SQL92 for a Progress DBA

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Agenda:

Goal: **Make you successful with SQL applications!**

- OpenEdge SQL
  - Component overview
  - Initial connection
- OpenEdge database
  - Setup and maintenance
    - Control and performance
- OpenEdge SQL specifics
  - Tools
  - Applications
Use Case

• Open Edge Application

• Users want to use ODBC Compliant Tools

• Crystal Report, EXCEL

• How to care and tend to this added responsibility
OpenEdge is OpenSSL HTTP HTTP/S HTML .NET Java™ .NET™ Web services

OpenEdge SQL (works with OpenEdge RDBMS)

Crystal Reports WebSphere® JBOSS / JRun Java / JDBC apps J2EE™ / JTA .NET / ODBC apps ADO.NET / VB

ABL: (ABL works with relational DBs)

.NET
Java
HTML

SSL
HTTP
HTTP/S
HTML

“Other” RDBMS

OpenEdge RDBMS

OpenEdge ABL Server

OpenEdge SQL Server

ODBC Clients

JDBC Clients

Service Interfaces

OpenEdge ABL Clients

Open Clients (Non-OpenEdge)

Open Clients: Java™ .NET™ Web services

OpenEdge DataServers

Oracle® MSSQL ODBC

Data is fully interoperable: ABL & SQL
Client Side Drivers v10+

%DLC%\install\odbc\sql-odbc-setup.exe (ODBC)
ds-setup.exe (Data Server Bits)

NetSetup on a Client

SQL Client Access also available from ESD

Client does not need to me on server.
  DB = AIX and Client on Windows
Platforms and Keys

<table>
<thead>
<tr>
<th>Platform</th>
<th>Serial Number</th>
<th>Control Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 32-bit</td>
<td>006013399</td>
<td>Z8CS9 TQE6D 5MGYP</td>
</tr>
<tr>
<td>Windows 64-bit</td>
<td>006013408</td>
<td>Z8DRH TPM6D N4GYM</td>
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<td>HP-UX Itanium 64-bit</td>
<td>006013363</td>
<td>X8HRS 2QM2C 5MDYR</td>
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<td>IBM AIX 64-bit</td>
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<td>X9CSH 2PM6C 54CYM</td>
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<td>Sun Solaris 64-bit</td>
<td>006013391</td>
<td>X9GR? 2QP6D 54GYR</td>
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<td>Linux 32-bit</td>
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<td>X8CRH TPP6C N4DYM</td>
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<td>Linux 64-bit</td>
<td>006013384</td>
<td>X9HRS TQP6C N4G?M</td>
</tr>
</tbody>
</table>
ODBC Manager

32 Bit Manager

C:\Windows\SysWOW64\odbcad32.exe

64 Bit Manager

C:\Windows\System\odbcad32.exe
Client and the ODBC Connection

The Client application and the ODBC DSN must match bit sizes to work.

32 Bit Client + 32 Bit ODBC = Works
64 Bit Client + 64 Bit ODBC = Works

32 Bit Client + 64 Bit ODBC = Mismatch Failure
64 Bit Client + 32 Bit ODBC = Mismatch Failure
ODBC: Multi-Database configuration

See kbase article 2767 for details

1. Only Primary DB can change. All Other DBs are Read Only.

2. Must specify the full path for the databases when the databases are started via the AdminServer / Progress Explorer.

3. All databases need to be of the same codepage
ODBC DSN – single connection
ODBC DSN - Advanced Tab
Dirty Read

A dirty read occurs when one user is updating or inserting a record while a different user is reading it, but the work is not yet committed to the database.

User A executes:
INSERT INTO State (state, state_name, region) VALUES (‘ME’, ’Maine’, ’Northeast’);
User B executes: SELECT * FROM State;
User B sees: state ‘ME’
User A executes: ROLLBACK WORK; User B has seen data that really did not exist.
Non-Repeatable Read

Occurs when one user is repeating a read operation on the same records but has updated values.

User A executes: SELECT * FROM State;
User B executes:
UPDATE State
SET state_name = 'Arkansas'
WHERE state = 'AK';
COMMIT WORK;
SELECT * FROM pub.State
User A re-executes:
SELECT * FROM State;
User A has now updated records in the result set.
Phantom Read

Occurs when one user is repeating a read operation on the same records, but has new records in the results set.

