

An overview of RDB2RDF techniques and tools

DERI Reading Group Presentation

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- Integrate data from different RDBs
- Add semantics to the existing relational data



RDB2RDF mappings

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- Translate relational data to RDF (loadable into an RDF store)
 - Directly queryable RDF dump
 - Harder to maintain consistency (e.g. constantly updated DB)
- Generate a mapping of the RDB that can be queried using SPARQL
 - The SPARQL query is translated into SQL
 - May lead to longer query times (e.g. inferencing)



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- Human readable syntax and XML and RDF representations
- Mappings must be expressed using the Rule Interchange Format (RIF) [4] syntax
- Support for exposing vendor specific SQL features (e.g. spatial support)
- Mechanism to reuse public identifiers (or if necessary create new ones) for database entities



Reference Framework

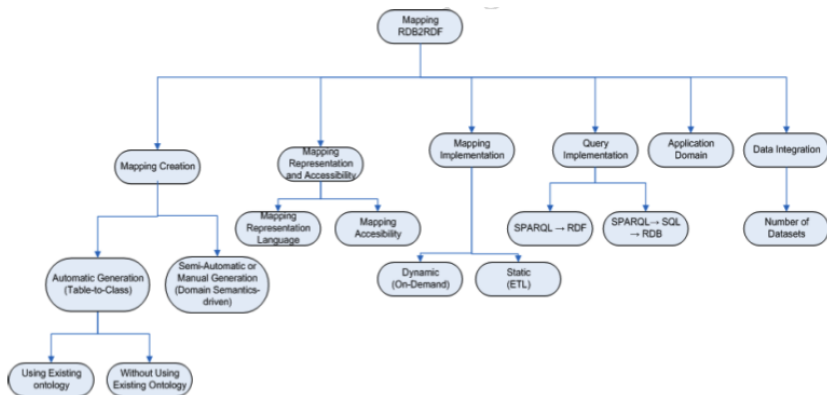
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Characterizes each tool over the following aspects:



Mapping tools (I)

Overview of generic Tools and Applications:

Virtuoso RDF View: Table to class and column as predicate approach and user generated. Can use either type of Mapping and Query implementation.

D2RQ: Can use automatic and user generated mappings. Allows for either type of Mapping and Query implementation.

Triplify: Maps HTTP-URI requests to relational database queries expressed in SQL. No SPARQL support.



Mapping tools (II)

R2O: Can use automatic and user generated mappings. Allows for either type of Mapping and Query implementation.

RDBToOnto: Creates automatically generated mappings (Table to Class). Static mapping (RDF dump). SPARQL on generated ontology.

SBDR, Automapper: Automatic mapping creation using the Table to Class and Columns as Properties approach. Allows for both types of Mapping implementation. SPARQL queries are rewritten to SQL.



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- Mappings should be available for re-use.
- The representation of mappings in a standardized form is necessary to enable their reuse.



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- Data stored in RDBs

- Can SPARQL be used to express the types of query required in scientific applications?
- Can the performance of RDF triple stores and RDB2RDF tools meet the requirements of the large data sets encountered in the scientific domain?



Dataset & Queries

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20 queries (scientific application domain)

- Large number involve mathematical functions, aggregates, ordering



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- No mathematical functions
- No aggregate or grouping
- Of 18 queries (2 were not considered due to depending on a server function), 9 are expressible in SPARQL.



Compared Systems

5 systems were compared (1 RDB, 2 RDB2RDF and 2 triple stores):

MySQL: Used with the publicly available data and queries.

D2RQ: Uses Jena for RDF access and data was stored in the MySQL database.

SquirrelRDF: Exposes the RDB data as an RDF view and allows to query using SPARQL. Similar conditions to D2RQ.

Jena: Triple store with a relational database backend. (Not the MySQL relational data).

Sesame: Triple store with RDF native backend.



Performance results

	MySQL (ms)		D2RQ (ms)		SquirrelRDF (ms)		Jena (ms)		Sesame (ms)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Query 1	34	0.5	352	17.2	613	13.5	3,450	775.5	39	24.2
Query 2	38	1.0	5,339	36.5	21,492	259.7	485,932	169,800.6	83	12.0
Query 3	33	1.2	2,733	34.4	837	11.2	7,229	2,549.8	69	26.4
Query 5	34	2.5	4,090	43.0	1,307	10.0	17,793	8,849.5	65	13.4
Query 6	1	0.4	7,468	224.5	19,984	87.8	372,561	60,204.8	56	32.7

Queries: <http://surveys.roe.ac.uk/ssa/sqlcookbook.html#Examples>

- best results: MySQL
- best SPARQL-enabled: Sesame



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- best results: MySQL
- best SPARQL-enabled: Sesame
- RDF and SPARQL still can not compete with relational databases in the scientific domain



Conclusions

Steps forward:

- New SPARQL (1.1) features include aggregates, SPARQL functions, which provide some of the missing features
- More research on query translation and SPARQL optimisation is needed



Thank you!

Questions?



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