IBM WebSphere Business Integration Adapters

# Adapter for iSeries User Guide

*Version 2.1.x*

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**Note!**

Before using this information and the product it supports, read the information in “Notices” on page 77.

**13September2005**

This edition of this document applies to connector version 2.1.x and to all subsequent releases and modifications until otherwise indicated in new editions.

# Contents

**About this document . . . v**
Audience . . . v
Related documents . . . v
Typographic conventions . . . vi

**New in this release . . . vii**
Version 2.1.x . . . vii
Version 2.0.x . . . vii
Prior versions . . . vii

**Chapter 1. Overview . . . 1**
An overview of the iSeries and AS/400 systems . . . 1
How the adapter works . . . 3

**Chapter 2. Installing the iSeries adapter . . . 5**
Adapter for iSeries environment . . . 5
Installing the iSeries adapter and related files . . . 7
Installed file structure . . . 7
Post installation tasks . . . 7

**Chapter 3. Configuring the iSeries adapter . . . 9**
Configuring the connector . . . 9

**Chapter 4. Understanding business objects for the connector . . . 29**
Defining connector metadata . . . 29
Overview of business object structure . . . 29
Business Object structure for RPG, COBOL, and Java programs . . . 30
Business Object structure for iSeries data queues . . . 34
Configuring meta objects for polling . . . 34
Specifying business object attribute properties . . . 36
Specifying business object attribute level application text . . . 36

**Chapter 5. Creating and modifying business objects . . . 39**
Overview of the ODA for iSeries . . . 39
Generating business object definitions . . . 39
Specifying business object information . . . 45
Uploading business objects . . . 47

**Chapter 6. Troubleshooting and error handling . . . 49**
Error handling . . . 49
Logging . . . 49
Tracing messages . . . 49

**Appendix. Standard configuration properties for connectors . . . 51**
New properties . . . 51
Standard connector properties overview . . . 51
Standard properties quick-reference . . . 53
Standard properties. . . . 59

**Index . . . 75**

**Notices . . . 77**
Programming interface information . . . 79

Trademarks and service marks . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 79

# About this document

The IBM$^{(R)}$ WebSphere$^{(R)}$ Business Integration Adapters portfolio supplies integration connectivity for leading e-business technologies, enterprise applications, legacy, and mainframe systems. The product set includes tools and templates for customizing, creating, and managing components for business process integration.

This document describes the installation, configuration, business object development, and troubleshooting for the IBM WebSphere Business Integration Adapter for iSeries$^{(TM)}$.

## Audience

This document is for WebSphere consultants and customers who are implementing the connector as part of a WebSphere business integration system. To use the information in this document, you should be knowledgeable in the following areas:

- Connector development
- Business object development
- OS/400 application architecture
- iSeries Integrated File System

## Related documents

The complete set of documentation available with this product describes the features and components common to all WebSphere Business Integration Adapters installations, and includes reference material on specific components.

You can install related documentation from the following sites:

For general adapter information; for using adapters with WebSphere message brokers (WebSphere MQ Integrator, WebSphere MQ Integrator Broker, WebSphere Business Integration Message Broker); and for using adapters with WebSphere Application Server, see the following Web site:

http://www.ibm.com/websphere/integration/wbiadapters/infocenter

For using adapters with InterChange Server:

http://www.ibm.com/websphere/integration/wicserver/infocenter

For more information about message brokers (WebSphere MQ Integrator Broker, WebSphere MQ Integrator, and WebSphere Business Integration Message Broker):

http://www.ibm.com/software/integration/mqfamily/library/manualsa/

For more information about WebSphere Application Server:

http://www.ibm.com/software/webservers/appserv/library.html

These sites contain simple directions for downloading, installing, and viewing the documentation.

For more information about JT400 and iSeries Access:

http://publib.boulder.ibm.com/pubs/html/as400/infocenter.html

**Note:** Important information about this product may be available in Technical Support Technotes and Flashes issued after this document was published. These can be found on the WebSphere Business Integration Support Web site,

http://www.ibm.com/software/integration/websphere/support/

Select the component area of interest and browse the Technotes and Flashes sections.

## Typographic conventions

This document uses the following conventions:

| | |
|---|---|
| `courier font` | Indicates a literal value, such as a command name, filename, information that you type, or information that the system prints on the screen. |
| **bold** | Indicates a new term the first time that it appears. |
| *italic*, *`italic`* | Indicates a variable name or a cross-reference. |
| *blue outline* | A blue outline, which is visible only when you view the manual online, indicates a cross-reference hyperlink. Click inside the outline to jump to the object of the reference. |
| `{ }` | In a syntax line, curly braces surround a set of options from which you must choose one and only one. |
| `[ ]` | In a syntax line, square brackets surround an optional parameter. |
| `...` | In a syntax line, ellipses indicate a repetition of the previous parameter. For example, `option[,...]` means that you can enter multiple, comma-separated options. |
| `< >` | In a naming convention, angle brackets surround individual elements of a name to distinguish them from each other, as in `<server_name><`*`connector_name`*`>tmp.log`. |
| `/, \` | In this document, backslashes (\) are used as the convention for directory paths. For UNIX installations, substitute slashes (/) for backslashes. All WebSphere business integration system product pathnames are relative to the directory where the product is installed on your system. |
| *`%text%`* and *`$text`* | Text within percent (%) signs indicates the value of the Windows `text` system variable or user variable. The equivalent notation in a UNIX environment is *`$text`*, indicating the value of the *`text`* UNIX environment variable. |
| *ProductDir* | Represents the directory where the product is installed. |

# New in this release

## Version 2.1.x

- iSeries ODA supports RPG and RPGLE source programs
- Support for AIX 5.3, Linux RedHat 3.0 Update 1, Linux SuSe 8.1 SP3, and Java Toolbox V5.3.0.6. For more information on hardware and software support, see "Adapter for iSeries environment" on page 5.
- Support for IBM Tivoli License Manager (ITLM)
- Adapter can now call .PGMs written in COBOL and JAVA. New verb ″CALLPGM″ has been added to support this function.
- Support for JVM 1.4.2
- Globalization support for iSeries adapter and ODA. The adapter and ODA will support G1 languages, but the ASI will not.

## Version 2.0.x

- Support for accessing data queues on iSeries
- Polling Support to monitor data queues. The adapter is now bi-directional. This means that the adapter supports both Event and Request Processing
- ODA facility for generating BO Specifications from RPG Source Programs and data queues on iSeries Machines
- Facility to call a particular RPG PGM multiple times using a single request BO. The BO can now have values returned from multiple calls to the same RPG Program
- A problem where in the RPG PGM was called twice in a single call was also fixed in this version.

## Prior versions

Changes in prior versions are described in the sections that follow.

### Version 1.1.x

Support for Report Program Generator (RPG) 3 has been added.

Beginning with the 1.1 version, the Adapter for iSeries is no longer supported on Microsoft Windows NT.

Adapter installation information has been moved from this guide. See Chapter 2, "Installing the iSeries adapter and related files" on page 7, for the new location of that information.

### Version 1.0.x

Version 1.0.x is the first release of the IBM WebSphere Business Integration Adapter for iSeries. The adapter provides the ability to execute Report Program Generator (RPG) 4 programs on an iSeries or AS/400 system.

