JDBC Connectivity using WebSphere Message Broker v6.1

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WebSphere Message Broker L2 Support

Agenda

- Overview
  - JDBC Primer
  - Requirements
  - JDBC Driver Types
  - Supported Databases
  - WebSphere Message Broker Nodes
    - DatabaseRetrieve Node
    - DatabaseRoute Node
    - Java Compute Node

Agenda (contd.)

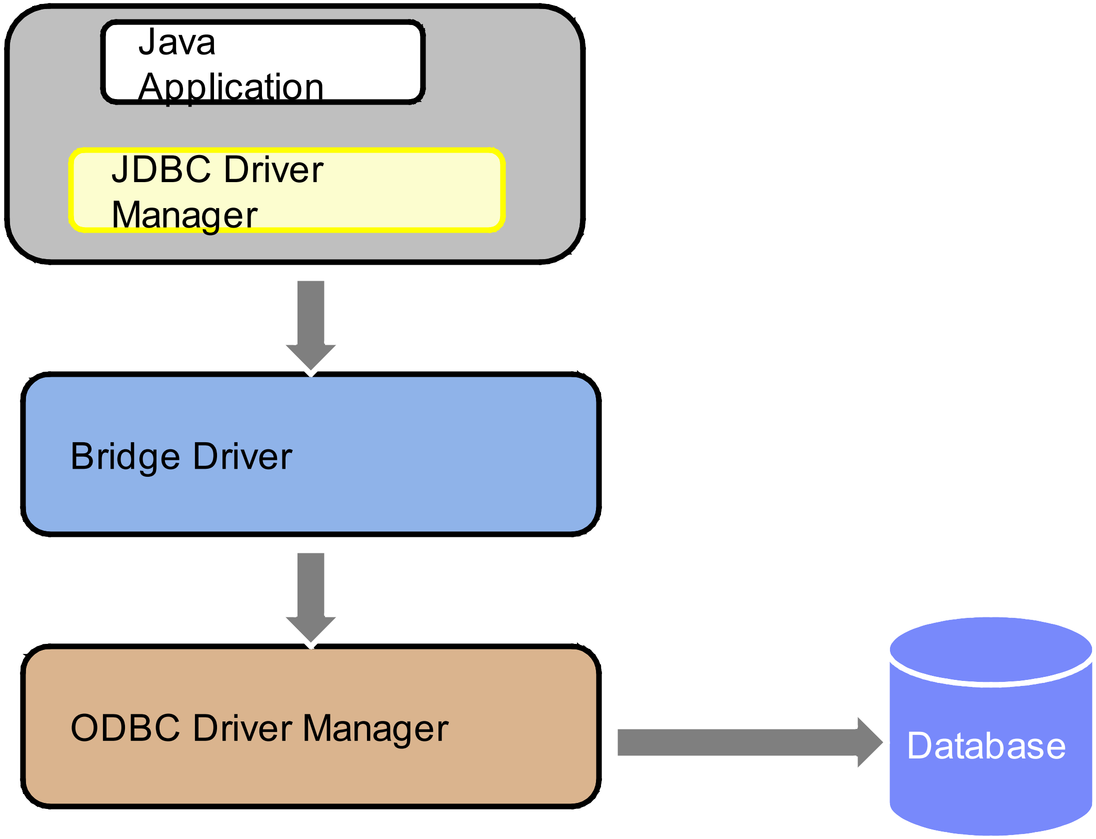
- JDBC Administration Tasks
  - JDBC Setup
    - Create Configurable Service
    - Setting up Security Identity
    - Modify existing JDBC Providers
    - Query JDBC Providers
  - XA Coordination
- Implementing JDBC

JDBC Primer

- What is JDBC?
  - The Java™ Database Connectivity (JDBC) is an API that defines how a client can access a database
- Why JDBC?
  - JDBC API is an industry standard for database independent connectivity between the Java programming language and a wide range of databases
- Requirements
  - JRE 1.4.2 or greater
  - Database
  - JDBC Driver

