DATA SOURCE AND RESOURCE REFERENCE SETTINGS IN WEBSPHERE 7.0, RATIONAL APPLICATION DEVELOPER FOR WEBSPHERE VER 8 WITH JAVA 6 AND MICROSOFT SQL SERVER 2008

By Wick Gankanda | Updated: August 8, 2012

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When trying to connect to a database without a data source with WebSphere 7.0, the following error is thrown by the Web Application server:

```
com.ibm.ws.webcontainer.servlet.ServletWrapper service SRVE0068E: Uncaught exception
created in one of the service methods of the servlet <servlet-name> in application <web-
service-application> ... javax.naming.NameNotFoundException: Name comp/env/jdbc not found
in context "java:".
```

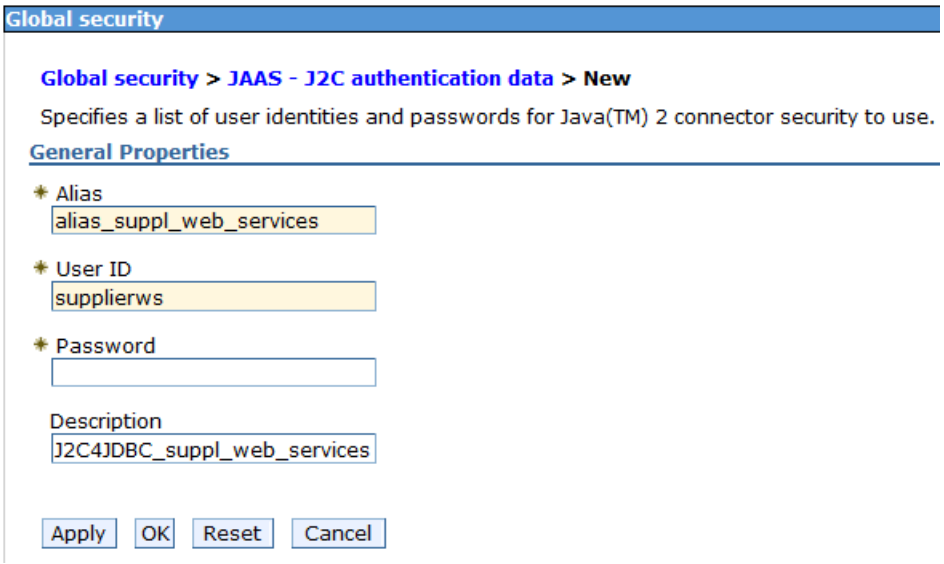
Creating an Authentication Alias

Log onto the administrative console AKA Integrated Solutions Console > select **Security** > **Global security** > expand **Java Authentication and Authorization Server** > click **J2C authentication data**

Click **New** > enter an alias name, user ID, and password for the database

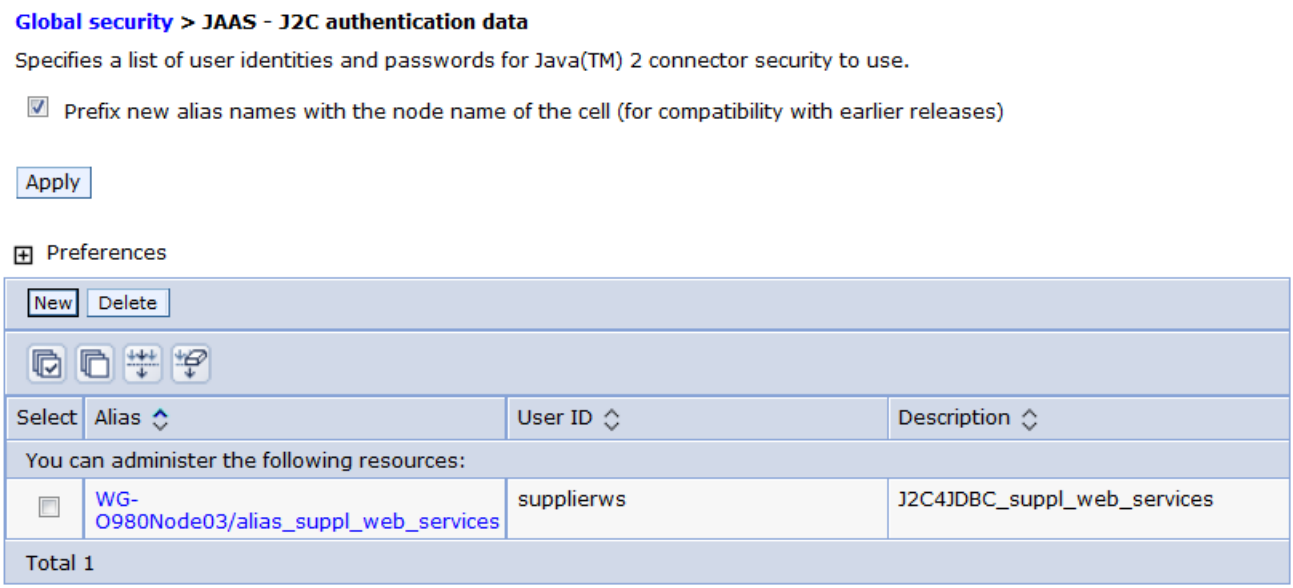
Example:

Alias (name of the authentication data entry): alias_suppl_web_services
User ID: ?
Password: ?
Description: J2C for JDBC suppl_web_services



Click **OK** > click **Save directly to the master configuration** >

Example of result:



Connecting to a SQL Server Database

Configuring WebSphere Application Server variables for Microsoft SQL Server JDBC Drivers

Microsoft SQL Server JDBC Driver 4.0 files were not found in RAD 8 installation and had to be downloaded from Microsoft. Once downloaded, the compressed file is unzipped and its contents extracted to folders.

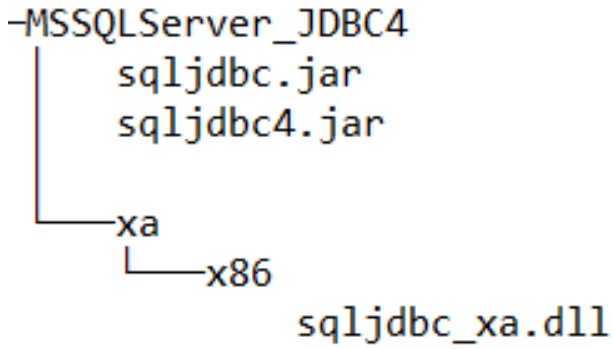
Obtaining the Latest Driver Files from Microsoft

Microsoft SQL Server JDBC drivers can be downloaded from Microsoft.

Go to this page and download the latest drivers:
Microsoft JDBC Driver for SQL Server
`http://msdn.microsoft.com/en-us/data/aa937724.aspx`

Setting up the Driver Files for WebSphere Application Server Access

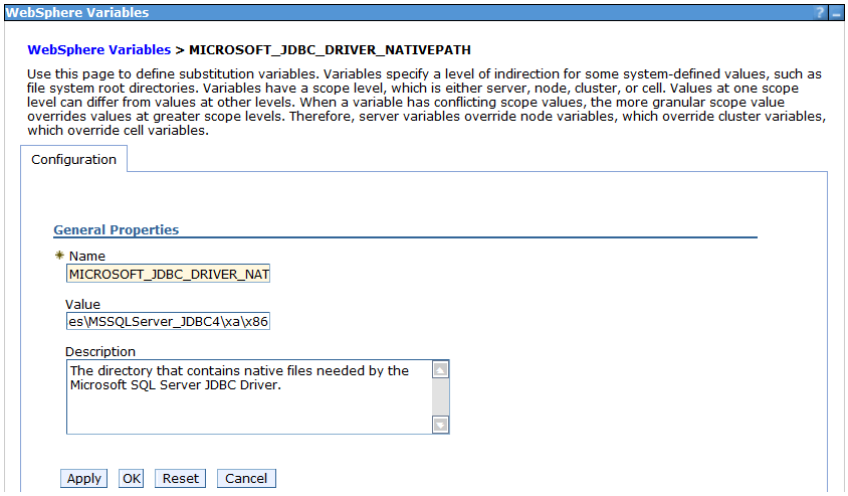
Unzip the download and create this folder structure at a location that's accessible to WebSphere 7.0 server.