# Chapter 1. Overview

This chapter describes the IBM WebSphere Business Integration Adapter for iSeries. The adapter, using the IBM Toolbox for Java (a set of Java$^{(TM)}$ classes), provides the ability to execute RPG programs and access data queues on an iSeries or AS/400 system. IBM's Toolbox for Java provides a set of classes to access data queues and run programs. The adapter uses these classes and information from the incoming business object to build the parameter list for executing the program and read/write from/to data queues. The iSeries adapter currently supports both request processing and event processing.

Adapters consist of an application-specific component and the connector framework. The application-specific component contains code tailored to a particular application. The connector framework, whose code is common to all adapters, acts as an intermediary between the integration broker and the application-specific component. The connector framework provides the following services between the integration broker and the application-specific component:

- Sends business objects
- Manages the exchange of startup and administrative messages

This document contains information about the application-specific component and connector framework. It refers to both of these components as the adapter.

For more information about the relationship of the integration broker to the adapter, see the *IBM WebSphere InterChange Server System Administration Guide*, or the *IBM WebSphere Business Integration Implementation Guide for WebSphere MQ Integrator Broker*.

This chapter contains the following sections:

- "An overview of the iSeries and AS/400 systems"
- "How the adapter works" on page 3

## An overview of the iSeries and AS/400 systems

The IBM iSeries (known as AS/400) is a highly integrated, reliable server platform that allows businesses to run multiple operating environments simultaneously. Their integrity and security characteristics allow them to be used in many critical applications.

RPG has evolved from being a simple Report Program Generator, (from which it got its name) into a powerful application development procedural language on iSeries machines. Currently it is supported on the ILE (Integrated Language Environment) on iSeries.

Host servers handle requests from client PCs or other devices running an application as illustrated in Figure 1 on page 2 to enable printing a document and other tasks. The iSeries and AS/400 computers are full function servers capable of performing many tasks at once, including file, database, applications, mail, print, multimedia, fax and wireless communications. Each task server runs as a separate job on the system, and each server job sends and receives data streams on a socket connection.

One of these host servers is the Remote Command and Distributed program call server. This server runs the programs on an iSeries or AS/400 system.

IBM's Toolbox for JAVA has a multitude of packages that handle different functionalities. For example, Access classes manage sign-on information, create and maintain socket connections, and send and receive data, while Command Call classes run iSeries and AS/400 batch commands.

IBM's iSeries adapter uses the Access classes, and Program Call classes to call the RPG program. Data conversion classes provide the capability to convert numeric and character data between iSeries or AS/400 and Java formats.

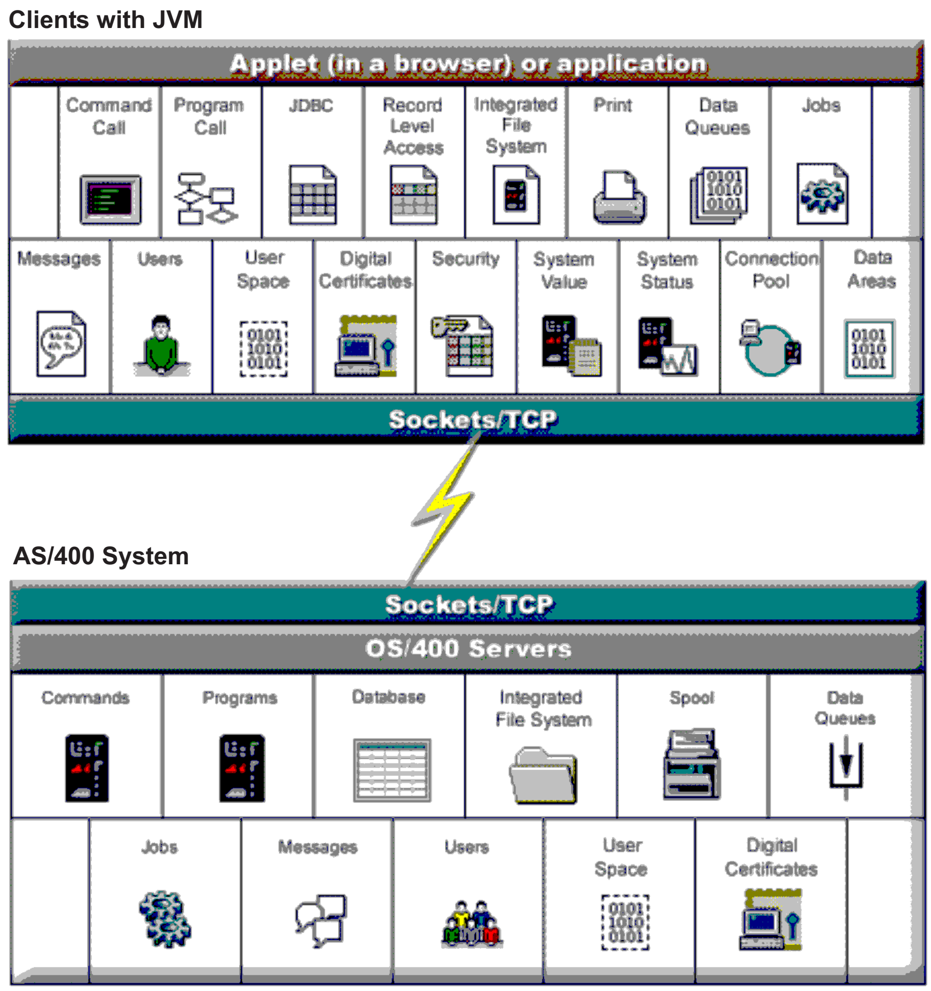


*Figure 1. Overview of AS/400 client - server architecture*

While OS/400 running on an AS/400 is capable of handling many types of tasks, the iSeries adapter only uses the Remote Command and Distributed program call server. This server runs the programs on the AS/400 system.

A diagram of the iSeries adapter connection of the client to the server is shown in Figure 2 on page 3.

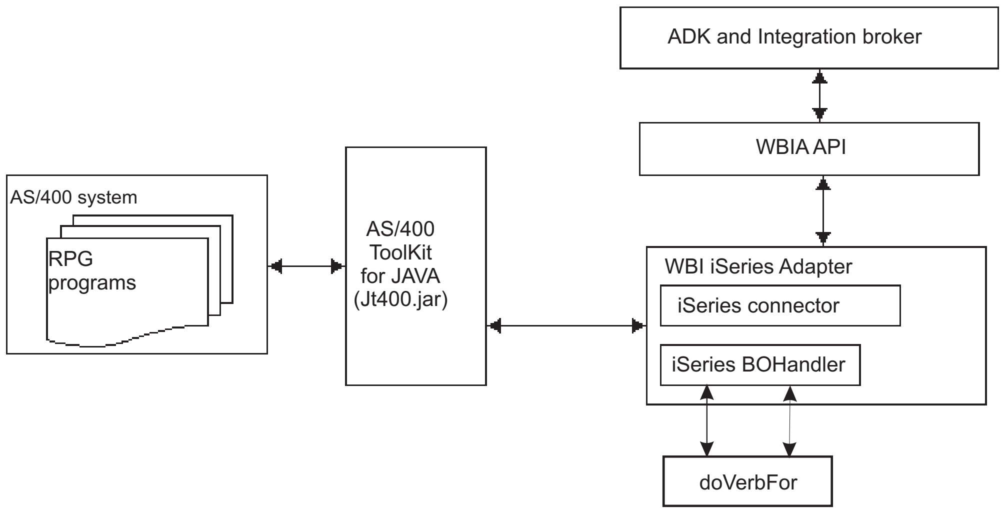


*Figure 2. Diagram of the iSeries adapter's connections*

### Data queues

The data queues on iSeries allow fast communications between jobs. Therefore, it is an excellent way to synchronize and pass data between jobs. With data queues on iSeries:

- Many jobs can simultaneously access the data queues
- Messages on a data queue are free format
- The data queue can be used for either synchronous or asynchronous processing
- The messages on a data queue can be ordered in one of the following ways:
  - Last-in first-out (LIFO)
  - First-in first-out (FIFO)
  - Keyed

Each message on a keyed data queue has a key associated with it. A message can be taken off the queue only by specifying the key that is associated with it.

