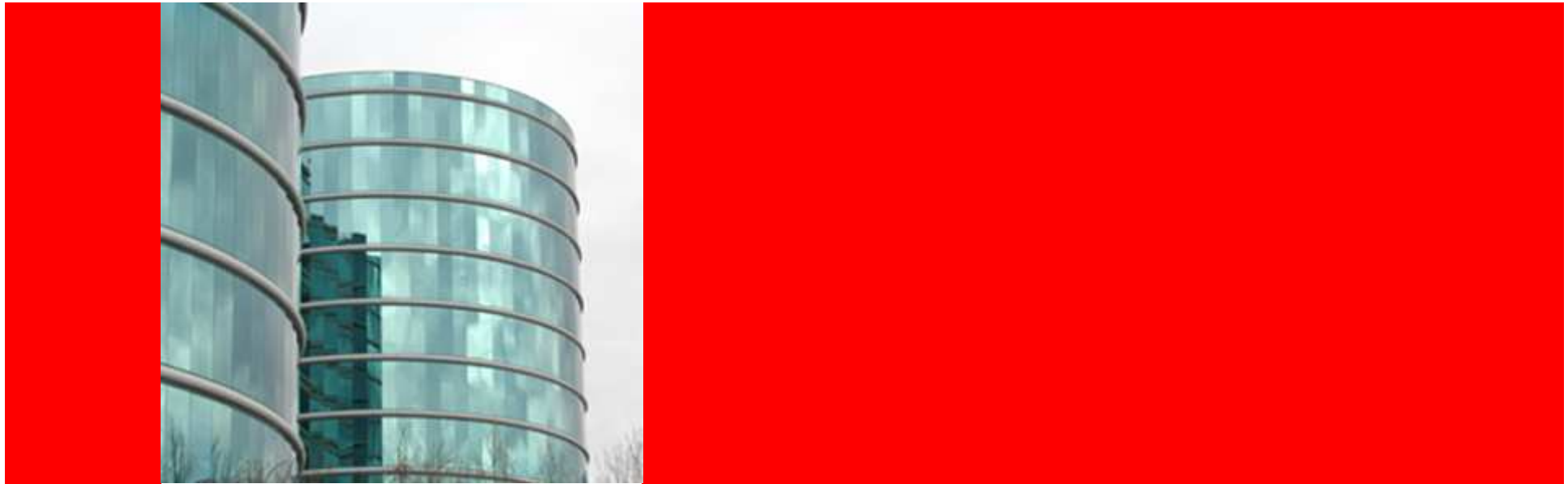




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Oracle Rdb Connectivity Update

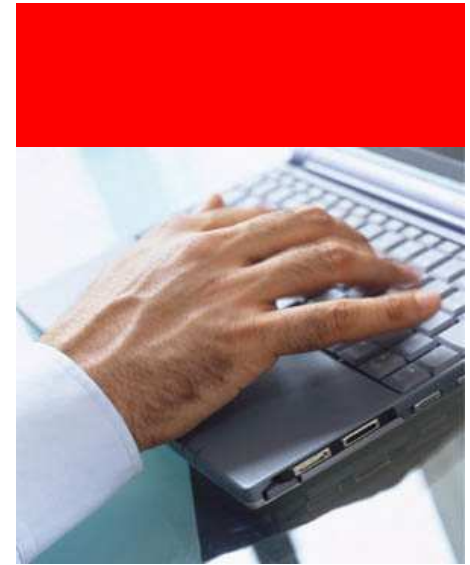
Jim Murray

Oracle New England Development Centre



Agenda

- SQS/Service update
- Oracle JDBC for Rdb update
- Oracle Rdb Data Provider for .NET update



Oracle SQL/Services and OCI Services for Oracle Rdb





SQL/Services

- Release 7.3
 - Released December, 2007
 - Available on E-Delivery, Metalink & OTN
- Release 7.3.0.1
 - Released September, 2008
 - Available on Metalink & OTN
- Release 7.3.0.2
 - Released September, 2009
 - Available on Metalink




Oracle SQL/Services Release 7.3.0.2 Overview

- Frequency of SYSUAF non-interactive login update is now configurable
- Bugcheck Output additions
 - Shared Memory Usage
 - Link Time Information
 - Image Name, User & Link Directory Added
- Dispatcher Failures on Alpha with Failed Listener
- Server Bugcheck After Client Aborted With Ctrl C