This installation uses the path "C:\classes" to store the "MSSQLServer_JDBC4" folder.

Setting Environment Variables in WebSphere for Microsoft JDBC Drivers

Setting WebSphere Environment Variables on Windows 7



In the administrative console >
click **Environment** > **WebSphere variables**

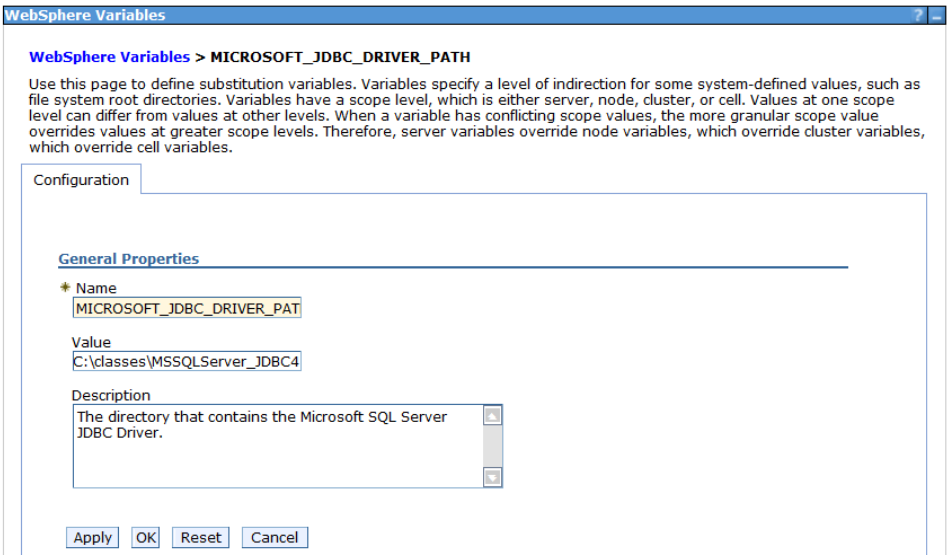
Set the value of the **MICROSOFT_JDBC_DRIVER_PATH** environment variable to the location of the sqljdbc4.jar file.

Value: (Specifies the absolute path that the symbolic name represents)

Description: (Specifies an optional description for your administrative records)

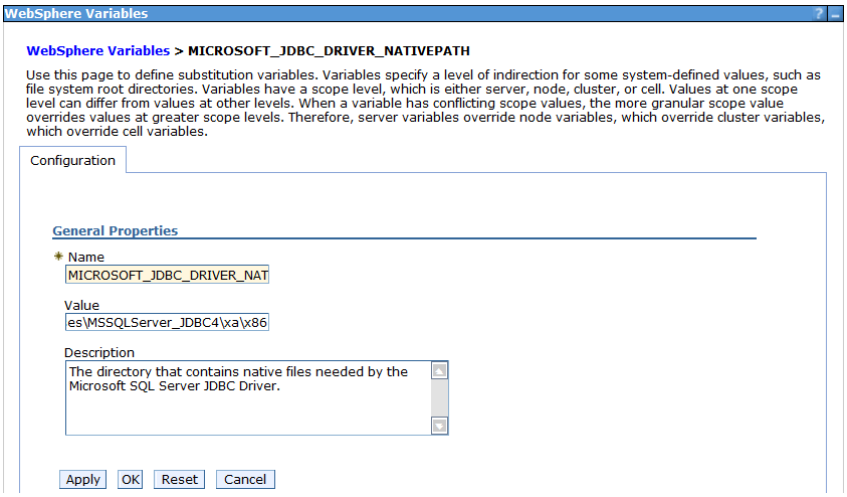
Example path:
On Windows 7
`C:\classes\MSSQLServer_JDBC4`

Click **OK**.

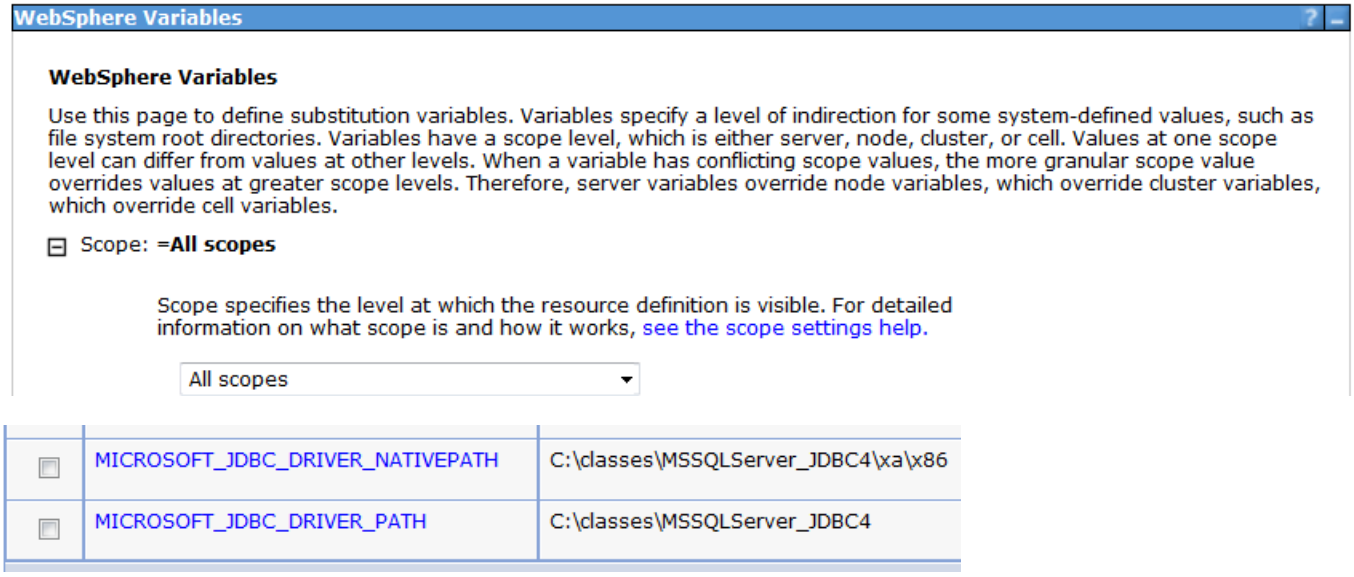


Set the value of the **MICROSOFT_JDBC_DRIVER_NATIVEPATH** environment variable to the location of the x86 folder.
Value: (Specifies the absolute path that the symbolic name represents)
Description: (Specifies an optional description for your administrative records)
Example path on Windows 7 `C:\classes\MSSQLServer_JDBC4\xa\x86`

Click **OK**.



