

An Introduction to XQuery

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What is XQuery?

- A specification for a query language that allows extraction of information from an XML file or a collection of XML-like data
- Under development by W3C



A Comparison

- Q. One often hears that XQuery is to XML as SQL is to relational data. Is this true?
- A. It's best to explore XQuery and answer this yourself.
- We will revisit this question later



Getting Started

- Developers like learning by doing
- eXist makes this easy for XQuery
- eXist is an open source XML database
- Installs quickly and easily
- Includes a query sandbox that lets you construct and submit queries and view the results
- Let's look at the sandbox



An Observation

- All of the queries we just issued are nothing more than XPath
- XQuery is based on and is an extension of XPath
- Every XPath expression is a valid XQuery



Beyond XPath

- Much of the power of XQuery comes from FLWOR expressions (pronounced “flower”)
 - FOR
 - LET
 - WHERE
 - ORDER BY
 - RETURN



F = FOR

- Iterates over an input sequence
- Calculates some value for each item in the sequence
- Returns the sequence that is the concatenation of the results of the calculations
- A FLWOR expression can contain multiple FOR clauses



L = LET

- Declares a variable and assigns a value
- In a FOR clause, the variable is bound to each item in the sequence in turn
- In a LET clause, the variable takes a single value
- A FLWOR expression can contain multiple LET clauses



W = WHERE

- Serves as a filter
- Specifies the conditions under which items are to be included
- A FLWOR expression can contain only a single WHERE clause
 - **Must** appear **after** **all** FOR and LET clauses



O = ORDER BY

- Specifies how query results should be sorted
- Seemingly simple on the surface – and usually is
- Can be complex – we will see examples
- A FLWOR expression can contain only a single ORDER clause
 - **Must** follow the WHERE clause, if present



R = RETURN

- Defines items in the result
- **Must** be present in every FLWOR expression
- **Must** always be last



Complex Queries

- A FLWOR expression can be used anywhere an expression is used
- Does not have to be at the top level of a query
- FLWOR expressions can be nested
- Let's look at the equivalent of an outer join



Creating XML Documents

- The output of queries can be more than simple values
- XQuery can create XML
- Using nested, complex queries and XML tags, a single XQuery can create a complete XML document



XQuery functions

- XQuery includes over 100 built-in functions for:
 - String values
 - Numeric values
 - Date time comparison
 - Node and QName manipulation
 - Sequence manipulation
 - Boolean manipulation



User-Defined Functions

- Can be defined in a query or in a separate library

➤ **Syntax:**

```
declare function prefix:function_name($parameter AS datatype)
  AS returnType
{
  (: ...function code here... :)
};
```



Declaring XQuery Types

- In FOR and LET clauses, you may (optionally) declare the types of each variable
- Helps others understand your intent
- The system makes **no** attempt at conversion



XQuery Position Variables

- An auxiliary variable used to hold current position
- Value ranges from 0 to number of items in a sequence
- If there is an ORDER BY clause, the position values represent the position of the items *before* sorting



The SQL Comparison

- We asked earlier if XQuery was to XML what SQL is to relational data
- You have now seen XQuery
- And the answer is.....



XQueries From Java

- XQuery is most powerful when invoked from and used in conjunction with Java
- Let's explore an example