## How the adapter works

The following sections describe how the adapter processes business objects.

### Business object processing

The adapter receives business object requests from an integration broker and builds the parameter list for the RPG program, then establishes a connection with an iSeries or AS/400 system and executes the program.

The incoming business object contains the connection child attribute. The information in this attribute is used to connect to the iSeries or AS/400 system.

### Connector operations

The connector passes business objects between the integration broker and a business object handler. The connector:

1. Registers the BOHandler with the framework.

2. The framework sends the BO request to the BOHandler.
3. The BOHandler uses the attribute information in the incoming business object to build the RPG program parameter list.
4. The BOHandler calls the RPG program running on the iSeries or AS/400 system.

   **Note:** This is essentially a call to execute an RPG program on the iSeries or AS/400 system which then returns either a success or fail message.
5. The BOHandler then returns the results of the execution of the RPG program to the adapter framework. It also populates the business object with the returned parameters.

The adapter is written in Java and consists of two components:
- Connector
- Business object handler

# Chapter 2. Installing the iSeries adapter

This chapter describes the process of installing and configuring the connector. It contains the following sections:

- "Adapter for iSeries environment"
- "Installing the iSeries adapter and related files" on page 7
- "Installed file structure" on page 7
- "Post installation tasks" on page 7

## Adapter for iSeries environment

Before installing, configuring, and using the adapter, you must understand its environmental requirements.

- Broker compatibility
- Adapter platforms
- Prerequisites

In addition to the sections below, hardware and software requirements are also available in the following techdoc

http://www.ibm.com/support/docview.wss?uid=swg27006249

### Broker compatibility

The adapter framework that an adapter uses must be compatible with the version of the integration broker (or brokers) with which the adapter is communicating. Version 2.0 of the adapter for iSeries is supported on the following versions of the adapter framework and with the following integration brokers:

**Adapter framework:** WebSphere Business Integration Adapter Framework, versions 2.6 and 2.7.

**Integration brokers:**

- WebSphere InterChange Server, version 4.2.2, 4.3
- WebSphere MQ Integrator, version 2.1.0
- WebSphere MQ Integrator Broker, version 2.1.0
- WebSphere Business Integration Message Broker, version 5.0
- WebSphere Application Server Enterprise, version 5.0.2, with WebSphere Studio Application Developer Integration Edition, version 5.0.1
- WebSphere Business Integration Server Foundation 5.1, 5.1.1

See the Release Notes for any exceptions.

**Note:** For instructions on installing the integration broker and its prerequisites, see the following documentation. For WebSphere InterChange Server (ICS), see the *System Installation Guide for UNIX* or *for Windows*.

For message brokers (WebSphere MQ Integrator Broker, WebSphere MQ Integrator, and WebSphere Business Integration Message Broker), see *Implementing Adapters with WebSphere Message Brokers*, and the installation documentation for the message broker. Some of this can be found at the following Web site: http://www.ibm.com/software/integration/mqfamily/library/manualsa/.

For WebSphere Application Server, see *Implementing Adapters with WebSphere Application Server* and the documentation at: http://www.ibm.com/software/webservers/appserv/library.html.

## Adapter platforms

The adapter runs on the following platforms:

- Windows 2000, 2003
- Sun Solaris 8, 9
- AIX 5.2, 5.3
- HP-UX 11i
- Linux RedHat AS/ ES/WS 3.0 with Update 1
- Linux SuSe 8.1 with SP3

## Prerequisites

To use the connector, your environment must have the following:

1. Java and jar files:
   - JDK 1.3 or later
   - Java Secure Socket Extension 1.0 (JSSE)
   - Jt400.jar file

     **Note:** The IBM Toolbox for Java (licensed product 5722-JC1) V5R2 file can be downloaded from the Toolbox Web site at: http://www-1.ibm.com/servers/eserver/iseries/toolbox/downloads.htm.
     The jt400.jar needs to be copied to the %Product_dir%\connectors\iSeries directory.
   - WBIA.jar file
   - CrossWorlds.jar file
   - BIA_iSeries.jar file
2. The iSeries adapter is designed to connect to an AS/400 with one of the following OS/400 versions:
   - Version 5, Releases 1
   - Version 4, Releases 1 through 3
3. The Host Servers option of OS/400 must be installed and running.

   **Note:** The OS/400 data queue server requires PTFs to correctly perform peek functions. You must have the appropriate PTF from the following link:

   `http://www-1.ibm.com/servers/eserver/iseries/toolbox/hostservicepackdetail.htm`
4. You must be running RPG III or IV.

## Installing the iSeries adapter and related files

For information on installing WebSphere Business Integration adapter products, refer to the *Installing WebSphere Business Integration Adapters* guide located in the WebSphere Business Integration Adapters Infocenter at the following site:

http://www.ibm.com/websphere/integration/wbiadapters/library/infocenter

## Installed file structure

The adapter installation copies the standard files associated with the connector into your system. The utility installs the connector into the *ProductDir*\connectors\iSeries directory, and adds a shortcut for the connector to the Start menu.

**Note:** *ProductDir* represents the directory where the product is installed.

Table 1 describes the file structure used by the connector, and shows the files that are automatically installed when you install the connector through the Installer.

*Table 1. File structure for the connector*

| **Subdirectory of *ProductDir*** | **Description** |
|---|---|
| `\connectors\iSeries\BIA_iSeries.jar` | Contains classes used by the iSeries connector only |
| `\connectors\iSeries\start_iSeries.bat` | The startup script for the iSeries connector (Windows) |
| `\connectors\iSeries\start_iSeries.sh` | The startup script for the iSeries connector (Unix) |
| `\connectors\iSeries\ext\` | A directory where the ODA-generated .jar files can be saved. If you save to this directory, specify the directory in the startup script (start_iSeries.bat or start_iSeries.sh). |
| `\connectors\messages\ BIA_iSeriesAdapter.txt` | Message file for the connector |
| `\ODA\iSeries\BIA_iSeriesODA.jar` | The iSeries ODA |
| `\ODA\iSeries\start_iSeriesODA.bat` | The ODA startup file (Windows) |
| `\ODA\iSeries\start_iSeriesODA.sh` | The ODA startup file (Unix) |
| `Data\App\BIA_iSeriesAdapterTemplate` | Repository definition for the connector. |

## Post installation tasks

After installation and before startup, you must configure the adapter. For details, see Chapter 3, “Configuring the iSeries adapter,” on page 9.

