



IBM Software Group

WebSphere DataPower Appliances SQL/ ODBC Use Cases Presentation – Part 2

Moses Allotey-pappoe, Carol Miller, Dominic Micale, Andrew Simmering, Alfred Williamson & Paul Megani
IBM® WebSphere DataPower appliance L2 Support Engineers
26 October 2010



WebSphere® Support Technical Exchange



Agenda

- Introduction
- Summary of Part 1 of the 3 Part Series Presentation
- Evolution of the SQL Data Source Object
- The SQL Data Source Object
 - ▶ Overview
 - ▶ Configuration
 - ▶ Usage
 - ▶ Limitations
- 5 Use Cases
- Summary
- Additional WebSphere Product Resources
- Questions and Answers

Introduction

- Part 2 of 3 part series on the DataPower SQL/ODBC Component.
- Part 1 can be found at the following url:
<http://www-01.ibm.com/support/docview.wss?uid=swg27019748>
- Part 2 shall focus on the DataPower SQL extension function and element, and focus on SQL/ODBC configuration and some use cases.

Summary of Part 1 – SQL Data Source

- Licensed feature
 - ▶ Requires the SQL-ODBC license
- Not available on all appliances.
 - ▶ Available on the XI50, XB60 (included by default), and XM70
- Provides the configuration to establish a direct connection to a database instance on a remote data server.
- Allows for optional valid ODBC configuration parameters to be defined.

Summary of Part 1: Supported Databases

- Connect to a remote database server.
- Supported database servers as of the 3.8.1 firmware
 - ▶ DB2: all supported versions up to 9.5
 - ▶ Microsoft® SQL Server: all supported versions up to 2008
 - ▶ Oracle: all supported versions up to 11g
 - ▶ Sybase: all supported versions up to 15

Summary of Part 1: SQL/ODBC Usage

- Dynamically perform database operations such as
 - ▶ SQL statements (SELECT, INSERT, UPDATE, DELETE, XQueries)
 - ▶ Stored Procedures
- Used by:
 - ▶ SQL action in a processing policy
 - ▶ Custom stylesheet
 - `dp:sql-execute()` extension function
 - `<dp:sql-execute>` extension element



Evolution of the SQL/Data Source

- 3.3.3 (out of support):
 - ▶ SQL added
 - ▶ Initially only supporting Oracle
 - ▶ Available via extension function and SQL action.
 - ▶ Initially licensable on XS and XI.
- 3.5.0:
 - ▶ Added support for DB2



Evolution of the SQL/ODBC Feature – Cont'd

- 3.6.0:
 - ▶ Added support for Sybase.
 - ▶ Removed XS support.
- 3.6.1:
 - ▶ Added support for SQL Server
 - ▶ DB2v9 (using IBM's driver).
 - ▶ Added status provider.

Evolution of the SQL/ODBC Feature – Cont'd

- 3.7.1:
 - ▶ Added connection pooling for DB2v9
 - ▶ Added extension element.
- 3.7.2:
 - ▶ Added connection pooling for non-DB2 drivers.
- 3.7.3:
 - ▶ Removed legacy DB2 driver,
 - ▶ renamed DB2v9 -> DB2.
- 3.8.0:
 - ▶ Added support for Oracle RAC and connectivity via ServiceName.



The SQL Data Source Object: Overview

- Connect to a remote database server.
- Can be used by the following services:
 - ▶ Web Application Firewall
 - ▶ XML Firewall
 - ▶ Multi-Protocol Gateway
 - ▶ Web Service Proxy
- Cannot be used in the front-end or backend of a service.
- Can be used in the Processing Rules:
 - ▶ request, response, and error rule.
- Location of the SQL Data Source object
 - ▶ WebGUI – Network -> SQL Data Source



The SQL Data Source Object: Configuration

DataPower XI50 | Configure: SQL Data Source - Mozilla Firefox

File Edit View History Bookmarks Tools Help

9.70.152.15 https://9.70.152.15:9090/configure/SQLDataSource/hcsprod-hinprod-accountInfo

Most Visited Getting Started IBM

WEB SEARCH

DataPower XI50 | Configure: SQL Da...