OCI Services for Oracle Rdb Release 7.3.0.2 Overview

- New Configuration Test Tool
 - `rdb$natconn_check_setup.com`
- DBLINK enhancements
 - Statistics Now Returned for Selects
 - Optimized Memory Use in OCI Executor
 - Dictionary Enhancements
- Floating Point Parameters with Comma as Decimal Separator



Oracle SQL/Services

Release 7.3.0.2





Oracle SQL/Services Release 7.3.0.2

Configurable SYSUAF Update Frequency

- Frequency of SYSUAF non-interactive login update is now configurable
- Define system logical
SQLSRV\$UPDATE_LOGIN_FREQUENCY
- Valid values: ALWAYS, DAILY, WEEKLY, MONTHLY, YEARLY, NEVER
- Default is DAILY
- Example:
\$ define/system sqlsrv\$update_login_frequency monthly



Oracle SQL/Services Release 7.3.0.2 Bugcheck Output changes

- Shared Memory Usage Added
 - Uses same format as SQLSRV_MANAGE SHOW SERVER command
 - Enables diagnosis of insufficient shared memory
- Link Time Information Added
 - Dumps link date for all images in loaded image section

SQLSRV_DISP73 00010000 001649FF 5-NOV-2008 17:33:59.19

- Image Name, User & Link Directory Added
 - Name of image bugchecking, user who linked image and link directory
 - Enables special images to be easily identified



Oracle SQL/Services Release 7.3.0.2

Dispatcher Failures on Alpha with Failed Listener

- If dispatcher defined with multiple listeners and one listener failed to start, dispatcher failed to start
- Alpha only
- Now logs an error and continues to start, If at least one listener starts successfully
- Can now have one LISTENER.ORA and configuration file for entire cluster



Oracle SQL/Services Release 7.3.0.2 Server Bugcheck After Client Aborted With Ctrl C

- If client aborted with ctrl C, subsequent client request sometimes resulted in bugcheck and SQL/Services server shutdown
- Example for user with over 300 services to display:

```
$ SQLSRV_MANAGE73
SQLSRV> connect server;
SQLSRV> show services;
^C
$ SQLSRV_MANAGE73
SQLSRV> connect server;
SQLSRV> show services;
%SQLSRV-E-READERR, Error on read
%SYSTEM-F-LINKDISCON, network partner disconnected logical link
%SQLSRV-E-READERR, Error on read
```




OCI Services for Oracle Rdb Release 7.3.0.2 New Configuration Test Tool

rdb\$natconn_check_setup.com

- Tests that the OCI Services server configuration setup is correct, after system is configured
- Automatically installed with SQL/Services
- Example:

```
$ @rdb$natconn_check_setup "oci_service"  
"smith" - "secret" "oci_disp"
```



OCI Services for Oracle Rdb

Release 7.3.0.2





OCI Services for Oracle Rdb Release 7.3.0.2 New Configuration Test Tool

Tool confirms the following on the server node:

1. SYS\$MANAGER:SQLSRV_SQLNET73.DAT exists
2. TNSNAMES.ORA & LISTENER.ORA exist in correct directory
3. Service is defined in TNSNAMES.ORA
4. HOST specified for service is current node
5. PORT & SID are defined for service
6. Service is defined in SQL/Services configuration file
7. Service is currently running
8. Database specified in TNSNAMES.ORA (universal service) or configuration file (database service), but not both locations



OCI Services for Oracle Rdb Release 7.3.0.2 New Configuration Test Tool

Tool confirms the following on the server node:

- 10. Database has been created
- 11. Dispatcher is defined in SQL/Services configuration file
- 12. Dispatcher is configured using the OCI protocol
- 13. Dispatcher is currently running
- 14. At least one listener associated with dispatcher is defined in LISTENER.ORA for current node, using port specified for service
- 15. Database has been prepared for use with OCI Services and upgraded for current release
- 16. Connection can be made for service, if Oracle client available on server node



OCI Services for Oracle Rdb Release 7.3.0.2 Statistics Now Returned for Selects on DBLINK

- Prior to 7.3.0.2, statistics not returned to Oracle through DBLINK
 - Often resulted in decreased performance and non-optimal strategy choices for queries
- Many statistics & counts available in Rdb now returned to Oracle
 - Includes table, column and index information
- In test cases, Oracle now chooses better strategies for slow queries and query is significantly faster