# Chapter 3. Configuring the iSeries adapter

This chapter describes the process of configuring the connector. It contains the following sections:

- "Configuring the connector"

## Configuring the connector

The iSeries adapter uses standard connector properties for configuration as detailed in the next section and connector-specific properties as detailed in the following section.

This section includes the following topics:

- "Overview of Connector Configurator"
- "Starting Connector Configurator" on page 10
- "Running Configurator from System Manager" on page 11
- "Creating a connector-specific property template" on page 11
- "Creating a new configuration file" on page 13
- "Setting the configuration file properties" on page 16
- "Saving your configuration file" on page 22
- "Changing a configuration file" on page 23
- "Completing the configuration" on page 23
- "Using Connector Configurator in a globalized environment" on page 23
- "Starting the connector" on page 24
- "Stopping the connector" on page 25
- "Creating multiple connector instances" on page 26

### Overview of Connector Configurator

Connector Configurator allows you to configure the connector component of your adapter for use with these integration brokers:

- WebSphere InterChange Server (ICS)
- WebSphere MQ Integrator, WebSphere MQ Integrator Broker, and WebSphere Business Integration Message Broker, collectively referred to as the WebSphere Message Brokers (WMQI)
- WebSphere Application Server (WAS)

You use Connector Configurator to:

- Create a **connector-specific property template** for configuring your connector.
- Create a **connector configuration file**; you must create one configuration file for each connector you install.
- Set properties in a configuration file.
  You may need to modify the default values that are set for properties in the connector templates. You must also designate supported business object definitions and, with ICS, maps for use with collaborations as well as specify messaging, logging and tracing, and data handler parameters, as required.

The mode in which you run Connector Configurator, and the configuration file type you use, may differ according to which integration broker you are running. For example, if WMQI is your broker, you run Connector Configurator directly, and not from within System Manager (see "Running Configurator in stand-alone mode").

Connector configuration properties include both standard configuration properties (the properties that all connectors have) and connector-specific properties (properties that are needed by the connector for a specific application or technology).

Because **standard properties** are used by all connectors, you do not need to define those properties from scratch; Connector Configurator incorporates them into your configuration file as soon as you create the file. However, you do need to set the value of each standard property in Connector Configurator.

The range of standard properties may not be the same for all brokers and all configurations. Some properties are available only if other properties are given a specific value. The Standard Properties window in Connector Configurator will show the properties available for your particular configuration.

For **connector-specific properties**, however, you need first to define the properties and then set their values. You do this by creating a connector-specific property template for your particular adapter. There may already be a template set up in your system, in which case, you simply use that. If not, follow the steps in "Creating a new template" on page 11 to set up a new one.

**Note:** Connector Configurator runs only in a Windows environment. If you are running the connector in a UNIX environment, use Connector Configurator in Windows to modify the configuration file and then copy the file to your UNIX environment.

## Starting Connector Configurator

You can start and run Connector Configurator in either of two modes:

- Independently, in stand-alone mode
- From System Manager

### Running Configurator in stand-alone mode

You can run Connector Configurator independently and work with connector configuration files, irrespective of your broker.

To do so:

- From **Start>Programs**, click **IBM WebSphere InterChange Server>IBM WebSphere Business Integration Tools>Connector Configurator**.
- Select **File>New>Connector Configuration**.
- When you click the pull-down menu next to **System Connectivity Integration Broker**, you can select ICS, WebSphere Message Brokers or WAS, depending on your broker.

You may choose to run Connector Configurator independently to generate the file, and then connect to System Manager to save it in a System Manager project (see "Completing a configuration file" on page 15.)

## Running Configurator from System Manager

You can run Connector Configurator from System Manager.

To run Connector Configurator:

1. Open the System Manager.
2. In the System Manager window, expand the **Integration Component Libraries** icon and highlight **Connectors**.
3. From the System Manager menu bar, click **Tools>Connector Configurator**. The Connector Configurator window opens and displays a **New Connector** dialog box.
4. When you click the pull-down menu next to **System Connectivity Integration Broker**, you can select ICS, WebSphere Message Brokers or WAS, depending on your broker.

To edit an existing configuration file:

- In the System Manager window, select any of the configuration files listed in the Connector folder and right-click on it. Connector Configurator opens and displays the configuration file with the integration broker type and file name at the top.
- From Connector Configurator, select **File>Open**. Select the name of the connector configuration file from a project or from the directory in which it is stored.
- Click the Standard Properties tab to see which properties are included in this configuration file.

## Creating a connector-specific property template

To create a configuration file for your connector, you need a connector-specific property template as well as the system-supplied standard properties.

You can create a brand-new template for the connector-specific properties of your connector, or you can use an existing connector definition as the template.

- To create a new template, see "Creating a new template."
- To use an existing file, simply modify an existing template and save it under the new name. You can find existing templates in your `\WebSphereAdapters\bin\Data\App` directory.

### Creating a new template

This section describes how you create properties in the template, define general characteristics and values for those properties, and specify any dependencies between the properties. Then you save the template and use it as the base for creating a new connector configuration file.

To create a template in Connector Configurator:

1. Click **File>New>Connector-Specific Property Template**.
2. The **Connector-Specific Property Template** dialog box appears.
   - Enter a name for the new template in the **Name** field below **Input a New Template Name.** You will see this name again when you open the dialog box for creating a new configuration file from a template.
   - To see the connector-specific property definitions in any template, select that template's name in the **Template Name** display. A list of the property definitions contained in that template appears in the **Template Preview** display.

3. You can use an existing template whose property definitions are similar to those required by your connector as a starting point for your template. If you do not see any template that displays the connector-specific properties used by your connector, you will need to create one.
   - If you are planning to modify an existing template, select the name of the template from the list in the **Template Name** table below **Select the Existing Template to Modify: Find Template.**
   - This table displays the names of all currently available templates. You can also search for a template.

**Specifying general characteristics:** When you click **Next** to select a template, the **Properties - Connector-Specific Property Template** dialog box appears. The dialog box has tabs for General characteristics of the defined properties and for Value restrictions. The General display has the following fields:

- **General:**
  Property Type
  Updated Method
  Description
- **Flags**
  Standard flags
- **Custom Flag**
  Flag

After you have made selections for the general characteristics of the property, click the **Value** tab.

**Specifying values:** The **Value** tab enables you to set the maximum length, the maximum multiple values, a default value, or a value range for the property. It also allows editable values. To do so:

1. Click the **Value** tab. The display panel for Value replaces the display panel for General.
2. Select the name of the property in the **Edit properties** display.
3. In the fields for **Max Length** and **Max Multiple Values**, enter your values.

To create a new property value:

1. Select the property in the **Edit properties** list and right-click on it.
2. From the dialog box, select **Add**.
3. Enter the name of the new property value and click OK. The value appears in the **Value** panel on the right.

The **Value** panel displays a table with three columns:

The **Value** column shows the value that you entered in the **Property Value** dialog box, and any previous values that you created.

