Embedded SQL in a large VDF Application

Cove Systems StreamV

- Successor to Stream II (1985 – 2009)
- Development Started 2001
- Released 2006
- Sites with 5 – 250+ users
- Multi-Currency
- Multi-Language
- Multi-Locational
- Fail-Safe (Logging & Multi-way replication)

Cove Systems StreamV

- 464 Views (VW)
- 234 Modal Dialogs (DG)
- 308 Lookups (SL)
- 194 Report Views (RV)
- 627 Packages (PKG)
- 443 Include Files (INC)
- 81 Web Objects (WO)
- 600K+ Lines of Code
- 136 Data Files
- 4 Executables

Cove Systems StreamV

- 99% VDF Code
- 1% C++ Code for OS calls
- VDF 15.0
- Web Services Interfaces
  - Offer & Consume

Why Embedded SQL?

- Site specific customization w/o code changes
  - Non-compiled Code
  - SQL Test Points
  - SQL Lookups (Queries)
  - SQL Reports
- Easier Software Enhancement & Distribution
- Increased Functionality & Tools
- Reduced coding

And more reasons

- More flexible reporting
  - Reporting on non-index data
  - Subtotal only reporting
- Reporting Speed (in some cases)
- Full Text Search Capabilities
- Use or Update data on other servers/databases

A Detour - SQL Submission

- What is Looks like – The SQL Statement is a literal text string sent to the SQL server, and a result set is returned.
- As seen in:
  - SQL Server Management Studio
  - MSQuery (Word/Excel)
  - ADO Explorer & Others

A Detour – SQL Submission

- What Really Happens
- The Submitter parses the SQL Statement into
  - Separate queries; selects, updates, etc….
  - Properly sequences text field/blobs
  - Stored Statements Submissions
  - Sends them sequentially and fetches the result sets
- The Submitter analyzes the result sets returned and either uses them in the other queries or displays them.

Real programmers don’t use submitters

- DAC Embedded SQL provides the tools to talk to the SQL server directly.
- Programmer handles parsing SQL Statement, submitting, processing result sets.
- The minimum
  - Open Connection
  - Execute Statement (sends to SQL server)
  - Fetch Data from Result Set (Row by row)
  - Close Connection
  - Do something with the data, like display it.
- Source: *CoveSQLQuery.pkg*

How Cove implemented Embedded SQL

- oCoveSQLHandler
- oCoveSQLQuery
- cCoveSQLGrid
- CoveBasicReport
- SQL Execution Points
- Tools

oCoveSQLHandler Object

- Is an instance of cSQLHandleManager (DAC Object)
- Creates interface object to SQL, which:
  - Opens standard or remote connection
  - Sends Query to the SQL server
  - Pulls the result set(s) data from the server
  - Closes Connection
- Source: *CoveSQLObject.pkg*

oCoveSQLQuery Object (Overview)

- Is a cObject to hold the Cove SQL code
  - **fSQLQuery** – Single line query to return a result set in a 2 dimensional array
  - **fSQLResultSet** – Function to return a result set after setting properties in object. Used for more complex queries.
  - **fSQLMultiResultSet** – Function to return a result set after setting properties in object. Used for more complex queries.
- Source: *CoveSQLQuery.pkg*

oCoveSQLQuery Object (Detail)

- Open the connection (read connection string from a data record)
- Process SQL Cove Tokens in SQL Statement (CoveTokenReplacement.pkg)
- Make sure no disallowed commands
- Open Database
  - Submit one or more queries or stored procedures
  - Fetch one or more result sets
  - Fetch Data for col. names and widths.
- Close Database and then Connection
- Source: *CoveSQLQuery.pkg*

cCoveSQLGrid – Nearly a result set object

- Display a result set from a Query
  - Submits query from a data record or string
  - Reads result set into a Grid object
  - Sets column titles to field names or based on AS data.
  - Sets columns widths based on returned data.
  - Totals columns as required
  - Option to output data
    - XML file (to browser for import into Excel)
    - CSV/Tab delimited
- Source: cCoveSQLGrid.pkg

SQL Queries in the Application

- One or more queries per module
  - Common code base.
- Select query from a set of data records
- Additional columns on the fly
- Token replacement & manifest constants
- Drill down support

- StreamV – CRM Query, edit control record, totals, editor, zoom
- CRMQuery.vw

BasicReport with SQL

- The Power of DAC Objects
- Enhanced DAC BasicReport Class
  - Selects records based on a list of recnums provided by an SQL Query.
  - Augmented FIND_REC function to get next record from result set array.
  - Loads record in buffer and relates.
- All other report behavior remains the same.