OCI Services for Oracle Rdb Release 7.3.0.2

Optimized Memory Use in OCI Executor on DBLINK

- Memory allocated by Oracle Net routines via callback was being released at end of session
- Appeared to be memory leak for long-running session
- Now released at end of each OCI call, so it does not accumulate for long sessions



OCI Services for Oracle Rdb Release 7.3.0.2 Dictionary Enhancements

- Enhancements in Oracle metadata stored in Rdb
- ALL_USERS view now selects data from USER\$ table
- Improved datatype casting for NULL values
- Domains RDB1LONG, RDB2LONG & RDB4LONG no longer created, but won't be removed from existing prepared databases



OCI Services for Oracle Rdb Release 7.3.0.2 Floating Point Parameters with Comma as Decimal Separator

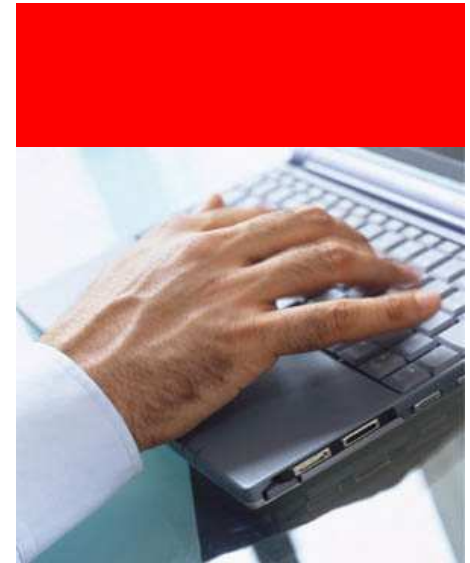
- Error occurred under following conditions
 - Using OCI calls to insert floating point variable into Rdb database
 - NLS_LANG set to language where comma defined as decimal separator (ex: german_germany.we8mswin1252)
- Error seen:
ORA-01438: value larger than specified precision allowed for this column
- Using comma as decimal separator in SQL statement is not allowed; restriction of Oracle Rdb
- Simply use decimal point instead of comma


Oracle JDBC Oracle Rdb



Oracle JDBC for Rdb

- Release 7.2.5.2
 - Released February 2008
- Release 7.2.5.3
 - Released June 2008
- Release 7.2.5.4
 - Released October 2009
- Release 7.3
 - Scheduled December 2009






Oracle JDBC Oracle Rdb Release 7.2.5.4





Oracle JDBC for Rdb 7.2.5.4 Problems Fixed

- Access Violations
 - Java_rdb_JNI_SetStrVal
 - DriverManager.getConnection() when db specification missing
- DCL command line too long
 - RDBJDBC_STARTSRV.COM
- Unaligned faults on IA64 fixed
- ReadOnly transactions not enforced on Connection Switch
- Accumulation of mailboxes associated with Sockets on OpenVM
- Cast problem STRING => DATE/TIME



Oracle JDBC Oracle Rdb Release 7.3





Oracle JDBC for Rdb 7.3 New Features

- ShutDown hook
- Driver.attach()
 - `oracle.rdb.jdbc.rdbThin.Driver.attach(...)`
- Get Known Databases
 - `Driver.getDatabases()`
 - `Stmt.Execute("show databases");`
- Thin Controller additions
 - Obfuscate passwords
 - e.g. `##014DA4128E4584DAD6E8FE5D697B4DCD483E17DA`
 - REGEX Server matching on commands



Oracle JDBC for Rdb 7.3 New Features (cont.)

- Performance Enhancements
 - MP Server improvements
 - Server/executor synchronization
 - Client/Server improvements
 - Reduced number of network round-trips
 - Client-side Caching
 - Statement caching
 - Statement Handle caching
 - ResultSet caching
 - Record streaming



Oracle JDBC for Rdb 7.3 ShutDown hook

Problem:

- Multiprocess Native connections
 - Thread started for each connection
 - If connection not closed thread still active
 - Application will not shutdown until all threads are terminated

Solution:

- this & prior versions:
 - Always CLOSE connections before application exit
- this version:
 - Connection will enable shutdown thread
 - Fired when application terminates
 - Forces disconnect and thread termination