Example of result:



Setting WebSphere Environment Variables on WebSphere 7.0 EXPRESS Web Application Server on Series i

Create this folder structure with JDBC SQL Server files

```
ms_sql
   |   sqljdbc4.jar
   |
   └──xa
      └──x86
            sqljdbc_xa.dll
```

Go to **Environment** > **WebSphere variables** > lookup absolute path for WebSphere variable 'WAS_INSTALL_ROOT'
Example: `/QIBM/ProdData/WebSphere/AppServer/V7/Express`

Copy the above folder structure to the ‘lib’ folder in the path specified above for 'WAS_INSTALL_ROOT'
Example: `/QIBM/ProdData/WebSphere/AppServer/V7/Express/lib/ms_sql`
Go to **Environment** > **WebSphere variables**

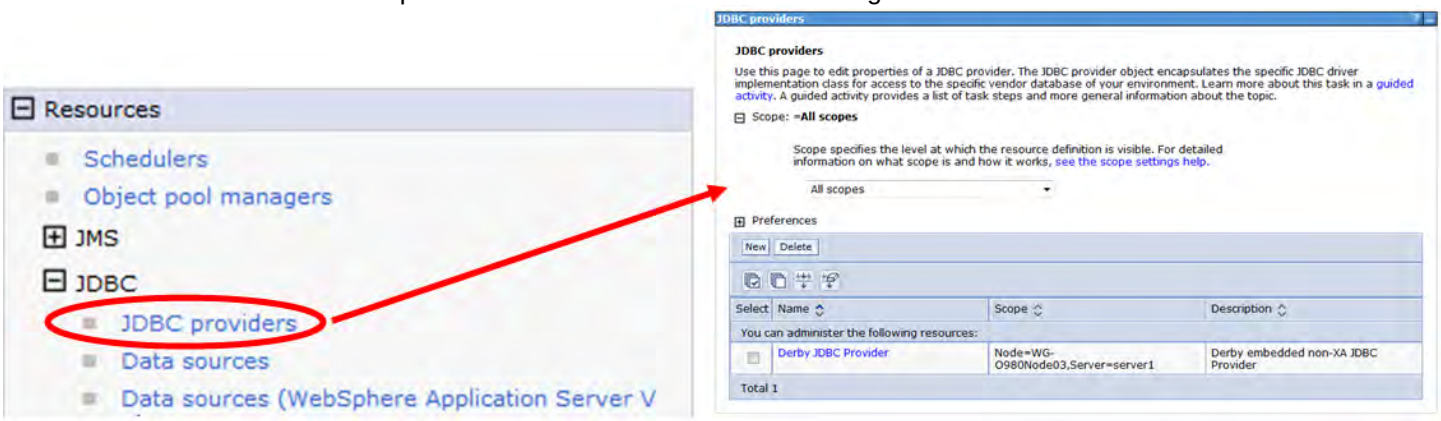
- set WebSphere variable 'MICROSOFT_JDBC_DRIVER_PATH' to ${WAS_INSTALL_ROOT}/lib/ms_sql
- set WebSphere variable 'MICROSOFT_JDBC_DRIVER_NATIVEPATH' to ${MICROSOFT_JDBC_DRIVER_PATH}/xa/x86

Variables in WebSphere 7.0 EXPRESS may look like this:

MICROSOFT_JDBC_DRIVER_NATIVEPATH	${MICROSOFT_JDBC_DRIVER_PATH}/xa/x86
MICROSOFT_JDBC_DRIVER_PATH	${WAS_INSTALL_ROOT}/lib/ms_sql
MQ_INSTALL_ROOT	[illegible]/lib/WMQ
ORACLE_JDBC_DRIVER_PATH	
OS400_NATIVE_JDBC40_DRIVER_PATH	
OS400_NATIVE_JDBC_DRIVER_PATH	
OS400_TOOLBOX_JDBC_DRIVER_PATH	
SERVER_LOG_ROOT	${LOG_ROOT}/WEBAPPSVR
SERVER_LOG_ROOT	${LOG_ROOT}/IHS_WEBAPPHTTP
SYBASE_JDBC_DRIVER_PATH	
UNIVERSAL_JDBC_DRIVER_PATH	${WAS_INSTALL_ROOT}/universalDriver/lib
USER_INSTALL_ROOT	/QIBM/UserData/WebSphere/AppServer/V7/Express/profiles/WEBAPPSVR
User-defined_JDBC_DRIVER_PATH	
WAS_CELL_NAME	LADEV2_WEBAPPSVR
WAS_ETC_DIR	${USER_INSTALL_ROOT}/etc
WAS_INSTALL_LIBRARY	QWAS7A
WAS_INSTALL_ROOT	/QIBM/ProdData/WebSphere/AppServer/V7/Express

Creating the JDBC Provider

In the administrative console > expand **Resources** > **JDBC** from the navigation tree > Click **JDBC Providers** >



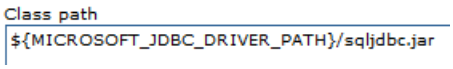
Select the scope:

> **Scope** to specify the level at which a resource is visible on the administrative console panel. By changing the value for Scope, you see only the resources that are defined at that scope.
>
> **Recommended: Node** - limits the visibility to all the servers on the named node. The node scope is the default scope for most resource types.

Select **New** > create a **new JDBC provider** >

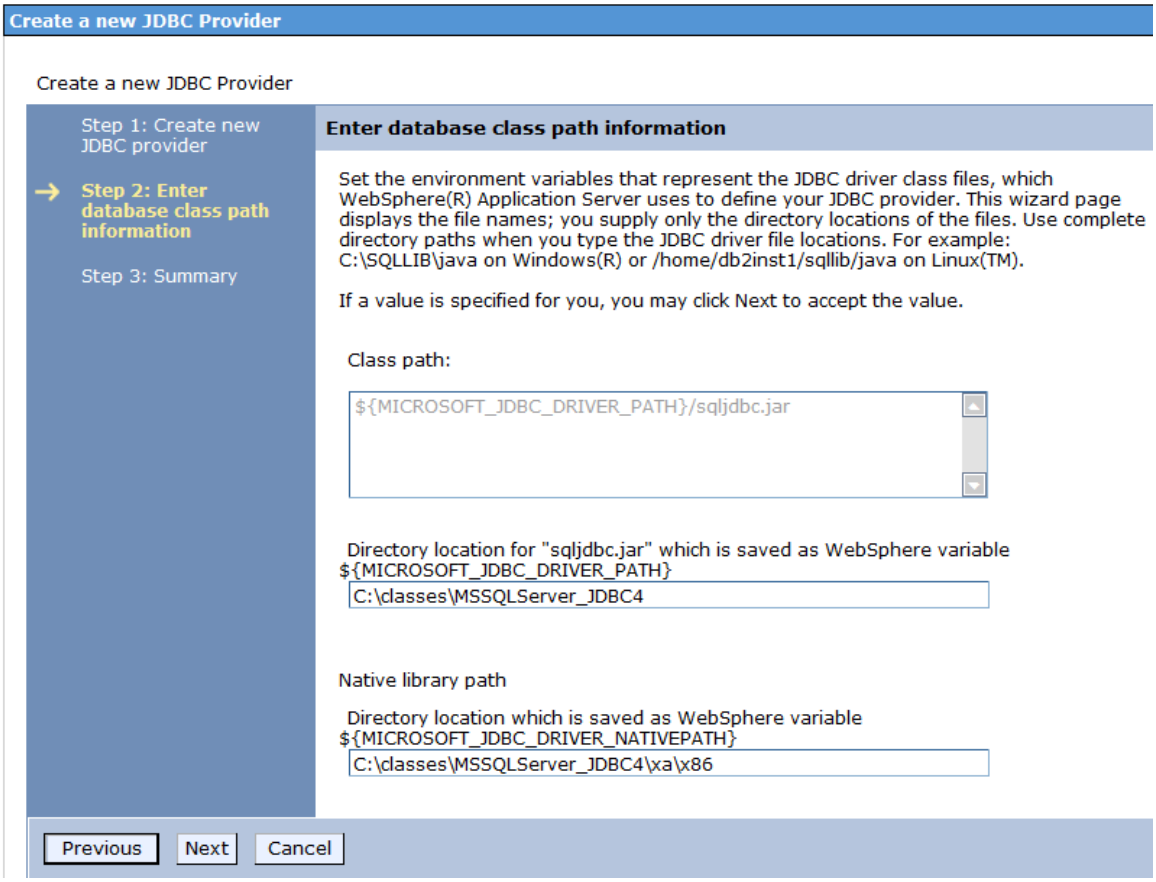
> Verify the Scope
> Database type: SQL Server
> Provider type: Microsoft SQL Server JDBC Driver
> Implementation type: XA data source (for support of two-phase commit transactions)
> Name: Microsoft SQL Server JDBC Driver (XA)
> Description: Microsoft SQL Server JDBC Driver (XA). This provider is configurable in version 6.1.0.15 and later nodes.

