

LENA - Browsing RDF Data More Complex Than Foaf*

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ABSTRACT

We present LENA, a web-based RDF browser that supports the rendering of complex RDF data, including interlinked data available on the Semantic Web, based on criteria expressed as SPARQL queries. The user interface of LENA enables to switch between different views onto the presented data enabling users to browse with respect to individual interests or expertise.

1. INTRODUCTION

With the rise of the Semantic Web more and more RDF data becomes available ranging from data describing social connectivity of persons,¹ over descriptions of complex multimedia assets [1] to descriptions of genomes,² as well as the interconnection of such data on the web. The complexity of the ontologies describing such data varies significantly and influences the readability and comprehensibility of the data. For example, understanding the meaning of the Foaf ontology and thereby expressed data is straightforward even when the data is only given in some triple notation. However, understanding RDF data describing the decomposition of an image into several segments that are annotated with various low-level and high-level features – as expressible by the COMM ontology [1] – is difficult even for expert users.

Accordingly, Semantic Web data described by such complex ontologies provoke a means for presenting such data i) in a comprehensible way and ii) to users with different interests and backgrounds. For instance, a professional in image processing may be interested in specific low-level features of an image while a person trying to sort images based on the objects depicted by an image may be interested in high-level annotations only.

In this poster, we present LENA,³ a web-based browser for RDF data that was designed to fulfill the requirements mentioned before. LENA stands for lens-based navigator and has been developed within the research project X-Media to support users dealing with complex data from the automotive and aviation industry. LENA supports i) the visualization of RDF data in a human-readable way, based on ii) the description of complex data selections, and iii) the provision of multiple renderings for the same data to conform to the specific information needs of different users. Additionally, LENA allows to browse interrelated RDF data available on the Semantic Web by

implementing a Linked Data⁴ browser.

2. SELECTING FROM COMPLEX DATA

LENA supports the Fresnel display vocabulary [3] for describing which related resources shall be presented for a RDF resource. Such a description is called a lens, e.g. a lens can be defined so that all images depicting a person shall be shown together with its mpeg-7 dominant color descriptor.

Within a lens-definition, such criteria on RDF resources are expressed in a selector language. However, available implementations of selector languages did not support complex criteria required to define lenses on RDF data created by sophisticated ontology frameworks [1, 2]. Thus, we developed SPARQL selectors as a means to express complex criteria by the use of SPARQL queries⁵: SPARQL *select* queries can be used to express which RDF resources match a lens, while *construct* queries are supported to select related resources. Listing 1 is an extract of a lens definition matching the example from above. Lines 3 to 9 show a select-query to select images annotated with an instance of a person, lines 10 to 19 show a construct-query for selecting the dominant color descriptor property for matching image resources.

Listing 1: Example Lens

```
1 :COMM_low_level a fresnel:Lens;  
2 fresnel:purpose fresnel:defaultLens ;  
3 fresnel:instanceLensDomain "SELECT ?image WHERE {  
4 ?image rdf:type core:image-data ;  
5 edns:setting ?s-annotation .  
6 ?person edns:setting ?s-annotation ;  
7 rdf:type foaf:Person .  
8 ?s-annotation rdf:type core:semantic-annotation  
9 }"^^fresnel:sparqlSelector ;  
10 fresnel:showProperties "CONSTRUCT {  
11 ?instance visual:color-index ?color-index-value  
12 } WHERE {  
13 visual:color-index rdf:type ?color-indexes .  
14 ?color-index-value data:has-vector ?color-indexes .  
15 ?color-indexes  
16 rdf:type visual:dominant-color-value-descriptor ;  
17 edns:about ?dcd .  
18 ?dcd rdf:type visual:dominant-color-descriptor  
19 }"^^fresnel:sparqlSelector
```

3. USER INTERFACE

LENA presents its users a navigation sidebar and a content area as shown in Figure 1. The sidebar is divided into three main blocks that are starting points for browsing RDF data available to LENA, namely the “Lenses” block

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¹<http://foaf-project.org>

²<http://www.geneontology.org>

³<http://isweb.uni-koblenz.de/Research/lena>

⁴<http://linkeddata.org>

⁵Our implementation of SPARQL selectors is now integrated into the Simile Fresnel engine <http://simile.mit.edu/wiki/Fresnel>



Figure 1: Screenshots of LENA showing different lenses.

and the “Remote Classes” and “Local Classes” blocks. Selecting a lens from the “Lenses” block, users can browse data corresponding to the view expressed by the selected lens, e.g. the *COMM_low.level* lens shows images and associated low-level features. The “Remote Classes” and “Local Classes” blocks provide an overview of the available remote Linked Data and local data respectively, showing for each RDF-class in the dataset, how many instances are available. Instances matching any lens description are highlighted by an additional icon. By selecting a class, users can browse instances of that class based on the *default lens* that represents RDF data as a listing of triples (cf. Fig. 1). While browsing data with LENA, users can switch to further views of the same data by navigation elements shown for each displayed resource: As illustrated in Fig. 1 (i) shows a link for viewing the shown resource based on another lens, (ii) can be used to view a resource using the default lens and (iii) allows to inspect the single resource with the current lens. With respect to Linked Data, dereferenceable URIs can be looked up on the starting page of LENA. Additionally further interconnecting URIs in the remote data are marked by the Semantic Web Cube logo, that is depicted in Fig. 2.

4. ARCHITECTURE

LENA runs as a Java servlet and utilises the SIMILE Fresnel Engine, which produces an XML output of a Fresnel selection being made. The SIMILE Fresnel Engine has been extended in order to allow browsing in the way described above, by adding relevant information to the XML output. LENA is making use of the extended engine and transforms the XML output by means of XSLT to XHTML. Furthermore LENA is responsible for generating the sidebar and managing the triple store as well as the aggregation of Linked Data. The architecture is illustrated in Fig. 2.

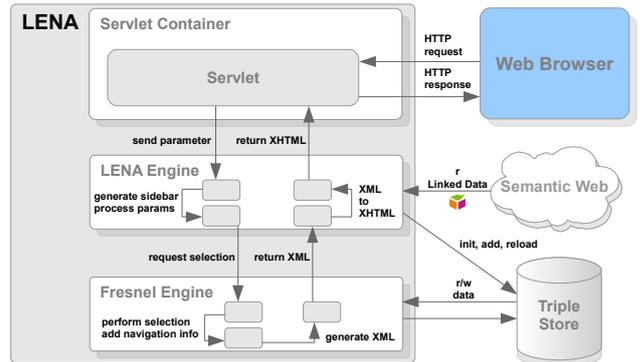


Figure 2: LENA Architecture

5. CONCLUSION

We presented LENA, an RDF browser that enables users to take multiple different views onto complex RDF data. View definitions itself are expressed as RDF data and can be defined by the use of the standardized query language SPARQL. By the possibility to browse Linked Data the browser paradigm is widened to a growing set of data available on the web.

6. REFERENCES

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