

FAIR Data Point (FDP)



-based prototype

Arnold Kuzniar
11-11-2015

Installation & Deployment

- Virtuoso OSE
 - 7.2.1 & 6.1.8
- OSes
 - OS X 10.7.5
 - Ubuntu 14.04 LTS (dev)
<http://virtuoso.biotoools.nl:8888>



Linked Data Services

- Virtuoso SPARQL endpoint
 - **R2RML: RDB → RDF (BreeDB)**
<http://virtuoso.biotoools.nl:8888/sparql/>
- Virtuoso Linked Data Platform (LDP)
 - **LDP server + client**
<http://virtuoso.biotoools.nl:8888/DAV/home/davuser/>

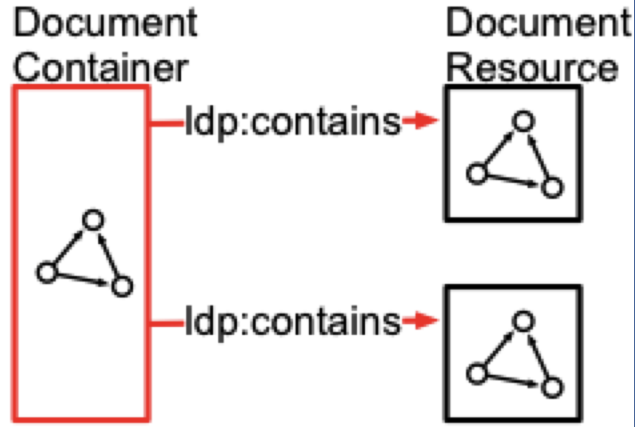
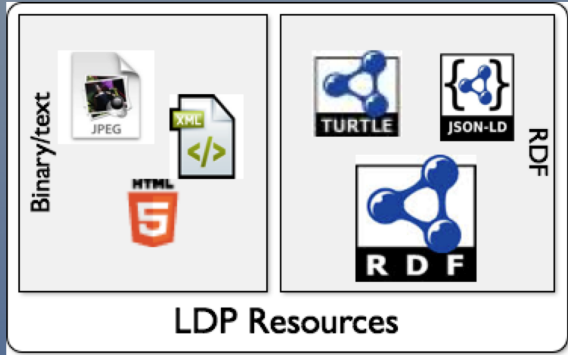
Linked Data Platform (LDP)

- W3C Recommendation (v1.0; Feb 26, 2015)
- Formalizes Linked Data deployment
- Standardizes HTTP-based CRUD on **Resources** (documents) and **Containers** (collections)
- ↑ Availability & accessibility of Linked Data
- Enables Enterprise Application Integration

LDP concepts

Non-RDF Source

RDF Source



Basic Container

- Resource** - A HTTP-addressable resource with
 - member** range: rdfs:Resource - LDP servers should
 - constrainedBy** range: rdfs:Resource - Links a res
- RDFSource** - A Linked Data Platform Res
- Container** - A Linked Data Platform RDF . associated with it.
 - hasMemberRelation** range: rdfs:Property - Inc
 - isMemberOfRelation** range: rdfs:Property - Inc
 - membershipResource** range: rdfs:Property - I
 - ldp:isMemberOfRelation**, the membership
 - insertedContentRelation** range: rdfs:Property
 - contains** range: rdfs:Resource - Links a conta
- BasicContainer** - An LDPC that uses a
- DirectContainer** - An LDPC that is simi
- IndirectContainer** - An LDPC that has
- NonRDFSource** - A Linked Data Platform
- MemberSubject** - Used to indicate default a resource.
- PreferContainment** - URI identifying a LDP
- PreferMembership** - URI identifying a LDPC
- PreferEmptyContainer** - (*deprecated*) Arch
- PreferMinimalContainer** - URI identifying t other exclusions might be added. This definitio
- Page** - URI signifying that the resource is an i
 - pageSortCriteria** range: rdf:List - Link to the list of
- PageSortCriterion** - Element in the list of sc
 - pageSortPredicate** range: rdf:Property - Predicat
 - pageSortOrder** range: rdf:Property - The ascend
 - Ascending** - Ascending order.
 - Descending** - Descending order.
 - pageSortCollation** range: rdf:Property - The colla
- pageSequence** - Link to a page sequence resc

