



Publishing Relational Data as virtual RDF

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Abstract: The D2R Server helps as a middleware between the relational databases(RDB) to resource description format(RDF). By creating a mapping file, we can publish the RDB data as an RDF format. But configuring a mapping file is complicated and cumbersome. Published data can be displayed using the semantic web browser. The RDF file can be queried using SPARQL.

Keywords: D2RQ, RDF, RDB, SPARQL, SQL

I. INTRODUCTION

As the latest development of Web to make semantically readable this is the goal of Semantic web because the present day internet is still the lack of rich semantic data. The role of the Semantic web is to make the web to be machine readable; that makes the automatically find and publish the most useful content to end user. But presently most of the internet data is stored in databases. The data stored in the databases has to be transformed into semantic data, which will be helpful to process by the machine. The Semantic data is exhibited as a set of assertions, these called as statements. These statements contain Subject, predicate, and object. It enables to links the relational data. Resource Description Framework (RDF)¹ is used as a commonly used method for the description of a statement that is implemented in Web resources, using a variety of syntax notations. So converting relational database data into Resource Description Format¹ and querying using SPARQL² or Linked data³ is present interest by semantic web researchers [1].

For the above said problem and keep the database content up-to-date about semantic web view and exploit the data in the database, it is best to have a tool to access the RDB schemas to RDF graph make available to apply queries on this using SPARQL. In these days more popularly used tool D2RQ⁴. This tool is helpful to implement SPARQL queries as an endpoint to connect with RDB SQL interface and dump relational databases in RDF. The mapping file has to be created to access RDB schemas. This mapping file describes how to map RDB schemas to RDF, but it is not easy to create the mapping file the user has to know the Semantics of RDF. If the user is a novice, the tool will generate mapping file on its own, which is a tailor-made.

The D2R Server [4][5][6], was helpful

1. create a mapping file as per your requirement,
2. We can apply SPARQL Query on-the-fly on the RDB databases [3] via a D2RQ server, [2] and,
3. The above queries output resulted as RDF dataset

II. RELATED WORK

Ying Chen, Xiaoming Zhao, Shiqing zhang[7] modified existing methodologies of linked data and proposed open source D2R server architecture to publish the RDB data as RDF

Yanping Chen and Qian Yang [8] were proposed SPARQL/ update for linking RDB data to RDF. In this, they studied implicit problems of RDF as well as URI problems.

Sujin YOO, Younghwan KIM, Seongbin PARK [9], they developed a tool check the whether the URI is RDF or not if it is RDF URI, it will display the graph of the RDF using SVG2 and GRAPHVIZ.

Arup Sarkar, Ujjal Marjit and Utpal Biswas [10] proposed as a framework for RDB as input to RDFdumper then they considered Provenance data for this and displayed information in the web browsers.

III. EXPERIMENTAL RESULTS

To link the data of RDB to RDF, I used D2RQ tool. The tool enables us to publish the relational data to resource description format. We run the D2R server without mapping file the resultant output was displayed in Fig-1. In the fig-1 D2R server home page, it consists of the four parts, in that one the first part showing what are the three ways of accessing published RDB data using D2R server. The second part is HTML view used in most of the web browsers; the third part is RDF view of RDB. Different semantic web browsers can display the RDF view of the relational database. There are few semantic web browsers like Tabulator, dipper, Sigma, the magpie is there, but DISCO [11], MARBLE [12] are used in D2RQ server, and the fourth part is SPARQL end part.