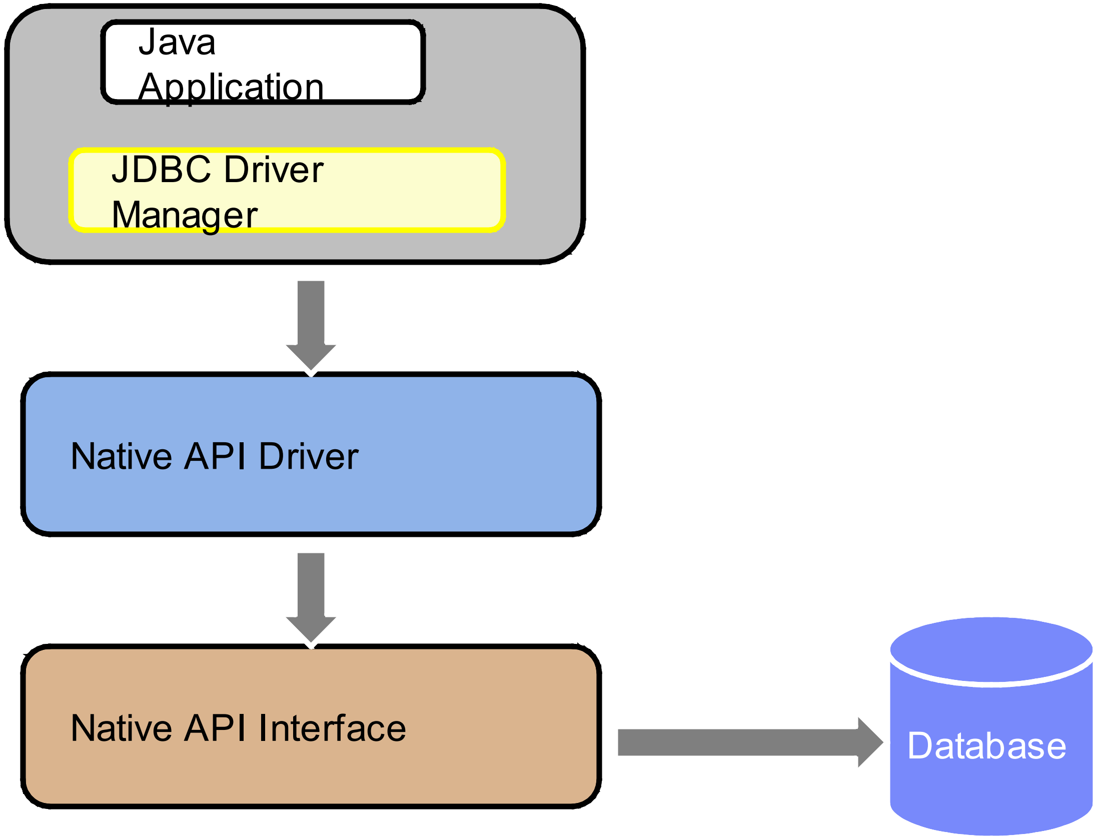
JDBC Driver Types

- Type 1 (JDBC – ODBC Bridge Driver)



