webMethods Adapter for JDBC Installation and User's Guide

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WEBMETHODS

This document applies to webMethods Adapter for JDBC 10.3 and to all subsequent releases.

Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

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Table of Contents

About this Guide

This guide describes how to configure and use webMethods Adapter for JDBC. It contains information for administrators and application developers who want to exchange data with relational databases.

To use this guide effectively, you should be familiar with:

- The basic concepts and tasks for working with relational databases
- Creating flow or Java services
- Terminology and basic operations of your operating system
- The setup and operation of webMethods Integration Server.
- How to perform basic tasks with Software AG Designer.

Document Conventions

Convention	Description
Bold	Identifies elements on a screen.
Narrowfont	Identifies service names and locations in the format *folder.subfolder.service*, APIs, Java classes, methods, properties.
Italic	Identifies: Variables for which you must supply values specific to your own situation or environment. New terms the first time they occur in the text. References to other documentation sources.
`Monospace font`	Identifies: Text you must type in. Messages displayed by the system. Program code.
{ }	Indicates a set of choices from which you must choose one. Type only the information inside the curly braces. Do not type the { } symbols.
|	Separates two mutually exclusive choices in a syntax line. Type one of these choices. Do not type the | symbol.
[ ]	Indicates one or more options. Type only the information inside the square brackets. Do not type the [ ] symbols.
...	Indicates that you can type multiple options of the same type. Type only the information. Do not type the ellipsis (...).

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1 Overview of the Adapter

About Adapter for JDBC

webMethods Adapter for JDBC is an add-on to webMethods Integration Server that enables you to exchange data with relational databases through the use of a JDBC driver. The adapter provides seamless and real-time communication with the database without requiring changes to your existing application infrastructure.

Using Adapter for JDBC, Integration Server clients can create and run services that execute transactions to retrieve data from, and insert and update data in, relational databases.

For example, you can use Adapter for JDBC to add a customer to an Oracle database based on data from another system connected to Integration Server. Or you can use Adapter for JDBC to poll a Microsoft SQL Server database for customers that have been added to the database, and to send that data to Integration Server to be inserted into another resource.

For a list of the database versions, JDBC drivers, and platforms that Adapter for JDBC supports, see *webMethods Adapters System Requirements*.

For a list of known driver limitations, see "JDBC Driver Specific Properties" on page 255.

Architecture Overview

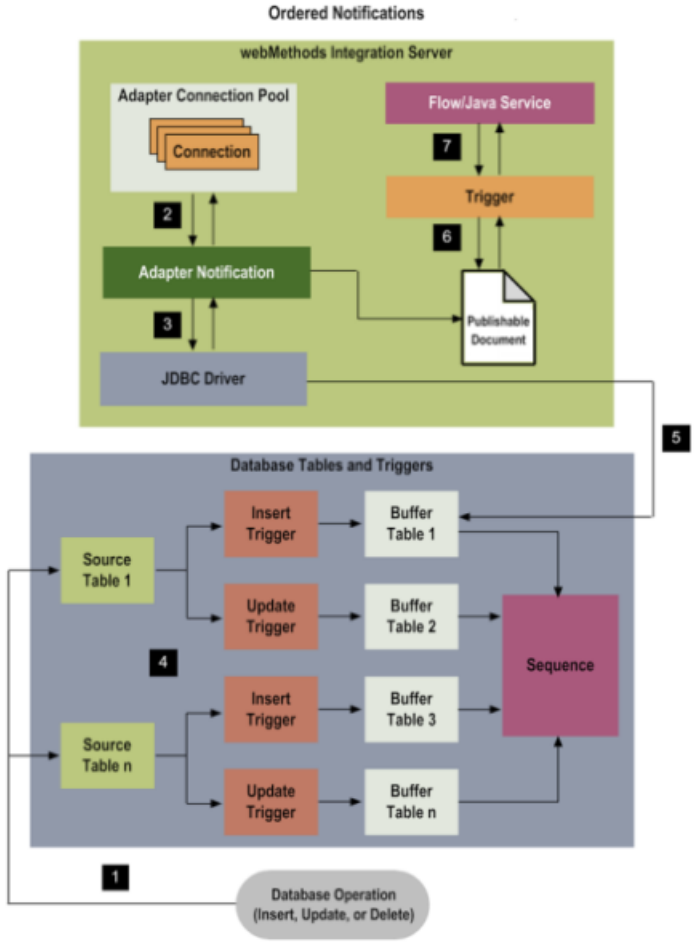
Adapter for JDBC provides a set of user interfaces, services, and templates that enable you to create integrations with databases using a JDBC driver. The adapter is provided as a single package that must be installed on Integration Server. For detailed installation instructions, see "Overview of Installing, Upgrading, and Uninstalling Adapter for JDBC" on page 50. For software requirements, see *webMethods Adapters System Requirements*.

Because Adapter for JDBC uses a JDBC driver to perform operations on databases, the adapter requires a supported JDBC driver to be installed and loaded in the packages directory of Integration Server. For more details, see "Installing a JDBC Driver on Integration Server" on page 67.

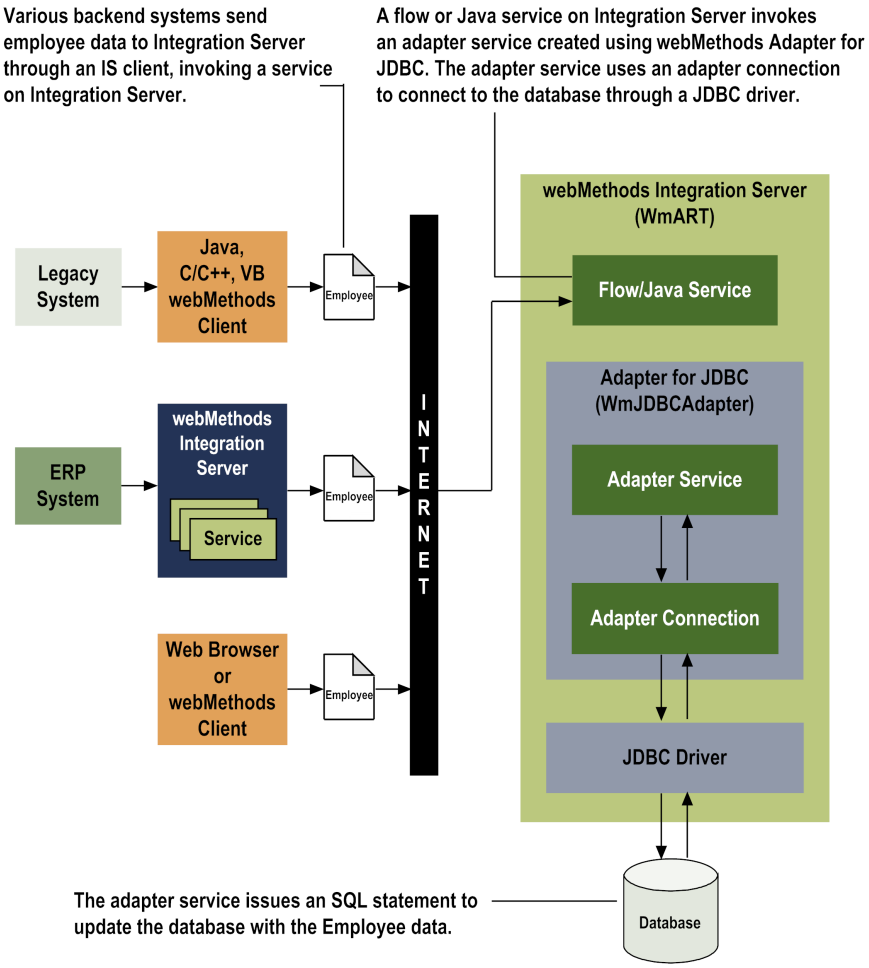
Adapter for JDBC enables you to configure the following components:

- **Adapter connections.** Enable Integration Server to connect to database systems at run time. You must configure an adapter connection before you can configure adapter services or adapter notifications. For a detailed description of adapter connections, see "Adapter Connections" on page 15.
- **Adapter services.** Enable Integration Server to initiate and perform database operations on a database. For example, an adapter service could enable a trading partner to query your inventory database to determine whether a particular item is currently in stock. You configure adapter services using adapter services templates, which are provided with Adapter for JDBC. For a detailed description of adapter services, see "Adapter Services" on page 18.
- **Adapter notifications.** Monitor a database and notify Integration Server when an action (not initiated by Integration Server) occurs on a particular database table. For example, an adapter notification could notify Integration Server when an update operation was performed on a particular database table. For a detailed description of adapter notifications, see "Adapter Notifications" on page 25.

The following diagram shows at a high level how an adapter service uses an adapter connection and a JDBC driver to connect to and perform an operation on a database.



The next diagram shows a business integration where an adapter service is used to update a database with employee data. The employee data could be provided by several different types of external Integration Server (IS) clients.



The architecture for integrations using adapter notifications is similar to the architecture for integrations using adapter services shown above, but it varies according to the type of notification. The primary difference between these types of integrations is that notifications are initiated by events that occur on the database, not by actions that occur on Integration Server.

With adapter notifications, you can capture event data from the database and use it to initiate another action within Integration Server. For example, you could create an adapter notification to monitor an employee table within a database and whenever an employee is added to the table, you could post that employee data to a Broker. Broker clients could then subscribe to that notification's publishable document.

For more information about the architecture for the different types of adapter notifications, see "Adapter Notifications" on page 25.

Package Management

Adapter for JDBC is provided as a package called WmJDBCAdapter that you manage like any package on Integration Server.

There are several considerations regarding how you set up and effectively manage your packages on Integration Server:

- You must create user-defined packages for your connections, adapter services, and notifications. For details, see "Adapter for JDBC Package Management" on page 56.
- You should understand how package dependencies work so you make the best decisions regarding how you manage your adapter services and notifications. For details, see "Package Dependency Requirements and Guidelines" on page 57.
- You control which development groups have access to which adapter services and notifications. For details, see "Group Access Control" on page 59.
- You should understand how clustering, an advanced feature of Integration Server, works to effectively manage your adapter services. For details, see "Adapter for JDBC in a Clustered Environment" on page 59.

Adapter Connections

Adapter for JDBC connects to a database through a JDBC driver at run time. You create one or more connections at design time to use in integrations. The number of connections you create, and the types of those connections, depend on the types of databases you are connecting to and your integration needs. For example, if you are connecting to an Oracle database and a DB2 Server database, you will need to create connections that are unique to those two databases. Additionally, if you have multiple installations of the same kinds of databases, you access each using different connections. For example, if you have a data warehouse system and an ERP system that use your Oracle database, you create a connection for each system.

Adapter for JDBC connections contain parameters that Integration Server uses to manage connections to the database so that they can be used by the adapter to provide services. You configure connections using Integration Server Administrator. You must have Integration Server Administrator privileges to access Adapter for JDBC's administrative screens.

For instructions on configuring, viewing, editing, enabling, and disabling Adapter for JDBC connections, see "Overview of Adapter Connections" on page 66. For information about setting user privileges, see the *webMethods Integration Server Administrator's Guide* for your release.

Using JDBC Drivers to Connect to Databases

Adapter for JDBC connections access databases using either the driver's DataSource or XADataSource objects provided by your JDBC driver. For more information about DataSource and XADataSource objects, see the documentation provided with your JDBC driver.

The JDBC driver must be installed on the Integration Server machine and loaded when the server starts. For instructions, see "Installing a JDBC Driver on Integration Server" on page 67.

For more information about the transaction types supported in Adapter for JDBC, see "Transaction Management of Adapter Connections" on page 16.

For a complete list of the JDBC drivers that the adapter supports, see *webMethods Adapters System Requirements*.

For a list of known driver limitations, see "JDBC Driver Specific Properties" on page 255.

Transaction Management of Adapter Connections

Adapter for JDBC connections support the following transaction types:

Transaction Type	Description
NO_TRANSACTION	The connection provides no transaction control over the operations being performed. That is, the connection automatically commits (Auto Commit) all operations.
LOCAL_TRANSACTION	With this transaction type, all of the operations on the same connection in one transaction boundary are committed or rolled back together. A transaction boundary means the scope of the transaction, from the beginning to the end of a transaction. It can be in one adapter service, one flow service, one Java service, or several steps in a flow service.
XA_TRANSACTION	This transaction type allows the connection to support two-phase transactions executed across multiple databases. In one transaction boundary, all of the operations on multiple connections are committed or rolled back together. A transaction boundary means the scope of the transaction, from the beginning to the end of a transaction. It can be in one adapter service, one flow service, one Java service, or several steps in a flow service. **Note:** All of the connections involved in a two-phase transaction must support the XA_TRANSACTION transaction type.

Note:
Insert Notifications, Update Notifications, Delete Notifications, and Ordered Notifications support LOCAL_TRANSACTION mode only.

When you define a connection, the transaction type that you choose determines the type of transaction management that the connection's operations use implicitly. Implicit transactions, which include the transaction types in the preceding table, are managed by the Integration Server transaction manager.

You can also explicitly manage transactions using built-in services. For information about, and examples of, explicitly managing transactions, see "Transaction Management Overview" on page 240.

Transaction Isolation Level Settings

Adapter for JDBC supports the setting of transaction isolation levels on a database. These settings prevent dirty read, repeatable read, and phantom read of the database. The type of isolation levels supported by the adapter depends on the database that you are connecting to. The commonly

used isolation levels are TRANSACTION_READ_UNCOMMITTED, TRANSACTION_READ_COMMITTED, TRANSACTION_REPEATABLE_READ, and TRANSACTION_SERIALIZABLE.

Adapter for JDBC supports all the isolation level settings supported by your database, for example, the isolation level SNAPSHOT for MS SQL Server 2005.

The isolation level settings can be specified in the **Other Properties** field of the Connection Configuration screen, while configuring a connection. For more information about specifying these levels, see "Configuring Adapter for JDBC Connections" on page 68.

Connection Pools

Integration Server includes a connection management service that dynamically manages connections and connection pools based on configuration settings that you specify for the connection. All adapter services use connection pooling.

A connection pool is a collection of connections with the same set of attributes. Integration Server maintains connection pools in memory. Connection pools improve performance by enabling adapter services to re-use open connections instead of opening new connections.

Run-Time Behavior of Connection Pools

When you enable a connection, Integration Server initializes the connection pool, creating the number of connection instances you specified in the connection's **Minimum Pool Size** field when you configured the connection. Whenever an adapter service needs a connection, Integration Server provides a connection from the pool. If no connections are available in the pool, and the maximum pool size has not been reached, the server creates one or more new connections (according to the number specified in the **Pool Increment Size** field) and adds them to the connection pool. If the pool is full (as specified in **Maximum Pool Size** field), the requesting service will wait for Integration Server to obtain a connection, up to the length of time specified in the **Block Timeout** field, until a connection becomes available. Periodically, Integration Server inspects the pool and removes inactive connections that have exceeded the expiration period that you specified in the **Expire Timeout** field.

If initialization of the connection pool fails because of a network connection failure or some other type of exception, you can enable the system to retry the initialization any number of times, at specified intervals. For information about configuring connections, see "Configuring Adapter for JDBC Connections" on page 68.

Built-In Services for Connections

Integration Server provides built-in services that enable you to programmatically control connections. You can use them to enable and disable a connection, and to return usage statistics and the current state (Enabled or Disabled) and error status for a connection. These services are located in the WmART package, in the pub.art.connection folder.

The setAdapterServiceNodeConnection and setPollingNotificationNodeConnection built-in services enable you to change the connection associated with an adapter service or notification respectively. For more

information, see "Changing the Connection Associated with an Adapter Service or Notification at Design Time" on page 22.

For details, see the *webMethods Integration Server Built-In Services Reference* for your release.

Adapter Services

To use Adapter for JDBC, you create adapter services. Adapter services allow you to connect to the adapter's resource and initiate an operation on the resource from Integration Server.

You call adapter services from flow or Java services to interact with database tables. The adapter services perform database operations by calling JDBC APIs. Integration Server then uses adapter connections that you defined earlier to execute the adapter services. For details, see "Adapter Service Transaction Processing" on page 23.

Adapter services are based on templates provided with Adapter for JDBC. Each template represents a specific technique for doing work on a resource, such as using the SelectSQL template to retrieve specified information from a database.

An adapter service template contains all the code necessary for interacting with the resource but without the data specifications. You provide these specifications when you create a new adapter service.

Creating a new service from an adapter service template is straightforward. Using Software AG Designer, you assign the service a default adapter connection.

After you select the connection for the adapter service, you select the adapter service template and supply the data specifications using Designer. Some familiarity with using Designer is required. For more information, see the *webMethods Service Development Help* for your release.

Adapter for JDBC provides the following adapter service templates:

Adapter Service Type	Adapter Service Template	Description
Select SQL	SelectSQL	Retrieves specified information from a database table and includes a mapping for an output field that stores the number of rows retrieved. For instructions about configuring the service, see "Configuring SelectSQL Services" on page 89.
Insert SQL	InsertSQL	Inserts new information into a database table. For instructions about configuring the service, see

Adapter Service Type	Adapter Service Template	Description
		"Configuring InsertSQL Services" on page 93.
Update SQL	UpdateSQL	Updates the existing information in a database table and includes a mapping for an output field that stores the number of affected rows. For instructions about configuring the service, see "Configuring UpdateSQL Services" on page 95.
Batch Insert SQL	BatchInsertSQL	Inserts new information into a database table. Use this service when you will be inserting a large volume of data into a single table. The data source for the service can be from a flat file or from other services that generate an Integration Server document list. For instructions about configuring the service, see "Configuring BatchInsertSQL Services" on page 99.
Batch Update SQL	BatchUpdateSQL	Updates information in a database table when dealing with a large volume of data. Use this service when you will be updating a large volume of data in a single table. The data source for the service can be from a flat file or from other services that generate an Integration Server document list. For instructions about configuring the service, see "Configuring BatchUpdateSQL Services" on page 102.
Delete SQL	DeleteSQL	Deletes rows from a table and includes a mapping for an output

Adapter Service Type	Adapter Service Template	Description
		field that stores the number of affected rows. For instructions about configuring the service, see "Configuring DeleteSQL Services" on page 106.
Custom SQL	CustomSQL	Defines and executes custom SQL to perform database operations. You can execute almost any SQL statement required by integrations, such as data management statements. For instructions about configuring the service, see "Configuring CustomSQL Services" on page 108.
Dynamic SQL	DynamicSQL	Defines and executes a SQL statement, part of which you set at run time through the input field. For instructions about configuring the service, see "Configuring DynamicSQL Services" on page 112.
Stored Procedure	StoredProcedure	Calls a stored procedure to perform database operations. For instructions about configuring the service, see "Configuring StoredProcedure Services" on page 116.
Stored Procedure with signature	StoredProcedureWithSignature	Calls a stored procedure to perform database operations. Obtains the stored procedure's parameters by introspecting and listing the signature of the stored procedure at the time you configure the adapter service. For instructions about configuring the service, see "Configuring

Adapter Service Type	Adapter Service Template	Description
		StoredProcedureWithSignature Services" on page 120.
Execute Service	ExecuteService	Executes a Java or flow service using a JDBC connection object from the Adapter for JDBC connection pool. For more information see "Using a Connection from the Connection Pool Within a Java or Flow Service" on page 22. For instructions about configuring the service, see "Configuring ExecuteService Services" on page 126.

Using Adapter Services

The following table lists the tasks required to use adapter services.

For this task...	Use these tools...
1. Create an adapter connection. For details, see "Overview of Adapter Connections" on page 66.	Integration Server Administrator
2. Select the appropriate adapter service template and configure the adapter service. Depending on the type of adapter service, you specify: ■ The adapter connection ■ The database table ■ The SQL expression used to modify or select data, a stored procedure to execute against the database, or a Java or flow service that uses a connection object from the Adapter for JDBC connection pool. ■ The input fields and types as needed ■ The output fields and types as needed The adapter allows you to dynamically configure the data type mapping for a particular database in an XML configuration file. For more information about configuring data types, see "Overview of Data Type Configuration" on page 180.	Designer

For this task...	Use these tools...
For more information about configuring adapter services, see "Overview of Adapter Services" on page 88.	
3. If you plan to use an Integration Server flow or Java service to invoke the adapter service, design the flow or Java service to use this adapter service.	Designer
4. Manage the adapter service. For details, see "Overview of Package Management" on page 56, "Overview of Adapter Services" on page 88, and "Overview of Logging and Exception Handling" on page 194.	Designer and Integration Server Administrator

Using a Connection from the Connection Pool Within a Java or Flow Service

Typically, adapter services use connections from the adapter's connection pool. However, you can also have any custom Java or flow services that perform database operations use Adapter for JDBC connections from the connection pools. By using the ExecuteService adapter service template, you can create an adapter service that provides a JDBC connection from a connection pool and then calls the specified Java or flow service. For more information, see "Configuring ExecuteService Services" on page 126.

Changing the Connection Associated with an Adapter Service or Notification at Design Time

Integration Server provides built-in services that you can use at design time to change the connection associated with an adapter service or notification. The built-in services, setAdapterServiceNodeConnection and setPollingNotificationNodeConnection, are provided in the WmART package's pub.art.service folder and pub.art.notification folder, respectively. Using this function, you can change the specific connection associated with an adapter service or an adapter notification at design time so that you do not need to create and maintain multiple adapter services and notifications.

Note:
The setAdapterServiceNodeConnection and setPollingNotificationNodeConnection services can be run at design time only. Do not use them within an Integration Server flow or Java service. You must run the services directly from Designer by selecting a service and running it.

For details, see the *webMethods Integration Server Built-In Services Reference* for your release.

Other built-in services enable you to control connections. For more information, see "Built-In Services for Connections" on page 17.

Changing the Connection Associated with an Adapter Service at Run Time

Integration Server enables you to dynamically select the connection a service uses to interact with the adapter's resource. This feature enables one service to interact with multiple, similar backend resources.

For example, a service can be defined to use a default connection that interacts with your company's production database. However, at run time you can override the default connection and instead use another connection to interact with the company's test database.

For more information about overriding a service's default connection at run time, see "Dynamically Changing a Service's Connection at Run Time" on page 79.

Changing the User Credentials of a Service's Associated Connection at Run Time

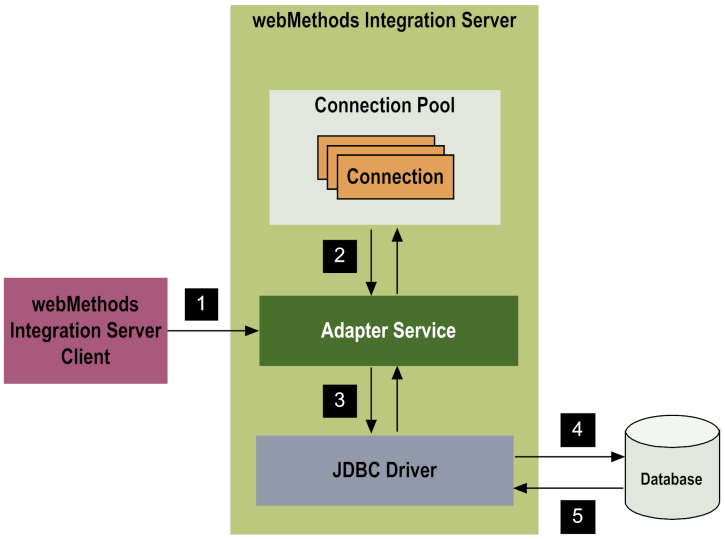
Adapter for JDBC enables you to dynamically change the user credentials of a connection associated with an adapter service at run time. This feature enables you to interact with a database with different user privileges.

For example, consider a service's associated adapter connection that uses an administrator's credentials at design time to define a connection to a database. At run time, you can override the administrator's account credentials with individual user credentials to limit access to the database according to the permission level each user has. This capability also enables you to keep track of the database operations by the user initiating the service.

For more information, see "Dynamically Changing the User Credentials of a Service's Connection at Run Time" on page 80.

Adapter Service Transaction Processing

The following diagram illustrates how Adapter for JDBC processes adapter services at run time.



Step	Description
1	An Integration Server client, typically using a flow or Java service, invokes a Adapter for JDBC service on Integration Server to perform an operation on a database. You configured the adapter service earlier using Designer.
2	The adapter service gets a connection from the service's connection pool. Adapter connections contain connection information for the database, including JDBC driver parameters.
3	The adapter service uses the JDBC driver to connect to the database. You created and enabled the adapter connection earlier using Integration Server Administrator.
4	All adapter services except ExecuteService perform a SQL operation against the database. ■ For SelectSQL, InsertSQL, UpdateSQL, DeleteSQL, CustomSQL, and DynamicSQL services, the adapter service executes a SQL statement against the database. ■ For BatchInsertSQL and BatchUpdateSQL services, the adapter service executes batch SQL statements against the database. The adapter service will continue to loop through the document list that is used as input, set the fields to the parameters of the SQL statement and then add that command set to the batch. Upon completion, the adapter sends the entire batch to the database resource for execution. ■ For StoredProcedure and StoredProcedureWithSignature services, the adapter service executes a stored procedure against the database. ■ The ExecuteService adapter service executes a Java or flow service that needs a connection object from the connection pool. For more information see "Using a Connection from the Connection Pool Within a Java or Flow Service" on page 22.

Step	Description
5	Depending on the adapter service type, such as a SelectSQL service, the adapter service may return data to Integration Server. ■ If the operation is successful, the service returns the output from the service's database operation, if applicable. With BatchInsertSQL and BatchUpdateSQL services, if all commands are successfully executed, the adapter commits all commands in the batch and returns a list of String values. These values will vary by driver. Refer to your driver documentation for details. ■ If the operation is unsuccessful, the service returns an error such as an AdapterException. If the database throws an exception while performing the adapter service's operation, the adapter passes the exception to the Integration Server logs. For more information about how the adapter handles exceptions, see "Overview of Logging and Exception Handling" on page 194.

Adapter Notifications

An adapter notification monitors a specified database table for changes, such as an insert, update, or delete operation, so that the appropriate Java or flow services can make use of the data, such as sending an invoice or publishing it to Integration Server.

Adapter for JDBC notifications are polling-based. That is, Integration Server will invoke the notification periodically based on the polling interval that you specify when you schedule the notification as described in "Managing Polling Notifications" on page 171.

Important:
Software AG recommends using the same polling notification on multiple Integration Server instances only in an Integration Server cluster. For more information about using polling notifications in a cluster, see "Polling Notification Support in Clusters" on page 45.

Adapter notifications vary somewhat in how they work, depending on the type of the adapter notification. Be sure to review "Notification Types" on page 27 to understand how their operations differ.

Choice of Publish Destinations

You can choose the destination to which asynchronous notifications should publish messages. Specifically, you can choose whether the asynchronous notification templates use JMS APIs to publish messages to Integration Server or Broker APIs to publish notification messages to Broker.

Note:
To use the JMS protocol with asynchronous notifications, you must first configure a JMS connection alias on Integration Server. For more information, see the *webMethods Integration Server Administrator's Guide* for your release.

For steps for selecting a publish destination for asynchronous notification messages, see "Overview of Adapter Notifications" on page 134.

Adapter Notification Templates

Adapter for JDBC provides the following adapter notification templates:

Notification Type	Notification Template	Description
Insert Notification	InsertNotification	Publishes notification of insert operations on a database table. For instructions, see "Configuring InsertNotifications" on page 135.
Update Notification	UpdateNotification	Publishes notification of update operations on a database table. For instructions, see "Configuring UpdateNotifications" on page 140.
Delete Notification	DeleteNotification	Publishes notification of delete operations on a database table. For instructions, see "Configuring DeleteNotifications" on page 146.
Basic Notification	BasicNotification	Polls a database table for data using a SQL Select operation. For instructions, see "Configuring BasicNotifications" on page 151.
Stored Procedure Notification	StoredProcedure Notification	Publishes notification data by calling a stored procedure inside of a database. For instructions, see "Configuring StoredProcedureNotifications" on page 156.
Stored Procedure Notification with Signature	StoredProcedure NotificationWith Signature	Publishes notification data by calling a stored procedure inside of a database. Obtains the stored procedure's parameters by introspecting and listing the signature of the stored procedure at the time you configure the notification.
Ordered Notification	OrderedNotification	Publishes notification data for multiple insert, update, or delete operations on multiple tables for a given database. For instructions, see"Configuring OrderedNotifications" on page 165.

Exactly Once Notification Feature

Most adapter notifications, such as Insert Notifications and Update Notifications, can use the Exactly Once notification feature. This feature ensures that notification data is not duplicated even if a failure occurs during processing. This is achieved by assigning unique IDs for each publishable document. After a processing failure, Integration Server checks for duplicate records in storage and ignores any duplicate IDs.

Note:
Stored Procedure Notifications do not support the Exactly Once notification feature because they do not use publishable document unique IDs.

For more details, see "Using the Exactly Once Notification Feature" on page 173.

Notification Types

There are seven types of notifications: Insert, Update, Delete, Basic, Stored Procedure, StoredProcedureNotificationWithSignature, and Ordered Notifications. They vary in how they are structured and operate, as described in the following sections.

Insert Notifications, Update Notifications, and Delete Notifications

Insert Notifications, Update Notifications, and Delete Notifications use a combination of triggers and buffer tables to capture events that happen on specific tables in a database. You configure the triggers and buffer tables when you configure the notifications.

These types of notifications operate similarly, with the exception of the type of SQL operation (insert, update, or delete) that they monitor. The adapter creates the trigger and buffer table when you enable a notification. The buffer table, which you specified when you configured the notification, holds the data selected by the trigger. There are no special size constraints for the buffer tables. The trigger monitors the database table you specified when you configured the notification and inserts data into the buffer table. When you disable a notification, the adapter drops the trigger and buffer table.

When you enable a notification, the database trigger monitors the table and inserts the data into the buffer table. When Integration Server invokes the notification, it retrieves the rows of data from the buffer table, publishes each row in the notification's publishable document, and then removes this row from the buffer table.

After you enable these types of notifications, the trigger and buffer table remain in the database table when you:

- Shut down Integration Server.
- Disable the package containing the enabled notification.
- Reload the package containing the enabled notification.
- Suspend the notification.

In the meantime, the trigger continues to monitor the table and to insert data into the buffer table. Integration Server invokes the enabled notification when it restarts, or when it enables or reloads the package that contains this notification. For more information about how these types of notifications work, see "Insert, Update, and Delete Notifications Transaction Processing" on page 29.

For instructions for configuring this type of adapter notification, see "Configuring InsertNotifications" on page 135, "Configuring UpdateNotifications" on page 140, or "Configuring DeleteNotifications" on page 146.

For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.

Using Insert, Update, and Delete Notifications

The following table lists the tasks required to use these types of notification:

For this task...	Use these tools...
1. Create an adapter connection. For details, see "Overview of Adapter Connections" on page 66.	Integration Server Administrator
2. Configure the notification and specify the: ■ Adapter connection ■ Source table ■ Publishable document to contain the data from the buffer table. There is a single publishable document used for all events associated with the notification. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release. ■ Output data fields contained in the publishable document ■ Database trigger and buffer table For instructions for configuring notifications, see "Overview of Adapter Notifications" on page 134.	Designer
3. If you plan to use an Integration Server flow or Java service, design it to react to the data changes contained in the notification's publishable document. Create the Integration Server trigger to use the notification's publishable document. For details, see the *webMethods Service Development Help* for your release.	Designer

For this task...	Use these tools...
4. Schedule and enable the adapter notification. When you enable the notification: ■ It automatically creates the database trigger and buffer table you configured when you created the notification. ■ The Integration Server Scheduler invokes the notification and continues to do so periodically, based on the polling schedule parameters you created earlier. For instructions for scheduling and enabling notifications, see "Managing Polling Notifications" on page 171.	Integration Server Administrator
5. Manage the notification. For details, see "Overview of Package Management" on page 56, "Overview of Adapter Notifications" on page 134, and "Overview of Logging and Exception Handling" on page 194.	Designer and Integration Server Administrator

Retrieving Old and New Values as Output for an UpdateNotification

Using an UpdateNotification, you can retrieve either the old value, the new value, or both the old and new values from the database table as output values.

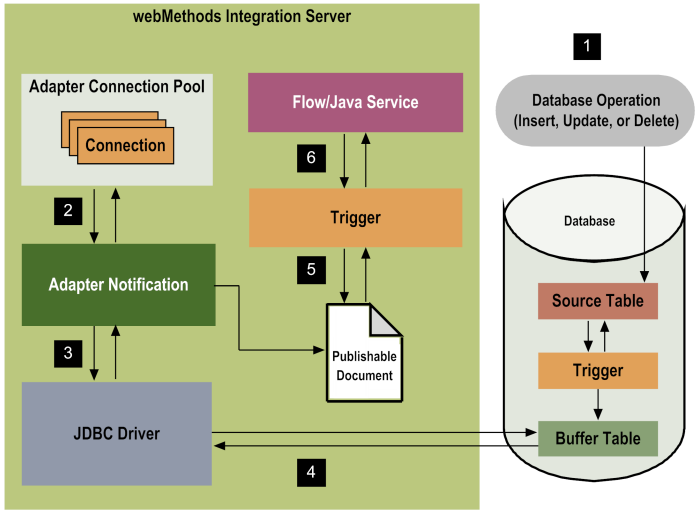
Note:
The old value is the value that exists before a value is updated in the selected column of the database table.

You can set the required output value options while configuring the UpdateNotification in the **Select** tab of the UpdateNotification template. For more information about setting the output value options, see "Configuring UpdateNotifications" on page 140.

Insert, Update, and Delete Notifications Transaction Processing

The following diagram illustrates what happens when these types of notifications are invoked. Integration Server continues to invoke the notification periodically, as defined when you configured the schedule parameters for polling the notification.

Insert, Update, and Delete Notifications



Step	Description
1	Insert Notifications, Update Notifications, and Delete Notifications monitor an operation that happens to a database table, such as an insert, update, or delete operation. You specified the source table to monitor at the time you configured the adapter.
2	The notification gets a connection from the service's connection pool. Adapter connections contain connection information for the database, including JDBC driver parameters.
3	The notification uses the JDBC driver to connect to the database. You created and enabled the adapter connection earlier using Integration Server Administrator.
4	The notification retrieves the rows of data from the buffer table. The buffer table holds the data selected by the trigger. While the adapter notification remains enabled, the trigger continues to monitor the database table and insert data into the buffer table.
5	The notification creates the publishable document, which contains a row of data from the buffer table. The notification publishes the publishable document. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.
6	Using an Integration Server trigger you configured to use the notification's publishable document, a flow or Java service on Integration Server is invoked to react to the data changes contained in the publishable document. After the data is published, the data is removed from the buffer table.

Basic Notifications

In contrast with Insert Notifications, Update Notifications, and Delete Notifications, Basic Notifications require that you define a buffer table, and a database trigger or other means of monitoring database changes so that changes are written into the buffer table.

To monitor database changes, a Basic Notification queries the buffer table. Basic Notifications provide you with the flexibility to manage buffer tables, such as a table with user privileges, and to tailor your own database monitoring methods for producing notification data. By default, after the data is retrieved and processed, it is deleted from the buffer table to ensure that the data is not processed multiple times. If you do not want to delete the data from the buffer table, and you also do not want the adapter to publish the data more than once, you can mark the processed data as published. The notification then only processes the data that is not published. To use this option, you need to:

1. Add a column of CHAR(1) data type with any name in the database table that you are trying to use. This column is required to hold the status of the data, that is, whether the data is processed or not processed.
2. While configuring the Basic Notification, select the newly added column in the **Mark ID Column**, see step 1. For instructions about configuring the Basic Notification, see "Configuring BasicNotifications" on page 151.

For more information about how Basic Notifications work, see "Basic Notifications Transaction Processing" on page 32.

Using Basic Notifications

The following table lists the tasks required to use this notification:

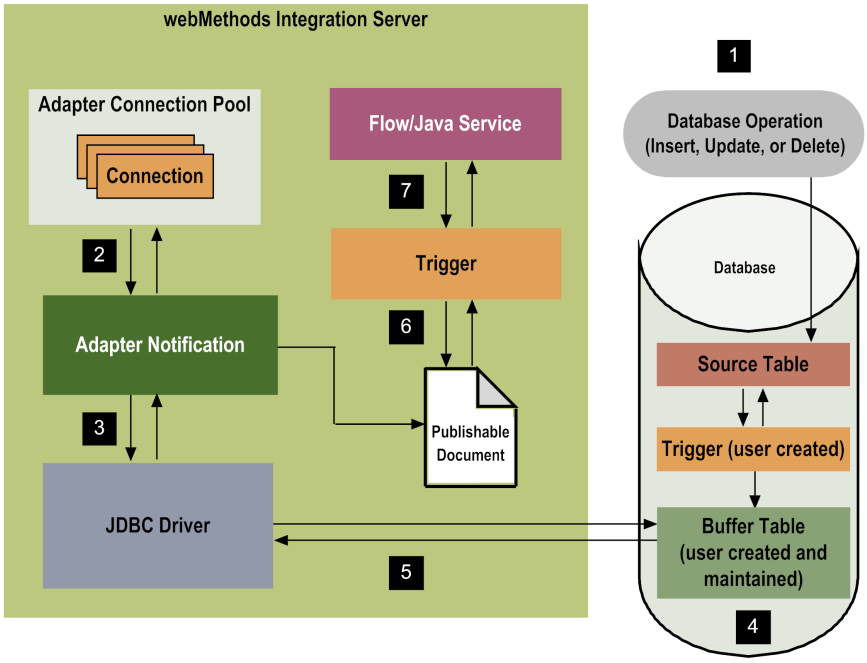
For this task...	Use these tools...
1. If needed, create your own buffer table and database trigger (or other means) to monitor for database changes.	User-defined
2. Create an adapter connection. For details, see "Overview of Adapter Connections" on page 66.	Integration Server Administrator
3. Configure the notification and specify the: ■ Adapter connection ■ Buffer tables that you created independently ■ Publishable document to contain the data from the buffer table. There is a single publishable document used for all events associated with the notification. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.	Designer

For this task...	Use these tools...
■ Output data fields contained in the publishable document For instructions for configuring this type of notification, see "Configuring BasicNotifications" on page 151.	
4. If you plan to use an Integration Server flow or Java service, design it to react to the data changes contained in the notification's publishable document. Create the Integration Server trigger to use the notification's publishable document. For details, see the *webMethods Service Development Help* for your release.	Designer
5. Schedule and enable the adapter notification. When you enable the notification, the Integration Server Scheduler invokes the notification periodically and continues to do so, based on the polling schedule parameters you created earlier. For instructions for scheduling and enabling notifications, see "Managing Polling Notifications" on page 171.	Integration Server Administrator
6. Manage the notification. For details, see "Overview of Package Management" on page 56, "Overview of Adapter Notifications" on page 134, and "Overview of Logging and Exception Handling" on page 194.	Designer and Integration Server Administrator

Basic Notifications Transaction Processing

The following diagram and steps illustrate what happens when a Basic Notification is invoked. Integration Server continues to invoke the notification periodically, as defined when you configured the polling schedule parameters for the notification.

Basic Notifications



Step	Description
1	Basic Notifications monitor an operation that happens to a database table, such as an insert, update, or delete operation. You specified the buffer table to monitor at the time you configured the adapter.
2	The notification gets a connection from the service's connection pool. Adapter connections contain connection information for the database, including JDBC driver parameters.
3	The notification uses the JDBC driver to connect to the database. You created and enabled the adapter connection earlier using Integration Server Administrator.
4	Unlike Insert Notifications, Update Notifications, and Delete Notifications, you create your own buffer table and trigger, or other means of monitoring database changes. The diagram and steps listed here assume you are creating your own buffer table and trigger to monitor for changes. The buffer table you define will hold the data selected by any trigger you create. The trigger will monitor the database table and insert data into the buffer table.
5	The notification retrieves the rows of data from the buffer table.
6	The notification creates the publishable document, which contains a row of data from the buffer table. The notification publishes the publishable document.

Step	Description
	For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.
7	Using an Integration Server trigger you configured to use the notification's publishable document, a flow or Java service on Integration Server is invoked to react to the data changes contained in the publishable document. After the data is published, the data in the buffer table will be retained or removed, depending on how you configured your buffer table and trigger.

Stored Procedure Notifications

A Stored Procedure Notification calls a stored procedure you created earlier to publish notification data in the notification's publishable documents. For more information about how Stored Procedure Notifications work, see "Stored Procedure Notifications Transaction Processing" on page 35.

For information about configuring this type of adapter notification, see "Configuring StoredProcedureNotifications" on page 156.

Note:
Stored Procedure Notifications do not support the Exactly Once notification feature because they do not use publishable document unique IDs. For details about this feature, see "Stored Procedure Notifications" on page 34.

Using Stored Procedure Notifications

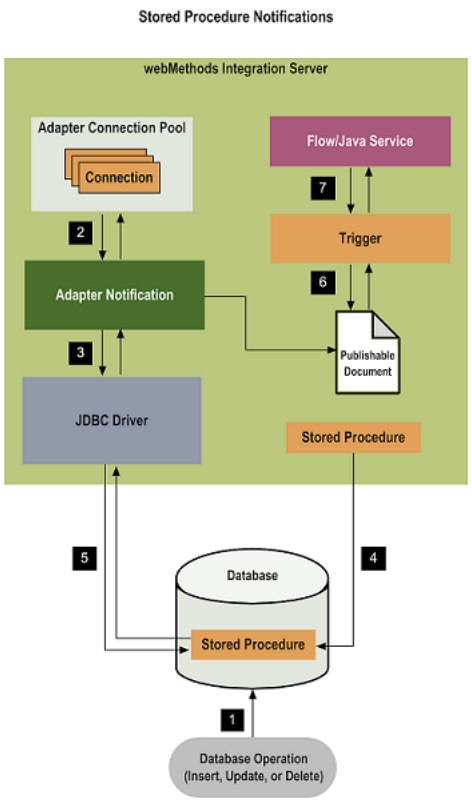
The following table lists the tasks required to use this notification:

For this task...	Use these tools...
1. To ensure that the same data is not published multiple times, design and test your stored procedure so that whenever the stored procedure is invoked, you are assured that it provides the correct data.	User-dependent
2. Create an adapter connection. For details, see "Overview of Adapter Connections" on page 66.	Integration Server Administrator
3. Configure the notification and specify the: ■ Adapter connection ■ Stored procedure ■ Publishable document to contain the data. There is a single publishable document used for all events associated with the notification.	Designer

For this task...	Use these tools...
For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release. ■ Any output data fields to be contained in the publishable document For instructions for configuring this type of notification, see "Configuring StoredProcedureNotifications" on page 156.	
4. If you plan to use an Integration Server flow or Java service, design it to react to the data changes contained in the notification's publishable document. Create the Integration Server trigger to use the notification's publishable document. For details, see the *webMethods Service Development Help* for your release.	Designer
5. Schedule and enable the adapter notification. When you enable the notification, the Integration Server Scheduler invokes the notification and continues to do so periodically, based on the polling schedule parameters you created earlier. For instructions for scheduling and enabling notifications, see "Managing Polling Notifications" on page 171.	Integration Server Administrator
6. Manage the notification. For details, see "Overview of Package Management" on page 56, "Overview of Adapter Notifications" on page 134, and "Overview of Logging and Exception Handling" on page 194.	Designer and Integration Server Administrator

Stored Procedure Notifications Transaction Processing

The following diagram and steps illustrate what happens when a Stored Procedure Notification is invoked.



Step	Description
1	A Stored Procedure Notification uses a stored procedure you created in the database to monitor an operation that happens to a database table, such as an insert, update, or delete operation. When the Stored Procedure Notification calls the stored procedure, it stores any output in the notification's publishable documents.
2	The notification gets a connection from the service's connection pool. Adapter connections contain connection information for the database, including JDBC driver parameters.
3	The notification uses the JDBC driver to connect to the database. You created and enabled the adapter connection earlier using Integration Server Administrator.
4	Integration Server calls the stored procedure.
5	The notification retrieves each row of data from the stored procedure.
6	Each row of data is published using the notification's publishable document. Depending on the stored procedure, the Stored Procedure Notification's publishable documents can contain any of the following:

Step	Description
	■ Output parameters: if the called stored procedure has any output parameters, they are contained in any publishable documents for the Stored Procedure Notification. ■ Return values: if the called stored procedure returns any values, then a return value is contained in a publishable document for the Stored Procedure Notification. ■ Single result set (or Oracle REF CURSOR): Stored Procedure Notifications can support one result set. The result set can contain nested cursors. If a call to the stored procedure produces a result set, then the single result set is contained in one or more publishable documents for the Stored Procedure Notification. In some cases, a call to a Stored Procedure Notification can produce a single result set that contains multiple records. In this case, each record will have a separate publishable document, containing one row and one or more columns, that is returned to the adapter. **Note:** When using the result set that contains nested cursors, the performance of Adapter for JDBC could degrade. Since the nested cursors are recursively processed, Adapter for JDBC may also return data that may not be required. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.
7	Using an Integration Server trigger you configured to use the notification's publishable document, a flow or Java service on Integration Server is invoked to react to the data changes contained in the publishable document.

Ordered Notifications

You use Ordered Notifications to monitor multiple insert, update, or delete operations on one or more tables for a given database by creating a single notification using the same publishable document. Similar to Insert Notifications, Update Notifications, and Delete Notifications, Ordered Notifications use triggers and buffer tables to capture events that happen on specific tables in a database.

After you enable the Ordered Notification, the trigger, buffer table, and sequence remain in the database table when you:

- Shut down Integration Server.
- Disable the package containing the enabled Ordered Notification.
- Reload the package containing the enabled Ordered Notification.