WebSphere. DataPower XI50 admin @ L2xi41 Domain: meganiVodafoneDavidC Save Config Logout

Control Panel

Debug-Level Logging is enabled, which impacts performance. [Manage debug settings.](#)

Configure SQL Data Source

main Data_Source_Configuration_Parameters

SQL Data Source: hcsprod-hinprod-accountInfo [up]

Apply Cancel Delete Undo

Export | [View Log](#) | [View Status](#) | [Help](#)

Admin State enabled disabled

Comments

Database Type *

Connection User Name *

Connection Password *

Data Source ID *

Data Source Host *

Data Source Port *

Limit Returned Data on off

Maximum Connections *

Allow Read-Only Access on off

Network Settings

- FTP Quoted Commands
- IMS Connect
- iSCSI CHAP
- iSCSI Target
- iSCSI Volume
- Load Balancer Group
- MQ Queue Manager
- MQ Queue Manager Group
- NFS Dynamic Mounts
- NFS Static Mounts
- Peer Group
- SQL Data Source
- TIBCO EMS
- User Agent
- WebSphere JMS

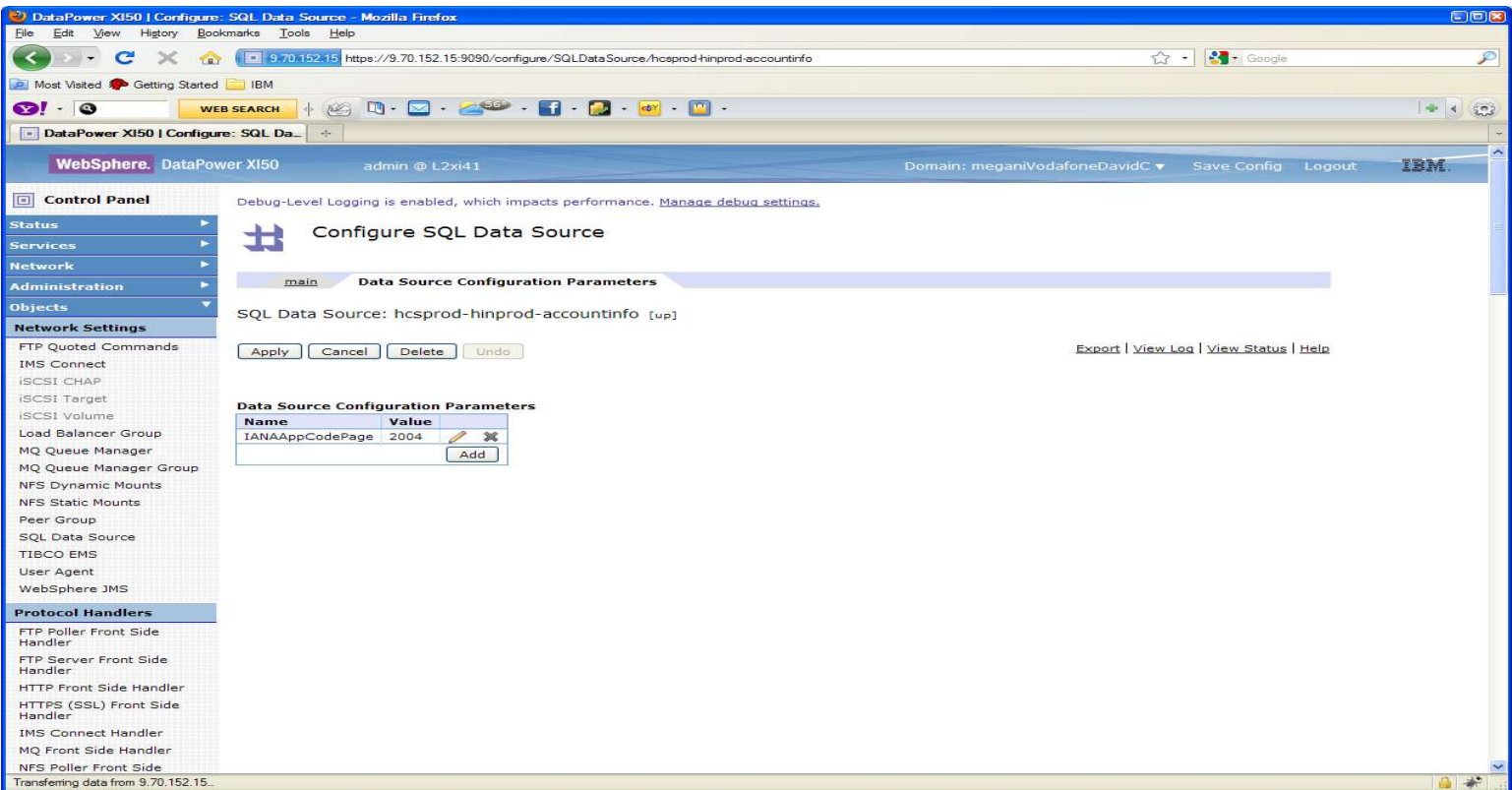
Protocol Handlers

- FTP Poller Front Side Handler
- FTP Server Front Side Handler
- HTTP Front Side Handler
- HTTPS (SSL) Front Side Handler
- IMS Connect Handler
- MQ Front Side Handler
- NFS Poller Front Side

Done

The SQL Data Source Object: Configuration Cont'd

- The following shows use of the Configuration Parameter tab. In this case we're setting a parameter to allow for certain Spanish characters.