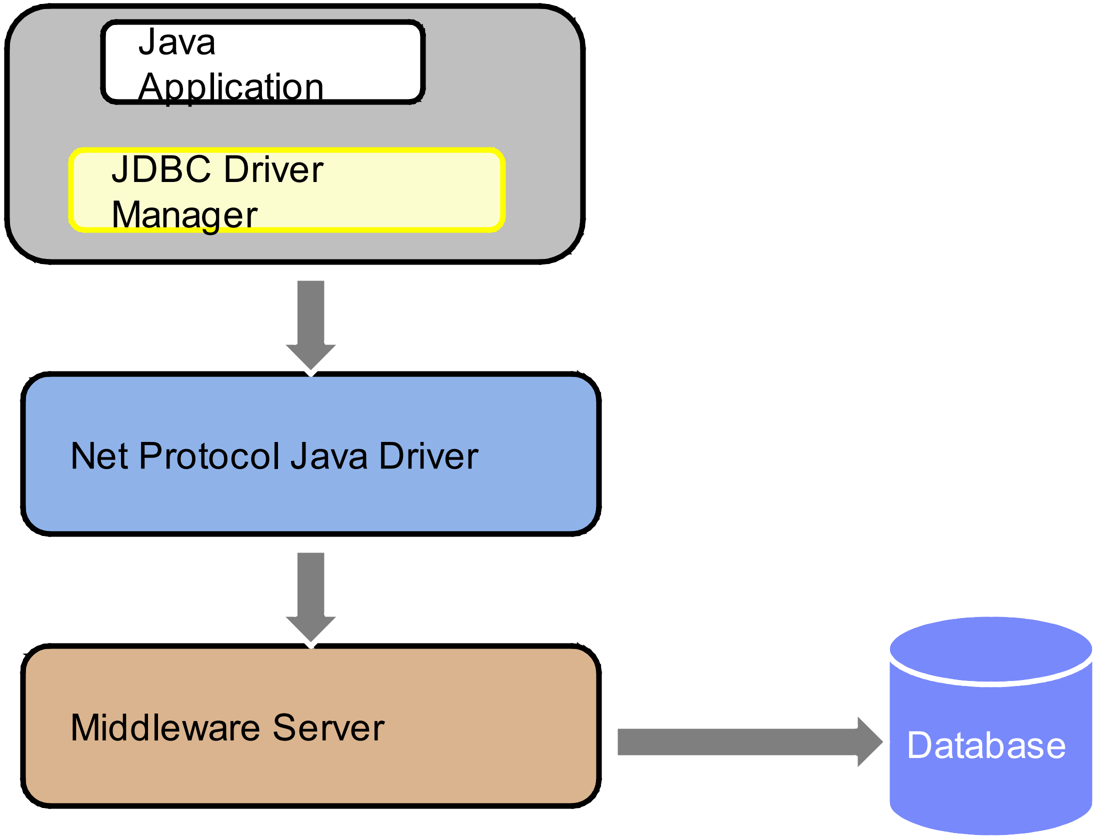
JDBC Driver Types

- Type 2 (Native API Interface - Partial Java Driver)



JDBC Driver Types

- Type 3 (Pure Java driver for database middleware)



Java Application

JDBC Driver Manager

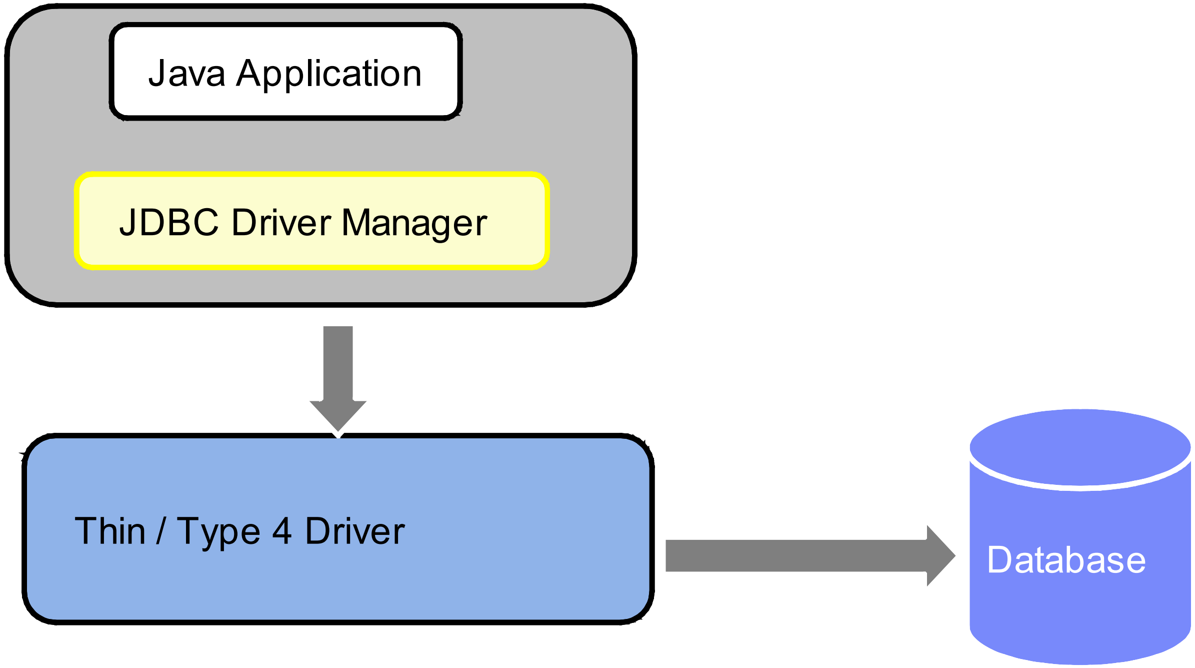
Net Protocol Java Driver

Middleware Server

Database

JDBC Driver Types

- Type 4 (Pure Java Driver – Direct DB interface)