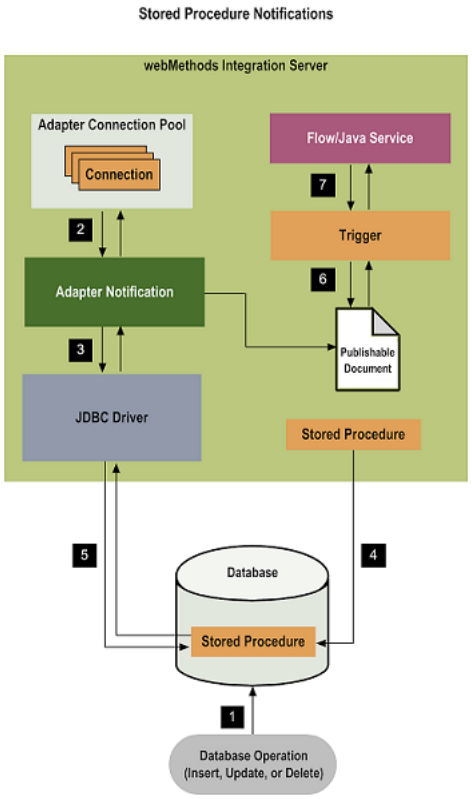
In the meantime, the trigger continues to monitor the table and to insert data into the buffer table. Integration Server invokes the enabled Ordered Notification when it restarts, or when it enables or reloads the package that contains this notification.

When you disable a notification, the adapter drops the trigger, the buffer table, and the sequence.

For more information about how Ordered Notifications work, see "Ordered Notifications Transaction Processing" on page 43.

Stored Procedure Notifications Transaction Processing

The following diagram and steps illustrate what happens when a Stored Procedure Notification is invoked.



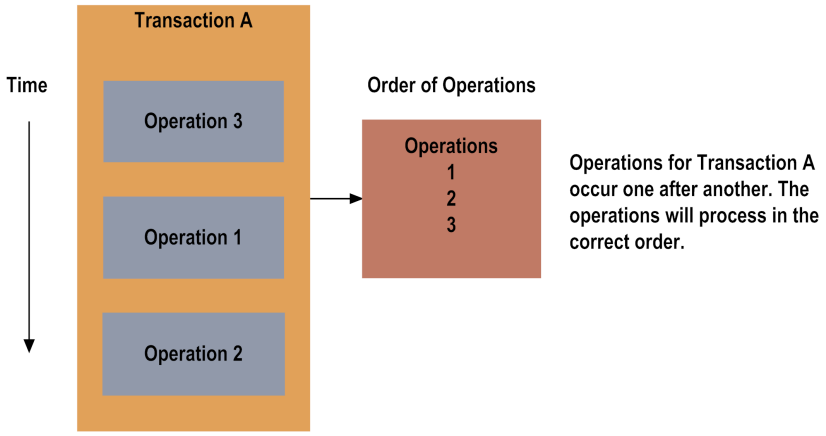
Step	Description
1	A Stored Procedure Notification uses a stored procedure you created in the database to monitor an operation that happens to a database table, such as an insert, update, or delete operation. When the Stored Procedure Notification calls the stored procedure, it stores any output in the notification's publishable documents.
2	The notification gets a connection from the service's connection pool. Adapter connections contain connection information for the database, including JDBC driver parameters.
3	The notification uses the JDBC driver to connect to the database. You created and enabled the adapter connection earlier using Integration Server Administrator.

Step	Description
4	Integration Server calls the stored procedure.
5	The notification retrieves each row of data from the stored procedure.
6	Each row of data is published using the notification's publishable document. Depending on the stored procedure, the Stored Procedure Notification's publishable documents can contain any of the following: ■ Output parameters: if the called stored procedure has any output parameters, they are contained in any publishable documents for the Stored Procedure Notification. ■ Return values: if the called stored procedure returns any values, then a return value is contained in a publishable document for the Stored Procedure Notification. ■ Single result set (or Oracle REF CURSOR): Stored Procedure Notifications can support one result set. The result set can contain nested cursors. If a call to the stored procedure produces a result set, then the single result set is contained in one or more publishable documents for the Stored Procedure Notification. In some cases, a call to a Stored Procedure Notification can produce a single result set that contains multiple records. In this case, each record will have a separate publishable document, containing one row and one or more columns, that is returned to the adapter. **Note:** When using the result set that contains nested cursors, the performance of Adapter for JDBC could degrade. Since the nested cursors are recursively processed, Adapter for JDBC may also return data that may not be required. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.
7	Using an Integration Server trigger you configured to use the notification's publishable document, a flow or Java service on Integration Server is invoked to react to the data changes contained in the publishable document.

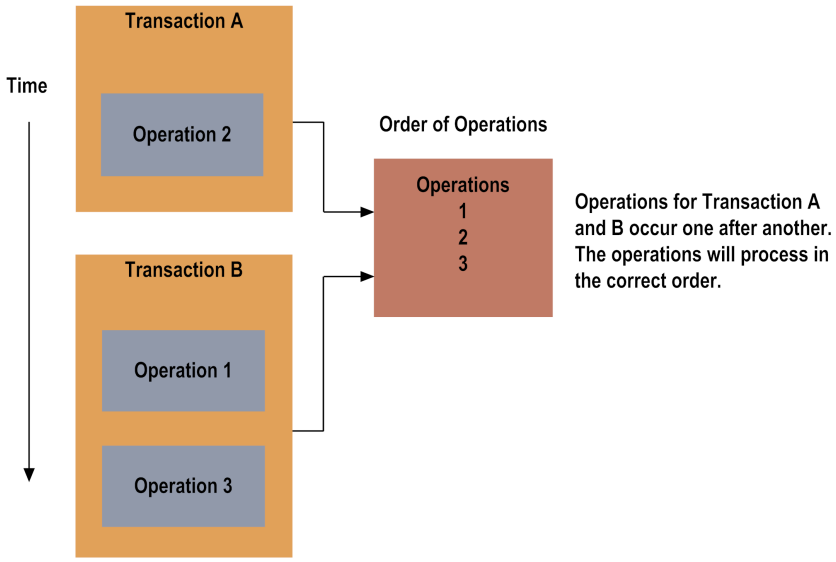
Considerations when Using Ordered Notifications

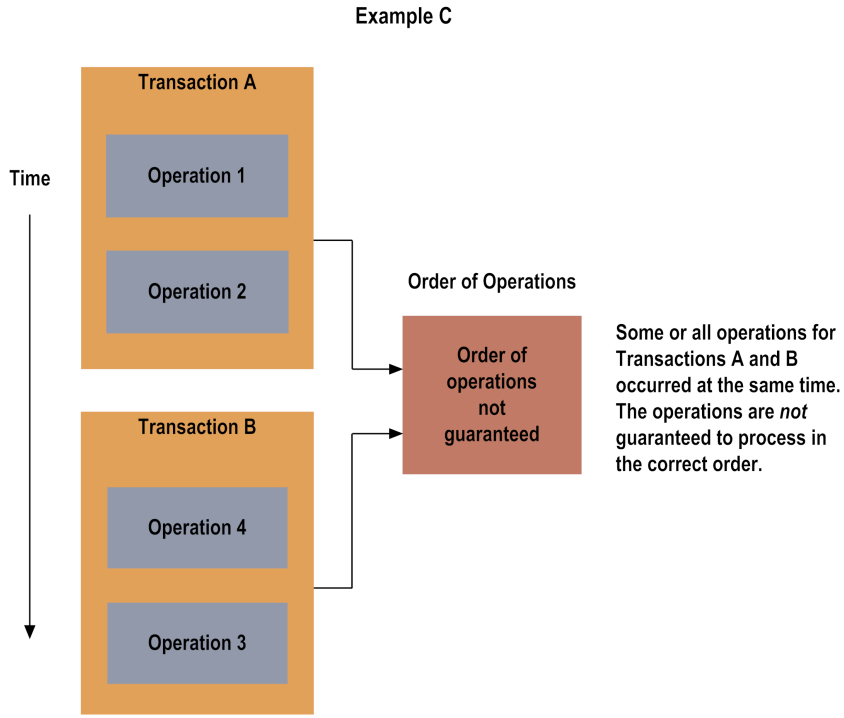
- Use the Ordered Notification only if you need to preserve the order in which the operations occur; otherwise, use Insert Notifications, Update Notifications, and Delete Notifications because they have better performance.
- Ordered Notifications ensure that the operations process in the correct order when they occur sequentially in one transaction; however, order preservation is not guaranteed if the operations occur in concurrent transactions. For example, see the following diagrams. Examples A and B will process operations in the correct order. Example C is not guaranteed to process operations in the correct order.

Example A



Example B





Configuring an Integration Server Trigger and Flow Service

With Ordered Notifications, you typically configure an Integration Server trigger to subscribe to the notification's publishable document and a flow service that the trigger invokes. Because the primary reason to use Ordered Notifications is to preserve the order in which the operations occur, be sure to use the **Processing Mode** option in Designer when you create the trigger and flow service.

For more information about using configuring Integration Server triggers and flow services, see the *webMethods Service Development Help* for your release.

Using Ordered Notifications

Note:
You can create only one trigger for each operation on a table. For each notification, you can configure only one trigger for each table.

The following table lists the tasks required to use this notification:

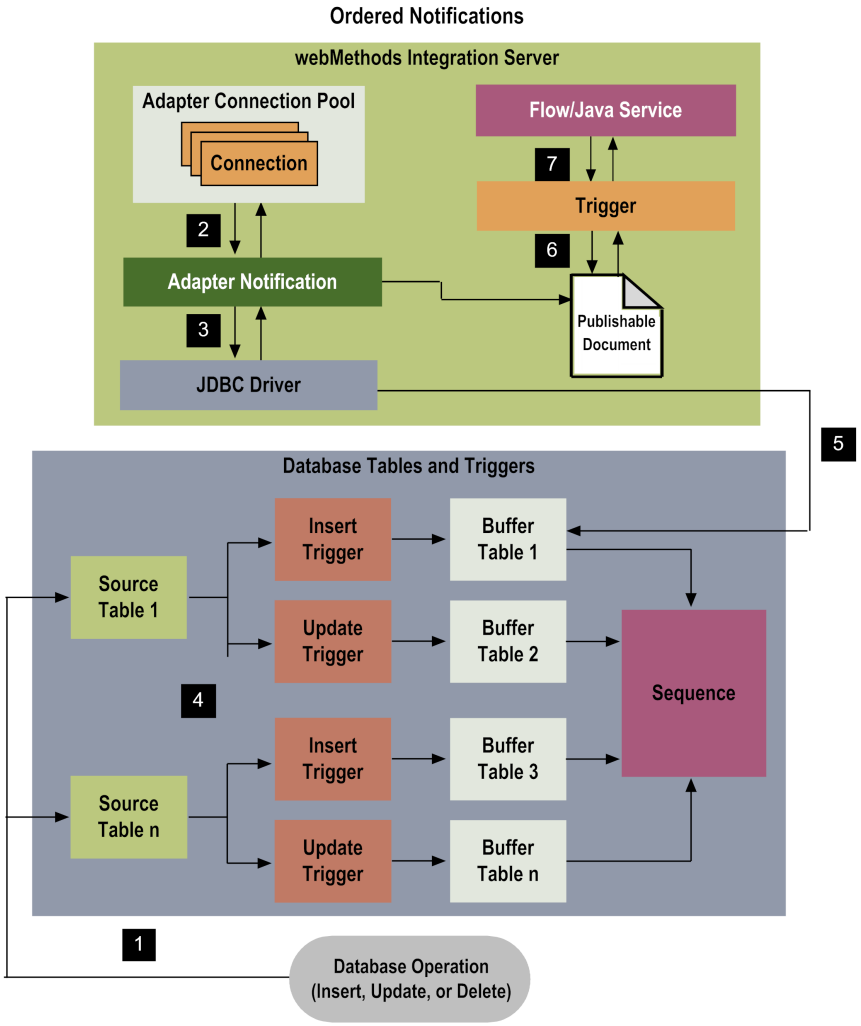
For this task...	Use these tools...
1. Create an adapter connection. For details, see "Overview of Adapter Connections" on page 66.	Integration Server Administrator
2. Configure the notification and specify the: ■ Adapter connection	Designer

For this task...	Use these tools...
■ Source tables ■ Type of operation associated with the Ordered Notification; that is, an insert, update, or delete operation ■ Operation ID you create for each operation ■ Output data fields to be published for each operation ■ Database trigger and buffer table The buffer table will hold the data selected by the trigger. The trigger will monitor the database table and insert data into the buffer table. For more details, see "Ordered Notifications" on page 37. ■ Publishable document to contain the data from the buffer table. There is a single publishable document used for all events associated with the notification. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release. For instructions for configuring this type of notification, see "Configuring OrderedNotifications" on page 165.	
3. If you plan to use an Integration Server flow or Java service, design it to react to the data changes contained in the notification's publishable document. Create the Integration Server trigger to use the notification's publishable document. For details, see the *webMethods Service Development Help* for your release. If you use a trigger, be sure to set the **Processing mode** option to **Serial**. For details, see "Ordered Notifications" on page 37.	Designer
4. Schedule and enable the adapter notification. When you enable the notification, it automatically creates the database trigger, sequence, and buffer table you configured when you created the notification. The Integration Server Scheduler invokes the notification periodically, based on the polling schedule parameters you created earlier, and continues to do so.	Integration Server Administrator

For this task...	Use these tools...
For instruction for scheduling and enabling notifications, see "Managing Polling Notifications" on page 171.	
5. Manage the notification. For details, see "Overview of Package Management" on page 56, "Overview of Adapter Notifications" on page 134, and "Overview of Logging and Exception Handling" on page 194.	Designer and Integration Server Administrator

Ordered Notifications Transaction Processing

The following diagram and steps illustrate what happens when an Ordered Notification is invoked. Integration Server continues to invoke the notification periodically, as defined when you configured the polling schedule parameters for the notification.



Step	Description
1	Ordered Notifications monitor multiple insert, update, or delete operations on one or more tables by creating a single notification using the same publishable document.
2	The notification gets a connection from the service's connection pool. Adapter connections contain connection information for the database, including JDBC driver parameters.
3	The notification uses the JDBC driver to connect to the database. You created and enabled the adapter connection earlier using Integration Server Administrator.
4	The buffer table holds the data selected by the trigger. While the adapter remains enabled, the trigger continues to monitor the database table and insert data into the buffer table. With Ordered Notifications, the adapter creates the trigger, sequence, and buffer tables for each operation you want to monitor when you enable the notification. The database trigger monitors the tables and inserts data into the buffer table. When Integration Server invokes the notification, the notification will poll all of the buffer tables and publish the data in the same order in which the operations occurred. This ensures that the order of the operations is preserved.
5	The notification retrieves the rows of data from the buffer table. Each Ordered Notification generates one row for each operation. The notification uses the Operation ID and an Operation Type field you specified when you configured the notification to uniquely identify this row. The Operation ID is user-defined.
6	The notification creates the publishable document, which contains a row of data, including the Operation ID and Operation Type, from the buffer table. The notification publishes the publishable document.
7	Using an Integration Server trigger you configured to use the notification's publishable document, a flow or Java service on Integration Server is invoked to react to the data changes contained in the publishable document. The flow service that processes the publishable document for the Ordered Notification needs to check the Operation ID field in the document and retrieve data from the record with the name identified by the Operation ID for processing. For example, a flow service checks to see if the Operation ID has a value of UPDATE. If this is true, then the flow service picks up the data from the UPDATE record as input and processes it. If the Operation ID value is INSERT, the flow service picks up data from the INSERT record as input and processes accordingly. For more information about using triggers and flow services with Ordered Notifications, see “Ordered Notifications” on page 37. After the data is published, the data is deleted from the buffer table.

Polling Notification Support in Clusters

Adapter for JDBC provides the ability to enable multiple instances of the same polling notification in your Integration Server clusters, and to coordinate their schedules and execution.

For more information about how to use polling notifications in a clustered environment, see "Polling Notification Support in Clusters" on page 45.

Polling Notifications and States

The following table summarizes the states in which polling notifications can exist and how they affect the triggers, buffer tables, and data processing of a polling notification.

State name	Status of trigger and buffer table when polling notification enters this state	Data processing while in this state	Comments
Enabled	Database trigger and buffer table are created.	The polling notification performs as scheduled.	
Suspended	Database trigger and buffer table persist. Table retains its rows.	The polling notification is removed from the scheduler and does not execute while suspended. Any instances executing at the time the Suspended state is initiated are unaffected.	You can suspend polling notifications in an Enabled state. You cannot suspend polling notifications in a Disabled state. You can copy or export suspended polling notifications. You cannot move, rename, or delete suspended polling notifications.
Disabled	Database trigger and buffer table are dropped.	The polling notification is removed from the scheduler and does not execute.	

The table above applies to Insert Notifications, Update Notifications, Delete Notifications, and Ordered Notifications. However, the table does not apply to Basic Notifications or Stored Procedure Notifications because with these, the resource administrator (not Adapter for JDBC) is responsible for maintaining the trigger and buffer table.

For instructions on enabling, suspending, and disabling polling notifications, see the explanation of the **State** field in "Managing Polling Notifications" on page 171.

Support for Synonyms

Adapter for JDBC provides support for database synonyms.

Important:
Not all JDBC drivers for backends that the adapter supports return synonyms. You can use synonyms only with some of the supported backends.

For information about working with and creating synonyms, see the documentation of your database vendor.

Synonym Support for Oracle Database

To enable synonym support for an Oracle database, you must specify `connectionproperties={includeSynonyms=true}` in the **Other Properties** field for the adapter connection. For information about configuring connections, see "Configuring Adapter for JDBC Connections" on page 68.

The following table lists the adapter services and notifications that support synonyms.

Adapter Services	Adapter Notifications
SelectSQL	Basic Notification
DeleteSQL	Delete Notification
InsertSQL	Insert Notification
UpdateSQL	Ordered Notification
StoredProcedure	Stored Procedure Notification
	Update Notification

Consider the following limitations when using synonyms with adapter services:

- If you want to use synonyms for stored procedures, you cannot use the StoredProcedureWithSignature adapter service. Use the StoredProcedure service instead.
- The SelectSQL, DeleteSQL, InsertSQL, and Update SQL services support synonyms only for database tables and views.

For information about configuring adapter services, see "Overview of Adapter Services" on page 88. For information about configuring adapter notifications, see "Overview of Adapter Notifications" on page 134.

Synonym Support for DB2 UDB

The following table lists the adapter services and notifications that support synonyms for a DB2 Universal Database (UDB).

Adapter Services	Adapter Notifications
SelectSQL	Basic Notification
DeleteSQL	Delete Notification
InsertSQL	Insert Notification
UpdateSQL	Ordered Notification
	Update Notification

Consider the following limitations when using synonyms with adapter services:

- The StoredProcedure and StoredProcedureWithSignature adapter services do not support synonyms because synonyms are treated as an alias table type in DB2 UDB. However, aliases cannot be created for stored procedures.
- The SelectSQL, DeleteSQL, InsertSQL, and Update SQL services support synonyms only for database tables and views.

For information about configuring adapter services, see "Overview of Adapter Services" on page 88. For information about configuring adapter notifications, see "Overview of Adapter Notifications" on page 134.

Forcing a Timeout During Long-Running SQL Operations in Services and Notifications

In Adapter for JDBC services or notifications, some of the SQL operations may take a long time to execute. You can force these services or notifications to time out after a specific amount of time. You specify the number of seconds with the watt.adapter.JDBC.QueryTimeout property.

To set this property, use Integration Server Administrator and select **Settings > Extended > Edit Extended Settings**. Enter this property in the Extended Settings box:

```
watt.adapter.JDBC.QueryTimeout=value
```

where *value* is the number of seconds the adapter waits for the service or the notification to execute before stopping the SQL operation and throwing an exception. For more information about setting the watt properties, see the *webMethods Integration Server Administrator's Guide* for your release.

Using Version Control Systems to Manage Adapter Elements

The adapter supports the Version Control System (VCS) Integration feature provided by Designer. When you enable the feature in Integration Server, you can check adapter packages or elements into and out of your version control system from Designer. For more information about the VCS Integration feature, see the *Administering the VCS Integration Feature*.

Beginning with Integration Server 8.2 SP3, the adapter supports the local service development feature in Designer. This feature extends the functionality of the VCS Integration feature to check package elements and their supporting files into and out of a VCS directly from Designer. For

more information about local service development and how it compares to the VCS Integration feature, see the *webMethods Service Development Help*.

Infrastructure Data Collector Support for Adapter for JDBC

Optimize Infrastructure Data Collector monitors the system and operational data associated with webMethods run-time components such as Integration Servers, Broker Servers, Brokers, and adapters, and reports the status of these components on Optimize for Infrastructure or other external tools. When you start monitoring an Integration Server, Infrastructure Data Collector automatically starts monitoring all ART-based adapters that are installed on the Integration Server.

For information about monitored key performance indicators (KPIs) collected for the monitored adapter components, see the Optimize documentation for your release.

Viewing the Adapter's Update Level

You can view the list of updates that have been applied to the adapter. The list of updates appears in the **Updates** field on the adapter's About page in Integration Server Administrator.

Controlling Pagination

When using the adapter on Integration Server 10.3, you can control the number of items that are displayed on the adapter Connections screen and Notifications screen. By default, 10 items are displayed per page. Click **Next** and **Previous** to move through the pages, or click a page number to go directly to a page.

To change the number of items displayed per page, set the watt.art.page.size property and specify a different number of items.

To set the number of items per page

1. From Integration Server Administrator, click **Settings > Extended**.
2. Click **Edit Extended Settings**. In the Extended Settings editor, add or update the watt.art.page.size property to specify the preferred number of items to display per page. For example, to display 50 items per page, specify:

   ```
   watt.art.page.size=50
   ```

3. Click **Save Changes**. The property appears in the Extended Settings list.

   For more information about working with extended configuration settings, see the *webMethods Integration Server Administrator's Guide* for your release.

2 Installing, Upgrading, and Uninstalling Adapter for JDBC

Overview of Installing, Upgrading, and Uninstalling Adapter for JDBC

This chapter explains how to install, upgrade, and uninstall Adapter for JDBC. The instructions use the Software AG Installer and the Software AG Uninstaller wizards. For complete information about the wizards or other installation methods, or to install other webMethods products, see *Installing webMethods Products On Premises* for your release.

Requirements

For a list of operating systems, RDBMSs, and webMethods products supported by Adapter for JDBC, see *webMethods Adapters System Requirements*.

Adapter for JDBC has no hardware requirements beyond those of its host Integration Server.

The Integration Server Home Directory

You can create and run multiple Integration Server instances under a single installation directory. Each Integration Server instance has a home directory under *Integration Server_directory*\instances*instance_name* that contains the packages, configuration files, log files, and updates for the instance.

For more information about running multiple Integration Server instances, see the *webMethods Integration Server Administrator's Guide* for your release.

This guide uses the packages_directory as the home directory in Integration Server classpaths. The packages_directory is *Integration Server_directory*\instances*instance_name*\packages directory.

Installing Adapter for JDBC

Note:
If you are installing Adapter for JDBC in a clustered environment, you must install the adapter on each Integration Server in the cluster, and each installation must be identical. For more information about working with Adapter for JDBC in a clustered environment, see "Adapter for JDBC in a Clustered Environment" on page 59.

To install Adapter for JDBC

1. Download Installer from the Empower Product Support website.

2. If you are installing the adapter on an existing Integration Server, shut down the Integration Server.

3. Start the Installer wizard.

4. Choose the webMethods release that includes the Integration Server on which you want to install the adapter. For example, if you want to install the adapter on Integration Server 10.3, choose the 10.3 release.

5. Specify the installation directory as follows:

   - If you are installing on an existing Integration Server, specify the webMethods installation directory that contains the host Integration Server.
   - If you are installing both the host Integration Server and the adapter, specify the installation directory to use.

6. In the product selection list, select **Adapters > webMethods Adapter 10.3 for JDBC**.

   You can choose to install the package in the default instance. In this case, Software AG Installer installs the adapter in both locations, *Integration Server_directory*\packages and the default instance packages directory located in *Integration Server_directory*\instances\default\packages.

7. To download the documentation for the adapter, go to Software AG Documentation website.

8. After the installation completes, close the Installer and start the host Integration Server.

9. See "Installing a JDBC Driver on Integration Server" on page 67 for instructions on installing a compatible JDBC driver.

Installing Adapter for JDBC using Microservices Container

To install Adapter for JDBC using Microservices container

1. Download Installer from the Empower Product Support website.

2. If you are installing the adapter on an existing Integration Server, shut down the Integration Server.

3. Start the Installer wizard.

4. Specify the installation directory as follows:

   - If you are installing on an existing Integration Server, specify the webMethods installation directory that contains the host Integration Server.
   - If you are installing both the host Integration Server and the adapter, specify the installation directory to use.

5. In the product selection list, select **Adapters** > **webMethods Adapter 10.3 for JDBC**.

   From the Software AG Installer dialogue box, select the **Microservices Container 10.1**.

6. Expand Infrastructure and then Libraries.

   In the expanded list of options in libraries, select the **Database Driver Libraries 10.1** check box.

7. To download the documentation for the adapter, go to Software AG Documentation website.

8. After the installation completes, close the Installer and start the host Integration Server.

9. For more information on Microservices Container, see *Developing Microservices with webMethods Microservices Runtime*.

Upgrading to Adapter 10.3 for JDBC

You can upgrade to Adapter 10.3 for JDBC from Adapter 9.10 for JDBC.

Before upgrading you can choose to archive the existing adapter package. Archiving creates a copy of the adapter package which enables you to revert to the earlier adapter package later if necessary.

Archiving

To archive the existing adapter

1. Navigate to **Packages > Management** in Integration Server Administrator.

2. Locate WmJDBCAdapter and click the icon  in the Archive column.

   The Archive page is displayed in Integration Server Administrator with the list of all files to be archived.

   By default, **Full** Archive Type is selected.

3. Click **Create Archive**.

   Integration Server creates a copy of the adapter package in the *Integration Server_directory*\replicate\outbound directory.

Upgrading

To upgrade to Adapter 10.3 for JDBC

1. Uninstall the existing adapter and delete the package using the instructions in "Uninstalling Adapter for JDBC" on page 53.

2. Install Adapter for JDBC using the instructions in "Installing Adapter for JDBC" on page 50.

Reverting

To revert to the earlier adapter

1. Uninstall the existing adapter and delete the package using the instructions in "Uninstalling Adapter for JDBC" on page 53.

2. Copy the packages_directory`\replicate\outbound\WmJDBCAdapter` to packages_directory`\replicate\inbound` directory.

3. Navigate to **Packages > Management** in Integration Server Administrator.

4. Click **Install Inbound Releases**.

   The Inbound Releases page is displayed in Integration Server Administrator.

5. Select the Release file name from the drop-down list and click **Install Release**.

Uninstalling Adapter for JDBC

To uninstall Adapter for JDBC

1. Shut down the host Integration Server. You do not need to shut down any other webMethods products or applications that are running on your machine.

2. Start Software AG Uninstaller, selecting the webMethods installation directory that contains the host Integration Server.

3. In the product selection list, select **Adapters > webMethdods Adapter 10.3 for JDBC**. You can also choose to uninstall documentation.

4. After Uninstaller completes, restart the host Integration Server.

Uninstaller removes all Adapter for JDBC-related files that were installed. However, Uninstaller does not delete files created after you installed the adapter (for example, user-created or configuration files), nor does it delete the adapter directory structure. You can go to the *Integration Server_directory*\packages directory and *Integration Server_directory*\instances\default\packages directory. Delete the WmJDBCAdapter directory.

3 Package Management

Overview of Package Management

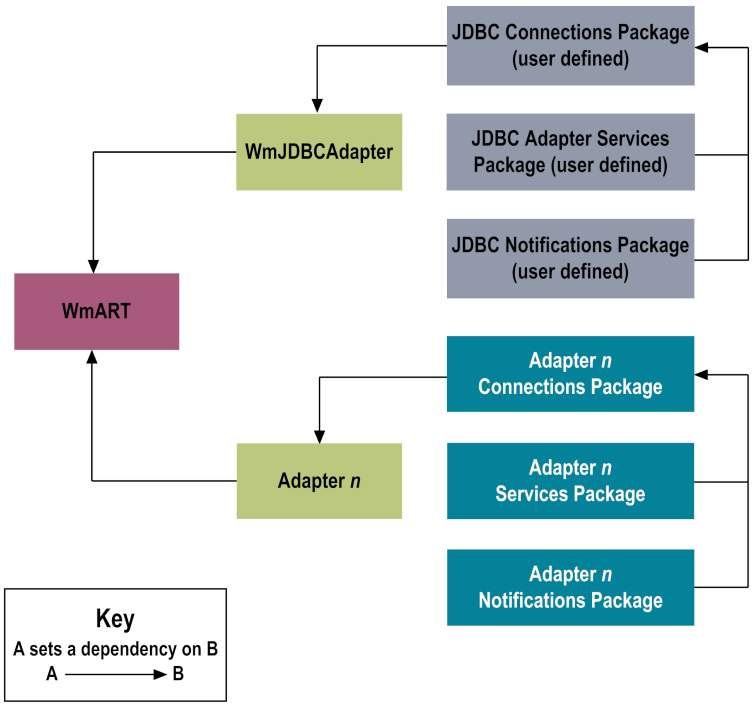
The following sections describe how to set up and manage your Adapter for JDBC packages, set up Access Control Lists (ACLs), and use the adapter in a clustered environment.

Adapter for JDBC Package Management

Adapter for JDBC is provided as a package called WmJDBCAdapter. You manage the WmJDBCAdapter package as you would manage any package on webMethods Integration Server.

When you create connections, adapter services, and adapter notifications, define them in user-defined packages rather than in the WmJDBCAdapter package. Doing so will allow you to manage the package more easily.

As you create user-defined packages in which to store connections, adapter services, and adapter notifications, use the package management functionality provided in Software AG Designer and set the user-defined packages to have a dependency on the WmJDBCAdapter package. That way, when the WmJDBCAdapter package loads or reloads, the user-defined packages load automatically. See the following diagram:



Package management tasks include:

- Setting package dependencies (see "Package Dependency Requirements and Guidelines" on page 57)
- "Enabling Packages" on page 57
- "Importing and Exporting Packages" on page 58

- "Group Access Control" on page 59

Package Dependency Requirements and Guidelines

This section contains a list of dependency requirements and guidelines for user-defined packages. For instructions for setting package dependencies, see the *webMethods Service Development Help* for your release.

- A user-defined package must have a dependency on its associated adapter package, WmJDBCAdapter. (The WmJDBCAdapter package has a dependency on the WmART package.)
- Package dependencies ensure that at startup the Integration Server automatically loads or reloads all packages in the proper order: the WmART package first, the adapter package next, and the user-defined packages last. The WmART package is automatically installed when you install Integration Server. You should not need to manually reload the WmART package.
- If the connections and adapter services of an adapter are defined in different packages, then:
  - A package that contains the connections must have a dependency on the adapter package.
  - Packages that contain adapter services must have a dependency on their associated connection package.
- Keep connections for different adapters in separate packages so that you do not create interdependencies between adapters. If a package contains connections for two different adapters, and you reload one of the adapter packages, the connections for both adapters will reload automatically.
- Integration Server will not allow you to enable a package if it has a dependency on another package that is disabled. That is, before you can enable your package, you must enable all packages on which your package depends. For information about enabling packages, see "Enabling Packages" on page 57.
- Integration Server will allow you to disable a package even if another package that is enabled has a dependency on it. Therefore, you must manually disable any user-defined packages that have a dependency on the adapter package before you disable the adapter package. For information about disabling packages, see "Disabling Packages" on page 58.
- You can name connections, adapter services, and notifications the same name provided that they are in different folders and packages.

Enabling Packages

All packages are automatically enabled by default. Use the following procedure when you want to enable a package that was previously disabled.

To enable a package

1. Open Integration Server Administrator if it is not already open.

2. In the **Packages** menu of the navigation area, click **Management**.

3. Click **No** in the **Enabled** column. The server displays a ✔ and **Yes** in the **Enabled** column.

Note:
Enabling an adapter package will not cause its associated user-defined packages to be reloaded. For information about reloading packages, see the *webMethods Service Development Help* for your release.

Important:
Before you manually enable a user-defined package, you must first enable its associated adapter package (WmJDBCAdapter).

Disabling Packages

When you want to temporarily prohibit access to the elements in a package, disable the package. When you disable a package, the server unloads all of its elements from memory. Disabling a package prevents Integration Server from loading that package at startup.

Important:
If your adapter has multiple user-defined packages, and you want to disable some of them, disable the adapter package first (WmJDBCAdapter). Otherwise, errors will be issued when you try to access the remaining enabled user-defined packages.

To disable a package

1. Open Integration Server Administrator if it is not already open.

2. In the **Packages** menu of the navigation area, click **Management**.

3. Click **Yes** in the **Enabled** column for the package that you want to disable. The server issues a prompt to verify that you want to disable the package. Click **OK** to disable the package. When the package is disabled, the server displays **No** in the **Enabled** column.

A disabled adapter will:

- Remain disabled until you explicitly enable it using Integration Server Administrator.
- Not be listed in Designer.

Importing and Exporting Packages

You import and export packages using Designer. Exporting allows you to export the package to a .zip file and save it to your hard drive. The .zip file can then be imported for use by another package.

Important:

Do not rename packages you export; the rename function is comparable to moving a package, and when you import the renamed package, you lose any triggers, connections, and notifications associated with this package.

For details about importing and exporting packages, see the *webMethods Service Development Help* for your release.

Group Access Control

To control which groups have access to which adapter services, use access control lists (ACLs). For example, you can use ACLs to prevent one development group from inadvertently updating the work of another group, or to allow or deny access to services that are restricted to one group but not to others.

For information about assigning and managing ACLs, see the *webMethods Service Development Help* for your release.

Adapter for JDBC in a Clustered Environment

Clustering is an advanced feature of the webMethods product suite that substantially extends the reliability, availability, and scalability of Integration Server. Clustering accomplishes this by providing the infrastructure and tools to deploy multiple Integration Servers as if they were a single virtual server and to deliver applications that leverage that architecture. Because this activity is transparent to the client, clustering makes multiple servers look and behave as one.

Integration Server 10.3 supports the caching and clustering functionality provided by Terracotta. Caching and clustering are configured at the Integration Server level and Adapter for JDBC uses the caching mechanism that is enabled on Integration Server. Adapter for JDBC does not explicitly implement any clustering or caching beyond what is already provided by Integration Server.

With clustering, you get the following benefits:

- **Load balancing.** This feature, provided automatically when you set up a clustered environment, allows you to spread the workload over several servers, thus improving performance and scalability.
- **Failover support.** Clustering enables you to avoid a single point of failure. If a server cannot handle a request, or becomes unavailable, the request is automatically redirected to another server in the cluster.

  Note:
  Integration Server clustering redirects HTTP and HTTPS requests, but does not redirect FTP or SMTP requests.
- **Scalability.** You can increase your capacity even further by adding new machines running Integration Server to the cluster.

For details on Integration Server clustering, see the *webMethods Integration Server Clustering Guide* for your release.

Polling Notification Support in Integration Server Clusters

Adapter for JDBC enables the coordinated execution of polling notifications within an Integration Server cluster. Adapter for JDBC provides the ability to enable multiple instances of the same polling notification in your cluster, and to coordinate their schedules and execution. This provides enhanced quality of service by allowing configurations for automated failover between notifications and distributed processing of polling notifications.

Important:
Adapter for JDBC supports enabling the same polling notification on multiple Integration Server instances connecting to the same backend database to achieve automated failover, *only* when the multiple Integration Servers share the same ISInternal database. If you attempt to use the same polling notification on multiple Integration Servers pointing to the same backend database but using separate ISInternal databases, you may encounter abnormal results.

With Integration Server 10.3, Adapter for JDBC uses Integration Server Scheduler to support polling notifications. On enabling a polling notification, a new Integration Server scheduled task is created, which polls the backend resource at the given interval. Do not manually edit or change scheduled tasks. Each polling notification creates an Integration Server scheduled task. When a notification is disabled, the scheduled task in Integration Server is removed.

Important:
All adapter polling notifications must be in a disabled state on all nodes in the Integration Server cluster before you disable the cluster.

Considerations for Polling Notifications Executing via Scheduled Tasks

With polling notifications executing via scheduled tasks, ensure that:

- Each notification is present in all cluster nodes at all times.
- The Overlap function for the polling notifications is disabled.
- Polling notifications names do not exceed 400 characters.
- The value of the Integration Server watt.server.scheduler.threadThrottle property should not be lower than the number of total polling notifications and scheduled tasks. By default the value is 75% of the total threads.
- The IS Internal functional alias (specified on the Settings > JDBC Pools screen) is configured with a database.

Note:
You can make scheduled notification tasks visible in the Server > Scheduler page in Integration Server Administrator by setting `watt.pkg.art.scheduler.notificationtask.display=true`

If the parameter is not shown, add it.

Configuring this property is required only for debugging or for editing the polling notification schedule interval.

Adapter Service Support in Clusters

Adapter services are supported in a clustered environment. In order for a cluster to handle requests identically, you should be sure the identical service is in each server in the cluster so that if a given service is not available, the request can be redirected and handled by another server in the cluster.

For more details about adapter services in clusters, see "Clustering Considerations and Requirements" on page 62.

Replicating Packages to Integration Servers

Every Integration Server in the cluster should contain an identical set of packages that you define using Adapter for JDBC; that is, you should replicate the Adapter for JDBC services, the connections they use, and the adapter notifications.

To ensure consistency, we recommend that you create all packages on one server, and replicate them to the other servers. If you allow different servers to contain different services, you might not derive the full benefits of clustering. For example, if a client requests a service that resides in only one server, and that server is unavailable, the request cannot be successfully redirected to another server.

For information about replicating packages, see the *webMethods Integration Server Administrator's Guide* for your release.

Disabling the Redirection of Administrative Services

As mentioned in "Adapter for JDBC in a Clustered Environment" on page 59, a server that cannot handle a client's service request can automatically redirect the request to another server in the cluster. However, Adapter for JDBC uses certain predefined administrative services that you should not allow to be redirected. These services are used internally when you configure the adapter. If you allow these services to be redirected, your configuration specifications might be saved on multiple servers, which is an undesirable result. For example, if you create two Adapter for JDBC services, one might be stored on one server, while the other one might be stored on another server. Remember that all adapter services must reside on all Integration Servers in the cluster.

To disable the redirection of administrative services

1. Shut down Integration Server Administrator. For the procedure to do this, see the *webMethods Integration Server Administrator's Guide* for your release.

2. Open the following file:

   Integration Server_directory\config\redir.cnf

3. Add the following line to the file:

```
<value name="wm.art">false</value>
```

4. Save the file and restart Integration Server.

Clustering Considerations and Requirements

Note:
The following sections assume that you have already configured the Integration Server cluster. For details about webMethods clustering, see the *webMethods Integration Server Clustering Guide* for your release.

The following considerations and requirements apply to Adapter for JDBC in a clustered environment.

Requirements for Each Integration Server in a Cluster

The following table describes the requirements of each Integration Server in a given cluster:

All Integration Servers in a given cluster must have identical...	For Example...
Integration Server versions	All Integration Servers in the cluster must be the same version, with the same service packs and fixes applied.
Adapter packages	All adapter packages on one Integration Server should be replicated to all other Integration Servers in the cluster.
Adapter connections	If you configure a connection to the database, this connection must appear on all servers in the cluster so that any Integration Server in the cluster can handle a given request identically. If you plan to use connection pools in a clustered environment, see "Considerations When Configuring Connections with Connection Pooling Enabled" on page 63.
Adapter services	If you configure a specific InsertSQL Adapter Service, this same adapter service must appear on all servers in the cluster so that any Integration Server in the cluster can handle the request identically. If you allow different Integration Servers to contain different services, you might not derive the full benefits of clustering. For example, if a client requests a service that resides on only one server, and that server is unavailable, the request cannot be successfully redirected to another server.
Adapter notifications	If you configure a specific Insert notification, this same adapter notification must appear on all servers in the cluster so that any Integration Server in the cluster can handle the request identically. If you allow different Integration Servers to contain different notification, you might not derive the full benefits of clustering. For example, if a

All Integration Servers in a given cluster must have identical...	For Example...
	notification executes on only one server, and that server is unavailable, the notification cannot be successfully redirected to another server.

For information about replicating adapter packages, connections, adapter services, and adapter notifications across multiple Integration Servers in a cluster, see "Replicating Packages to Integration Servers" on page 61.

Considerations When Installing Adapter for JDBC Packages

For each Integration Server in the cluster, use the standard Adapter for JDBC installation procedures for each machine, as described in "Overview of Installing, Upgrading, and Uninstalling Adapter for JDBC" on page 50.

Considerations When Configuring Connections with Connection Pooling Enabled

When you configure a connection that uses connection pools in a clustered environment, be sure that you do not exceed the total number of connections that can be opened simultaneously for that database.

For example, if you have a cluster of two Integration Servers with a connection configured to a database that supports a maximum of 100 connections opened simultaneously, the total number of connections possible at one time must not exceed 100. This means that you cannot configure a connection with an initial pool size of 100 and replicate the connection to both servers, because there could be possibly a total of 200 connections opened simultaneously to this database.

In another example, consider a connection configured with an initial pool size of 10 and a maximum pool size of 100. If you replicate this connection across a cluster with two Integration Servers, it is possible for the connection pool size on both servers to exceed the maximum number of database connections that can be open at one time.

For information about configuring connections for Adapter for JDBC, see "Overview of Adapter Connections" on page 66.

For more general information about connection pools, see the *webMethods Integration Server Administrator's Guide* for your release.

4 Adapter for JDBC Connections

Overview of Adapter Connections

This chapter describes how to configure and manage Adapter for JDBC connections. For more information about how adapter connections work, see "Adapter Connections" on page 15.

Before Configuring or Managing Adapter Connections

Perform the following steps before configuring or managing adapter connections.

To prepare to configure or manage adapter connections

1. Install webMethods Integration Server and Adapter for JDBC on the same machine. For details, see "Overview of Installing, Upgrading, and Uninstalling Adapter for JDBC" on page 50.

2. Install a compatible JDBC driver. For instructions, see "Installing a JDBC Driver on Integration Server" on page 67. For a list of supported drivers, see *webMethods Adapters System Requirements*.

3. Make sure you have Integration Server administrator privileges so that you can access Adapter for JDBC's administrative screens. For information about setting user privileges, see the *webMethods Integration Server Administrator's Guide* for your release.

4. Be sure to check for a list of known driver limitations because it may affect how you configure your connections.

5. Start your Integration Server and Integration Server Administrator, if they are not already running.

6. Using Integration Server Administrator, make sure the WmJDBCAdapter package is enabled. For instructions, see "Enabling Packages" on page 57.

7. Using Designer, create a user-defined package to contain the connection, if you have not already done so. For more information about managing packages for the adapter, see "Adapter for JDBC Package Management" on page 56.

8. If you use Oracle JDBC OCI drivers, you must set an environment variable before you can configure the connection. For details, see "Setting the Environment Variable for Oracle JDBC OCI Drivers" on page 283.

   If you use Oracle JDBC OCI drivers with Oracle OCI Instant Client, then copy the following client library files before you set the environment variable:

   - ojdbc5.jar and ojdbc6.jar files to the two locations, *Integration Server_directory*`\lib\jars` and *Integration Server_directory*`\instances\`*`instance_name`*`\lib\jars`.
   - All the other client library files to the two locations, *Integration Server_directory*`\lib` and *Integration Server_directory*`\instances\`*`instance_name`*`\lib`.

Installing a JDBC Driver on Integration Server

You must install a JDBC driver on Integration Server before you can specify connections. Integration Server requires access to the Java classes for each JDBC driver that it uses to connect to a database. For a list of supported drivers, see *webMethods Adapters System Requirements*.

You can install the JDBC driver in two modes:

- *Default or Single Version*
- *Multiple Version*

Warning:
The *Default or Single Version* and *Multiple Version* modes are mutually exclusive. At any given point of time, you can use the JDBC driver(s) in one mode only.

Installing Default or Single Version of JDBC Driver on Integration Server

To install default or single version of JDBC driver on Integration Server:

1. Place the JDBC driver JAR file(s) in the classpath of Integration Server, typically in *Integration Server_directory*`/instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars` folder.

2. Restart Integration Server.

   Integration Server uses the JAR file(s) added to its classpath after the restart.

Installing Multiple Versions of JDBC Driver on Integration Server

To install multiple versions of JDBC driver on Integration Server:

1. If you want to use multiple versions of JDBC drivers, then perform the following steps for each version:

   a. Create a new folder with a meaningful name in *Integration Server_directory*`/instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars`. For example, folder `oracleV8` to contain Oracle Version 8 JAR file(s).

   b. Place the JDBC driver JAR file(s) in the folder.

      Note:
      Ensure that none of the related driver JAR file(s) of other versions are placed inside any of the classpaths of Integration Server:

- *Default driver group classpath*: *Integration Server_directory*/`instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars`
- *Static folder classpath*: *Integration Server_directory*/`instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars/static`
- *Integration Server common library classpath*: *Integration Server_directory*/`common/lib`

For example, if you want to use multiple Oracle specific JAR file(s) such as `ojdbc8.jar` and `ojdbc6.jar`, you must perform the following:

1. Create two new folders `oracleV8` and `oracleV6` in *Integration Server_directory*/`instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars`. Similarly, you can create folders for other databases with the following names:
   - `mssqlV11`
   - `mssqlV10`
   - `mssqlV8`
   - `mysqlV8`
   - `mysqlV5.1.40`
2. Place the respective JDBC driver JAR file(s) in this folder. For example:
   a. `ojdbc6.jar` JAR file in *Integration Server_directory*/`instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars/oracleV6` folder.
   b. `ojdbc8.jar` JAR file in *Integration Server_directory*/`instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars/oracleV8` folder.

   You can see **oracleV8** and **oracleV6** in the **Driver Group** dropdown in the JDBC Connection page.
3. In the JDBC Connection page, select the **Driver Group** based on your requirements.

Note:
Ensure that none of the related driver JAR file(s) of other versions are placed inside any of the classpaths of Integration Server: *Default driver group classpath*, *Static folder classpath* or *Integration Server common library classpath*.

Configuring Adapter for JDBC Connections

When you configure Adapter for JDBC connections, you specify information that Integration Server uses to connect to a JDBC system. You can configure Adapter for JDBC connections either manually using the Integration Server Administrator screen or programmatically using the pub.jdbcAdapter:createConnectionNodes service.

