Now It’s Obvious to The Eye—Visually Explaining XQuery Evaluation in a Native XML Database Management System
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XML Transaction Coordinator (XTC)

Key Aspects
- Native XML data management
- XML query processing
- ACID transactions for dynamic XML
- Adaptivity and energy efficiency aspects

The XTC XQuery Compiler (XTCcmp)

- Exploration of classical OP techniques to treat XQuery
- Rule-based query rewriting and plan generation
- Support for a rich physical XML algebra (approx. 50 physical operators)
- Dynamic rule selection and configuration of the query compiler

The XTC Explain Tool (XPlain)

- Allows to follow the complete query evaluation process from head to toe
- Easy to understand—even for XQuery novices and non-database experts
- Dynamic rule selection and configuration of the query compiler

XPlain supports different types of users in improving their work:

Developers
- Immediately see the impact of different rewrite and optimization strategies

Lecturers
- Teach XQuery classes supported by our self-explanatory graphical XQuery representation

Administrators
- Focus only on the query execution plan and speed-up query evaluation by creating new indexes

The XML Query Graph Model (XQM)

- Operator graph that hides physical/system-dependent aspects
- Each operator consumes and produces (nested) tuple sequences
- Operators: SELECT, ACCESS, STRUCT_JOIN, SPLIT, MERGE, SET, GROUP_BY, UNNEST, HTJ, REVERSE, and TUP_VAR_REF

XQuery Compilation on XTC

- Follows the classical query processing approach
- Separates logical/algebraic optimization from physical optimization
- Initial stages follow the XQuery Formal Semantics to ensure correctness
- Rule engine used as common infrastructure for various stages

Demo Setup

XTC Server

Server Config
- BufferSize 4 MB
- Isolation Level Repeatable
- PageSize 16 KB
- *...

XPlain

Rule Repository
- Meta-Data
  - Documents
  - Indexes
  - Structural Summaries

Documents
- sample.xml
- auction.xml

Rule Engine
- Query Engine
- Evaluates
- Evaluates
- Sensis Query
- * Result Sequence
- * Result Statistics

XML Constructor
- Literal
- Select Operator
  - with element-generating projection with predicate and sorting

Structural Join Operator
- on the descendant axis with
  - distinct-disc-order function

Sequence Access Operator
- all book elements

N Estive Access Operator
- with correlated input (context) and
  - with navigational axis evaluation

XML Query Graph Model (XQM)