The **Default Value** column allows you to designate any of the values as the default.

The **Value Range** shows the range that you entered in the **Property Value** dialog box.

After a value has been created and appears in the grid, it can be edited from within the table display.

To make a change in an existing value in the table, select an entire row by clicking on the row number. Then right-click in the **Value** field and click **Edit Value**.

**Setting dependencies:** When you have made your changes to the **General** and **Value** tabs, click **Next**. The **Dependencies - Connector-Specific Property Template** dialog box appears.

A dependent property is a property that is included in the template and used in the configuration file *only if* the value of another property meets a specific condition. For example, `PollQuantity` appears in the template only if JMS is the transport mechanism and `DuplicateEventElimination` is set to `True`.
To designate a property as dependent and to set the condition upon which it depends, do this:

1. In the **Available Properties** display, select the property that will be made dependent.
2. In the **Select Property** field, use the drop-down menu to select the property that will hold the conditional value.
3. In the **Condition Operator** field, select one of the following:

   == (equal to)

   != (not equal to)

   > (greater than)

   < (less than)

   >= (greater than or equal to)

   <=(less than or equal to)
4. In the **Conditional Value** field, enter the value that is required in order for the dependent property to be included in the template.
5. With the dependent property highlighted in the **Available Properties** display, click an arrow to move it to the **Dependent Property** display.
6. Click **Finish**. Connector Configurator stores the information you have entered as an XML document, under `\data\app` in the`\bin` directory where you have installed Connector Configurator.

## Creating a new configuration file

When you create a new configuration file, you must name it and select an integration broker.

- In the System Manager window, right-click on the **Connectors** folder and select **Create New Connector**. Connector Configurator opens and displays the **New Connector** dialog box.
- In stand-alone mode: from Connector Configurator, select **File>New>Connector Configuration**. In the New Connector window, enter the name of the new connector.

You also need to select an integration broker. The broker you select determines the properties that will appear in the configuration file. To select a broker:

- In the **Integration Broker** field, select ICS, WebSphere Message Brokers or WAS connectivity.
- drop-down the remaining fields in the **New Connector** window, as described later in this chapter.

### Creating a configuration file from a connector-specific template

Once a connector-specific template has been created, you can use it to create a configuration file:

1. Click **File>New>Connector Configuration**.
2. The **New Connector** dialog box appears, with the following fields:
   - **Name**

     Enter the name of the connector. Names are case-sensitive. The name you enter must be unique, and must be consistent with the file name for a connector that is installed on the system.

     **Important:** Connector Configurator does not check the spelling of the name that you enter. You must ensure that the name is correct.
   - **System Connectivity**

     Click ICS or WebSphere Message Brokers or WAS.
   - **Select Connector-Specific Property Template**

     Type the name of the template that has been designed for your connector. The available templates are shown in the **Template Name** display. When you select a name in the Template Name display, the **Property Template Preview** display shows the connector-specific properties that have been defined in that template.

     Select the template you want to use and click **OK**.
3. A configuration screen appears for the connector that you are configuring. The title bar shows the integration broker and connector names. You can fill in all the field values to complete the definition now, or you can save the file and complete the fields later.
4. To save the file, click **File>Save>To File** or **File>Save>To Project**. To save to a project, System Manager must be running.
   If you save as a file, the **Save File Connector** dialog box appears. Choose `*.cfg` as the file type, verify in the File Name field that the name is spelled correctly and has the correct case, navigate to the directory where you want to locate the file, and click **Save**. The status display in the message panel of Connector Configurator indicates that the configuration file was successfully created.

   **Important:** The directory path and name that you establish here must match the connector configuration file path and name that you supply in the startup file for the connector.
5. To complete the connector definition, enter values in the fields for each of the tabs of the Connector Configurator window, as described later in this chapter.

## Using an existing file

You may have an existing file available in one or more of the following formats:

- A connector definition file.
  This is a text file that lists properties and applicable default values for a specific connector. Some connectors include such a file in a `\repository` directory in their delivery package (the file typically has the extension `.txt`; for example, CN_XML.txt for the XML connector).
- An ICS repository file.
  Definitions used in a previous ICS implementation of the connector may be available to you in a repository file that was used in the configuration of that connector. Such a file typically has the extension `.in` or `.out`.
- A previous configuration file for the connector.
  Such a file typically has the extension *.cfg.

Although any of these file sources may contain most or all of the connector-specific properties for your connector, the connector configuration file will not be complete until you have opened the file and set properties, as described later in this chapter.

To use an existing file to configure a connector, you must open the file in Connector Configurator, revise the configuration, and then resave the file.

Follow these steps to open a *.txt, *.cfg, or *.in file from a directory:

1. In Connector Configurator, click **File>Open>From File**.
2. In the **Open File Connector** dialog box, select one of the following file types to see the available files:
   - Configuration (`*.cfg`)
   - ICS Repository (`*.in`, `*.out`)

     Choose this option if a repository file was used to configure the connector in an ICS environment. A repository file may include multiple connector definitions, all of which will appear when you open the file.
   - All files (*.*)

     Choose this option if a `*.txt` file was delivered in the adapter package for the connector, or if a definition file is available under another extension.
3. In the directory display, navigate to the appropriate connector definition file, select it, and click **Open**.

Follow these steps to open a connector configuration from a System Manager project:

1. Start System Manager. A configuration can be opened from or saved to System Manager only if System Manager has been started.
2. Start Connector Configurator.
3. Click **File>Open>From Project**.

## Completing a configuration file

When you open a configuration file or a connector from a project, the Connector Configurator window displays the configuration screen, with the current attributes and values.

The title of the configuration screen displays the integration broker and connector name as specified in the file. Make sure you have the correct broker. If not, change the broker value before you configure the connector. To do so:

1. Under the **Standard Properties** tab, select the value field for the `BrokerType` property. In the drop-down menu, select the value `ICS`, `WMQI`, or `WAS`.
2. The Standard Properties tab will display the properties associated with the selected broker. You can save the file now or complete the remaining configuration fields, as described in "Specifying supported business object definitions" on page 19..
3. When you have finished your configuration, click **File>Save>To Project** or **File>Save>To File**.

   If you are saving to file, select `*.cfg` as the extension, select the correct location for the file and click **Save**.

   If multiple connector configurations are open, click **Save All to File** to save all of the configurations to file, or click **Save All to Project** to save all connector configurations to a System Manager project.

Before it saves the file, Connector Configurator checks that values have been set for all required standard properties. If a required standard property is missing a value, Connector Configurator displays a message that the validation failed. You must supply a value for the property in order to save the configuration file.

## Setting the configuration file properties

When you create and name a new connector configuration file, or when you open an existing connector configuration file, Connector Configurator displays a configuration screen with tabs for the categories of required configuration values.

Connector Configurator requires values for properties in these categories for connectors running on all brokers:

- Standard Properties
- Connector-specific Properties
- Supported Business Objects
- Trace/Log File values
- Data Handler (applicable for connectors that use JMS messaging with guaranteed event delivery)

**Note:** For connectors that use JMS messaging, an additional category may display, for configuration of data handlers that convert the data to business objects.