Supported Databases

WebSphere Message Broker v6.1 supports the following JDBC type 4 drivers

- IBM® DB2 Driver for JDBC and SQLJ Version 9.1 and 9.5
- Microsoft® SQL Server 2005 JDBC driver 1.1 (non-XA only)
- Oracle 10gR2 or 11gR1 JDBC Driver
- Sybase jConnect for JDBC 6.05
- IBM Informix JDBC 3.00.JC3

Note: On all distributed platforms, JDBC type 4 transaction support that uses DB2 requires DB2 Version 9.1 Fix Pack 3 or later; support for DB2 Version 8 is not available.

WebSphere Message Broker Nodes

- The following nodes can be configured for JDBC connectivity
  - DatabaseRetrieve node
  - DatabaseRoute node
  - Java Compute
  - Java UDN

JDBC Administration Tasks

- Creating a Configurable Service
  - A JDBC Provider configurable service must be defined to provide the broker with the necessary information to establish a connection to the database
  - Connection to only one database is allowed per configurable service
  - JDBC connections are supported only to DB2, Informix, Oracle, SQL Server and Sybase
  - Check the list of available JDBC providers

    mqsireportproperties *Broker Name* -c JDBCProviders -a -o AllReportableEntityNames

JDBC Administration Tasks (contd.)

- Creating a new Configurable Service

Command Syntax:

```
            mqsicreateconfigurableservice  <Broker Name>
                    -c JDBCProviders
                    -o <ProviderName>
                    -n <List of Properties>
                    -v <Property Values>
```

```
  Eg: mqsicreateconfigurableservice KPV61BK
                    –c JDBCProviders
                    –o DB2
                    –n connectionURLFormat
                     -v "jdbc:db2://[serverName]:[portNumber]/[databaseName]:user=
[user];password=[password];“
```

JDBC Administration Tasks (contd.)

- JDBC Provider Properties
  - **connectionUrlFormat** – a pattern that represents a connection URL
  - **connectionUrlFormat Attr1-5** – any non-standard attributes in URL format
  - **databaseName** - Name of the database – eg. SAMPLE
  - **databaseType** - The database type – eg. DB2
  - **databaseVersion** - The database version; eg. 9.1
  - **description** - An optional property to describe the data source definition
  - **jarsURL** – local directory path where the JAR file containing the driver is located
  - **portNumber** - port number on which the database server is listening
  - **serverName** - The name of the server
  - **securityIdentity** - A unique security key to perform a broker registry lookup to find an entry under the broker's DSN entries, which store the encrypted password for the user on their associated host system – eg. jdbc::DB2DataSource1
  - **type4DriverClassName** – JDBC driver class name – eg. com.ibm.db2.jcc.DB2Driver
  - **type4DatasourceClassName -**Name of JDBC DataSource class- eg. com.ibm.db2.jcc.DB2DataSource

JDBC Administration Tasks (contd.)

- Modifying an existing JDBC Provider

Command Syntax:

```
mqsichangeproperties <Broker Name>
                               -c <ConfigurableServiceType>
                               -o <ServiceName>
                               -n <Property>
                               -v <Value>
```

```
Eg: mqsichangeproperties KP61BK
             –c JDBCProviders
             –o DB2
              –n databaseName,jarsURL,securityIdentity,serverName
               -v SAMPLE,C:\Program FilesIBM\DB2v9.5\java,
                  db2Sample,localhost
```

JDBC Administration Tasks (contd.)

- Query existing JDBC Providers

Command Syntax:

```
 mqsireportproperties <Broker Name> -c JDBCProviders
                                    –o AllReportableEntityNames -a
```

```
            JDBC Providers

                DB2
                Informix
                Informix_With_Date_Format
                Microsoft_SQL_Server
                Oracle
                Sybase_JConnect6_05
```

JDBC Administration Tasks (contd.)