Oracle JDBC for Rdb 7.3

Driver.attach

- Attach additional databases to existing connection
- New connection keyword “ALIAS”
- Use attach method in oracle.rdb.jdbc.rdbThin.Driver

```
String dbUrl = "jdbc:rdbThin://localhost:1701/my_dbs:mf_personnel";
RdbConnection conn = DriverManager.getConnection(dbUrl, user, pwd);
Statement stmt = conn.createStatement();
oracle.rdb.jdbc.rdbThin.Driver d =
    (oracle.rdb.jdbc.rdbThin.Driver)DriverManager.getDriver(dbUrl);

RdbConnection dbConnection2 = d.attach(
    "my_dbs:personnel", "PERS", user, pwd, conn);

ResultSet rs = stmt.executeQuery(
    "select rdb$file_name from pers.rdb$database");
```



Oracle JDBC for Rdb 7.3

Driver.attach (cont.)

- Use attach method in Driver

```
String dbUrl = "jdbc:rdbThin://localhost:1701/my_dbs:mf_personnel";
RdbConnection conn = DriverManager.getConnection(dbUrl, user, pwd);
Statement stmt = conn.createStatement();
oracle.rdb.jdbc.rdbThin.Driver d =
    (oracle.rdb.jdbc.rdbThin.Driver)DriverManager.getDriver(dbUrl);

RdbConnection dbConnection2 = d.attach(
    "my_dbs:personnel", "PERS", user, pwd, conn);

ResultSet rs = stmt.executeQuery(
    "select rdb$file_name from pers.rdb$database");
```



Oracle JDBC for Rdb 7.3

Get Known Databases

- Returns databases that connected server knows about.
- Available in Thin Only
- 2 ways to get databases:
 1. New method
 - `Driver.getDatabases()`
 2. New SQL syntax specific to Oracle JDBC for Rdb
 - `SHOW DATABASES`
- Server must have feature enabled
 - `allowShowDatabases` (default FALSE)



Oracle JDBC for Rdb 7.3

Get Known Databases(cont)

- `Driver.getDatabases()`
 - Static method
 - No Prior Connection required

```
Hashtable h =  
( new oracle.rdb.jdbc.rdbThin.Driver() ).getDatabases(  
    "//localhost:1701/");
```

- **SHOW DATABASES** in SQL Statement
 - Connection must be established

```
Stmt.execute("show databases");
```




Oracle JDBC for Rdb 7.3 Obfuscate

- New Thin Controller command
 - OBFUSCATE plaintext_pwd
java -jar rdbthincontrol.jar -obfuscate jdbc_user
obfuscation : ##014DA4128E4584DAD6E8FE5D697B4DCD483E17DA
- Not to be confused with DIGEST for server and control passwords
 - DIGEST
 - uses a one-way algorithm
 - Prefix = “0x”
 - OBFUSCATE
 - is reversible
 - Prefix = “##”



Oracle JDBC for Rdb 7.3 Obfuscate (cont.)

- Use obfuscated password in configuration file where password will be sent to Rdb

```
<server
  name = "srv1"
  type = "RdbThinSrv"
  url = "///localhost:1701/"
  srv.password="0x811B15F866179583EB3C96751585B843"
  anonymous = "true"
  user = "jdbc_user"
  password = "##014DA4128E4584DAD6E8FE5D697B4DCD483E17DA"
  restrictAccess = "true"
  >
    <allowUser name = "jdbc_user"/>
    <allowUser name = "murray"/>
</server>
```



Oracle JDBC for Rdb 7.3 Match Conditions

- Server matching on Thin Controller commands
- Regular Expression (REGEX) matching
- Match criteria
 - #NODE:
 - #NAME:
 - #PORT:
 - #TYPE:
 - #VERSION:
 - #STATE:
- Examples
 - `thincontroller -poll #name:mpx`
 - `thincontroller -poll #node:.roggy.`



Oracle JDBC for Rdb 7.3 Performance Enhancements

- MP Server improvement
- Server/executor synchronization
 - Uses global memory (always has)
 - Now uses OpenVMS Pthread Mutexes instead of locks for synchronization
 - Faster
 - Reduced CPU



Oracle JDBC for Rdb 7.3 Performance Enhancements (Cont)

- Client/Server improvements
- Reduced number of round-trips for
 - Database attach
 - Query compilation
 - Record retrieval



Oracle JDBC for Rdb 7.3 Performance Enhancements (Cont)