User A executes:
SELECT * FROM State;

User B executes:
INSERT INTO pub.State (state, state_name, region) VALUES ('CT', 'Connecticut', 'Northeast');
COMMIT WORK;

User A re-executes:
SELECT * FROM pub.State;

User A has new records in the results set.
# Default Isolation Settings

<table>
<thead>
<tr>
<th>Isolation</th>
<th>Dirty read</th>
<th>Nonrepeatable read</th>
<th>Phantom read</th>
</tr>
</thead>
<tbody>
<tr>
<td>READ UNCOMMITTED</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>READ COMMITTED</td>
<td>Prevented</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>REPEATABLE READ</td>
<td>Prevented</td>
<td>Prevented</td>
<td>Permitted</td>
</tr>
<tr>
<td>SERIALIZABLE</td>
<td>Prevented</td>
<td>Prevented</td>
<td>Prevented</td>
</tr>
</tbody>
</table>
Default Isolation Levels

- **READ_UNCOMMITTED**, other processes can be read from the database. Only modified data is locked and is not released until the transaction ends. [FOR EACH NO-LOCK]

- **READ_COMMITTED**, other processes can change a row that your application has read if the cursor is not on the row you want to change. This level prevents other processes from changing records that your application has changed until your application commits them or ends the transaction.
Default Isolation Levels

• REPEATABLE_READ, other processes are prevented from accessing data that your application has read or modified. All read or modified data is locked until transaction ends. [FOR EACH EXCLUSIVE-LOCK]

• SERIALIZABLE, other processes are prevented from changing records that are read or changed by your application (including phantom records) until your program commits them or ends the transaction. This level prevents the application from reading modified records that have not been committed by another process.
Connection – server side
Default server setup

SQL client

SQL client

ABL client

ABL client

SQL & ABL Broker

SQL Servers

Shared Memory

DB

ABL Servers
“Recommended” server setup
Recommended parameters example

Separating ABL and SQL brokers/servers example

Start a primary ABL broker
proserve myDB
  -S 6000   -H localhost
  -ServerType 4GL
  -Mi 1   -Ma 5
  -minport 6100
  -maxport 6300
  -Mpb 4
  -Mn 8   -B<n> -L<n> . . .

Start a secondary SQL broker
proserve myDB
  -S 5000   -H localhost
  -ServerType SQL
  -Mi 5   -Ma 10
  -minport 5100
  -maxport 5300
  -Mpb 2  –m3

Secondary broker uses 1 –Mn for itself
Verify the Math

• SQL92 ODBC Parameter Tool
Security

Authenticate then authorize

**Authentication**

• Identify who I am
• Validate I am who I say I am

**Authorization**

• Being I am who I say I am…
• What am I allowed to do
Security

ID and passwords

• Database authentication
  • Performed at connection
  • SQL
    • User ID and password required to authenticate
• ABL
  • User ID and password NOT required
ID and passwords scenarios

Case 1: Users have not been created (no rows in _User table)

- No password validation at connection
  - You are not “authenticated”
  - You can pretend to be someone you are not
- Unable to do much (not authorized) UNLESS
  - You created the database
  - You know an authorized user
    - Database creator
    - Someone who was granted privileges
SQL Authentication - Am I who I say I am?

ID and passwords scenarios…cont’d

Case 2: Users have been created
(rows exist in _User table)

• Password validation at connection
• Valid users defined by a DBA or SA
  • Can be created by SQL or ABL
  • Make sure existing SQL DBA has userid/pswd
• Invalid login/password error message:
  • “Access denied (Authorisation failed). (8933)
Authorization – What am I allowed to do?

• SQL follows GRANT security model
  • By default, a connected userid is not *authorized* to do anything.
  • *Exceptions:*
    • the DBA account (*full operations*)
    • the TABLE owner

• DBA controls operation privileges
  with GRANT / REVOKE syntax
Encountering data access errors

```
select count(*) from customer;
```

Access denied (Authorization failed) (7512)

- Possible reasons for this:
  - No authorization privileges
  - Schema scope
Authorization – What can I do?

