Debugging top ten WMB problems with databases on Windows®/UNIXes

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WebSphere® Support Technical Exchange
Agenda

- The “famous” BIP2322E
- Character conversion
- ODBC connection problem
- JDBC connection pooling
- ODBC and XA
- ODBC with Oracle® RAC
- JDBC connectivity and XA
- JDBC for maps
Common Problems: BIP2322E

- One of the most commonly occurring messages in PMRs
- Indicates a problem performing a Database Operation
- Is a Generic message – more info in the ‘inserts’
Anatomy of BIP2322

BIP2322E: Database error: SQL State "INSERT1"; Native Error Code ‘INSERT2’; Error Text "INSERT3".
The error has the following diagnostic information: SQL State "INSERT1" SQL Native Error Code ‘INSERT2’ SQL Error Text "INSERT3"
This message may be accompanied by other messages describing the effect on the message broker itself. Use the reason identified in this message with the accompanying messages to determine the cause of the error.

BIP2322E: Database error: SQL State "IM001"; Native Error Code '0'; Error Text "Microsoft ODBC Driver Manager does not support this function".
The error has the following diagnostic information: SQL State "IM001" SQL Native Error Code '0' SQL Error Text "Microsoft ODBC Driver Manager does not support this function"
This message may be accompanied by other messages describing the effect on the message broker itself. Use the reason identified in this message with the accompanying messages to determine the cause of the error.
BIP2322 Message Inserts

- **Insert1 SQLState**
  - 5 character code supplied in a diagnostic data structure when Broker makes an ODBC call.
  - ODBC specification lists some
  - Drivers free to add their own

- **Insert2 Native Error Code**
  - For errors which occur in the data source the driver passes through a native error code given to it by the datasource.
  - DB specific

- **Insert3 Message**
  - Has one of 2 possible formats
    - [Vendor-identifier][ODBC Component Identifier] Error Message
      
      \[for \ errors \ that \ do \ not \ occur \ in \ the \ data \ source\]
    - [Vendor-identifier][ODBC Component Identifier][Data source identifier] Error Message
      
      \[for \ errors \ which \ occur \ in \ the \ datasource\]
Problem 1: SQL State IM004

BIP2322E: Database error: SQL State "IM004"; Native Error Code '0';
Error Text "[DataDirect][ODBC lib] Driver's SQLAllocHandle on SQL_HANDLE_ENV failed".
The error has the following diagnostic information:
SQL State 'IM004'
SQL Native Error Code '0'
SQL Error Text "[DataDirect][ODBC lib] Driver's SQLAllocHandle on SQL_HANDLE_ENV failed"

- Identify the database being used
  - In this case Informix®
- Identify the Inserts
  - SQL State: IM004
  - Native Error Code: 0
  - Diagnostic Message: [DataDirect][ODBC lib] Driver's SQLAllocHandle on SQL_HANDLE_ENV
What do the inserts tell us?

- The description for ‘IM004’ is:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Applicable API Calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM004</td>
<td>Driver’s <code>SQLAllocHandle</code> on SQLHANDLE_ENV failed</td>
<td><code>SQLBrowseConnect</code> <code>SQLConnect</code> <code>SQLDriverConnect</code></td>
</tr>
</tbody>
</table>

- The driver is not even managing to establish a connection to the database
- Almost always an environment problem
What to check?

- Does mqsicvp return the same problem?
  - mqsicvp  <broker> -n <dsn name> -u <user> -p <password>
  - If mqsicvp succeeds then retry issuing mqsisetdbparms to set the pwd, remembering the changes only take effect after a broker restart

- Is the ODBC Environment configured?
  - Win: Does the DSN Name exist in the ODBC Data Sources Manager
  - Unix: Is $ODBCINI set? Is ODBCSYSINI set? Do they point to readable files and does the odbc.ini file contain a DSN entry for this DSN?
What to check? (2)

- Is the native environment configured?
  - Are any LIBPATH, LD_LIBPATH or other environment variables required by the driver set?