The screenshot shows the WebSphere Administration Console interface for configuring an SQL Data Source. The browser window title is "DataPower XI50 | Configure: SQL Data Source - Mozilla Firefox". The URL is "https://9.70.152.15:9090/configure/SQLDataSource/hcsprod-hinprod-accountinfo". The page title is "Configure SQL Data Source". The "Data Source Configuration Parameters" tab is selected, showing the configuration for the "SQL Data Source: hcsprod-hinprod-accountinfo [UP]". The "Data Source Configuration Parameters" table is displayed with the following data:

Name	Value
IANAAppCodePage	2004

The interface includes a "Control Panel" on the left with various settings categories like Status, Services, Network, Administration, Objects, Network Settings, and Protocol Handlers. The main area contains buttons for "Apply", "Cancel", "Delete", and "Undo", along with "Export", "View Log", "View Status", and "Help" links.

SQL/ODBC Data Source: Usage

- The SQL Action
- The dp:sql-execute Extension Function
- The dp:sql-execute Extension Element

SQL/ODBC Data Source: Limitations

- Lack of strong security (SSL)
 - ▶ However with that being said you can employ the sql-injection-filter or encrypt the data with the encrypt action on a processing rule.
 - ▶ You can wrap the database connection in an SSL proxy profile to achieve an encrypted database connection.
- Limited database vendor support.



SQL/ODBC Data Source Usage Detail

- The SQL Action
 - ▶ Can employ the following types of methods for communicating to the RDBMS:
 - ▶ Static
 - ▶ Stylesheet
 - ▶ Variable



SQL/ODBC Data Source Usage Detail

The screenshot displays the 'Configure SQL Action' web interface in a Mozilla Firefox browser window. The browser title is 'L2a41 - Configure SQL Action - Mozilla Firefox' and the address bar shows 'https://9.70.152.15/service/ProcessingStepAction?popup=true'. The page header includes 'WebSphere. DataPower XI50' and the IBM logo. The main title is 'Configure SQL Action' with a 'Help' link. The interface is divided into sections: 'Basic' (selected) and 'Advanced'. The 'Input' section has an 'Input' field with '(auto)' and a dropdown menu with '(auto) *'. The 'Options' section is titled 'SQL' and includes: 'SQL Data Source' with a dropdown menu showing '(none)' and a '+ ...' button; 'SQL Input Method' with a dropdown menu showing 'Static'; 'SQL Text' with a text input field containing 'select * from orders'; and 'Asynchronous' with radio buttons for 'on' (selected) and 'off'. The 'Output' section has an 'Output' field and a dropdown menu showing 'OUTPUT'. At the bottom of the form are 'Delete', 'Done', and 'Cancel' buttons. The status bar at the bottom left shows 'Done'.

SQL/ODBC Data Source Usage Detail

L2x41 - Configure SQL Action - Mozilla Firefox
https://9.70.152.15:9090/service/ProcessingStepAction?popup=true

WebSphere. DataPower XI50

Configure SQL Action

Help

Basic Advanced

Input

Input (auto) (auto) *

Options

SQL

SQL Data Source (none) + ...

SQL Input Method Stylesheet

Processing Control File local:///myStylesheet.xml Upload... Fetch... Edit... View... Var Builder

Asynchronous on off

Output

Output OUTPUT

Delete Done Cancel

Done

SQL/ODBC Data Source Usage Detail

The screenshot displays the 'Configure SQL Action' web interface in Mozilla Firefox. The browser title is 'L2a41 - Configure SQL Action - Mozilla Firefox' and the address bar shows 'https://9.70.152.15/service/ProcessingStepAction?popup=true'. The page header includes 'WebSphere. DataPower XI50' and the IBM logo. The main title is 'Configure SQL Action' with a 'Help' link.

The interface is divided into several sections:

- Basic** (selected) and **Advanced** tabs.
- Input** section: 'Input' field with '(auto)' and a dropdown menu set to '(auto) *'.
- Options** section: 'SQL' icon, 'SQL Data Source' dropdown set to '(none)', 'SQL Input Method' dropdown set to 'Variable', 'Variable Name' field with 'var://' and 'context/select/orders', and 'Asynchronous' radio buttons set to 'off'.
- Output** section: 'Output' field with 'OUTPUT' dropdown.

Buttons at the bottom include 'Delete', 'Done', and 'Cancel'. The status bar at the bottom indicates 'Transferring data from 9.70.152.15...'.

