How to Use Linked Data Infrastructure for Digital Humanities? – Practical View

Jouni Tuominen, University of Helsinki & Aalto University
Linked Data Application Ecosystem

Application 1

Application 2

Application N

SPARQL Endpoint

Linked Data Services
Standard WWW Technology

Client Side (Browser)

Server Side
Datasets

Linked Data Finland

Below you find examples of datasets (services) published by LDF.fi, arranged according to their application domain.

Encyclopedic

1. Finnish Wikipedia as Linked Data (DBpedia). First publication of the Finnish DBpedia linked open data via a SPARQL endpoint.

Lexical

1. WordNet. Large lexical database of English with translations collected by the Open Multilingual WordNet Project.

Cultural Heritage

1. MuseumFinland. The data behind the classic online application from 2004 that was rewarded e.g. the international Semantic Web Challenge Award.
2. Semantic Kalevala and Folklore. Arguably the first publication of folklore as Linked Open Data in the world.
3. Data from CultureSampo (Kulttuurisampo) (work in progress). Data from the CultureSampo application that got the Outstanding Paper Award 2011-2012 of the Semantic Web Journal.
4. BookSampo (Kirjasampo). Data behind the famous collaborative Kirjasampo application of the Finnish Public Libraries that contains rich semantic descriptions of virtually all Finnish fiction literature.

History

2. World War I Linked Open Data. Result on an international collaboration regarding sharing data about war history.
3. Finnish war victim databases published by the National Archives of Finland:
   - War Victims in Finland 1914–1922
   - Prisoner-of-war deaths and people handed over in Finland 1939–1955
   - Casualties during the Finnish wars 1939–1945
4. WarSampo. Large heterogeneous sets of data about the World War II in Finland as linked open data.

Law

1. Finnish Law as Linked Open Data (Semantic Finlex). Finnish Law and law cases available as (Linked) Open Data for the first time!

Spatial

1. Finnish Geographic Names. Information on 800,00 Finnish places translated into Linked Data from the registry maintained by the National Land Survey of Finland.
2. Names Archive of the Institute for the Languages of Finland. Information on 2.3 million place name records from the Names Archive of the Institute for the Languages of Finland. The NameSampo (Nimisampo) service is based on this data and other place name datasets.

Linked Open Universities

1. Linked Open Aalto. Aalto University's pioneering work in opening its data repositories as Linked Data for applications.

Linked Science

1. Bird Observations of the nationwide Tiira.fi Service. Collaborative citizen science data on the semantic web for applications, such as BirdWatch.
2. Bird Observations of Hallias Station with Hanko Weather Data. Exceptional dataset of systematic bird observations for ca. 30 years from the Hallias bird observation station in Hanko linked with weather observation data.

Ontologies

1. ONKI Light on SPARQL Ontology Service for thesauri. Large Linked Data collection of national thesauri developed into ontologies by the FinnoNTO project 2003-2012.
2. Agent Ontology. First attempt to create a shared national data repository of historical persons and organizations.
3. Finnish Places as Linked Data. First attempt to create a shared national Linked Data repository of historical and contemporary places.
4. Finnish History Events. First attempt to create a shared Linked Data repository of national historical events created in collaboration with Finnish historians.
Open Data Service
Access open data sources maintained by the National Library of Finland

Data Catalog
Our data catalog showcases the open data sets and APIs of the National Library.

Linked Data

Linked Bibliographic Data
The national bibliography Fennica is available as RDF Linked Open Data.

Browse our Linked Data

Collections
- Fennica

Concept Schemes
- Finnish Corporate Names
- YSO - General Finnish ontology
- YSO places

Access
- SPARQL endpoint
- Linked Data Fragments server
- Downloadable data dumps

Documentation
- Fennica RDF data model documentation
- What is included in Fennica (in Finnish)

Finto vocabulary service
The Finnish thesaurus and ontology service provides access to controlled vocabularies such as thesauri, classifications and ontologies as Linked Data.
Tools created with the Europeana LOD API

Europeana Linked Open Data feeds Irish place name database
Europeana Linked Open Data feeds Irish place name database

Amsterdam Museum Linked Open Data
Amsterdam Museum Linked Open Data: The Linked Open Data Cloud connects items from various domains, including cultural heritage. By using unique web-identifiers (URIs) for objects and a common framework for describing them (RDF), and by linking to existing resources, a web of semantically-linked data emerges.

