SPARQL Query System on Agriculture Semantic Dataset

A. Antveer Kaur
M.Tech scholar, Department of computer science
Banasthali University, Jaipur, Rajasthan
bntsnghbr940@gmail.com

Abstract

This Paper represent endpoint application on agriculture semantic web using SPARQL for farmers. It is designed to support intelligent agriculture system which gives the information to farmers about its crops marketing and diseases. We depict the current threat which faced by Semantic endpoint to move on implementation of Semantic Web. We show architecture and tools for SPARQL query system. We also provide practical demo with some examples using virtuoso jena provider for SPARQL queries on agriculture resource description format data sets. Using virtuoso Jena tool, we will create RDF data graph with AGRO triples data set.

Keyword: RDF, Semantic Web Application, SPARQL.

I. Introduction

Today World Wide Web is most accessible by people of world which use to decompose the linked documents. Semantic web is extension of World Wide Web in which information gives in well defined meaning to better enabling computers and people do work in corporation. Traditional Web Search is time-consuming and gives unrelated information. Semantic Web is generating rapidly changes in web where make linked document machine readable form as well as human readable. It provides more accurate information related to query of users. To give meaning to existing resources and linked, new languages and standards are being developed and disseminated by World Wide Web consortium (WW3C 2000).

We present problem about searching the semantic information and resources. Semantic web is not currently fully developed and standardized. It is illusion technology which may be developed in earlier year. We give a proposal about semantic architecture and tools which will made query for semantic information in easy way at endpoint application structure. Also introduce the problems which are being faced to connect SPARQL with resource description format.

In this paper have 5 sections. Section 1 presents introduction about .Section 2 introduce about architecture of semantic web .Section 3 do familiar with tools of semantic web. Section 4 present how made SPARQL queries on virtuoso Jena provide with agro RDF data set examples and show its result. Section 5 made conclusion about our paper.

II. Architecture of SPARQL based semantic web

In this section we introduce about the architecture of Semantic Web which enabled by SPARQL on Android based application. Semantic web have not predefined standard about architecture of it. There are two architectures being used to develop the android based application and desktop based application. Desktop based application architecture featured into figure1. When any user type query on information extraction system is store on temporary resource description format by Jena provide interface and made query using SPARQL. The control component works on it. Today much ontology
has been developed successfully like FOAF, SWRC etc (Koivunen et al,2005). Control component do mapping through ontology mapping library to found out suitable ontology Id for temp RDF graph. SPARQL is used for transformation engine to querying with RDF dataset.

![Figure 1. Architecture of Semantic desktop application](image)

SQL Northwind database also used for backend to retrieve the data like as relational data. Android devices store triple dataset in persistent memory. SPARQL endpoint application is being used to retrieve data from RDF dataset relevant to user query. SPARQL endpoint application is deployed on group of nodes for requesting data between node and web server (ijetty which available for android application).

### III. Linked Data Tools for SPARQL Query System

There are varieties of tools available for creation, modification and retrieving linked data. We provide short summary about tools functions which are available. The scenario tell about the farmer query system which farmer get latest details about crop prices rates from market Semantic(Koivunen , 2005).

**Jena**- It is used to store, create and manipulate RDF data and RDF Graph model. RDF data store in triple format like (Subject, predicate, object). It also provide oracle Jena adaptor with java interface API for creating and accessing RDF data and ontology also. (Miche et al, 2011)

**AllegroGraph**- It is open source and free tool for RDF database storage. It makes possible SPARQL endpoint application on RDF database and also prologue reasoning to create new ontology in new domains.

**Sesame**- It provide free semantic framework for query to ontology and triple data which stored into relational database.

**Virtuoso**- It is free license commercial free application used as data server. It used to store XML, RDF and ontology library. It also support Jena interface and sesame.