For connectors running on **ICS**, values for these properties are also required:

- Associated Maps
- Resources
- Messaging (where applicable)

**Important:** Connector Configurator accepts property values in either English or non-English character sets. However, the names of both standard and connector-specific properties, and the names of supported business objects, must use the English character set only.

Standard properties differ from connector-specific properties as follows:

- Standard properties of a connector are shared by both the application-specific component of a connector and its broker component. All connectors have the same set of standard properties. These properties are described in Appendix A of each adapter guide. You can change some but not all of these values.
- Application-specific properties apply only to the application-specific component of a connector, that is, the component that interacts directly with the application. Each connector has application-specific properties that are unique to its application. Some of these properties provide default values and some do not; you can modify some of the default values. The installation and configuration chapters of each adapter guide describe the application-specific properties and the recommended values.

The fields for **Standard Properties** and **Connector-Specific Properties** are color-coded to show which are configurable:

- A field with a grey background indicates a standard property. You can change the value but cannot change the name or remove the property.

- A field with a white background indicates an application-specific property. These properties vary according to the specific needs of the application or connector. You can change the value and delete these properties.
- Value fields are configurable.
- The **Update Method** field is displayed for each property. It indicates whether a component or agent restart is necessary to activate changed values. You cannot configure this setting.

## Setting standard connector properties

Standard configuration properties provide information that all connectors use. See "Standard configuration properties for connectors," on page 51 for documentation of these properties.

**Important:** Because this connector supports all integration brokers, configuration properties for all brokers are relevant to it.

You must set at least the following standard connector configuration properties before running the connector:
- AgentTraceLevel
- ApplicationName
- ControllerStoreAndForwardMode
- ControllerTraceLevel
- DeliveryTransport

To change the value of a standard property:
1. Click in the field whose value you want to set.
2. Either enter a value, or select one from the drop-down menu if it appears.
3. After entering all the values for the standard properties, you can do one of the following:
   - To discard the changes, preserve the original values, and exit Connector Configurator, click **File>Exit** (or close the window), and click **No** when prompted to save changes.
   - To enter values for other categories in Connector Configurator, select the tab for the category. The values you enter for **Standard Properties** (or any other category) are retained when you move to the next category. When you close the window, you are prompted to either save or discard the values that you entered in all the categories as a whole.
   - To save the revised values, click **File>Exit** (or close the window) and click **Yes** when prompted to save changes. Alternatively, click **Save>To File** from either the File menu or the toolbar.

**Connector-specific properties:** Connector-specific configuration properties provide information needed by the connector at runtime. Connector-specific properties also provide a way of changing static information or logic within the connector agent without having to recode and rebuild the agent.

Table 2 lists the connector-specific configuration properties for the connector. See the section that follows for explanations of the properties.

Table 2. Connector-specific configuration properties

| Name | Possible values | Default value | Required? |
|---|---|---|---|
| ApplicationName | `iSeriesAdapter` | None | Yes |
| UseDefaults | *default value* | None | Yes |
| MessageFileName | `BIA_iSeriesAdapter.txt` | `BIA_iSeriesAdapter.txt` | No |
| PollQuantity | an integer greater than 1 | 1 | No |

*ApplicationName:* This is a unique name that must be specified for each connector.

*UseDefaults:* For example, some of the input parameters to a program are constant. So these attributes can be designed to have default values. If there is no default value and the UseDefaults property is set to `true`, the adapter errors out and throws a VerbProcessingFailedException error message. If UseDefaults is not set or set to `false`, and there are no default values, the adapter builds a string of length MaxLength with padded spaces for the attribute values.

*MessageFileName:* This is the name and path of the error message file if it is not located in the standard message location %CROSSWORLDS%\connectors\messages. If the message file name is not in a fully qualified path, the message file is assumed to be located in the directory specified by the HOME environment variable or the startup parameter user.home. If a connector message file does not exist, the file BIA_iSeriesAdapter.txt is used as the message file.

*PollQuantity:* PollQuantity is an integer value above 1 specifying the number of items to poll from the data queues. Note that if `n` is specified as PollQuantity value then each queue configured using meta objects is polled `n` times. The default value is taken as 1.

## Setting application-specific configuration properties

For application-specific configuration properties, you can add or change property names, configure values, delete a property, and encrypt a property. The default property length is 255 characters.

1. Right-click in the top left portion of the grid. A pop-up menu bar will appear. Click **Add** to add a property. To add a child property, right-click on the parent row number and click **Add child**.
2. Enter a value for the property or child property.
3. To encrypt a property, select the **Encrypt** box.
4. Choose to save or discard changes, as described for "Setting standard connector properties" on page 17.

The Update Method displayed for each property indicates whether a component or agent restart is necessary to activate changed values.

**Important:** Changing a preset application-specific connector property name may cause a connector to fail. Certain property names may be needed by the connector to connect to an application or to run properly.

**Encryption for connector properties:** Application-specific properties can be encrypted by selecting the **Encrypt** check box in the Connector-specific Properties window. To decrypt a value, click to clear the **Encrypt** check box, enter the correct value in the **Verification** dialog box, and click **OK**. If the entered value is correct, the value is decrypted and displays.

The adapter user guide for each connector contains a list and description of each property and its default value.

If a property has multiple values, the **Encrypt** check box will appear for the first value of the property. When you select **Encrypt**, all values of the property will be encrypted. To decrypt multiple values of a property, click to clear the **Encrypt** check box for the first value of the property, and then enter the new value in the **Verification** dialog box. If the input value is a match, all multiple values will decrypt.

**Update method:** Refer to the descriptions of update methods found in the *Standard configuration properties for connectors* appendix, under "Configuration property values overview" on page 52.

## Specifying supported business object definitions

Use the **Supported Business Objects** tab in Connector Configurator to specify the business objects that the connector will use. You must specify both generic business objects and application-specific business objects, and you must specify associations for the maps between the business objects.

**Note:** Some connectors require that certain business objects be specified as supported in order to perform event notification or additional configuration (using meta-objects) with their applications. For more information, see the *Connector Development Guide for C++* or the *Connector Development Guide for Java*.

**If ICS is your broker:** To specify that a business object definition is supported by the connector, or to change the support settings for an existing business object definition, click the **Supported Business Objects** tab and use the following fields.

*Business object name:* To designate that a business object definition is supported by the connector, with System Manager running:

1. Click an empty field in the **Business Object Name** list. A drop-down list displays, showing all the business object definitions that exist in the System Manager project.
2. Click on a business object to add it.
3. Set the **Agent Support** (described below) for the business object.
4. In the File menu of the Connector Configurator window, click **Save to Project**. The revised connector definition, including designated support for the added business object definition, is saved to an ICL (Integration Component Library) project in System Manager.

To delete a business object from the supported list:

1. To select a business object field, click the number to the left of the business object.
2. From the **Edit** menu of the Connector Configurator window, click **Delete Row**. The business object is removed from the list display.
3. From the **File** menu, click **Save to Project**.

Deleting a business object from the supported list changes the connector definition and makes the deleted business object unavailable for use in this implementation of this connector. It does not affect the connector code, nor does it remove the business object definition itself from System Manager.

*Agent support:* If a business object has Agent Support, the system will attempt to use that business object for delivering data to an application via the connector agent.

Typically, application-specific business objects for a connector are supported by that connector's agent, but generic business objects are not.