ECLAP Linked Open Graph
ECLAP Linked Open Graph allows users to see, explore and browse the relationships among the ECLAP content and other types of resource created on the ECLAP platform.
Linked Data browsing for humans and machines
SPARQL endpoints for querying data for analysis, visualization, mash-up apps e.g. CSV
SPARQL example with AcademySampo’s Ylioppilasmatrirkelli data 1640–1899
persons and their student nations

```
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
PREFIX o: <http://lfd.fi/yoma/>
PREFIX gvp: <http://vocab.getty.edu/ontology#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX geo: <http://www.w3.org/2003/01/geo/wgs84_pos#>

SELECT * WHERE {
  ?person a foaf:Person ;
  :student_nation ?sn ;
  skos:prefLabel ?person_name .
  ?sn skos:prefLabel ?sn_label . FILTER (LANG(?sn_label)='fi')
}
```

<table>
<thead>
<tr>
<th>person</th>
<th>sn</th>
<th>person_name</th>
<th>sn_label</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://lfd.fi/yoma/p10">http://lfd.fi/yoma/p10</a></td>
<td><a href="http://lfd.fi/yoma/sn15">http://lfd.fi/yoma/sn15</a></td>
<td><em>Maexmontanus, Gabriel</em></td>
<td><em>Satakuntalainen osakunta</em></td>
</tr>
<tr>
<td><a href="http://lfd.fi/yoma/p10136">http://lfd.fi/yoma/p10136</a></td>
<td><a href="http://lfd.fi/yoma/sn15">http://lfd.fi/yoma/sn15</a></td>
<td><em>Sigelli, Erik (1764-1813)</em></td>
<td><em>Satakuntalainen osakunta</em></td>
</tr>
<tr>
<td><a href="http://lfd.fi/yoma/p10140">http://lfd.fi/yoma/p10140</a></td>
<td><a href="http://lfd.fi/yoma/sn15">http://lfd.fi/yoma/sn15</a></td>
<td><em>Astrén, David (1764-1838)</em></td>
<td><em>Satakuntalainen osakunta</em></td>
</tr>
<tr>
<td><a href="http://lfd.fi/yoma/p1020">http://lfd.fi/yoma/p1020</a></td>
<td><a href="http://lfd.fi/yoma/sn15">http://lfd.fi/yoma/sn15</a></td>
<td><em>Melartopaeus, Gabriel (-1686)</em></td>
<td><em>Satakuntalainen osakunta</em></td>
</tr>
</tbody>
</table>
Predicate-Object Graph

# persons born in 1750-1840 and their student nations

```sparql
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX geo: <http://www.w3.org/2003/01/geo/wgs84_pos#>

SELECT * WHERE {
  ?person a foaf:Person ;
  :student_nation ?sn ;
  skos:prefLabel ?person_name .
  ?sn skos:prefLabel ?sn_label . FILTER (LANG(?sn_label)="fi")
}

?person :has_birth { schema:date/gvp:estStart ?date } .
FILTER (?"1750-01-01"^^xsd:date <= ?date && ?date <= "1840-01-01"^^xsd:date)
```
SELECT * WHERE {
  { SELECT ?sn (COUNT(?person) AS ?no) WHERE {
    ?person a foaf:Person ;
    :student_nation ?sn ;
    skos:prefLabel ?person_name .
    ?sn skos:prefLabel ?sn_label . FILTER (LANG(?sn_label)='fi')
  }
  FILTER ("1750-01-01"^^xsd:date <= ?date && ?date <= "1840-01-01"^^xsd:date)
  } GROUP BY ?sn
  ORDER BY DESC (?no)
}
?sn skos:prefLabel ?sn_label . FILTER (LANG(?sn_label)='fi')
The distribution of the student nations and birth places of persons born in 1750-1840

```sql
SELECT * WHERE {
  
  SELECT ?place ?sn (COUNT(?person) AS ?no) WHERE {
    ?person a foaf:Person ;
    :student_nation ?sn ;
    skos:prefLabel ?person_name .
    ?sn skos:prefLabel ?sn_label . FILTER (LANG(?sn_label)='fi')
  }

  ?person :has_birth [ schema:place ?place ;
  schema:date/gvp:estStart ?date ] .

  FILTER ("1750-01-01"^^xsd:date <= ?date && ?date <= "1840-01-01"^^xsd:date)
}
GROUP BY ?place ?sn
```

