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Querying XML

Paul Cotton

SC32 Plenary

Santa Fe, Jan 24, 2000

Biography

- ◆ IBM representative to CAC SC32
- ◆ ISO SQL/MM Full-Text Editor
- ◆ DB2 architect, IBM Toronto Lab
- ◆ XML Activity participant since 1998
- ◆ Chairman of W3C XML Query WG

Organization of Presentation

- ◆ Example usage scenarios
- ◆ XML query history
- ◆ Query Languages '98 workshop
- ◆ Candidate requirements
- ◆ W3C XML Query working group
- ◆ Questions

Example usage scenarios

- ◆ XML document management
- ◆ XML processing of DBMS data
- ◆ Filtering of XML messages
- ◆ Integration of multiple XML sources
- ◆ Existing W3C query facilities
- ◆ Other scenarios

XML document management

- ◆ Documents structured using XML
- ◆ Collections of documents
 - Technical manuals
- ◆ Query facilities
 - Retrieve individual documents or fragments
 - Generate new XML output
 - Text search operations including ranking

XML processing of DBMS data

- ◆ DBMS data
 - SQL databases
 - Object-oriented databases
 - Native XML repositories
- ◆ XML can be physical or virtual
- ◆ Queries facilities
 - Operations on text and non-text data types
 - Operations on object types
 - Aggregations

Filtering of XML messages

- ◆ Messages formatted using XML
- ◆ Streams with multiple sources/sinks
- ◆ Software-based message routing
- ◆ Query facilities
 - Message selection and filtering
 - Message transformation
 - Text and non-text data type operations

Integration of multiple XML sources

- ◆ Integration of document-oriented and data-oriented data sources
- ◆ More than single document processing
- ◆ Queries facilities
 - Data integration
 - Joining of data in multiple sources

Existing W3C query facilities

- ◆ DOM Iterators or TreeWalkers
- ◆ XPath queries as used by XPointer and XSLT
- ◆ IETF DAV Searching and Location (DASL)

Other scenarios

- ◆ Your favorite XML search/query scenario

XML query history

- ◆ Early 1998: “roll your own query language”
- ◆ XSL Working Group
 - XSLT needed syntax to select nodes
- ◆ XML Linking Working Group
 - XPointer needed syntax to select a location
- ◆ February 1999 joint meeting
 - Rapprochement on 90% of requirements
- ◆ XPath
 - W3C recommendation with XSLT

XML query history - 2

- ◆ Early queries facilities for SGML
- ◆ Academic research into semi-structured data and its operations
- ◆ XQL: See <http://metalab.unc.edu/xql>
- ◆ XML-QL, August, 1998
 - <http://www.w3.org/TR/NOTE-xml-ql/>

Query Languages Workshop '98

- ◆ W3C sponsored workshop
- ◆ Boston (USA), December 2-3, 1998
- ◆ 98 participants: W3C members, database vendors, invited experts,
- ◆ 66 position papers
- ◆ See: <http://www.w3.org/TandS/QL/QL98>

Candidate requirements

- ◆ QL'98 workshop summary
 - Candidate Requirements for XML Query, Paul Cotton and Ashok Malhotra, IBM
 - <http://www.w3.org/TandS/QL/QL98/pp/queryreq.html>
- ◆ See also:
 - Database Desiderata for an XML Query Language, David Maier, Oregon Graduate Institute
 - <http://www.w3.org/TandS/QL/QL98/pp/maier.html>

Query language and structure

- ◆ Non-procedural query language
- ◆ XML syntax for query language
- ◆ Build on syntax used by other XML standards
- ◆ Ability to transmit a query in a URL
- ◆ Queries should be XPointer/XLink aware
- ◆ Uniform support for elements and attributes

Query language facilities

- ◆ Support for query operations
 - selection of a document or element based on content, structure or attribute values
 - extraction of particular elements
 - reduction: removing sub-elements
 - restructuring: construct new elements
 - combination: merging of elements
 - joins across data sources
- ◆ Support for insert, update and delete

Query language facilities - 2

- ◆ Support for nested queries and closure
- ◆ Support for full-text queries
- ◆ Facilities to construct XML documents

Query data sources

- ◆ Ability to query multiple documents
- ◆ Ability to query distributed data stored in a variety of formats such as SQL and OO databases. XML query must be translatable to query facility for underlying data.
- ◆ Ability to create XML schemas from non-XML data sources
- ◆ Support for “live” data.

Using the XML query language

- ◆ Query should be usable on a document without a schema
- ◆ Presence of a schema should permit query validation
- ◆ Support for local environment variables
- ◆ Possible to run queries in several different environments/contexts

XML query language semantics

- ◆ Precise semantics
 - Query equivalence
 - Query containment
- ◆ Compositional semantics
 - Referential transparency
- ◆ Provided by data model of XML, set of query operators and then a query syntax

W3C XML Query WG - History

- ◆ July 1999 - Working Group proposed as part of XML Activity Phase 3 rechartering
- ◆ September - Call for WG participation
- ◆ September - WG constituted and chartered
- ◆ More than 30 W3C member companies
- ◆ September 15-16 - Initial F2F meeting
- ◆ December 2-3 - Second F2F meeting

W3C XML Query WG - Status

- ◆ Requirements document to be submitted as a W3C Working Draft
- ◆ Regular F2F meetings
- ◆ Weekly teleconference calls
- ◆ Public working drafts every three months
- ◆ Proposed recommendation(s)

XML Query WG relationships

- ◆ Existing W3C recommendations
 - XPath and XSLT
 - DOM
 - Internationalization
- ◆ Emerging W3C recommendations
 - Infoset
 - XML Schema
 - XPointer and XLink
- ◆ IETF DASL

Questions

- ◆ Today
- ◆ Public email list: www-ql@w3.org
- ◆ Later - cotton@ca.ibm.com