Note:
If you use Oracle JDBC OCI drivers with Adapter for JDBC, you must add an environment variable setting before you configure adapter connections. For details, see "Setting the Environment Variable for Oracle JDBC OCI Drivers" on page 283.

To configure an adapter connection

1. In the **Adapters** menu in Integration Server Administrator's navigation area, click **webMethods Adapter for JDBC**.

2. On the Connections screen, click **Configure New Connection**.

3. On the Connection Types screen, select the **Connection Type**:

   - **webMethods Adapter for JDBC Connection**
   - **webMethods Adapter for JDBC SSL Connection**

4. In the **Configure Connection Type > webMethods Adapter for JDBC** section, configure the following fields:

Field	Description/Action
Package	Package in which to create the connection. Use Designer to create the package before specifying the value in this field. For general information about creating packages, see the *webMethods Service Development Help* for your release. **Note:** Configure the connection in a user-defined package rather than in the adapter's package. For other important considerations when creating packages for Adapter for JDBC, see "Adapter for JDBC Package Management" on page 56.
Folder Name	Folder in which to create the connection.
Connection Name	Name you want to give to the connection. Connection names cannot have spaces or use special characters reserved by Integration Server and Designer. For more information about the use of special characters in package, folder, and element names, see the *webMethods Service Development Help* for your release.

5. In the **Connection Properties** section, use the following fields:

   Note:
   The following table shows suggested values for these parameters as guidance only. For more information about what values to assign to these parameters, see your JDBC driver documentation.

   a. Specify the **Transaction Type**, **Driver Group**, and **DataSource Class** fields as follows:

Field	Description/Action
Transaction Type	Type of transaction support that the connection provides. Select one of the following transaction types: ■ **NO_TRANSACTION**: Connection automatically commits operations. ■ **LOCAL_TRANSACTION**: Connection uses local transactions. If you plan to use the connection with BatchInsertSQL or BatchUpdateSQL adapter services, you must specify LOCAL_TRANSACTION type. **Note:** If you are configuring a Basic Notification and using the **Exactly Once Notification** and **Delete selected records** options, you must configure the notification to use a LOCAL_TRANSACTION connection. For information about these specific configuration options, see "Configuring BasicNotifications" on page 151. ■ **XA_TRANSACTION**: Connection uses XA transactions. For a more detailed description of the transaction support provided by Adapter for JDBC, see "Transaction Management of Adapter Connections" on page 16.
Driver Group	Enables you to use multiple versions of the JDBC driver JAR file(s) which are used to connect to different versions of the database. ■ The **Driver Group** field lists the *Default* and the user created folders located at *Integration Server_directory*/`instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars`. ■ *Default or Single Version*: If you want to use a single version of JDBC driver, then place the JAR file(s) in the *Integration Server_directory*/`instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars` folder which is the represented by the **Default** value in the **Driver Group** field. This is the default and existing behavior. ■ *Multiple Version*: If you want to use multiple versions of JDBC drivers, then perform the following for each version: 1. Create a new folder in *Integration Server_directory*/`instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars` folder. 2. Place the respective JDBC driver JAR file(s) in this folder. **Note:** Ensure that none of the related driver JAR file(s) of other versions are placed inside any of the classpaths of Integration Server: ■ *Default driver group classpath*: *Integration Server_directory*/`instances/`*`instance_name`*`/packages/WmJDBCAdapter/code/jars`

Field	Description/Action
	■ *Static folder classpath*: *Integration Server_directory*/`instances/`*instance_name*`/packages/WmJDBCAdapter/code/jars/static` ■ *Integration Server common library classpath*: *Integration Server_directory*`/common/lib` For more information, see "Installing a JDBC Driver on Integration Server" on page 67. **Warning:** **The *Default or Single Version* and *Multiple Version* modes are mutually exclusive. At any given point of time, you can use the JDBC driver(s) in one mode only.**
DataSource Class	Name of the JDBC driver's DataSource or XADataSource class. Type the DataSource or XADataSource class names, depending on the JDBC driver and transaction type that the connection will use. For more information about the datasource for different databases, see "JDBC Driver Specific Properties" on page 255.

b. Depending on the driver type, some or all of the following fields are required.

Note:
If you use a DataDirect Connect for JDBC driver you must create the package and port information you enter from this tab. For details, see DataDirect Connect documentation.

Field	Description/Action
Server Name	Name of the server that hosts the database.
User*	Username that the connection will use to connect to the database.
Password*	Password for the database user name specified in **user**. **Note:** You can also update the password programmatically using the pub.jdbcAdapter:updateConnectionPassword service.
Retype Password	Retype the password you just entered.
Database Name	Database to which the connection will connect.
Port Number	Port number that the connection must use to connect to the database.

Field	Description/Action
Network Protocol	A standard JDBC DataSource property to indicate the name of the network protocol that the connection will use when connecting to the database.

Other Properties	Property specific to the database. You can specify database specific property settings, table filter property settings, transaction isolation level settings, and driver-dependent property settings in this field.
	■ Use ; (semi-colons) to delimit multiple property settings: TableFilter settings, transaction isolation level settings, and driver-dependent settings.
	`TableFilter='<current catalog>'.'Accounting'.'Finance';`
	`selectMethod=cursor;transactionIsolation=2`
	■ Use { } to delimit a combination of multiple key value pairs that use ; (semi-colons) as delimiters.
	`TableFilter='<current catalog>'.'Accounting';driverType=oci;`
	`connectionProperties={oracle.jdbc.V8Compatible=true,includeSynonymns=true};`
	`transactionIsolation=2`
	Note:
	Do not enter spaces after the semi-colon.

c. Complete the following fields that appear only if you select **webMethods Adapter for JDBC SSL Connection** as the **Connection Type**.

Field	Description/Action
TrustStore Alias/File Path	Alias for the truststore file or the fully qualified file name of the SSL truststore.
TrustStore Password*	Password for the SSL truststore.
Retype TrustStore Password	Retype the password you just entered.
KeyStore Alias/File Path	Alias for the keystore file or the fully qualified file name of the SSL keystore.
KeyStore Password	Password for the SSL keystore.
Retype KeyStore Password	Retype the password you just entered.

Note:
For more information about configuring keystore aliases and truststore aliases for securing communication with Integration Server, see *webMethods Integration Server Administrator's Guide*.

Note:

For more information about JDBC driver specific connection properties, see "JDBC Driver Specific Properties" on page 255.

6. In the **Connection Management Properties** section, use the following fields:

Field	Description/Action
Enable Connection Pooling	Enables the connection to use connection pooling. For more information about connection pooling, see "Adapter Connections" on page 15. **Note:** If you plan to enable connection pooling in a clustered environment, consider the connection pool size. For details, see "Considerations When Configuring Connections with Connection Pooling Enabled" on page 63.
Minimum Pool Size	If connection pooling is enabled, this field specifies the number of connections to create when the connection is enabled. The adapter will keep open the number of connections you configure here regardless of whether these connections become idle.
Maximum Pool Size	If connection pooling is enabled, this field specifies the maximum number of connections that can exist at one time in the connection pool.
Pool Increment Size	If connection pooling is enabled, this field specifies the number of connections by which the pool will be incremented if connections are needed, up to the maximum pool size.
Block Timeout	If connection pooling is enabled, this field specifies the number of milliseconds that Integration Server will wait to obtain a connection with the database before it times out and returns an error. For example, you have a pool with **Maximum Pool Size** of 20. If you receive 30 simultaneous requests for a connection, 10 requests will be waiting for a connection from the pool. If you set the **Block Timeout** to 5000, the 10 requests will wait for a connection for 5 seconds before they time out and return an error. If the services using the connections require 10 seconds to complete and return connections to the pool, the pending requests will fail and return an error message stating that no connections are available. If you set the **Block Timeout** value too high, you may encounter problems during error conditions. If a request contains errors that delay the response, other requests will not be sent. This setting must be tuned in conjunction with the **Maximum Pool Size** to accommodate such bursts in processing.
Expire Timeout	If connection pooling is enabled, this field specifies the number of milliseconds that an inactive connection can remain in the pool before it is closed and removed from the pool. The connection pool will remove inactive connections until the number of connections in the pool is equal to the **Minimum Pool Size**. The inactivity timer for a connection is reset when the connection is used by the adapter.

Field	Description/Action
	If you set the **Expire Timeout** value too high, you may have a number of unused inactive connections in the pool. This consumes local memory and a connection on your backend resource. This could have an adverse effect if your resource has a limited number of connections. If you set the **Expire Timeout** value too low, performance could degrade because of the increased activity of creating and closing connections. This setting must be tuned in conjunction with the **Minimum Pool Size** to avoid excessive opening/closing of connections during normal processing.
Startup Retry Count	Number of times that the system must attempt to initialize the connection pool at startup if the initial attempt fails. The default is `0`.
Startup Backoff Timeout	Number of seconds that the system must wait between attempts to initialize the connection pool.
Heart Beat Interval	If the connection pooling is enabled and the minimum pool size is more than zero, the **Heart Beat Interval** is applicable. The connection pool checks the connectivity of the connections that are idle for the value of **Heart Beat Interval**. The default value for **Heart Beat Interval** is zero and it is mentioned in seconds. For example, if the value of **Heart Beat Interval** is 25 seconds, connection pool looks for connection that are idle for 25 seconds. If the connection is broken then the connection pool is reset. The feature is applicable for Integration Server 10.5 and all subsequent versions.

7. Click **Save Connection**.

   The connection you created appears on the adapter's Connections screen and in Designer.

   You can enable a connection only if the parameters for the connection are valid.

Configuring Database Common Connection Properties

Table Filter Property Settings

Specify table filter property settings to limit the list of catalogs, schemas, and tables you select when you create adapter services and notifications. This setting is beneficial if you work with large databases.

Note:
Use a ; (semi-colon) to delimit table filter, transaction isolation level, and driver-dependent property settings. Do not enter spaces after the semi-colon. For example: `TableFilter='<current catalog>'.'Accounting';driverType=oci`

Use the following format to enter table filter property settings in the **Other Properties** field:

```
TableFilter='catalog1'.'schema1'.'table1',
'catalog2'.'schema2'.'table2','catalogN'.'schemaN'
```

For example:

```
TableFilter='Payables'.'Accounting'.'Finance'
```

Note:
The `TableFilter` setting is case-sensitive. Be sure that the names you enter match the names in the database table. If you use `'<current catalog>'` or `'<current schema>'` described below, be sure that you use all lowercase letters.

When configuring the `TableFilter` property, you can use the following rules:

Use	Purpose
<current catalog>	Use the *catalog* for the default login catalog. **Note:** Informix databases automatically access the current catalog only.
<current schema>	Use the *schema* for the login user.
table	Table name pattern. The *table* is an optional field. If you do not specify a *table* value, Adapter for JDBC loads all of the tables for the schema. The following example lists all the tables under the Accounting schema: `TableFilter='<current catalog>'.'Accounting'`

% (percent)	Use the % to match any substring of zero or more characters. The following example lists all the tables under the Accounting schema named Finance, Finance1, FinanceDept, and so forth:
	`TableFilter='<current catalog>'.`
	`'Accounting'.'Finance%'`

, (commas)	Use the , to list multiple TableFilter settings. Do not enter spaces after the comma. For example:
	`TableFilter='<current catalog>'.'Accounting'.`
	`'Finance_','<current catalog>'.'Employee%'`

_ (underscore)	Use the _ to match any one character. The following example lists all the tables under the Accounting schema named Finance1, Finance2, Finance3, and so forth: `TableFilter='<current catalog>'.'Accounting'.'Finance_'`
; (semi-colons)	Use the ; to delimit multiple property settings: TableFilter settings, transaction isolation level settings, and driver-dependent settings. Do not enter spaces after the semi-colon. For example: `TableFilter='<current catalog>'.'Accounting'.`

Use	Purpose
	`'Finance_','<current catalog>'.'Accounting';transactionIsolation=2;driverType=thin`

Transaction Isolation Level Settings

Specify transaction isolation level settings to set the transaction isolation level for a database. This setting prevents dirty read, repeatable read, and phantom read of the database. For more information about the transaction isolation level settings in Adapter for JDBC, see "Transaction Isolation Level Settings" on page 16.

Note:
Use a ; (semi-colon) to delimit table filter, transaction isolation level, and driver-dependent property settings. Do not enter spaces after the semi-colon. For example: `TableFilter='<current catalog>'.'Accounting';driverType=oci`

Use the following format to specify the transaction isolation levels of the database:

```
transactionIsolation=value
```

where *value* is the integer value of the transaction isolation level.

For example, `transactionIsolation=2`, where `2` sets the TRANSACTION_READ_COMMITTED isolation level.

You can specify only one transaction isolation level for a connection. The commonly used transaction isolation levels and their values are:

Transaction Isolation Settings	Value
TRANSACTION_READ_UNCOMMITTED	1
TRANSACTION_READ_COMMITTED	2
TRANSACTION_REPEATABLE_READ	4
TRANSACTION_SERIALIZABLE	8

For information about the transaction isolation levels supported by your database, refer to your database documentation.

If you do not specify the isolation level in the **Other Properties** field, the default isolation level of the database is considered. If you specify an isolation level that is not supported by the database, an error is thrown while enabling the connection.

Driver-dependent Property Settings

Specify driver-dependent property settings to provide additional JDBC driver DataSource properties depending on the driver that you use. Use the following format:

```
propertyName=value
```

In the **Other Properties** field, type the driver-dependent parameters based on the JDBC driver and the transaction type the connection is using.

For more information about the database specific properties, see "JDBC Driver Specific Properties" on page 255.

Kerberos Authentication

Kerberos is an authentication protocol that uses symmetric encryption and a trusted third-party system to validate the identity of clients. The Kerberos protocol provides authentication over open and insecure networks in which communication between the hosts can be intercepted. You can use Integration Server to enable and configure Kerberos authentication for service requests.

Pre-requisites: The `krb5.conf` file from the Key Distribution Center(KDC).

1. Configure the `krb5.conf` in Integration Server Administrator.

   a. Start Integration Server Administrator.

   b. Go to **Security** > **Kerberos**.

   c. Click **Edit Kerberos Settings**.

   d. Go to **Security** > **Kerberos** > **Edit** page.

   Provide the following information in **Kerberos Settings** section:

Field	Description
Realm	Optional. Domain name of the Kerberos server, in all uppercase letters.
Key Distribution Center Host	Optional. Host name of the machine on which the KDC resides.
Kerberos Configuration File	Location of the Kerberos configuration file that contains the Kerberos configuration information, including the locations of KDCs, defaults for the realm and for Kerberos applications, and the host names and Kerberos realms mappings
Use Subject Credentials Only	Specifies whether Integration Server requires a Kerberos V5 Generic Security Services (GSS) mechanism to obtain the necessary credentials from an existing subject set up by the JAAS authentication module.

   For more information about configuring Integration Server to use Kerberos, see *webMethods Integration Server Administrator's Guide*.

2. Add the login module in *Integration Server_directory*\instances\<*instance_name*>\config\is_jaas.cnf file. The is_jaas.cnf file is provided by Integration Server and located in *Integration Server_directory*\instances\<*instance_name*>\config directory.

   If you decide to create a login module configuration file, the file must follow this format:

   ```
   <name> {
       <LoginModule> <flag> <LoginModule options>;
       <optional_additional_LoginModules, flags_and_options>;
   };
   ```

   Example of a login module configuration file for Microsoft SQL Server JDBC driver:

   ```
   SQLJDBCDriver {
      com.sun.security.auth.module.Krb5LoginModule required useTicketCache=true;
   };
   ```

   Note:
   The name of the login module configuration file can be fixed or variable, depending on the driver, and can be optionally passed as a connection property. For Microsoft SQL Server JDBC driver, the name of the login module configuration file can optionally be passed using connection property jaasConfigurationName, thereby allowing each connection to have its own login configuration.

3. You can utilize Kerberos authentication in two ways.

   - **Kerberos ticket cache**

     Example of Kerberos ticket cache authentication for Microsoft SQL Server JDBC driver:

     ```
     SQLJDBCDriver {
        com.sun.security.auth.module.Krb5LoginModule required useTicketCache=true;

     };
     ```

   - **Kerberos keytab file**

     The keytab file specifies the service principal. Example of Kerberos keytab file authentication for Microsoft SQL Server JDBC driver:

     ```
     SQLJDBCDriver {
     com.sun.security.auth.module.Krb5LoginModule
     required useKeyTab=true
     keyTab="c:\softwareag\joe_analyst.keytab"
     principal="joe_analyst/xxx.eur.ad.sag@example.com";
     };
     ```

4. Configure the **Other Properties** field in JDBC Connection.

   For example a Microsoft SQL Server JDBC driver:

   ```
   integratedSecurity=true;authenticationScheme=JavaKerberos
   ```

General Constraints

- When you reload the adapter values after modifying an existing StoredProcedureWithSignature service at the backend, the service parameters are updated, but the input fields are not updated. To work around this limitation:
  - Add new arguments to the end of the argument list in the stored procedure definition. Do not add new arguments in-between existing arguments in the list.
  - When you change the order of the service parameters, you must re-edit the input fields for the parameters manually.

Dynamically Changing a Service's Connection at Run Time

You can run a service using a connection other than the default connection that was associated with the service when the service was created.

Important:
At run time, you can change either the credentials (user name and password) or the connection name associated with a specific service, but not both at the same time. If you override both the credentials and the connection name, Adapter for JDBC takes into account only the connection name override.

To override the default connection, you must code your flow to pass a value through the pipeline into a service's $connectionName field.

For example, you have a flow whose primary purpose is to update a production database. However, you want the flow to have the capability to update a test database, with the decision of which database to update to be made programmatically at runtime. The output signature of the flow's first service contains a field called Target. The flow could branch based on the value in Target. If Target contains the value Production, the second service in the flow would ignore $connectionName, thus using its default connection to connect to (and then update) the production database. However, if Target contains the value Test, the second service in the flow would use the value in the $connectionName from the pipeline and connect to (and then update) the test database.

Keep in mind these restrictions when using dynamic connections:

- Both connections, the default and override, must use the same database schema.
- The connection with which you override the default (that is, the value provided for $connectionName) must be configured to use the same transaction type as the default connection.

For more information, see "Changing the Connection Associated with an Adapter Service at Run Time" on page 23.

Dynamically Changing the User Credentials of a Service's Connection at Run Time

In Adapter for JDBC, you can dynamically provide the user name and password credentials associated with a specific adapter service at run time. This capability enables you to override the connection that is associated with the adapter service at design time. If you provide the user name and password credentials in an adapter service at run time, Adapter for JDBC connects to the database using the new credentials, along with the other connection parameters associated with the service's associated connection. If you do not provide any user credentials at run time, Adapter for JDBC connects to the database using the user credentials provided at design time.

For more information, see "Changing the User Credentials of a Service's Associated Connection at Run Time" on page 23.

Viewing Adapter Connection Parameters

You can view a connection's parameters from Integration Server Administrator and Designer.

Using Integration Server Administrator to View Adapter Connection Parameters

Perform the following steps to view adapter connection parameters in Integration Server Administrator.

To view the parameters for a connection using Integration Server Administrator

1. In the **Adapters** menu in Integration Server Administrator's navigation area, click **webMethods Adapter for JDBC**.

   When using the adapter with Integration Server 8.0 and later, you can sort and filter the list of connections that appears on the Connections screen.

   - To sort information on the Connections screen, click the **Up** and **Down** arrows at the top of the column you want to sort.
   - To filter the list of connections:

     1. On the Connections screen, click **Filter Connections**.
     2. Type the criterion by which you want to filter into the **Filter criteria** box. Filtering is based on the node name, not the connection alias. To locate all connections containing specific alphanumeric characters, use asterisks (*) as wildcards. For example, if you want to display all connections containing the string "abc", type `*abc*` in the **Filter criteria** box.
     3. Click **Submit**. The Connections screen displays the connections that match the filter criteria.

4. To re-display all connections, click **Show All Connections**.

   The Connections screen appears, listing all the current connections. You can control the number of connections that are displayed on this screen. For more information, see "Controlling Pagination" on page 48.

2. On the Connections screen, click the icon for the connection you want to see.

   The View Connection screen displays the parameters for the connection. For descriptions of the connection parameters, see "Configuring Adapter for JDBC Connections" on page 68.

3. Click **Return to webMethods Adapter for JDBC Connections** to return to the main connections screen.

Using Designer to View Adapter Connection Parameters

Perform the following steps to view adapter connection parameters in Designer.

To view the parameters for a connection using Designer

1. From the Designer navigation area, open the package and folder in which the connection is located.

2. Double-click the connection you want to view.

   The parameters for the connection appear on the **Connection Information** tab. For descriptions of the connection parameters, see "Configuring Adapter for JDBC Connections" on page 68.

Editing Adapter Connections

If the login information for a database changes, or if you want to redefine parameters that a connection uses when connecting to a database, you can update a connection's parameters using Integration Server Administrator.

To edit a connection

1. In the **Adapters** menu in Integration Server Administrator's navigation area, click **webMethods Adapter for JDBC**.

2. Make sure that the connection is disabled before editing it. For instructions, see "Disabling Adapter Connections" on page 83.

3. On the Connections screen, click the icon for the connection you want to edit.

   The Edit Connection screen displays the current parameters for the connection. Update the connection's parameters by typing or selecting the values you want to specify.

For descriptions of the connection parameters, see "Configuring Adapter for JDBC Connections" on page 68.

4. Click **Save Changes** to save the connection and return to the Connections screen.

Copying Adapter Connections

You can copy an existing Adapter for JDBC connection to configure a new connection with the same or similar connection properties without having to re-type all of the properties for the connection. You copy adapter connections using Integration Server Administrator.

To copy a connection

1. In the **Adapters** menu in Integration Server Administrator's navigation area, click **Adapter for JDBC**.

2. On the Connections screen, click the icon for the connection you want to copy.

   The Copy Connection screen displays the current parameters for the connection you want to copy. Name the new connection, specify a package name and folder name, and edit any connection parameters as needed by typing or selecting the values you want to specify.

   Note:
   When you copy a connection, the new connection does not save the password of the original connection. You must enter and then retype the password before you can save the new connection.

   For descriptions of the connection parameters, see "Configuring Adapter for JDBC Connections" on page 68.

3. Click **Save Connection Copy** to save the connection and return to the Connections screen.

Deleting Adapter Connections

If you no longer want to use a particular Adapter for JDBC connection, you can delete it. You delete adapter connections using Integration Server Administrator.

If you delete a Adapter for JDBC connection, the adapter services or notifications that are defined to use the connection will no longer work. However, you can assign a different connection to an adapter service and re-use the service. To do this, use the setAdapterServiceNodeConnection built-in service. For more information, see "Changing the Connection Associated with an Adapter Service or Notification at Design Time" on page 22.

To delete a connection

1. In the **Adapters** menu in the Integration Server Administrator navigation area, click **Adapter for JDBC**.

2. Make sure that the connection is disabled before deleting. To disable the connection, click **Yes** in the **Enabled** column and click **OK** to confirm. The **Enabled** column now shows **No** (Disabled) for the connection.

3. On the Connections screen, click ✕ for the connection you want to delete.

   Integration Server deletes the adapter connection.

Enabling Adapter Connections

A Adapter for JDBC connection must be enabled before you can configure any adapter service using the connection, or before an adapter service can use the connection at run time. You enable adapter connections using Integration Server Administrator.

Note:
When you reload a package that contains enabled connections, the connections will automatically be enabled when the package reloads. If the package contains connections that are disabled, they will remain disabled when the package reloads.

To enable a connection

1. In the **Adapters** menu in the Integration Server Administrator navigation area, click **Adapter for JDBC**.

2. On the Connections screen, click **No** in the **Enabled** column for the connection you want to enable.

   Integration Server Administrator enables the adapter connection and displays a ✔ and **Yes** in the **Enabled** column.

Disabling Adapter Connections

Adapter for JDBC connections must be disabled before you can edit or delete them. You disable adapter connections using Integration Server Administrator.

To disable a connection

1. In the **Adapters** menu in the Integration Server Administrator navigation area, click **Adapter for JDBC**.

2. On the Connections screen, click **Yes** in the **Enabled** column for the connection you want to disable.

   The adapter connection becomes disabled and you see a **No** in the **Enabled** column.

5 Using Command Central to Manage Adapter for JDBC

Adapter for JDBC Configuration Types

The following is the configuration type for Adapter for JDBC:

Configuration Type	Configuration ID	Use to configure...
webMethods Adapter for JDBC	Connections	The connection for Adapter for JDBC.

Working with Adapter for JDBC Configuration Types

Perform the following procedure to add, edit, view, or delete items for Adapter for JDBC configuration type items over Command Central.

To create, edit, view, or delete an item for an Adapter for JDBC configuration type

1. Select the Integration Server environment from the Environment pane, then click the **webMethods Adapter for JDBC** from the **Instances** tab.
2. Click **Configuration** tab
3. Command Central displays the **Connections** screen for Adapter for JDBC configuration type.
4. To create a connection for Adapter for JDBC connection configuration type, click  . Enter the required values in the displayed fields and click **Save**.

   Note:
   For more information about the usage and field descriptions of the Adapter for JDBC configuration types, see "Configuring Adapter for JDBC Connections" on page 68
5. To edit a connection, click the corresponding connection configuration type that you want to update and click **Edit**. Make the necessary changes and click one of the following:
   - **Test** to test the connection configuration type.
   - **Save** to save your changes.
   - **Cancel** to cancel the edits to the configuration type item.

   To enable the connection, select the Yes radio button in the **Enabled** field of the **Connection State** section. By default, No radio button is selected.
6. To view the connection details, click on the connection name of the newly created connection.
7. To delete a connection, click the connection configuration type that you want to delete and click  .

6 Adapter Services

Overview of Adapter Services

This chapter describes how to configure and manage Adapter for JDBC services. For detailed descriptions of the available Adapter for JDBC services, see "Adapter Services" on page 18.

Before Configuring or Managing Adapter Services

Perform the following steps before configuring or managing adapter services.

To prepare to configure or manage Adapter for JDBC services

1. Start your Integration Server and Integration Server Administrator, if they are not already running.

2. Make sure you have Integration Server Administrator privileges so that you can access Adapter for JDBC's administrative screens. For information about setting user privileges, see the *webMethods Integration Server Administrator's Guide* for your release.

3. Be sure to check "JDBC Driver Specific Properties" on page 255 for a list of known limitations for your database driver since it may affect how you configure your connections and adapter services.

4. If you have made changes to the table schema for a given adapter service, be sure to update the adapter service accordingly.

5. Using Integration Server Administrator, make sure the WmJDBCAdapter package is enabled. For instructions, see "Enabling Packages" on page 57.

6. Using Integration Server Administrator, configure an adapter connection to use with the adapter service. For instructions, see "Configuring Adapter for JDBC Connections" on page 68.

   Note:
   Integration Server provides a built-in service you can use at design time to change the connection associated with an adapter service. For more information, see "Changing the Connection Associated with an Adapter Service or Notification at Design Time" on page 22.

7. Start Software AG Designer if it is not already running.

8. Using Designer, create a user-defined package to contain the service, if you have not already done so. When you configure adapter services, you should always define them in user-defined packages rather than in the WmJDBCAdapter package. For more information about managing packages for the adapter, see "Overview of Package Management" on page 56.

Configuring SelectSQL Services

A SelectSQL service retrieves specified information from a database table. You configure Adapter for JDBC services using Designer. For more information about adapter services, see "Using Adapter Services" on page 21.

Be sure to review the section "Before Configuring or Managing Adapter Services" on page 88 before you configure adapter services.

To configure a SelectSQL service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.

2. Select the parent namespace, type a name for the adapter service, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the appropriate **Adapter Connection Name** and click **Next**.

5. From the list of available templates, select the **SelectSQL** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **Tables** tab to configure the database table (or tables) the operation accesses, using the following fields:

Field	Description/Action
Table Alias	The table alias is assigned automatically when you select more than one table in the **Table Name** field. The default is `t1`.
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The type displays automatically based on the table you select.

7. If you are not joining tables, skip this step. Select the **Joins** tab to specify the columns for joining the tables you just configured.

a. Select the icon to create new left and right columns.

b. Select **Left Column** and select the first table's joining column.

c. Select the appropriate **Operator**.

d. Select **Right Column** and select the next table's joining column.

e. Repeat this procedure until you have defined all the joins.

8. Use the **SELECT** tab to define the columns and fields to be selected as follows:

a. In the **ALL/DISTINCT** field, select **ALL** to include duplicate rows or **DISTINCT** to suppress duplicate rows. Selecting **ALL** corresponds to the SQL statement `SELECT ALL name from tablename`. The default value is blank, which corresponds to the SQL statement `SELECT name from tablename`.

b. Use the icon to create new rows as needed. You can use the icon to fill in all rows to the table.

c. As you insert additional rows, the corresponding **Column Type**, **JDBC Type**, **Output Field Type**, and **Output Field** display for each column you select in the **Expression** field.

Use the following fields:

Field	Description/Action
Expression	The column name in the database table.
Column Type	The column data type defined in the database table.
JDBC Type	The JDBC type of the corresponding **Output Field**.
Output Field Type	The data type of the output field. Adapter for JDBC automatically converts database-specific types to Java data types. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Output Field	The name of the field containing the output from the SELECT operation. An output field name displays when you select an expression. You can also modify the output field names as required.
Sort Order	Specifies how rows are returned as follows: Select either **Ascend** or **Descend**. Leave the field blank if there is no sort order.
Maximum Row	Use this field only to specify the maximum number of records to retrieve from the database. The default value of `0` (no limit) retrieves all records.

Field	Description/Action
Query Time Out	Specify the query time-out value in seconds. This value is the amount of time Adapter for JDBC waits for the service to execute before stopping the SQL operation. The time out specified in the **Query Time Out** field is not guaranteed but depends on the implementation specific to the driver vendor. The JDBC standard Statement.SetQueryTimeout() method relies on the Statement.cancel() method. When execution takes longer than the specified time-out interval, the monitor thread calls Statement.cancel(). In some cases, because of a limitation in the Statement.cancel() method, the time out does not free the thread that invoked the Statement.execute() method and this may lead to higher waiting times. The default value is `-1`. Use the default value to have the service use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to `0`, or if the watt.adapter.JDBC.QueryTimeout property is not set, the service executes without a time out. If you specify a value greater than `0`, the service executes with the specified value as the time out. **Note:** `-1` is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.
Result Field	Specify a name for the output field that must contain the total number of rows affected by the SQL statement. Do not use *results* as the value of the **Result Field**.
Result Field Type	The data type of the **Result Field**.

9. Use the **WHERE** tab to specify the conditions for selecting information:

   a. Select the icon to define new WHERE clause fields.

   b. Select a logical operator from the **AND/OR** field, an **Operator**, and separators (the left and right parentheses) as needed, and specify values for the following fields:

Field	Description/Action
AND/OR	The logical operator.

Field	Description/Action
Column	The name of the column you want to use in the WHERE clause.
Operator	The operator used with the **Column** and **Input Field**.
Input Field	The default value is ?, which acts as a placeholder for the variable so that you can set the input variable for that column at run time, or get input external to this adapter service. You can also type a fixed value in this field now or at run time. If you type a fixed value, be sure that it is valid, or an exception will be generated at run time.

The adapter automatically generates values for the following fields:

Field	Description
Parameter	The number of the inserted row.
Column (second occurrence of this field)	The name of the column you want to use in the WHERE clause.
JDBC Type	The JDBC type of the corresponding **Input Field**.
Input Field Type	The corresponding input field's Java type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Input Field (second occurrence of this field)	The name of the input field. By default the name combines the values of the **Parameter** and **Column** fields. However, you can also choose to specify any custom value.

Note:
For Oracle users, if you use a CHAR(n) data type and enter a value in the **Input Field**, Adapter for JDBC automatically sets the ORACLEFIXED_CHAR data type as the JDBC data type.

Note:
The WHERE clause does not support the java.sql.Array data type.

c. If necessary, use the ⇧ or ⇩ icons to change the order of the WHERE clause to ensure the parameters are parsed in the correct order.

d. Repeat this procedure until you have specified all WHERE parameters.

10. From the **File** menu, select **Save**.

Configuring InsertSQL Services

An InsertSQL service inserts new information into a database table. You configure Adapter for JDBC services using Designer. For more information about adapter services, see "Using Adapter Services" on page 21.

Be sure to review the section "Before Configuring or Managing Adapter Services" on page 88 before you configure adapter services.

To configure an InsertSQL service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.

2. Select the parent namespace, type a name for the adapter service, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the appropriate **Adapter Connection Name** and click **Next**.

5. From the list of available templates, select the **InsertSQL** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **Table** tab to configure the database table to be updated and set the fields as follows:

Field	Description/Action
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.

7. Select the **INSERT** tab and use the **Column**, **Column Type**, **JDBC Type** and **Expression** fields on the top row of the tab to define the columns and fields to be inserted as described in the following table.

   a. Use the icon to create new rows as needed. You can use the icon to fill in all rows to the table.

Field	Description/Action
Column	The INSERT column name in the database table.
Column Type	The INSERT column data type in the database table.
JDBC Type	The JDBC type for the input field.
Expression	The default value is ?, which acts as a placeholder for the variable so that you can set the input variable for that column at run time, or get input external to this adapter service. It adds one row with the same column name to the table. You can also type a fixed value in this field now or at run time. If you type a fixed value, be sure that it is valid, or an exception will be generated at run time.

b. For each inserted row that uses the default **Expression** value of ?, the corresponding **JDBC Type**, **Input Field**, and **Input Field Type** display on the second row of the INSERT tab.

Use the following fields:

Field	Description/Action
Column	The INSERT column name in the database table.
Column Type	The INSERT column data type in the database table.
JDBC Type	The JDBC type for the input field.
Input Field*	The input field name. You can change this name if needed.
Input Field Type	The data type of the input field. You can change this type if needed.

Note:
For Oracle users, if you use a CHAR(n) data type and enter a value in the **Input Field**, Adapter for JDBC automatically sets the ORACLEFIXED_CHAR data type as the JDBC data type.

c. Specify the query time out value of the InsertSQL service you are configuring in the following field:

Field	Description/Action
Query Time Out	The query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the service to execute before stopping the SQL operation. The time out specified in the **Query Time Out** field is not guaranteed but depends on the implementation specific to the driver vendor. The JDBC standard Statement.SetQueryTimeout() method relies on the

Field	Description/Action
	Statement.cancel() method. When execution takes longer than the specified time-out interval, the monitor thread calls Statement.cancel(). In some cases, because of a limitation in the Statement.cancel() method, the time out does not free the thread that invoked the Statement.execute() method and this may lead to higher waiting times. The default value is `-1`. Use the default value to have the service use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to `0`, or if the watt.adapter.JDBC.QueryTimeout property is not set, the service executes without a time out. If you specify a value greater than `0`, the service executes with the specified value as the time out. **Note:** `-1` is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

8. Use the **Result** tab's **Result Field** and **Result Field Type** to specify the output field name and corresponding field types for the resulting number of rows that have been inserted.

9. From the **File** menu, select **Save**.

Configuring UpdateSQL Services

An UpdateSQL service updates existing information in a database table and includes a mapping for an output field that stores the number of rows affected by the update operation. You configure Adapter for JDBC services using Designer. For more information about adapter services, see "Using Adapter Services" on page 21.

Be sure to review the section "Before Configuring or Managing Adapter Services" on page 88 before you configure adapter services.

To configure an UpdateSQL service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.

2. Select the parent namespace, type a name for the adapter service, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the appropriate **Adapter Connection Name** and click **Next**.

5. From the list of available templates, select the **UpdateSQL** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **Table** tab to configure the database table to be updated and set fields as follows:

Field	Description/Action
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.

7. Select the **UPDATE** tab and use the **Column**, **Column Type**, **JDBC Type** and **Expression** fields on the top row of the tab to define the columns and fields, as follows:

   a. Use the icon to create new rows as needed. You can use the icon to fill in all rows to the table.

Field	Description/Action
Column	The UPDATE column name in the database table.
Column Type	The UPDATE column data type in the database table.
JDBC Type	The JDBC type of the corresponding **Input Field**.
Expression	The default value is `?`, which acts as a placeholder for the variable so that you can set the input variable for that column at run time, or get input external to this adapter service. It adds one row with the same column name to the table. You can also type a fixed value in this field now or at run time. If you type a fixed value, be sure that it is valid, or an exception will be generated at run time.

   b. If you insert additional rows using the default **Expression** value of `?`, the corresponding **JDBC Type**, **Input Field** and **Input Field Type** display on the second row of the UPDATE tab:

Field	Description/Action
Column	The UPDATE column name in the database table.
Column Type	The column data type defined in the database table.
JDBC Type	The JDBC type of the input field.
Input Field	The input field name. You can change this name if needed.
Input Field Type	The data type of the input field. You can change this type if needed.

Note:
For Oracle users, if you use a CHAR(n) data type and enter a value in the **Input Field**, Adapter for JDBC automatically sets the ORACLEFIXED_CHAR data type as the JDBC data type.

c. Specify the query time out value of the UpdateSQL service you are configuring in the following field:

Field	Description/Action
Query Time Out	The query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the service to execute before stopping the SQL operation. The time out specified in the **Query Time Out** field is not guaranteed but depends on the implementation specific to the driver vendor. The JDBC standard Statement.SetQueryTimeout() method relies on the Statement.cancel() method. When execution takes longer than the specified time-out interval, the monitor thread calls Statement.cancel(). In some cases, because of a limitation in the Statement.cancel() method, the time out does not free the thread that invoked the Statement.execute() method and this may lead to higher waiting times. The default value is `-1`. Use the default value to have the service use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to `0`, or if the watt.adapter.JDBC.QueryTimeout property is not set, the service executes without a time out. If you specify a value greater than `0`, the service executes with the specified value as the time out. **Note:** `-1` is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

8. Use the **WHERE** tab to specify the conditions for selecting information:

   a. Select the icon to define new WHERE clause fields.

   b. Select a logical operator from the **AND/OR** field, an **Operator**, and separators (the left and right parentheses) as needed.

   Use the following fields:

Field	Description/Action
AND/OR	The logical operator.
Column	The name of the column you want to use in the WHERE clause.
Operator	The operator used with the **Column** and **Input Field**.
Input Field*	The default value is ?, which acts as a placeholder for the variable so that you can set the input variable for that column at run time, or get input external to this adapter service. You can also type a fixed value in this field now or at run time. If you type a fixed value, be sure that it is valid, or an exception will be generated at run time.

The adapter automatically generates values for the following fields:

Field	Description
Parameter	The number of the inserted row.
Column (second occurrence of this field)	The name of the column you want to use in the WHERE clause.
JDBC Type	The JDBC type of the corresponding **Input Field**.
Input Field Type	The corresponding input field's Java type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Input Field (second occurrence of this field)	The name of the input field. By default the name combines the values of the **Parameter** and **Column** fields. However, you can also choose to specify any custom value.

Note:
For Oracle users, if you use a CHAR(n) data type and enter a value in the **Input Field**, Adapter for JDBC automatically sets the ORACLEFIXED_CHAR data type as the JDBC data type.

Note:
The WHERE clause does not support the java.sql.Array data type.

9. Use the **Result** tab's **Result Field** and **Result Field Type** to specify the output field name and corresponding field types for the resulting number of rows that have been inserted.

10. From the **File** menu, select **Save**.

Configuring BatchInsertSQL Services

Similar to an InsertSQL service, a BatchInsertSQL service also inserts new information into a database table; however the BatchInsertSQL service can insert a large volume of data into a table more efficiently than an InsertSQL service, improving performance when a large data volume is involved. You configure Adapter for JDBC services using Designer. For more information about adapter services, see "Using Adapter Services" on page 21.

Be sure to review the section "Before Configuring or Managing Adapter Services" on page 88 before you configure adapter services.

Note:
BatchInsertSQL services cannot be used with a Teradata database (any version).

To configure a BatchInsertSQL Service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.

2. Select the parent namespace, type a name for the adapter service, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the appropriate **Adapter Connection Name** and click **Next**.

   Note:
   For BatchInsertSQL services, you must use a LOCAL_TRANSACTION connection. If you do not use LOCAL_TRANSACTION, you will not see a list of tables in the **Tables** tab. Also, you may not see an error message until you reload metadata values or check the error log. For instructions for creating a LOCAL_TRANSACTION connection, see "Configuring Adapter for JDBC Connections" on page 68. For information about reloading metadata values, see "Reloading Adapter Values" on page 177.

5. From the list of available templates, select the **BatchInsertSQL** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **Table** tab to configure the database table to be updated and set the fields as follows:

Field	Description/Action
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.

7. Select the **INSERT** tab and use the **Column**, **Column Type**, **JDBC Type**, and **Expression** fields on the top row of the tab to define the columns and fields to be inserted as described in the following table.

   a. Use the  icon to create new rows as needed. You can use the  icon to fill in all rows to the table.

Field	Description/Action
Column	The INSERT column name in the database table.
Column Type	The INSERT column data type in the database table.
JDBC Type	The JDBC type for the input field.
Expression	The default value is `?`, which acts as a placeholder for the variable so that you can set the input variable for that column at run time, or get input external to this adapter service. It adds one row with the same column name to the table. You can also type a fixed value in this field now or at run time. If you type a fixed value, be sure that it is valid, or an exception will be generated at run time.

   b. For each inserted row that uses the default **Expression** value of `?`, the corresponding **Input Field**, and **Input Field Type** display on the second row of the INSERT tab. Use the following fields:

Field	Description/Action
Column	The INSERT column name in the database table.
Column Type	The INSERT column data type in the database table.
Input Field	The input field name. You can change this name if needed.
Input Field Type	The data type of the input field. You can change this type if needed.

Field	Description/Action
	Note: If you use WmFlatFile services to generate the document list as input, the input field type must be java.lang.String. This is because fields from WmFlatFile services generate documents that have String fields.

Note:
For Oracle users, if you use a CHAR(n) data type and enter a value in the **Input Field**, Adapter for JDBC automatically sets the ORACLEFIXED_CHAR data type as the JDBC data type.

c. Specify the query time out value of the BatchInsertSQL service you are configuring in the following field:

Field	Description/Action
Query Time Out	The query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the service to execute before stopping the SQL operation. The time out specified in the **Query Time Out** field is not guaranteed but depends on the implementation specific to the driver vendor. The JDBC standard Statement.SetQueryTimeout() method relies on the Statement.cancel() method. When execution takes longer than the specified time-out interval, the monitor thread calls Statement.cancel(). In some cases, because of a limitation in the Statement.cancel() method, the time out does not free the thread that invoked the Statement.execute() method and this may lead to higher waiting times. The default value is `-1`. Use the default value to have the service use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to `0`, or if the watt.adapter.JDBC.QueryTimeout property is not set, the service executes without a time out. If you specify a value greater than `0`, the service executes with the specified value as the time out. **Note:** `-1` is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

8. Use the **Batch Result** tab's **Batch Result Output Name** to specify the output field name for the batch operation. The output of the batch operation is a string list. The elements of the string

list are ordered according to the order in which commands were added to the batch. Depending on the JDBC driver you use, the elements in the string list may be one of the following:

- A number greater than or equal to zero. This indicates that the command was successfully executed and the number of rows in the database affected.
- A value of SUCCESS_NO_INFO. This indicates that the command was processed successfully but the number of rows affected is unknown.

9. From the **File** menu, select **Save**.

Configuring BatchUpdateSQL Services

Similar to an UpdateSQL service, a BatchUpdateSQL service updates information in a database table. However, the BatchUpdateSQL service can update a large volume of data in a table more efficiently than an UpdateSQL service, improving performance when a large data volume is involved. You configure Adapter for JDBC services using Designer. For more information about adapter services, see "Using Adapter Services" on page 21.

Note:
BatchUpdateSQL services cannot be used with a Teradata database (any version).

Be sure to review the section "Before Configuring or Managing Adapter Services" on page 88 before you configure adapter services.

To configure a BatchUpdateSQL Service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.
2. Select the parent namespace, type a name for the adapter service, and click **Next**.
3. Select **Adapter for JDBC** as the adapter type and click **Next**.
4. Select the appropriate **Adapter Connection Name** and click **Next**.

   Note:
   For BatchUpdateSQL services, you must use a LOCAL_TRANSACTION connection. If you do not use LOCAL_TRANSACTION, you will not see a list of tables in the **Tables** tab. Also, you may not see an error message until you reload metadata values or check the error log. For instructions for creating a LOCAL_TRANSACTION connection, see "Before Configuring or Managing Adapter Connections" on page 66. For information about reloading metadata values, see "Reloading Adapter Values" on page 177.

5. From the list of available templates, select the **BatchUpdateSQL** template and click **Finish**.

The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **Table** tab to configure the database table to be updated and set the fields as follows:

Field	Description/Action
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.

7. Select the **UPDATE** tab and use the **Column**, **Column Type**, **JDBC Type**, and **Expression** fields on the top row of the tab to define the columns and fields, as follows:

   a. Use the icon to create new rows as needed. You can use the icon to fill in all rows to the table.

Field	Description/Action
Column	The UPDATE column name in the database table.
Column Type	The UPDATE column data type in the database table.
JDBC Type	The JDBC type of the corresponding **Input Field**.
Expression	The default value is `?`, which acts as a placeholder for the variable so that you can set the input variable for that column at run time, or get input external to this adapter service. It adds one row with the same column name to the table. You can also type a fixed value in this field now or at run time. If you type a fixed value, be sure that it is valid, or an exception will be generated at run time.

   b. If you insert additional rows using the default **Expression** value of `?`, the corresponding **Input Field** and **Input Field Type** display on the second row of the UPDATE tab:

Field	Description/Action
Column	The UPDATE column name in the database table.
Column Type	The column data type defined in the database table.

Field	Description/Action
Input Field	The input field name. You can change this name if needed.
Input Field Type	The data type of the input field. You can change this type if needed. **Note:** If you use WmFlatFile services to generate the document list as input, the input field type must be java.lang.String. This is because fields from WmFlatFile services generate documents are have String fields.

