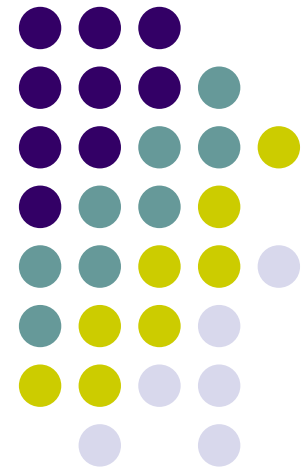




Working with XML Data using XQuery and ADO.NET

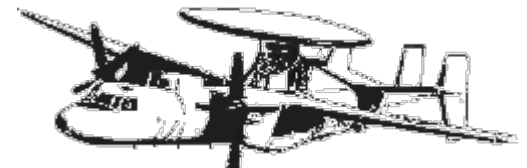
Or, “One More Tool in Your Toolbox”
Hal Hayes, ACRITECH Corporation

Hal Hayes, hal.hayes@acritech.com



About Me...

- Founder and President of Capital Area Visual Basic User Group (CAVBUG) in 1999
- Co-Founder of Capital Area .NET User Group (www.caparea.net)
- Learning Tree Instructor for XML and SQL Server
- MCP, MSCS, BSCS, BSAE
- President, ACRITECH Corporation. Specializing in web-based (ASP.NET, MS SQL Server and Oracle, XML, SharePoint, LogiXML) solutions for Medical and Government Sectors
- Retired Reserve U.S. Navy Aviator (NFO)



Code Camp “Manifesto”

- Code is free and without restriction
- No Fluff, Just Stuff



What you should know...

- XML
- XML Schemas
- XPath and XSLT
- Working with XML in .NET
- Working with XML in SQL Server



Question

- Currently storing XML in the database?
- If so, what layer are you manipulating XML?
 - Client?
 - Middle-tier?
 - Backend-server?
 - Within SQL Server?



Questions that led to this presentation



- What is XQuery?
- How is it implemented in SQL Server 2005?
- What options do you have to interact with XQuery on SQL Server 2005 on the client-side through ADO.NET?



Outline/Agenda

- Very brief overview of XQuery
- Encoding XQuery
- Some Gotchas
- Working with XQuery and ADO.Net together
- References



What is XQuery?

- XML-based functional, declarative query language
- XQuery is SQL-like
- Fine-grained querying against native XML (hierarchical vs. flat table/record format for SQL)
- Syntax is straight-forward making it easy (??) to query your XML data
- Namespace aware
- Can work with or without a Schema (strong vs. weak-typed)



W3 standardized language (<http://www.w3.org/XML/Query>)

Why Query with XQuery?

- XML is in the database
 - Databases are being used more often as repositories for XML data documents.
 - XML provides a hierarchical, flexible data structure
 - Database provide proven storage management, security and performance.
 - Something new department. Serialization of CLR object data and storing them in an XML column in a table
- Text-based searching (Full Text Search) is not structurally aware
- XPath alone is too limited
- XQuery provides both strong search capability plus the ability to shape your results to a usable format



Microsoft's XQuery Implementation



- **Only** available (at this time) in SQL Server 2005 (server-side)
- Microsoft has **withdrawn** XQuery from .NET Framework 2.0 (client-side) for VS2005 release
- Status of XQuery Standard is “Last Call Working Draft” with Recommendation status (final) expected mid-2006
- SQL Server 2005 XQuery is a subset of W3C Working Draft
- Incorporates XPath Version 2.0 (also in “Working Draft” status)



How to XQuery

- Implemented through the query() method of an XML data type or XML column
- Constructs of XQuery Language
 - XPath Expressions
 - FLWOR Expressions
- Comments in XQuery “(: ... :)”, for April CTP



FLOWR

Main construct of XQuery is the **FLOWR** expression

- For-Let-Where-Order-Return
- equivalence to SELECT-FROM-HAVING-WHERE in SQL
- Use the **Return** construct to shape your results

```
<bi b>
{
  for $b in doc("bi b. xml ")/bi b/book
  where $b/publ i sher = "Addi son-
Wesl ey" and $b/@year > 1991
  return
    <book year="{ $b/@year }">
      { $b/ti tle }
    </book>
}
</bi b>
```