- Note that Informix requires a large number of environment variables set
Resolution (1)

- The following native environment is required for Informix:

```bash
export INFORMIXDIR=/installation_directory_of_informix_client_software
export PATH=${INFORMIXDIR}/bin:${PATH}
export INFORMIXSERVER=server_name
export INFORMIXSQLHOSTS=${INFORMIXDIR}/etc/sqlhosts
export TERMCAP=${INFORMIXDIR}/etc/termcap
export TERM=vt100
export LIBPATH=${INFORMIXDIR}/lib:${INFORMIXDIR}/lib/esql:${INFORMIXDIR}/lib/cli:$LIBPATH
```

[IFXUSER]
Driver=/usr/informix/64-bit/lib/cli/iclit09b.so
Description=IBM Informix ODBC Driver
ServerName=<server>
Database=<db>
Resolution (2)

- Use ldd to determine if the driver library can locate all of its dependencies
  - Run mqsiprofile, then cd to the dir containing the driver referenced in the odbc.ini
  - Run ldd on this file

- Something is missing from the LIBPATH!
Resolution (3)

```bash
echo $LIBPATH
/Development/mqsi/6.1.0.9/jre15/ppc64/bin:
/Development/mqsi/6.1.0.9/jre15/ppc64/bin/classic:
/usr/mqm/java/lib64:/Development/mqsi/6.1.0.9/xml4c/lib64:/usr/mqm/lib64:
/Development/mqsi/6.1.0.9/ODBC64/V5.3/lib:
/Development/mqsi/6.1.0.9/xlxpc/lib64:
/Development/mqsi/6.1.0.9/lib:
/Development/mqsi/6.1.0.9/bin:
/usr/lib:/lib:/usr/informix/64-bit/lib:
/usr/informix/64-bit/lib/cli
```

- Where is `/usr/informix/64-bit/lib/esql`?
- Add it to the profile ie:
- `Export LIBPATH=$LIBPATH:/usr/informix/64-bit/lib/esql`
Resolution (4)

- Re-run ldd:

- Restart Broker with new env
- Problem resolved!

```
bash-3.00$ ldd iclit09b.so
iclit09b.so needs:
   /usr/lib/libc_r.a(shr_64.o)
   /usr/informix/64-bit/lib/esql/libifgls.so
   /usr/informix/64-bit/lib/esql/libifglx.so
   /usr/lib/libpthreads.a(shr_xpg5_64.o)
   /usr/lib/libtli.a(shr_64.o)
   /unix
   /usr/lib/libcrypt.a(shr_64.o)
   /usr/lib/libc.a(shr_64.o)
   /usr/lib/libc.a(pse_64.o)
```
Problem 2: SQLState 40001

BIP2322E: Database error: SQL State "40001"; Native Error Code '-911';
Error Text "[IBM][CLI Driver][DB2/AIX64] SQL0911N The current transaction has been
rolled back because of a deadlock or timeout Reason code=2".
The error has the following diagnostic information:
SQL State "40001" SQL Native Error Code '-911' SQL Error Text
"[IBM][CLI Driver][DB2/AIX64] SQL0911N The current transaction has been rolled back
because of a deadlock or timeout Reason code=2"

- Identify the database being used
  - In this case DB2®
- Identify the Inserts
  - SQLState: 40001
  - Native Error Code: -911
  - Diagnostic Message: "[IBM][CLI Driver][DB2/AIX64] SQL0911N The current transaction
    has been rolled back because of a deadlock or timeout Reason code=2"
What do the inserts tell us?

- The description for ‘40001’ is:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Applicable API Calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>40001</td>
<td>Serialization Failure</td>
<td>SQLBulkOperations, SQLColumnPrivileges, SQLColumns, SQLEndTran, SQLExecDirect, SQLExecute, SQLFetch, SQLFetchScroll, SQLForeignKeys, SQLErrorTypeInfo, SQLMoreResults, SQLParamData, SQLPrimaryKeys, SQLProcedureColumns, SQLProcedures, SQLSetPos, SQLSpecialColumns, SQLStatistics, SQLTablePrivileges, SQLTables</td>
</tr>
</tbody>
</table>
What do the inserts tell us?