SQL/ODBC Data Source Usage Detail

DataPower X50 | Processing Policy: - Mozilla Firefox
 https://9.70.152.15:9090/configure/StylePolicyEditor/ss+xml-fw?skipNav=true&policyNameSelect=ss+xml-fw&service=XMLFirewallService

Configure XML Firewall Style Policy

Policy:
 Policy Name: *
 [Export](#) | [View Log](#) | [View Status](#) | [Close Window](#)

Rule:
 Rule Name: Rule Direction:

Create rule: Click New, drag action icons onto line. Edit rule: Click on rule, double-click on action

CLIENT → [Filter] → [Sign] → [Verify] → [Validate] → [Encrypt] → [Decrypt] → [Transform] → [Route] → [AAA] → [Results] → [Advanced] → ORIGIN SERVER

Order	Rule Name	Direction	Actions
↑ ↓	ss+xml-fw_request	Client to Server	[Filter] [Sign] [Verify] [Validate] [Encrypt] [Decrypt] [Transform] [Route] [AAA] [Results] [Advanced] delete rule

[Scroll to top](#)

Done



SQL/ODBC Data Source Usage Detail - dp:sql-execute Extension function

- Executes an SQL statement against a DB2, Oracle, or Sybase database
- **Syntax**
 - dp:sql-execute(*object*, *statement*)**
- The timeout value for the **dp:sql-execute extension function is the timeout value of the HTTP user agent for the appropriate XML manager.**
- All arguments are passed as XPath expressions

SQL/ODBC Data Source Usage Detail - dp:sql-execute Extension function

- Example of using the dp:sql-execute extension function:

...

```
<xsl:variable name="where-clause" select="..."/>
```

<!--specify location of WHERE clause, for example -->

```
<xsl:variable name="sqlString" select="SELECT ID, COUNT(1) FROM tTable  
  <xsl:value-of select="$where-clause"/>GROUP BY ID"/>
```

```
<xsl:variable name="sqlNodeSet">
```

```
  <xsl:copy-of select="dp:sql-execute('data-source-name', $sqlString)/>  
</xsl:variable>
```

...

SQL/ODBC Data Source Usage Detail - dp:sql-execute Extension Element

- Executes a query statement against a database using parameter markers.
- The syntax is as follows:

```
<dp:sql-execute source="datasource" statement="statement">
  <arguments>
    <argument type="sqlType" mode="mode" isNull="{true|false}"
              precision="precision" scale="scale" nullable="{true|false}">
      value
    </argument>
    ...
  </arguments>
</dp:sql-execute>
```

SQL/ODBC Data Source Usage Detail - dp:sql-execute Extension Element

- The dp:sql-execute extension element is different from the **dp:sql-execute() extension function**.
- The dp:sql-execute element provides a superset of the capabilities that are provided by the **dp:sql-execute() function**.
- **While both execute** SQL statements without parameter markers, the dp:sql-execute element provides support for parameter markers in SQL statements.

SQL/ODBC Data Source Usage Detail - dp:sql-execute Extension Element

- The dp:sql-execute element executes SQL statements against data stores using parameter markers.
- Parameter markers are represented by the question mark (?) character.
- A parameter marker acts as a temporary placeholder
- All arguments are passed as XPath expressions

SQL/ODBC Data Source Usage Detail - dp:sql-execute Extension Element

- Performs a simple **SELECT** operation. This call is equivalent to using the

dp:sql-execute() extension function within the select attribute of an `<xsl:copy-of>` element.

...

```
<xsl:output indent="yes" encoding="UTF-8" version="1.0" method="xml"/>
```

```
<xsl:template match="/">
```

```
  <dp:sql-execute source="DB2LUW95" statement="SELECT * FROM  
  TBIRSMM"/>
```

```
</xsl:template>
```

...

SQL/ODBC Data Source Usage Detail - dp:sql-execute Extension Element

- Performs an **INSERT operation**. Uses an `<xsl:for-each>` element to insert multiple rows.

...

```

<xsl:output indent="yes" encoding="UTF-8" version="1.0" method="xml"/>
<xsl:template match="/*[local-name()='Return']">
  <dp:sql-execute source="DB2LUW95" statement="INSERT INTO TBIRSMFM VALUES(?,?,?,?)">
    <xsl:for-each select="*[local-name()='ReturnData']/*">
      <arguments>
        <argument>
          <xsl:value-of select="../*[local-name()='ReturnId']/text()"/>
        </argument>
        <argument>
          <xsl:value-of select="./@documentId"/>
        </argument>
        <argument>
          <xsl:value-of select="./@documentName"/>
        </argument>
        <argument>
          <xsl:copy-of select="."/>
        </argument>
      </arguments>
    </xsl:for-each>
  </dp:sql-execute>
</xsl:template>
...

```

SQL/ODBC Data Source Usage Detail - dp:sql-execute Extension Element

- Uses parameter markers to call a stored procedure. This procedure has input, input-output, and output parameters.