After creating the JDBC provider, the class path will point to older SQL JDBC driver.

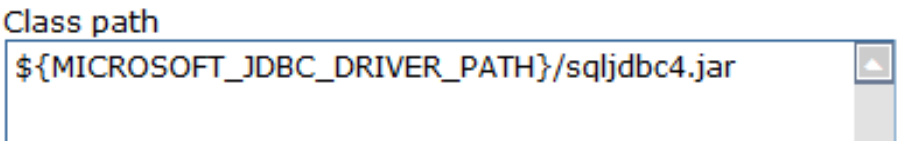


Expand **Resources** > **JDBC** from the navigation tree > Click **JDBC providers** > select the provider 'Microsoft SQL Server JDBC Driver (XA)' > change and verify the directory location for the SQL Server JDBC drivers

> **Change the class path *** THIS IS CRITICAL OR CONNECTION WILL FAIL *****:
> from ${MICROSOFT_JDBC_DRIVER_PATH}/sqljdbc.jar
> to **${MICROSOFT_JDBC_DRIVER_PATH}/sqljdbc4.jar**
>
> Directory location for "sqljdbc.jar" which is saved as WebSphere variable ${MICROSOFT_JDBC_DRIVER_PATH}
> Native library path: Directory location which is saved as WebSphere variable ${MICROSOFT_JDBC_DRIVER_NATIVEPATH}



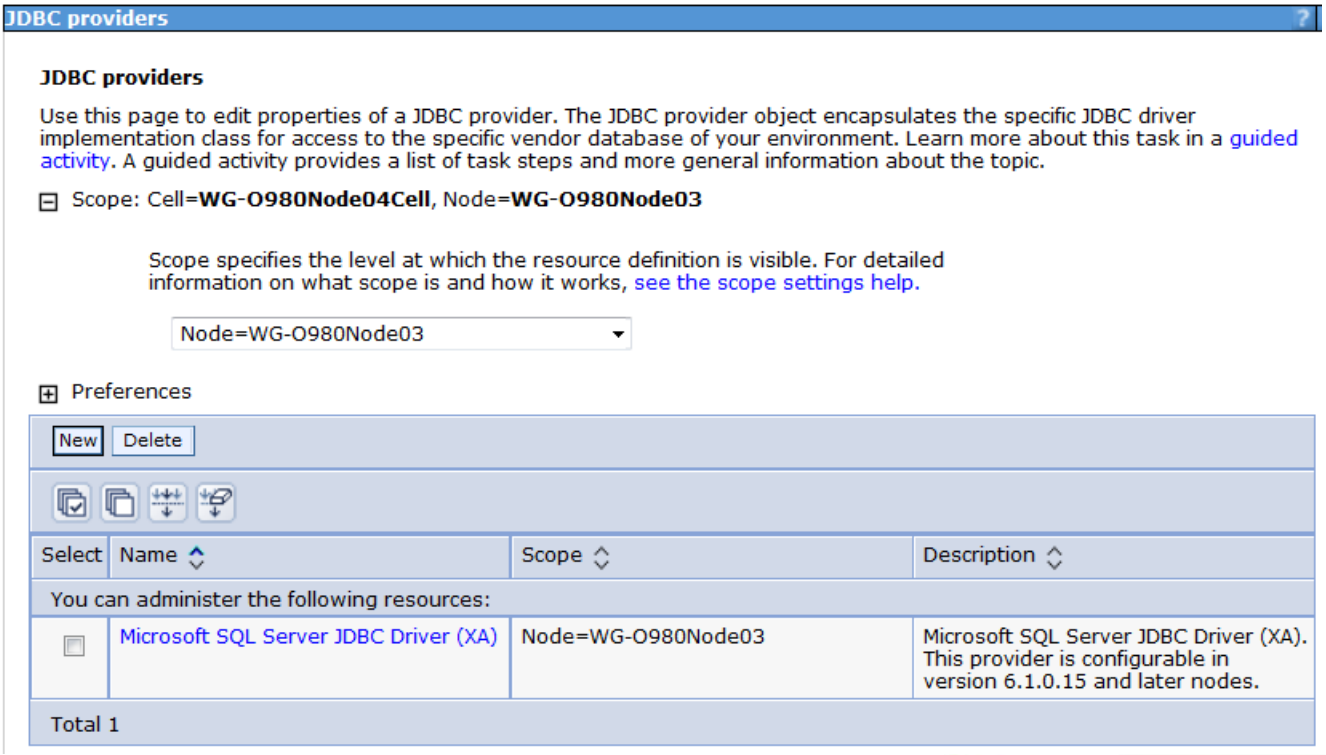
Verify this:



Click **Next** > review the summary of the settings > click **Finish**

Click **Save directly to the master configuration**.

Example of result:



Creating the Data Source

Expand **Resources** > **JDBC** > select **Data sources**:

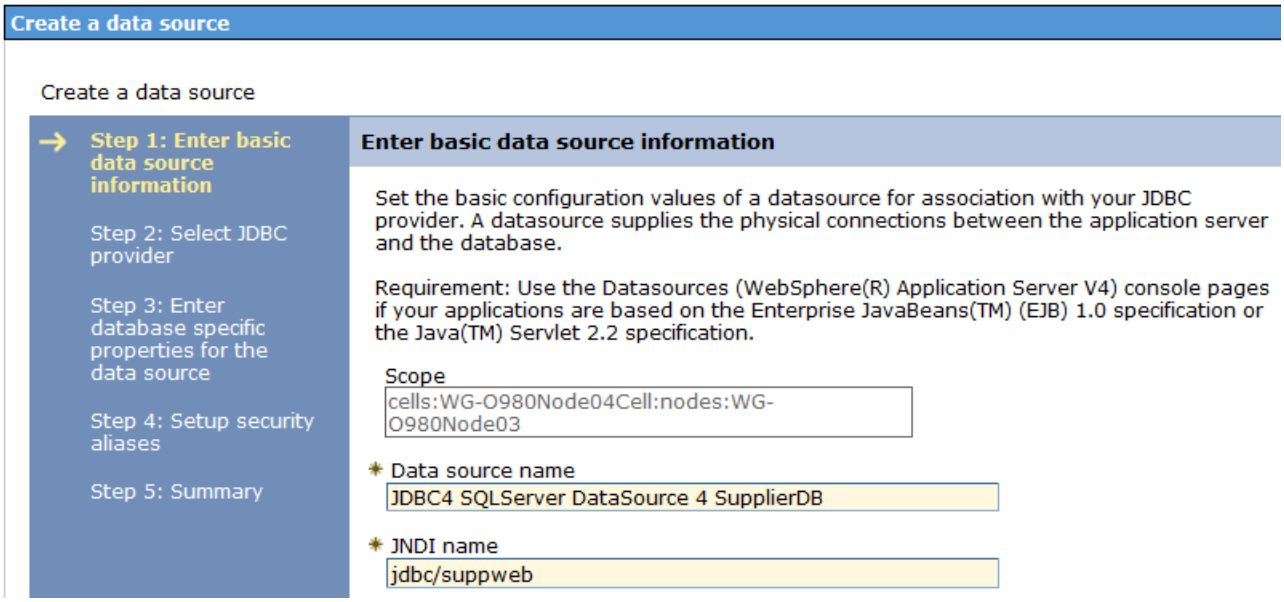
Select the Scope:

> **Recommended: Node** - limits the visibility to all the servers on the named node. The node scope is the default scope for most resource types.