LDP Vocabulary

Virtuoso LDP implementation

- LDP server + GUI
- Using WebDAV protocol (r/w HTTP)
WebDAV API = LDP API
- RDF Turtle + metadata (Dublin Core Terms)
- Unix-style “file” permissions + WebID ACL
- LDP paging
- HTTP logging and recording

Virtuoso v7.2.1 ↔ GUI/curl

- Create LDPR: PUT→HTTP/1.1 201 Created 😊
- Access LDPR
 - GET meta-data (text/turtle) → HTTP/1.1 404 Not Found 😞
 - GET data (text/plain) → HTTP/1.1 200 😊
- Create LDPC: GUI 😊 PUT/POST (via curl) 😞
- Access LDPC: HTTP/1.1 500 SPARQL Request Failed 😞
- Delete LDPC 😊

Virtuoso v6.8.1 ↔ GUI/curl

- Create LDPR: PUT → HTTP/1.1 201 Created 😊
- Access LDPR
 - GET meta-data (text/turtle) → HTTP/1.1 200 😊
 - GET data (text/plain) → HTTP/1.1 200 😊
- Create LDPC: GUI 😊 PUT/POST (via curl) 😡
- Access LDPC: HTTP/1.1 200 😊
- Delete LDPC 😊

LDPR: Non-RDF Source

- Access *test.txt* [Content-type: **text/plain**]

```
curl -u davuser:davuser -iH 'Accept: text/turtle'  
http://virtuoso.biotools.nl:8888/passport/test.txt
```

→ meta-data 😊

```
curl -u davuser:davuser -iH 'Accept: text/plain'  
http://virtuoso.biotools.nl:8888/passport/test.txt
```

→ file content (cat test.txt) 😊

LDPR: RDF Source

- Access *test.ttl* [Content-type: **text/turtle**]

```
curl -u davuser:davuser -iH 'Accept: text/turtle'  
http://virtuoso.biotools.nl:8888/passport/test.ttl
```

→ file content BUT NOT meta-data! 

```
curl -u davuser:davuser -iH 'Accept: text/plain'  
http://virtuoso.biotools.nl:8888/passport/test.txt
```

→ file content (cat test.txt)

LDPR: RDF Source

- Access *test2.ttl* [Content-type: **text/plain**] !!!

```
curl -u davuser:davuser -iH 'Accept: text/turtle'  
http://virtuoso.biotools.nl:8888/passport/test2.ttl
```

→ meta-data 😞

```
curl -u davuser:davuser -iH 'Accept: text/plain'  
http://virtuoso.biotools.nl:8888/passport/test2.ttl
```

→ file content (cat test.txt)

LDP Container

```
curl -u davuser:davuser -iH 'Accept: text/turtle'  
http://virtuoso.biotoools.nl:8888/passport/
```

→ meta-data 😊 BUT partial compliance with LDP spec

Virtuoso LDP response	LDP Vocabulary?
ldp:Container	TRUE
ldp:membershipSubject	FALSE
ldp:membershipPredicate	FALSE
ldp:membershipObject	FALSE
ldp:MemberSubject	TRUE
ldp:Page	TRUE
ldp:nextPage	FALSE
ldp:pageOf	FALSE

Virtuoso LDP Conformance Report

- BasicContainer-PostJsonLd → **FAIL**

```
curl -u davuser:davuser -ivT jsonld.js -H "Content-Type: application/ld+json" http://virtuoso.biotools.nl:8888/passport/
```

→ it works via PUT instead of POST:)

- BasicContainer-JsonLdRepresentation → **PASS**

```
curl -u davuser:davuser -iH "Accept: application/ld+json" http://virtuoso.biotools.nl:8888/passport/
```