FLOWR (cont'd)

- **for** clause provides a definition of a variable and binding of iterations across a range of sequence values (SQL-SELECT)
- **let** clause allows association of a variable to a further ordered list of tuples (SQL-SET)
- **where** is a filter of the current sequence or tuples from for/let (SQL-WHERE)
- **order** sorts current results based on a given criteria (SQL-ORDER)
- **return** is used to create output that can be XML or not XML (SQL-RETURN)



XQuery cont'd

- Set of built in functions, like `xs:integer` which converts values to...integer
- Syntax can be “fussy” for complex queries
 - One possible solution is to use less complex queries then use CLR to pull together results
 - Change in XML document structure, especially strong-type (Schema) will break previously created statement
 - Recommend keeping complex XQuery on the server “wrapped”



DML methods on XML data type

These are not XQuery implementations, but they can be used to with the XML data type.

- **value()** : get a value from an XML structure
- **exists()** : does a specified node exist
- **nodes()** : produces a 0 or more set of nodes
- **modify()** : insert, delete, and replace XML nodes



About the Demos

- MS SQL Server 2005 April CTP
- VS2005 Beta 2

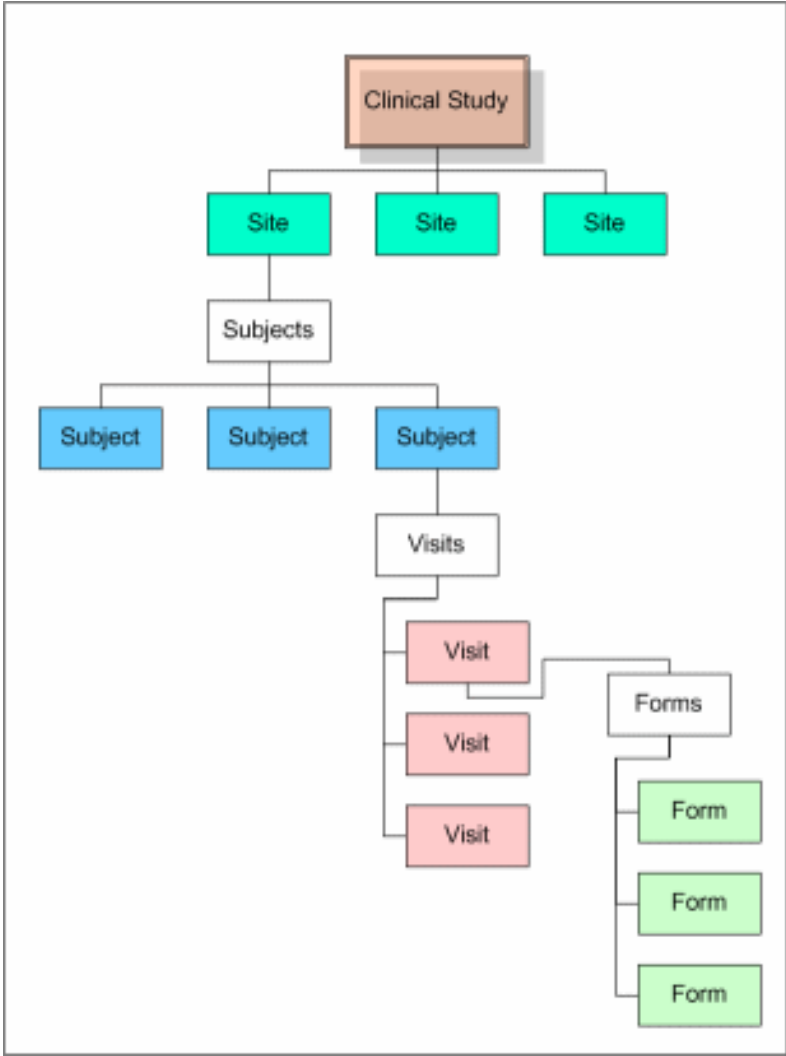


About the Data

Based on Clinical Drug Trial Management System Data
Study/Sites/Subjects/Visits/Forms

- Site – location where study is being conducted
- Subject – a participant
- Visit – subjects make visits for the administration of trial drugs and for checkup of their condition. Some visits are scheduled, others are not.
- Form – Collection of data pertaining to a particular focus area (such as vital signs, medical history)





Demo 1 ...