To indicate that the business object is supported by the connector agent, check the **Agent Support** box. The Connector Configurator window does not validate your Agent Support selections.

*Maximum transaction level:* The maximum transaction level for a connector is the highest transaction level that the connector supports.

For most connectors, `Best Effort` is the only possible choice.

You must restart the server for changes in transaction level to take effect.

**If a WebSphere Message Broker is your broker:** If you are working in stand-alone mode (not connected to System Manager), you must enter the business object name manually.

If you have System Manager running, you can select the empty box under the **Business Object Name** column in the **Supported Business Objects** tab. A combo box appears with a list of the business object available from the Integration Component Library project to which the connector belongs. Select the business object you want from the list.

The **Message Set ID** is an optional field for WebSphere Business Integration Message Broker 5.0, and need not be unique if supplied. However, for WebSphere MQ Integrator and Integrator Broker 2.1, you must supply a unique **ID**.

**If WAS is your broker:** When WebSphere Application Server is selected as your broker type, Connector Configurator does not require message set IDs. The **Supported Business Objects** tab shows a **Business Object Name** column only for supported business objects.

If you are working in stand-alone mode (not connected to System Manager), you must enter the business object name manually.

If you have System Manager running, you can select the empty box under the Business Object Name column in the Supported Business Objects tab. A combo box appears with a list of the business objects available from the Integration Component Library project to which the connector belongs. Select the business object you want from this list.

### Associated maps (ICS only)

Each connector supports a list of business object definitions and their associated maps that are currently active in WebSphere InterChange Server. This list appears when you select the **Associated Maps** tab.

The list of business objects contains the application-specific business object which the agent supports and the corresponding generic object that the controller sends to the subscribing collaboration. The association of a map determines which map will be used to transform the application-specific business object to the generic business object or the generic business object to the application-specific business object.

If you are using maps that are uniquely defined for specific source and destination business objects, the maps will already be associated with their appropriate business objects when you open the display, and you will not need (or be able) to change them.

If more than one map is available for use by a supported business object, you will need to explicitly bind the business object with the map that it should use.

The **Associated Maps** tab displays the following fields:

- **Business Object Name**

  These are the business objects supported by this connector, as designated in the **Supported Business Objects** tab. If you designate additional business objects under the Supported Business Objects tab, they will be reflected in this list after you save the changes by choosing **Save to Project** from the **File** menu of the Connector Configurator window.
- **Associated Maps**

  The display shows all the maps that have been installed to the system for use with the supported business objects of the connector. The source business object for each map is shown to the left of the map name, in the **Business Object Name** display.
- **Explicit**

  In some cases, you may need to explicitly bind an associated map.

  Explicit binding is required only when more than one map exists for a particular supported business object. When ICS boots, it tries to automatically bind a map to each supported business object for each connector. If more than one map takes as its input the same business object, the server attempts to locate and bind one map that is the superset of the others.

  If there is no map that is the superset of the others, the server will not be able to bind the business object to a single map, and you will need to set the binding explicitly.

  To explicitly bind a map:

  1. In the **Explicit** column, place a check in the check box for the map you want to bind.
  2. Select the map that you intend to associate with the business object.
  3. In the **File** menu of the Connector Configurator window, click **Save to Project**.
  4. Deploy the project to ICS.
  5. Reboot the server for the changes to take effect.

## Resources (ICS)

The **Resource** tab allows you to set a value that determines whether and to what extent the connector agent will handle multiple processes concurrently, using connector agent parallelism.

Not all connectors support this feature. If you are running a connector agent that was designed in Java to be multi-threaded, you are advised not to use this feature, since it is usually more efficient to use multiple threads than multiple processes.

### Messaging (ICS)

The messaging properties are available only if you have set MQ as the value of the `DeliveryTransport` standard property and ICS as the broker type. These properties affect how your connector will use queues.

### Setting trace/log file values

When you open a connector configuration file or a connector definition file, Connector Configurator uses the logging and tracing values of that file as default values. You can change those values in Connector Configurator.

To change the logging and tracing values:

1. Click the **Trace/Log Files** tab.
2. For either logging or tracing, you can choose to write messages to one or both of the following:
   - To console (STDOUT):
     Writes logging or tracing messages to the STDOUT display.

     **Note:** You can only use the STDOUT option from the **Trace/Log Files** tab for connectors running on the Windows platform.
   - To File:
     Writes logging or tracing messages to a file that you specify. To specify the file, click the directory button (ellipsis), navigate to the preferred location, provide a file name, and click **Save**. Logging or tracing message are written to the file and location that you specify.

     **Note:** Both logging and tracing files are simple text files. You can use the file extension that you prefer when you set their file names. For tracing files, however, it is advisable to use the extension `.trace` rather than `.trc`, to avoid confusion with other files that might reside on the system. For logging files, `.log` and `.txt` are typical file extensions.

### Data handlers

The data handlers section is available for configuration only if you have designated a value of JMS for DeliveryTransport and a value of JMS for ContainerManagedEvents. Not all adapters make use of data handlers.

See the descriptions under `ContainerManagedEvents` in Appendix A, Standard Properties, for values to use for these properties. For additional details, see the *Connector Development Guide for C++* or the *Connector Development Guide for Java*.

## Saving your configuration file

When you have finished configuring your connector, save the connector configuration file. Connector Configurator saves the file in the broker mode that you selected during configuration. The title bar of Connector Configurator always displays the broker mode (ICS, WMQI or WAS) that it is currently using.

The file is saved as an XML document. You can save the XML document in three ways:

- From System Manager, as a file with a `*.con` extension in an Integration Component Library, or
- In a directory that you specify.
- In stand-alone mode, as a file with a `*.cfg` extension in a directory folder. By default, the file is saved to `\WebSphereAdapters\bin\Data\App`.

- You can also save it to a WebSphere Application Server project if you have set one up.

For details about using projects in System Manager, and for further information about deployment, see the following implementation guides:

- For ICS: *Implementation Guide for WebSphere InterChange Server*
- For WebSphere Message Brokers: *Implementing Adapters with WebSphere Message Brokers*
- For WAS: *Implementing Adapters with WebSphere Application Server*

## Changing a configuration file

You can change the integration broker setting for an existing configuration file. This enables you to use the file as a template for creating a new configuration file, which can be used with a different broker.

**Note:** You will need to change other configuration properties as well as the broker mode property if you switch integration brokers.

To change your broker selection within an existing configuration file (optional):

- Open the existing configuration file in Connector Configurator.
- Select the **Standard Properties** tab.
- In the **BrokerType** field of the Standard Properties tab, select the value that is appropriate for your broker.
  When you change the current value, the available tabs and field selections on the properties screen will immediately change, to show only those tabs and fields that pertain to the new broker you have selected.

## Completing the configuration

After you have created a configuration file for a connector and modified it, make sure that the connector can locate the configuration file when the connector starts up.

To do so, open the startup file used for the connector, and verify that the location and file name used for the connector configuration file match exactly the name you have given the file and the directory or path where you have placed it.

## Using Connector Configurator in a globalized environment

Connector Configurator is globalized and can handle character conversion between the configuration file and the integration broker. Connector Configurator uses native encoding. When it writes to the configuration file, it uses UTF-8 encoding.