- SQL statement caching
 - Connection switch
 - `@sqlcache=100`
 - Executable statement
 - `Stmt.executeUpdate("set sqlcache 100");`
 - store compilation information about query reducing the need to retrieve column info etc
 - Use with CARE!
 - Rdb statement handle held for duration of connection or until SQL cache emptied
 - `Stmt.executeUpdate("set sqlcache 0");`



Oracle JDBC for Rdb 7.3 Performance Enhancements (Cont)

- SQL statement handle caching
 - Requires sqlcache enabled
 - Connection switch
 - `@sqlcachePS=true`
 - Store compiled handles of queries and re-uses free statement handles, similar to using PreparedStatement
 - Some 3rd party software send down same PreparedStatement SQL text multiple times expecting that statement compilation has been cached.
 - Use with CARE!
 - Rdb statement handle held for duration of connection or until SQL cache emptied
 - `Stmt.executeUpdate("set sqlcache 0");`



Oracle JDBC for Rdb 7.3

Performance Enhancements (Cont)

- Results caching
 - Connection switch **@resultsCache=true**
 - Resultset for same SQL query cached and re-used
 - Re-use within same connection ONLY
 - Useful when connection pooling and same query issued many times
 - Fixed for duration of connection (snapshot of results at time of first execution)
 - Local resources used (client only), statement released on server side on Statement.Close() of first execution.
 - USE WITH CARE!
 - Volatile data may cause cache to be stale



Oracle JDBC for Rdb 7.3 Performance Enhancements (Cont)

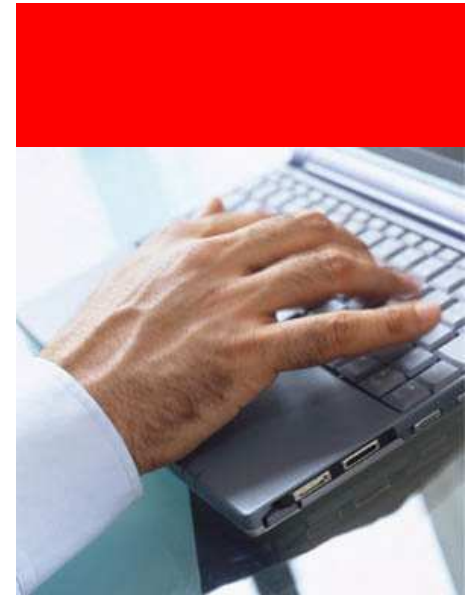
- Record Streaming
 - Connection switch **@stream=true**
 - Without streaming each FetchSize buffer of records requires 1 network round-trip
 - With streaming server sends all records down to client in FetchSize buffers, 1 network round trip only
 - Cursor automatically closed on End-Of-Stream
 - Use with CARE !
 - Large resultSets will saturate Network
 - if application expects termination of resultset mid-stream


Oracle Rdb Data Provider for .NET



Oracle Rdb Data Provider for .NET

- Release 7.3.0.1
 - Released March 2008
- Release 7.3.1
 - Released January 2009
- Release 7.3.1.1
 - Released October 2009





Oracle Rdb Data Provider for .NET Release 7.3.1





Oracle Rdb Data Provider for .NET 7.3.1 Problems Fixed

- RdbConnection
 - Connection state not changed when connection lost
 - IsOpen problem
 - StateChanged event not raised on close
- Incorrect error message
 - *"Non supported SQL92 token at position NNNNNN"*
- FetchSize
 - Default not set – order of operations
 - Ignored if RdbParameters present
- Memory problems
 - SetStrVal – *"Attempted to read or write protected memory"*
 - RdbDataAdapter.Dispose() - leak



Oracle Rdb Data Provider for .NET 7.3.1 Problems Fixed (cont.)

- RdbDataAdapter.Fill() loses last column
- DbType.Time not converted correctly
- Access violation
 - `Oracle.DataAccess.RdbClient.Common.SQS.SetStrVal`
 - Multiple thread concurrent connections request
- Overflow/underflow Exception not raised by RdbParameter



Oracle Rdb Data Provider for .NET 7.3.1 New Features


- Simple Connection Pooling
 - PooledSQS connection type
 - PooledThin connection type
- RdbConnection.GetSchema()
 - Database metadata and more



Oracle Rdb Data Provider for .NET 7.3.1 RdbDataAdapter.Fill() Problem

- RdbDataAdapter.Fill() loses last column
 - Thin Server connectivity only
 - Multi-table queries with certain syntax

```
DataSet ds = new DataSet();  
string selectString =  
@"select first_name, last_name from (employees) inner join  
  salary_history on employees.employee_id =  
  salary_history.employee_id where employees.last_name = 'Toliver';"
```



```
RdbDataAdapter adapter =  
new RdbDataAdapter(selectString, conn);  
adapter.Fill(ds);
```




Oracle Rdb Data Provider for .NET 7.3.1 DbType.Time not converted correctly

- Several possible exception conditions raised

e.g.