- The description for ‘-911’ is:
  The current unit of work was the victim in a deadlock, or experienced a timeout, and had to be rolled back.
  The reason code indicated whether a deadlock or timeout occurred.
- Reason Code 2 means deadlock
- Other Reason Codes:
  - 2 – deadlock
  - 68 – timeout
  - 72 – DB2 Data Links Manager Error
  - 73 – Queuing Threshold Reached
What to check?

- Number of additional instances deployed
- Other applications accessing the table
- Transactional settings on Nodes performing db work
  - Automatic
    - Work committed or rolled back at end of flow invocation depending on the success of the flow itself
  - Commit
    - Work committed at end of ESQL compute node (including flow downstream of output terminals)
What to check? (2)

- Usually a result of multiple threads or applications holding locks on table rows required by each other
  - Check application logic
What to check? (3)

- DB2 Can attempt to escalate “row locks” to “table locks”
  - May be locking more of the table than you expect
  - Identify apps holding lock using:
    - Db2 get snapshot for applications on <dbName>
  - Increase DIAGLEVEL to 4
    - Db2 will output lock information to db2diag.log
Resolution

- The maxlocks db config parameter determines when lock escalation is triggered
- Set too low this can cause escalation from row locks to table locks
- Increase this value on db
Problem 3: Character Conversion problem

- Unexpected character conversion causes either parse failures or data corruption
- Multiple codepage conversions can occur depending on scenario
IBM Software Group

"Statement Converter"

Platform / db based default (Usually UTF-8 or UTF-16)
Overridden with MQSI_ODBC_ASSOCIATE_CONVERTERS

ODBC Layer

Driver Manager

Driver

Client (Oracle @ WMB 6.1)

DB

Message Tree – UCS-2

UTF

ANSI (IANAAppCodePage)

UTF

ANSI (IANAAppCodePage)

ANSI (IANAAppCodePage)

ANSI (NLS_LANG)

UTF
What to check?

- IANAAppCodePage
  
  - Set in odbc.ini
  
  - Precedence order
    
    - [DSN] specific stanza
    - [ODBC] stanza
  
  - Should match Broker codepage
What to check? (2)

- Broker Codepage
  - Precedence order (Unix)
    - MQSI_LOCAL_CCSID
    - LC_ALL
    - LANG
  - Precedence order (Win)
    - MQSI_LOCAL_CCSID
    - System Language setting
  - Check with `mqsiservice`

BIPmsgs en_GB
- Console OEM CP=850, ICU CCSID=5348
- Default codepage=ibm-5348_P100-1997, in ascii=ibm-5348_P100-1997
- JAVA console codepage name=cp850
What to check? (3)

- Database Codepage
- Combination of column type and db setting
- Check documentation for column information
  - DB2
    - SELECT CODEPAGE FROM SYSCAT.DATATYPES WHERE TYPENAME = 'VARCHAR'
  - Oracle
    - SELECT * FROM nls_database_parameters WHERE parameter LIKE 'NLS_CHAR%'
  - Informix
    - SELECT tabname, site FROM informix.systables WHERE tabname like 'GL_%'
  - SQLServer®
    - Sys.databases and sys.columns returns collations information
  - Sybase®
    - Sp_helpsort
What to check? (4)

- Bound Data (Stored procedure parameters) is converted using the “Statement converters”
  - Shouldn’t usually need to set unless directed by service
  - Set to defaults according to platform and database being connected to
  - Can be changed using env var MQSI_ODBC_ASSOCIATE_CONVERTERS=NNNxNNN
    - Digit 1 = Database Type
      1. DB2
      2. DB2 on z/OS
      3. DB2 IICF
      4. SQLSERVER
      5. ORACLE
      6. SYBASE®
      7. INFORMIX
      8. DERBY®
    - Digit 2 = SQL data type to use
      1. SQL_C_CHAR
      2. SQL_C_WCHAR
    - Digit 3 = Minimum bytes per code point
    - Character 4
      - S = Set the UCS-2 Connection Attribute
      - N = Do not set the UCS-2 Connection Attribute
    - Final 4 digits = Codepage identifier to use for conversion
Example Conversion Issue