- Display existing JDBC Provider properties

  Eg: mqsireportproperties <Broker Name> -c JDBCProviders –o DB2 –r

```
JDBCProviders - DB2

connectionUrlFormat='jdbc:db2://[serverName]:[portNumber]/[databaseName]:user=
   [user];password=[password];‘
   connectionUrlFormatAttr1='‘                         connectionUrlFormatAttr2=''
   connectionUrlFormatAttr3='‘                         connectionUrlFormatAttr4=''
   connectionUrlFormatAttr5=''
   databaseName=‘jdbctest ‘
   databaseType='DB2 Universal Database‘               databaseVersion='9.1‘
   description='default_Description‘
   jarsURL='C:\Program Files\IBM\DB2v9.5\java‘         portNumber='50000‘
   securityIdentity='default_User@default_Server‘
   serverName='default_Database_Server_Name'
   type4DatasourceClassName='com.ibm.db2.jcc.DB2XADataSource'
   type4DriverClassName='com.ibm.db2.jcc.DB2Driver'
```

Securing JDBC Connections

- Identify the userid to be associated with the JDBC connection

- Associate the userid with the security identity

  mqsisetdbparms <*Broker Name*> -n *security_identity* -u *userID* -p *password*

- Update the corresponding securityIdentity property for the JDBCProvider configurable service to associate the connection with the security identity that you have just defined.

  mqsichangeproperties <*Broker Name* > -c JDBCProviders -o <*Provider*> -n securityIdentity -v <*Value*>

XA Coordination

To configure the database that is accessed through a Type 4 JDBC connection to participate in globally coordinated transactions use the following steps:

- Ensure that the JDBCProvider service definition is appropriate for coordinated transactions

- Edit the qm.ini file (UNIX® and Linux®) or Queue Manager properties in MQExplorer (Windows®) and add the following stanza for each database:

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

XA Coordination (contd.)

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

- On UNIX and Linux systems create a symbolic link to the switch file in <WMB InstallDir>/lib directory to /var/mqm/exits/<SwitchFileName> and /var/mqm/exits64/<SwitchFileName>

Platform	32-bit Switch File	64-bit Switch File
AIX	libJDBCSwitch.so	libJDBCSwitch64.so
HP-UX / Itanium		libJDBCSwitch.so
HP-UX/ PA-RISC	libJDBCSwitch.sl	libJDBCSwitch64.sl
Linux / PPC		libJDBCSwitch.so
z/Linux		libJDBCSwitch.so
Linux / x86-64	libJDBCSwitch.so	
Solaris / SPARC	libJDBCSwitch.so	libJDBCSwitch64.so
Solaris / x86-64		libJDBCSwitch.so

XA Coordination (contd.)

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

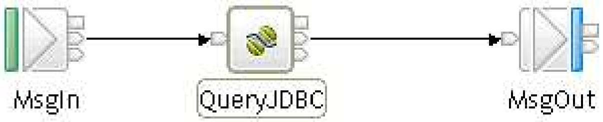
JDBC Implementation

- Below is a simple example that demonstrates a Type 4 JDBC connection using a Java Compute Node
- Environment
  - WMB v6.1.0.3 (Runtime / Toolkit)
  - DB2 v9.5
  - Database Employees
- Define JDBC Security Identity

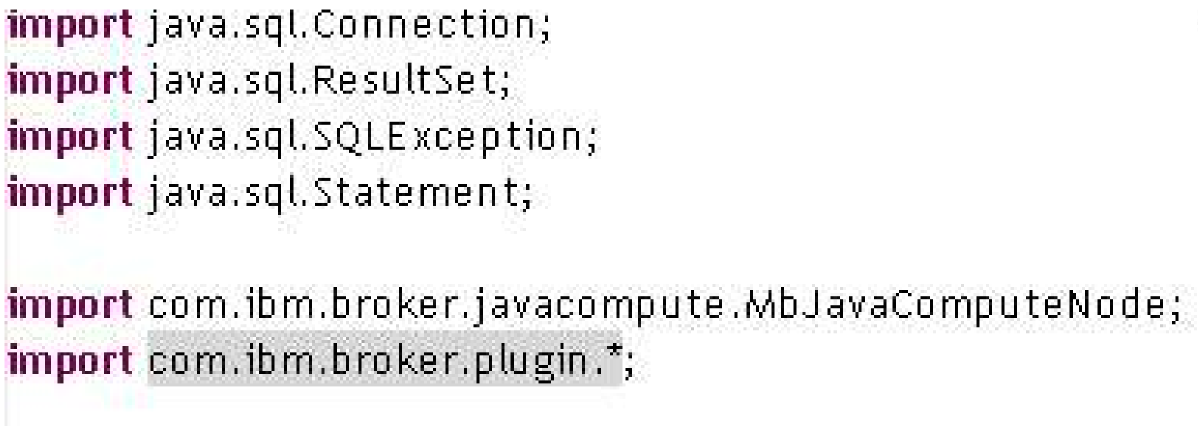
  mqsisetdbparms KP61BK –n jdbc::employees –u ***perik*** –p ***PASSWORD***
- Create / Modify a JDBC Provider Configurable Service

JDBC Implementation (contd.)