`System.NullReferenceException: Object reference
not set to an instance of an object`

or

`%RDB-E-ARITH_EXCEPT, truncation of a numeric
value at runtime`

`-COSI-F-IVTIME, invalid date or time`



Oracle Rdb Data Provider for .NET 7.3.1 Overflow/underflow Exception not raised

- Overflow/underflow Exception not raised by RdbParameter
 - For example, the following statement will silently truncate the value specified:

```
RdbParameter p1 =  
new RdbParameter(":iEMPNO", DbType.Int16, 999999999999,  
"EMPNO");
```



Oracle Rdb Data Provider for .NET 7.3.1 Connection Pooling

- Pooling allowed within the same application instance
 - Client application
 - Middle tier application
- Pooled variants of standard connection types
 - TYPE = POOLEDSQLS
 - TYPE = POOLEDTHIN
- Additional RdbConnection methods available for pool maintenance



Oracle Rdb Data Provider for .NET 7.3.1 Connection Pooling (cont.)

- Unique pool per Database/Username/Password
- Default pools
 - Connection added or returned to pool on Close()
 - No maximum size
 - number of concurrent connections using the same Database/Username/Password
 - Database connections remain active until application closes down
 - Must close down the application



Oracle Rdb Data Provider for .NET 7.3.1 Connection Pooling (cont.)

- Use RdbConnection methods for more control
 - EstablishPool, create a control pool
 - ShutdownPool, close all free connections
 - AddToPool, add specified number of connections to pool
 - ClearThisPool, clear connections from pool
- Various GET methods for pool stats
 - GetPoolsCount – total number of pools
 - GetThisFreePoolCount - # of connections in the free pool associated with this connection
 - others



Oracle Rdb Data Provider for .NET 7.3.1 Connection Pooling Example

```
RdbConnection conn9 = new RdbConnection(cs2);  
conn9.AddToPool(repeats, maxFree, false);  
  
Log("Number of pools = " + RdbConnection.GetPoolsCount());  
Log("Pool size = " + conn9.GetThisPoolCount());  
Log("Free Pool Size = " + conn9.GetThisFreePoolCount());  
Log("Max Free Pool Size = " + conn9.GetThisMaxFreePool());
```



Oracle Rdb Data Provider for .NET 7.3.1 GetSchema

- Return information about connection and connected database
- Standard DbConnection method
 - GetSchema(), returns list of collections available
 - GetSchema(CollectionName, Restrictions) returns details of specific collection
 - Collections
 - Common Schema Collections
 - Rdb specific Collections



Oracle Rdb Data Provider for .NET 7.3.1

GetSchema - Common Schema Collections

- MetaDataCollections
- DataSourceInformation
- DataTypes
- Restrictions
- ReservedWords



Oracle Rdb Data Provider for .NET 7.3.1

GetSchema - Rdb Specific Collections

- Tables
- Views
- Columns
- Domains
- Triggers
- Arguments
- ...
- Check the Oracle Rdb Data Provider For .Net Developer's Guide for more full list



Oracle Rdb Data Provider for .NET Release 7.3.1.1






Oracle Rdb Data Provider for .NET 7.3.1.1 Problems Fixed

- Unsupported DbType in RdbParameter
- Cast problem with tiny int
- Memory leak when updating Blob columns FetchSize
- Statement Handles not Released
- Retrieving Blob data from Column with Associate Variables

```
CmdObj.CommandText =  
    "select resume RES from resumes";
```



- Fraction of Seconds trimmed from VMS DATE




Oracle Rdb Data Provider for .NET 7.3.1.1 New Features

- Additional DbType Support in RdbParameters
 - `DbType.AnsiString`
 - `DbType.AnsiStringFixedLength`
 - `DbType.StringFixedLength`



For More Information

search.oracle.com



OR

- www.oracle.com/rdb
- metalink.oracle.com
- <http://www.hp.com/products/openvms>
- Jim.murray@oracle.com

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