- Using a Unicode UCS-2 database the character U+0178 (Latin capital letter Y with diaeresis) is inserted as corrupted data into a db table
  - U+0178 is valid in UCS-2 in both the db and broker
  - Some kind of interim conversion must be occurring
Resolution

- Check odbc.ini
  - IANAAppCodePage=4
    - This is ISO_8859_1 aka Latin-1
- Change to an appropriate codepage
  - In this instance Broker is running in windows-1252
  - This character is valid in Windows-1252
  - So set IANAAppCodePage=2252
Problem 4: IM002

- Problem: you are setting up an ODBC database connection and get an error like:

  BIP2393E: Database error: ODBC return code '-1' from data source "'odbc::TEST1'" using ODBC driver manager '"libbipodbc.so'".
  The broker received an error when processing a database operation. The ODBC return code was '-1'. See the following messages for information obtained from the database about this error. Use the following messages to determine the cause of the error. Typical problems are an incorrect data source, or table names. Correct either the database or the broker configuration.

  BIP2322E: Database error: SQL State '"IM002'"; Native Error Code '0';
  Error Text '"[DataDirect][ODBC lib] Data source name not found and no default driver specified'.
  The error has the following diagnostic information:
  SQL State '"IM002'"
  SQL Native Error Code '0'
  SQL Error Text '"[DataDirect][ODBC lib] Data source name not found and no default driver specified'.
  This message may be accompanied by other messages describing the effect on the message broker itself. Use the reason identified in this message with the accompanying messages to determine the cause of the error.

  BIP8040E: Unable to connect to the database.
Complication – many layers

- WebSphere Message Broker
- Driver Manager
- Driver
- Database client
- Database server
- Wire protocol
- Shared memory
- ODBC configuration
Complication – the driver manager

- Different versions of WebSphere Message Broker use different driver managers on UNIX/Linux:
  - V6.1 DataDirect
  - V7.0 DataDirect (default)
    - IE02 SupportPac (optional)
  - V8.0 IE02 SupportPac

- On Windows, all versions use the Microsoft driver manager

- From V7 onwards, the BIP2393 message logs which driver manager is being used:
  
  **BIP2393E: Database error: ODBC return code '-1' from data source 'odbc::TEST1' using ODBC driver manager 'libbipodbc.so'.**
  
  - DataDirect libbipodbc
  - IE02 libodbcinterface
  - Microsoft odbc32
The IM002 message

- The IM002 message originates in the driver manager
  - Unix
    - The ODBC configuration file cannot be found
    - The file can be found, but the Data Source Name cannot be found in the file
  - Windows (rarely seen)
    - The Data Source has not been configured for ODBC
Solving on UNIX – most problems are typos

- Check that an odbc.ini file has been customized
- Check that the Data Source Name can be found in the file
- Check that the top stanza in the odbc.ini file references the stanza for the Data Source Name
- Check that the Data Source Name (spelling, capitalization) is consistent in the file
- Remove any extraneous whitespace (at end of lines) from the odbc.ini file
- Check that $ODBCINI points to the right file
- We recommend that $ODBCINI should be set by a script in ${MQSI_WORKPATH}/common/profiles
Problem 5: JDBC Connection Pooling

- Problem: you are using JDBC and want to have 100 Message Flow instances, and your database will only support 10 concurrent connections.

- Solution: use JDBC connection pooling

- How? Adjust the ‘maxConnectionPoolSize’ parameter in the appropriate JDBC Provider:
  - `maxConnectionPoolSize=<maximum connections>`
  - `maxConnectionPoolSize=0` (No limit)
Example JDBC Provider

$ mqsireportproperties MYBROKER -r -c JDBCProviders -o MyProvider

JDBCProviders
  MyProvider
    connectionUrlFormat='jdbc:db2://[serverName]:[portNumber]/[databaseName]:user=[user];password=[password];'
    connectionUrlFormatAttr1=''
    connectionUrlFormatAttr2=''
    connectionUrlFormatAttr3=''
    connectionUrlFormatAttr4=''
    connectionUrlFormatAttr5=''
    databaseName='USERDB'
    databaseSchemaNames=''
    databaseType='DB2 Universal Database'
    databaseVersion='default_Database_Version'
    description='default_Description'
    environmentParms='default_none'
    jarsURL='/myjdbcdriver'
    jdbcProviderXASupport='jdbcProviderXASupport'
    maxConnectionPoolSize='10'
    portNumber='60000'
    securityIdentity='USERDB'
    serverName='myserver'
    type4DatasourceClassName='com.ibm.db2.jcc.DB2XADatasource'
    type4DriverClassName='com.ibm.db2.jcc.DB2Driver'
Considerations

