XQuery Reloaded

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Google searches for “XQuery” (normalized)
Google searches for “SQL” (normalized)
XQuery folklore

- XML and XQuery are slow
- XQuery is complicated
- Legacy of XML, Namespaces, Schema, Xpath
- Bad products
- No people
- ...

...
XQuery folklore

- XML and XQuery are slow
  - partly true, but products are catching up
  - highly optimizable (like SQL; better than Java) [Boncz06]
- XQuery is complicated
  - is skiing more complicated than snowboarding?
  - try to process Web pages, RSS Feeds with Java!
- Legacy of XML, Namespaces, Schema, XPath
  - yes, but... no alternative (relevance!)
- Bad products
  - huge investments: research projects, big players
- No people
  - courses at all top places (ETH, Stanford, etc.)
- ....

This talk

Clear your mind and get rid of prejudices

- Explain XQuery in a nutshell
- XQuery today and tomorrow
- Introduce Zorba – the MySQL for XQuery
- Show some fancy usages of Zorba

Not in this talk: How to design an XQuery processor. If you are interested in that, talk to one of us after the talk
The roots of XQuery…

- Origins go back to the QL workshop 1998
- Standardized by the W3C (recommendation since 2007)
- Started out as a query language
- Closed data model, composition
  - results of expressions can be input for expressions
- Compliant with other standards
  - XML, XML Schema, XPath, Web Services, ...
- Example query:
  ```
  for $empl in //employees
  let $name := $emp/name
  where $x/salary > 5000
  order by $name
  return $name
  ```
Today, XQuery is much more….

XQuery = Query + Update + Fulltext + Scripting + Streaming + Libraries

- **X**
  - XQuery is the only language for XML, but that does not mean that XML is all it can do
  - CSV, JSON, HTML, …
  - spectrum: structured data to unstructured text

- **Query**
  - XQuery has joins, group-by, sorting, etc., but that does not mean that it is only good for the DB
  - by now, full-fledged programming language
  - modules for structured programming

→ The name „XQuery“ is a disnomer!!!
XQuery is alive

...why else should so many people from different companies care to have his/her name on the paper

Most successful in the middle-tier

- Data integration
- Configuration
- Reporting

but also in the database world

(Oracle has 8000+ customers reporting XQuery bugs)
XQuery in the future: Gartner’s Top Ten disruptive technologies for 2008 to 2012

- Cloud computing and cloud/web platforms
- Multi-core and hybrid processors
- Virtualisation and fabric computing
- Social networks and social software
- Web mashups
- User interface
- Ubiquitous computing
- Contextual computing
- Augmented reality
- Semantics
What is needed:
A programming language for the Web

- **Machine-to-Machine Communication** between/inside distributed systems across company boundaries
- **Machine-to-Human Communication** over the browser, event-based interaction
- **Variety of workloads:** Updates, OLTP/OLAP/Streaming queries, structured and semi-structured data, varying and evolving over time

IMHO XQuery is the best starting point

*XQuery is not perfect, but solves many of the problems*
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XQuery mashups

„Gartner predicts that web mashups, which mix content from publicly available sources, will be the dominant model (80 percent) for the creation of new enterprise applications.“

- Requires to integrate different source
- XQuery is made for the web
  - Works natively with XML and JSON
  - Has native support for REST and WebServices
- XQuery is a programming language
XQuery and cloud computing/Web platforms

Incoming XML message

XML
- XML Protocol (SOAP)
- XML Schema validation
- XSLT/ XQuery evaluation

Java/C#, JavaScript
- Application logic, data validation
- Error handling, caching, replication and distribution

SQL
- Queries and updates
- Integrity constraints
- Triggers, transactions, etc.

Java/C#
- SQL
- Java/C#

Outgoing XML message

communication with the world

application logic

data persistence and integrity;
transactions
XQuery and cloud computing/Web platforms

- No impedance mismatch
- Reduce the numbers of “hops”
- XQuery made for the web-standards
XQuery and new hardware / multi-cores

- Requires a highly parallelizable programming language
- Declarative (functional) programming model
- XQuery is highly optimizable and parallelizable (as well as SQL is highly optimizable and parallelizable)
- Made for bulk processing
If you do not buy all that:
Still, XML is out there and it will not disappear

- XML is best choice for **communication data**
  - general: web services (SOAP, WSDL), REST, RSS
  - specific: XBRL, HL7, ebXML, RosettaNet, ...
- XML is best choice for **meta-data and code**
  - configuration files, XMI (Eclipse), XForms (apps), XMP (photography), XAML / InfoPath (UIs), ...
- XML is best choice for **documents**
  - XHTML, SVG, OpenXML (Office), UBL (business)

**XQuery is the cheapest way to process XML (and JSON)**
What is missing is a MySQL for XQuery
Zorba

- Intended to be the MySQL for XQuery
- Developed by the FLWOR Foundation
- A team of 5 full-time programmers and several volunteers
- Contributing companies/organisations

http://www.zorba-xquery.com/
What makes Zorba different?

- Not a “research” project!!!
- Open-source “Apache License”
- Zorba is a query processor like MySQL
- Exchangeable store
  - comes with an in-memory store
  - feel free to implement other stores (like 28msec)
- Zorba is designed for compliance first!
- Feature complete (except for full-text)
  - full-standard and not just the researchy features
- C++, interfaces to all main languages (Java, PHP, …)
Zorba libraries/features

- XQuery 1.1, Update, Scripting
- Debugger
- Eval
- JSON
- REST/HTTP
- XQDoc
- PDF
- E-Mail
- Collections
- Tidy

....
Cool stuff with Zorba: XQuery in the browser

Web browser

DOM

Events

Data access and manipulation

Plug In

Zorba

Store

http://www.xqib.org
Cool stuff with Zorba: 28msec WebServer

http://www.28msec.com
Cool stuff with Zorba: Xadoop

- Hadoop + Zorba
- Position XQuery as an alternative to Pig/Hive/etc.
- Well-suited for semi-structured data
- Use cases
  - pre-processing
  - financial data
  - analysis of blogs/wikipedia etc.
  - ....
- Pre-packed on EC2

So far, just a toy project with open ending...
XQuery Benchmarking Service

http://xqbench.org

- Supports several benchmarks
  - XMark
  - TPC-W like scenario
- Automatic test infrastructure
- Browse results
- Allows to post: Your queries + Your documents

Main goal: put pressure on the vendors and give use cases for the open-source community
Conclusion

- Zorba as the MySQL for XQuery
- XQuery combines a database and a programming language
- XQuery is ready for the next step

FLWOR Foundation: http://www.flworfound.org
Zorba XQuery Processor: http://www.zorba-xquery.com
XQuery in the Browser: http://www.xqib.org
XQuery Benchmarking Service: http://www.xqbench.org
XQuery Eclipse Plug-In: http://www.xqdt.org
Xadoop (not yet online): http://www.xadoop.org/