...

```
<xsl:output indent="yes" encoding="UTF-8" version="1.0" method="xml"/>
```

```
<xsl:template match="/">
```

```
  <dp:sql-execute source="DB2LUW95" statement="CALL MY_PROC(?,?,?)">
```

```
    <arguments>
```

```
      <argument type="SQL_CHAR" mode="INPUT">
```

```
        <xsl:value-of select="//@title"/>
```

```
      </argument>
```

```
      <argument type="SQL_VARCHAR" mode="INPUT_OUTPUT">
```

```
        <xsl:value-of select="//@isbn"/>
```

```
      </argument>
```

```
      <argument type="SQL_XML" mode="OUTPUT"/>
```

```
    </arguments>
```

```
  </dp:sql-execute>
```

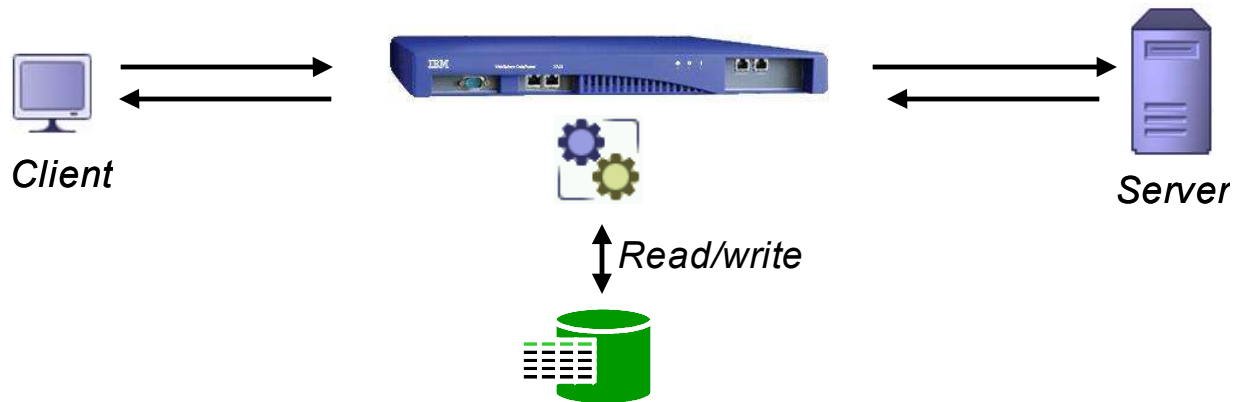
```
</xsl:template>
```

...

■ Use Cases

- ▶ # 1 - Transaction data storage/retrieval
- ▶ # 2 - Authentication/authorization
- ▶ # 3 - Logging/auditing
- ▶ # 4 - Batch processing
- ▶ # 5 - Binary Processing

Use Case 1: Transaction data storage/retrieval



Use Case 1: Transaction data storage/retrieval

- Configuration details:
 - ▶ Any DataPower service can be used
 - Service choice will certainly depend on requirements.
 - ▶ XML Firewall service for simple configuration
 - Loopback



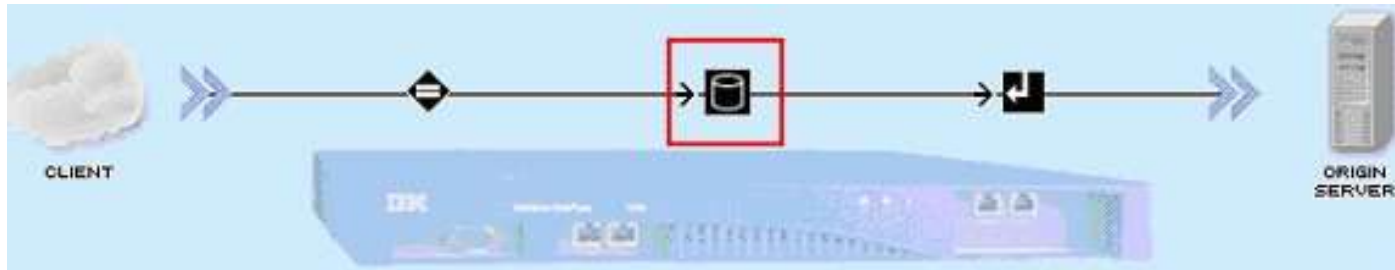
Use Case 1: Transaction data storage/retrieval

- Configuration details continued:
 - ▶ SQL Action
 - Static SQL Input Method
 - Simple select statement

The screenshot shows the 'Configure SQL Action' dialog box. The 'Advanced' tab is active. The 'Input' section has a text field containing 'INPUT' and a dropdown menu also set to 'INPUT'. The 'Options' section includes an 'SQL' icon, a 'SQL Data Source' dropdown set to 'db2datasource', a 'SQL Input Method' dropdown set to 'Static', and a 'SQL Text' field containing 'SELECT * FROM ORDERS'. The 'Asynchronous' section has radio buttons for 'on' and 'off', with 'off' selected. The 'Output' section has a text field containing 'OUTPUT' and a dropdown menu also set to 'OUTPUT'. At the bottom are 'Delete', 'Done', and 'Cancel' buttons.