Note:
For Oracle users, if you use a CHAR(n) data type and enter a value in the **Input Field**, Adapter for JDBC automatically sets the ORACLEFIXED_CHAR data type as the JDBC data type.

c. Specify the query time out value of the BatchUpdateSQL service you are configuring in the following field:

Field	Description/Action
Query Time Out	The query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the service to execute before stopping the SQL operation. The time out specified in the **Query Time Out** field is not guaranteed but depends on the implementation specific to the driver vendor. The JDBC standard Statement.SetQueryTimeout() method relies on the Statement.cancel() method. When execution takes longer than the specified time-out interval, the monitor thread calls Statement.cancel(). In some cases, because of a limitation in the Statement.cancel() method, the time out does not free the thread that invoked the Statement.execute() method and this may lead to higher waiting times. The default value is `-1`. Use the default value to have the service use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to `0`, or if the watt.adapter.JDBC.QueryTimeout property is not set, the service executes without a time out. If you specify a value greater than `0`, the service executes with the specified value as the time out. **Note:** `-1` is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

8. Use the **WHERE** tab to specify the conditions for selecting information:

   a. Select the icon to define new WHERE clause fields.

   b. Select a logical operator from the **AND/OR** field, an **Operator**, and separators (the left and right parentheses) as needed. Use the following fields:

Field	Description/Action
AND/OR	The logical operator.
Column	The name of the column you want to use in the WHERE clause.
Operator	The operator used with the **Column** and **Input Field**.
Input Field	The default value is ?, which acts as a placeholder for the variable so that you can set the input variable for that column at run time, or get input external to this adapter service. You can also type a fixed value in this field now or at run time. If you type a fixed value, be sure that it is valid, or an exception will be generated at run time.
JDBC Type	The JDBC type of the corresponding **Input Field**.
Input Field Type	The corresponding input field's Java type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Input Field (second occurrence of this field)	Type the name of the input field. If you use the default ? variable placeholder as the **Input Field** value in the where clause, be sure to enter the corresponding **Input Field** and its **JDBC Field Type** in the same order as they appear on the top portion of the WHERE tab.

Note:
The WHERE clause does not support the java.sql.Array data type.

9. Use the **Batch Result** tab's **Batch Result Output Name** to specify the output field name for the batch operation. The output of the batch operation is a string list. The elements of the string list are ordered according to the order in which commands were added to the batch. Depending on the JDBC driver you use, the elements in the string list may be one of the following:

   - A number greater than or equal to zero. This indicates that the command was successfully executed and the number of rows in the database affected.
   - A value of SUCCESS_NO_INFO. This indicates that the command was processed successfully but the number of rows affected is unknown.

10. From the **File** menu, select **Save**.

Configuring DeleteSQL Services

A DeleteSQL service deletes rows from a table and includes a mapping for an output field that stores the number of affected rows. You configure Adapter for JDBC services using Designer. For more information about adapter services, see "Using Adapter Services" on page 21.

Be sure to review the section "Before Configuring or Managing Adapter Services" on page 88 before you configure adapter services.

To configure a DeleteSQL service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.

2. Select the parent namespace, type a name for the adapter service, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the appropriate **Adapter Connection Name** and click **Next**.

5. From the list of available templates, select the **DeleteSQL** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **Table** tab to configure the database table to be updated and set the fields as follows:

Field	Description/Action
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.

7. Use the **WHERE** tab to specify the conditions for selecting information:

   a. Select the icon to define new WHERE clause fields.

   b. Select a logical operator from the **AND/OR** field, an **Operator**, and separators (the left and right parentheses) as needed.

Use the following fields:

Field	Description/Action
AND/OR	The logical operator.
Column	The name of the column you want to use in the WHERE clause.
Operator	The operator used with the **Column** and **Input Field**.
Input Field	The default value is ?, which acts as a placeholder for the variable so that you can set the input variable for that column at run time, or get input external to this adapter service. You can also type a fixed value in this field now or at run time. If you type a fixed value, be sure that it is valid, or an exception will be generated at run time.

The adapter automatically generates values for the following fields:

Field	Description
Parameter	The number of the inserted row.
Column (second occurrence of this field)	The name of the column you want to use in the WHERE clause.
JDBC Type	The JDBC type of the corresponding **Input Field**.
Input Field Type	The corresponding input field's Java type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Input Field (second occurrence of this field)	The name of the input field. By default the name combines the values of the **Parameter** and **Column** fields. However, you can also choose to specify any custom value.

Note:
For Oracle users, if you use a CHAR(n) data type and enter a value in the **Input Field**, Adapter for JDBC automatically sets the ORACLEFIXED_CHAR data type as the JDBC data type.

Note:
The WHERE clause does not support the java.sql.Array data type.

8. Use the **Result** tab's **Result Field** and **Result Field Type** to specify the output field name and corresponding field types for the resulting number of rows that have been inserted.

9. To verify input or output information for this service, use the **Input/Output** tab as needed.

10. From the **File** menu, select **Save**.

Configuring CustomSQL Services

A CustomSQL service defines and executes custom SQL to perform database operations. You can execute almost any SQL statement required by integrations, such as data management statements. You configure Adapter for JDBC services using Designer. For more information about adapter services, see "Using Adapter Services" on page 21.

If you need to write custom SQL, you can create a service that uses customized SQL statements. This allows you the flexibility to execute almost any SQL statements required, such as data management statements and data definition statements, including insert, select, update, and delete.

Because an adapter service that uses custom SQL provides no error checking, be sure that your SQL statement works correctly. You can verify SQL statement accuracy using your vendor's SQL utility. For details, see your vendor documentation.

Be sure to review the section "Before Configuring or Managing Adapter Services" on page 88 before you configure adapter services.

Note:
You can use a CustomSQL service to call a stored procedure only when the stored procedure does not have any OUT/INOUT or return parameters. If you need to use these parameters, use the StoredProcedure service. For instructions, see "Configuring StoredProcedure Services" on page 116.

Considerations before using Fill in all rows to the table feature in CustomSQL Adapter Service

Before you begin, ensure that the connection to the database is enabled. Also ensure that the Input/Output tab in the Designer is empty. The following table describes the restrictions when creating an SQL query statement using *Fill in all rows to the table* feature in CustomSQL Adapter Service:

Considerations	Invalid Query input	Valid Query input
Specify the table alias along with the table name if the SQL query contains more than one table.	`select deptno, empno from dept,emp deptno`	`select d.deptno, e.empno from dept d,emp e where d.deptno = ?`
Use different column name alias for columns in the SQL query.	`select firstname as name, lastname as name from emp`	`select firstname as f_name, lastname as l_name from emp`
	`select name,name from emp`	`select name as name1,name as name2 from emp`
For Sybase databases, specify an alias for the column	`select e.deptno, count(e.job) from employees e group by e.deptno`	`select e.deptno, count(e.job) as count from employees e group by e.deptno`

Considerations	Invalid Query input	Valid Query input
result if you are using functions on an output column.		
Column names in the SQL query should not be enclosed in quotes.	`select partno as 'partno' from emp where partno = 1`	`select partno as partno from emp where partno=1`
Use the “as” keyword when you specify an alias for a column.	`select city dummy from emp`	`select city as dummy from emp`
Irrespective of the database type, the query syntax must follow the SQL standards. Standards corresponding to specific database types are not supported.	For MySQL query, `insert into example_default_now set id=?,data=?`	For MySQL query, `insert into example_default_now [(set,data)] values (?,?)`

Note:
If your SQL query has errors or does not follow the considerations specified in the above table, the **Fill in all rows to the table** icon does not populate the input and output parameters. Then the input and output parameters must be configured manually. You can view the error message by clicking the **Reload values from adapter** icon.

Creating a CustomSQL service

Use the following instructions to create a CustomSQL adapter service. You configure adapter services using Designer.

To create a CustomSQL service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.
2. Select the parent namespace, type a name for the adapter service, and click **Next**.
3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the appropriate **Adapter Connection Name** and click **Next**.

5. From the list of available templates, select the **CustomSQL** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **SQL** tab to specify a SQL statement and the associated input and output parameters.

   Use the icon and to create new rows as needed. You can use the icon to fill in all rows to the table.

   Be sure to review the section "Considerations before using Fill in all rows to the table feature in CustomSQL Adapter Service" on page 108 before you use the Fill in all rows to the table icon.

   Set the SQL parameters as described in the following table:

   Note:
   When using the CustomSQL service for a Select SQL, it is not mandatory to configure the output fields **Output JDBC Type**, **Output Field Type**, and **Output Field**. Adapter for JDBC uses the fields provided in the Select SQL statement as the output parameter fields.

Field	Description/Action

SQL*	A SQL statement. If you need more space to type your statement, use the launch icon to the right to open a text editor window. You can type the statement directly in this field, for example:
	`select short_col, int_col, float_col, double_col, date_col, date_time_col, varchar_col from -ADAPTER-TEST`
	For variable names, use the `?` variable placeholder for each variable. For example:
	`select employee_name where StaffID = ? and Dept = ?`
	Note:
	If you use the `?` variable placeholders in your SQL statement, be sure to enter the corresponding **Input Field** and field type information in the same order as they appear in your SQL statement. For example, using the SQL statement above, `StaffID` would be the first entry in the **Input Field** and `Dept` would be the second entry.
	Note:
	Do not end your SQL statement with a semi-colon (`;`) or an exception will be generated at run time.
	Note:

Field	Description/Action
	You may paste text into this field from the system clipboard. However, you may not cut or copy text from this field to the clipboard for pasting into another application.
Input JDBC Type	The JDBC type of the corresponding **Input Field**.
Input Field Type	The Java type that corresponds to the input JDBC type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Input Field	Type the name of the input field.
Output JDBC Type	The JDBC type of the corresponding **Output Field**.
Output Field Type	The Java type that corresponds to the output JDBC type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Output Field	The output field name.
Maximum Row	The maximum number of records to retrieve from the database. The default value of `0` (no limit) retrieves all records. Use this field only with SQL statements that return a result set.
Query Time Out	Specify the query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the service to execute before stopping the SQL operation. The time out specified in the **Query Time Out** field is not guaranteed but depends on the implementation specific to the driver vendor. The JDBC standard Statement.SetQueryTimeout() method relies on the Statement.cancel() method. When execution takes longer than the specified time-out interval, the monitor thread calls Statement.cancel(). In some cases, because of a limitation in the Statement.cancel() method, the time out does not free the thread that invoked the Statement.execute() method and this may lead to higher waiting times. The default value is `-1`. Use the default value to have the service use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out.If you specify a value equal to `0`, or if the watt.adapter.JDBC.QueryTimeout property is not set, the service executes without a time out.If you specify a value greater than `0`, the service executes with the specified value as the time out. **Note:** `-1` is the only permissible negative value for this field.

Field	Description/Action
	For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.
Result Field	Name of the output field that contains the total number of rows affected by the SQL statement.
Result Field Type	The data type of the **Result Field**.

7. From the **File** menu, select **Save**.

Configuring DynamicSQL Services

Creating a DynamicSQL service allows you to configure a dynamic SQL statement, part of which you set at run time using input fields. At run time, the service will create the SQL statement by combining the contents of the input fields and then executing it. This is useful when you need the flexibility to set all or part of a SQL statement at run time, instead of at design time.

Important:
Adapter for JDBC does not validate the input parameters of a DynamicSQL service for any malicious SQL injections. When you use a variable input parameter such as the text ${INPUT_FIELD_NAME} in a DynamicSQL service, you must take extra measures to avoid potential security risks by, for example, using a wrapper service for your DynamicSQL service that will validate the variable input parameters.

Using Input and Output Parameters

You must specify the input and output parameters of the DynamicSQL service at design time. When you configure the service, the input fields you configure will contain the input for the SQL statement. The output fields you configure will contain the results from the result set. Be sure that the input and output fields correctly match those of the SQL statement. If there is any mismatch, the service will generate an exception at run time.

Note:
When using the DynamicSQL service for a Select SQL, it is not mandatory to configure the output fields **Output JDBC Type**, **Output Field Type**, and **Output Field**. Adapter for JDBC uses the fields provided in the Select SQL statement as the output parameter fields.

Configuring a DynamicSQL Statement

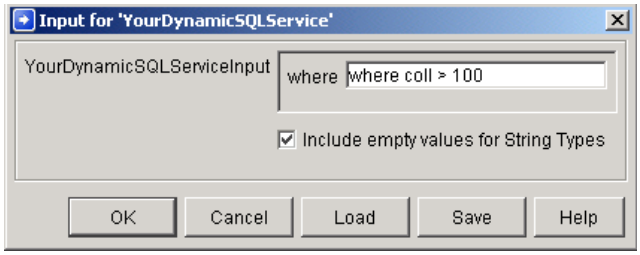
DynamicSQL uses ${*INPUT_FIELD_NAME*} to map a part of the SQL statement to the input field. At design time, the service template generates an input field with *INPUT_FIELD_NAME*. At run time, the service parses the statement and replaces the ${*INPUT_FIELD_NAME*} with the actual contents of the input field.

For example, consider the following DynamicSQL statement:

```
select * from table1 ${where}:
```

In this example, the service template will generate an input field for the `{where}` portion of the statement. Note that you do not type a semicolon (`;`) at the end of the SQL statement. Doing so will generate an exception at run time.

At run time, the `{where}` field is set to `where col1>100:`



The generated SQL statement will be `Select * from table1 where col1>100.`

A more extreme example would be to set the SQL field to "${sql}"; in this case, the entire SQL statement will be set through the input field `sql`.

Creating a DynamicSQL Service

Use the following instructions to create a DynamicSQL adapter service. You configure Adapter for JDBC services using Designer.

Be sure to review the section "Before Configuring or Managing Adapter Services" on page 88 before you configure adapter services.

Note:
You can use a DynamicSQL service to call a stored procedure only when the stored procedure does not have any OUT/INOUT or return parameters. If you need these parameters, use the StoredProcedure service. For instructions, see "Configuring StoredProcedure Services" on page 116.

To create a DynamicSQL service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.

2. Select the parent namespace, type a name for the adapter service, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the appropriate **Adapter Connection Name** and click **Next**.

5. From the list of available templates, select the **DynamicSQL** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **Dynamic SQL** tab to specify a SQL statement and the associated input and output parameters.

   Use the  icon and set the SQL parameters as described in the table below.

Field	Description/Action

SQL	A SQL statement. If you need more space to type your statement, use the launch icon to the right to open a text editor window. You can type the statement directly in this field, for example:
	`select short_col, int_col, float_col, double_col, date_col, date_time_col, varchar_col from ADAPTER-TEST`
	For variable names, use the `?` variable placeholder for each variable. For example:
	`select employee_name where StaffID = ? and Dept = ?`
	Note:
	If you use the `?` variable placeholders in your SQL statement, be sure to enter the corresponding **Input Field** and field type information in the same order as they appear in your SQL statement. In the above example, `StaffID` would be the first entry in the **Input Field** and `Dept` would be the second entry.
	Note:
	Do not end your SQL statement with a semi-colon (`;`) or you will generate an exception.
	Note:
	You may paste text into this field from the system clipboard. However, you may not cut or copy text from this field to the clipboard for pasting into another application.

Input JDBC Type	The JDBC type of the corresponding **Input Field**.
Input Field Type	The Java type that corresponds to the input JDBC type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Input Field*	Type the name of the input field.

Field	Description/Action
Output JDBC Type	The JDBC type of the corresponding **Output Field**.
Output Field Type	The Java type that corresponds to the output JDBC type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Output Field	The output field name.
Maximum Row	The maximum number of records to retrieve from the database. The default value of `0(no limit)` retrieves all records.Use this field only with SQL statements that return a result set.
Query Time Out	Specify the query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the service to execute before stopping the SQL operation. The time out specified in the **Query Time Out** field is not guaranteed but depends on the implementation specific to the driver vendor. The JDBC standard Statement.SetQueryTimeout() method relies on the Statement.cancel() method. When execution takes longer than the specified time-out interval, the monitor thread calls Statement.cancel(). In some cases, because of a limitation in the Statement.cancel() method, the time out does not free the thread that invoked the Statement.execute() method and this may lead to higher waiting times. The default value is `-1`. Use the default value to have the service use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to `0`, or if the watt.adapter.JDBC.QueryTimeout property is not set, the service executes without a time out. If you specify a value greater than `0`, the service executes with the specified value as the time out. **Note:** `-1` is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.
Result Field	Name of the output field that contains the total number of rows affected by the SQL statement.Do not use `results` as the value of the **Result Field**.
Result Field Type	The data type of the **Result Field**.

7. From the **File** menu, select **Save**.

Configuring StoredProcedure Services

A StoredProcedure service calls a stored procedure to perform database operations. The SQL statement for an adapter service can also be a stored procedure call. A stored procedure is SQL code that is encapsulated in a statement and compiled into executable code. It is an object that is stored in the database and called when the adapter applies the SQL statement to the database.

Stored procedures provide greater flexibility in performing database operations in response to documents. You can configure operations for stored procedure calls with or without parameters. To learn how to create a stored procedure, see the vendor documentation for your database.

Considerations when Configuring StoredProcedure Adapter Services

You must consider the following restrictions when configuring StoredProcedure services:

- The adapter StoredProcedure service does not support stored procedures that have Array or Struct as OUT parameters. You can use the StoredProcedureWithSignature service instead. For information on configuring StoredProcedureWithSignature service, see "Configuring StoredProcedureWithSignature Services" on page 120.
- When operating on a MySQL database, the adapter StoredProcedure service supports stored procedures, but does not support functions. To call functions, use the StoredProcedureWithSignature service template instead. For more information about configuring StoredProcedureWithSignature services, see "Configuring StoredProcedureWithSignature Services" on page 120.
- MySQL 5.0.x does not support stored procedure and function names containing spaces.
- When using SAP HANA database, ResultSet tab cannot be configured because the cursor cannot be returned as output in SAP HANA stored procedures.

Creating StoredProcedure Adapter Services

You configure Adapter for JDBC services using Designer.

Be sure to review the sections "Before Configuring or Managing Adapter Services" on page 88 and "Considerations when Configuring StoredProcedure Adapter Services" on page 116 before you configure StoredProcedure services.

To configure a StoredProcedure adapter service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.
2. Select the parent namespace, type a name for the adapter service and click **Next**.
3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the appropriate **Adapter Connection Name** and click **Next**.

5. From the list of available templates, select the **StoredProcedure** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **Call** tab to specify the stored procedure to call. Use the following fields to set the **Call** parameters:

Field	Description/Action
Catalog Name	The name of the catalog. The default for the catalog name is `current catalog`.
Schema Name	The name of the schema. The default for the schema name is `current schema`.
Enable Procedure Name Lookup (Optional)	To type in the **Procedure Name**, set this field to `False`. To select the **Procedure Name** from a list, set this field to `True`. The default is `False`. To save you time, use the default value (typing the name) if you know the name of the procedure and you are working with a large database which may have a long list of procedures.
Procedure Name	Type or select the stored procedure name, depending on how you set the **Enable Procedure Name Lookup** field.
JDBC Type	Specify the JDBC type of the corresponding return field for the stored procedure.Use the icon to create new rows as needed. You can use the icon to fill in all rows to the table.
Return Field Name	Add return field names for the stored procedure.Use the icon to create new rows as needed. You can use the icon to fill in all rows to the table.
Query Time Out	Specify the query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the service to execute before stopping the SQL operation. The time out specified in the **Query Time Out** field is not guaranteed but depends on the implementation specific to the driver vendor. The JDBC standard Statement.SetQueryTimeout() method relies on the Statement.cancel() method. When execution takes longer than the specified time-out interval, the monitor thread calls Statement.cancel(). In some cases, because of a limitation in the Statement.cancel() method, the time out does not free the thread that invoked the Statement.execute() method and this may lead to higher waiting times.

Field	Description/Action
	The default value is `-1`. Use the default value to have the service use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to `0`, or if the watt.adapter.JDBC.QueryTimeout property is not set, the service executes without a time out. If you specify a value greater than `0`, the service executes with the specified value as the time out. **Note:** `-1` is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

7. Use the **Parameter** tab to specify the stored procedure's parameters.

8. Use the  icon to create new stored procedure parameters as needed. You can use the  icon to fill in all rows to the table.

Field	Description/Action
Param JDBC Type	The JDBC type of the stored procedure parameter.
Param Name	The stored procedure parameter name.
Param Type	Define the parameter type as IN, INOUT, or OUT.
Expression	The default value is `?`, which acts as a placeholder for the variable so that you can set the input variable for that column at run time, or get input external to this adapter service. It adds one row with the same column name to the table. You can also type a fixed value as input now or at run time. If you choose to type a fixed value, you type a stored procedure call statement with values you set using this field.
Input Name	The name of any input parameters.
Input Type	The input parameter Java type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Output Name	The name of any output parameters.
Output Type	The output parameter Java type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

9. If the procedure returns a result set, select the **ResultSet** tab to specify result set parameters using the fields in the following table.

Note:
StoredProcedure services can support multiple results sets. The result set can contain nested cursors.When using the result set that contains nested cursors, the performance of Adapter for JDBC could degrade. Since the nested cursors are recursively processed, Adapter for JDBC may also return data that may not be required.

Use the icon to create additional result sets as needed. Use the following fields:

Field	Description/Action
Result Set Index	An index is automatically assigned to each result set. The first row default value is 1.
Result Set Name	The name of the result set you want to create.
Result Set Name (from second row)	Select result set name.
Column Name	The name of the column of the result set.
JDBC Type	The JDBC type of the result column.
Output Type	The Java type of the result column. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

10. From the **File** menu, select **Save**.

Specifying the Maximum Number of Result Set Indexes for a StoredProcedure Adapter Service

The StoredProcedure adapter service can be configured to return multiple result sets. By default, the service can return only a maximum of 20 result sets. A new result set index cannot be added manually. To specify the required maximum number of result sets, you can use the watt.adapter.JDBC.StoredProcedureMaxCursorIndex property.

To set this property, use Integration Server Administrator and select **Settings > Extended > Edit Extended Settings**. Enter this property in the Extended Settings box:

```
watt.adapter.JDBC.StoredProcedureMaxCursorIndex=value
```

where *value* is the required maximum number of result sets. For example, to return a maximum number of 30 result sets from the StoredProcedure service, set the property as:

```
watt.adapter.JDBC.StoredProcedureMaxCursorIndex=30
```

The value should be greater than zero with no upper limits. However, it is recommended to provide a value within the practical limits. A large value can lead to an unpredictable behavior of the system. Instead, you can configure another StoredProcedure adapter service for the next set of result sets.

For more information about setting the watt properties, see the *webMethods Integration Server Administrator's Guide* for your release.

Configuring StoredProcedureWithSignature Services

A StoredProcedureWithSignature service calls a stored procedure to perform database operations. Unlike a StoredProcedure adapter service, the StoredProcedureWithSignature service enables you to automatically obtain a stored procedure's parameters by introspecting and listing the signature of the stored procedure at the time you configure the adapter service. This means that you do not need to look up and retype these parameters manually.

Considerations when Configuring StoredProcedureWithSignature Adapter Services

You must consider the following restrictions when configuring StoredProcedureWithSignature adapter services:

- StoredProcedureWithSignature services cannot be used with an Informix or Sybase database (all versions).
- When using Array as IN or OUT parameter in an Oracle database, the input to the IN parameter must be a Java array. The OUT parameter returns a Java array as Java data type, java.lang.Object.
- When operating on a MySQL database, the adapter StoredProcedureWithSignature service supports functions, but does not support stored procedures. To call stored procedures, use the StoredProcedure service template instead. For more information about configuring StoredProcedure services, see "Configuring StoredProcedure Services" on page 116.
- MySQL 5.0.x does not support stored procedure and function names containing spaces.
- When using SAP HANA database, ResultSet tab cannot be configured because the cursor cannot be returned as output in SAP HANA stored procedures.

Creating StoredProcedureWithSignature Adapter Services

You configure Adapter for JDBC services using Designer.

Be sure to review the sections "Before Configuring or Managing Adapter Services" on page 88 and "Considerations when Configuring StoredProcedure Adapter Services" on page 116 before you configure StoredProcedureWithSignature services.

To configure a StoredProcedureWithSignature service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.
2. Select the parent namespace, type a name for the adapter service, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the appropriate **Adapter Connection Name** and click **Next**.

5. From the list of available templates, select the **StoredProcedureWithSignature** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.

6. Select the **Call** tab to specify the stored procedure to call. Use the following fields to set the call parameters:

Field	Description/Action
Catalog Name	Name of the catalog. The default for the catalog name is `current catalog`.
Schema Name	Name of the schema. The default for the schema name is `current schema`. **Note:** You can disable the schema lookup performed on the database by configuring the **Schema Name** parameter in the **Configuration** tab.
Procedure Name Pattern	To save time, you can type all or part of the procedure name in this field to narrow your search. This is helpful when dealing with a large database that has a long list of procedures. Use % as a multi-character wildcard and _ (underscore) as a single character wildcard. **Note:** With DB2 databases, functions do not appear in the list of procedure names. Only procedures appear in the list. **Note:** The **Procedure Name Pattern** field value is not considered if you disable the store procedure lookup performed on the database.
Procedure Name	Select the stored procedure name, depending on the how you set the **Procedure Name Pattern** field. If you select **<All Procedures>**, this field lists all of the procedures in the selected catalog and schema. **Note:** You can disable the store procedure lookup performed on the database by configuring the **Procedure Name** parameter in the **Configuration** tab.
Specific Name (Only for DB2 and DB2AS400)	Select the specific name for a stored procedure in a DB2 or DB2 AS/400 database after specifying the **Procedure Name**.

a. The top table on the **Call** tab lists the following fields and values based on the signature for the stored procedure:

Field	Description/Action
Parameter Name	Stored procedure parameter name.
SQL Type	SQL data type of the database column.
JDBC Type	JDBC data type of the stored procedure parameter.
Parameter Type	Defines the parameter type as IN, INOUT, or OUT. If you select IN or INOUT, you may also set the input expression in the **Expression** field.
Expression*	Sets the input for the IN or INOUT parameter types only. The RETURN or OUT parameters will appear automatically on the **Call** tab's bottom table. For a list of the allowable expression settings by parameter type, and how each parameter will map to the input or output fields, see the following table.

The following table shows valid expressions by parameter type:

Parameter Type	Expression	Input or Output Mapping?
RETURN	Empty (default)	Output field
OUT	Empty (default)	Output field
IN	? (default)	Input field
	Fixed value	No mapping
INOUT	? (default)	Input and output field
	Empty	Output field
ORACLE CURSOR (INOUT)	Empty (default)	Output field

b. The middle table on the **Call** tab lists the following input parameters and values for the stored procedure that will map to the input fields of the service:

Field	Description/Action
Input Parameter Name	Stored procedure input parameter name.
SQL Type	The SQL data type of the database column.
JDBC Type	JDBC data type of the input parameter.
Input Field	Name of any input parameters.

Field	Description/Action
Input Field Type	Input parameter Java data type. For a list of JDBC type to Java data type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

c. The bottom table on the **Call** tab lists the following output parameters and values for the stored procedure that will map to the output of the service, including the OUT or INOUT parameters:

Field	Description/Action
Output Parameter Name	Stored procedure output parameter name.
SQL Type	SQL data type of the database column.
JDBC Type	JDBC data type of the output parameter.
Output Field	Name of the output parameter.
Output Field Type	Output parameter Java data type. For a list of JDBC to Java data type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

d. Specify the query time out value of the StoredProcedureWithSignature service you are configuring in the following field:

Field	Description/Action
Query Time Out	Query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the service to execute before stopping the SQL operation. The time out specified in the **Query Time Out** field is not guaranteed but depends on the implementation specific to the driver vendor. The JDBC standard Statement.SetQueryTimeout() method relies on the Statement.cancel() method. When execution takes longer than the specified time-out interval, the monitor thread calls Statement.cancel(). In some cases, because of a limitation in the Statement.cancel() method, the time out does not free the thread that invoked the Statement.execute() method and this may lead to higher waiting times. The default value is `-1`. Use the default value to have the service use the value indicated on the `watt.adapter.JDBC.QueryTimeout` property as the time out. If you specify a value equal to `0`, or if the `watt.adapter.JDBC.QueryTimeout` property is not set, the service executes without a time out. If you specify a value greater than `0`, the service executes with the specified value as the time out. **Note:**

Field	Description/Action
	`-1` is the only permissible negative value for this field. For more information about the `watt.adapter.JDBC.QueryTimeout` property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

7. Select the **Configuration** tab to configure the lookup parameters for stored procedure. Use the following fields to set the parameters and values:

Field Name	Use Lookup
Schema Name	Performs a lookup on the database for schema name. Possible values are: ■ `true`. Default. Performs a lookup on the database for schema name. ■ `false`. Skips the lookup on the database for schema name. The **Schema Name** field is now editable and you can enter the value.
Procedure Name	Performs a lookup on the database for procedure name. Possible values are: ■ `true`. Default. Performs a lookup on the database for procedure name. ■ `false`. Skips the lookup on the database for procedure name. The **Procedure Name** field is now editable and you can enter the value. **Note:** The value in the **Procedure Name Pattern** field is not considered.

8. If the procedure returns a result set, select the **ResultSet** tab to specify result set parameters using the fields in the following table.

   StoredProcedureWithSignature services can support multiple results sets. The result set can contain nested cursors.

   Note:
   When using the result set that contains nested cursors, the performance of Adapter for JDBC could degrade. Since the nested cursors are recursively processed, Adapter for JDBC may also return data that may not be required.

   Use the  icon to create additional result sets as needed.

   Note:
   While all the tables in the **Call** tab will be updated automatically if the selected stored procedure changes, the **ResultSet** tab information is not updated automatically. To update this information, you must manually update the fields in the **ResultSet** tab.

   Provide values for the following parameters:

Field	Description/Action
Result Set Index	An index is automatically assigned to each result set. The first row default value is `1`. **Note:** When using for Oracle database, this field is not required.
Result Set Name	Name of the result set you want to create. **Note:** When using for Oracle database, this field is not required.
Result Set Name (from second row)	Select result set name.
Column Name	Name of the column of the result set.
JDBC Type	JDBC data type of the result column.
Output Type	Java data type of the result column. For a list of JDBC to Java data type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

9. From the **File** menu, select **Save**.

Using Oracle Object or User-defined Data Type in StoredProcedureWithSignature Adapter Services

The user-defined data types supported for the input and output parameters in StoredProcedureWithSignature are: simple object type, nested object type and array of object types.

User-defined data types	Input and Output Field Type	Description
Simple and Nested object type		Mapped to **JDBC Type** `STRUCT`.
		The **Input Field Type** and **Output Field Type** supported for User-defined data types are `java.lang.Object` and `IDATA`, an object of `com.wm.data.IData`.
	`java.lang.Object`	Input: Pass a single-dimensional object array as shown in the following example: `Object objType = new Object[]{1,"name"};` Output: Return value is a single-dimensional Object array.

User-defined data types	Input and Output Field Type	Description
	IDATA	Input: Perform the following steps: 1. Create a Document Type with fields having names in uppercase. 2. Create an input field of type Document Reference using the Document Type created in step 1. 3. Map the input field created in step 2 to the input parameter passed to the adapter service of user-defined type parameter. Output: Return value is a Document of type com.wm.data.IData.
Array of object type		Mapped to JDBC type ARRAY.
		The **Input Field Type** and **Output Field Type** supported for User-defined data types are java.lang.Object and IDATA_ARRAY, an array object of com.wm.data.IData.
	java.lang.Object	Input: Pass the value in a two-dimensional object array as shown in the following example: `Object objType = new Object[][]{{1,"name1"},{2,"name2"}};` Output: Return value is a two-dimensional Object array.
	IDATA_ARRAY	Input: Perform the following steps: 1. Create a Document List with fields having names in uppercase. 2. Use the wm.adapter.wmjdbc.utils:docListToObject service to map the Document List to the Object. 3. Map the output value of the service from step 2 to the ARRAY parameter. Output: Return value is an Object List of type com.wm.data.IData.

Configuring ExecuteService Services

An ExecuteService allows a Java or a flow service to use a connection from the adapter's connection pool. You can configure the ExecuteService using Designer. For more information on how a service

can use a connection, see "Using a Connection from the Connection Pool Within a Java or Flow Service" on page 22.

To configure an ExecuteService service

1. In Designer, right-click the package in which the service should be contained and select **New > Adapter Service**.
2. Select the parent namespace, type a name for the adapter service, and click **Next**.
3. Select **Adapter for JDBC** as the adapter type and click **Next**.
4. Select the appropriate **Adapter Connection Name** and click **Next**.
5. From the list of available templates, select the **ExecuteService** template and click **Finish**.

   The adapter service editor for the adapter service appears. You can select the **Adapter Settings** tab at any time to confirm the adapter service properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Service Template**, as necessary.
6. Select the **Service to Invoke** tab to specify the Java or the flow service name that needs the connection:

Field	Description/Action
Service Name	The Java or the flow service name that requires a connection from the connection pool. If you specify an incorrect service name, an exception is thrown at run time.

7. From the **File** menu, select **Save**.

Considerations When Creating a Java or Flow Service that Uses a Connection from the Connection Pool

- Use the value in the *$db_service_connection* from the pipeline to obtain the connection. You can also use the following Java String constant variable in your Java or flow service code, provided that the package in which you create the service is dependent on the WmJDBCAdapter package:

  ```
  com.wm.adapter.wmjdbc.services.ExecuteService.PIPELINE_CONNECTION
  ```

  For information about setting the package dependencies, see the *webMethods Service Development Help* for your release.
- Do not use the forbidden methods like `close()`, `setAutoCommit()`, and `commit()` in the service code. Doing so causes the adapter to throw an exception at run time.

- When using the ExecuteService in transactions, it is important for the WmART package to be aware about any exceptions generated in the service within the transaction SEQUENCE block. Only then will a roll back of the transaction happen. You can do this by throwing a ServiceException from the service. You can use the following sample code in the service code to do so.

```
java.sql.Connection conn =
(java.sql.Connection)IDataUtil.get(pipeline.getCursor(),
com.wm.adapter.wmjdbc.services.ExecuteService.PIPELINE_CONNECTION);
try
{
java.sql.PreparedStatement pstmt=conn.prepareStatement("insert into Person
values(1,'Chris')");
pstmt.execute();
}
catch(Throwable e)
{
e.printStackTrace();
throw new ServiceException(e);
}
```

Note:
If an error occurs when using the ExecuteService in a transaction for a Teradata database, the roll back of transactions does not happen.

Testing Adapter Services

You use Designer to test adapter services.

For more information about testing and debugging services, see the *webMethods Service Development Help* for your release.

To test adapter services

1. In Designer, expand the package and folder that contain the service you want to test.
2. Double-click the service you want to test.

   Designer displays the configured service in the service template's Adapter Service Editor.
3. Select **Run > Run As > Run Service**.
4. Specify how you want to connect to the database, using either of the following ways:
   - To connect to a database using a connection that is different than the connection specified during design time, specify the connection name here:

Parameter	Description
$connectionName	The connection used to connect to the database.

Note:
The database schema of the overridden connection must be the same as that of the default connection. For more information, see "Dynamically Changing a Service's Connection at Run Time" on page 79.

- To connect to a database using user credentials of a connection that are different than the user credentials provided when configuring the connection, specify the user name and password here.

Parameter	Description
$dbUser	The user name used to connect to the database.
$dbPassword	The password used to connect to the database.

Note:
If you do not provide the user credentials here, the user credentials specified when the connection was configured are used. For more information, see "Dynamically Changing the User Credentials of a Service's Connection at Run Time" on page 80.

Note:
You can override either the connection or the user credentials at run time. If you provide both, the connection name and the user credentials, the connection name takes precedence and the service is invoked using the overridden connection.

5. If you defined any other input fields, you will be prompted to type their input values. Type the values for each input field and then click **OK**.

6. Click the **Service Result** tab to view the output from the service.

Viewing Adapter Services

You use Designer to view adapter services.

To view a service

1. In Designer, expand the package and folder that contain the service you want to view.

2. Double-click the service you want to view.

   Designer displays the configured service in the service template's Adapter Service Editor.

Editing Adapter Services

You use Designer to edit adapter services.

To edit an adapter service

1. In Designer, browse to and open the adapter service that you want to edit.
2. Double-click the service that you want to edit.

   Designer displays the adapter service in the service template's Adapter Service Editor.
3. Do one of the following:
   - If you have the VCS Integration feature enabled, right-click the service and select **Check Out**.
   - If you do not have the VCS Integration feature enabled, right-click the service and select **Lock for Edit**.
   - If you are using the local service development feature, from the **Team** menu in Designer, select the appropriate option to check out the service. The options available in the **Team** menu depend on the VCS client that you use.
4. Modify the values for the adapter service's parameters as needed. For detailed descriptions of the service's parameters, see the section on configuring a service for the specific type of service you want to edit.
5. After you complete your modifications, save the service and do one of the following:
   - If you have the VCS Integration feature enabled, right-click the service and select **Check In**. Enter a check-in comment and click **OK**.
   - If you do not have the VCS Integration feature enabled, right-click the service and select **Unlock**.
   - If you are using the local service development feature, from the **Team** menu in Designer, select the appropriate option to check in the service. The options available in the **Team** menu depend on the VCS client that you use.
6. Save the service.

Deleting Adapter Services

You use Designer to delete adapter services.

To delete a service

1. In Designer, expand the package and folder that contain the service you want to delete.
2. Right-click the adapter service and click **Delete**.

Validating Adapter Service Values

Designer enables Adapter for JDBC to validate user-defined data for adapter services at design time. You can validate the values for a single adapter service or you can configure Designer to always validate the values for adapter services. Both options could potentially slow your design-time operations.

If you select the option to always validate values for adapter services, it will do so for all webMethods WmART-based adapters installed on Integration Server.

For more information about the **Adapter Service/Notification Editor** and other Designer menu options and toolbar icons, see the *webMethods Service Development Help* for your release.

Validate Data for a Single Adapter Service

Perform the following procedure to validate data for a single adapter service.

To validate data for a single adapter service

1. In Designer, expand the package and folder that contain the service for which you want to enable automatic validation.
2. Double-click the service for which you want to validate the data.

   Designer displays the configured adapter service in the service template's Adapter Service Editor.
3. Click the icon.

Validating Data for All Adapter Services

Perform the following procedure to enable Designer to always validate data for all adapter services.

To always validate the values for all adapter services

1. In Designer, select the **Window > Preferences >Software AG> Service Development > Adapter Service/Notification Editor** item.
2. Enable the **Automatic data validation** option.
3. Click **OK**.

Reloading Adapter Values

You can enable Adapter for JDBC to reload and validate user-defined data for adapter services at design time in Designer. You can reload values for a single adapter service or you can configure

Designer so it automatically reloads the values for adapter services. Both options could potentially slow your design-time operations.

When you reload adapter values for a single adapter service, Designer compares the service values against the resource data that has already been fetched from the selected adapter.

If you select the option to always reload values for adapter services, it will do so for all webMethods WmART-based adapters installed on Integration Server.

For more information about the **Adapter Service/Notification Editor**, other menu options, and toolbar icons, see the *webMethods Service Development Help* for your release.

Reloading the Values for a Single Adapter Service

Perform the following procedure to reload the adapter values for a single adapter service.

To reload the adapter values for a single adapter service

1. In Designer, expand the package and folder that contain the service for which you want to enable automatic validation.
2. Double-click the service for which you want to validate the data.

   Designer displays the configured adapter service in the service template's Adapter Service Editor.
3. Click the  icon.

Reloading the Values for All Adapter Services

Perform the following procedure to reload the adapter values for all adapter services.

To reload the adapter values for all adapter services

1. In Designer, select the **Window > Preferences >Software AG> Service Development > Adapter Service/Notification Editor** item.
2. Enable the **Automatic polling of adapter metadata** option.
3. Click **OK**.

7 Adapter Notifications

Overview of Adapter Notifications

This chapter describes how to configure and manage Adapter for JDBC notifications. For detailed descriptions of the available Adapter for JDBC notifications, see "Adapter Notifications" on page 25.

Before Configuring or Managing Notifications

Perform the following steps before configuring or managing notifications.

To prepare to configure or manage Adapter for JDBC notifications

1. Start your Integration Server and Integration Server Administrator, if they are not already running.

2. Make sure you have Integration Server Administrator privileges so that you can access Adapter for JDBC's administrative screens. For information about setting user privileges, see the *webMethods Integration Server Administrator's Guide* for your release.

3. Be sure to check for a list of known limitations for your database driver since it may affect how you configure your connections and notifications.

4. If you have made changes to the table schema for a given adapter notification, be sure to update the adapter notification accordingly.

5. If you plan to use the Only Once notification feature, for details, see "Using the Exactly Once Notification Feature" on page 173.

6. Using Integration Server Administrator, make sure the WmJDBCAdapter package is enabled. For instructions, see "Enabling Packages" on page 57.

7. Using Integration Server Administrator, configure an adapter connection to use with the notification. For instructions, see "Configuring Adapter for JDBC Connections" on page 68.

   Note:
   Integration Server provides a built-in service you can use at design time to change the connection associated with a polling notification. For more information, see "Changing the Connection Associated with an Adapter Service or Notification at Design Time" on page 22.

8. Start Software AG Designer if it is not already running.

9. Using Designer, create a user-defined package to contain the notification, if you have not already done so. When you configure notifications, you should always define them in user-defined packages rather than in the WmJDBCAdapter package. For more information about managing packages for the adapter, see "Overview of Package Management" on page 56.

10. You must schedule a notification and then enable it before you can use the notification. For instructions, see "Managing Polling Notifications" on page 171.

11. If you want to enable the same polling notification on multiple Integration Server instances connecting to the same source database to achieve automated failover, you have to use the polling notification within an Integration Server cluster. For information how to configure clustered polling notifications, see "Polling Notification Support in Integration Server Clusters" on page 60.

Configuring InsertNotifications

An InsertNotification publishes notification of insert operations on a database table. For more information about notifications, see "Adapter Notifications" on page 25.

Considerations when Configuring InsertNotifications

You must consider the following restrictions when configuring InsertNotifications:

- InsertNotifications cannot be used with a Teradata database (any version).
- MySQL version 5.0.x does not support multiple triggers with the same event (insert, delete, or update) for one table. Hence, with a MySQL database, when using an InsertNotification to monitor a table, you must disable the notification before you can enable another InsertNotification or an OrderedNotification with an insert operation for the same table.

Creating an InsertNotification

You configure notifications using Designer.

Be sure to review the sections "Before Configuring or Managing Notifications" on page 134 and "Considerations when Configuring InsertNotifications" on page 135 before you configure InsertNotifications.

To create an InsertNotification

1. In Designer, right-click the package in which the notification should be contained and select **New > Adapter Notification**.

2. Select the parent namespace, type a name for the adapter notification, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the **InsertNotificaton** template and click **Next**.

5. Select the appropriate **Adapter Connection Name** and click **Next**.

   The name of the publishable document associated with this notification is displayed.

6. Click **Finish**.

   For more information about adapter notifications and publishable documents, see "Adapter Notifications" on page 25. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.

7. Designer creates the notification, and the editor for the adapter notification appears.

   a. You can select the **Adapter Settings** tab at any time to confirm adapter notification properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Notification Template**, as necessary.

   b. In the **Publish Document** section, you can specify how you want the notification document to be published:

   - To publish documents to Broker, select **Broker/Local**. This is the default option.
   - To publish documents to a JMS provider, select **JMS Provider**, and provide values for the following input fields:

Field	Description/Action
Connection alias name	The name of the JMS connection alias configured on Integration Server. If the connection alias is a Broker Cluster configured with Multisend Guaranteed policy, you must add the watt property watt.art.notification.jmsSend.usePublicService and set it to **true**. **Note:** Adapter Runtime does not support LOCAL_TRANSACTION and XA_TRANSACTION type JMS connection alias.
Destination name	The name of the destination from which you want the JMS trigger to receive messages.
Destination type	Whether the destination is a **Queue** (default) or a **Topic**.

   The information from the **Permissions** tab appears in the **Properties** panel.

8. Select the **Notification Configure** tab and use the following fields:

Field	Description/Action
Base Name	The base name used to generate the **Resource Name** created by Adapter for JDBC. **Note:**

Field	Description/Action
	For OS/390 DB2 7.2, the **Base Name** you create below must be no more than five characters because triggers on OS/390 name cannot be more than eight characters.
Publish Locally	Specifies whether to publish the notification's publishable document to the local Integration Server. By default, this option is not selected, that is, if the Broker is configured to Integration Server, the publishable document is published to the Broker; otherwise the publishable document is published to the local Integration Server. Selecting the **Publish Locally** option reduces performance problems, if Integration Server is connecting to a remotely located Broker that is in turn triggering a service on the local Integration Server.
Resource Type	Types are buffer table, trigger, and sequence. The base name and resource type determine the following **Resource Name**.
Resource Name	To ensure uniqueness, the resource name combines the following elements. You cannot edit this name. ■ Resource prefix (WMB, WMT, and WMS for buffer table, trigger, and sequence respectively) ■ The name you typed in the **Base Name** field ■ A suffix, based on a system timestamp
File Record Format	The format of the file record. Optional field used by DB2 for AS/400 V4R5 only.
Database Name	The name of the database where the buffer tables will be created. Optional field used by DB2 for OS/390 only.
Table Space Name	The table space where the buffer tables will be created. Optional field used by DB2 for OS/390 only.

9. Select the **Tables** tab and use the following fields:

Note:
For AS/400 DB2 V4R5 using a jt400.jar file, the table name for the notification cannot exceed 10 characters; otherwise, an exception will be generated when you try to enable the notification.

Field	Description/Action
Table Alias	The table alias is automatically assigned when you select more than one table in the **Table Name** field. The default is `t1`.

Field	Description/Action
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.

10. If you are not joining tables, skip this step. Select the **Joins** tab to specify the columns for joining the tables you just configured.

    a. Select the icon to create new left and right columns.

    b. Select **Left Column** and select the first table's joining column.

    c. Select the appropriate **Operator**.

    d. Select **Right Column** and select the next table's joining column.

    e. Repeat until you have defined all the joins.