Privileges syntax: GRANT (2 types)

• Database wide (system admin or general creation)

```sql
GRANT { DBA, RESOURCE } TO user_name [, user_name ] , ...;
```

Can do anything Can CREATE stuff
Authorization – What can I do?

Privileges syntax: GRANT (2 types)

• Database wide (system admin or general creation)

  GRANT { DBA, RESOURCE }
    TO user_name [, user_name ] , …;

• For specified Tables or Views

  GRANT { privilege [, privilege ] , ... | ALL }
    ON table_name
    TO { user_name [, user_name ] , ... | PUBLIC }
    [ WITH GRANT OPTION ];

  Where ‘privilege’ is:

  { SELECT | INSERT | DELETE | INDEX |
    UPDATE [ ( column , column , ... ) ] | |
    REFERENCES [ ( column , column , ... ) ] }


Authorization – What can I do?

Example Syntax: GRANT

- For specified Tables or Views - Example

  ```sql
  GRANT select ON PUB.Customer
  TO bob;
  
  GRANT select ON PUB.Order-line
  TO PUBLIC;
  
  COMMIT WORK;
  ROLLBACK WORK;
  ```

- See PSDN whitepaper on authorization for additional details.
create user 'sqluser', 'readonly123';

/// //// grantall.sql  READONLY User
grant select on pub.Benefits to sqluser;
grant select on pub.BillTo to sqluser;
grant select on pub.Bin to sqluser;
Commit work;
Encountering data access errors

```sql
select count(*) from customer;
```

Access denied (Authorization failed) (7512)

- Possible reasons for this:
  - No authorization privileges
  - Schema scope
Schema: a logical grouping

_In the “SQL world” schema is NOT meta data nor is it “Area 6”_
Schemas

What is a default schema?

• Users have a default schema attached to their ID
  
  <userid>.<table> oeuuser.customer

• ABL uses one “hidden” schema – ‘PUB’
  • Use PUB.customer for access from SQL

• Avoiding schema qualification in SQL:
  
  CREATE PUBLIC SYNONYM customer FOR
  pub.customer;

• Can set it as a registry entry in ODBC dsn definition
Solving data access errors

```
select count(*) from customer;
```

Access denied (Authorization failed) (7512)

**Solution #1:**

```
SELECT count(*) FROM myschema.customer;
```

**Solution #2:**

```
SELECT count(*) FROM pub.customer;
```

**Solution #3:**

```
SET SCHEMA 'pub';
SELECT count(*) FROM customer;
```
4 Part Naming – Multi-Database Query

Fully Qualified Names – *catalog is database name*

- Four level naming convention

\[\text{catalog.schema.table.column.column-name}\]
4 Part Naming – Multi-Database Query

Fully Qualified Names – catalog is database name

• Four level naming convention
  
  \texttt{catalog.schema.table.column.name}

• Example

\begin{verbatim}
SELECT Pub.Customer.CustNum,
      SportsPrimary.Pub.Customer.Name,
      SportsAux1.Pub.Order.OrderNum ...
\end{verbatim}
4 Part Naming – Multi-Database Query

Fully Qualified Names – catalog is database name

• Four level naming convention
  \[ \text{catalog.schema.table.column.column-name} \]

• Example
  ```sql
  SELECT Pub.Customer.CustNum,
          SportsPrimary.Pub.Customer.Name,
          SportsAux1.Pub.Order.OrderNum ...
  ```

• ABL has 3 level naming convention
  \[ \text{catalog.table.column.column-name} \]
OpenEdge Specifics

SQL is a standard,
but each vendor has its own dialect
OpenEdge SQL Specifics - Quoting

Non-SQL standard names

- Hyphenated names:

```sql
SELECT cust-num FROM PUB.Customer;
```

Column CUST cannot be found (13865)

- Solution: quoting (double quotes)

```sql
SELECT “cust-num” FROM PUB.Customer;
```

Most reporting applications will do this automatically.
Overstuffed fields - error

- ABL allows more data than column definition
- SQL restricted to _field._sql-width value

```sql
SELECT name from PUB.customer;
```

Column name in table PUB.customer has value exceeding its max length.