- Only available from V7.0.0.1
- Only for JDBC connections
- Not applicable to the DatabaseRetrieve and DatabaseRoute nodes
- In a JavaCompute node, you must obtain the connection from `getJDBCType4Connection()`
- Performance is typically around 5% slower (depends on workload)
Problem 6 - ODBC XA

Problem: A message flow is configured to be globally coordinated using MQ as the transaction manager and with an Oracle database as an XA resource. The message flow fails with the error:

BIP2322E: Database error:
  SQL State 'HY000'; Native Error Code '0';
  Error Text '[IBM][ODBC Oracle Wire Protocol driver] xa_start() failed.'
ODBC XA – Message Broker support

- Globally coordinated transaction support (‘XA’) is provided for the following databases using ODBC connectivity:
  - DB2
  - Oracle
  - Sybase (on Linux for System x 64-bit platform at WMB v8.0)

- Configuration steps:
  - Configure the database
  - Configure MQ
  - Configure Message Broker
ODBC XA - Configuring databases

- Check the [WebSphere Message Broker Information Center](http://publib.boulder.ibm.com/infocenter/wmbhelp/v8r0m0/topic/com.ibm.etools.mft.doc/ac00396_.htm) for any database configuration tasks that are required to enable XA support
  - http://publib.boulder.ibm.com/infocenter/wmbhelp/v8r0m0/topic/com.ibm.etools.mft.doc/ac00396_.htm

- For example, for Oracle:
  - Ensure that the JAVA_XA package is present on the Oracle database
    - Check by using the following Oracle SQLPLUS command:
      - describe JAVA_XA;
    - Otherwise, 'xa_start()' failure is seen
  - Ensure that the user ID that the broker uses to access the database has the necessary Oracle privileges to access the DBA_PENDING_TRANSACTIONS view. You can grant the required access by using the following Oracle SQLPLUS command:
    - grant select on DBA_PENDING_TRANSACTIONS to userid;
ODBC XA - Configuring MQ

- Add an XAResourceManager stanza to qm.ini
  - Example, for an Oracle datasource:

```ini
XAResourceManager:
Name=OracleXA
SwitchFile=UKoradtc24.so
XAOpenString=ORACLE_XA
  +HostName=MyHostName
  +PortNumber=MyPortNumber
  +ServiceName=MyServiceName
  +ACC=P/MyUserId/MyPassword
  +sestm=100+threads=TRUE
  +DataSource=MyDataSourceName
  +K=2+
XACloseString=
ThreadOfControl=THREAD
```

- Restart the queue manager
  - Export $ODBCINI in the environment before starting the queue manager
ODBC XA – Configuring MQ

- Use the command `mqsimanagexalinks` to create symbolic links for the switch load libraries:
  - `/var/mqm/exits` (for 32-bit execution groups)
  - `/var/mqm/exits64` (for 64-bit execution groups)
- For example, to create the links required for Oracle and Sybase databases for WMB V7.0 which uses the DataDirect Connect for ODBC V6.0 drivers:
  - `mqsimanagexalinks create DD60 /opt/IBM/mqsi/7.0`
    - `libodbcinst.a -> /opt/IBM/mqsi/7.0/ODBC/V6.0/lib/libodbcinst.a`
    - `libUKicu24.a -> /opt/IBM/mqsi/7.0/ODBC/V6.0/lib/libUKicu24.a`
    - `UKase24.so -> /opt/IBM/mqsi/7.0/ODBC/V6.0/lib/UKase24.so`
    - `UKasedtc24.so -> /opt/IBM/mqsi/7.0/ODBC/V6.0/lib/UKasedtc24.so`
    - `UKora24.so -> /opt/IBM/mqsi/7.0/ODBC/V6.0/lib/UKora24.so`
    - `UKoradtc24.so -> /opt/IBM/mqsi/7.0/ODBC/V6.0/lib/UKoradtc24.so`
ODBC XA - Configuring the Broker