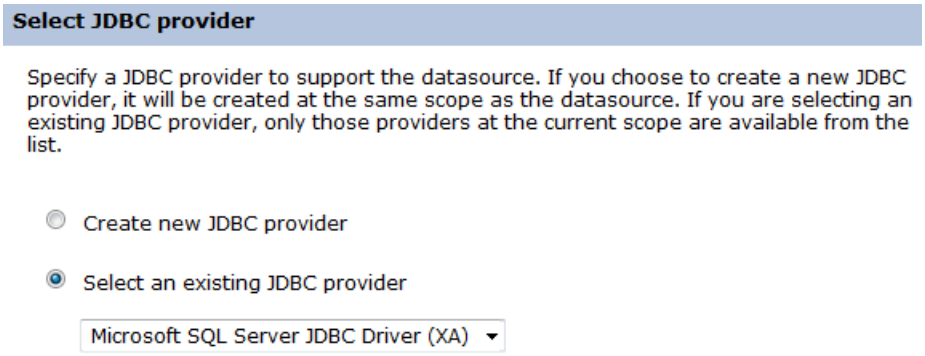
Click New to create a new data source > enter basic data source information

Example:

Data source name (This name is used for administrative purposes): JDBC4 SQLServer DataSource 4 SupplierDB
JNDI name (JNDI name that will be used to access the data source): jdbc/suppweb



Click **Next** > Select JDBC provider

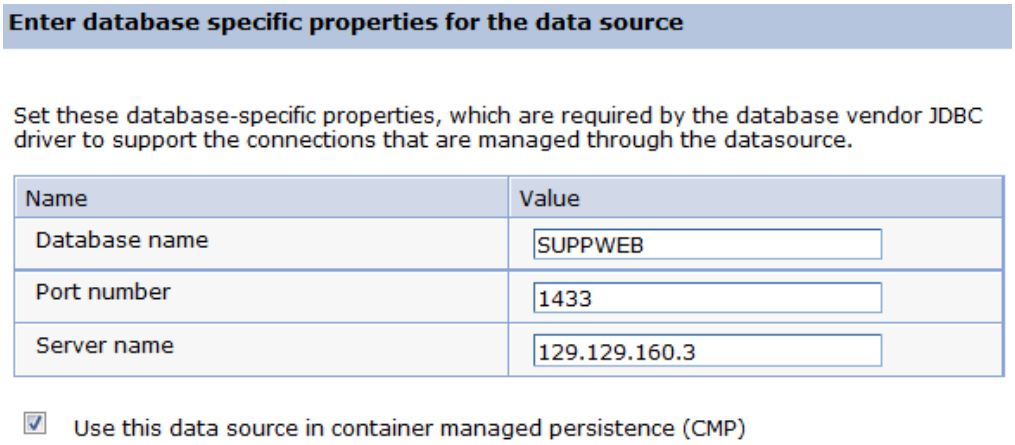


Click **Next** > enter database specific properties for the data source

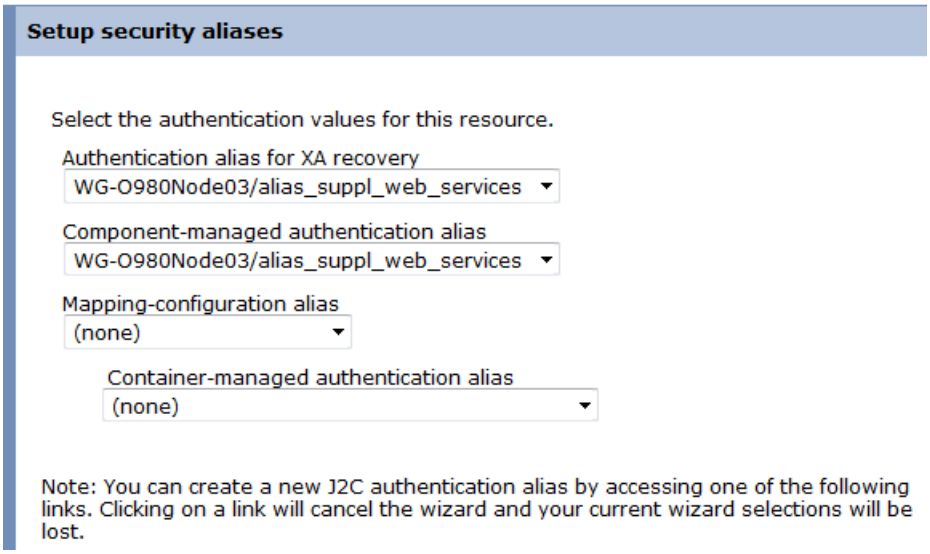
Database name:
Port number (the database server listens on):
Server Name:

Select **Use this data source in container managed persistence (CMP)**

Click **Next**.



Setup security aliases using the drop-down options for **Authentication alias for XA recovery** and **Component-managed authentication alias**.



Click **Next** > review the summary of the settings > click **Finish**.

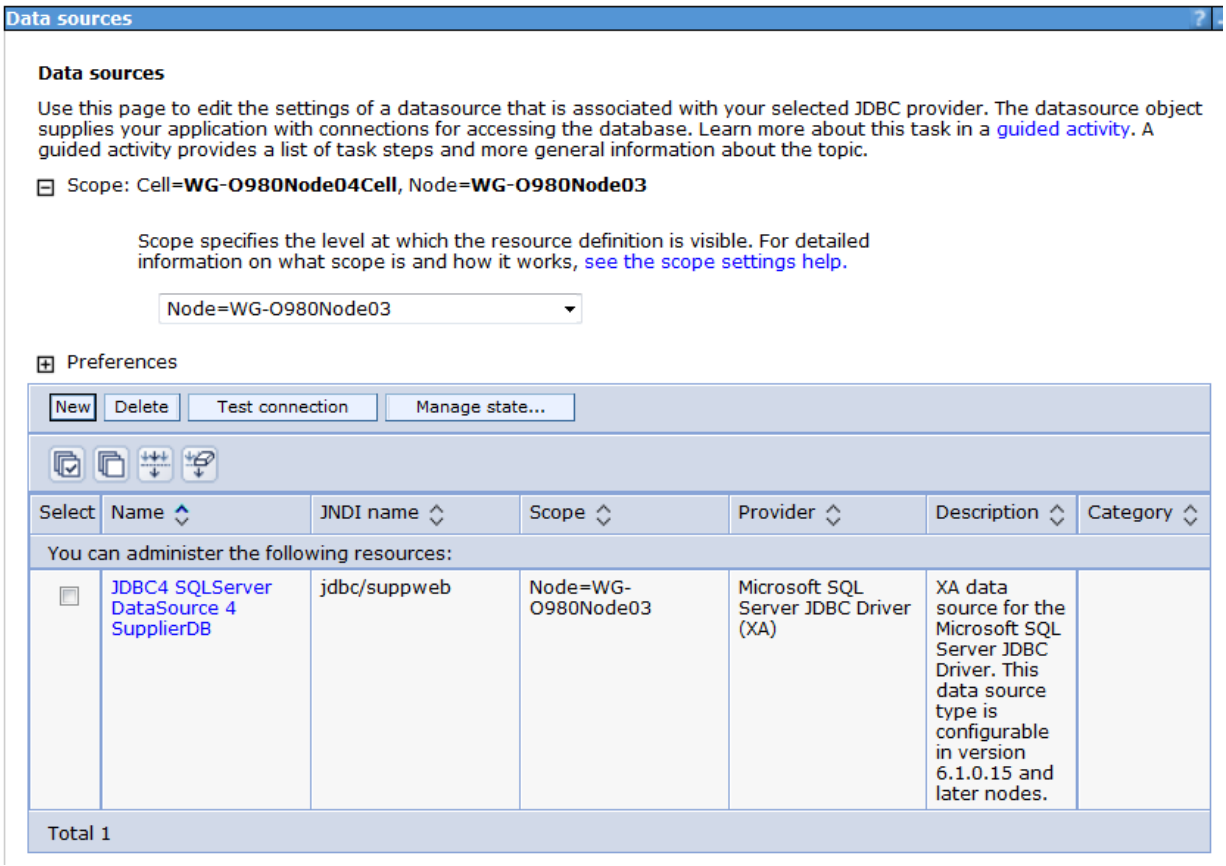
Summary

Summary of actions:

Options	Values
Scope	cells:WG-O980Node04Cell:nodes:WG-O980Node03
Data source name	JDBC4 SQLServer DataSource 4 SupplierDB
JNDI name	jdbc/suppweb
Select an existing JDBC provider	Microsoft SQL Server JDBC Driver (XA)
Implementation class name	com.microsoft.sqlserver.jdbc.SQLServerXADataSource
Database name	SUPPWEB
Port number	1433
Server name	129.129.160.3
Use this data source in container managed persistence (CMP)	true
Authentication alias for XA recovery	WG-O980Node03/alias_suppl_web_services
Component-managed authentication alias	WG-O980Node03/alias_suppl_web_services
Mapping-configuration alias	(none)
Container-managed authentication alias	(none)

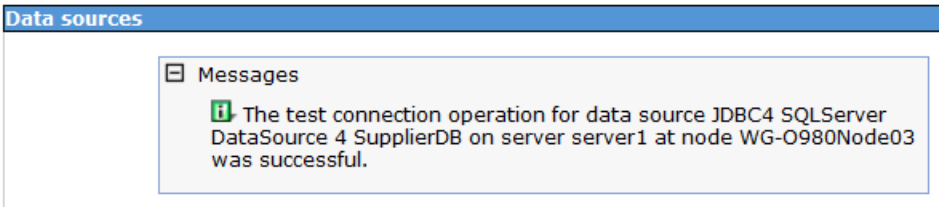
Click **Save directly to the master configuration**.

Example of result:



Test the new connection by selecting the new data source and clicking **Test connection**.

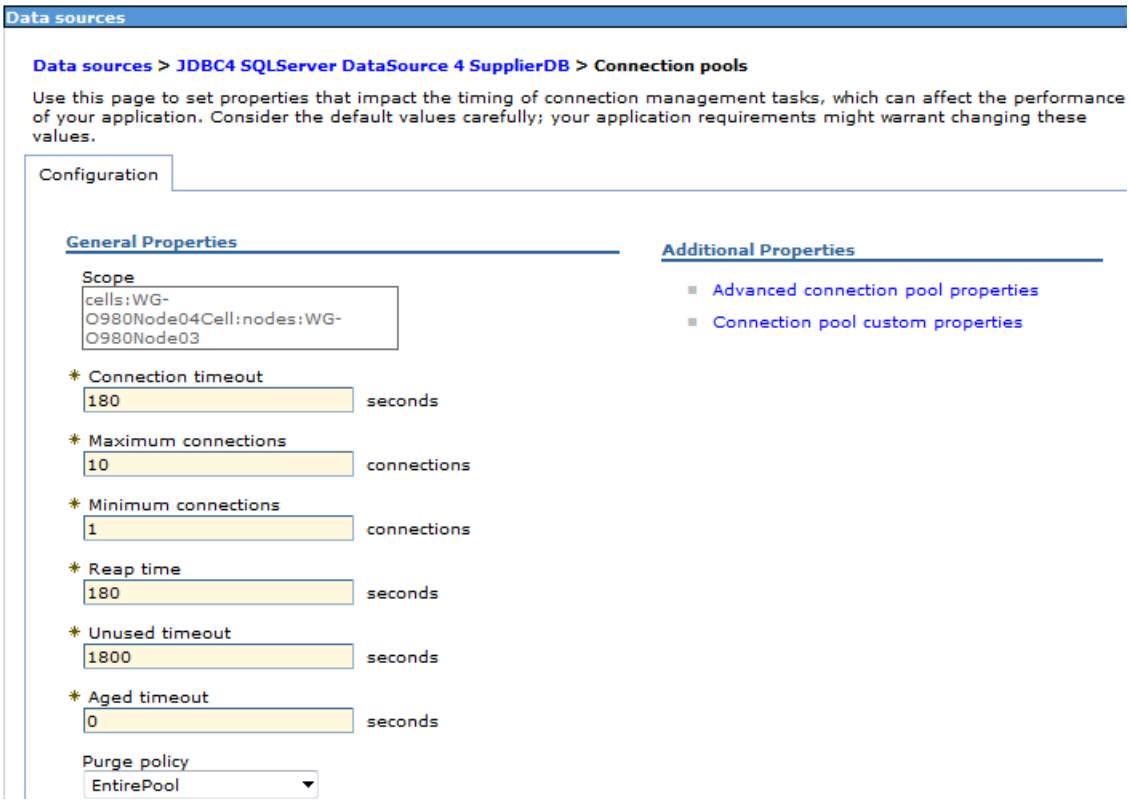
A successful connection will output this message:



Configuring Connection Pooling Properties

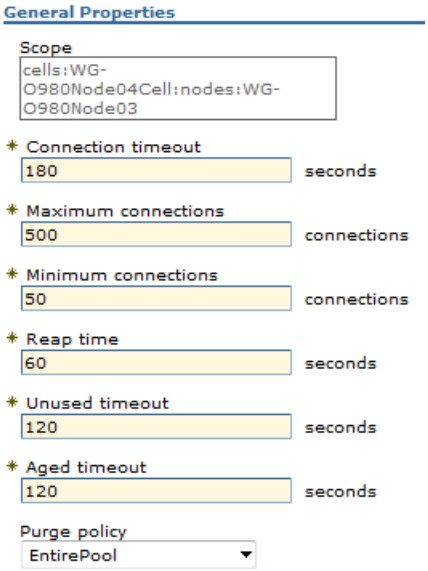
In the administrative console > expand **Resources** > **JDBC** > **Data sources** > select the data source name

Select **Connection pool properties** in the **Additional Properties** section



Specify the following information:

Connection Timeout:	180	seconds
Max Connections:	500	connections
Min Connections:	50	connections
Reap Time:	60	seconds
Unused Timeout:	120	seconds
Aged Timeout:	120	seconds
Purge Policy:	EntirePool	

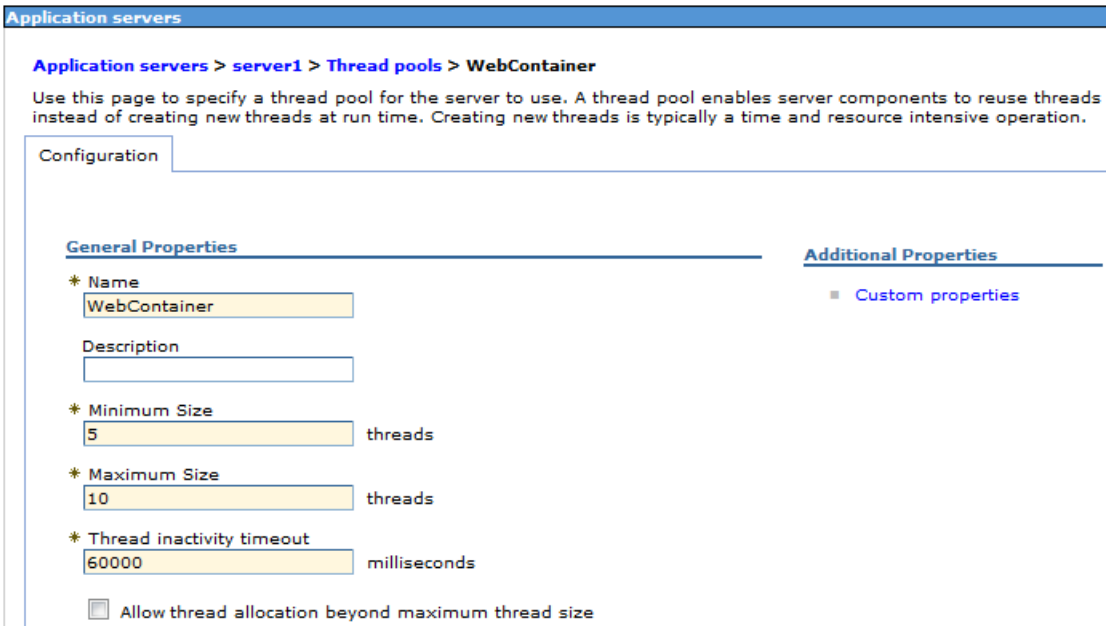


Click on **OK** > **Save directly to the master configuration**.

