



Linked Data

- The Lingua Franca of Data Integration
- Flexible Schema, Schema-Last
- Global Identifiers
- Reuse of Modeling
- Desiloization, Explicit Metadata



Advantages

- Most Users Choose RDF for Schema Flexibility
- Integration of Many Diverse Sources
- Long Term Preservation – Data Must be Self-Describing
- Fast time to solution, adjust modeling as you go
- Many non-RDF applications “reinvent the triple”,. E.g. mixing metadata and data, key-value pairs



Costs of Linked Data

- Schema-first is usually more efficient
- Query optimization is harder
- Data takes more space
- Schema-last is high value, users will trade absolute performance for flexibility



Virtuoso

- One of the leading Linked Data Platforms
- Applications in: life sciences, publishing, Financial services, government...
- OpenPHACTS, DBpedia, data.gov, Bio2RDF, Uniprot
- Available in open source and commercial



Product Features

- Multi-model, SPARQL and SQL
- Single server and scale-out
- Column store and vectored execution
- Excellent data compression, architecture optimized down to the metal, very up to date



Database is a Performance Game

- Virtuoso Agenda: Be the fastest in SQL, then offer RDF on top at no extra cost
 - The science is the same for RDF and SQL
 - RDF data usually has structure but what is obvious in SQL must be discovered in RDF
 - RDF storage is usually structure agnostic: What is accessed together is not stored together
- Therefore RDF is harder to optimize and run

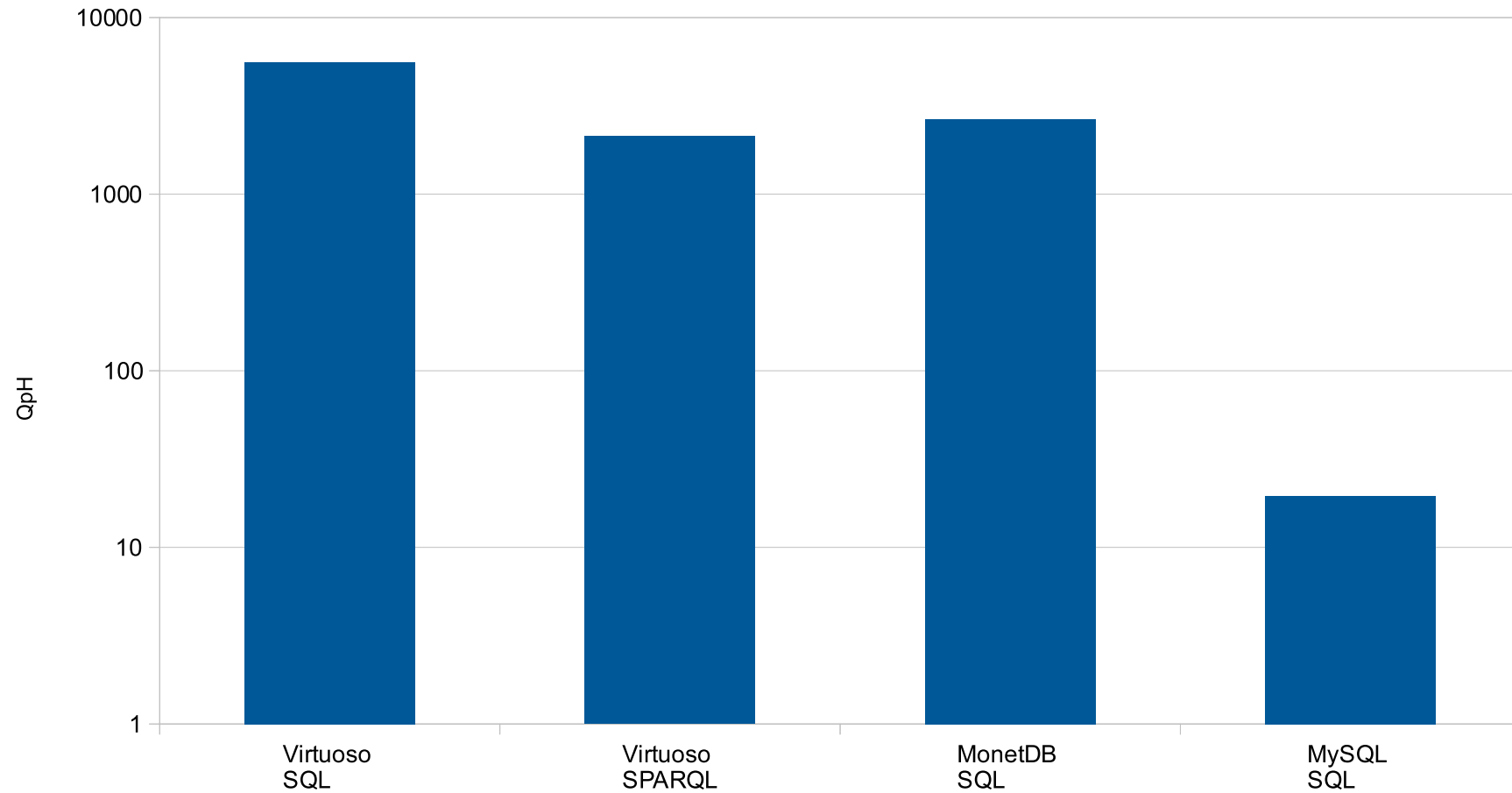


State of Play

- Virtuoso SPARQL beats most SQL
- Virtuoso SQL leads in RDBMS performance

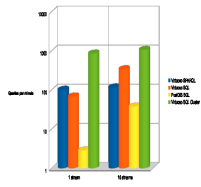


Star Schema Benchmark





Geospatial





Future of Linked Data

Benefit from linked data at best of breed RDBMS speed and scale

- Structure-aware RDF storage: What is de facto a table becomes a physical table
- No extra cost for regular data
- No compromise in flexibility, but pay for extra freedoms only when exercising these
- Query optimization reduces back to SQL
- First results to be published in September 2014

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