- **DataSourceName stanza** should be defined in the $ODBCINI file in the same way as for non-XA connections
  - The **DataSourceName** should match the one given in the XAOpenString in the qm.ini file

- The final step is to deploy a message flow for XA.
  - Add the message flow to a broker archive
  - Select the Manage tab, and select the message flow. The configurable properties for the message flow in the broker archive are displayed in the Properties view
  - Select *coordinatedTransaction* to configure the message flow as globally coordinated; when you set this property, the external transaction manager (WebSphere MQ) coordinates the transaction with all the resource managers that you have defined to the queue manager
Problem 7 - Oracle RAC

- Problem: You are using Oracle Real Application Cluster (RAC) in an Active-Passive configuration. When a failover occurs to the standby node, the message flow appears to hang.

- Symptoms:
  - There is a build up of messages waiting to be processed by the message flow.
  - The message flow cannot be stopped and re-started.
  - A `pstack` or `procstack` output shows a `TCPIP recv()` call at the top of the stack.
Oracle RAC

- Introduced in Oracle 9i
- Oracle RAC databases build on the basic Oracle architecture to provide a highly available and scalable system where a single shared physical database is serviced by multiple concurrent Oracle instances
- Typically, each instance runs on a separate node in the cluster and communicates with other instances on other nodes
- Together the instances present themselves as a single Service to client applications
- Supported by WebSphere Message Broker since WMB V6.0
Oracle RAC – Typical configuration

Oracle RAC Nodes
- Active/Passive
- Same Service offered

Preferred

Available

Listener A
Instance A
Node A

Listener B
Instance B
Node B

Shared Storage
Oracle RAC - Failover

- Oracle RAC provides two methods of failover:
  - Connect Time Failover
    - The ability to connect to the database through alternative listeners
    - Does not preserve states for transactions or queries
    - Supported by Message Broker. The broker needs to explicitly re-establish a new connection
  - Transparent Application Failover (TAF)
    - If a communication link failure occurs after a connection has been established, the connection fails over to another active node. The application does not need to explicitly re-establish the connection
    - Disrupted transactions are rolled back
    - If the statement executing at the time of the failure is a SELECT statement, that statement may be automatically re-executed on the new connection with the cursor positioned on the row on which it was positioned prior to the failover
    - Not supported by Message Broker
Oracle RAC – ODBC configuration

- On unix and Linux, Oracle wire protocol driver configuration in $ODBCINI
  - Use `ServiceName` instead of SID
    - `;# Oracle Real Application Clusters stanza
    - [ORACLERACDB]
      - `Driver=<Your Broker install directory>/ODBC/V6.0/lib/UKora24.so`
      - `Description=DataDirect 6.0 Oracle Wire Protocol`
      - `HostName=nodeA`
      - `PortNumber=1521`
      - `ServiceName=myRACService`
      - `AlternateServers=(HostName=nodeB:PortNumber=1521:ServiceName=myRACService)`
      - `CatalogOptions=0`
      - `EnableStaticCursorsForLongData=0`
      - `ApplicationUsingThreads=1`
      - `EnableDescribeParam=1`
      - `OptimizePrepare=1`
      - `WorkArounds=536870912`
      - `ProcedureRetResults=1`
      - `ColumnSizeAsCharacter=1`
      - `LoginTimeout=0`
ODBC RAC

- On Windows, use the ODBC Data Source Administrator
- Configure the DataDirect Technologies 6.0 Oracle Wire Protocol driver
- On the General tab, enter: Data Source Name
  - Host name and Port of the preferred Oracle listener
  - Service Name
- On the Failover tab:
  - Add a list of Alternate Servers
  - Ensure Failover mode is 0
Oracle RAC – Failover settings

- **FailoverMode** is a property that can be set in the $ODBCINI on unix/Linux, but only the default value of 0 (Connection - the driver provides failover protection for new connections only) is supported.