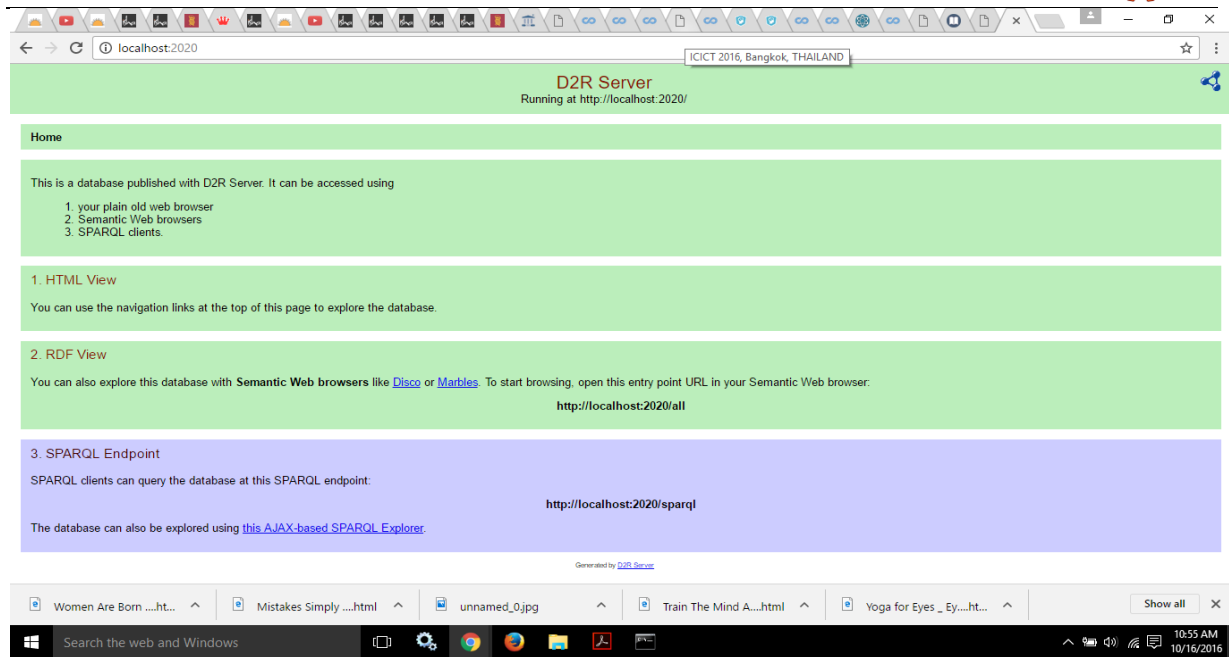


Fig:1 Without mapping file.

The Figure-2 shows the with mapping file to MySQL database. Here in the fig you distinctly see the different databases, such as Bookman, HR_Departments, HR_Employees, etc. on the top.

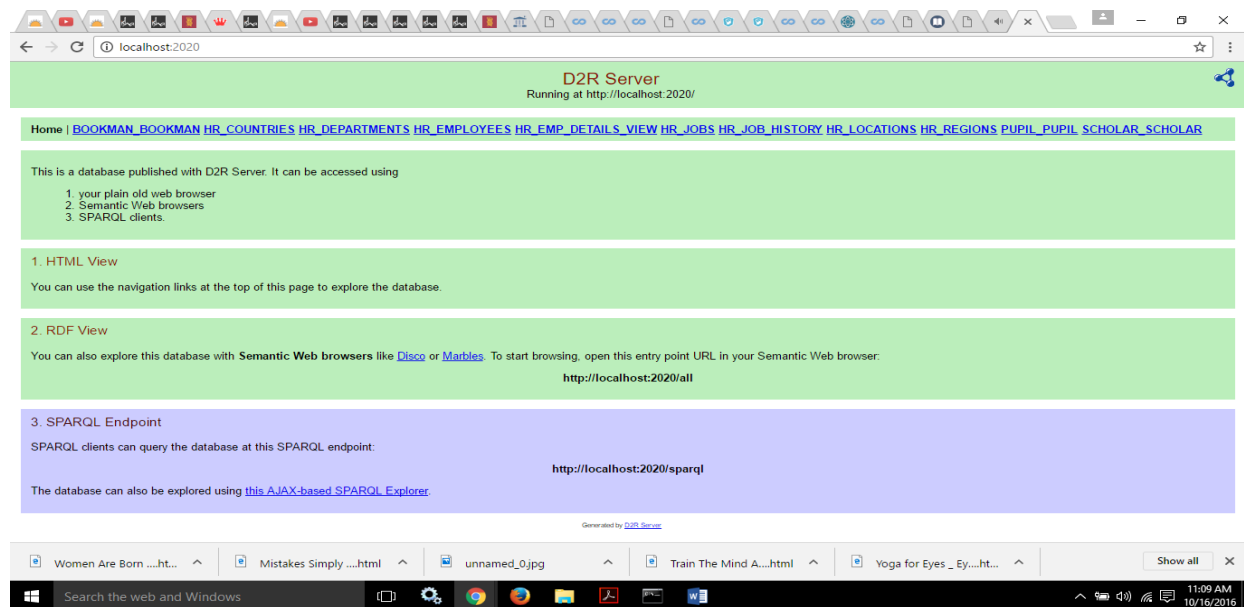


Fig:2 With mapping file to MYSQL database.

The fig-3 shows the database bookman contains bookman table and it also displays the fields of the table and also their values, for example, attributes like BADDRESS and its value Kakinada, BID as b001 and also BNAME as hanimi and it also displays the metadata of the database.



Fig:3 BOOKMAN database and the tuples in it.