11. Use the **SELECT** tab to define the columns and fields to be selected using the following fields:

    Note:
    When using the Join clause, select only the fields of the monitor table in the **Select** tab.

    a. In the **ALL/DISTINCT** field, select **ALL** to include duplicate rows or **DISTINCT** to suppress duplicate rows. Selecting **ALL** corresponds to the SQL statement `SELECT ALL name from tablename`. The default value is blank, which corresponds to the SQL statement `SELECT name from tablename`.

    b. Select the icon (or the icon to fill in all rows of the table) to create new fields as needed.

    c. In the **Expression** field, select a column or type any valid SQL expression. The corresponding **Column Type**, **JDBC Type**, **Output Field Type**, and **Output Field** display for each column you select in the **Expression** field. Use the following fields:

Field	Description/Action
Expression	The column name or SQL expression.
Column Type	The column data type defined in the database table.

Field	Description/Action
JDBC Type	The JDBC type of the corresponding **Output Field**.
Output Field Type	The data type of the output field. Adapter for JDBC automatically converts database-specific types to Java data types. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Output Field	The name of the field containing the output from the SELECT operation. An output field name displays when you select an expression. You can also modify the output field names as required.
Maximum Row	Specifies the number of rows to be retrieved from the buffer table. This field is useful when you are working with a large number of records and you want to limit the number of documents sent each time the notification polls. Use a value of `0` to indicate no limit on the number of rows retrieved.
Query Time Out	Specify the query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the notification to execute before stopping the SQL operation. The default value is -1. Use the default value to have the notification use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to 0, or if the watt.adapter.JDBC.QueryTimeout property is not set, the notification executes without a time out. If you specify a value greater than 0, the notification executes with the specified value as the time out. **Note:** -1 is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

12. Use the **WHEN** tab to specify the conditions for selecting information using the following fields.

Note:
If you use Microsoft SQL Server, Sybase, or V4 AS/400 DB2, do not use the **WHEN** tab because this feature is not supported. An exception will be generated if you try to use this tab.

a. Select the icon to define new WHEN clause fields.

b. Select the **Column** field and choose a column from the list.

c. Select a logical operator from the **AND/OR** field, an **Operator**, and separators (the left and right parentheses) as needed.

d. Type a fixed value in the **Value** field. Be sure that it is a valid value, or an exception will be generated at run time.

e. If necessary, use the ⇧ or ⇩ icons to change the order of the WHEN clause to ensure the parameters are parsed in the correct order.

f. Repeat until you have specified all WHEN parameters.

13. The information about using the **Permissions** tab to assign an access control list (ACL) to an element appears in the Properties panel.

14. From the **File** menu, select **Save**.

15. You must schedule and enable the notification using Integration Server Administrator before you can use it. For details, see "Managing Polling Notifications" on page 171.

Configuring UpdateNotifications

An UpdateNotification publishes notification of update operations on a database table. For more information about notifications, see "Adapter Notifications" on page 25.

Considerations when Configuring UpdateNotifications

You must consider the following restrictions when configuring UpdateNotifications:

- UpdateNotifications cannot be used with a Teradata database (any version).
- MySQL version 5.0.x does not support multiple triggers with the same event (insert, delete, or update) for one table. Hence, with a MySQL database, when using an UpdateNotification to monitor a table, you must disable the notification before you can enable another UpdateNotification or an OrderedNotification with an update operation for the same table.
- When using an UpdateNotification with a MySQL database, updating any database field with the same value will not invoke a trigger.

Creating an UpdateNotification

You configure notifications using Designer.

Be sure to review the sections "Before Configuring or Managing Notifications" on page 134 and "Considerations when Configuring UpdateNotifications" on page 140 before you configure an UpdateNotification.

To create an UpdateNotification

1. In Designer, right-click the package in which the notification should be contained and select **New > Adapter Notification**.

2. Select the parent namespace, type a name for the adapter notification, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the **UpdateNotificaton** template and click **Next**.

5. Select the appropriate **Adapter Connection Name** and click **Next**.

   The name of the publishable document associated with this notification is displayed.

6. Click **Finish**.

   For more information about adapter notifications and publishable documents, see "Adapter Notifications" on page 25. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.

7. Designer creates the notification, and the editor for the adapter notification appears.

   a. You can select the **Adapter Settings** tab at any time to confirm adapter notification properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Notification Template**, as necessary.

   b. In the **Publish Document** section, you can specify how you want the notification document to be published:

      - To publish documents to Broker, select **Broker/Local**. This is the default option.
      - To publish documents to a JMS provider, select **JMS Provider**, and provide values for the following input fields:

Field	Description/Action
Connection alias name	The name of the JMS connection alias configured on Integration Server. If the connection alias is a Broker Cluster configured with Multisend Guaranteed policy, you must add the watt property watt.art.notification.jmsSend.usePublicService and set it to **true**. **Note:** Adapter Runtime does not support LOCAL_TRANSACTION and XA_TRANSACTION type JMS connection alias.
Destination name	The name of the destination from which you want the JMS trigger to receive messages.
Destination type	Whether the destination is a **Queue** (default) or a **Topic**.

8. Select the **Notification Configure** tab and use the following fields:

Field	Description/Action
Base Name	The base name used to generate the **Resource Name** created by Adapter for JDBC. **Note:** For OS/390 DB2V7.2, the **Base Name** you create below must be no more than five characters because triggers on OS/390 name cannot be more than eight characters.
Publish Locally	Specifies whether to publish the notification's publishable document to the local Integration Server. By default, this option is not selected, that is, if the Broker is configured to Integration Server, the publishable document is published to the Broker; otherwise the publishable document is published to the local Integration Server. Selecting the **Publish Locally** option reduces performance problems, if Integration Server is connecting to a remotely located Broker that is in turn triggering a service on the local Integration Server.
Resource Type	Types are buffer table, trigger, and sequence. The base name and resource type determine the following **Resource Name**.
Resource Name	To ensure uniqueness, the resource name combines the following elements. You do not edit this name. ■ Resource prefix (WMB, WMT, and WMS for buffer table, trigger, and sequence respectively) ■ The name you typed in the **Base Name** field ■ A suffix, based on a system timestamp
File Record Format	The format of the file record. Optional field used by DB2 for AS/400 V4R5 only.
Database Name	The name of the database where the buffer tables will be created. Optional field used by DB2 for OS/390 only.
Table Space Name	The table space where the buffer tables will be created. Optional field used by DB2 for OS/390 only.

9. Select the **Tables** tab and use the following fields:

Note:
For AS/400 DB2 V4R5 using a jt400.jar file, the table name for the notification cannot exceed 10 characters; otherwise, an exception will be generated when you try to enable the notification.

Field	Description/Action
Table Alias	The table alias is automatically assigned when you select more than one table in the **Table Name** field. The default is `t1`.
Table Name	Select a table. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.

10. If you are not joining tables, skip this step. Select the **Joins** tab to specify the columns for joining the tables you just configured.

    a. Select the icon to create new left and right columns.

    b. Select **Left Column** and select the first table's joining column.

    c. Select the appropriate **Operator**.

    d. Select **Right Column** and select the next table's joining column.

    e. Repeat until you have defined all the joins.

11. Use the **SELECT** tab to define the columns and fields to be selected as follows:

    Note:
    When using the Join clause, select only the fields of the monitor table in the **Select** tab.

    a. In the **ALL/DISTINCT** field, select **ALL** to include duplicate rows or **DISTINCT** to suppress duplicate rows. Selecting **ALL** corresponds to the SQL statement `SELECT ALL`*`name`*`from`*`tablename`*. The default value is blank, which corresponds to the SQL statement `SELECT`*`name`*`from`*`tablename`*.

    b. Select the icon (or the icon to fill in all rows of the table) to create new fields as needed.

    c. In the **Expression** field, select a column or type any valid SQL expression. The corresponding **Column Type**, **JDBC Type**, **Output Field Type**, and **Output Field** display for each column you select in the **Expression** field. Use the following fields:

Field	Description/Action
Expression	The column name or SQL expression.
Column Type	The column data type defined in the database table.
JDBC Type	The JDBC type of the corresponding **Output Field**.
Output Field Type	The data type of the output field. Adapter for JDBC automatically converts database-specific types to Java data types. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Output Field	The name of the field containing the output from the SELECT operation. An output field name displays when you select an expression. You can also modify the output field names as required.
Notify On Update	Enable this option to indicate for which of the columns specified in the **SELECT** tab you want a notification, if the column is updated. Select: ■ **Yes** if you want a notification if this column of data has been updated. **Yes** is the default value. ■ **No** if you do not want a notification if this column of data has been updated. For example, you configure the following three output fields: **MyName**, **MyNumber**, and **MyLocation**. You want a notification only if the **MyLocation** output field is updated. In this case, you would select **Yes** for the **MyLocation** output field, and select **No** for the **MyName** and **MyNumber** output fields.
Output Value Type	Specifies which output value to retrieve from the database table. By default, the UpdateNotification retrieves the new value from the database table. Select either of the following output value types: ■ **Old**: Retrieves the old value from the database table ■ **New**: Retrieves the new value from the database table To retrieve both the old and the new values, create two rows and then select an **Output Value Type** as **Old** in one row and an **Output Value Type** as **New** in the other row. While doing so, ensure that the **Output Field** is unique for both the old and the new values. **Note:** For Sybase and Microsoft 2000/2005, you cannot retrieve both the old and the new values in the same notification. The notification must retrieve either the old or the new value.
Maximum Row	Specifies the number of rows to be retrieved from the buffer table. This field is useful when you are working with a large number of

Field	Description/Action
	records and you want to limit the number of documents sent each time the notification polls. Use a value of `0` to indicate no limit on the number of rows retrieved.
Query Time Out	Specify the query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the notification to execute before stopping the SQL operation. The default value is -1. Use the default value to have the notification use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to 0, or if the watt.adapter.JDBC.QueryTimeout property is not set, the notification executes without a time out. If you specify a value greater than 0, the notification executes with the specified value as the time out. **Note:** -1 is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

12. Use the **WHEN** tab to specify the conditions for selecting information:

    Note:
    If you use Microsoft SQL Server, Sybase, or V4 AS/400 DB2, do not use the **WHEN** tab because this feature is not supported. An exception will be generated if you try to use this tab.

    a. Select the icon to define new WHEN clause fields.

    b. Select the **Column** field and choose a column from the list.

    c. Select a logical operator from the **AND/OR** field, an **Operator**, and separators (the left and right parentheses) as needed.

    d. Type a fixed value in the **Value** field. Be sure that it is a valid value, or an exception will be generated at run time.

    e. If necessary, use the or icons to change the order of the WHEN clause to ensure the parameters are parsed in the correct order.

    f. Repeat until you have specified all WHEN parameters.

13. The information about using the **Permissions** tab to assign an access control list (ACL) to an element appears in the Properties panel.

14. From the **File** menu, select **Save**.

15. You must schedule and enable the notification using Integration Server Administrator before you can use it. For details, see "Managing Polling Notifications" on page 171.

Configuring DeleteNotifications

A DeleteNotification publishes notification of delete operations on a database table. For more information about notifications, see "Adapter Notifications" on page 25.

Considerations when Configuring DeleteNotifications

You must consider the following restrictions when configuring DeleteNotifications:

- DeleteNotifications cannot be used with a Teradata database (any version).
- MySQL version 5.0.x does not support multiple triggers with the same event (insert, delete, or update) for one table. Hence, with a MySQL database, when using a DeleteNotification to monitor a table, you must disable the notification before you can enable another DeleteNotification or an OrderedNotification with a delete operation for the same table.

Creating a DeleteNotification

You configure notifications using Designer.

Be sure to review the sections "Before Configuring or Managing Notifications" on page 134 and "Considerations when Configuring DeleteNotifications" on page 146 before you configure DeleteNotifications.

To create a DeleteNotification

1. In Designer, right-click the package in which the notification should be contained and select **New > Adapter Notification**.

2. Select the parent namespace, type a name for the adapter notification, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the **DeleteNotificaton** template and click **Next**.

5. Select the appropriate **Adapter Connection Name** and click **Next**.

   The name of the publishable document associated with this notification is displayed.

6. Click **Finish**.

For more information about adapter notifications and publishable documents, see "Adapter Notifications" on page 25. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.

7. Designer creates the notification, and the editor for the adapter notification appears.

   a. You can select the **Adapter Settings** tab at any time to confirm adapter notification properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Notification Template**, as necessary.

   b. In the **Publish Document** section, you can specify how you want the notification document to be published:

      - To publish documents to Broker, select **Broker/Local**. This is the default option.
      - To publish documents to a JMS provider, select **JMS Provider**, and provide values for the following input fields:

Field	Description/Action
Connection alias name	The name of the JMS connection alias configured on Integration Server. If the connection alias is a Broker Cluster configured with Multisend Guaranteed policy, you must add the watt property watt.art.notification.jmsSend.usePublicService and set it to **true**. **Note:** Adapter Runtime does not support LOCAL_TRANSACTION and XA_TRANSACTION type JMS connection alias.
Destination name	The name of the destination from which you want the JMS trigger to receive messages.
Destination type	Whether the destination is a **Queue** (default) or a **Topic**.

   The information from the **Permissions** tab appears in the **Properties** panel.

8. Select the **Notification Configure** tab and use the following fields:

Field	Description/Action
Base Name	The base name used to generate the **Resource Name** created by Adapter for JDBC. **Note:**

Field	Description/Action
	For OS/390 DB2V7.2, the **Base Name** you create below must be no more than 5 characters because triggers on OS/390 name cannot be more than 8 characters.
Publish Locally	Specifies whether to publish the notification's publishable document to the local Integration Server. By default, this option is not selected, that is, if the Broker is configured to Integration Server, the publishable document is published to the Broker; otherwise the publishable document is published to the local Integration Server. Selecting the **Publish Locally** option reduces performance problems, if Integration Server is connecting to a remotely located Broker that is in turn triggering a service on the local Integration Server.
Resource Type	Types are buffer table, trigger, and sequence. The base name and resource type determine the following **Resource Name**.
Resource Name	To ensure uniqueness, the resource name combines the following elements. You do not edit this name. ■ Resource type prefix (WMB, WMT, and WMS for buffer table, trigger, and sequence respectively) ■ The name you typed in the **Base Name** field ■ A suffix, based on a system timestamp
File Record Format	The format of the file record. Optional field used by DB2 for AS/400 V4R5 only.
Database Name	The name of the database where the buffer tables will be created. Optional field used by DB2 for OS/390 only.
Table Space Name	The table space where the buffer tables will be created. Optional field used by DB2 for OS/390 only.

9. Select the **Tables** tab and use the following fields:

Note:
For AS/400 DB2 V4R5 using a jt400.jar file, the table name for the notification cannot exceed 10 characters; otherwise, an exception will be generated when you try to enable the notification.

Field	Description/Action
Table Alias	The table alias is automatically assigned when you select more than one table in the **Table Name** field. The default is `t1`.

Field	Description/Action
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name cannot contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.

10. If you are not joining tables, skip this step. Select the **Joins** tab to specify the columns for joining the tables you just configured.

    a. Select the icon to create new left and right columns.

    b. Select **Left Column** and select the first table's joining column.

    c. Select the appropriate **Operator**.

    d. Select **Right Column** and select the next table's joining column.

    e. Repeat until you have defined all the joins.

11. Use the **SELECT** tab to define the columns and fields to be selected.

    Note:
    When using the Join clause, select only the fields of the monitor table in the **Select** tab.

    a. In the **ALL/DISTINCT** field, select **ALL** to include duplicate rows or **DISTINCT** to suppress duplicate rows. Selecting **ALL** corresponds to the SQL statement `SELECT ALL` *`name`* `from` *`tablename`*. The default value is blank, which corresponds to the SQL statement `SELECT` *`name`* `from` *`tablename`*.

    b. Select the icon (or the icon to fill in all rows of the table) to create new fields as needed.

    c. In the **Expression** field, select a column or type any valid SQL expression. The corresponding **Column Type**, **JDBC Type**, **Output Field Type**, and **Output Field** display for each column you select in the **Expression** field. Use the following fields:

Field	Description/Action
Expression	The column name or SQL expression.
Column Type	The column data type defined in the database table.

Field	Description/Action
JDBC Type	The JDBC type of the corresponding **Output Field**.
Output Field Type	The data type of the output field. Adapter for JDBC automatically converts database-specific types to Java data types. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Output Field	The name of the field containing the output from the select operation. An output field name displays when you select an expression. You can also modify the output field names as required.
Maximum Row	Specifies the number of rows to be retrieved from the buffer table. This field is useful when you are working with a large number of records and you want to limit the number of documents sent each time the notification polls. Use a value of `0` to indicate no limit on the number of rows retrieved.
Query Time Out	Specify the query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the notification to execute before stopping the SQL operation. The default value is -1. Use the default value to have the notification use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to 0, or if the watt.adapter.JDBC.QueryTimeout property is not set, the notification executes without a time out. If you specify a value greater than 0, the notification executes with the specified value as the time out. **Note:** -1 is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

12. Use the **WHEN** tab to specify the conditions for selecting information:

Note:
If you use Microsoft SQL Server, Sybase, or V4 AS/400 DB2, do not use the **WHEN** tab because this feature is not supported. An exception will be generated if you try to use this tab.

a. Select the **Insert Row** icon to define new WHEN clause fields.

b. Select the **Column** field and choose a column from the list.

c. Select a logical operator from the **AND/OR** field, an **Operator**, and separators (the left and right parentheses) as needed.

d. Type a fixed value in the **Value** field. Be sure that it is a valid value, or an exception will be generated at run time.

e. If necessary, use the ⇧ or ⇩ icons to change the order of the WHEN clause to ensure the parameters are parsed in the correct order.

f. Repeat until you have specified all WHEN parameters.

13. The information about using the **Permissions** tab to assign an access control list (ACL) to an element appears in the Properties panel.

14. From the **File** menu, select **Save**.

15. You must schedule and enable the notification using Integration Server Administrator before you can use it. For details, see "Managing Polling Notifications" on page 171.

Configuring BasicNotifications

A BasicNotification polls a database table for data using a SQL Select operation. For more information about notifications, see "Adapter Notifications" on page 25.

Creating a BasicNotifications

You configure notifications using Designer.

Be sure to review the section "Before Configuring or Managing Notifications" on page 134 before you configure notifications.

To configure a BasicNotification

1. In Designer, right-click the package in which the notification should be contained and select **New > Adapter Notification**.

2. Select the parent namespace, type a name for the adapter notification, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the **BasicNotificaton** template and click **Next**.

5. Select the appropriate **Adapter Connection Name** and click **Next**.

   The name of the publishable document associated with this notification is displayed.

6. Click **Finish**.

For more information about adapter notifications and publishable documents, see "Adapter Notifications" on page 25. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.

7. Designer creates the notification, and the editor for the adapter notification appears.

   a. You can select the **Adapter Settings** tab at any time to confirm adapter notification properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Notification Template**, as necessary.

   b. In the **Publish Document** section, you can specify how you want the notification document to be published:

   - To publish documents to Broker, select **Broker/Local**. This is the default option.
   - To publish documents to a JMS provider, select **JMS Provider**, and provide values for the following input fields:

Field	Description/Action
Connection alias name	The name of the JMS connection alias configured on Integration Server. If the connection alias is a Broker Cluster configured with Multisend Guaranteed policy, you must add the watt property watt.art.notification.jmsSend.usePublicService and set it to **true**. **Note:** Adapter Runtime does not support LOCAL_TRANSACTION and XA_TRANSACTION type JMS connection alias.
Destination name	The name of the destination from which you want the JMS trigger to receive messages.
Destination type	Whether the destination is a **Queue** (default) or a **Topic**.

   The information from the **Permissions** tab appears in the **Properties** panel.

8. Select the **Tables** tab and use the following fields:

Note:
For AS/400 DB2 V4R5 using a jt400.jar file, the table name for the notification cannot exceed 10 characters; otherwise, an exception will be generated when you try to enable the notification.

Field	Description/Action
Table Alias	The table alias is automatically assigned when you select more than one table in the **Table Name** field. The default is `t1`.

Field	Description/Action
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.

9. If you are not joining tables, skip this step. Select the **Joins** tab to specify the columns for joining the tables you just configured.

   a. Select the icon (or the icon to fill in all rows of the table) to create new left and right columns.

   b. Select **Left Column** and select the first table's joining column.

   c. Select the appropriate **Operator**.

   d. Select **Right Column** and select the next table's joining column.

   e. Repeat until you have defined all the joins.

10. Use the **SELECT** tab to define the columns and fields to be selected.

    a. In the **ALL/DISTINCT** field, select **ALL** to include duplicate rows or **DISTINCT** to suppress duplicate rows. Selecting **ALL** corresponds to the SQL statement `SELECT ALL name from tablename`. The default value is blank, which corresponds to the SQL statement `SELECT name from tablename`.

    b. Select the icon (or the icon to fill in all rows of the table) to create new fields as needed.

    c. In the **Expression** field, select a column or type any valid SQL expression. The corresponding **Column Type**, **JDBC Type**, **Output Field Type**, and **Output Field** display for each column you select in the **Expression** field. Use the following fields:

Field	Description/Action
Expression	The column name or SQL expression.
Column Type	The column data type defined in the database table.
JDBC Type	The JDBC type of the corresponding **Output Field**.

Field	Description/Action
Output Field Type	The data type of the output field. Adapter for JDBC automatically converts database-specific types to Java data types. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Output Field	The name of the field containing the output from the SELECT operation. An output field name displays when you select an expression. You can also modify the output field names as required.
Sort Order	Specifies ordering of publishable documents per each polling. Use this field to ensure that the notification's publishable documents, for each polling, are in the correct ascending or descending order based on one or more table columns. Select either **Ascend** or **Descend**. Leave the field blank if there is no sort order.

d. If you want the notification's publishable document to be published to the local Integration Server, select the **Publish Locally** option.

By default, this option is not selected, that is, if the Broker is configured to Integration Server, the publishable document is published to the Broker; otherwise the publishable document is published to the local Integration Server.

Selecting the **Publish Locally** option reduces performance problems, if Integration Server is connecting to a remotely located Broker that is in turn triggering a service on the local Integration Server.

e. If you want to use the Exactly Once notification feature, you must enable the **Exactly Once Notification** option. For more information, see "Using the Exactly Once Notification Feature" on page 173.

f. Set the **Delete selected records** flag to automatically delete the selected records from the buffer table (based on their **Record ID Column** value) after the notification. Use this option to prevent publishing the same documents to Integration Server each time polling occurs.

Note:
Running a BasicNotification may generate a *duplicate message* error. Integration Server will ignore the duplicate notification document. In this case, you should check the **Delete selected records** option and choose a column with sequentially unique values as the **Record ID Column** value next in the procedure.

g. You must use the **Record ID Column** field to use the Exactly Once notification feature. Select the column from the buffer table that you want to use as the unique ID for the publishable document for this notification. For more information, see "Using the Exactly Once Notification Feature" on page 173.

To ensure that all values will be unique, choose a table column in the **Record ID Column** field whose values are sequential numbers.

h. Use the **Mark ID Column** field to mark the records as processed. Select the column that you created in the database table to hold the status of the record. Use this option when you do not want to set the **Delete selected records** flag, and also want to avoid the publishing of duplicate records. For information about creating the column that holds the status of the records and marking the records as published, see "Basic Notifications" on page 31.

i. Use the **Maximum Row** field to specify the maximum number of records to retrieve from the database. This field is useful when you are working with a large number of records and you want to limit the number of documents sent each time the notification polls.

The default value of `0` (no limit) retrieves all records.

j. Use the **Query Time Out** field to specify the query time out value of the BasicNotification you are configuring. This value is the amount of time Adapter for JDBC waits for the notification to execute before stopping the SQL operation.

The default value is -1. Use the default value to have the notification use the value indicated on the `watt.adapter.JDBC.QueryTimeout` property as the time out.

If you specify a value equal to 0, or if the `watt.adapter.JDBC.QueryTimeout` property is not set, the notification executes without a time out.

If you specify a value greater than 0, the notification executes with the specified value as the time out.

Note:
-1 is the only permissible negative value for this field.

For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

11. Use the **WHERE** tab to specify the WHERE conditions on the SQL query statement for selecting information:

a. Select the  icon to define new WHERE clause fields.

b. Select a logical operator from the **AND/OR** field, an **Operator**, and separators (the left and right parentheses) as needed, and use the following fields:

Field	Description/Action
AND/OR	The logical operator.
Column	The name of the column you want to use in the WHERE clause.
Operator	The operator used with the **Column** and **Input Field**.
Input Field	Type a fixed value in this field. Be sure that it is a valid value, or an exception will be generated at run time.

Note:
For Oracle users, if you use a CHAR(n) data type and enter a value in the **Input Field**, Adapter for JDBC automatically sets the ORACLEFIXED_CHAR data type as the JDBC data type.

c. If necessary, use the ⇧ or ⇩ icons to change the order of the WHERE clause to ensure the parameters are parsed in the correct order.

d. Repeat this procedure until you have specified all the WHERE parameters.

12. The information about using the **Permissions** tab to assign an access control list (ACL) to an element appears in the Properties panel.

13. From the **File** menu, select **Save**.

14. You must schedule and enable the notification using Integration Server Administrator before you can use it. For details, see "Managing Polling Notifications" on page 171.

Configuring StoredProcedureNotifications

A StoredProcedureNotification publishes notification data by calling a stored procedure inside of a database. For more information about notifications, see "Adapter Notifications" on page 25.

Creating a StoredProcedureNotifications

You configure notifications using Designer.

Be sure to review the section "Before Configuring or Managing Notifications" on page 134 before you configure notifications.

For details and important considerations when using a StoredProcedureNotification, see "Stored Procedure Notifications" on page 34.

To configure a StoredProcedureNotification

1. In Designer, right-click the package in which the notification should be contained and select **New > Adapter Notification**.

2. Select the parent namespace, type a name for the adapter notification, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the **StoredProcedureNotificaton** template and click **Next**.

5. Select the appropriate **Adapter Connection Name** and click **Next**.

   The name of the publishable document associated with this notification is displayed.

6. Click **Finish**.

   For more information about adapter notifications and publishable documents, see "Adapter Notifications" on page 25. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.

7. Designer creates the notification, and the editor for the adapter notification appears.

   a. You can select the **Adapter Settings** tab at any time to confirm adapter notification properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Notification Template**, as necessary.

   b. In the **Publish Document** section, you can specify how you want the notification document to be published:

   - To publish documents to Broker, select **Broker/Local**. This is the default option.
   - To publish documents to a JMS provider, select **JMS Provider**, and provide values for the following input fields:

Field	Description/Action
Connection alias name	The name of the JMS connection alias configured on Integration Server. If the connection alias is a Broker Cluster configured with Multisend Guaranteed policy, you must add the watt property watt.art.notification.jmsSend.usePublicService and set it to **true**. **Note:** Adapter Runtime does not support LOCAL_TRANSACTION and XA_TRANSACTION type JMS connection alias.
Destination name	The name of the destination from which you want the JMS trigger to receive messages.
Destination type	Whether the destination is a **Queue** (default) or a **Topic**.

   The information from the **Permissions** tab appears in the **Properties** panel.

8. Select the **Call** tab to specify which stored procedure to use with the notification. Use the  icon and set the **Call** parameters as follows:

Field	Description/Action
Catalog Name	The name of the catalog. The default for the catalog name is `current catalog`.

Field	Description/Action
Schema Name	The name of the schema. The default for the schema name is `current schema`.
Enable Procedure Lookup (Optional)	To type in the **Procedure Name**, set this field to `False`.To select the **Procedure Name** from a list, set this field to `True`. The default is `False`. Set this value to `False` if you know the name of the procedure and you are working with a large database that has a long list of procedures.
Procedure Name	Type or select the stored procedure name, depending on how you set the **Enable Procedure Lookup** field.
Publish Locally	Specifies whether to publish the notification's publishable document to the local Integration Server. By default, this option is not selected, that is, if the Broker is configured to Integration Server, the publishable document is published to the Broker; otherwise the publishable document is published to the local Integration Server. Selecting the **Publish Locally** option reduces performance problems, if Integration Server is connecting to a remotely located Broker that is in turn triggering a service on the local Integration Server.
JDBC Type	The JDBC type of the corresponding **Return Field Name**.
Return Field Name	Name of the return field of the stored procedure.
Query Time Out	Specify the query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the notification to execute before stopping the SQL operation. The default value is -1. Use the default value to have the notification use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to 0, or if the watt.adapter.JDBC.QueryTimeout property is not set, the notification executes without a time out. If you specify a value greater than 0, the notification executes with the specified value as the time out. **Note:** -1 is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

9. Use the **Parameter** tab to specify stored procedure parameters. Use the icon (or the icon to fill in all rows of the table) to create new parameters for the stored procedure.

Field	Description/Action
ParamJDBCType	The JDBC type of the stored procedure parameter. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
ParamName	Stored procedure parameter name.
ParamType	Select OUT as the parameter type because StoredProcedure Notifications do not accept input parameters.
Expression	Keep the default value of ? because StoredProcedure Notifications do not accept input parameters.
Output Name	Name of any output parameters of the stored procedure, if any. For information about output fields for stored procedures, see "Stored Procedure Notifications" on page 34.
Output Type	Output parameter Java type. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

10. StoredProcedure notifications can support one result set (or one Oracle REF CURSOR). The result set can contain nested cursors.

Note:
When using the result set that contains nested cursors, the performance of Adapter for JDBC could degrade. Since the nested cursors are recursively processed, Adapter for JDBC may also return data that may not be required.

If the procedure returns a result set, select the **ResultSet** tab to specify result set parameters using the fields in the following table:

Field	Description/Action
Result Set Index	An index is automatically assigned to each result set. The first row default value is 1. **Note:** When using for Oracle database, this field is not required.
Result Set Name	Type the name of the result set you want to create. For information about result sets, see "Stored Procedure Notifications" on page 34. **Note:** When using for Oracle database, this field is not required.
Result Set Name (from second row)	Select a valid result set name.
Column Name	Name of column of the result set.

Field	Description/Action
JDBC Type	The JDBC type of the result set column.
Output Type	The Java type of the result column. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

11. The information about using the **Permissions** tab to assign an access control list (ACL) to an element appears in the Properties panel.

12. From the **File** menu, select **Save**.

13. You must schedule and enable the notification using Integration Server Administrator before you can use it. For details, see "Managing Polling Notifications" on page 171.

Configuring StoredProcedureNotificationWithSignature

A StoredProcedureNotificationWithSignature publishes notification data by calling a stored procedure inside of a database. Unlike a StoredProcedureNotification, the StoredProcedureNotificationWithSignature enables you to automatically obtain a stored procedure's parameters by introspecting and listing the signature of the stored procedure at the time you configure this notification. This means that you do not need to look up and retype these parameters manually.

Creating a StoredProcedureNotificationWithSignature

You configure Adapter for JDBC notifications using Designer. For more information about adapter notifications, including what you need to know before you configure and manage them, see "Before Configuring or Managing Notifications" on page 134.

To configure a StoredProcedureNotificationWithSignature

1. In Designer, right-click the package in which the notification should be contained and select **New > Adapter Notification**.

2. Select the parent namespace, type a name for the adapter notification, and click **Next**.

3. Select **Adapter for JDBC** as the adapter type and click **Next**.

4. Select the **StoredProcedureNotificationWithSignature** template and click **Next**.

5. Select the appropriate **Adapter Connection Name** and click **Next**.

   The name of the publishable document associated with this notification is displayed.

6. Click **Finish**.

   For more information about adapter notifications and publishable documents, see "Adapter Notifications" on page 25. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.

7. Designer creates the notification, and the editor for the adapter notification appears.

   a. You can select the **Adapter Settings** tab at any time to confirm adapter notification properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Notification Template**, as necessary.

   b. In the **Publish Document** section, you can specify how you want the notification document to be published:

   - To publish documents to Broker, select **Broker/Local**. This is the default option.
   - To publish documents to a JMS provider, select **JMS Provider**, and provide values for the following input fields:

Field	Description/Action
Connection alias name	Name of the JMS connection alias configured on Integration Server. If the connection alias is a Broker Cluster configured with Multisend Guaranteed policy, you must add the watt property watt.art.notification.jmsSend.usePublicService and set it to **true**. **Note:** Adapter Runtime does not support LOCAL_TRANSACTION and XA_TRANSACTION type JMS connection alias.
Destination name	Name of the destination from which you want the JMS trigger to receive messages.
Destination type	Specify whether the destination is a **Queue** (default) or a **Topic**.

   The information from the **Permissions** tab appears in the **Properties** panel.

8. Select the **Call** tab to specify the stored procedure to call. Provide values for the following call parameters:

Field	Description/Action
Catalog Name	Name of the catalog. The default for the catalog name is `current catalog`.
Schema Name	Name of the schema. The default for the schema name is `current schema`. **Note:**

Field	Description/Action
	You can disable the lookup performed on the database for schema name by configuring the **Schema Name** parameter in the **Configuration** tab.
Procedure Name Pattern	To save time, you can type all or part of the procedure name in this field to narrow your search. This is helpful when dealing with a large database that has a long list of procedures. Use % as a multi-character wildcard and _ (underscore) as a single character wildcard. **Note:** With DB2 databases, functions do not appear in the list of procedure names. Only procedures appear in the list. **Note:** If you disable the lookup performed on the database for stored procedure name by configuring the **Procedure Name** parameter in the **Configuration** tab, the value in the **Procedure Name Pattern** field is not taken into consideration OR is ignored.
Procedure Name	Type or select the stored procedure name, depending on how you set the **Procedure Name Pattern** field. If you select **<All Procedures>**, this field lists all of the procedures in the selected catalog and schema. **Note:** You can disable the lookup performed on the database for stored procedure name by configuring the **Procedure Name** parameter in the **Configuration** tab.
Publish Locally	Specifies whether to publish the notification's publishable document to the local Integration Server. By default, this option is not selected, that is, if the Broker is configured to Integration Server, the publishable document is published to the Broker; otherwise the publishable document is published to the local Integration Server. Selecting the **Publish Locally** option reduces performance problems, if Integration Server is connecting to a remotely located Broker that is in turn triggering a service on the local Integration Server.

a. The top table on the **Call** tab based on the signature for the stored procedure you specified:

Field	Description/Action
Parameter Name	Stored procedure parameter name.
SQL Type	SQL data type of the database column.
JDBC Type	JDBC data type of the stored procedure parameter.

Field	Description/Action
Parameter Type	Defines the parameter type as IN, INOUT, or OUT. If you select IN or INOUT, you may also set the input expression in the **Expression** field.
Expression*	Sets the input for the IN or INOUT parameter types only. The RETURN or OUT parameters will appear automatically on the **Call** tab's bottom table. For a list of the allowable expression settings by parameter type, and how each parameter will map to the input or output fields, see the following table.

The following table shows valid expressions by parameter type:

Parameter Type	Expression	Input or Output Mapping?
RETURN	Empty (default)	Output field
OUT	Empty (default)	Output field
IN	Default is empty, but it needs to be updated with a fixed value.	No mapping
INOUT	Empty (default)	Output field
ORACLE CURSOR (INOUT)	Empty (default)	Output field. Set the parameters in the **ResultSet** tab as described later in the procedure.

b. The bottom table on the **Call** tab lists the following output parameters and values for the stored procedure that will map to the output of the notification's publishable document and returns the value of OUT or INOUT parameters:

Field	Description/Action
Output Parameter Name	Stored procedure output parameter name.
SQL Type	SQL data type of the database column.
JDBC Type	JDBC data type of the output parameter.
Output Field	Name of the output parameter.
Output Field Type	Output parameter Java data type. For a list of JDBC to Java data type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

c. Specify the query time out value of the StoredProcedureNotificationWithSignature notification you are configuring in the following field:

Field	Description/Action
Query Time Out	Query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the notification to execute before stopping the SQL operation. The default value is `-1`. Use the default value to have the notification use the value indicated on the `watt.adapter.JDBC.QueryTimeout` property as the time out. If you specify a value equal to `0`, or if the `watt.adapter.JDBC.QueryTimeout` property is not set, the notification executes without a time out. If you specify a value greater than `0`, the notification executes with the specified value as the time out. **Note:** `-1` is the only permissible negative value for this field. For more information about the `watt.adapter.JDBC.QueryTimeout` property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

9. Select the **Configuration** tab to configure the lookup parameters for stored procedure. Use the following fields to set the parameters and values:

Field Name	Use Lookup
Schema Name	Performs a lookup on the database for schema name. Possible values are: ■ `true`. Default. Performs a lookup on the database for schema name. ■ `false`. Skips the lookup on the database for schema name. The **Schema Name** field is now editable and you can enter the value.
Procedure Name	Performs a lookup on the database for procedure name. Possible values are: ■ `true`. Default. Performs a lookup on the database for procedure name. ■ `false`. Skips the lookup on the database for procedure name. The **Procedure Name** field is now editable and you can enter the value. **Note:** The value in the **Procedure Name Pattern** field is not taken into consideration/ignored.

10. If the procedure returns a result set, select the **ResultSet** tab to specify result set parameters using the fields in the following table.

    This type of notification can support multiple results sets. Use the icon to create additional result sets as needed.

    Note:

While all the tables in the **Call** tab are updated automatically if the selected stored procedure changes, the **ResultSet** tab information is not updated automatically. To update this information, you must manually update the fields in the **ResultSet** tab.

Provide values for the following parameters:

Field	Description/Action
Result Set Index	An index is automatically assigned to each result set. The first row default value is 1.
Result Set Name	The name of the result set you want to create.
Result Set Name(from second row)	Select result set name.
Column Name	The name of the column of the result set.
JDBC Type	The JDBC data type of the result column.
Output Type	The Java data type of the result column. For a list of JDBC to Java data type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

11. The information about using the **Permissions** tab to assign an access control list (ACL) to an element appears in the Properties panel.

12. From the **File** menu, select **Save**.

13. You must schedule and enable the notification using Integration Server Administrator before you can use it. For details, see "Managing Polling Notifications" on page 171.

Configuring OrderedNotifications

An OrderedNotification publishes notification data for multiple insert, update, or delete operations on multiple tables. For more information about notifications, see "Adapter Notifications" on page 25.

With OrderedNotifications, typically you configure an Integration Server trigger to subscribe to the notification's publishable document and a flow service that the trigger invokes. Because the primary reason to use OrderedNotifications is to preserve the order in which the operations occur, be sure to set the **Processing Mode** option to Serial on the **Settings** tab in Designer when you create the trigger and flow service. For more information about configuring Integration Server triggers and flow services, see the *webMethods Service Development Help* for your release.

Considerations when Configuring OrderedNotifications

You must consider the following restrictions when configuring an OrderedNotification:

- OrderedNotifications cannot be used with a Teradata database (any version).
- When using an OrderedNotification with a MySQL database, updating any database field with the same value will not invoke a trigger.
- MySQL version 5.0.x does not support multiple triggers with the same event (insert, delete, or update) for one table. Hence, with a MySQL database, before you can enable an OrderedNotification for a table, you must disable any OrderedNotification or other adapter notifications of the same operation type monitoring the table.

Creating an OrderedNotification

You configure notifications using Designer.

Be sure to review the sections "Before Configuring or Managing Notifications" on page 134 and "Considerations when Configuring OrderedNotifications" on page 165 before you configure an OrderedNotification.

To create an OrderedNotification

1. In Designer, right-click the package in which the notification should be contained and select **New > Adapter Notification**.
2. Select the parent namespace, type a name for the adapter notification, and click **Next**.
3. Select **Adapter for JDBC** as the adapter type and click **Next**.
4. Select the **OrderedNotificaton** template and click **Next**.
5. Select the appropriate **Adapter Connection Name** and click **Next**.
6. The name of the publishable document associated with this notification displays. Click **Finish**.

   For more information about adapter notifications and publishable documents, see "Adapter Notifications" on page 25. For more details about the Integration Server publishable documents, see the *Publish-Subscribe Developer's Guide* for your release.
7. Designer creates the notification, and the editor for the adapter notification appears.

   a. You can select the **Adapter Settings** tab at any time to confirm adapter notification properties such as the **Adapter Name**, **Adapter Connection Name**, and **Adapter Notification Template**, as necessary.

   b. In the **Publish Document** section, you can specify how you want the notification document to be published:

      - To publish documents to Broker, select **Broker/Local**. This is the default option.

- To publish documents to a JMS provider, select **JMS Provider**, and provide values for the following input fields:

Field	Description/Action
Connection alias name	The name of the JMS connection alias configured on Integration Server. If the connection alias is a Broker Cluster configured with Multisend Guaranteed policy, you must add the watt property watt.art.notification.jmsSend.usePublicService and set it to **true**. **Note:** Adapter Runtime does not support LOCAL_TRANSACTION and XA_TRANSACTION type JMS connection alias.
Destination name	The name of the destination from which you want the JMS trigger to receive messages.
Destination type	Whether the destination is a **Queue** (default) or a **Topic**.

The information from the **Permissions** tab appears in the **Properties** panel.

8. Select the **Notification Configure** tab and use the following fields:

Field	Description/Action
Base Name	The base name used to generate the **Resource Name** created by Adapter for JDBC. **Note:** For OS/390 DB2V7.2, the **Base Name** you create below must be no more than five characters because triggers on OS/390 name cannot be more than eight characters.
Publish Locally	Specifies whether to publish the notification's publishable document to the local Integration Server. By default, this option is not selected, that is, if the Broker is configured to Integration Server, the publishable document is published to the Broker; otherwise the publishable document is published to the local Integration Server. Selecting the **Publish Locally** option reduces performance problems, if Integration Server is connecting to a remotely located Broker that is in turn triggering a service on the local Integration Server.
Resource Type	Types are buffer table, trigger, and sequence. The base name and resource type determine the following **Resource Name**.
Resource Name	To ensure uniqueness, the resource name combines the following elements. You do not edit this name.

Field	Description/Action
	■ Resource prefix (WMB, WMT, and WMS for buffer table, trigger, and sequence respectively) ■ The name you typed in the **Base Name** field ■ A suffix, based on a system timestamp
File Record Format	The format of the file record. Optional field used by DB2 for AS/400 V4R5 only.
Database Name	The name of the database where the buffer tables will be created. Optional field used by DB2 for OS/390 only.
Table Space Name	The table space where the buffer tables will be created. Optional field used by DB2 for OS/390 only.

9. Select the **Source Tables** tab and use the following fields:

Note:
For AS/400 DB2 V4R5 using a jt400.jar file, the table name for the notification cannot exceed 10 characters; otherwise, an exception will be generated when you try to enable the notification.

Field	Description/Action
Table Alias	The table alias is automatically assigned when you select more than one table in the **Table Name** field. The default is `t1`.
Table Name	Select a table name. The default for the associated catalog name is `current catalog`. The default for the associated schema name is `current schema`. The table name must not contain a period. If the table name does contain a period, Designer will throw an error. **Note:** Informix databases do not allow you to specify a catalog and database name because you can only access the current catalog.
Type	The table type displays automatically based on the table you select.
Operation Type	Select INSERT, UPDATE, or DELETE operation.
Operation ID	Assign an ID to uniquely identify the given operation for the notification.

10. Use the **SELECT** tab to define the columns and fields to be selected using the following fields:

    a. In the **ALL/DISTINCT** field, select **ALL** to include duplicate rows or **DISTINCT** to suppress duplicate rows. Selecting **ALL** corresponds to the SQL statement `SELECT ALL` *`name`* `from`

tablename. The default value is blank, which corresponds to the SQL statement `SELECT name from tablename`.

b. Select the icon (or the icon to fill in all rows of the table) to create new fields as needed. For each **Expression** column you select, the corresponding **Operation ID**, **Column Type**, **JDBC Type**, **Output Field Type**, and **Output Field** display.

Use the following fields:

Field	Description/Action
Expression	The column name.
Operation ID	The corresponding operation ID for the expression.
Column Type	The column data type defined in the database table.
JDBC Type	The JDBC type of the corresponding **Output Field**.
Output Field Type	The data type of the output field. Adapter for JDBC automatically converts database-specific types to Java data types. For a list of JDBC type to Java type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.
Output Field	The name of the field containing the output from the SELECT operation. An output field name displays when you select an expression. You can also modify the output field names as required.
Notify On Update	Used for Update operations only. Enable this option to indicate which of the columns specified in the **SELECT** tab you want notification if updated. Select: ■ **Yes** if you want notification if this column of data has been updated. **Yes** is the default value. ■ **No** if you do not want notification if this column of data has been updated. For example, you configure the following three output fields: **MyName**, **MyNumber**, and **MyLocation**. You want notification only if the **MyLocation** output field is updated. In this case, you would select **Yes** for the **MyLocation** output field, and select **No** for the **MyName** and **MyNumber** output fields.
Output Value Type	Used for Update operations only. Specifies which output value to retrieve from the database table. By default, the notification retrieves the new value from the database table. Select either of the following output value types: ■ **Old**: Retrieves the old value from the database table ■ **New**: Retrieves the new value from the database table

Field	Description/Action
	To retrieve both the old and the new values, you need to create two rows and then select an **Output Value Type** as **Old** in one row and an **Output Value Type** as **New** in the other row. While doing so, ensure that the **Output Field** is unique for both the old and the new values. **Note:** For Sybase and Microsoft 2000/2005, you cannot retrieve both the old and the new values in the same notification. The notification must retrieve either the old or the new value.
Maximum Row	Specifies the number of rows to be retrieved from the buffer table. This field is useful when you are working with a large number of records and you want to limit the number of documents sent each time the notification polls. Use a value of 0 to indicate no limit on the number of rows retrieved.
Query Time Out	Specify the query time out value in seconds. This value is the amount of time Adapter for JDBC waits for the notification to execute before stopping the SQL operation. The default value is -1. Use the default value to have the notification use the value indicated on the watt.adapter.JDBC.QueryTimeout property as the time out. If you specify a value equal to 0, or if the watt.adapter.JDBC.QueryTimeout property is not set, the notification executes without a time out. If you specify a value greater than 0, the notification executes with the specified value as the time out. **Note:** -1 is the only permissible negative value for this field. For more information about the watt.adapter.JDBC.QueryTimeout property, see "Forcing a Timeout During Long-Running SQL Operations in Services and Notifications" on page 47.