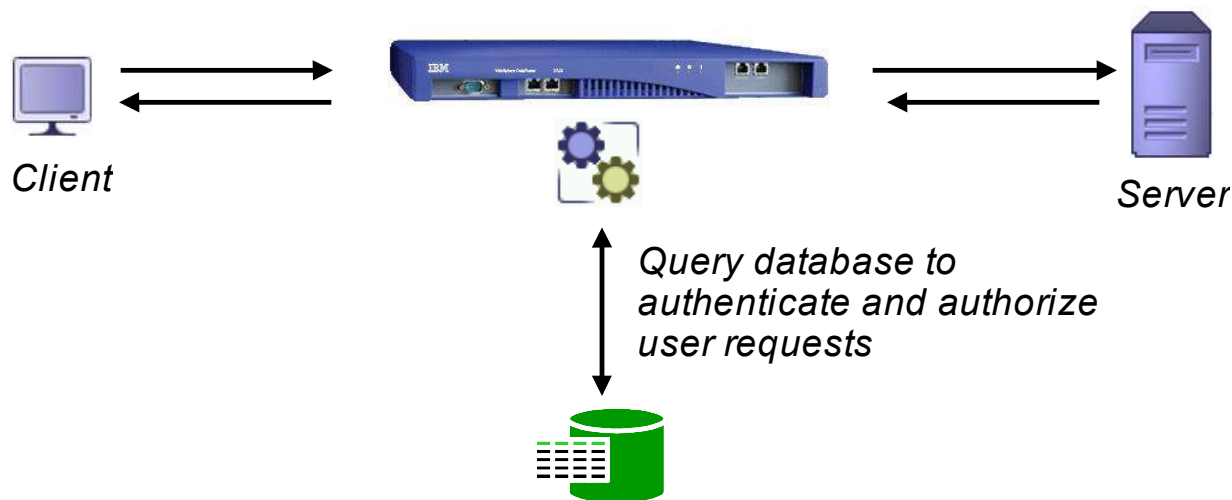
Use Case 1: Transaction data storage/retrieval

- Configuration details continued:
 - ▶ Processing policy
 - SQL action



Use Case 2: Authentication/authorization

- Separate from AAA
- Authenticate users
- Authorize user request(s)

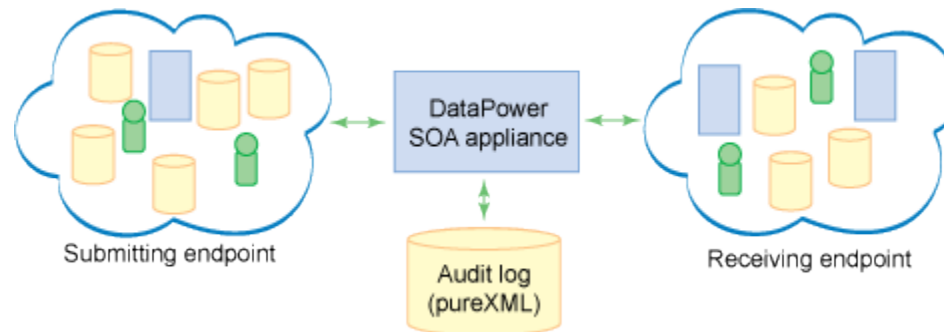


Use Case 2: Authentication/authorization

- Configuration details:
 - ▶ Setup can be very similar to 'Use Case 1'
 - ▶ Most likely want to use custom stylesheet (XSL) instead of the SQL action
 - Apply business logic when authenticating or authorizing