<table>
<thead>
<tr>
<th>place</th>
<th>sn</th>
<th>no</th>
<th>sn_label</th>
<th>place_label</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://ldf.fi/yoma/places/m2913">http://ldf.fi/yoma/places/m2913</a></td>
<td><a href="http://ldf.fi/yoma/sn11">http://ldf.fi/yoma/sn11</a></td>
<td>196</td>
<td>&quot;Pohjalainen osakunta&quot;</td>
<td>&quot;Oulu&quot;</td>
</tr>
<tr>
<td><a href="http://ldf.fi/yoma/places/m4400">http://ldf.fi/yoma/places/m4400</a></td>
<td><a href="http://ldf.fi/yoma/sn20">http://ldf.fi/yoma/sn20</a></td>
<td>156</td>
<td>&quot;Uusmaalainen osakunta&quot;</td>
<td>&quot;Helsinki&quot;</td>
</tr>
<tr>
<td><a href="http://ldf.fi/yoma/places/m2876">http://ldf.fi/yoma/places/m2876</a></td>
<td><a href="http://ldf.fi/yoma/sn11">http://ldf.fi/yoma/sn11</a></td>
<td>114</td>
<td>&quot;Pohjalainen osakunta&quot;</td>
<td>&quot;Vaasa&quot;</td>
</tr>
</tbody>
</table>
# the distribution of the student nations and birth places of persons born in 1750-1840, with coordinates and color-coding of the places

```
SELECT * WHERE {

    SELECT ?place ?sn (COUNT(?person) AS ?no) WHERE {
        ?person a foaf:Person ;
        ?sn skos:prefLabel ?sn_label . FILTER (LANG(?sn_label)='fi')

        ?person :has_birth [ schema:place ?place ;
                            schema:date/gvpiesestStart ?date ] .
        FILTER ("1750-01-01"^^xsd:date <= ?date && ?date <= "1840-01-01"^^xsd:date)
    } GROUP BY ?place ?sn
ORDER BY (?no)
}

?sn skos:prefLabel ?sn_label . FILTER (LANG(?sn_label)='fi')

?place skos:prefLabel ?locationLabel ;
    geo:ilat ?lat ;
    geo:ilong .

BIND (CONCAT("Point("+STR(?lat)+" "+STR(?long)+")") AS ?location)

VALUES (?sn ?locationColor) {
    (:sn11 'rgb(64,64,255)') # Pohja
    (:sn20 'blue') # Uusmaa
    (:sn21 'indigo') # Viipuri
    (:sn9 'yellow') # Länsis.
    (:sn5 'red') # Hämäläinen
    (:sn16 'green') # Savonräläinen osakunta
    (:sn2 'purple')# Boreal
    (:sn15 'orange')# Satakunta
    (:sn13 '#DD4') # Suedois
    (:sn17 'brown') # Småland
}
```
Places

Places of birth 1640–1800, color by Student Nation:

- Swedish
- Botnia
- West Finland
- Tavastia
- Boreal
- Nyland
- Wyburg
- Småland
Learn SPARQL! Thanks!

https://www.wikidata.org/wiki/Wikidata:SPARQL_tutorial