11. Use the **WHEN** tab to specify the conditions for selecting information using the following table.

Note:
If you use Microsoft SQL Server or Sybase, do not use the **WHEN** tab because this feature is not supported. An exception will be generated if you try to use this tab.

a. Select the icon to define new WHEN clause fields.

b. Select the column in the **Expression** field. The corresponding **Operation ID** is displayed.

c. Select a logical operator from the **AND/OR** field, an **Operator**, and separators (the left and right parentheses) as needed.

d. Type a fixed value in the **Value** field. Be sure that it is a valid value, or an exception will be generated at run time.

e. If necessary, use the ⏫ or ⏬ icons to change the order of the WHEN clause to ensure the parameters are parsed in the correct order.

f. Repeat until you have specified all WHEN parameters.

12. The information about using the **Permissions** tab to assign an access control list (ACL) to an element appears in the Properties panel.

13. From the **File** menu, select **Save**.

14. You must schedule and enable the notification using Integration Server Administrator before you can use it. For details, see "Managing Polling Notifications" on page 171.

Note:
While enabling the Ordered Notification that monitors a Sybase database, if you encounter an error that indicates data definition commands are not allowed in transactions, then you need to run the following command in your Sybase database: `sp_dboption database_name,"ddl in tran", true.`

Managing Polling Notifications

You must schedule a notification and then enable it before you can use the notification. Use Integration Server Administrator along with the following procedures to do so.

Note:
You must have Integration Server Administrator privileges to access Adapter for JDBC's administrative screens. For information about setting user privileges, see the *webMethods Integration Server Administrator's Guide* for your release.

To manage polling notifications

1. Start Integration Server Administrator.

2. From the **Adapters** menu in the navigation area of Integration Server Administrator, select **Adapter for JDBC**.

3. From the navigation area, select **Polling Notifications**.

4. From the **Adapter for JDBCPolling Notifications** table, use the fields in the following table to manage each adapter notification:

Note:

For AS/400 DB2 V4R5 using a jt400.jar file, the table name for the notification cannot exceed 10 characters. If the table name exceeds 10 characters, an exception will be generated when you try to enable the notification.

Note:
If you use an XA-Transaction connection, you cannot enable a notification.

Field	Description/Action
Notification Name	The name of the notification.
Package Name	The name of the package for the notification.
State	After you schedule a polling notification, you can use this option's dropdown list to set the polling notification's state: **Note:** You must schedule a polling notification before you can enable it. To schedule a polling notification, use the icon described in these procedures. ■ **Enabled**: The polling notification performs as scheduled. ■ **Suspended**: The polling notification is removed from the scheduler but the database trigger and buffer table are not dropped. ■ **Disabled**: The polling notification is removed from the scheduler and the database trigger and buffer table are dropped. The **Suspend all enabled** and **Enable all suspended** links help you change states quickly for multiple polling notifications. Enabling, suspending, and disabling a notification affects how its trigger and buffer tables are created and dropped. For details, see "Polling Notifications and States" on page 45. If there is no polling notification scheduled for a given adapter notification, control for this field is disabled. Use the icon to schedule a polling notification.
Edit Schedule	Click the icon to create or modify polling notification parameters. **Note:** You must disable a polling notification before you can edit it.
View Schedule	Click on the **View Schedule** icon to review the parameters for the selected polling notification. Click **Return toAdapter for JDBCNotifications** to go back to the main polling notification page.
Run As User	Click to assign a user to a polling notification. By default, **Run As User** is set to **Administrator**. You can now configure the **Run as User** in the Integration Server Administrator to assign a user to a polling notification.

5. To create or modify schedule parameters for the selected adapter notification, click on the icon and use the following fields:

Field	Description/Action
Interval (seconds)	Type the polling interval time in seconds.
Overlap	**Note:** Do not use this option; otherwise, when you enable this notification, it may lock up tables and cause Integration Server to fail.
Immediate	Enable this option to start polling immediately.

6. Click **Save Schedule**.

7. After you create a polling notification, you can enable it. Use the **State** field to enable a polling notification.

Using the Exactly Once Notification Feature

Adapter notifications can use the Exactly Once notification feature. This feature ensures that notification data will not be duplicated even if a failure occurs during processing. This is achieved by assigning unique IDs for each publishable document. After a processing failure, Integration Server checks for duplicate records in storage and ignores any duplicate IDs.

Because this feature ensures that the rows of the data in the buffer table will not be duplicated even after a processing failure, you should not re-create a notification in the event of a processing failure. The Exactly Once feature will automatically make the appropriate corrections as needed.

Note:
Stored Procedure Notifications do not support the Exactly Once notification feature because they do not use publishable document unique IDs.

Enabling Exactly Once Notification

To use the Exactly Once feature, you must enable Exactly Once Processsing in Integration Server. For more information, see the *webMethods Integration Server Administrator's Guide* for your release.

Exporting Configured Adapter Notifications

You can export notifications from one Integration Server to another Integration Server. You do not need to disable notifications in order to export them. In most cases, the current state of the notifications in the package that you export is retained. However, if you deploy to a different Integration Server and connect to a different database, then you should first disable the notification.

Note:
A given notification can only run on one Integration Server at a time.

After you export or deploy an adapter notification, Software AG recommends reloading the adapter values in the notification template in Designer if all of the following conditions are met:

1. The connection for the notification in the source and target Integration Server connects to the same database.
2. The connection for the notifications is configured with different schemas on the source and target Integration Server.
3. The two schemas have access to each other's database objects.

Software AG recommends using Basic Notifications in critical environments.

With Insert Notifications, Update Notifications, Delete Notifications, and Ordered Notifications the buffer table and trigger remain in the database. When the Integration Server with the exported notifications starts, each configured notification starts to poll the data from the buffer table.

If you want to export configured notifications in a Disabled state, you need to disable the notifications before you export the package containing them. With Insert Notifications, Update Notifications, Delete Notifications, and Ordered Notifications the buffer table and trigger will be dropped when you disable the notification. When you enable the exported notification, the buffer table and trigger will be created.

For more details, see "Insert Notifications, Update Notifications, and Delete Notifications" on page 27.

When exporting the configured notifications, Software AG recommends that you export them in a Suspended state. The trigger and buffer table are not dropped in the Suspended state.

After exporting the configured notifications, the following scenarios can occur in Adapter for JDBC if the notifications are not exported in a Suspended state:

- ,
- While reloading the package containing exported enabled notifications, or while restarting Integration Server, if some or all of the database objects of a notification are missing, the adapter throws a warning indicating that the database objects are missing, and then disables that notification.
- When enabling an exported disabled notification, if some or all of the database objects for that notification exist, the adapter throws an error indicating that the database objects exist.
- When disabling an exported notification, if some of the database objects are missing, the adapter disables the notification but does not delete the existing database objects. The next time you enable the same notification, the adapter throws an error indicating that incomplete database objects exist.

To help you recover from these scenarios, Adapter for JDBC provides the following services:

- pub.pollingNotificationUtils:getDatabaseObjectsForNotification to list the existing database objects of a notification.
- pub.pollingNotificationUtils:dropDatabaseObjects to delete the existing database objects of a notification.

For more information about these services, see pub.pollingNotificationUtils:getDatabaseObjectsForNotification and pub.pollingNotificationUtils:dropDatabaseObjects.

For information about polling notifications and their states, see "Polling Notifications and States" on page 45.

For more information about exporting packages, see the *webMethods Integration Server Administrator's Guide* for your release.

Viewing Notifications

You use Designer to view notifications.

To view a notification

1. In Designer, expand the package and folder that contain the notification you want to view.
2. Double-click the notification you want to view.

   Designer displays the notification in the notification template's Adapter Notification Editor.

Editing Notifications

You use Designer to edit notifications. You may be able to change the connection associated with an adapter using the built-in service pub.art.notification:setPollingNotificationNodeConnection. For more information, see "Changing the Connection Associated with an Adapter Service or Notification at Design Time" on page 22.

To edit a notification

1. In Designer, expand the package and folder that contain the notification you want to edit.
2. Select the notification you want to edit.

   Designer displays the notification in the notification template's Adapter Notification Editor.
3. Do one of the following:
   - If you have the VCS Integration feature enabled, right-click the notification and select **Check Out**.
   - If you do not have the VCS Integration feature enabled, right-click the notification and select **Lock for Edit**.
   - If you are using the local service development feature, from the **Team** menu in Designer, select the appropriate option to check out the notification. The options available in the **Team** menu depend on the VCS client that you use.

4. Modify the values for the notification's parameters as needed. For detailed descriptions of the notification's parameters, see the section on configuring a notification for the specific type of notification you want to edit.

5. After you have completed your modifications, save the notification and do one of the following:

   - If you have the VCS Integration feature enabled, right-click the notification and select **Check In**. Enter a check-in comment and click **OK**.
   - If you do not have the VCS Integration feature enabled, right-click the notification and select **Unlock**.
   - If you are using the local service development feature, from the **Team** menu in Designer, select the appropriate option to check in the notification. The options available in the **Team** menu depend on the VCS client that you use.

   Note:
   Because adapter notifications inherently depend on connections, you cannot edit or change the adapter connection for a notification after you configure it.

Deleting Notifications

You use Designer to delete adapter notifications.

Note:
Before you delete the notification, be sure that you first disable it. Otherwise, the trigger and buffer table created by the notification will remain in the database. To disable a notification, see "Managing Polling Notifications" on page 171.

To delete a notification

1. In Designer, expand the package and folder that contain the notification you want to delete.

2. Right-click the notification and click **Delete**.

Validating Adapter Notification Values

Designer enables Adapter for JDBC to validate user-defined data for adapter notifications at design time. You can validate the values for a single notification or you can configure Designer to always validate the values for notifications. Both options could potentially slow your design-time operations.

When you enable data validation for a single adapter notification, Designer compares the notification values against the resource data that has already been fetched from the selected adapter.

If you select the option to always validate values for adapter notifications, it will do so for all webMethods WmART-based adapters installed on Integration Server.

For more information about the Adapter Service/Notification Editor, other Designer menu options, and toolbar icons, see the *webMethods Service Development Help* for your release.

Validate Data for a Single Adapter Notification

Perform the following procedure to validate data for a single adapter notification.

To validate data for a single adapter notification

1. In Designer, expand the package and folder that contain the notification for which you want to enable automatic validation.
2. Double-click the notification for which you want to validate the data.

   Designer displays the configured adapter notification in the service template's Adapter Notification Editor.
3. Click the icon.

Validating Data for All Adapter Notifications

Perform the following procedure to enable Designer to always validate data for all adapter notifications.

To enable automatic data validation for all values in adapter notifications

1. In Designer, select the **Window > Preferences >Software AG> Service Development > Adapter Service/Notification Editor** item.
2. Enable the **Automatic data validation** option.
3. Click **OK**.

Reloading Adapter Values

Designer enables Adapter for JDBC to reload and validate user-defined data for notifications at design time. You can reload values for a single notification or you can configure Designer to automatically reload the values for adapter notifications. Both options could potentially slow your design-time operations.

When you reload adapter values for a single adapter notification, Designer compares the notification values against the resource data that has already been fetched from the selected adapter.

If you select the option to always reload values for adapter notifications, it will do so for all webMethods WmART-based adapters installed on Integration Server.

For more information about the Adapter Service/Notification Editor, other menu options, and toolbar icons, see the *webMethods Service Development Help* for your release.

Reloading the Values for a Single Adapter Notification

Perform the following procedure to reload the adapter values for a single adapter notification.

To reload the adapter values for a single adapter notification

1. In Designer, expand the package and folder that contain the service for which you want to enable automatic validation.

2. Double-click the service for which you want to validate the data.

   Designer displays the configured adapter service in the service template's Adapter Notification Editor.

3. Click the  icon.

8 Data Type Configuration

Overview of Data Type Configuration

webMethods Adapter for JDBC allows you to dynamically configure the data type mapping for a particular database in an XML configuration file. The adapter provides the following data type mapping files in the *Integration Server_directory*\instances*instance_name*\packages\WmJDBC Adapter\config directory:

- a default data type mapping configuration file named TypeMapping.xml
- an XML schema file named TypeMapping.xsd
- a database-specific data type mapping configuration file for each supported backend, for example OracleTypeMapping.xml

Each column in a database table is assigned an SQL type. The JDBC driver then maps each SQL data type to a JDBC data type. The adapter in turn maps each JDBC data type to one or more Java data types that are used as the input or output of adapter services and notifications.

For more information on JDBC data type to Java data type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

Based on the XML configuration, Adapter for JDBC selects the exact JDBC type applicable for a particular table column in the database. The adapter service or notification template shows the corresponding Java data types that are mapped to the JDBC data type in the XML configuration file.

In rare cases, you might need to modify the database-specific configuration file, if you need custom processing of a data type. For more information on custom processing of a data type, see "Customize data type configuration" on page 184. If the modified file fails validation, Adapter for JDBC ignores the file, and the adapter connections to the database do not work.

The native SQL data types returned by the JDBC driver that are not part of the predefined JDBC data types must be configured as extended data types in the database-specific configuration file.

The Default Data Type Mapping File

The default TypeMapping.xml file contains the javaType entries with their setter and getter methods, along with the default jdbcType entries that contain the javaType mappings.

javaType

Contains:

- the fully qualified class name that is used while accessing the Java object corresponding to a database column.
- the setter and getter methods in the prepared statement and result set while accessing a specific column in the database.

typeMapping

Contains the Java type mappings for the default JDBC types supported in the java.sql.Types class. A single JDBC type can be mapped to one or more Java types. Those Java types appear as drop-down lists in the Adapter for JDBC service and notification templates in Software AG Designer.

If a database requires special handling for a JDBC type and needs to have different javaType mapping from the one provided in the default TypeMapping.xml file, you can modify the database-specific configuration file accordingly overriding the default configuration. For more information on custom processing of a data type, see "Customize data type configuration" on page 184.

The Database-Specific Data Type Mapping Files

A database-specific data type mapping configuration file can contain the following elements depending on whether some JDBC types need special handling.

extTypeMapping

Includes additional JDBC types that are not supported in the java.sql.Types class, as well as the corresponding code of the JDBC type.

typeClassName

Contains the fully qualified class name that extends the com.wm.adapter.wmjdbc.config.JDBCType class when a JDBC type requires special handling.

For example, the new class names for the Oracle BLOB and CLOB data types are included in the typeClassName attribute of the BLOB and CLOB JDBC types in the Oracle database configuration file because the Oracle BLOB and CLOB data types require special handling.

columnTypeMapping

Contains the mapping between the native SQL type of a column in a particular database (in the columnType element) and the corresponding JDBC type.

In addition, the following attributes provide special handling of a particular column type.

alternativeName

Specifies the value returned by the JDBC driver when a native SQL column type in a database has a different name from the name returned by the driver.

For example, a column of double precision type in a Sybase database is returned as double precis by the driver. In this case, the alternativeName attribute is set to `double precis` in the Sybase type mapping configuration file so that the adapter can recognize it as the double precision type.

includeColumnSize

Specifies whether a column type name is suffixed with the column size when creating an adapter service or notification. When the attribute is set to `false`, the column size is not included. The default value is `true`.

resizeFactor

Indicates that the size of a column is different from the size returned by the JDBC driver. The default value is `1`, that is, the column size is the same as the size returned by the JDBC driver.

includePrecision

Specifies whether to include column precision for a Decimal or Numeric JDBC type. If the attribute is set to `true`, precision is included. The default value is `false`.

Configuring a new data type

To configure a new data type in Adapter for JDBC

1. Open the database-specific data type mapping configuration file from the location-*Integration Server_directory*`\instances\`*`instance_name`*`\packages\WmJDBCAdapter\config` directory.

   For example, to configure the SDO_GEOMETRY data type in an Oracle database, open the OracleTypeMapping.xml file.

2. Add the jdbcType, typeClassName , and javaType attributes for the new data type in the extTypeMapping section of the configuration file.

   For example,

```
 <extTypeMapping>
....
...
  <jdbcType name="SDO_GEOMETRY" code="2002"
  typeClassName="com.test.OracleSDOGeometryType">

  <javaType name="STRING"/>
  <javaType name="STRUCT"/>
  <javaType name="OBJECT"/>
 </jdbcType>
</extTypeMapping>
```

3. In the columnTypeMapping section of the file, specify the new data type for the jdbcTypeName and nativeSqlType attributes in the columnType. This allows you to map the column in the database with the jdbcType attribute.

   For example,

```
<columnType jdbcTypeName="SDO_GEOMETRY"
nativeSqlType="SDO_GEOMETRY" includeColumnSize="false"/>
```

4. Create a new custom java class. Use the following attributes in the table to create the custom java class:

Attribute	Usage Note
Class Name	You can specify any name for the attribute.
Base Class	The new custom java class must be derived from the base class which is `com.wm.adapter.wmjdbc.config.JDBCType`. Location: *Integration Server_directory*`\instances\`*instance_name*`\packages\WmJDBCAdapter\code\classes\com\wm\adapter\wmjdbc\config\JDBCType`
Constructor	Override the constructor for the JDBCType which is: `public JDBCType (String name, int code, JAVAType javaType)`
Methods	Override the two methods: ■ `Object getOutput(ResultSet results, int index)` ■ `setInput(PreparedStatement statement, int index, Object value)`

Example,

The template to create a new java class for SDO_GEOMETRY data type in an Oracle database is as follows:

```
import com.wm.adapter.wmjdbc.config.JDBCType;
public class OracleSDOGeometryType extends JDBCType {
public OracleSDOGeometryType(String name, int code, JAVAType javaType) {
super(name, code, javaType);
}
@Override
public Object getOutput(ResultSet results, int index) throws
SQLException,DataMappingException {
/* Enter your code */
}
@Override
protected void setInput(PreparedStatement statement, int index, Object value) throws

SQLException, DataMappingException, IOException {
/* Enter your code */
}
}
```

5. Create a jar file using the new custom java class

6. Copy the .jar files for the typeClassName attribute to the location: *Integration Server_directory*`\instances\`*instances_name*`\pacakges\WmJDBCAdapter\code\jars` directory.

7. Restart the Integration Server

Customize data type configuration

To configure a custom data type in Adapter for JDBC, perform the following steps:

1. Create a directory with the name, `custom` in the *Integration Server_directory*`\instances\`*instance_name*`\packages\WmJDBCAdapter\config` directory.

2. Copy the database-specific data type mapping configuration file from the *Integration Server_directory*`\instances\`*instance_name*`\packages\WmJDBCAdapter\config` directory to the custom directory. For example, copy OracleTypeMapping.xml file from source location to target location.

3. Open the database-specific type mapping configuration file from the custom directory and modify it as required. For example, to configure the SDO_GEOMETRY data type in an Oracle database, open the OracleTypeMapping.xml file in custom directory, customize the file as per your specification, adhering to the TypeMapping.xsd schema located in the *Integration Server_directory*`\instances\`*instance_name*`\packages\WmJDBCAdapter\config` directory.

4. Save the file.

5. Restart the Integration Server.

Note:
If the modified file fails validation, Adapter for JDBC ignores the file and the adapter connections will work with the default configuration files.

Support for SQLXML Data Type

Adapter for JDBC provides support for the SQLXML data type for the following databases:

- DB2 for AS/400
- DB2 for OS/390
- Microsoft SQL Server
- Oracle

  To enable SQLXML data type support for Oracle, you must download the xdb6.jar and xmlparserv2.jar files from the Oracle website and copy them to the *Integration Server_directory*\instances*instance_name*\packages\WmJDBCAdapter\code\jars\static directory.

Note:
After installing a new fix, reapply the changes made to the configuration files manually.

9 Predefined Health Indicator

Predefined Health Indicator

Microservices Runtime includes predefined health indicators for some of its basic components. The health indicator captures the connection details for all the WmART based adapters at runtime. For more information, see *webMethods Adapter Runtime User's Guide*.

10 Administrator APIs

Administrator APIs

The Administrator APIs are available for Adapter for JDBC. For more information about Administrator APIs and samples, see *webMethods Adapter Runtime User's Guide*.

11 Configuration Variables Templates for Adapter Assets in Microservices

Configuration Variables Templates for Adapter Assets in Microservices Runtime

The webMethods Adapter Runtime (ART) asset properties that can be configured from Integration Server Administrator are available in the configuration variables template (`application.properties` file) generated by Microservices Runtime. For more information, see *webMethods Adapter Runtime User's Guide* and *Developing Microservices with webMethods Microservices Runtime*.

12 Parallel Asset Initialization

Parallel Asset Initialization

webMethods Adapter Runtime assets, connections, listeners, and notifications are initialized during Integration Servers startup and when packages are loaded. As a part of package loading, the enabled connections connect with the external systems. The listeners and notifications are initialized after the connections are initialized. The communication with external systems can be erroneous due to multiple reasons, such as broken connectivity and others. The communication with external systems also increases the time taken by the packages to load and subsequently increases the Integration Servers startup time. To address this issue, webMethods Adapter Runtime supports parallel asset initialization. For more information, see *webMethods Adapter Runtime User's Guide*.

13 Logging and Exception Handling

Overview of Logging and Exception Handling

The following sections describe Adapter for JDBC message logging, exception handling, and customizing and overriding the adapter's list of fatal error codes. A list of error codes and supporting information appears at the end of this chapter.

For a list of known database driver limitations, see "JDBC Driver Specific Properties" on page 255.

Adapter for JDBC Logging Levels

Adapter for JDBC uses the Integration Server logging mechanism to log messages. You can configure and view the Integration Server logs to monitor and troubleshoot Adapter for JDBC. For detailed information about logging in Integration Server, including instructions for configuring and viewing the different kinds of logs supported by the server, see the *webMethods Integration Server Administrator's Guide* for your release.

Accessing Adapter Logging Levels

With Integration Server, you can configure different logging levels for Adapter for JDBC.

To access the adapter's logging information

1. From the Integration Server Administrator screen, select **Settings > Logging**.

   The **Logging Settings** screen appears. The **Loggers** section has **Adapters** included in the **Facility** section.

2. Expand the **Adapters** tree to see a list of all installed adapters with their code number and adapter description, along with the logging level.

Changing Logging Levels

You use Integration Server to change the logging levels.

To change logging settings for the adapter

1. Click **Edit Logging Settings**. Select the required **Level of Logging** for Adapter for JDBC.

2. After making your changes, click **Save Changes**.

3. For complete information about specifying the amount and type of information to include in the log, see the *webMethods Audit Logging Guide* for your release.

Adapter for JDBC Message Logging

Integration Server maintains several types of logs; however, Adapter for JDBC only logs messages to the audit, error and server logs. Because Adapter for JDBC works in conjunction with the WmART package, the adapter's messages and exceptions typically appear within log messages for the WmART package.

The logging levels for Adapter for JDBC are given in the following table.

Integration Server	Log	Description
Integration Server 10.3	Audit Log	You can monitor individual adapter services using the audit log as you would audit any service in Integration Server. The audit properties for an adapter service are available in each Adapter for JDBC service template on the **Audit** tab.
	Error Log	Adapter for JDBC automatically posts fatal-level and error-level log messages to the server's error log. These log messages will appear as adapter run-time messages.
	Server Log	Adapter for JDBC posts messages to the server log, depending on how the server log is configured. Fatal-level through debug-level log messages appear as adapter run-time log messages. Trace-level log messages appear as Adapter for JDBC log messages.

Adapter for JDBC's log messages appear in either of the following formats:

- ADA.1.*nnnnc*
- ADA.0001.*nnnnc*

where the facility code ADA indicates that the message is from an adapter, 0001 or 1 indicate that it is Adapter for JDBC, *nnnn* represents the error's minor code, and (optionally) *c* represents the message's severity level. For detailed descriptions of Adapter for JDBC's minor codes, see "Adapter for JDBC Error Codes " on page 200.

To monitor Adapter for JDBC's log messages in the server log, ensure that your server log's logging settings are configured to monitor the following facilities:

- 0113 Adapter Run time (Managed Object)
- 0114 Adapter Run time
- 0115 Adapter Run time (Listener)
- 0116 Adapter Run time (Notification)

- 0117 Adapter Run time (Adapter Service)
- 0118 Adapter Run time (Connection)
- 0121 Adapter Run time (SCC Transaction Manager)
- 0126 Adapter Run time (SCC Connection Manager)

Adapter for JDBC Exception Handling

Adapter for JDBC throws an AdapterException for two reasons:

1. To report an error related to the adapter's logic, such as a configuration error or a connection creation error.
2. To wrap an SQLException if the adapter does not consider the SQLException's SQLCODE to be a fatal error. In this case, WmART wraps the AdapterException in a com.wm.pkg.art.error.DetailedServiceException and throws it to . AdapterExceptions containing an error code of 316 are SQLExceptions.

To manage the AdapterException, you caIntegration Servern catch the DetailedServiceException in a flow or Java service and then navigate through the nested exceptions to the AdapterException, which will contain the error code identifying the error.

AdapterException

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1. To report an error related to the adapter's logic, such as a configuration error or a connection creation error.
2. To wrap an SQLException if the adapter does not consider the SQLException's SQLCODE to be a fatal error. In this case, WmART wraps the AdapterException in a com.wm.pkg.art.error.DetailedServiceException and throws it to Integration Server. AdapterExceptions containing an error code of 316 are SQLExceptions.

To manage the AdapterException, you can catch the DetailedServiceException in a flow or Java service and then navigate through the nested exceptions to the AdapterException, which will contain the error code identifying the error.

AdapterConnectionException

Adapter for JDBC throws an AdapterConnectionException to wrap an SQLException if the adapter interprets the SQLCODE as a fatal error.

In this case, WmART resets the entire connection pool. WmART then wraps the exception in com.wm.pkg.art.error.DetailedSystemException and throws it to Integration Server.

SQLException

When an adapter connection's associated JDBC driver fails to execute a SQL command against a database, the driver throws a SQLException. SQLExceptions include a SQL STATE, a SQLCODE, and an error message.

Adapter for JDBC catches the SQLException from the JDBC driver and, depending on the SQLCODE, wraps the SQLException in either an AdapterException or an AdapterConnectionException. If a SQL CODE is in the adapter's list of fatal errors for the database, the adapter wraps the exception in an AdapterConnectionException; otherwise, it wraps it in an AdapterException. Each AdapterException and AdapterConnectionException contains an adapter error code. If the error code is 316, then the exception wraps an SQLException.

Customizing the Adapter's List of Fatal Error Codes

You can add a specific error code to the list of fatal error codes. This allows Adapter for JDBC to automatically refresh its connections when a specific error occurs. Be sure that there is no other use for this error code before you add it to the list.

To customize the fatal error list

1. Start Integration Server Administrator if it is not already running.
2. Under **Settings** in the left panel, select **Extended**.
3. Select **Edit Extended Settings**. In the edit box, type either of the following watt parameters:
   - `watt.adapter.JDBC.`*database driver*`.fatalErrors=+`*ErrorCode_1, ErrorCode_2,ErrorCode_n*

     This watt property is database driver specific. Note that there is no space after the , (comma).

     Example: To allow Adapter for JDBC to refresh connections when encountering Oracle error codes 17002 and 17003 using an Oracle JDBC driver, type:

     ```
     watt.adapter.JDBC.Oracle.fatalErrors=+17002,17003
     ```

     Note:
     If the error code of a database starts with a zero, then remove the zero from the error code and append the remaining code to the list. For example, for Oracle database, if you want to add the error code, 01401, then type the watt parameter as follows:
     `watt.adapter.JDBC.Oracle.fatalErrors=+1401`

     The following is a list of other supported driver settings (for `watt.adapter.JDBC.database driver.fatalErrors`):

Driver	Setting
Microsoft SQL Server	`watt.adapter.JDBC.MsMssql.fatalErrors`

Driver	Setting
Oracle JDBC	`watt.adapter.JDBC.Oracle.fatalErrors`
JTOpen	`watt.adapter.JDBC.DB2JTOPEN.fatalErrors`
DataDirect Connect for JDBC driver for DB2	`watt.adapter.JDBC.CJDBCDB2.fatalErrors`
Teradata Type 4	`watt.adapter.JDBC.TeraData.fatalErrors`
JDBC 2.21 type 4 for Informix	`watt.adapter.JDBC.INFORMIX.fatalErrors`
jCONNECT 5.5 and 6.05 type 4 for Sybase	`watt.adapter.JDBC.SYBASE.fatalErrors`
DB2 Universal type 2 and type 4	`watt.adapter.JDBC.DB2UNIVERSAL.fatalErrors`
Other driver types	`watt.adapter.JDBC.Generic.fatalErrors`

- `watt.adapter.JDBC.database.fatalErrors=+`*ErrorCode_1,ErrorCode_2, ErrorCode_n*

  This watt property is not database driver specific, instead applies to all drivers. Note that there is no space after the , (comma).

  Example: To allow Adapter for JDBC to refresh connections when encountering error codes 12535, type:

  ```
  watt.adapter.JDBC.database.fatalErrors=+12535
  ```

  It is recommended that you use this watt property to add error codes to the adapter's list of error codes, instead of `watt.adapter.JDBC.`*database driver*`.fatalErrors`.

4. Click **Save Changes**.

5. Restart Integration Server.

Overriding the Adapter's List of Fatal Error Codes

You can override the existing list of fatal error codes of Adapter for JDBC with a new list of error codes.

To override the existing fatal error list with a new fatal error list

1. Start Integration Server Administrator if it is not already running.

2. Under **Settings** in the left panel, select **Extended**.

3. Select **Edit Extended Settings**. In the edit box, type:

   ```
   watt.adapter.JDBC.database driver.fatalErrors=ErrorCode_1, ErrorCode_2,ErrorCode_n
   ```

For example, to override the list of fatal error codes for Adapter for JDBC with a list of error codes 17002, 17003, and 16702 for Oracle driver, type the following:

```
watt.adapter.JDBC.Oracle.fatalErrors=17002,17003,16702
```

Note that there is no space after the , (comma). For a list of other supported driver settings, see "Customizing the Adapter's List of Fatal Error Codes" on page 197.

Note:
If the error code of a database starts with a zero, then remove the zero from the error code and append the remaining code to the list. For example, for Oracle database, if you want to override the error code, 01401, then type the watt parameter as follows:
`watt.adapter.JDBC.Oracle.fatalErrors=1401`

By default, Adapter for JDBC's fatal error codes are 17001, 17002, 17416, 1092, 28, 1012, 17410, 12571, 3114, 1089, 1033, 08S01, 40003, -30081, -99999, HY000, -601, JZ0C0, -79716. This list is a combination of common fatal error codes from different databases.

4. Click **Save Changes**.

5. Restart Integration Server.

Suppressing the Logging of Errors

When a database is down or is unreachable, errors are logged repeatedly causing the Server and Error logs to overflow. You can avoid this by suppressing the error after which only the first five consecutive occurrences of the error are logged and then the error is suppressed. The first five occurrences of the error are logged to avoid any potential dangers that may result due to the suppressing of the error. However, it is recommended to use this option of suppressing the logging of errors, only when you know about an activity that can lead to the continuous logging of errors, for example, a scheduled database shut down, and you want to suppress only those errors.

To suppress the logging of errors

1. Start Integration Server Administrator if it is not already running.

2. Under **Settings** in the left panel, select **Extended**.

3. Select **Edit Extended Settings**. In the edit box, type:

```
watt.adapter.JDBC.SuppressErrorCodes=ErrorCode_1,ErrorCode_2,ErrorCode_n,Err
or_Description
```

where *ErrorCode_1*, *ErrorCode_2*, and *ErrorCode_n* are the error codes of the errors that you want to suppress, and *Error_Description* is the description of the error that you want to suppress. For databases that do not have error codes, you can provide the error description.

Example: To allow Adapter for JDBC to suppress the error codes ORA-12500, ORA- 01033, 17002, and the error with description `User account is locked`, type the following:

```
watt.adapter.JDBC.SuppressErrorCodes=ORA-12500,ORA-01033,17002,User account
is locked
```

Note that there is no space after the , (comma).

4. Click **Save Changes**.

5. Reload the WmJDBCAdapter package.

Adapter for JDBC Error Codes

The following table lists Adapter for JDBC's minor codes and provides information on the error message, reason, and possible action for each error.

Error Code	Description
200	**The JDBC DataSource class ClassName cannot be located.**
	Explanation: A DataSource class name was specified in the adapter Connection Properties **DataSource Class** field, but the class cannot be located. Either the class does not exist or the name was misspelled.
	Action: Check the spelling and make sure the JDBC driver file is in the CLASSPATH or in the packages_directory`/WmJDBCAdapter/code/jars` directory.
201	**The JDBC DataSource class ClassName cannot be instantiated.**
	Explanation: The instantiation of the JDBC driver's DataSource class failed.
	Action: Use a supported JDBC driver.
202	**Cannot set properties for JDBC DataSource class ClassName.**
	Explanation: Properties cannot be set through the DataSource class because the driver does not support the specified property.
	Action: For supported drivers and their settings, see "Using JDBC Drivers to Connect to Databases" on page 15.
203	**The JDBC DataSource class ClassName does not have some of the configured property settings.**
	Explanation: Some properties specified in the connection's properties are not correct.
	Action: For supported drivers and their settings, see "Using JDBC Drivers to Connect to Databases" on page 15.
204	**Cannot connect to the database with DataSource class ClassName.**
	Explanation: Check the SQL exception in the Integration Server error log, and check the database error messages.

Error Code	Description
	Action: The connection between the adapter and the database failed.
205	**Cannot retrieve the database metadata MetadataElement.**
	Explanation: An error occurred when the adapter tried to retrieve database metadata information.
	Action: Check the SQL exception in the Integration Server error log, and check the database error messages.
206	**The JDBC DataSource class** ClassName **is not XADataSource.**
	Explanation: The DataSource class name you specified in the Connection Properties DataSource Name field is not an XADataSource.
	Action: For supported drivers and DataSource class names, see your Adapter for JDBC documentation.
207	**The JDBC DataSource class** ClassName **does not support LOCAL_TRANSACTION.**
	Explanation: The LOCAL_TRANSACTION transaction type is not supported by this database.
	Action: Use NO_TRANSACTION instead.
208	**Cannot disconnect from the database** DataBaseName**. The connection between the adapter and database cannot be closed.**
	Explanation: The connection between the adapter and database cannot be closed.
	Action: Check the SQL exception in the Integration Server error logs and database error messages for details.
209	**Cannot create writer with file path** FilePathName **or JDBC Log.**
	Explanation: JDBC log file creation failed.
	Action: Check that the log file path has the correct watt.adapter.JDBC.JDBCLogFile setting.
210	**Cannot unlock webMethods OEM JDBC driver license.**
	Explanation: The OEM version of the DataDirect Connect for JDBC driver cannot be unlocked with the key "webMethods".
	Action: Check that the driver is the OEM version and that the key is "webMethods".
306	**The adapter does not support Ordered Notification for this database** DataBaseName**. Please select another service or notification template.**

Error Code	Description
	Explanation: Ordered Notifications are not supported on this database.
	Action: Use a BasicNotification or StoredProcedure Notification instead of OrderedNotification.
307	**The adapter does not support Automatic Notification for this** DataBaseName**. Please select another operation template.**
	Explanation: The Automatic Notification (InsertNotification, UpdateNotification, or DeleteNotification) is not supported for this database.
	Action: Use a BasicNotification or StoredProcedure Notification instead of InsertNotification, UpdateNotification, or DeleteNotification.
308	**There must be at least one expression for the SELECT statement.**
	Explanation: You did not specify any rows using the **SELECT** tab for the configured service.
	Action: Add rows to the SELECT tab.
309	**Select at least one column from the main table.**
	Explanation: There is no column specified from the table.
	Action: Add at least one column of the main table under the SELECT tab.
310	**The database vendor** VendorName **does not support the database trigger condition.**
	Explanation: The WHEN trigger condition does not apply to this database.
	Action: Do not use the **WHEN** tab with the notification.
311	**The connection is not available for** NotificationCallbackName**.**
	Explanation: There is no connection available in the connection pool.
	Action: Check the adapter connection and contact your administrator to increase the number of connections.
312	**Cannot commit the transaction to the database** DataBaseName**.**
	Explanation: The transaction commit failed.
	Action: Check the SQL exception in the Integration Server error logs and database error messages for details.
314	**Cannot set data for the input field** InputFieldName**.**
	Explanation: The input field value is not numeric.
	Action: Change to a numeric input value.

Error Code	Description
316	**Cannot execute the SQL statement** SQLStatement**. SQL statements failed to execute.**
	Explanation: An error occurs while executing AS 400 command.
	Action: Check the SQL exception in the Integration Server error logs and database error messages for details.
318	**Cannot get the list of catalogs.**
	Explanation: Catalog information for the database cannot be retrieved.
	Action: Check the SQL exception in the Integration Server error logs and database error messages for details.
319	**Cannot get the list of table columns.**
	Explanation: Column information for the database object cannot be retrieved.
	Action: Check the SQL exception in the Integration Server error logs and database error messages for details.
320	**Cannot get the list of stored procedures.**
	Explanation: Stored procedure information for the database cannot be retrieved.
	Action: Check the SQL exception in the Integration Server error logs and database error messages for details.
321	**Cannot get the list of schemas.**
	Explanation: Schema information for the database cannot be retrieved.
	Action: Check the SQL exception in the Integration Server error logs and database error messages for details.
322	**Cannot get the list of tables.**
	Explanation: Table information for the database cannot be retrieved.
	Action: Check the SQL exception in the Integration Server error logs and database error messages for details.
326	**This database does not support stored procedure calls using JDBC stored procedure escape syntax.**
	Explanation: Stored procedure calls are not supported by this database.
	Action: Do not use stored procedure services.
327	**This notification is not ready to be enabled.**
	Explanation: Configuration of the notification is not complete.

Error Code	Description
	Action: For complete instructions for configuring notifications, see "Adapter Notifications" on page 25.
331	**The String for the input field** InputFieldName **does not contain a parsable number.**
	Explanation: The input String value is not numeric.
	Action: Change to a numeric input String value.
333	**You must have the Record ID column listed under the SELECT tab.**
	Explanation: You did not configure the Record ID column.
	Action: Add the Record ID column using the **SELECT** tab for the Basic Notification.
334	**A notification procedure can only have a single result set.**
	Explanation: You configured more than one result set for the Stored Procedure Notification.
	Action: Rewrite the stored procedure and configure only one result set.
335	**A notification procedure can only have a single Oracle REF Cursor.**
	Explanation: You configured more than one Oracle REF Cursor for the Stored Procedure Notification.
	Action: Rewrite the stored procedure and configure only one Oracle REF Cursor.
336	**If you choose Only Once Notification, you must also check the Delete Selected Records box to avoid duplicate document warning messages.**
	Explanation: The **Delete Selected Records** box is not checked.
	Action: Check the **Delete Selected Records** box.
337	**The notification should not be configured on a connection with** TransactionType**.**
	Explanation: Notification is configured with connection of transaction type other than LOCAL_TRANSACTION.
	Action: Reconfigure the notification using LOCAL_TRANSACTION.
338	**The data mapping for field** FieldName **is not supported.**
	Explanation: The data mapping is not correct.
	Action: For a list of supported data type mappings, see "JDBC Data Type to Java Data Type Mappings" on page 214.

Error Code	Description
339	**The number of Base Name characters used in Notification Configure tab must not exceed** MaximumCharacterLength**.**
	Explanation: The **Base Name** is too long.
	Action: Refer to the message itself and shorten the **Base Name** using the **Notification Configure** tab.
401	**Cannot execute AS/400 command** CommandName**. The AS/400 environment may not be correct.**
	Explanation: An error occurs while executing AS 400 command.
	Action: Check the command and error message. For more details see the error logs.
402	**Cannot create file on AS/400.**
	Explanation: An error occurs when the adapter creates the file on the AS/400 system.
	Action: Check the file name and AS/400 file system.
403	**Cannot create trigger on AS/400.**
	Explanation: An error occurs when the adapter creates a trigger on the AS/400 system.
	Action: Check whether there is already a trigger with this name. Also check whether the user has rights to create the trigger.
404	**Cannot drop trigger on AS/400.**
	Explanation: Errors occur when the adapter drops a trigger from the AS/400 system.
	Action: Check whether the trigger exists.
501	BaseName **is not a valid name. For the notification on AS/400, the name of the source table, buffer table and trigger should not exceed 10 characters.**
	Explanation: The names are longer than 10 characters.
	Action: Change the base name so that the names of buffer table and trigger are 10 characters or less.

14 Support for OData Service

Understanding OData Service Terminology in Adapter

Before creating an OData service, you may find it helpful to first understand the following terminology related to OData support in theAdapter for JDBC:

- **External Entity Type.** External entity types are the representation of database tables. For more details on OData specific terminology, see the *webMethods Service Development Help*.

Supported and Unsupported OData Features

webMethods Adapter for JDBC webMethods Adapter for JDBC supports the following OData features:

- CRUD operations for each entity type.
- System query options such as `$select, $filter, $orderby, $top, $skip, $inlinecount,` and `$count.`

The following OData features are NOT supported:

- Referential constraints
- Association and navigation properties

Important:
Not all of Integration Server's OData features are supported when using an OData service with webMethods Adapter for JDBC.

Adding an External Entity Type to OData Service

You can add an external entity type to an existing OData service or while creating a new OData service.

For instruction on how to create an OData service using Designer, refer to *"Working with OData Services"* chapter in the *webMethods Service Development Help*.

Once you select a connection from the list of configured **Connection Alias**, Adapter for JDBC retrieves the list of database tables in the current catalog. You can add the database tables associated with the connection as external entity type to the OData service. These entity types are displayed in schema_TableName format in Designer.

In Designer, when you select an external entity type, Adapter for JDBC retrieves the properties for that entity type. You can configure the Java Data Type for the respective property. Each Java Data Type is mapped to a corresponding EDM Type. The mapping between Java Data type to EDM Type is shown below:

Java Type Name	Java Type	EDM Type
InputStream	java.io.InputStream	String

Java Type Name	Java Type	EDM Type
ARRAY	java.sql.Array	String
BOOLEAN	java.lang.Boolean	Boolean
SQLTIMESTAMP	java.sql.Timestamp	DateTimeOffset
LONG	java.lang.Long	Int64
STRING	java.lang.String	String
INT	java.lang.Integer	Int32
SHORT	java.lang.Short	Int16
DATE	java.util.Date	DateTime
BLOB	java.sql.Blob	Binary
CLOB	java.sql.Clob	String
FLOAT	java.lang.Float	Single
SQLDATE	java.sql.Date	DateTime
DOUBLE	java.lang.Double	Double
SQLTIME	java.sql.Time	Time
BIGDECIMAL	java.math.BigDecimal	Decimal
BYTESEQ	java.lang.Byte	Binary
BYTE	java.lang.Byte	SByte
SQLXML	java.sql.SQLXML	String

Note:

- You can make a property as key for the tables that do not have the primary key defined in the database. This can be done using the OData Sync feature.
- For MSSQL server, do not make entity property as a key which has SQL datatype nchar, as it may append extra character space in OData response link tag.

Sync the External Entity Type in Adapter

You can use the OData Sync feature in Designer to sync the properties of a selected external entity type with the latest changes made in the database tables. You can also use the Sync feature to edit the properties of an external entity type.

To modify the external entity type, see the *"Working with OData Services"* chapter in the *webMethods Service Development Help*.

Adapter specific OData Service operations

The Adapter for JDBC converts OData System queries to equivalent SQL query that correspond to the OData operations. The OData operations such as `retrieve, insert, delete` and `update` correspond to select, insert, delete, and update SQL queries for each external entity type.

Adapter for JDBC also supports filter expressions in OData requests to filter and return only those results that match the expression specified. You can add the `$filter` system query option at the end of the OData request.

Note:`$filter` system query option is applicable only for `retrieve` operation.

Adapter for JDBC supports the following operators:

Operator	Description	Example
`eq`	Equal	`$filter=City eq 'Redmond'`
`ne`	Not Equal	`$filter=City ne 'London'`
`gt`	Greater than	`$filter=Price gt 20`
`lt`	Less than	`$filter=Price lt 20`
`ge`	Greater than or equal	`$filter=Price ge 10`
`le`	Less than or equal	`$filter=Price le 100`
`and`	Logical and	`$filter=Price le 200 and Price gt 3.5`
`or`	Logical or	`$filter=Price le 3.5 or Price gt 200`

Adapter for JDBC supports the following functions:

Function	Description	Example
`endswith`	Returns the string that ends with the specified suffix	`$filter=endswith(FText,'RT')`
`startswith`	Returns the string that starts with the specified prefix	`$filter=startswith(FText, 'S')`
`substringof`	Returns the string that contains the specified substring	`$filter=substringof(FText, 'urn') eq true`
`substring`	Returns the string that contains the specified substring at the specified index	`$filter=substring(FText, 5) eq 'RED'`
`tolower`	Convert to lower case	`$filter=tolower(FText) eq 'code red'`

Function	Description	Example
`toupper`	Convert to upper case	`$filter=toupper(FText) eq '2ND ROW'`
`trim`	Removes leading and trailing spaces	`$filter=trim(FText) eq 'CODE RED'`
`concat`	Concatenates the specified properties	`$filter=concat(concat(FText, ', '), FCode) eq '2nd row, CODE RED'`
`round`	Rounds a numeric field	`$filter=round(FDecimal) eq 1`
`floor`	Gets the largest integer value that is not greater than property value	`$filter=floor(FDecimal) eq 0`
`ceiling`	Gets the smallest integer value that is greater than property value	`$filter=ceiling(FDecimal) eq 0`

Note:
The functions such as `ceiling` and `round` are applicable only for Oracle database.

A Data Type Mapping

JDBC Data Type to Java Data Type Mappings

Each column in the database table is assigned a SQL type. The JDBC driver maps each SQL data type to a JDBC data type. Adapter for JDBC then maps each JDBC data type to one or more Java data types that are used as the input or output of the adapter service or notification.

The following table shows the JDBC data type to Java data type mappings. You can map each JDBC data type to a set of Java data types by choosing one from the set. The JDBC data type you select during configuration will then map to the input or output of the adapter service or notification.

For a list of data types for which Integration Server has some constraints, see "JDBC Data Type to Java Data Type Mapping Constraints" on page 219.

Note:
Adapter for JDBC does not support the DATALINK DB2 data type when using the adapter with DB2 for AS/400 or DB2 for OS/390.

Note:
Adapter for JDBC does not support the TIMESTAMP WITH TIME ZONE and TIMESTAMP WITH LOCAL TIME ZONE data types in Oracle 10g.

