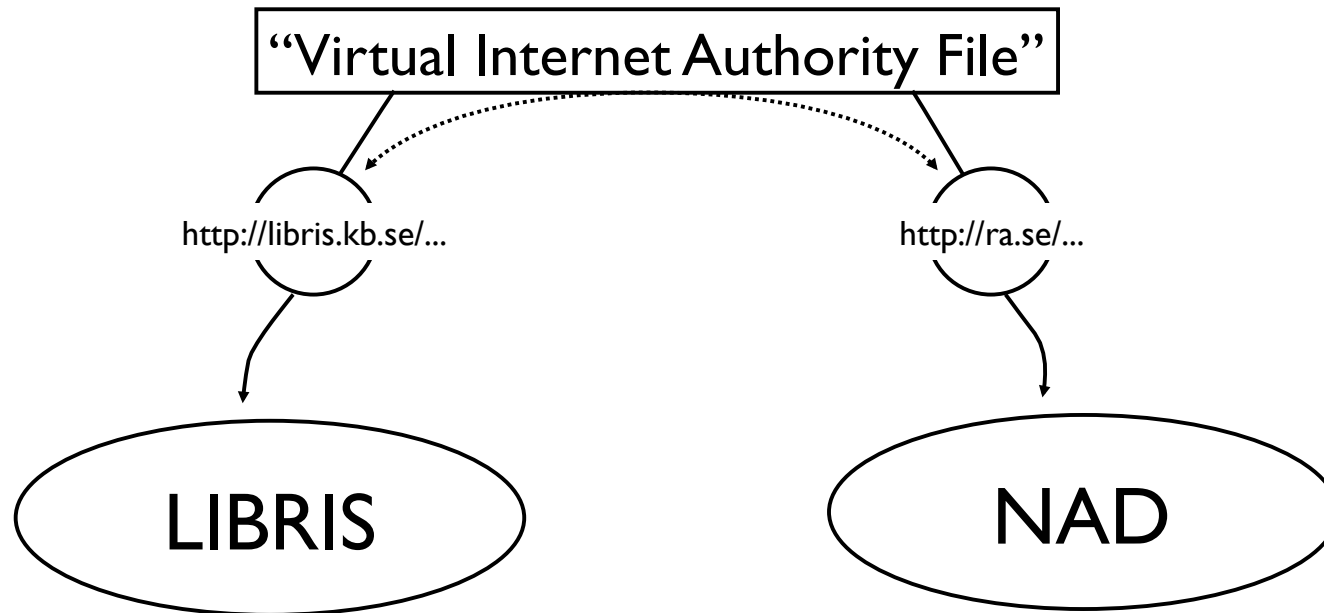
External links



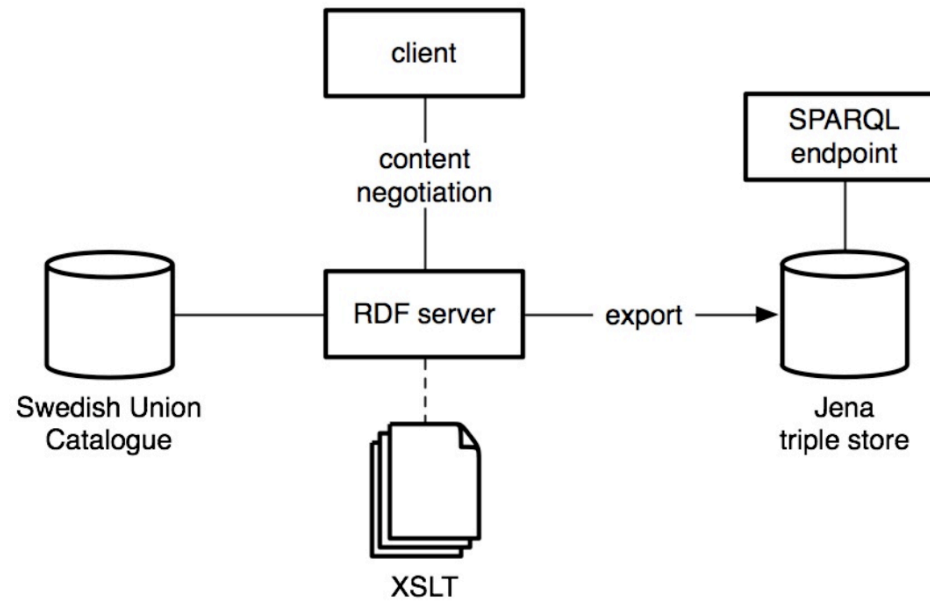
External links



External links



How



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!