Web Container Thread Connection Pool

In the administrative console > expand **Servers** > **Server Types** > click on **WebSphere application servers** > click on the server name > Under **Additional Properties** click **Thread pools** > click on the **WebContainer** thread pool

This screen is from the localhost:



Determining Web Container Thread Pool Values

Minimum Connection Pool Size

The default value of the minimum connection pool size is 5 .This value is appropriate to most configurations.

Maximum Connection Pool Size

When determining the maximum size of the database connection pool, consider the following issues:

The total number of connections that the WebSphere Commerce cluster can open to the database should not overwhelm your database.

In order to prevent deadlocks, there should be connections available for all the threads that might require one. It is not only the web container that uses database connections. The following equation can help you determine the maximum number of database connections you should allow:

DataSource Connection Pool Size >=

(# Of WebContainer Threads)
+ (# Of WC Scheduler Threads)
+ 1 (for WC Key Manager)
+ 1 (for WC Auditing)
+ (# of Parallel and Serial MQ listener threads)
+ (# of non-WebContainer Threads used by Custom Code)

In order to satisfy the rule that all the threads have connections available, you might need to either increase the number of database connections or reduce the number of WebContainer and other threads.

Recommended starting values for the WebContainer and database connection pool sizes

The following table lists recommended starting values for configuring the WebContainer and database connection pool sizes. The optimal configuration in your system might be different. Finding the best configuration for your environment can only be done by completing a performance tuning exercise.

	Minimum	Maximum
WebContainer	25	25
Database Pool	0	55

The values were determined following these considerations:

- The WebContainer minimum and maximum sizes are configured to be the same to avoid the overhead of creating and destroying threads.
- A value of 25 for the WebContainer is usually enough to allow high throughput and concurrency without overloading the server.
- The database pool is configured to ensure there will be enough connections available for all the WebContainer threads.
- The minimum value of the database pool is set to 0 to prevent firewall related problems and avoiding maintaining unused connections.

Thread inactivity timeout

Specifies the number of milliseconds of inactivity that should elapse before a thread is reclaimed. A value of 0 indicates not to wait and a negative value (less than 0) means to wait forever.

Example:

Minimum Size:	10 threads
Maximum Size:	1201 threads (2 x Connection-pools + 1)
Thread inactivity timeout:	300 milliseconds (number of milliseconds of inactivity that should elapse before a thread is reclaimed)

Uncheck **Allow thread allocation beyond maximum thread size**

Click on **OK** after settings the values > **Save directly to the master configuration** > restart this instance of the server.

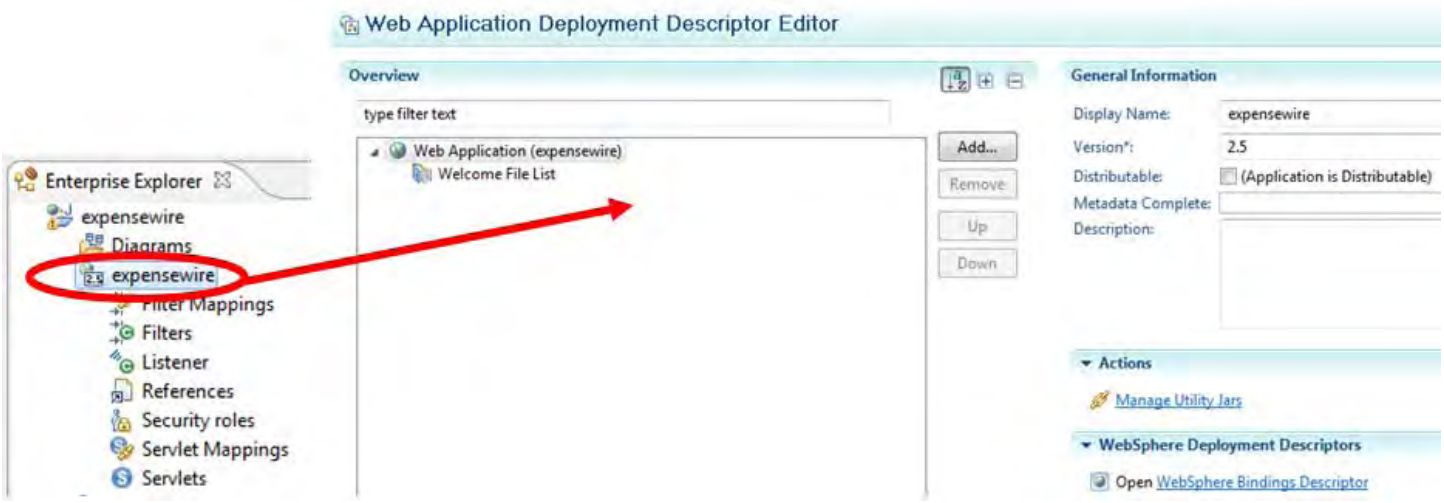
Using the Data Source in Java Programs

These examples were created using IBM Rational Application Developer for WebSphere Software version: 8.0.4.1.

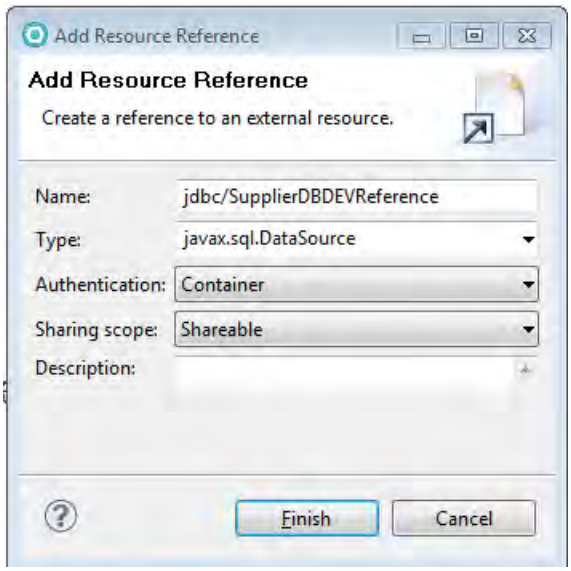
Data Source in a POJO (Plain Old Java Object) using the Deployment Descriptor

Defining a Resource Reference and WebSphere Bindings in RAD

Change to the **Web perspective** > right-click on the deployment descriptor > **Open with Web Application Deployment Descriptor Editor** > this opens the web.xml file



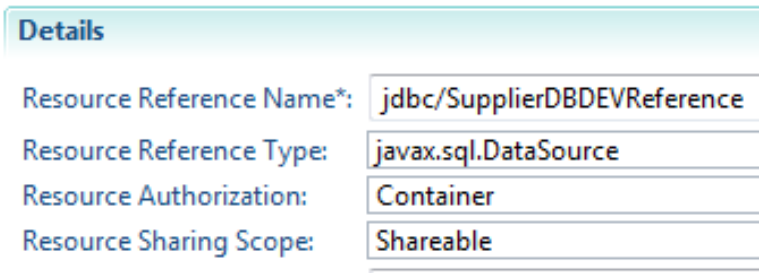
Right-click on **Web Application** (<name-of-web-application>) > **Add** > select **Resource Reference** > enter the following details:



Name (resource reference name to be used in applications): jdbc/SupplierDBDEVReference
Type: javax.sql.DataSource
Authentication: Container
Sharing scope: Shareable

Click **Finish**.