**B2RDF**- It use for converting data from one form to another form. It convert relational data to RDF dataset. It also make SPARQL query based on endpoint application. (Pickett et al, 2002)

### IV. Repository of SPARQL Queries on AGRO RDF dataset

We explore a practical approach for farmers using AGRO RDF dataset. Firstly, this describe about scenario which take as examples. The scenario is about crops like as cotton, wheat etc. for agriculture domain. If farmer want search about details of its crops then a semantic system how intelligently give
detail about it query. Data stored in triples for example “wheat has variety VT400” and” wheat has variety VT1200”. It shows “has variety “relationships between subject and object. RDF is used to store objects and it’s between relations also. RDF schema is framework about vocabulary of semantics classes and its properties. RDF stores data in triples syntax form which show in fig-3. (Feng et al,2006)

![Diagram of Agrordf Conceptualisation](image)

**Figure 3.** Conceptualisation for AgroRDF dataset.

To create RDF data graph and triples data form use Virtuoso Jena provide tool. It is used with support of java framework and iSPARQL. Agriculture data set is create using agrordf class with soil, variety and price rate IRI class and store in triples form with its properties. Firstly, we create wheat crop RDF dataset for its object like as Pricelist. Pricelist object have generalization in mandi price (as use in India) and factory price to provide price information to farmers in easy way. Using Jena provider, we have to create RDF data graph using IRI for agriculture ontology. (Chau, 2010)

```java
import java.util.*;
import com.hp.hpl.jena.query.*;
import com.hp.hpl.jena.rdf.model.RDFNode;
import com.hp.hpl.jena.graph.Node;
import com.hp.hpl.jena.graph.Triple;
import virtuoso.jena.driver.*;

public class agrordf {
    public static void main(String[] args) {
        String url;
        if(args.length == 0) url = "jdbc:virtuoso://localhost:1110";
        else url = args[0];
        System.out.println("RDF data graph for agriculture domain");
        Node cropNode=createNode("http://agrodomain.org/agriculture/crop");
        Node varietyNode=createNode("http://agrodomain.org/agriculture/variety");
        Node pricelistNode=createNode("http://agrodomain.org/agriculture/pricelist/mandiprice");
        Node factorypriceNode=createNode("http://agrodomain.org/agriculture/pricelist/factoryprice");
        Node mandi=agriordf.createIRI("http://agrodomain.org/agriculture/pricelist/mandiprice");
        Node factoryprice=agriordf.createIRI("http://agrodomain.org/agriculture/pricelist/factoryprice");
        VirtuosoGraph graph = new VirtuosoGraph("agrordf", url, "dba");
        graph.clear();
        System.out.println("graph.isEmpty() - " + graph.isEmpty());
        graph.add(new Triple(cropNode, varietyNode, pricelistNode));
        System.out.println("graph.getcount() - " + graph.getcount());
        System.out.println("graph.contains( " + graph.contains());
    }
}
```

**Figure 4.** Jena provider class agrordf for RDF Graph
Now, this class run using “java agrirdf.java” syntax it gives these output of RDF graph data set which draw the node of semantics and manage big data.

![RDF Graph Generation](image1)

**Figure.5.** Result of RDF Graph Generation

Using Northwind SQL database tool made SPARQL query on RDF Graph dataset.

```sql
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
SELECT DISTINCT ?p ?pricelist ?crop
FROM <http://localhost:1010>
WHERE {
    { rdfs:agrordf ?p ?pricelist . }
    UNION
    { ?crop ?p rdfs:agrordf . }
}
```

**Figure.6.** SPARQL query for retrieving variable.

It is used for retrieving the variable with union of another variable of Agro dataset. On the dataset query retrieve the crop variable with pricelist of it. SPARQL enable to make query on RDF data set using different type of operators like as a comparison, greater than and less than etc. similar to SQL query which made on relational data. It gives result into a table which show in fig.-7. It can also merge with web html page for client side.

<table>
<thead>
<tr>
<th>?p</th>
<th>?Pricelist</th>
<th>Rdf:agrordf</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.agrodomain.org/agriculture/crop">www.agrodomain.org/agriculture/crop</a></td>
<td><a href="http://www.agrodomain.org/agriculture/pricelist">www.agrodomain.org/agriculture/pricelist</a></td>
<td>Type: rdf</td>
</tr>
</tbody>
</table>

**Figure.7.** Result of SPARQL Query
V. Conclusion

This paper presents application for creation of Agro RDF Graph set and querying the graph dataset using SPARQL endpoint. Now Semantic web have very less technologies term in agriculture research, this work will be used in intelligent agro system for companies, research bodies. It motivates crop ontology applications for semantic web technology which useful for farmers in agriculture domain. Our future web will be refer with big data and large scalable for semantic agents. In this paper, SPARQL query represent potential faced for semantic search from RDF data set.

REFERENCES