- Client load balancing
  - Client connection requests are balanced across the available Oracle Listeners at connection time.
  - Add `LoadBalancing=1` to DSN stanza in $ODBCINI
  - Supported by Message Broker

- Server side load balancing is not supported

- `ConnectionRetryCount` and `ConnectionRetryDelay` (seconds) may also be used.
Oracle RAC – hang during failover

- Connection socket hasn't detected that the other end has gone after abrupt failure
- Solution: use property `QueryTimeout` in $ODBCINI or on the Advanced tab in the Windows ODBC configuration
  - The number of seconds for the default query timeout for all statements created by a connection
  - Default is 0, wait indefinitely
  - To prevent hang, set to a positive integer
Oracle RAC – XA support

- **Use** `ServiceName` instead of `SID` in `XAOpenString`

```
XAOpenString=ORACLE_XA
  +HostName=MyHostName
  +PortNumber=MyPortNumber
  +ServiceName=MyServiceName
  +ACC=P/MyUserId/MyPassword
  +sestm=100+threads=TRUE
  +DataSource=MyDataSourceName
  +K=2+
```

- **AlternateServers** read from `$ODBCINI` file; they are not specified in `XAOpenString`

- **New optional property, CTO=value (Connection Timeout in seconds)** may be added to the `XAOpenString`
  - Use to prevent hangs during failover
Problem 8: JDBC connectivity

• Problem: You have configured a message flow containing a JCN to do a database lookup and are getting JDBC connectivity error BIP6233E

• Symptoms:

  Syslogs show the following exceptions:
  BIP6233E: An error occurred in node: ABCJDBCService There was a problem establishing a connection to the given database URL: datasource URL = jdbc:oracle:thin:abc/eBG!!fGf21@10.6.100.37:1521:cmsp
  Exception details:Invalid argument(s) in call :

  BIP4362E: Java node error: Problem obtaining JDBC Connection for Datasource : Oracle

• Problem Diagnosis:

  Check the mqsireportproperties output:
  mqsireportproperties <broker_name> -c JDBCProviders -o <DB name> -r

  Check logs, stderr and stdout
  An execution group service trace may also be needed
**JDBC connectivity**

- Run `mqsireportproperties` to display the existing services
  
mqsireportproperties V61BK -c JDBCProviders -o AllReportableEntityNames -r

- Modify the JDBCProviders template provided with broker installation via `mqsichangeproperties` (below) or WMB Explorer

- OR Create a new Configurable service using `mqsicreateconfigurableservice` to create the service with default objects and values –
  
mqsicreateconfigurableservice V8BK -c JDBCProviders -o DB2_1 -n connectionUrlFormat -v "jdbc:db2://[serverName]:[portNumber]/[databaseName]:user=[user];password=[password];"

- Modify the object values using `mqsichangeproperties`
  
mqsichangeproperties V8BK -c JDBCProviders -o DB2_1 -n databaseVersion -v 9.7
JDBC connectivity

- If user and password specified in connectionUrlFormat then define the securityIdentity

- Run `mqsisetdbparms` to associate the securityIdentity with userID and password

  Eg. `mqsisetdbparms V61BK -n jdbc::DB2DataSource1 -u myuserid -p secretpw`

- Run the `mqsichangeproperties` command to create the securityIdentity

  Eg. `mqsichangeproperties V8BK -c JDBCProviders -o DB2_1 -n securityIdentity -v DB2DataSource1`
**JDBC connectivity**

The `connectionUrlFormat` property should not be edited, but rest of the properties may need to be changed.
JDBC connectivity

- **Solution:**
  - Ensure the `ConnectionURLFormat` property itself is not touched
  - All the parameters listed in `ConnectionURLFormat` are correctly configured in the configurable service
  - `securityIdentity` is correctly configured
  - Configure the node in message flow: Name of your `JDBCProvider` service must match the `datasourceName` parameter in the `getJDBCType4Connection()` call
    
    For example: `mqsicreateconfigurableservice V8BK -c JDBCProviders -o DB2_1`
    
    Code the following in JCN:
    ```java
    Connection DB2_Connection = this.
    getJDBCType4Connection("DB2_1", JDBC_TransactionType.MB_TRANSACTION_AUTO)
    ```
Problem 9: JDBC and XA

- Problem: What is the procedure to configure XA transactions for a JDBC connection on broker?