→ **FAILED**: HTTP/1.1 406 Unacceptable

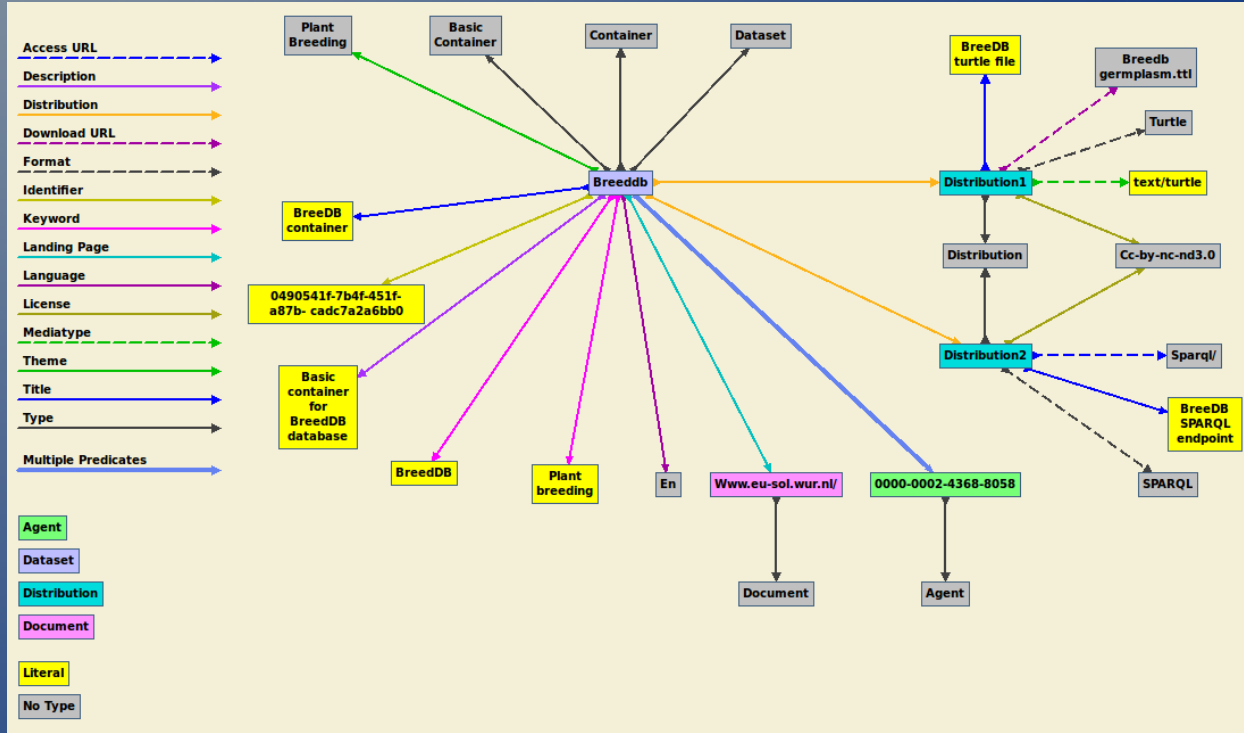
Customize LDP meta-data (DCAT)

- No success so far 🙄
- Main problem: cannot create LDPC with new LDP properties

```
curl -u davuser:davuser -H "Accept: text/turtle"  
http://virtuoso.biotools.nl:8888/passport/dcat-dataset
```

N.B.I'm cheating here: `dcat-dataset` ≠ LDPC but LDP-RS

DCAT model for BreeDB (Rajaram)



Conclusions

- Virtuoso OSE extensible, with many components (plug-in architecture) and features but buggy
- Installation relatively easy but compilation/testing take long
- Extensive documentation (4000+ pages) but sometimes with out-dated/erroneous examples
- LDP support incomplete (Virtuoso-specific predicates)
- Adding metadata (e.g. DCAT) to LDPC not possible yet

QI

- Glutton LDP Server (Python)
- OASIS Open Data Protocol (OData) - REST-based standard for querying and sharing of data across applications (“ODBC for Web”)
- Hydra W3C Community Group – hypermedia-driven Web APIs
- ICAT metadata catalogue (REST API)