What can't you do (based on the proposed standard)?

- No “let”

let \$req := root/Subjects/Subject[@ID_ = "10"]

- Can only XQuery across one XML column or single XML data type instance

- No user defined functions

declare function local:count-of-locked-subjects() ...

- No capability to import library modules

import module namespace myMod = "http://www.acritech.com/xquerymod"



XQuery Errors

- Static or compile time errors
- Runtime Errors
 - Converted to empty sequences
 - May propagate as empty XML or a NULL query result
 - This is a deviation from the W3C standard





XQuery and ADO.NET

- We can store and retrieve XML documents within SQL Server 2005
- We can use XQuery to search and extract XML documents, fragments, and values



But, how do we access an XQuery functionality from the Client-side of our applications?



Some Choices ...

1. Build the XQuery into a SQL statement dynamically and execute it on the server
2. Wrap the XQuery within a Transact-SQL stored procedure
3. Wrap the XQuery within a Transact-SQL user defined function
4. Wrap the XQuery within a CLR stored procedure



Demo 2 ...



What next?

- How good is SQL Server XQuery performance against large XML documents?
- What will be the best practices for using XQuery and CLR in SQL Server 2005?
- Will future releases of .NET Framework provide better integration of XML data type?
- What happens in 2006 to SQL Server when W3C produces XQuery standard?



Online References

W3 Xml Query,

<http://www.w3.org/XML/Query>

W3 Xml Query Use Cases

<http://www.w3.org/TR/2005/WD-xquery-use-cases-20050404>

W3 Xml Path Language (XPath) 2.0

<http://www.w3.org/TR/2005/WD-xpath20-20050404>

XML Best Practices for Microsoft SQL Server 2005,

<http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnsq190/html/sql25xmlbp.asp>

MSDN XML Support in Microsoft SQL Server 2005

<http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnsq190/html/sql2k5xml.asp>



Online References, Cont'd

Exploit Yukon's XML Data Type, Roger Jennings, Visual Studio Magazine,
http://www.ftponline.com/vsm/2005_06/magazine/features/rjennings/default.aspx

Get Ready for XQuery, Roger Jennings, Visual Studio Magazine
http://www.ftponline.com/xmlmag/2002_08/online/xml_rjennings_08_12_02/default.aspx



Books

- *A First Look at SQL Server 2005 for Developers*, Beauchemin, Berglund, Sullivan; Addison-Wesley
- *XQuery Kick Start*, James McGovern, et al.; SAMS
- *XQuery, The XML Query Language*, Michael Brundage, Addison-Wesley
- *XQuery from the Experts*, Don Chamberlin, et al., Addison-Wesley



Blogs of Note

Michael Rys, Program Manager for SQL Server's XML Technologies and member of W3 XML Query Working Group

<http://sqljunkies.com/WebLog/mrys>

Kent Tegels, DevelopMentor, MVP

<http://sqljunkies.com/WebLog/ktegels>

Mike Champion, Program Manager for XML Standards XML WebData team at Microsoft

<http://blogs.msdn.com/mikechampion>

Shankar Pal, XML SQL Program Manager, Microsoft Corporation

<http://blogs.msdn.com/spal>

Microsoft Corporation XML Team Weblog

<http://blogs.msdn.com/xmlteam/default.aspx>

Bob Beauchemin's Blog, Author of A First Look at SQL Server 2005 for Developers

<http://staff.develop.com/bobb/weblog/default.aspx>