Note:
Adapter for JDBC does not support user-defined data types, Oracle PL/SQL collections, or Oracle PL/SQL records.

JDBC Data Type	Java Data Type
ARRAY	java.sql.Array
	java.lang.Object
BIT	java.lang.Boolean
	java.lang.String
	java.lang.Object
TINYINT	java.lang.Byte
	java.lang.Integer
	java.lang.String
	java.lang.Object
	SetAsString
SMALLINT	java.lang.Short
	java.lang.Integer

JDBC Data Type	Java Data Type
	java.lang.String
	java.lang.Object
INTEGER	java.lang.Integer
	java.lang.String
	java.lang.Object
BIGINT	java.lang.Long
	java.lang.String
	java.lang.Object
FLOAT	java.lang.Double
	java.lang.String
	java.lang.Object
	java.math.BigDecimal
	SetAsString
REAL	java.lang.Float
	java.lang.String
	java.lang.Object
	java.math.BigDecimal
BOOLEAN	java.lang.Boolean
	java.lang.String
	java.lang.Object
DOUBLE	java.lang.Double
	java.lang.String
	java.lang.Object
	java.math.BigDecimal
	SetAsString
NUMERIC	java.math.BigDecimal
	java.lang.String
	java.lang.Object

JDBC Data Type	Java Data Type
DECIMAL	java.math.BigDecimal
	java.lang.String
	java.lang.Object
CHAR	java.lang.String
	java.lang.Character
	java.lang.Object
VARCHAR	java.lang.String
	java.lang.Object
LONGVARCHAR	java.lang.String
	java.lang.Object
DATE	java.sql.Date
	java.util.Date
	java.lang.String
	java.lang.Object
	SetAsString
TIME	java.sql.Time
	java.util.Date
	java.lang.String
	java.lang.Object
	SetAsString
TIMESTAMP	java.sql.Timestamp
	java.util.Date
	java.lang.String
	java.lang.Object
	SetAsString
TIMESTAMP WITH TIME ZONE	
TIMESTAMP WITH LOCAL TIME ZONE	
BINARY	byte array (byte [])

JDBC Data Type	Java Data Type
	java.lang.Object
VARBINARY	byte array (byte[])
	java.lang.Object
LONGVARBINARY	byte array (byte[])
	java.lang.Object
LONGNVARCHAR	java.lang.String
	java.lang.Object
NCHAR	java.lang.String
	java.lang.Object
NULL	java.lang.String
	java.lang.Object
NVARCHAR	java.lang.String
	java.lang.Object
CLOB	java.sql.Clob
	java.lang.String
	java.io.Reader
	java.lang.Object
BLOB	java.sql.Blob
	byte array
	java.io.InputStream
	java.lang.Object
ORACLECURSOR	java.lang.Object
ORACLEFIXED_CHAR	java.lang.String
STRUCT	java.sql.Struct
	java.lang.Object
OTHER	java.lang.Object
	java.lang.String
	java.sql.Struct

JDBC Data Type	Java Data Type
	java.sql.Array

Important Considerations When Using BLOB and CLOB Data Types

- When passing large CLOB or BLOB data, use the Java data types java.io.Reader for CLOB and java.io.InputStream for BLOB to prevent Integration Server from running out of memory. When using these data types, Adapter for JDBC streams the data into bytes thus allowing to pass large data. The data types java.io.Reader and java.io.InputStream are supported only for the Oracle database using the Oracle driver.
- When using the CLOB data with java.io.Reader as input data type, it is recommended that you use the InputStreamReader implementation of java.io.Reader with the correct encoding parameter.
- When Designer executes a Adapter for JDBC SELECT service that has its output type set to java.sql.Blob for a BLOB data type, Designer issues a java.io.NotSerializableException error. To work around this issue, perform one of the following:
  - Use another valid Output Type for BLOB data types.
  - Execute the service by navigating through Integration Server Administrator instead of saving or viewing the BLOB data through Designer.

Important Considerations When Using the Array and Struct Database Specific Data Types

- In an adapter service, when using the java.lang.Object as the output field type for a database column of type array or struct, Adapter for JDBC returns the data as a java.lang.Object array, provided that the array or struct data in the database table is composed of primitive data types.
- When using the java.sql.Array or java.sql.Struct as the output field type for a database column of type array or struct, Adapter for JDBC returns the java.sql.Array and the java.sql.Struct objects, respectively, as returned by the driver. However, when serializing the data across the JVMs, this returned data may not be serializable and may result into a java.io.NotSerializableException. Therefore, before serializing the data across the JVMs, it is important that you use a Java or a flow service to process the java.sql.Struct and java.sql.Array objects as required, and then drop them from the pipeline.

Note:
The java.sql.Struct and java.sql.Array data types are available only for Adapter for JDBC services.

Using the SetAsString Data Type in Adapter for JDBC

The SetAsString data type is a dummy string data type. When using this data type, Adapter for JDBC does not try to convert the input data into the equivalent JDBC data type, but passes the data to the underlying database driver as a string data type. Thus, you have the flexibility to specify the format of the equivalent JDBC data type by using a database specific function.

For example, you can specify the format for date, time, or timestamp using the to_date function or a similar database function for Oracle database. Adapter for JDBC treats the input data as a string data type and does not convert it to the equivalent JDBC data type. The to_date function then uses the string data to provide the required format of the date, time or timestamp.

If your database has native database specific functions that can convert string data type to any other data type, you may use the SetAsString data type.

Note:
The SetAsString data type is available only for Adapter for JDBC services.

JDBC Data Type to Java Data Type Mapping Constraints

Integration Server has some constraints when mapping JDBC data types to Java data types.

If you select one of the following Java data types, the data type will map exactly to the **Input/Output** tab in Designer:

- java.lang.String
- java.lang.Byte
- java.lang.Boolean
- java.lang.Character
- java.lang.Double
- java.lang.Float
- java.lang.Integer
- java.lang.Long
- java.lang.Short
- java.util.Date
- java.math.BigDecimal
- java.math.BigInteger
- java.lang.Object

Those data types not included in this list will map to java.lang.Object. In these cases, if the JDBC data type you specify is for input, you will need to pass in the object with the selected Java data type. If the JDBC type is for output, you can cast the object to the selected Java data type.

SQL Data Type to JDBC Data Type Mappings

For the mappings from SQL data types to JDBC data types, see your vendor's specifications.

Advanced Server Type to JDBC Data Type Mappings

Adapter for JDBC supports only the basic data types supported by the Postgres Plus Advanced Server 9.0 JDBC connector and listed in the following table:

JDBC Data Type	Advanced Server Type
INTEGER	INT4
TINYINT, SMALLINT	INT2
BIGINT	INT8
REAL, FLOAT	FLOAT4
DOUBLE	FLOAT8
DECIMAL, NUMERIC	NUMERIC
CHAR	BPCHAR
VARCHAR, LONGVARCHAR	VARCHAR
DATE	DATE
TIME	TIME
TIMESTAMP	TIMESTAMP
BINARY	BYTEA
BIT	BOOL

Advanced Server Type Constraints

When creating tables with the NUMERIC, VARCHAR, or BYTEA data types, you must specify a length for the table.

B Built-In Services

Overview

This appendix provides information on the built-in services provided by webMethods Adapter for JDBC. These services are located in the WmJDBCAdapter package.

pub.jdbcAdapter:updateNotificationSchema

The pub.jdbcAdapter:updateNotificationSchema Java service changes the schema names configured in the following types of notifications: InsertNotification, DeleteNotification, UpdateNotification, OrderedNotification, and BasicNotification.

This service always validates the new schemas against the notification settings, and sets the state of the notification to the state it is in before it is updated, regardless of whether the update is successful.

The service does the following:

Step	Description
1	The service checks the current status of the notification.
2	If the notification is enabled, the service checks the *forceDisable* parameter. If *forceDisable* is false, the service reports the error. If *forceDisable* is true, the service disables the notification.
3	The service validates the schema against the notification's settings. The validation requires that the schema be in the same catalog that is configured with the notification and that the table, synonym, view, or alias, configured in the notification be in the schema. If the schema is not valid, the service throws an exception.
4	The service updates the notification property with the new schemas, and throws an exception if the input fields for the new schemas are not valid.
5	If the original notification state is enabled, the service enables the notification.

Note:
If an exception is thrown when the service attempts to re-enable a polling notification, you will receive the message "The schema is updated but the notification could not be enabled." This is because, by design, the metadata has already been updated. You might need to roll back to the previous state, as needed.

Input Parameters

nodeName	**String.** Required. Sets the name of the notification to be updated.

forceDisable	**Boolean.** Required. If the value of this field is set to true, the service disables the notification that is in the enabled state.
allSchemaChange	**Record.** Optional. Indicates that the update is to occur on every schema name in the notification.
allSchemaChange.useCurrentSchema	**Boolean.** Optional. It sets all schema names to <current schema>.
allSchemaChange.schemaName	**String.** Optional. Sets all schema names to the value of this field.
schemaChanges	**Record List.** Optional. Makes individual schema changes, replacing the schema identified by the *existingSchema* field with the new name set in the *newSchema* field.
schemaChanges.existingSchema	**Record.** Required. Identifies the schema name to change.
schemaChanges.existingSchema.useCurrentSchema	**Boolean.**Optional. Identifies the <current schema>.
schemaChanges.existingSchema.schemaName	**String.** Optional. Specifies an existing schema name for the *schemaName* field.
schemaChanges.newSchema	**Record.** Required. Identifies an existing schema name that will replace all occurrences of existing schemas identified in the *existingSchema* field.
schemaChanges.newSchema.useCurrentSchema	**Boolean.** Optional. Sets new schema names to <current schema>.
schemaChanges.newSchema.schemaName	**String.** Optional. Sets new schema names to this name.

Output Parameters

None.

Configuring the UpdateNotificationSchema Service

Keep the following points in mind when configuring the pub.jdbcAdapter:updateNotificationSchema service:

- The *allSchemaChange* and *schemaChanges* fields are mutually exclusive. This means that if *allSchemaChange* is set, then *schemaChanges* will be ignored.

- The *useCurrentSchema* and *schemaName* fields are mutually exclusive everywhere they occur in the input. This means that if *useCurrentSchema* is set to true, then the value in *schemaName* will be ignored.
- A localized string is used for the <current schema>.
- The service does not generate output. It throws an AdapterServiceException and wraps exceptions from ART and Adapter for JDBC.

Setting Input Fields

The following tables list the input fields to be set for certain use cases.

Note:
Fields that do not list an input value in the tables below should be left empty.

Setting All Schemas to the <current schema>

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1
forceDisable	true
allSchemaChange	
allSchemaChange.useCurrentSchema	true

Setting All Schemas to Schema A

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1
forceDisable	true
allSchemaChange	
allSchemaChange.schemaName	A

Changing Occurrences of the <current schema> to Schema A

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1
forceDisable	true
schemaChanges	
schemaChanges[0]	
schemaChanges[0].existingSchema	
schemaChanges[0].existingSchema.useCurrentSchema	true
schemaChanges[0].newSchema	
schemaChanges[0].newSchema.schemaName	A

Changing Occurrences of Schema A to the <current schema>

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1
forceDisable	true
schemaChanges	
schemaChanges.schemaChanges[0]	
schemaChanges.schemaChanges[0].existingSchema	
schemaChanges.schemaChanges[0].existingSchema.schemaName	A
schemaChanges.schemaChanges[0].newSchema	
schemaChanges.schemaChanges[0].newSchema.useCurrentSchema	true

Changing Occurrences of Schema A to Schema A1, and Occurrences of Schema B to the <current schema>

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1
forceDisable	true
schemaChanges	

Input Field	Setting
schemaChanges.schemaChanges[0]	
schemaChanges.schemaChanges[0].existingSchema	
schemaChanges.schemaChanges[0].existingSchema.schemaName	A
schemaChanges.schemaChanges[0].newSchema	
schemaChanges.schemaChanges[0].newSchema.schemaName	A1
schemaChanges.schemaChanges[1]	
schemaChanges.schemaChanges[1].existingSchema	
schemaChanges.schemaChanges[1].existingSchema.schemaName	B
schemaChanges.schemaChanges[1].newSchema	
schemaChanges.schemaChanges[1].newSchema.useCurrentSchema	true

pub.jdbcAdapter:updateServiceSchema

The pub.jdbcAdapter:updateServiceSchema Java service enables you to change the schema settings associated with an adapter service without having to manually update the service from the Designer Adapter Service Editor.

This service supports the following types of services: InsertSQL, DeleteSQL, UpdateSQL, SelectSQL, StoredProcedure, and StoredProcedureWithSignature.

Unlike the pub.jdbcAdapter:updateServiceSchema service, the pub.jdbcAdapter:updateServiceSchema service does not validate the new schemas against the service settings.

Input Parameters

nodeName	**String.** Required. Sets the name of the service to be updated.
allSchemaChange	**Record.** Optional. Indicates that the update is to occur on every schema name in the adapter service.
allSchemaChange.useCurrentSchema	**Boolean.** Optional. It sets all schema names to <current schema>.
allSchemaChange.schemaName	**String.** Optional. Sets all schema names to the value of this field.
schemaChanges	**Record List.** Optional. Makes individual schema changes, replacing the schema

	identified by the *existingSchema* field with the new name set in the *newSchema* field.
schemaChanges.existingSchema	**Record**. Required. Identifies the schema name to change.
schemaChanges.existingSchema.useCurrentSchema	**Boolean.** Optional. Identifies the <current schema>.
schemaChanges.existingSchema.SchemaName	**String.** Optional. Specifies an existing schema name for the *SchemaName* field.

Output Parameters

None.

Configuring the updateServiceSchema Service

Keep the following points in mind when configuring the pub.jdbcAdapter:updateConnectionPassword service:

- The *allSchemaChange* and *schemaChanges* fields are mutually exclusive. This means that if *allSchemaChange* is set, then *schemaChanges* will be ignored.
- The *useCurrentSchema* and *schemaName* fields are mutually exclusive everywhere they occur in the input. This means that if *useCurrentSchema* is set to true, then the value in *schemaName* will be ignored.
- A localized string is used for the <current schema>.
- The service does not generate output. It throws an AdapterServiceException and wraps exceptions from ART and Adapter for JDBC.

Setting Input Fields

The following tables list the input fields to be set for certain use cases.

Note:
Fields that do not list an input value in the tables below should be left empty.

Setting All Schemas to the <current schema>

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1

Input Field	Setting
allSchemaChange	
allSchemaChange.useCurrentSchema	true

Setting All Schemas to Schema A

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1
allSchemaChange	
allSchemaChange.schemaName	A

Changing Occurrences of the <current schema> to Schema A

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1
schemaChanges	
schemaChanges[0]	
schemaChanges[0].existingSchema	
schemaChanges[0].existingSchema.useCurrentSchema	true
schemaChanges[0].newSchema	
schemaChanges[0].newSchema.schemaName	A

Changing Occurrences of Schema A to the <current schema>

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1
schemaChanges	
schemaChanges.schemaChanges[0]	

Input Field	Setting
schemaChanges.schemaChanges[0].existingSchema	
schemaChanges.schemaChanges[0].existingSchema.schemaName	A
schemaChanges.schemaChanges[0].newSchema	
schemaChanges.schemaChanges[0].newSchema.useCurrentSchema	true

Changing Occurrences of Schema A to Schema A1, and Occurrences of Schema B to the <current schema>

Use the following fields and settings:

Input Field	Setting
nodeName	folder1:notification1
schemaChanges	
schemaChanges.schemaChanges[0]	
schemaChanges.schemaChanges[0].existingSchema	
schemaChanges.schemaChanges[0].existingSchema.schemaName	A
schemaChanges.schemaChanges[0].newSchema	
schemaChanges.schemaChanges[0].newSchema.schemaName	A1
schemaChanges.schemaChanges[1]	
schemaChanges.schemaChanges[1].existingSchema	
schemaChanges.schemaChanges[1].existingSchema.schemaName	B
schemaChanges.schemaChanges[1].newSchema	
schemaChanges.schemaChanges[1].newSchema.useCurrentSchema	true

pub.jdbcAdapter:updateConnectionPassword

The pub.jdbcAdapter:updateConnectionPassword service updates the existing password of an existing connection with a new password without requiring you to manually change the connection's password in the **Connection Properties** screen.

You need to disable the connection before updating the password.

Input Parameters

connectionAlias	**String.** Required. The name of the connection for which the password has to be updated.
oldPassword	**String.** Required. The existing password of the connection.
newPassword	**String.** Required. The new password for the connection.
confirmNewPassword	**String.** Required. The new password for the connection. This is required to confirm the new password.

Output Parameters

None.

pub.jdbcAdapter:createConnectionNodes

The pub.jdbcAdapter:createConnectionNodes service automatically configures the JDBC connections without requiring you to use the Administrative screens.

The pub.jdbcAdapter:createConnectionNodes service is useful when you need to configure a large number of connections. The input for this service is an XML file that contains the connection configuration properties that are required to configure the connections.

A sample properties file, SampleConnectionProperties.xml, is available in the pub directory of the WmJDBCAdapter package. You can use this file as a template to provide the connection configuration properties and create a new XML file to configure connections. You can place the XML file in any folder you want to. For security reasons, it is not recommended to place the XML file having user names and passwords in clear text, in the pub directory of the WmJDBCAdapter package.

Note:
When using the encoding attribute in the XML file, ensure that it matches the encoding used when the XML file is saved, and also supports the characters specified in the file. This ensures the correct interpretation of any foreign characters in the XML file.

In the XML file, provide the Connection properties and the Connection Manager properties as name-value pairs. Based on the number of connections that need to be configured, provide the same number of connection configuration property sets in the XML file. For example, in the XML file, if you provide two connection configuration property sets, the pub.jdbcAdapter:createConnectionNodes service configures only two connections.

Note:
If the Connection Manager properties for the connection are not provided in the XML file, the connection is configured using the default Connection Manager properties.

Note:

If the SampleConnectionProperties.xml file is deleted, it is automatically re-generated the next time the WmJDBCAdapter package is reloaded.

After executing the service, the Results panel displays the status (success or failure) for each connection. The Results panel also displays an error message for the connection that has failed to configure.

Input Parameters

fileName	**String**. Required. The path of the XML file that contains the connection configuration properties.

Output Parameters

None.

Usage Notes

Using the pub.jdbcAdapter:createConnectionNodes service, you can configure a deleted connection that was configured using this service, but you cannot configure a connection that already exists. An error will be displayed in the Results panel indicating that there was a failure in configuring the connection. For example, consider the following scenario:

1. Invoke the pub.jdbcAdapter:createConnectionNodes service.
2. In the *fileName* field, type the path of the XML file containing the connection properties. The input XML file has properties for configuring connections conn_local1 and conn_local2.
3. Click **OK**. The connections conn_local1 and conn_local2 are configured.
4. Delete connection conn_local1. Now, the only existing connection is conn_local2.
5. Repeat step 1 and step 2 and then click **OK**.
6. The deleted connection conn_local1 is configured again, but the existing connection conn_local2 is not configured. No error message is thrown, but the Results panel shows a message indicating that there was a failure in configuring connection conn_local2.

Sample XML file with connection properties

```
<Connections>
  <Connection>
    <packageName>MyJDBC</packageName>
    <connectionAlias>Connections:con_local</connectionAlias>
    <connectionSettings>
      <transactionType>LOCAL_TRANSACTION</transactionType>
     <datasourceClass>oracle.jdbc.pool.OracleConnectionPoolDataSource</datasourceClass>

      <serverName>localhost</serverName>
      <user>user1</user>
      <password>abc123</password>
```

```
      <databaseName>ORCL1</databaseName>
      <portNumber>1521</portNumber>
      <otherProperties>driverType=thin</otherProperties>
      <networkProtocol>TCP</networkProtocol>
    </connectionSettings>
    <connectionManagerSettings>
      <poolable>true</poolable>
      <minimumPoolSize>1</minimumPoolSize>
      <maximumPoolSize>10</maximumPoolSize>
      <poolIncrementSize>1</poolIncrementSize>
      <blockingTimeout>1000</blockingTimeout>
      <expireTimeout>1000</expireTimeout>
      <startupRetryCount>1</startupRetryCount>
      <startupBackoffSecs>20</startupBackoffSecs>
      <heartBeatInterval>15</heartBeatInterval>
    </connectionManagerSettings>
  </Connection>

  <Connection>
    <packageName>MyJDBC</packageName>
    <connectionAlias>Connections:con_local2</connectionAlias>
    <connectionSettings>
      <transactionType>NO_TRANSACTION</transactionType>
     <datasourceClass>oracle.jdbc.pool.OracleConnectionPoolDataSource</datasourceClass>

      <serverName>localhost</serverName>
      <user>user2</user>
      <password>xyz321</password>
      <databaseName>ORCL1</databaseName>
      <portNumber>1521</portNumber>
      <otherProperties>driverType=thin</otherProperties>
      <networkProtocol>TCP</networkProtocol>
    </connectionSettings>
    <connectionManagerSettings>
      <poolable>true</poolable>
      <minimumPoolSize>5</minimumPoolSize>
      <maximumPoolSize>10</maximumPoolSize>
      <poolIncrementSize>1</poolIncrementSize>
      <blockingTimeout>1000</blockingTimeout>
      <expireTimeout>1000</expireTimeout>
      <startupRetryCount>1</startupRetryCount>
      <startupBackoffSecs>20</startupBackoffSecs>
      <heartBeatInterval>15</heartBeatInterval>
    </connectionManagerSettings>
  </Connection>
</Connections>
```

pub.pollingNotificationUtils:dropDatabaseObjects

The servicepub.pollingNoificationUtils:dropDatabaseObjects allows you to automatically clean up the existing database objects of a notification.

Input Parameters

notificationName	**String**. Required. The name of the notification from which the database objects need to be deleted.

Output Parameters

None.

Usage Notes

Disable the target notification before invoking this service. Invoking this service for an enabled or a suspended notification, throws an error.

pub.pollingNotificationUtils:getDatabaseObjectsForNotification

The service pub.pollingNotificationUtils:getDatabaseObjectsForNotification allows you to list the existing database objects associated with a notification.

The service returns null against the database objects that do not exist.

Input Parameters

notificationName	**String**. Required. The name of the notification from which to list the database objects.
jdbcConnectionSchemaName	**String** The name of the schema in the connection for the notification.
cliOrSysSchemaName	**String** The name of the alternative search schema.

Output Parameters

schemaName	The name of the schema associated with the notification.
bufferTableName	The buffer table name of the notification.
triggerName	The trigger name of the notification.
sequenceName	The sequence name of the notification.

wm.adapter.wmjdbc.utils:docListToObject

The wm.adapter.wmjdbc.utils:docListToObject utility service maps an input parameter of type **Document List** to a parameter of type **Object**.

Input Parameters

docList	**Document List**. Represents the **Document List** value to be mapped to the type **Object**.

Output Parameters

obj	**Object**. Represents the **Object** value mapped to the type **Document List**.

wm.adapter.wmjdbc.utils:objectToDocList

The wm.adapter.wmjdbc.utils: objectToDocList utility service maps an input parameter of type **Object** to a parameter of type **Document List**.

Input Parameters

obj	**Object**. Represents the **Object** value to be mapped to the type **Document List**.

Output Parameters

docList	**Document List**. Represents the **Document List** value mapped to the type **Object**.

wm.adapter.wmjdbc.admin.service:update

The wm.adapter.wmjdbc.admin.service:update service updates the table name in the configured adapter services.

The wm.adapter.wmjdbc.admin.service:update service may take a long time to complete processing if an input package contains a large number of connections. This is because packages are reloaded at the end of the service, and a package with a large number of connections takes more time to reload. To improve the performance, disable the connections prior to executing the service.

By default, the wm.adapter.wmjdbc.admin.service:update service runs under simulation mode, that is, no actual changes are made to the corresponding JDBC service nodes, and only a check is performed if the service nodes can be updated successfully.

Input Parameters

input		**Document List**. Required. Array of input records. At least one input record is required and each input record has the following parameters:
	packageName	**String**. Required. Name of the package containing the JDBC service nodes to be updated.
	nsFilter	**Document**. Optional. Namespace filter in the form of text expression(s), which can be applied to selectively filter JDBC

	service nodes within the package specified by the *packageName* parameter. The namespace filter has the following parameters: ■ *patternStyle*. **String**. Optional. Style of include or exclude text expression(s). The glob allows for glob-like expressions that are used in UNIX shell commands, whereas regex allows regular expressions as used by Java and Perl languages. Allowed values are: ■ **glob**. ■ **regex**. Default. ■ *include*. **String List**. Optional. Array of text expressions to include JDBC service nodes to be updated. The default is to include all JDBC service nodes matched by the *connectionAlias* parameter. ■ *exclude*. **String List**. Optional. Array of text expressions to exclude JDBC service nodes from being updated. The default is to exclude none.
connectionAlias	**String**. Required. Name of the connection alias. All JDBC service nodes matched by the namespace filter and having this connection alias are picked for an update.
configuration	Specifies the table configurations. ■ *tables*. **Document List**. Required. Represents an array of tables which can be updated after selectively filtering the JDBC service nodes within the package specified by the *packageName* parameter, namespace specified by the *nsFilter* parameter, and connection specified by the *connectionAlias* parameter. Each input record has the following parameters: ■ *oldName*. **String**. Required. Name of the table in the service node to be updated. All JDBC service nodes matched by the namespace filter, the connection alias filter and having the table name specified, are picked for an update. ■ *newName*. **String**. Required. Name of the new table. The matched JDBC service nodes that are updated to use the new table name. The JDBC services associated with the old table name and the new table name must belong to the same provider package and should be of the same type.
backup	**String**. Optional. Instructs the service to create a backup of the matched JDBC service nodes. Allowed values are **true** or **false**. Default value is **false**.

simulate	**String**. Optional. Instructs the service to run in simulation mode during which no changes are made to JDBC service nodes, and only a check is performed if a service node can be updated successfully or not. Allowed values are: ■ **true**. ■ **false**. Default. Set *simulate* to **false** to persist the changes made to a JDBC service node.

Output Parameters

output		**Document List**. Required. Array of output records of the service corresponding to each input record. Each output record has the following parameters:
	packageName	**String**. Required. Name of the package containing JDBC service nodes provided as an input to the service.
	status	**String**. Required. Overall status of the service. Allowed values are: ■ **success**. If all input JDBC service nodes could be updated successfully. ■ **fail**. If all input JDBC service nodes could not be updated successfully.
	errorMessage	**String**. Required. A detailed error message in case the service does not run properly.
	summary	**Document**. Required. Document listing the summary displaying how many JDBC service nodes in the input, filtered, matched, updated successfully and how many service nodes have skipped the update. Each record has the following parameters: ■ *total*. **String**. Required. Total number of JDBC service nodes in the package. ■ *filtered*. **String**. Required. Total number of JDBC service nodes in the package filtered according to the *nsFilter* parameter. If no *nsFilter* parameter is provided, the service includes all JDBC service nodes in the package. ■ *matched*. **String**. Required. Filtered nodes which matched the *connectionAlias* input parameter. ■ *updated*. **String**. Required. Matched nodes updated by the service.

	■ *skipped*. **String**. Required. Matched nodes that are not updated by the service.
matchedService	**Document List**. Required. Array of JDBC service nodes which matched the filtering criteria. Each record has the following parameters: ■ *name*. **String**. Required. Name of the service. ■ *message*. **String**. Required. A detailed message in case the service node was skipped from update.

C Built-In Transaction Management Services

Transaction Management Overview

This appendix provides an overview and examples of using transactions. It describes how Integration Server supports the built-in services used to manage explicit transactions for your Adapter for JDBC services in the WmART package. For descriptions of each of the specific built-in transaction management services that can be used with the WmART package, see "Built-In Transaction Management Services" on page 247.

For information about other built-in services available with Adapter for JDBC, see the *webMethods Integration Server Built-In Services Reference* for your release.

Transactions

Integration Server considers a transaction to be one or more interactions with one or more resources that are treated as a single logical unit of work. The interactions within a transaction are either all committed or all rolled back. For example, if a transaction includes multiple database inserts, and one or more inserts fail, all inserts are rolled back.

Transaction Types

Integration Server supports the following kinds of transactions:

- A *local transaction* (LOCAL_TRANSACTION) which is a transaction to a resource's local transaction mechanism
- An *XAResource transaction* (XA_TRANSACTION) which is a transaction to a resource's XAResource transaction mechanism

Integration Server can automatically manage both kinds of transactions, without requiring the adapter user to do anything. Integration Server uses a container-managed (implicit) transaction management approach based on the Connector Architecture standard, and also performs some additional connection management. This is because adapter services use connections to create transactions. For more information about implicit transactions, see "Implicit and Explicit Transactions" on page 241.

However, there are cases where adapter users need to explicitly control the transactional units of work. Examples of these cases are provided in "Implicit and Explicit Transaction Examples" on page 243.

To support transactions, Integration Server relies on an Oracle transaction manager. The transaction manager is responsible for beginning and ending transactions, maintaining a transaction context, enlisting newly connected resources into existing transactions, and ensuring that local and XAResource transactions are not combined in illegal ways.

The transaction manager only manages operations performed by adapter services, a transacted JMS trigger, or a built-in JMS service that uses a transacted JMS connection alias.

Important:
You cannot step or trace a flow that contains a transacted adapter service or a transacted JMS service.

XA Transactions

If an XA transactional connection throws an exception during a service transaction and the exception results in an inconsistent state, you may need to resolve the transaction using the tools provided with the database.

For information about using Integration Server to manage XA transactions, see the *webMethods Integration Server Administrator's Guide* for your release.

Implicit and Explicit Transactions

Implicit transactions are automatically handled by the Integration Server transaction manager. When you define an explicit transaction, you define the start-on-completion boundaries of the transaction. As such, implicit and explicit transactions need to be created and managed differently.

The following sections describe implicit and explicit transactions and how to manage them.

Implicit Transactions

With implicit transactions, Integration Server automatically manages both local and XAResource transactions without requiring you to explicitly do anything. That is, Integration Server starts and completes an implicit transaction with no additional service calls required by the adapter user.

A transaction context, which the transaction manager uses to define a unit of work, starts when an adapter service is encountered in a flow execution. The connection required by the adapter service is registered with the newly created context and used by the adapter service. If another adapter service is encountered, the transaction context is searched to see if the connection is already registered. If the connection is already registered, the adapter service uses this connection. If the connection is not registered, a new connection instance is retrieved and registered with the transaction.

Note that if the top level flow invokes another flow, adapter services in the child flow use the same transaction context.

When the top level flow completes, the transaction is completed and is either committed or rolled back, depending on the status (success or failure) of the top level flow.

A single transaction context can contain any number of XA_TRANSACTION connections but no more than one LOCAL_TRANSACTIxON connection. If you choose to provide dynamic user credentials at run time, then all the adapter services using the LOCAL_TRANSACTION connection within a single transaction must use the same user credentials. For example, if you have two adapter services *s1* and *s2* configured using the LOCAL_TRANSACTION connection *c1* in a single transaction context, then both *s1* and *s2* must either use the same dynamic credentials at run time or the default configured credentials provided at design time. For more information on dynamic user credentials for a service's associated connection, see"Changing the User Credentials of a Service's Associated Connection at Run Time" on page 23.

For implicit transaction examples, see "Implicit and Explicit Transaction Examples" on page 243.

For more information about designing and using flows, see the *webMethods Service Development Help* for your release.

For more information about transaction types, see "Transaction Management of Adapter Connections" on page 16.

Explicit Transactions

You use explicit transactions when you need to explicitly control the transactional units of work. To do this, you use additional services, known as built-in services, in your flow.

A transaction context starts when the pub.art.transaction:startTransaction service is executed. The transaction context is completed when either the pub.art.transaction:commitTransaction or pub.art.transaction:rollbackTransaction service is executed. As with implicit transactions, a single transaction context can contain any number of XA_TRANSACTION connections but no more than one LOCAL_TRANSACTION connection. If you choose to provide dynamic user credentials at run time, then all the adapter services using the LOCAL_TRANSACTION connection within a single transaction must use the same user credentials. For example, if you have two adapter services *s1* and *s2* configured using the LOCAL_TRANSACTION connection *c1* in a single transaction context, then both *s1* and *s2* must either use the same dynamic credentials at run time or the default configured credentials provided at design time.

For more information on dynamic user credentials for a service's associated connection, see "Changing the User Credentials of a Service's Associated Connection at Run Time" on page 23.

Note:
With explicit transactions, you must be sure to call either a commitTransaction or rollbackTransaction for each startTransaction; otherwise you will have dangling transactions that will require you to reboot Integration Server. You must also ensure that the startTransaction is outside the SEQUENCE.

A new explicit transaction context can be started within a transaction context, provided that you ensure that the transactions within the transaction context are completed in the reverse order they were started-that is, the last transaction to start should be the first transaction to complete, and so forth.

For example, the following is a *valid* construct:

```
pub.art.transaction:startTransaction
   pub.art.transaction:startTransaction
      pub.art.transaction:startTransaction
      pub.art.transaction:commitTransaction
   pub.art.transaction:commitTransaction
pub.art.transaction:commitTransaction
```

The following example shows an *invalid* construct:

```
pub.art.transaction:startTransaction
   pub.art.transaction:startTransaction
pub.art.transaction:commitTransaction
   pub.art.transaction:commitTransaction
```

For explicit transaction examples, see "Implicit and Explicit Transaction Examples" on page 243.

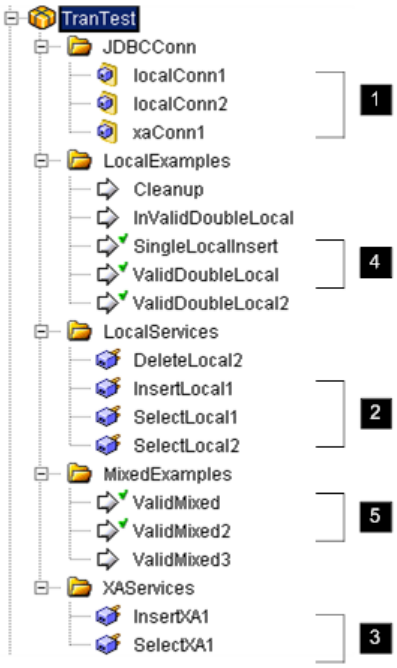
Note:
You can use the pub.flow:getLastError service in the SEQUENCE, to retrieve the error information when a sequence fails. For more information on using the pub.flow:getLastError service, see the *webMethods Service Development Help* for your release.

For more information about designing and using flows, see the *webMethods Service Development Help* for your release.

For more information about transaction types, see "Transaction Management of Adapter Connections" on page 16.

Implicit and Explicit Transaction Examples

The examples in this section use the connections, services, and flows shown below and described in the table that follows.

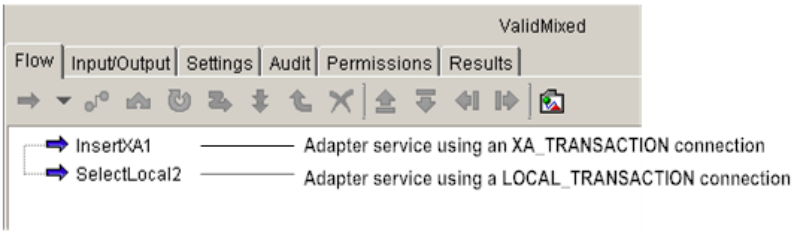


Step	Description
1	You configured three connections: ■ localConn1: LOCAL_TRANSACTION type ■ localConn2: LOCAL_TRANSACTION type ■ xaConn1: XA_TRANSACTION type
2	You configured the following adapter services which use the LOCAL_TRANSACTION connections listed in step 1 above. ■ InsertLocal1: configured to use localConn1 connection

Step	Description
	■ SelectLocal1: configured to use localConn1 connection ■ SelectLocal2: configured to use localConn2 connection
3	You configured the following adapter services which use the XA_TRANSACTION connection listed in step 1 above. ■ InsertXA1: uses xaConn1 connection ■ SelectXA1: uses xaConn1 connection
4	You create the following flow examples (described in this section) using LOCAL_TRANSACTIONs: ■ SingleLocalInsert (explicit transaction). See "Flow Example: SingleLocalInsert" on page 244. ■ ValidDoubleLocal (explicit transaction). See "Flow Example: ValidDoubleLocal" on page 246.
5	You create the following flow examples (described in this section) using both XA_TRANSACTIONs and LOCAL_TRANSACTIONs: ■ ValidMixed (implicit transaction). See "Flow Example: ValidMixed" on page 244. ■ ValidMixed2 (implicit/explicit transaction). See "Flow Example: ValidMixed2" on page 245.

Flow Example: ValidMixed

- This examples shows an Implicit Transaction.
- This flow calls:
  - One service using an XA_TRANSACTION connection (InsertXA1 service)
  - One service using a LOCAL_TRANSACTION connection (SelectLocal2 service)

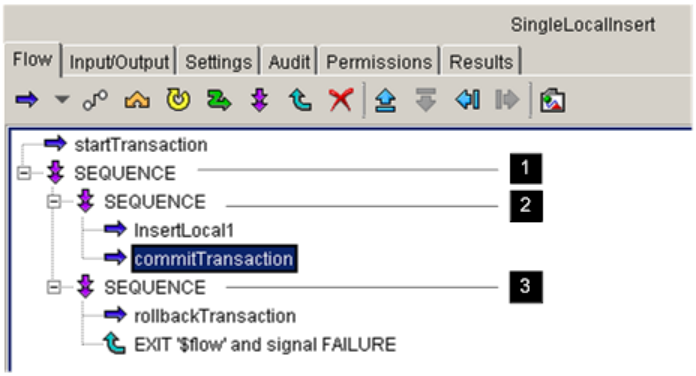


Flow Example: SingleLocalInsert

- This examples shows an Explicit Transaction.

- This flow calls one adapter service (InsertLocal1) using a LOCAL_TRANSACTION connection.

This example demonstrates the correct way to set up your flow to use an explicit transaction. You use the following construct of three SEQUENCEs, which is required to insure that the explicit transaction is either committed (on success) or rolled back (on failure).



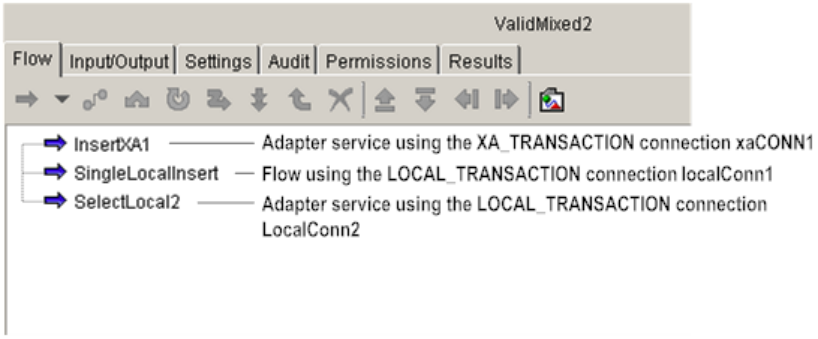
Step	Description
1	The top-level SEQUENCE will exit on success. Note that the start transaction is outside the SEQUENCE.
2	The transaction will be committed if successful, and the top-level SEQUENCE will complete.
3	This SEQUENCE is entered only if the previous SEQUENCE is unsuccessful. The transaction is rolled back and the flow exits with a status of failure.

Note that with this construct, you will not get trigger retries or a retryable exception. The EXIT statement will result in generating a Flow exception which is not retryable. To get retries, you will need to use a REPEAT step statement in your flow. For information about using the REPEAT statement, see the *webMethods Service Development Help* for your release.

Flow Example: ValidMixed2

- This examples shows both an Implicit and Explicit Transaction.
- This flow calls:
  - One adapter service (InsertXA1) using an XA_TRANSACTION connection
  - One flow (SingleLocalInsert-shown in "Flow Example: SingleLocalInsert" on page 244) which contains its own explicit transactions and using a LOCAL_TRANSACTION connection (localConn1)
  - One adapter service (SelectLocal2) using the same LOCAL_TRANSACTION connection (localConn2) as the SingleLocalInsert flow

In this example, InsertXA1 and SelectLocal2 are registered as part of the implicit transaction. SingleLocalInsert is part of its own explicit transaction. The explicit transaction is required since you are using two different local transaction connections (localConn1 and localConn2).

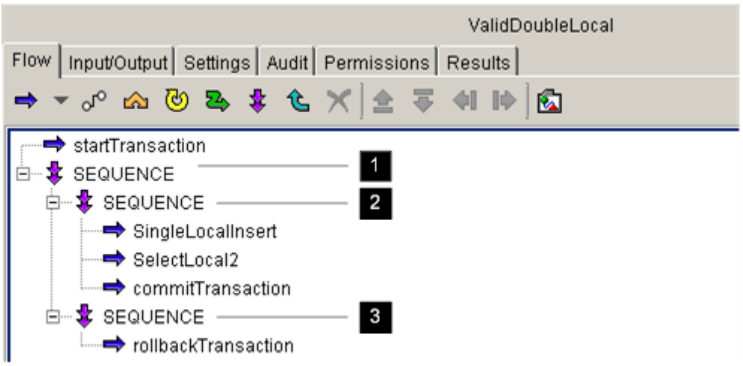


Flow Example: ValidDoubleLocal

- This example shows an Explicit transaction.
- This flow calls:
  - A flow (SingleLocalInsert) which uses the LOCAL_TRANSACTION connection localConn1
  - An adapter service (SelectLocal2) which uses the LOCAL_TRANSACTION connection localConn2

This flow shows an explicit transaction residing within another explicit transaction. The flow calls a flow and an adapter service which use different LOCAL_TRANSACTION connections. Recall that you must use an explicit transaction if you have more than one LOCAL_TRANSACTION connection.

Notice that the flow is similar to the SingleLocalInsert flow example shown in "Flow Example: SingleLocalInsert" on page 244, which uses a flow construct involving three SEQUENCEs to insure that the explicit transaction is either committed (on success) or rolled back (on failure).



Step	Description
1	The top-level SEQUENCE will exit on success. Note that the start transaction is outside the SEQUENCE.
2	The transaction will be committed if successful, and the top-level SEQUENCE will complete.
3	This SEQUENCE is entered only if the previous SEQUENCE is unsuccessful. The transaction is rolled back and the flow exits with a status of failure.

Built-In Transaction Management Services

The following sections describe each of the built-in services you can use with the WmART package.

pub.art.transaction:commitTransaction

This service commits an explicit transaction. It must be used in conjunction with the pub.art.transaction:startTransaction service.

If it does not have a corresponding pub.art.transaction:startTransaction service, your flow service will receive a run time error. For more information about implicit and explicit transactions, see "Implicit and Explicit Transactions" on page 241.

Input Parameters

commitTransactionInput	**Document.**A document that contains the variable *transactionName*, described below.
transactionName	**String.**Used to associate a name with an explicit transaction. The `transactionName` must correspond to the *transactionName* in any pub.art.transaction:startTransaction or pub.art.transaction:rollbackTransaction services associated with the explicit transaction. This value must be mapped from the most recent pub.art.transaction:startTransaction that has not previously been committed or rolled back.

Output Parameters

None.

pub.art.transaction:rollbackTransaction

This service rolls back an explicit transaction. It must be used in conjunction with the pub.art.transaction:startTransaction service.

If it does not have a corresponding pub.art.transaction:startTransaction service, your flow service will receive a run time error. For more information about implicit and explicit transactions, see "Implicit and Explicit Transactions" on page 241.

Input Parameters

rollbackTransactionInput	**Document.** A document that contains the variable *transactionName*, described below.
transactionName	**String.** Used to associate a name with an explicit transaction. The *transactionName* must correspond to the *transactionName* in any pub.art.transaction:startTransaction or pub.art.transaction:commitTransaction services associated with the explicit transaction. This value must be mapped from the most recent pub.art.transaction:startTransaction that has not previously been committed or rolled back.

Output Parameters

None.

pub.art.transaction:setTransactionTimeout

This service enables you to manually set a transaction timeout interval for implicit and explicit transactions.

When you use this service, you are temporarily overriding the Integration Server transaction timeout interval. For information on changing the server's default transaction timeout, see "Changing the Integration Server Transaction Timeout Interval" on page 249.

You must call this service within a flow before the start of any implicit or explicit transactions. Implicit transactions start when you call an adapter service in a flow. Explicit transactions start when you call the pub.art.transaction:startTransaction service.

If the execution of a transaction takes longer than the transaction timeout interval, all transacted operations are rolled back.

This service only overrides the transaction timeout interval for the flow service in which you call it.

Input Parameters

timeoutSeconds	**Integer** The number of seconds that the implicit or explicit transaction stays open before the transaction manager marks it for rollback.

Output Parameters

None.

pub.art.transaction:startTransaction

This service starts an explicit transaction.

It must be used in conjunction with either a pub.art.transaction:commitTransaction service or pub.art.transaction:rollbackTransaction service. If it does not have a corresponding pub.art.transaction:commitTransaction service or pub.art.transaction:rollbackTransaction service, your flow service will receive a run time error.

For more information about implicit and explicit transactions, see "Implicit and Explicit Transactions" on page 241.

Input Parameters

startTransactionInput	**Document.** A document that contains the variable *transactionName*, described below.
transactionName	**String.** Specifies the name of the transaction to be started. This parameter is optional. If you leave this parameter blank, Integration Server will generate a name for you. In most implementations, it is not necessary to provide your own transaction name as input.

Output Parameters

startTransactionOutput	**Document.** A document that contains the variable *transactionName*, described below.
transactionName	**String.** The name of the transaction the service just started.

Changing the Integration Server Transaction Timeout Interval

The Integration Server default transaction timeout is no timeout (NO_TIMEOUT). To change the server's transaction timeout interval, use a text editor to modify the server.cnf file and add the parameter below. Note that this parameter does not exist by default in the server.cnf file; you must add it to the file as described below.

Be sure to shut down Integration Server before you edit this file. After you make changes, restart the server.

Add the following parameter to the server.cnf file:

```
watt.art.tmgr.timeout=TransactionTimeout
```

where *TransactionTimeout* is the number of seconds before transaction timeout.

This transaction timeout parameter does not halt the execution of a flow; it is the maximum number of seconds that a transaction can remain open and still be considered valid. For example, if your current transaction has a timeout value of 60 seconds and your flow takes 120 seconds to complete, the transaction manager will rollback all registered operations regardless of the execution status.