- Create a Message Flow as shown under:



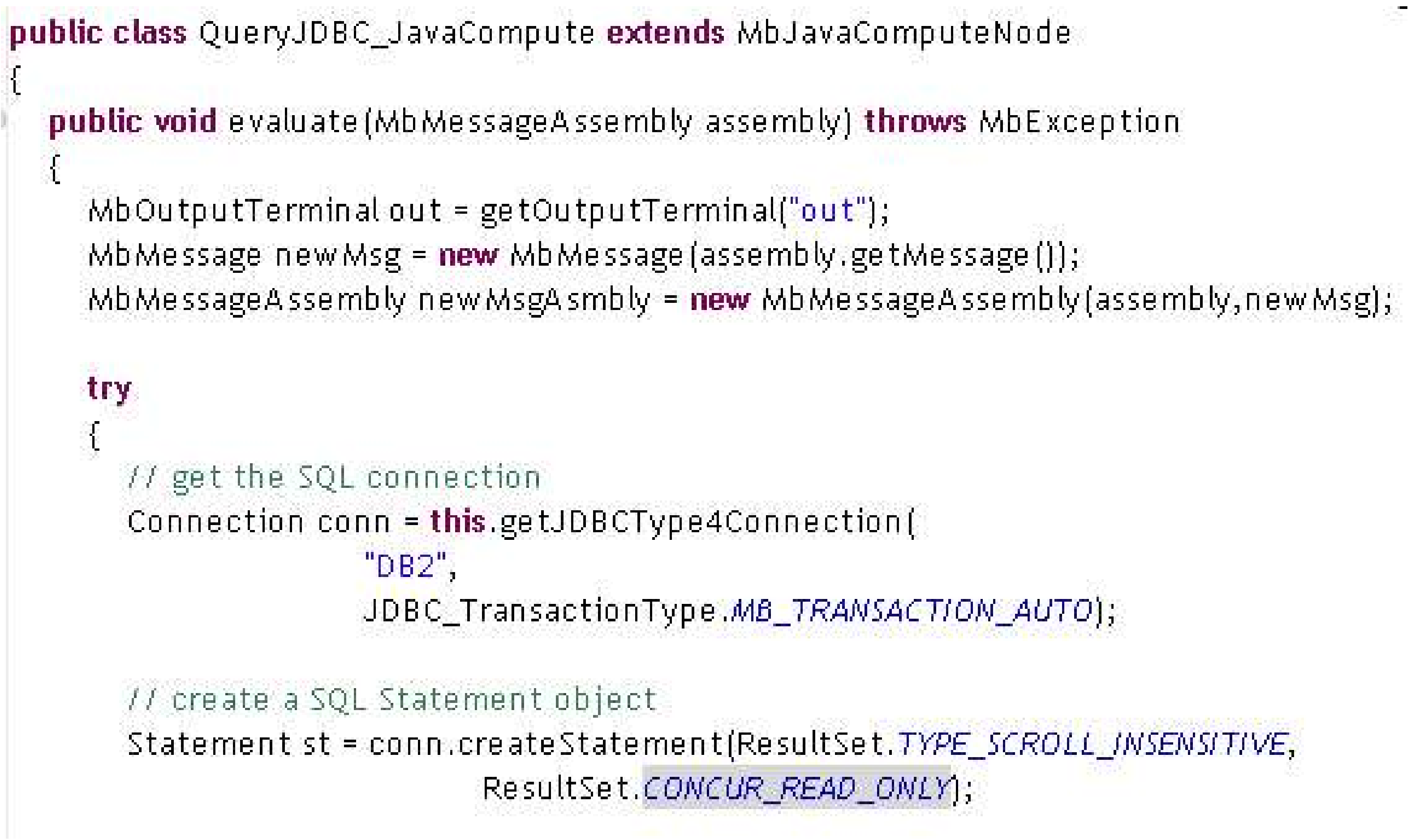
- Below is the code for the Java Compute Node’s evaluate method:



```
import java.sql.Connection;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.sql.Statement;

import com.ibm.broker.javacompute.MbJavaComputeNode;
import com.ibm.broker.plugin.*;
```

JDBC Implementation (contd.)