- Source: CoveBasicReport.pkg

Cove SQL Reporting

- Reduced Coding
  - Output in non-index sequences
  - On the fly temp file creation
- Much Faster on non-index searches
- Full text Reporting Capability
- Site modifiable reporting w/o code changes
  - Reduced user training with templates
- Standard Presentation Layer
  - All output as XML

Examples of non-Reporting SQL use

- Update & display with less code
  - Three queries, two result sets displayed
  - #1 Flag new orders (Update)
  - #2 Display selected orders (summary)
  - #3 Display selected orders (detail)

- BC_Util - BC SAP Order Sync View
- Source: cCoveSQLGrid.pkg, BC_SAP_Order_Sync.vw

Real Time Application Behavior Customization

- SQL Test Points
  - Without source changes
  - Without site code update
  - Rapid customization
  - Increased margin ($$)

    Login sample (login.vw)
    Order Entry Save Point (orderentry.vw)

Login SQL Test Point Sample

```
…….
 //
 // SQL Exit Routine to check if login OK
 //
Get fSQLQuery of oCoveSQLQuery "SQS:LOGIN:AUTH" to saResultSet
//
// See if we got anything back from the Query
//
If (saResultSet[0][0] <> 0 AND saResultSet[0][1] <> 0) Begin   // Any data?
  If (saResultSet[1][0] = "0") Begin                           // Yes or No
     PSTOP "Login Not Allowed" saResultSet[1][1]               // [1][1] Message
     Procedure_Return
   End
End
……
```

Order Entry Exit Routine/SQL Test Sample

```
……
Send Save_Order_Header iOrder          // with temp#
//
// VDF Pre-Save exit routines
//
Get Exit_Routine of CoveFunc "SOE" to iRetval
If iRetval eq 1 Procedure_Return
//
// SQL Exit Routine
//
Get DoSQLAudit to iRetval
If iRetval eq 1 Begin
   PSTOP "SQL Audit stopped save."
   Procedure_Return
End
……
```

Generic VDF SQL Tool

- Quick Query
- Data maintenance
- Testing

- SQLTest.vw

Notes

- Slower on small index searches (i.e. lookup lists)
  - SQL Gencode timing test
- Better speed through optimization
  - DAC Access model
  - Issues with keeping connection open (transactions)
- Server specific syntax
- Text field/blob issues
- Careful with stored procedures for portability
- Study the restructure behavior
  - Info on DAC forum

The Down Side – using SQL

- New language to learn
- Change in development flow
- Limited rhyme or reason to syntax
- New technology – SQL Servers
  - Backup
  - Data Transfer (BCF)

The Upside – Using SQL

- Recognition of “Database Administration” function by market, validated by Microsoft.
- Increased perceived value of support.
- Increased revenue stream for support of additional product.
- Customer perception of data freedom (“let my data go”)
- Sales opportunity for additional tools (and training/support)
  - BI – Business Intelligence
  - Assorted SQL reporting tools like ClickView
- Cheap Replication (No license on second server)

More Upside

- Reduced application development costs.
- Reduced reporting costs
  - Faster coding
  - Less on-demand scheduling disruptions
  - Happier customers from lower cost reports
- Increased reliability
  - More stable than Pervasive or Faircom
  - No indexing vs. embedded
- Lower application maintenance costs
  - Better tools
  - Code free data changes SQL Test
- Private or shared temp files (semaphores)

And by the way

- Express serves from Microsoft, IBM (DB2) and Oracle are free!
- Divide and archive
  - Easy dataset switching
- Noticeable SQL syntax and feature differences between servers

Free Server Comparison

- Per DAC Site

DBMS	***CPU Limit***	***Max Memory***	***Max Data***	***Server Platform***
MS-SQL	1 CPU	1 GB	10GB *(updated)*	Windows
DB2	2xDual Core	4 GB	Unlimited	Windows & Linux
Oracle	1 CPU	1 GB	4 GB	Windows & Linux

StreamV Features of Interest

- Web Services
  - Weather
  - Address Validation
- Com Objects
  - Imaging
- Help File update via ftp
- Email

Embedded SQL In StreamV

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