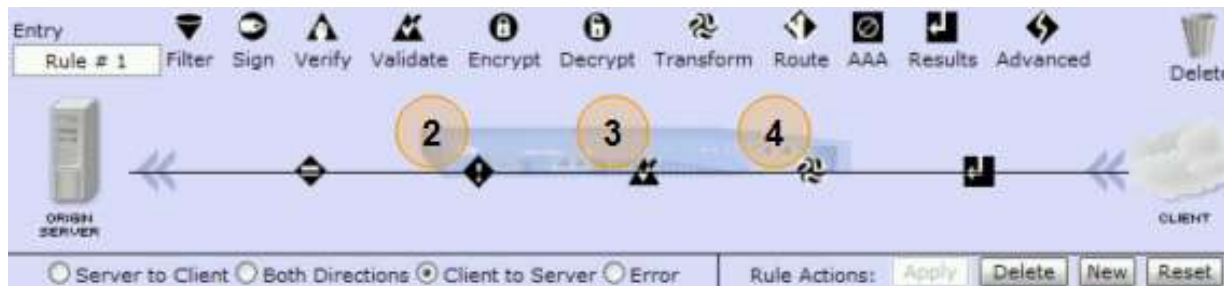
```
<xsl:template match="/">
  <xsl:variable name="query">
    SELECT * FROM Customer WHERE name =
      <xsl:value-of select="$customer_name"/>
    AND password > <xsl:value-of select="$password"/>
  </xsl:variable>
  <xsl:variable name="result" select="dp:sql-execute('db2datasource',$query)" />
  <xsl:copy-of select="$result" />
</xsl:template>
```

Use Case 3: Logging/auditing



Use Case 3: Logging/auditing

- Configuration details (Log schema validation failures)
 - ▶ Request rule
 - 2 – On-Error Action
 - 3 – Validate Action
 - 4 – Transform Action



Use Case 3: Logging/auditing

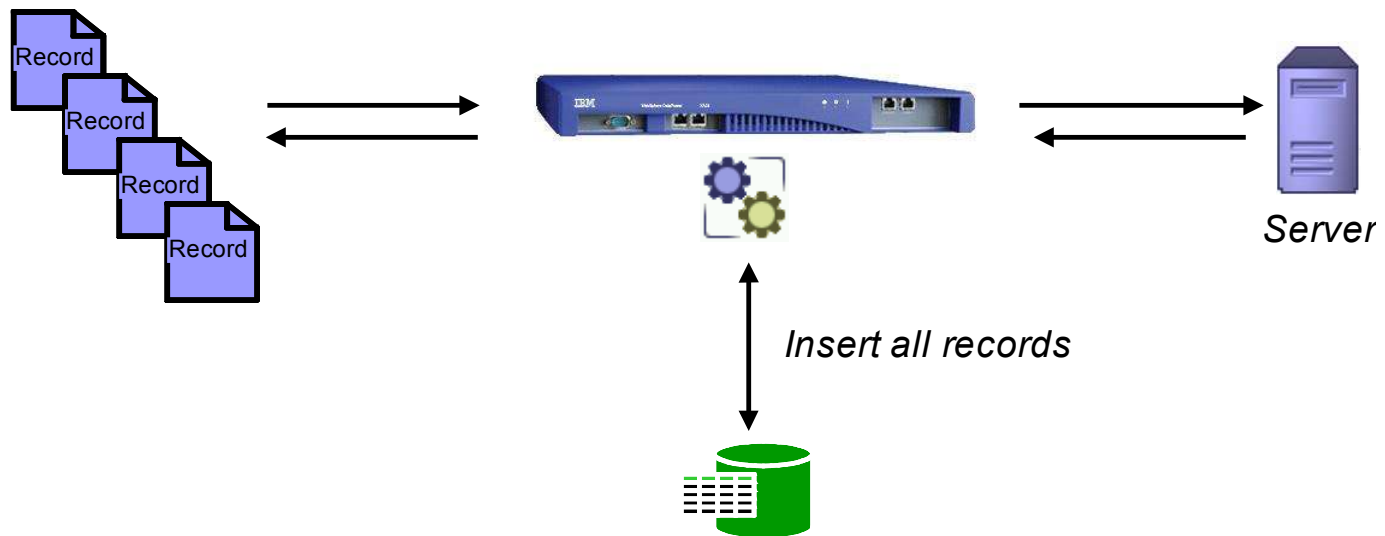
- Configuration details continued:
 - ▶ Error rule
 - Catch and process any processing failures
 - Use the Transform action (1) along with a custom stylesheet that will insert the error message into the database



Use Case 3: Logging/auditing

- Resource (DeveloperWorks article):
 - ▶ WebSphere DataPower and DB2 pureXML, Part 2: DB2 pureXML as an audit log for WebSphere DataPower
 - <http://www.ibm.com/developerworks/data/library/techarticle/dm-0806malaika/>