Example of result:



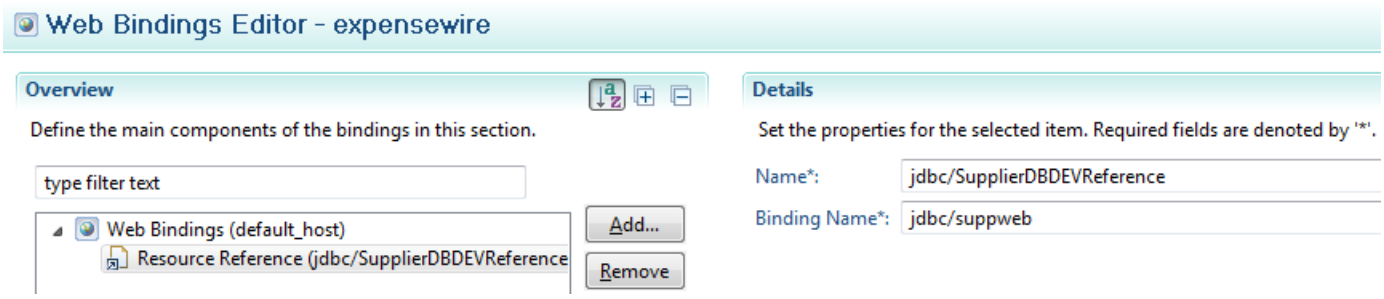
web.xml source:

```
<display-name>expensewire</display-name>
...
<resource-ref>
<res-ref-name>jdbc/SupplierDBDEVReference</res-ref-name>
<res-type>javax.sql.DataSource</res-type>
<res-auth>Container</res-auth>
<res-sharing-scope>Shareable</res-sharing-scope>
</resource-ref>
```

Click on **Web Application** (<name –of-web-application>) > **WebSphere Deployment Descriptors** > click on **WebSphere Binding Descriptor** > click on **Web Bindings** > **Add** > select **Resource Reference** > **OK** > enter the following details:

Name (resource reference name to be used in applications): jdbc/SupplierDBDEVReference
Binding Name (JNDI name field in WebSphere server): jdbc/suppweb

Example of result:



ibm-web-bnd.xml source:

```
<resource-ref name="jdbc/SupplierDBDEVReference" binding-name="jdbc/suppweb" />
```

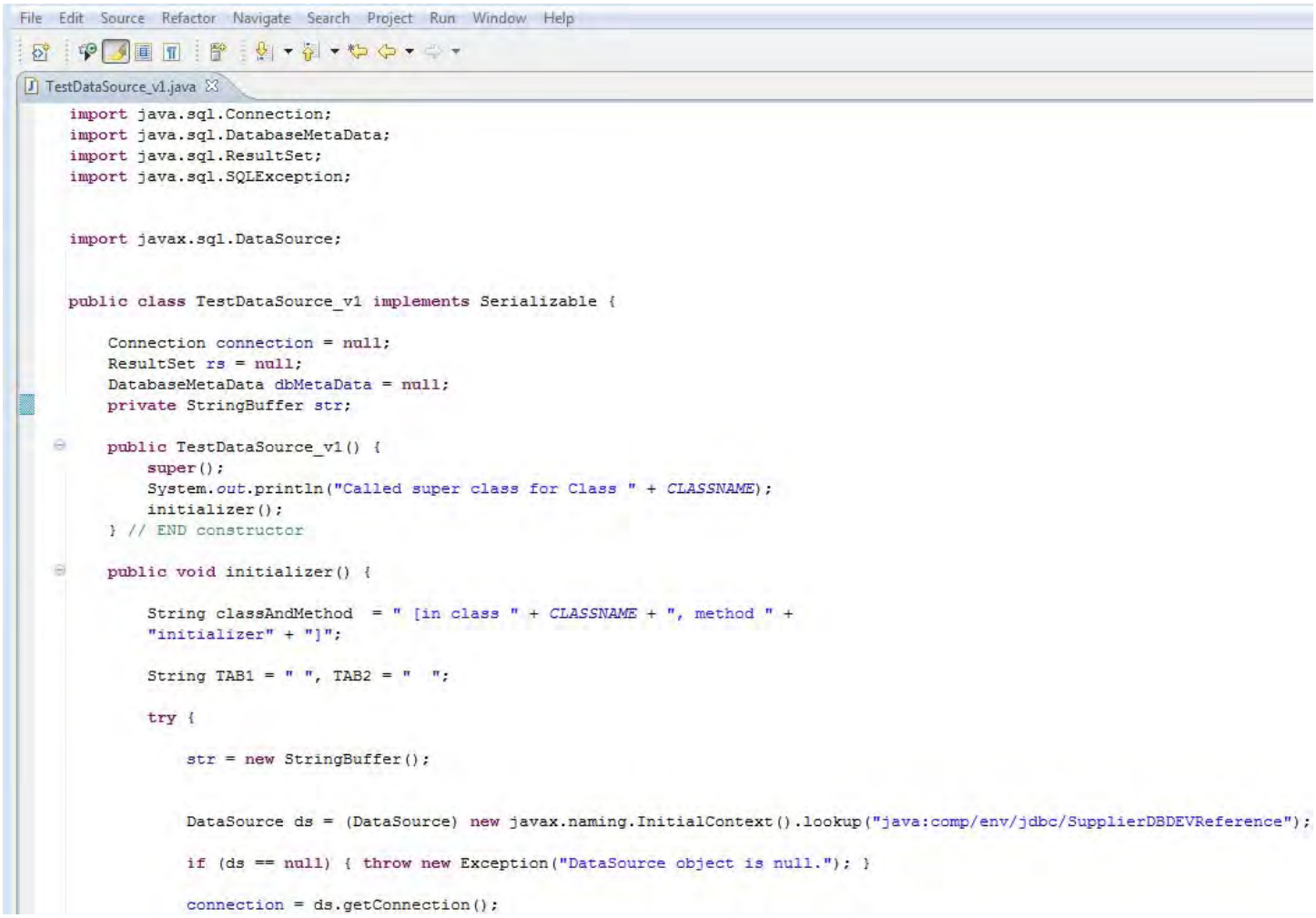
Select **File** > **Save All**.

Using the Data Source in a POJO

A Java bean Class `TestDataSource_v1`:

```
DataSource ds =
       (DataSource) new javax.naming.InitialContext().lookup("java:comp/env/jdbc/SupplierDBDEVReference");
connection = ds.getConnection();
System.out.println("Connect to " + connection.getCatalog() + " a success!" + CLASSNAME);
```

Screen-shot from the workspace in Rational Application Developer for WebSphere version 8



This class is called from a JSP page:

```
<jsp:useBean
id="tsds"
class="com.company.project.test.TestDataSource_v1"
scope="page"
type="com.company.project.test.TestDataSource_v1"/>
```

References

IBM Redbooks: WebSphere Application Server V7 Administration and Configuration Guide - Chapter 9. Accessing databases from WebSphere

http://www.redbooks.ibm.com/abstracts/sg247615.html

IBM InfoCenter: WebSphere Application Server considerations

http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/index.jsp?topic=%2Fcom.ibm.commerce.admin.doc%2Fconcepts%2Fcpmwas.htm

Configuring the WebContainer and database connection pool sizes for a WebSphere Commerce server

http://www-304.ibm.com/support/docview.wss?uid=swg21358336

IBM Redbooks: Experience Java EE! Using Rational Application Developer V7.5

http://www.redbooks.ibm.com/redpieces/pdfs/sg247827.pdf

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