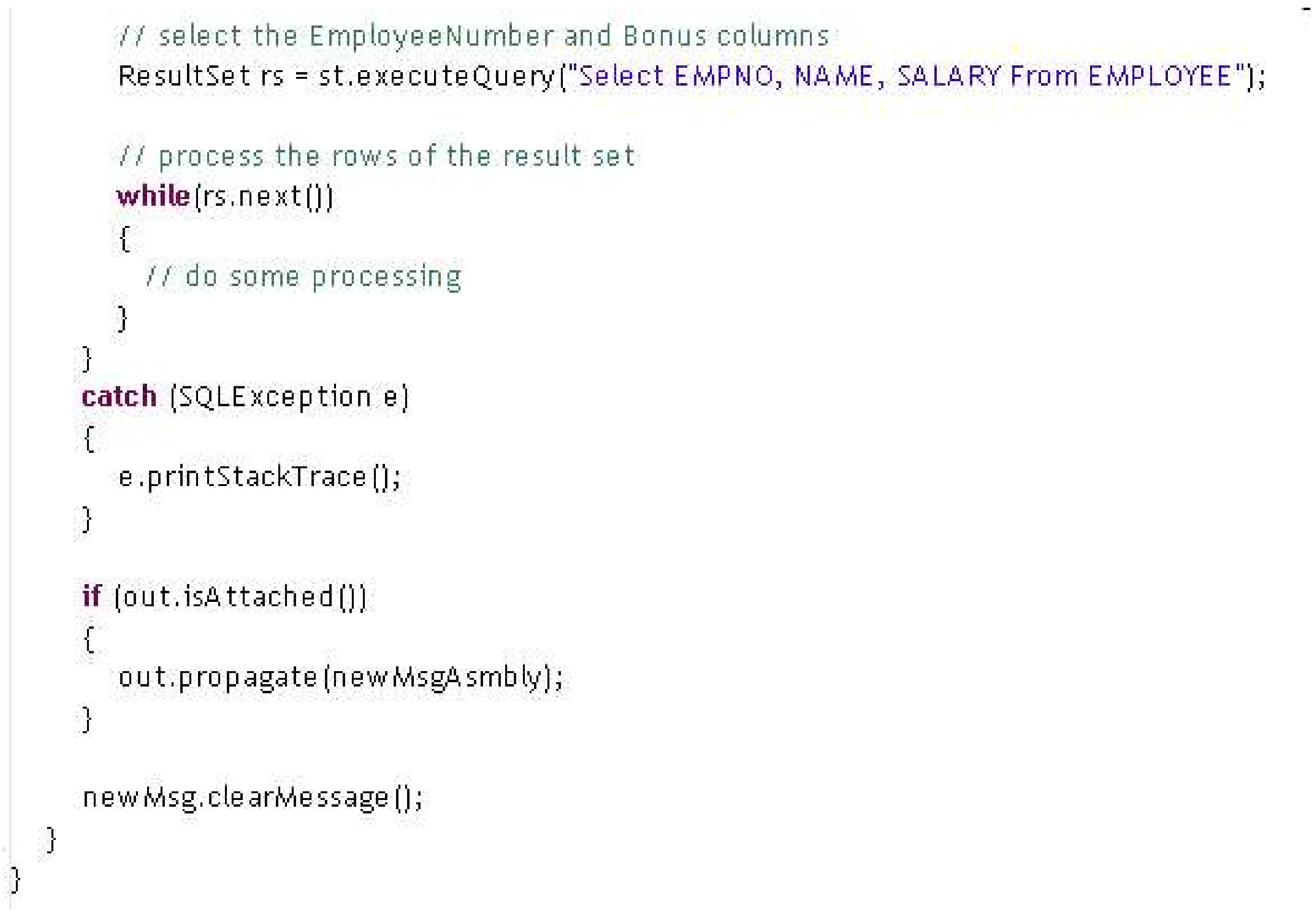


```
public class QueryJDBC_JavaCompute extends MbJavaComputeNode
{
  public void evaluate(MbMessageAssembly assembly) throws MbException
  {
    MbOutputTerminal out = getOutputTerminal("out");
    MbMessage newMsg = new MbMessage(assembly.getMessage());
    MbMessageAssembly newMsgAsmbly = new MbMessageAssembly(assembly,newMsg);

    try
    {
      // get the SQL connection
      Connection conn = this.getJDBCType4Connection(
                          "DB2",
                          JDBC_TransactionType.MB_TRANSACTION_AUTO);

      // create a SQL Statement object
      Statement st = conn.createStatement(ResultSet.TYPE_SCROLL_INSENSITIVE,
                               ResultSet.CONCUR_READ_ONLY);
```