The Fig-4 by showing the database data as RDF view by using Localhost:2020/all

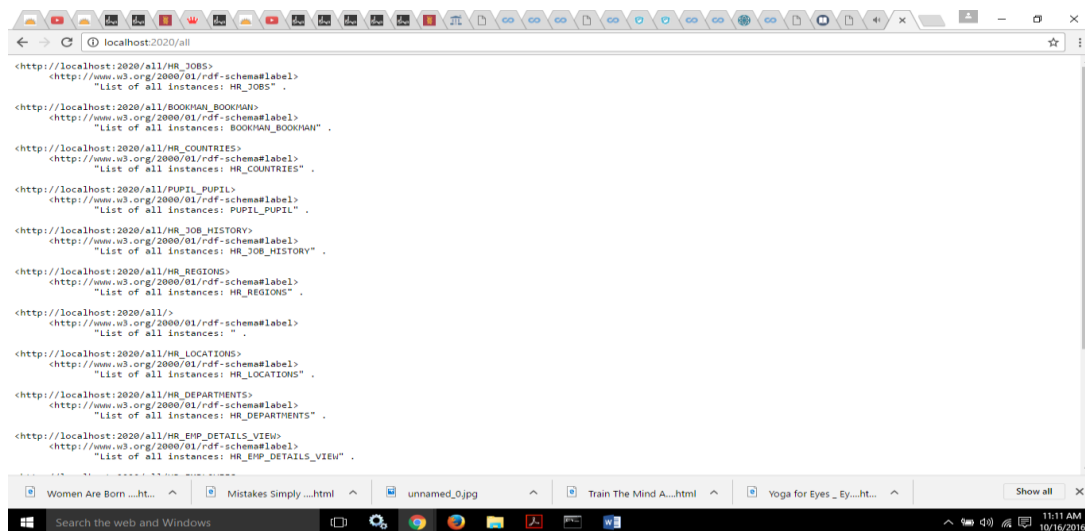


Fig:4 RDF view of the relational databases presents in MySQL database.

Next fig-5 was showing the output after running <http://localhost:2020/sparql>. Here querying the RDF [5] file by using SPARQL. The result of the query showing the subject, object and the predicate of the RDB and also the number of rows displayed in the output is limit 10. We can increase the limit to view the number of rows of the result.

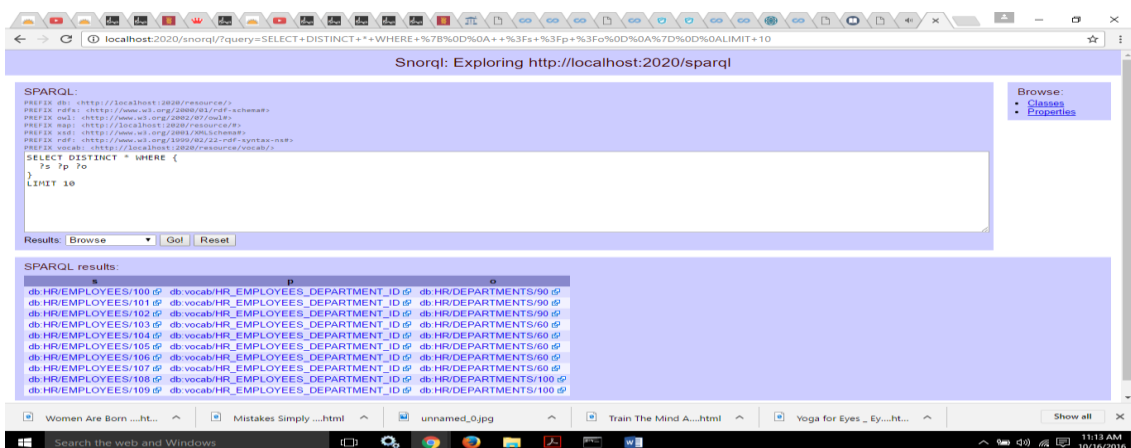


Fig :5 Result after applying SPARQL.

In fig-6 by applying URI <http://localhost:2020/snorql/classes> will explore the SPARQL query by showing the different classes. Below it displayed various classes like bookman, hr_countries etc. of triple store.