For more information about adding parameters to the server.cnf file, see the *webMethods Integration Server Administrator's Guide* for your release.

D Adapter Configuration Parameters

Overview

This appendix contains a description of Adapter for JDBC parameters you can specify in the server configuration file (server.cnf), which is located in the *Integration Server_directory*\config directory. Typically you use the Settings > Extended screen in Integration Server Administrator to update this file, but there might be times when you need to edit the file directly using a text editor. If you edit the file directly, you should first shut down Integration Server before updating the file. After you make the changes, restart the server. If you are using the Settings > Extended screen to update the server configuration file (server.cnf), a server restart is not required unless otherwise specified. The server uses default values for the parameters. If a parameter has a default, it is listed with the description of the parameter.

watt.adapter.JDBC.AutomaticNotification.Joincolumn.BufferTable

Specifies whether Adapter for JDBC displays the columns of the buffer table on the **Joins** tab for an Insert, Delete, or Update polling notification, when the notification has an Output Field name different from the column name in the source table, and the same column is selected on the **Joins** tab. If the parameter is set to `true`, the adapter displays the columns of the buffer table on the **Joins** tab for the notification. If the parameter is set the `false`, the adapter displays the columns of the source table on the **Joins** tab for the notification.

watt.adapter.JDBC.DateWithTimestamp

Appends the timestamp to the output of an Adapter for JDBC service when the adapter service retrieves data from a database table with a Date column, the JDBC type is set to DATE, and the **Output Field Type** parameter is set to java.lang.String. When the parameter is set to `true`, the adapter services append the timestamp to the output. When the parameter is set to `false`, the default, the adapter services do not append the timestamp to the output.

watt.adapter.JDBC.DateWithTimestampAndMilliseconds

Appends the timestamp with milliseconds to the output of an Adapter for JDBC service when the adapter service retrieves data from a database table with a Date column, the JDBC type is set to DATE, and the **Output Field Type** parameter is set to java.lang.String or SetAsString. When the parameter is set to `true`, the adapter services append the timestamp with milliseconds to the output. When the parameter is set to `false`, the default, the adapter services append the timestamp to the output without milliseconds.

watt.adapter.JDBC.DisableEmptyResult

Specifies whether Adapter for JDBC Custom SQL services and Dynamic SQL services return a document when the result set returned by the database is empty. When the parameter is set to `true`, the adapter services do not return an empty results document. When the parameter is set to `false`, the default, the adapter services return an empty results document.

watt.adapter.JDBC.StoredProcedure.customRSColNames

Specifies whether Adapter for JDBC supports the mapping of custom column names in the **Column Name** field to the result set in the Output signature of StoredProcedure and StoredProcedureWithSignature services. When the parameter is set to `true`, the default, the adapter supports the mapping of custom column names in the **Column Name** field. If the parameter is set to `false`, the adapter uses the standard values that match the result set in the Output signature of the StoredProcedure and StoredProcedureWithSignature service.

watt.adapter.JDBC.UsePlainString

Specifies whether Adapter for JDBC services return an exponential form of the column value retrieved from a database when using Java version 1.5 and higher. When the adapter services retrieve a column value of Decimal or Numeric JDBC Data Type and the **Output Field Type** is defined as java.lang.String, the output returned may sometimes be in exponential form. The output returned is the String obtained by invoking the BigDecimal.toString() method. Due to changes in the behavior of BigDecimal.toString in Java 5, BigDecimal.toString() now returns exponential values in some cases. When the watt.adapter.JDBC.UsePlainString parameter is set to `true`, Adapter for JDBC invokes the toPlainString() method and returns the non-exponential form in all cases. When the parameter is set to `false`, the default, the adapter invokes the toString() method, and returns the exponential form if needed.

watt.adapter.JDBC.notification.useBaseNameAsPrefix

Enables users to customize the names of notification resources. Set the parameter to *true* to use the **Base Name** provided in the notification as a prefix to notification resources like buffer table, sequence, and trigger. The default values if *false*. The parameter is applicable to the SAP HANA database only.

watt.adapter.JDBC.timezone.useGMT

Specifies whether Adapter for JDBC OData services retrieve, insert, and update time values in GMT or local timezone. If the parameter is set to *true*, then the time values are retrieved, inserted, and updated in GMT. The default value is *false*.

E JDBC Driver Specific Properties

Apache Cassandra

webMethods BigData Driver for Apache Cassandra

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION	`wm.jdbcx.cassandra.CassandraDataSource40`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`transactionmode`	To enable LOCAL_TRANSACTION: `transactionmode=ignore` **Note:** LOCAL_TRANSACTION connections are not supported.
`SchemaDefinition`	To work with an operating system other than Windows: `SchemaDefinition=<Valid file path>`
`REFRESH SCHEMA`	Use `REFRESH SCHEMA` in SQL statement to add newly discovered objects to your relational view of native data type.

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
webMethods BigData Driver for Apache Cassandra	No	No	No	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
webMethods BigData Driver for Apache Cassandra	Apache Cassandra	This driver does not support: 1. Services: UpdateSQL, BatchInsertSQL, BatchUpdateSQL, StoredProcedure, StoredProcedureWithSignature 2. Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, StoredProcedureNotifications, StoredProcedureNotificationsWithSignature, and OrderedNotifications 3. LOCAL_TRANSACTION and XA_TRANSACTION connections

Apache Hive

webMethods BigData Driver for Apache Hive

DataSource

Transaction Type	DataSource Class

NO_TRANSACTION, LOCAL_TRANSACTION	`wm.jdbcx.hive.HiveDataSource40`
	
	-OR-
	
	`wm.jdbcx.hive.HiveDataSource`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`transactionmode`	To enable LOCAL_TRANSACTION connections: `transactionmode=ignore`

Parameter	Description
	Note: LOCAL_TRANSACTION connections are not supported.

Kerberos Authentication

- Add the login module in *Integration Server_directory*\instances\<*instance_name*>\config\is_jaas.cnf file. The is_jaas.cnf file is provided by Integration Server and located in *Integration Server_directory*\instances\<*instance_name*>\config directory.

  Example of a login module configuration file:

  ```
  JDBC_DRIVER_01
  {com.sun.security.auth.module.Krb5LoginModule required
  useKeyTab=true keyTab="C:/SoftwareAG/Temp/user_xxx.keytab"
  principal="user_xxx/gbs.windmill.local@CLOUDERA.COM"
  doNotPrompt=true;
  };
  ```

- Configure the krb5.conf file in Integration Server Administrator. For more information, see "Kerberos Authentication" on page 77.

- Specify the Kerberos authentication parameters in the **Other Properties** field in the following format:

  ```
  authenticationMethod=kerberos;servicePrincipalName=<Service_Principal_Name>
  ```

  For example:

  ```
  authenticationMethod=kerberos;servicePrincipalName=hive/gbs.windmill.local@CLOUDERA.COM
  ```

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
webMethods BigData Driver for Apache Hive	No	No	No	No	No	No

Cloudera Hive JDBC Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	com.cloudera.hive.jdbc41.HS2DataSource

Kerberos Authentication

- Add the login module in *Integration Server_directory*`\instances\<`*instance_name*`>\config\is_jaas.cnf` file. The `is_jaas.cnf` file is provided by Integration Server and located in *Integration Server_directory*`\instances\<`*instance_name*`>\config` directory.

  Example of a login module configuration file:

```
Client
{com.sun.security.auth.module.Krb5LoginModule required
useKeyTab=true keyTab="C:/SoftwareAG/Temp/user_xxx.keytab"
principal="user_xxx/gbs.windmill.local@CLOUDERA.COM"
doNotPrompt=true;
};
```

- Configure the `krb5.conf` file in Integration Server Administrator. For more information, see "Kerberos Authentication" on page 77.

- Specify the Kerberos authentication parameters in the **Other Properties** field in the following format:

```
url={jdbc:hive2://<hostname>:portnumber/databasename;
AuthMech=1;
KrbRealm=<Kerberos_Realm_Name>;
KrbHostFQDN=<Kerberos_FQDN>;
KrbServiceName=<Kerberos_Service_Name>;
KrbAuthType=1}
```

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Cloudera Hive JDBC Driver	No	No	No	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
webMethods BigData Driver for Apache Hive	Apache Hive	This driver does not support: 1. Services: UpdateSQL, DeleteSQL, BatchInsertSQL, BatchUpdateSQL, StoredProcedure, StoredProcedureWithSignature.

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
		2. Notifications 3. XA_TRANSACTION connection

Apache Impala

Cloudera JDBC Driver 2.5 for Apache Impala

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION	For `ImpalaJDBC41.jar` JAR file: `com.cloudera.impala.jdbc41.DataSource`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`url`	Other database related properties are provided as part of the `url` values. `url={jdbc:impala://<hostname>:portnumber/databasename;AuthMech=1;SSL=SSL_value;UseSasl=UseSasl_value}` **Note:** The properties such as `AuthMech`, `SSL`, and `UseSasl` are required only for secured connections.

Kerberos Authentication

Specify the Kerberos authentication parameters in the **Other Properties** field in the following format:

```
url={jdbc:impala://<hostname>:portnumber/databasename;
AuthMech=1;
KrbRealm=<Kerberos_Realm_Name>;
KrbHostFQDN=<Kerberos_FQDN>;
KrbServiceName=<Kerberos_Service_Name>;
```

```
KrbAuthType=1}
```

For example:

```
url={jdbc:impala://gbs1.windmill.local:8443/default;
AuthMech=1;
KrbRealm=gbs_Realm.windmill.local;
KrbHostFQDN=gbs_FQDN.windmill.local;
KrbServiceName=impala;
KrbAuthType=1}
```

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Apache Impala Cloudera JDBC Driver 2.5	No	Yes	Yes	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
Cloudera JDBC Driver for Apache Impala	Apache Impala	■ Inserting and retrieving data works only on Current catalog and Current schema. ■ This driver does not support: 1. Services: UpdateSQL, DeleteSQL, BatchInsertSQL, BatchUpdateSQL, StoredProcedure, and StoredProcedureWithSignature 2. Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, StoredProcedureNotifications, StoredProcedureNotificationsWithSignature, and OrderedNotifications 3. LOCAL_TRANSACTION and XA_TRANSACTION connections

Apache SparkSQL

webMethods BigData Driver for Apache SparkSQL

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.wm.jdbcx.sparksql.SparkSQLDataSource`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`transactionmode`	To enable LOCAL_TRANSACTION connection: `transactionmode=ignore`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
webMethods BigData Driver for Apache SparkSQL	No	No	No	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
webMethods BigData Driver for Apache SparkSQL	Apache SparkSQL	This driver does not support: 1. Services: StoredProcedure, StoredProcedureWithSignature, UpdateSQL, BatchInsertSQL, BatchUpdateSQL, DeleteSQL

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
		2. Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, StoredProcedureNotifications, StoredProcedureNotificationsWithSignature, and OrderedNotifications 3. XA_TRANSACTION connections

Databricks

Simba Apache Spark JDBC Connector

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION	For `SparkJDBC42.jar` JAR file: `com.simba.spark.jdbc.DataSource`

Other Properties

Specify the server URL and the user credentials in the **Other Properties** field:

Parameter	Description

`url`	URL for Simba Apache Spark JDBC Connector. For format:
	`url={`
	`jdbc:spark://hostname:portnumber/databasename;`
	`TransportMode=TransportMode_value;`
	`SSL=SSL_value;AuthMech=AuthMech_value;`
	`httpPath=httpPath_value};`
	`userId=userId_value`
	
	Note:
	The properties such as AuthMech, and SSL are required only for secured connections.

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Simba Apache Spark JDBC Connector 2.6.22	No	No	Yes	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
Simba Apache Spark JDBC Connector	All platforms	This driver does not support: 1. Services: BatchInsertSQL, BatchUpdateSQL, StoredProcedure, StoredProcedureWithSignature 2. Notifications 3. LOCAL_TRANSACTION and XA_TRANSACTION connections

DB2

JTOpen v4.1 Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.ibm.as400.access.AS400JDBCDataSource`
XA_TRANSACTION	`com.ibm.as400.access.AS400JDBCXADataSource`

Transaction Isolation Level Setting

Specify the transaction isolation level properties in the **Other Properties** field:

Parameter	Description

`TransactionIsolation`	If you are accessing a table with the `<current catalog>.<current schema>` qualifier, set the transaction isolation level and also specify the `Libraries` property.
	`TransactionIsolation=none;`
	Example of `TransactionIsolation` and `Libraries`:
	`TransactionIsolation=none;Libraries=QGPL`

`Libraries`	If you are specifying the transaction isolation level, you must specify the `Libraries` property as shown: `Libraries=QGPL;`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description

`clischema`	Use the `clischema` property to enable or disable adapter polling notifications when the systriggers view is not in the default schema. For example:
	`clischema=schema_name`
	For example, if you specify `clischema=QSYS2`, when enabling or disabling a notification, the adapter issues the following query:
	`SELECT trigger_name FROM QSYS2.systriggers`

`metadatasource`	Use the `metadatasource` property if the StoredProcedure adapter service calls a stored procedure with a procedure name that is different from its specific name. For example: `metadatasource=1`

Required Connection Property Fields

Driver	Server Name	User	Password	Database Name	Port Number	Network Protocol
JTOpen v4.1 for DB2 for AS/400 v4r5, v5r1, v5r2, v5r3, and v5r4	Yes	Yes	Yes	No	No	No

DB2 Net Type 3 Driver

Transaction Isolation Level Setting

Specify the transaction isolation level properties in the **Other Properties** field:

Parameter	Description
`TransactionIsolation`	Non-repeatable read does not function when you set the transaction isolation level to `2`. `TransactionIsolation=2;`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`clischema`	Use the `clischema` property to enable an adapter polling notification if the triggers for the notification already exist. ■ You must create a systriggers view in the sysibm.systriggers table. ■ Specify the schema in which the view was created against the `clischema` property. Thus the adapter redirects the query for triggers to the appropriate schema. For example: `clischema=schema_name`

Required Connection Property Fields

Driver	Server Name	User	Password	Database Name	Port Number	Network Protocol
DB2 Net Type 3 for OS/390 V6 and V7	Yes	Yes	Yes	Yes	Yes	No
DB2 Net Type 3 for UDB V7.2 and V8.1	Yes	Yes	Yes	Yes	Yes	No

Note:
The DB2 net type 3 driver property **portNumber** is the same as the DB2 JDBC Applet server's port number. The default is `6789`.

DB2 Universal Type 2

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.ibm.db2.jcc.DB2SimpleDataSource`
XA_TRANSACTION	`com.ibm.db2.jcc.DB2XADataSource`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`driverType`	Required. `driverType=2`
`readOnly`	Creates a read only connection. `readOnly=true`
`currentSchema`	Specifies the default schema name used to qualify unqualified database objects in dynamically prepared SQL statements. `currentSchema=YourSchemaName`
`loginTimeout`	Maximum time in seconds to wait for the DataSource object to connect to a data source. `loginTimeout=number`

Required Connection Property Fields

Driver	Server Name	User	Password	Database Name	Port Number	Network Protocol
DB2 Universal Type 2 for UDB 8.1, 9.1, and 9.5	Yes	Yes	Yes	Yes	Yes	No

DB2 Universal Type 4

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.ibm.db2.jcc.DB2SimpleDataSource`
XA_TRANSACTION	`com.ibm.db2.jcc.DB2XADataSource`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`driverType`	Required. If the `driverType` is not set to `4`, then Type 2 connectivity is selected by default. `driverType=4`
`readOnly`	Creates a read only connection. `readOnly=true`
`currentSchema`	Specifies the default schema name used to qualify unqualified database objects in dynamically prepared SQL statements. `currentSchema=`*`YourSchemaName`*
`loginTimeout`	Maximum time in seconds to wait for the DataSource object to connect to a data source. `loginTimeout=`*`number`*
`traceFile`	Specifies the name of a file into which this driver writes the trace information. `traceFile=`*`fileName`*
`traceFileAppend`	Appends, instead of overwriting, the file that is specified by the `traceFile` property. `traceFileAppend=true`
`traceLevel`	Specifies the level to trace. `traceLevel=`*`number`* The value of *number* is set to the following integer value: ■ `-1` to TRACE_ALL.

Parameter	Description
	■ 2 to TRACE_STATEMENT_CALLS. For more information, see your vendor's driver documentation.

Required Connection Property Fields

Driver	Server Name	User	Password	Database Name	Port Number	Network Protocol
DB2 Universal Type 4 for UDB 7.2, 8.1, 9.1, and 9.5	Yes	Yes	Yes	Yes	Yes	No

DataDirect Connect

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION and XA_TRANSACTION	`com.wm.dd.jdbcx.db2.DB2DataSource.class`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`PackageName`	Name of the package you created earlier in the database. `PackageName=Package_Name_Value` For information about creating packages, see your DataDirect Connect for JDBC documentation. **Note:** Applicable to all **DataDirect Connect for JDBC 3.2 for DB2 UDB 7.2, 8.1, 9.1, and 9.5**

Required Connection Property Fields

Driver	Server Name	User	Password	Database Name	Port Number	Network Protocol
DataDirect Connect for JDBC 3.2 for UDB 7.2 and 8.1	Yes	Yes	Yes	Yes	Yes	No

DB2 App Type 2

Required Connection Property Fields

Driver	Server Name	User	Password	Database Name	Port Number	Network Protocol
DB2 App Type 2 for UDB V7.2 and V8.1	No	Yes	Yes	Yes	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
JT400 versions lower than 6.0	DB2 for AS/400 (all versions)	StoredProcedureWithSignature adapter services cannot operate on a DB2 for AS/400 database when: ■ A stored procedure has a stored procedure name that is different from its specific name. ■ Two stored procedures exist with the same procedure name but with different specific names.
DB2 Net Type 3 Driver	DB2 7 on OS/390	■ If you attempt to insert 20k or more records, either the system stops responding or you will receive a timeout error. ■ StoredProcedureWithSignature services and StoredProcedureNotificationWithSignature notifications are supported only on DB2 for OS/390 V6. Instead, you

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
		can use the StoredProcedure service or StoredProcedure Notification.
DB2 Net Type 3 Driver	DB2 7.2 on OS/390	When configuring a Adapter for JDBC notification in Software AG Designer (**File > New > Adapter Notification**), the Base Name you specify on the **Notification Configure** tab must be no more than 5 characters because triggers on OS/390 name cannot be more than 8 characters.
DB2 Net Type 3 Driver	DB2 on OS/390	Using a SelectSQL service, you cannot select a large volume of data (20k) using the CLOB data type.
DB2 Net Type 3 Driver	UDB 7.2	■ The driver does not write to the JDBC log, even when the log option is enabled. The workaround is to create an empty log file. To do this, use Integration Server Administrator and select **Settings > Extended > Edit Extended Settings** and type: `watt.adapter.JDBC.JDBCLogFile= c:\log.txt` ■ If you run a BatchUpdateSQL service that has no records that match your search criteria, you will receive an error; you must have at least one record that matches the criteria to execute successfully.
DB2 Net Type 3 Driver	UDB 8.1	No error message is issued when inserting a string that is larger than the size of the column defined for CHAR(N) or VARCHAR(N).
DB2 Net Type 3 Driver	UDB 7.2 and UDB 8.1	StoredProcedure and StoredProcedureWithSignature adapter services, and StoredProcedure and StoredProcdeureNotificationWithSignature adapter notifications do not display functions in the **Procedure Name** field. The workaround is to use the StoredProcedure service or the StoredProcedureNotification and type the function name in the **Procedure Name** field.
DB2 Net Type 3 Driver	UDB 9.1	The DB2 database system does not support the type 3 driver.
DB2 Universal Type 4	UDB 8.x	■ Does not support XA transactions for versions earlier than UDB 8.2. Instead, use the Universal type 2 driver if you

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
		need XA_TRANSACTION support in versions earlier than UDB 8.2. ■ White space characters are not removed from the SQL statements entered in the SQL textbox for CustomSQL or DynamicSQL services. This driver passes the SQL statements to the server exactly as entered. Ensure that the SQL you enter has no extraneous white space characters, such as new lines or tabs.
DB2 Universal Type 4	DB2 6 and DB2 7 on OS/390	Insert, Delete, Update, Basic, and Ordered Notifications cannot be enabled if the source table contains CHAR, VARCHAR, or LONG VARCHAR columns.
DataDirect Connect for JDBC 3.2	DB2 UDB 7.2	■ Does not support the BLOB data types. If you try to select data from a table that has BLOB data types, you receive the following message: **[DataDirect][DB2 JDBC Driver][DB2]AN UNSUPPORTED SQLTYPE WAS ENCOUNTERED IN POSITION 2 ON A PREPARE OR DESCRIBE OPERATION.** **Note:** This driver supports BLOB data types using OS/390 or DB2 iSeries V5R2. ■ Driver does not support XA_TRANSACTIONS using Java Transaction API (JTA). Instead, use UDB 8.1. ■ Cannot insert into a BLOB column type if you use byte array as the Input Field Type. The workaround is to use the IBM drivers (DB2 app type 2 or DB2 net type 3).
DataDirect Connect for JDBC 3.2	DB2 UDB 7.2 and UDB 8.1	■ Cannot use the CLOB data type in the OUT parameter in StoredProcedure services. You receive the following message: **[DataDirect][DB2 JDBC Driver][DB2]DATA TYPE/LENGTH/VALUE OF ARGUMENT 1 OF CLOBSP1 IS INVALID.**

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
		The CallableStatement.getClob() does not work; instead, use the IBM driver versions (DB2 app type 2 or DB2 net type 3). ■ Cannot run a StoredProcedure service using BLOB and CLOB data types (java.sql.Blob or java.sql.Clob) as the IN parameter. Instead, use an IBM driver (DB2 app type 2 or DB2 net type 3) with UDB 8.1 to work with IN, OUT LOB parameters.
DB2 JDBC App Type 2	Linux	Cannot enable XA_TRANSACTION connections.
DB2 JDBC App Type 2	AIX5.1	Cannot enable XA_TRANSACTION connections.
DB2 JDBC App Type 2	UDB DB2 8.1/Oracle Solaris	Cannot run a SelectSQL adapter service with table names that use special characters. Note that you can do so if you use a Microsoft Windows NT operating system and a JDBC app (type 2) driver.
DB2 JDBC App Type 2	UDB DB2 7.2	If a Stored Procedure Notification has been enabled for long periods of time, the following message is posted: **[IBM][CLI Driver][DB2/] SQL1131N DARI (Stored Procedure) process has been terminated abnormally is posted. SQLSTATE=38503**
DB2 JDBC App Type 2	UDB DB2 8.1	No error message is issued when inserting a string that is larger than the size of the column defined for CHAR(N) or VARCHAR(N).
DB2 JDBC App Type 2	UDB DB2 8.1 on AIX5.1	Integration Server crashes if the database is shut down while executing an InsertSQL adapter service using an XA_TRANSACTION connection.
DB2 JDBC App Type 2	UDB DB2 7.2 and UDB 8.1	StoredProcedure and StoredProcedureWithSignature adapter services, and StoredProcedure and StoredProcdeureNotificationWithSignature adapter notifications do not display functions in the **Procedure Name** field. The workaround is to use the StoredProcedure service or the StoredProcedureNotification and type the function name in the **Procedure Name** field.

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
DB2 JDBC App Type 2	UDB DB2 9.1	The support for DB2 JDBC App Type 2 driver is deprecated.

Google Cloud Spanner

Google Cloud Spanner Open-Source JDBC Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.google.cloud.spanner.jdbc.JdbcDataSource`

Other Properties

Specify the server URL and the user credentials in the **Other Properties** field:

Parameter	Description

`url`	URL for Google Cloud Spanner database. Format for user credentials:
	`Relative path to the credentials=<path to service account credential json file>`
	For example:
	`url=jdbc:cloudspanner:/projects/<project id>/ instances/<instance id>/databases/<database name>;`
	For more information on Google Cloud Spanner connection properties, see Google Cloud Spanner open-source JDBC driver documentation.

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Google Cloud Spanner Open-Source JDBC Driver	No	No	No	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
Google Cloud Spanner Open-Source JDBC Driver	Google Cloud Spanner	This driver does not support: ■ Services: StoredProcedure, StoredProcedureWithSignature. ■ Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, StoredProcedureNotifications, StoredProcedureNotificationsWithSignature, OrderedNotifications. ■ XA_TRANSACTION connections. ■ DDL statements in LOCAL_TRANSACTION

Informix

Informix JDBC Driver Type 4

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.informix.jdbcx.IfxDataSource` **Note:** If you use the com.informix.jdbcx.IfxDataSource DataSource class with Integration Server, you must disable the WmTomcat package. Be

Transaction Type	DataSource Class
	aware that disabling the WmTomcat package also disables support for any JSPs. For general information about setting dependencies, see "Adapter for JDBC Package Management" on page 56. For more detailed information see *Software AG Designer Online Help* for your release.
XA_TRANSACTION	`com.informix.jdbcx.IfxXADataSource`

Transaction Isolation Level Setting

Specify the transaction isolation level properties in the **Other Properties** field:

Parameter	Description
`TransactionIsolation`	Phantom read does not function when you set the transaction isolation level to `4`. For example: `TransactionIsolation=4;`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`IfxIFXHOST`	Machine name of the database server. Applicable for all transaction types. `IfxIFXHOST=`*`hostname`*

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Informix JDBC 2.21 Type 4 for Informix v. 7.31 and 9.x	Yes	Yes	Yes	Yes	Yes	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
Informix Driver for JDBC Version 2.21 type 4	Informix 7.31 and 9.x	■ This driver does not support multiple results sets. If you configure the adapter to use multiple result sets, all the rows in the result will be stored in the first Result Set you specified when you configured the adapter. ■ With Informix 9.3 and 9.4 using XA_TRANSACTION, you cannot update LONGVARCHAR data type columns with a null value. ■ With Informix 9.3 and 9.4 using XA_TRANSACTION, you cannot update BOOLEAN data type columns with a NOT NULL value.

MariaDB

MariaDB Connector/J Type 4 JDBC Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION and XA_TRANSACTION	`org.mariadb.jdbc.MySQLDataSource` `org.mariadb.jdbc.MariaDbDataSource`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
MariaDB Connector/J Type 4 JDBC Driver	No	No	No	No	No	No

MongoDB

webMethods BigData Driver for MongoDB

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`wm.jdbcx.mongodb.MongoDBDataSource40`

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`transactionmode`	To enable LOCAL_TRANSACTION: `transactionmode=ignore`
`SchemaDefinition`	To work with an operating system other than Windows: `SchemaDefinition=<Valid_File_Path>`
`REFRESH SCHEMA`	Use `REFRESH SCHEMA` in SQL statement to add newly discovered objects to your relational view of native data type.

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
webMethods BigData Driver for MongoDB	No	No	No	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
webMethods BigData Driver for MongoDB	MongoDB for all supported databases	This driver does not support: 1. Services: StoredProcedure

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
		2. Notifications 3. XA_TRANSACTION connections **Note:** MongoDB database supports WiredTiger storage engine.

Microsoft SQL

Microsoft JDBC Driver for SQL Server

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.microsoft.sqlserver.jdbc.SQLServerDataSource`
XA_TRANSACTION	`com.microsoft.sqlserver.jdbc.SQLServerXADataSource`

SSL Settings

Specify the SSL parameters in the **Other Properties** field in the following format:

```
encrypt=value;
trustStore=Truststore path;
trustStorePassword=Truststore password
```

- `encrypt` value is `true` or `false` depending on the encryption settings in the Microsoft SQL server.
- `trustStore` value is the path of the trusted certificate store.
- `trustStorePassword` value is the password used to protect the TrustStore data.

Note:
If you have configured SSL connections between Adapter for JDBC and Microsoft SQL Server, enter the TCPS port number of the Microsoft SQL Server.

Kerberos Authentication

Specify the Kerberos authentication parameters in the **Other Properties** field in the following format:

```
integratedSecurity=true;
authenticationScheme=NativeAuthentication
```

- NativeAuthentication is specific to the Windows platform and uses the following files:
  - The library `sqljdbc_auth.dll` for Microsoft JDBC driver version 7 or earlier.
  - The library `mssql-jdbc_auth-x.x.x.xxx.dll` for Microsoft JDBC driver version 8 or later.
- For Windows 32 or Windows 64, copy the appropriate library (`sqljdbc_auth.dll` or `mssql-jdbc_auth-x.x.x.xxx.dll`) to *Integration Server_directory*`\instances\`*instance_name*`\lib` directory.

Authentication

The user name and password you configure for a connection must be the same as those used to create the tables you use with a specific notification. Otherwise, an exception is generated at runtime.

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`selectMethod`	For XA_TRANSACTION only: `selectMethod=cursor`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Microsoft JDBC Driver Version 2.2.0019 for Microsoft SQL Server 2000	Yes	Yes	Yes	No	Yes	No
Microsoft JDBC Driver Version 1.0.809.102 for Microsoft SQL Server 2005	Yes	Yes	Yes	No	Yes	No

DataDirect Connect

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION , LOCAL_TRANSACTION and XA_TRANSACTION	`com.wm.dd.jdbcx.sqlserver.SQLServerDataSource`

JDBC Jars

Based on your Microsoft SQL Server architecture, use the required DLL and stored procedure folder found in `dd-cjdbc.jar` file. For details, see DataDirect Connect documentation.

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
DataDirect Connect for JDBC with Microsoft SQL Server 7	Yes	Yes	Yes	No	Yes	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
Microsoft JDBC Driver Version 2.2.0019 for Microsoft SQL Server 2000	Microsoft SQL Server 2000	■ When running the SelectSQL adapter service using the "not null real" type, the following error appears: **Value cannot be converted to requested type.** This is a driver issue for both the DataDirect Connect for JDBC and the Microsoft SQL Server 2000 Driver for JDBC. ■ This driver does not support retrieving table names from a database when the database's name contains special characters.

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
		■ This driver must have Oracle's JDK 1.3 package javax.sql.* in the Integration Server CLASSPATH before you can enable the adapter connection. If this package is missing, the following error appears: **unable to configure connection manager javax/sql/DataSource.**
Microsoft JDBC Driver Version 1.0.809.102 for Microsoft SQL Server 2005	Microsoft SQL Server 2005	■ This driver returns incorrect data type TEXT, IMAGE, and NTEXT for MS SQL data types VARCHAR(max), VARBINARY(max) and NVARCHAR(max) respectively. ■ This driver returns invalid JDBC data type for MS SQL UNIQUEIDENTIFIER data type.
DataDirect Connect	Microsoft SQL Server 2000	■ When running the SelectSQL adapter service using the "not null real" type, the following error appears: **Value cannot be converted to requested type.**

MySQL

JDBC Type 4 Driver for MySQL

DataSource

Transaction Type	DataSource Class

NO_TRANSACTION, LOCAL_TRANSACTION	`com.mysql.jdbc.jdbc2.optional.MysqlDataSource`
	For driver version 8.0.15 and later, use the following:
	`com.mysql.cj.jdbc.MysqlDataSource`

XA_TRANSACTION	`com.mysql.jdbc.jdbc2.optional.MysqlXADataSource`
	For driver version 8.0.15 and later, use the following:
	`com.mysql.cj.jdbc.MysqlXADataSource`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
JDBC Type 4 Driver for MySQL	Yes	Yes	Yes	Yes	Yes	No

Oracle

Oracle JDBC OCI Driver

Setting the Environment Variable for Oracle JDBC OCI Drivers

For Oracle JDBC OCI drivers, you must perform the following:

- Set the following environment variable before you configure the connection.

Platform	Environment Variable Setting
Solaris*	`LD_LIBRARY_PATH=/ORACLE_HOME/lib`
HP*	`SHLIB_PATH=/ORACLE_HOME/lib`
AIX*	`LIBPATH=/ORACLE_HOME/lib`
Linux	`LD_LIBRARY_PATH=/ORACLE_HOME/lib`

- Check that the OCI client is configured correctly before you proceed.

Note:
*If you are using Oracle 920 JDBC driver files with an Oracle 920 client to connect to different Oracle database versions, set the environment variable for your platform to `/ORACLE_HOME/lib32`.

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`oracle.jdbc.pool.OracleDataSource`
XA_TRANSACTION	`oracle.jdbc.xa.client.OracleXADataSource`

Driver Type Setting

Specify the parameters in the **Other Properties** field:

Parameter	Description

`driverType`	For **Oracle JDBC OCI Driver version 8i**:
	`driverType=oci8`
	For **Oracle JDBC OCI Driver version 9i**:
	`driverType=oci`

Other transaction type settings

- Adapter for JDBC supports the Oracle RAC TAF facility which provides failover support for Oracle v.9.2.x using an OCI driver. Under these circumstances you must use LOCAL_TRANSACTION connections.

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Oracle JDBC OCI Driver	Yes	Yes	Yes	Yes	Yes	Yes

Oracle JDBC Thin Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`oracle.jdbc.pool.OracleDataSource`
XA_TRANSACTION	`oracle.jdbc.xa.client.OracleXADataSource`

Driver Type Setting

Specify the driver-dependent parameters based on the JDBC driver and the transaction type that the connection is using in the **Other Properties** field:

Parameter	Description
`driverType`	For example: `driverType=thin`

Kerberos Authentication

Specify the Kerberos authentication parameters in the **Other Properties** field in the following format:

```
connectionProperties={
oracle.net.authentication_services=(KERBEROS5),
oracle.net.kerberos5_mutual_authentication=true,
oracle.net.kerberos5_cc_name=<kerberoscache_file_path>}
```

where <*kerberoscache_file_path*> is the path to the file that has the stored ticket.

Synonym Support

Specify the following property to enable synonym support in the **Other Properties** field:

```
connectionproperties={includeSynonyms=true}
```

SSL Setting

- If you have configured SSL connections between Adapter for JDBC and Oracle server, enter the TCPS port number of the Oracle server.
- If you have configured SSL connections between Adapter for JDBC and Oracle server, enter `tcp` or `tcps` in the **Network Protocol** field.
- If you have configured SSL connections between Adapter for JDBC and Oracle server, set the truststore alias name in the `watt.server.ssl.trustStoreAlias` property.
  - In Integration Server Administrator, select **Settings** > **Extended**.
  - Set the property, `watt.server.ssl.trustStoreAlias` to the truststore alias name created in Integration Server. Add the watt property if it does not exist.
- For information on creating truststore aliases, refer to the *webMethods Integration Server Administrator's Guide*.

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Oracle JDBC Thin Driver	Yes	Yes	Yes	Yes	Yes	No

DataDirect Connect

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION and XA_TRANSACTION	`com.wm.dd.jdbcx.oracle.OracleDataSource`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
DataDirect Connect	No	No	No	No	No	No

Oracle Autonomous JDBC Thin Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`oracle.jdbc.pool.OracleDataSource`
XA_TRANSACTION	`oracle.jdbc.xa.client.OracleXADataSource`

Driver Type Setting

Specify the driver-dependent parameters based on the JDBC driver and the transaction type that the connection is using in the **Other Properties** field:

Parameter	Description
`driverType`	For example: `driverType=thin`

Other Properties

Specify the following properties in the **Other Properties** field:

Parameter	Description
`retry_count`	Number of times to retry after the initial attempt fails. For example: `(retry_count=20)`
`retry_delay`	Time (milliseconds) to delay the retry. For example: `(retry_delay=3)`
`service_name`	Name of the service to run. For example: `(service_name=xxx.adb.oraclecloud.com)`
`ssl_server_dn_match`	Flag to indicate if the SSL Server DN is a match. Possible values are: ■ `yes` ■ `no`. Default. For example: `(ssl_server_dn_match=yes)`
`TNS_ADMIN`	Path to autonomous wallet. An autonomous wallet is an encrypted file containing certificates and/or database credentials, such as username and password used to connect to the Oracle Database. Autonomous wallet prevents specifying usernames and passwords in a shell script or in an application database configuration file. For example: `TNS_ADMIN="C:\\XXX\\Wallet_XXXX"`

For example:

```
url=jdbc:oracle:thin:@(description=(retry_count=20)(retry_delay=3)
(address=(protocol=tcps)(port=1522)(host=adb.aaa-xxx.oraclecloud.com))
(connect_data=(service_name=sss.adb.oraclecloud.com))
(security=(ssl_server_dn_match=yes)))?TNS_ADMIN="C:\\XXX\\Wallet_XXXX"
```

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Oracle Autonomous JDBC Thin Driver	Yes	Yes	Yes	Yes	Yes	Yes
	Retry Count	**Retry Delay**	**Service Name**	**Database Name**	**SSL Server DNS Match**	**TNS ADMIN**
	Yes	Yes	Yes	Yes	Yes	Yes

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
■ Oracle JDBC OCI Driver ■ Oracle JDBC Thin Driver	All supported Oracle databases	■ The NUMBER and NUMBER(n,m) Oracle data types map to java.math.BigDecimal in all the adapter services by default. ■ BLOB and CLOB data types cannot be used in a table definition when configuring the adapter notifications.
■ Oracle JDBC OCI Driver	Oracle 8.0.5	■ When mapping a date data type to java.util.Date using the InsertSQL adapter service, you receive the following error: **ORA-1024 Invalid data type in OCI call.** As a workaround, map the date to java.sql.Timestamp. ■ When connecting to an Oracle 8.0.5 server using the OCI driver and trying to Insert BLOB and CLOB data types, you receive the following error: **ORA-01461: can bind a LONG value only for insert into a LONG column.**
■ Oracle JDBC OCI Driver ■ Oracle JDBC Thin Driver	HP-UX 11i	Be sure to apply the HP-UX 11i Quality Pack (June 2002) and the PHSS_26138 on HP-UX 11i before configuring the adapter connection using an OCI driver; otherwise, you receive the following error: **Unresolved symbol :gethrtime (code).**
■ Oracle JDBC OCI Driver ■ Oracle JDBC Thin Driver	HP-UX	If all the adapter notifications are enabled for more than 18 hours, you receive the following error: **OCI-21503: program terminated by fatal error OCI-04030: out of process memory when trying to allocate 20056 bytes.**

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
■ Oracle JDBC OCI Driver classes12 ■ Oracle 8i, 9i, 10g, and 11g JDBC Thin Driver	All supported Oracle databases	StoredProcedureWithSignature services and StoredProcedureNotificationWithSignature notifications do not work with Stored Procedures containing a parameter of type Oracle Cursor, when the ref cursor is declared as a cursor type that is defined as a strong type with the %ROWTYPE attribute. The workaround is to define the ref cursor as a weak type.
■ Oracle JDBC Thin Driver 9.0.1 (Mac OS) ■ Oracle JDBC OCI Driver ■ Oracle JDBC Thin Driver (all other OSs) ■ DataDirect driver shipped with Host Integration Server	Oracle 10g	With Oracle Database 10g, you cannot configure adapter services or notifications with BINARY_DOUBLE or BINARY_FLOAT databases using the Adapter Service Editor. In these cases, if you try to insert a row, the corresponding JDBC data type does not appear in the Adapter Service Editor. As an alternative, use the CustomSQL adapter service when configuring services involving these data types.

PostgreSQL

Advanced Server JDBC Connector Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.edb.ds.PGSimpleDataSource`
XA_TRANSACTION	`com.edb.xa.PGXADataSource`

Driver JAR

Use the `edb-jdbc16.jar` driver JAR for Advanced Server JDBC Connector.

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Advanced Server JDBC Connector Driver	Yes	Yes	Yes	Yes	Yes	No

PostgreSQL JDBC Driver

DataSource

Driver jar: for PostgreSQL

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`org.postgresql.ds.PGSimpleDataSource`
XA_TRANSACTION	`org.postgresql.xa.PGXADataSource`

Driver JAR

Use the `postgresql-42.2.2.jar` driver JAR for PostgreSQL JDBC Driver.

Other Properties

Specify the parameters in the **Other Properties** field:

Parameter	Description
`postgresql.casesensitive`	Enclose the table names, column names, and procedure names in quotes if the values are in upper case or camel case. Possible values are: ■ `true`. Default. The table names, column names, and procedure names are enclosed in quotes if the values are in upper case or camel case. ■ `false`. The table names, column names, and procedure names are not enclosed in quotes if the values are in upper case or camel case. For example: `postgresql.casesensitive=true`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
PostgreSQL JDBC Driver	No	No	No	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
Advanced Server JDBC Connector Driver	Postgres Plus Advanced Server 9.0/ Any supported operating system	This driver does not support Query timeout.
PostgreSQL JDBC Driver	PostgreSQL	This driver does not support: 1. Services: StoredProcedure, StoredProcedureWithSignature 2. Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, StoredProcedureNotifications, StoredProcedureNotificationsWithSignature, and OrderedNotifications

SAP HANA

SAP HANA Driver for JDBC

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.sap.db.jdbcext.DataSourceSAP`
XA_TRANSACTION	`com.sap.db.jdbcext.XADataSourceSAP`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
SAP HANA JDBC Driver	Yes	Yes	Yes	No	Yes	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
SAP HANA JDBC driver	All supported databases	This driver does not support: ■ XA_TRANSACTION except for ngdbc JAR file of version 2. ■ Metadata lookup for ARRAY data type. Only CustomSQL and DynamicSQL services can be used to perform operations using these data types. ■ The WHEN tab in InsertNotification, UpdateNotification, DeleteNotification, and OrderedNotification because SAP HANA trigger definition does not support the WHEN clause. ■ StoredProcedure, StoredProcedureWithSignature, StoredProcedureNotification and StoredProcedureNotificationWithSignature do not support ResultSet. ■ XA datasource class for StoredProcedure and StoredProcedureWithSignature adapter services with adapter connection.

Snowflake

JDBC Driver for Snowflake

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`net.snowflake.client.jdbc.SnowflakeBasicDataSource`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
JDBC Driver for Snowflake	No	No	No	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
JDBC Driver for Snowflake (snowflake-jdbc-3.9.1)	Snowflake 3.55.4	This driver does not support: 1. Services: StoredProcedure, StoredProcedureWithSignature 2. Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, StoredProcedureNotifications, StoredProcedureNotificationsWithSignature, OrderedNotifications 3. XA_TRANSACTION connections

Sybase

jCONNECT 5.5 Type 4 Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.sybase.jdbc2.jdbc.SybDataSource`
XA_TRANSACTION	`com.sybase.jdbc2.jdbc.SybXADataSource`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
jCONNECT 5.5 for Sybase v. 11.x, 12.x, and 15.x	Yes	Yes	Yes	Yes	Yes	No

jCONNECT 6.05 Type 4 Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.sybase.jdbc3.jdbc.SybDataSource`
XA_TRANSACTION	`com.sybase.jdbc3.jdbc.SybXADataSource`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
jCONNECT 6.05 type 4 for Sybase v. 11.x, 12.x, and 15.x	Yes	Yes	Yes	Yes	Yes	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
jCONNECT 5.5 and 6.05 Type 4	Sybase 11.x, 12.x, and 15.x	A Sybase column using a BIT data type does not allow NULL values due to driver behavior. This means that if you insert a `NULL` or `?` (variable) value when you run an InsertSQL service, the driver converts this column value to false and inserts the NULL value for the column into the database.
jConnect for 7.0 Type 4	Sybase 15.7	This driver does not support XA_TRANSACTION connections.
jConnect for 7.0 Type 4	Sybase 16.x	This driver does not support: 1. Services: StoredProcedure, StoredProcedureWithSignature. 2. Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, StoredProcedureNotifications, StoredProcedureNotificationsWithSignature, and OrderedNotifications
All driver types	All Sybase versions	The TEXT, IMAGE, and UNITEXT data types are not supported for all types of adapter notifications in Sybase.

Teradata

Teradata JDBC Type 4 Driver

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.ncr.teradata.TeraDataSource`

Transaction Isolation Level Setting

Specify the transaction isolation level properties in the **Other Properties** field:

Parameter	Description
`TransactionIsolation`	■ Dirty read does not function if you set the transaction isolation level to `1`. ■ Non-repeatable read and phantom read cannot be avoided even if you set the transaction isolation level to `8`. For example: `TransactionIsolation=Transaction_Isolation_Level;`

Other Properties

Specify the driver-dependent parameters based on the JDBC driver and the transaction type that the connection is using in the **Other Properties** field:

Parameter	Description
`DSName`	Teradata database server name. `DSName=value`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
Teradata Type 4 v03.04.00 (for V2R5 and V2R6)	No	Yes	Yes	No	No	No
Teradata Type 4 v12.00.00.01 (for R12.0)	No	Yes	Yes	Yes	No	No
Teradata Type 4 v13.00.00.20 (for R13.0, R13.10, and R14.0)	No	Yes	Yes	Yes	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
Teradata V2R5 (Type 4)	All supported databases	■ If you use the `@` character in a table or column name, you will receive the following syntax error:

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
		Expected something between the word 'SP$CHAR#TABLE' and '@'." while using in Insert service on Teradata. ■ This driver does not support: 1. Services: BatchInsertSQL, BatchUpdateSQL 2. Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, and OrderedNotifications 3. XA_TRANSACTION connections
Teradata V2R6, R12.0, R13.0, R13.10, and R14.0 (Type 4)	All supported databases	This driver does not support: 1. Services: BatchInsertSQL, BatchUpdateSQL 2. Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, and OrderedNotifications 3. XA_TRANSACTION connections

Tibero

JDBC Driver for Tibero

DataSource

Transaction Type	DataSource Class
NO_TRANSACTION, LOCAL_TRANSACTION	`com.tmax.tibero.jdbc.ext.TbConnectionPoolDataSource`
XA_TRANSACTION	`com.tmax.tibero.jdbc.ext.TbXADataSource`

Required Connection Property Fields

Driver Name	Server Name	User	Password	Database Name	Port Number	Network Protocol
JDBC Driver for Tibero	No	No	No	No	No	No

Limitations

Driver	Database/ Adapter IS Operating System/ Platform Affected	Limitation Description
JDBC Driver for Tibero 5 SP1	Tibero 5.1	This driver does not support the following: 1. Services: StoredProcedure, StoredProcedureWithSignature 2. Notifications: InsertNotifications, UpdateNotifications, DeleteNotifications, StoredProcedureNotifications, StoredProcedureNotificationsWithSignature, OrderedNotifications