JDBC Implementation (contd.)



```
            // select the EmployeeNumber and Bonus columns
            ResultSet rs = st.executeQuery("Select EMPNO, NAME, SALARY From EMPLOYEE");

            // process the rows of the result set
            while(rs.next())
            {
                // do some processing
            }
        }
        catch (SQLException e)
        {
            e.printStackTrace();
        }

        if (out.isAttached())
        {
            out.propagate(newMsgAsmbly);
        }

        newMsg.clearMessage();
    }
}
```

JDBC Tracing

- DB2
  - IBM_JAVA_OPTIONS=-Ddb2.jcc.propertiesFile=<Path/jccProps.properties>
  - Edit jccProps.properties file and add the following entries

```
db2.jcc.override.traceDirectory=/tmp
db2.jcc.override.traceFile=jccTrace.out
db2.jcc.override.traceFileAppend=true
db2.jcc.override.traceLevel=-1
```

- Oracle
  - IBM_JAVA_OPTIONS=-Doracle.jdbc.Trace=true

Notes

- Samples gallery has an example with DatabaseRoute Node
- APARs of interest
  - IC60625 - JDBCType4connection doesn't reconnects after network failure/DB restart
  - IC58607 – Unable to get a Type 4 JDBC connection with Informix
  - IC59641 – Unable to set additional DB2 JDBC Type 4 properties
- To test JDBC connectivity outside WebSphere Message Broker use the JDBC Test Tool

http://www.ibm.com/support/docview.wss?rs=71&q1=JDBC+connectivity&uid=swg24001799&loc=en_US&cs=utf-8&la

Summary

To enable JDBC connectivity

- Create a new configurable service or
- Modify the existing configurable service
- Enable security identity
- Configure the BAR file properties (if using XA)

Additional WebSphere Product Resources

- 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/

- Learn about other upcoming webcasts, conferences and events: http://www.ibm.com/software/websphere/events_1.html

- Join the Global WebSphere User Group Community: http://www.websphere.org

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- View a Flash replay with step-by-step instructions for using the Electronic Service Request (ESR) tool for submitting problems electronically: http://www.ibm.com/software/websphere/support/d2w.html

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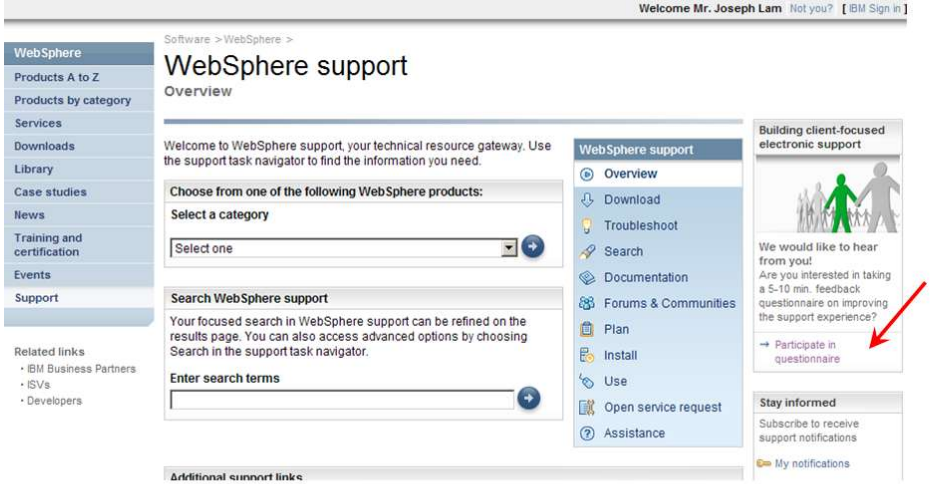

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