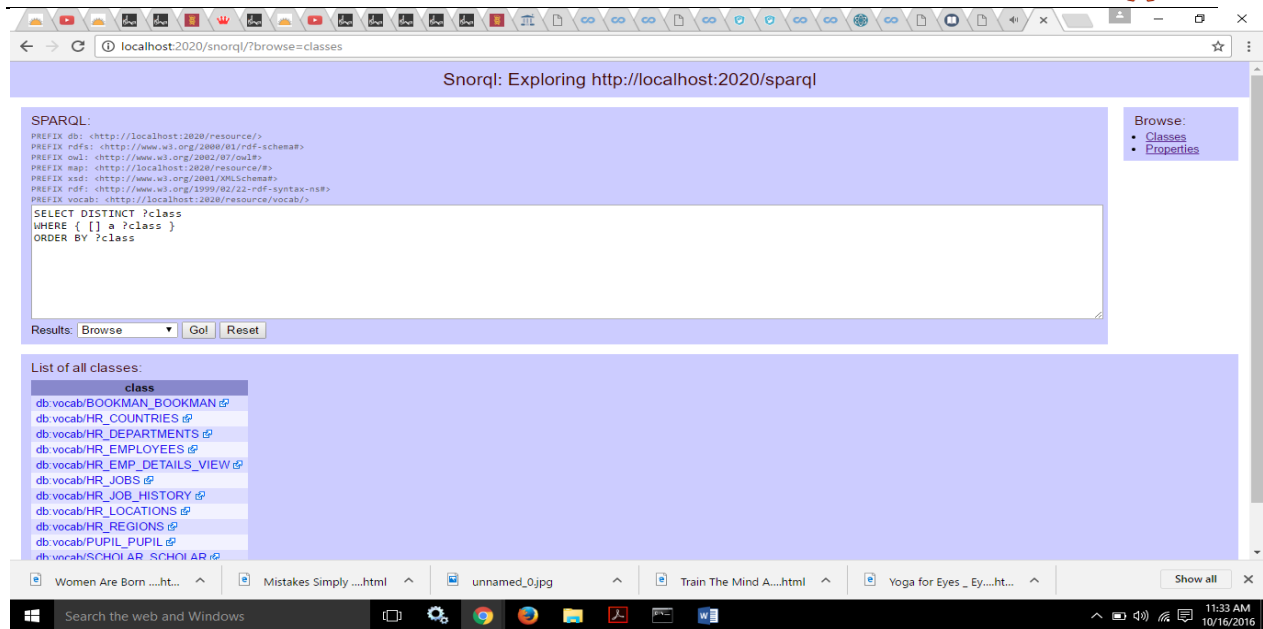


Fig:6 After applying SPARQL, List of Classes

<http://localhost:2020/snorql/?browse=properties>



Fig: 7 After applying SPARQL, List of properties of above classes.

Fig-7 using SNORQL tool explore the RDF triple store properties of the classes. It displayed the attributes of the Bookman table and fields of the other tables. It was displaying the distinct properties of the classes in ascending order.

IV. CONCLUSION

In this paper I used to publish the data from the relational database as Linked Data on the Web of Data. In this work I depicted the use of student database in the college, but it does not limit to its use for student database only. In general, it could be useful for any domain of relational database systems. I presented some snippets for better understanding that how structured RDF data get generated internally within the system. A sample HR_department data is also shown here. Advance link discovery of various external databases still at the experimental level.



REFERENCES

Proceedings Papers:

- [1]. Alexander, K., Cyganiak, R., Hausenblas, M., Zhao, J. (2009). Describing Linked Datasets. *Proceedings of the 2nd Workshop on Linked Data on the Web (LDOW2009)*.
- [2]. Yasunori Yamamoto and Toshiaki Katayama, D2RQ Mapper.
- [3]. Van de Sompel, H., Lagoze, C., Nelson, M., Warner, S., Sanderson, R., Johnston, P. (2009). Adding eScience Assets to the Data Web. *Proceedings of the 2nd Workshop on Linked Data on the Web (LDOW2009)*.
- [4]. Bizer, C., Cyganiak, R. (2006). D2R Server - Publishing Relational Databases on the Semantic Web. Poster at the 5th International Semantic Web Conference (ISWC2006).
- [5]. T.B. Lee, J. Hendler, O. Lassila, et al. *The semantic web. Scientific American*, 284(5):34{43, 2001.
- [6]. L.O. Data, W3c sweo community project, <http://www.w3.org/wiki/SweoIG/TaskForces/CommunityProjects/LinkingOpenData> (last modified on 13 May 2013).

Journal Papers:

- [7]. Ying Chen, Xiaoming Zhao, Shiqing Zhang Publishing RDF from Relational Database Based on D2R Improvement, *WSEAS TRANSACTIONS on INFORMATION SCIENCE and APPLICATIONS, Issue 8, Volume 10, August 2013*.
- [8]. Yanping Chen and Qian Yang, "Using SPARQL/UPDATE to Extend RDB-to-RDF: A Mapping Approach, *International Journal of Database Theory and Application Vol.7, No.5 (2014), pp.227-238*.
- [9]. Sujin YOO, Younghwan KIM, Seongbin PARK, *An Educational Tool for Browsing the Semantic Web, Informatics in Education, 2013, Vilnius University, Vol. 12, No. 1, 143–151*.
- [10]. Arup Sarkar, Ujjal Marjit and Utpal Biswas, LINKED DATA GENERATION FOR THE UNIVERSITYDATA FROM LEGACY DATABASE, *International Journal of Web & Semantic Technology (IJWesT) Vol.2, No.3, July 2011*.

Web References:

- [11]. Bizer, C., Gauc, T. (2007). Disco – Hyperdata Browser. A Simple Browser for Navigating the Semantic Web. <http://wifo5-03.informatik.uni-mannheim.de/bizer/ng4j/disco/>
- [12]. <http://marbles.sourceforge.net/>