- Solution: Follow the steps listed below:

  - Ensure that the JDBCProvider service definition is appropriate for coordinated transactions (consult with DBA)
  - Edit the qm.ini file (UNIXes) or QMgr properties in MQExplorer (Windows) and add the following stanza for each database:

    ```
    XAResourceManager:
    Name=Database_Name
    SwitchFile=JDBCSwitch
    XAOpenString=JDBC_DataSource
    ThreadOfControl=THREAD
    ```

    (DSN defined on the configurable service)
    (fixed for UNIXes & Win64-bit, but fully qualified name for Win32-bit - \JDBCSwitch.dll)
    (JDBCProvider configurable service name)
    (fixed for V7/V8)
JDBC and XA

- On Windows 32-bit copy the switch file from `<WMB>`\bin to `<WMQ>`\exits directory

- On Windows 64-bit copy the switch file from `<WMB>`\bin to `<WMQ>`\exits64 directory

- On UNIXes create a symbolic link to the switch file located in `<WMB>`/lib directory to `/var/mqm/exits/<SwitchFileName>

  For example: `ln -s <WMB>/lib/libJDBCSwitch.so /var/mqm/exits/JDBCSwitch`

  and

  `/var/mqm/exits64/<SwitchFileName>

  For example: `ln -s <WMB>/lib/libJDBCSwitch.so /var/mqm/exits64/JDBCSwitch`
JDBC and XA

- Configure the MessageFlow for XA coordination
  Open the toolkit
  In the BAR editor, add the message flow
  In the Configure tab, select Coordinated Transaction

Points to remember:

If the database has to be brought down, then ensure that broker is restarted as well

On Windows if configured with DB2, then ensure that MQ and WMB Service user IDs are members of the group DB2USERS
Problem 10: Toolkit JDBC for maps

- Problem: When trying to map database objects on a mapping node in the Toolkit, my table directory is shown as empty. From Toolkit > Data Source Explorer view, I can successfully connect to the database but the table directory is shown empty.

- Symptoms: The table directory shows no tables. There are no errors.

- Problem Diagnosis:
  - Check the Toolkit > Data Source Explorer view > Database connections configuration in the Toolkit.
Toolkit JDBC for maps

- Run the following steps:
  - Go to WMB Toolkit > Data Source Explorer view > Database connections
  - Right-click the Database connection for the database i.e. referenced in the map and select Properties
Toolkit JDBC for maps

- Ensure the Database properties (name, host, port, user Id) are correct
- Ensure the JDBC driver you select is compatible with the version of database you are using
- Ensure the driver jar file location is correct on the WMB machine
- Rebuild and save the project interchange (recommended)
Toolkit JDBC for maps

- Double-click on the map under Toolkit maps to open it
- Click "Select the Rows from a database" icon
Toolkit JDBC for maps

- Select "Add database..." in New Database Select window
- Select "Import from a database" to create a new database definition file
Toolkit JDBC for maps

- Select Database connection from the "New Database Definition File" window
- Select schema and Finish
Toolkit JDBC for maps

- You should now see the DB table contents in the columns to finish the mappings
References

WebSphere Message Broker V8 Information Center

WebSphere Message Broker support page

Knowledge Collection: Database connectivity/ODBC/JDBC for WMB

ODBC SQLStates

DB2 SQLStates

Oracle SQLStates

SQLServer SQLStates
Additional WebSphere Product Resources

- Learn about upcoming WebSphere Support Technical Exchange webcasts, and access previously recorded presentations at: http://www.ibm.com/software/websphere/support/supp_tech.html

- Discover the latest trends in WebSphere Technology and implementation, participate in technically-focused briefings, webcasts and podcasts at: http://www.ibm.com/developerworks/websphere/community/

- Join the Global WebSphere Community: http://www.websphereusergroup.org

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