**Solution:**

*Fix _sql-width via SQL “ALTER TABLE or Data Dictionary*

```sql
ALTER table... ALTER column... SET PRO_SQL_WIDTH <value>;
```
OpenEdge Specifics - Overstuffed fields

Strategies for managing:

• Dbtool : percentage option ($DLC/bin/dbtool)

1. SQL Width & Date Scan w/Report Option
2. SQL Width Scan w/Fix Option

Choice: 2

<connect>: (0=single-user 1=self-service >1=#threads)? 3

Padding % above current max: 25
<table>: (Table number or all)? all
<area>: (Area number or all)? all
OpenEdge Specifics - Overstuffed fields

Strategies for managing

• ABL client startup parameter

```
<progress-client>  --checkwidth n
```

where "n" can be one of the following:

0 — Ignore: Default is to ignore _width value.
1 — WARNING: Store the data and generate a warning.
2 — ERROR: Do not store data and generate an error.

.lg and screen: Width of data is greater than x.customer.Name _width.
Yet More Solutions

• Authorized Data Truncation (ADT) 11.5.1
  • A SQL client parameter that returns data values truncated to the size noted in the meta schema.
  • Alternative is an error gets thrown and the record is not included.
  • Both a Server and Client Parameter.
  • Client takes precedence.

• Autonomous Schema Update (ASU) 11.6
  • Builds on ADT.
  • Record expanded but truncated data returned first pass.
  • On second read, full data returned.
OpenEdge Specifics – Arrays / Extents

• Selecting array columns as a whole

```
SELECT quarterlySales from PUB.MySales;
```

Result: semi-colon separated `varchar` value
102332.67;330002.77;443434.55;333376.50

• Selecting array column individually – SQL99 (10.1a)

```
SELECT quarterlySales[1] from PUB.MySales;
```

Result: numeric value
102332.67
Using views to break out array element

```
CREATE VIEW pubView.QuarterSalesView
    (qS1, qS2, qS3, qS4) AS
SELECT quarterlySales[1], quarterlySales[2],
    quarterlySales[3], quarterlySales[4]
FROM PUB.MySales;
```

```
GRANT select ON pubView.QuarterSalesView
    TO PUBLIC;
```

```
SELECT qS1, qS2, qS3, qS4
FROM pubView.QuarterSalesView;
```

Result: numeric values

102332.67  330002.77  443434.55  333376.50
Basic Performance: What is the cost?

Database without statistics

Optimizer:
How many rows do I think you have?

100K
50K
10K

rows

Customer | Orders | Parts | OrderLines | SalesHist
Basic Performance: Here’s the cost.

Database with Update Statistics

- **Customer**: 10K rows
- **Orders**: 50K rows
- **Parts**: 100K rows
- **OrderLines**: 100K rows
- **SalesHist**: 50K rows
Query Performance: Update Statistics

**UPDATE STATISTICS syntax**

- All Statistics: Table Cardinality, indexes and all columns

```sql
UPDATE TABLE STATISTICS AND
INDEX STATISTICS AND
[ALL] COLUMN STATISTICS;
```

- Statistics - particular table

```sql
UPDATE TABLE STATISTICS AND
INDEX STATISTICS AND
[ALL] COLUMN STATISTICS
FOR pub.customer;
```
• Is there a way to grant a user select privilege for all tables in one statement?
  • There is no way to grant privileges for all tables in one statement. Other than grant dba ;)

• Does the field level extent (array fields) reporting where members are separated by ";" work for ALL data type?
  • yes

• If so, then how is a ";" handled within a character field? Is it quoted when encountered to differentiate between an array entry separator?
  • An embedded semi-colon in a varchar array will be preceded by a ~
Extra Topics

• SQLDUMP /SQLLOAD – Moves data in and out

• SQLSCHEMA – Meta data including table definitions, views, stored procedures including related privileges, and triggers

Use Case, some one set up ODBC for reporting a long time ago. New server or upgrade needing a D&L.

Go Live and all of the reporting breaks.
In Summary

• Initial SQL connection

• Setup and maintenance in OpenEdge database for security and performance

• Specifics of OpenEdge with SQL applications
Thank You