Use Case 4: Batch Processing



Use Case 4: Batch Processing

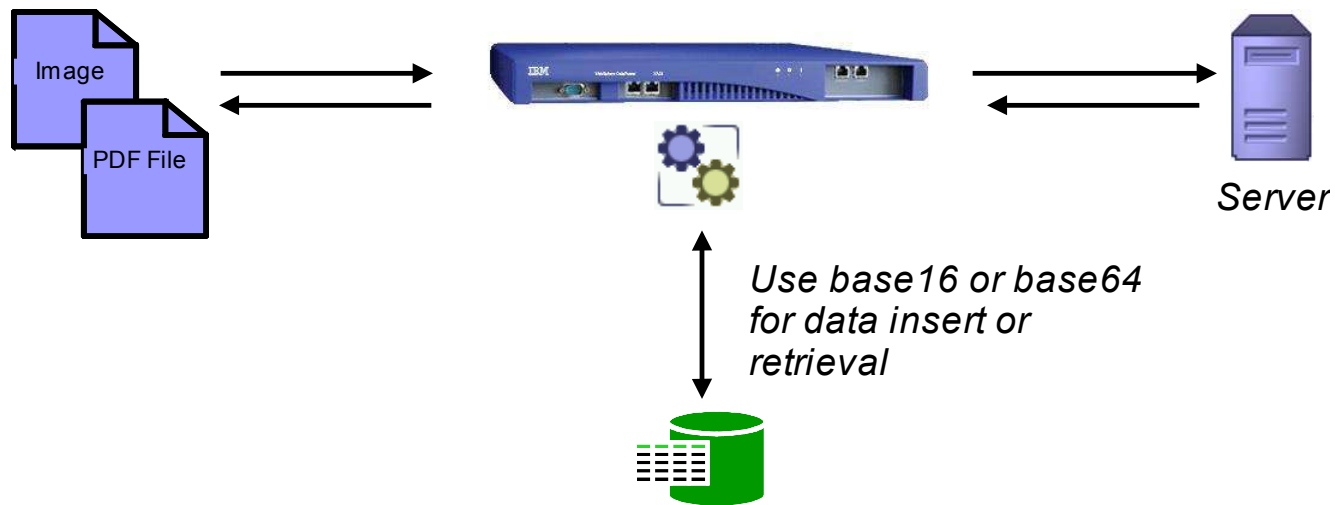
- Configuration details
 - ▶ Records in XML format

```
<Records>  
    <record>...</record>  
    <record>...</record>  
    <record>...</record>  
    ...  
    ...  
    ...  
</Records>
```


Use Case 4: Batch Processing

- Configuration details continued:
 - ▶ Multi-Protocol Gateway service
 - XML request/response type
 - Adjust XML Parser Limits in XML Manager
 - Use appropriate Front-side handler(s)
 - HTTP, HTTPS, FTP, MQ, Tibco, etc
 - ▶ Processing rule
 - Combine 'For each' and SQL actions or
 - Transform action with a custom stylesheet (XSL)
 - Use for each statement along with the `dp:sql-execute()` extension function or `<dp:sql-execute>` extension element to insert the records

Use Case 5: Binary Processing



Use Case 5: Binary Processing

- Configuration details
 - ▶ Data format
 - Base64 encode and XML wrap data
 - XML request/response type can be used
 - Base16 encode
 - Consumes considerably more bandwidth than base64
 - Requires less processing by DataPower

Use Case 5: Binary Processing

- Configuration details
 - ▶ If raw binary data is to be processed:
 - Non-XML request/response type
 - Use Binary Transform action to encode
 - ▶ Use `dp:radix-convert()` extension function
 - Convert between
 - base64 and base16 or
 - base16 and base64 encoding



Use Case 5: Binary Processing

- Resource (technote):
 - ▶ Converting database binary column values to base64 using the IBM WebSphere DataPower dp:radix-convert extension function.
 - <http://www-01.ibm.com/support/docview.wss?uid=swg21420523>



Summary

- The presentation is part 2 of a 3 part technical exchange. During this presentation we explored the following:
 - Quick Review of the Part 1 Presentation
 - Evolution of the SQL Data Source Object
 - Talked about the SQL Data Source object in terms of providing:
 - ▶ Overview
 - ▶ Configuration
 - ▶ Usage
 - ▶ Limitations

Summary Continued

- We then explored the usage of the SQL Data Source object in terms of:
 - ▶ The SQL Action
 - ▶ The dp:sql-execute Extension Function
 - ▶ The dp:sql-execute Extension Element
 - ▶ Supported SQL data types.

Summary Continued

- Lastly we reviewed several use cases of how to exploit the SQL Data Source object, and take advantage of its full functionality.



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>
- Access key product show-me demos and tutorials by visiting IBM Education Assistant:
<http://www.ibm.com/software/info/education/assistant>
- View a webcast replay with step-by-step instructions for using the Service Request (SR) tool for submitting problems electronically:
<http://www.ibm.com/software/websphere/support/d2w.html>
- Sign up to receive weekly technical My Notifications emails:
<http://www.ibm.com/software/support/einfo.html>

We Want to Hear From You!

Tell us about what you want to learn

Suggestions for future topics
Improvements and comments about our webcasts
We want to hear everything you have to say!

Please send your suggestions and comments to:
wsehelp@us.ibm.com

Questions and Answers