Connector Configurator supports non-English characters in:

- All value fields
- Log file and trace file path (specified in the **Trace/Log files** tab)

The drop list for the `CharacterEncoding` and `Locale` standard configuration properties displays only a subset of supported values. To add other values to the drop list, you must manually modify the `\Data\Std\stdConnProps.xml` file in the product directory.

For example, to add the locale `en_GB` to the list of values for the `Locale` property, open the `stdConnProps.xml` file and add the line in boldface type below:

```
<Property name="Locale"
isRequired="true"
updateMethod="component restart">
                <ValidType>String</ValidType>
            <ValidValues>
                                <Value>ja_JP</Value>
                                <Value>ko_KR</Value>
                                <Value>zh_CN</Value>
                                <Value>zh_TW</Value>
                                <Value>fr_FR</Value>
                                <Value>de_DE</Value>
                                <Value>it_IT</Value>
                                <Value>es_ES</Value>
                                <Value>pt_BR</Value>
                                <Value>en_US</Value>
                                <Value>en_GB</Value>

                    <DefaultValue>en_US</DefaultValue>
            </ValidValues>
    </Property>
```

## Starting the connector

A connector must be explicitly started using its **connector start-up script**. On Windows systems the startup script should reside in the connector's runtime directory:

```
ProductDir\connectors\connName
```

where *connName* identifies the connector.

On UNIX systems the startup script should reside in the *UNIX ProductDir*/bin directory.

The name of the startup script depends on the operating-system platform, as Table 3 shows.

*Table 3. Startup scripts for a connector*

| Operating system | Startup script |
|---|---|
| UNIX-based systems | `connector_manager` |
| Windows | start_*connName*.bat |

When the startup script runs, it expects by default to find the configuration file in the *Productdir* (see the commands below). This is where you place your configuration file.

**Note:** You need a local configuration file if the adapter is using JMS transport.

You can invoke the connector startup script in any of the following ways:
- On Windows systems, from the **Start** menu

  Select **Programs>IBM WebSphere Business Integration Adapters>Adapters>Connectors**. By default, the program name is "IBM WebSphere Business Integration Adapters". However, it can be customized. Alternatively, you can create a desktop shortcut to your connector.
- From the command line
  - On Windows systems:

    ```
    start_connName connName brokerName [-cconfigFile ]
    ```
  - On UNIX-based systems:

```
connector_manager -start connName brokerName [-cconfigFile ]
```

where *connName* is the name of the connector and *brokerName* identifies your integration broker, as follows:

  - For WebSphere InterChange Server, specify for *brokerName* the name of the ICS instance.
  - For WebSphere message brokers (WebSphere MQ Integrator, WebSphere MQ Integrator Broker, or WebSphere Business Integration Message Broker) or WebSphere Application Server, specify for *brokerName* a string that identifies the broker.

**Note:** For a WebSphere message broker or WebSphere Application Server on a Windows system, you *must* include the `-c` option followed by the name of the connector configuration file. For ICS, the `-c` is optional.

- From Adapter Monitor, which is launched when you start System Manager running with the WebSphere Application Server or InterChange Server broker:

  You can load, activate, deactivate, pause, shutdown or delete a connector using this tool.
- From System Manager (available for all brokers):

  You can load, activate, deactivate, pause, shutdown or delete a connector using this tool.
- On Windows systems, you can configure the connector to start as a Windows service. In this case, the connector starts when the Windows system boots (for an Auto service) or when you start the service through the Windows Services window (for a Manual service).

For more information on how to start a connector, including the command-line startup options, refer to one of the following documents:

- For WebSphere InterChange Server, refer to the *System Administration Guide*.
- For WebSphere message brokers, refer to *Implementing Adapters with WebSphere Message Brokers*.
- For WebSphere Application Server, refer to *Implementing Adapters with WebSphere Application Server*.

## Stopping the connector

The way to stop a connector depends on the way that the connector was started, as follows:

- If you started the connector from the command line, with its connector startup script:
  - On Windows systems, invoking the startup script creates a separate “console” window for the connector. In this window, type “Q” and press Enter to stop the connector.
  - When using InterChange Server on UNIX-based systems, connectors run in the background so they have no separate window. Instead, run the following command to stop the connector:

    ```
    connector_manager_connName -stop
    ```

    where *connName* is the name of the connector.
- From Adapter Monitor (WebSphere Business Integration Adapters product only), which is launched when you start System Manager:

  You can load, activate, deactivate, pause, shutdown or delete a connector using this tool.
- From System Monitor (WebSphere InterChange Server product only):

You can load, activate, deactivate, pause, shutdown or delete a connector using this tool.
- On Windows systems, you can configure the connector to start as a Windows service. In this case, the connector stops when the Windows system shuts down.

## Creating multiple connector instances

Creating multiple instances of a connector is in many ways the same as creating a custom connector. You can set your system up to create and run multiple instances of a connector by following the steps below. You must:
- Create a new directory for the connector instance
- Make sure you have the requisite business object definitions
- Create a new connector definition file
- Create a new start-up script

### Create a new directory

You must create a connector directory for each connector instance. This connector directory should be named:

```
ProductDir\connectors\connectorInstance
```

where `connectorInstance` uniquely identifies the connector instance.

If the connector has any connector-specific meta-objects, you must create a meta-object for the connector instance. If you save the meta-object as a file, create this directory and store the file here:

```
ProductDir\repository\connectorInstance
```

**Create business object definitions:** If the business object definitions for each connector instance do not already exist within the project, you must create them.
1. If you need to modify business object definitions that are associated with the initial connector, copy the appropriate files and use Business Object Designer to import them. You can copy any of the files for the initial connector. Just rename them if you make changes to them.
2. Files for the initial connector should reside in the following directory:

   ```
   ProductDir\repository\initialConnectorInstance
   ```

   Any additional files you create should be in the appropriate `connectorInstance` subdirectory of `ProductDir\repository`.

**Create a connector definition:** You create a configuration file (connector definition) for the connector instance in Connector Configurator. To do so:
1. Copy the initial connector's configuration file (connector definition) and rename it.
2. Make sure each connector instance correctly lists its supported business objects (and any associated meta-objects).
3. Customize any connector properties as appropriate.

**Create a start-up script:** To create a startup script:
1. Copy the initial connector's startup script and name it to include the name of the connector directory:

   dirname
2. Put this startup script in the connector directory you created in "Create a new directory."

3. Create a startup script shortcut (Windows only).
4. Copy the initial connector’s shortcut text and change the name of the initial connector (in the command line) to match the name of the new connector instance.

You can now run both instances of the connector on your integration server at the same time.

For more information on creating custom connectors, refer to the *Connector Development Guide for C++ or for Java*.

# Chapter 4. Understanding business objects for the connector

This chapter describes the structure of iSeries business objects, how the connector processes the business objects, and the assumptions the connector makes about them. Use this information as a guide to modifying existing business objects for iSeries or as suggestions for implementing new business objects.

This chapter contains the following sections:

- "Defining connector metadata"
- "Business Object structure for RPG, COBOL, and Java programs" on page 30
- "Business Object structure for iSeries data queues" on page 34
- "Configuring meta objects for polling" on page 34
- "Specifying business object attribute properties" on page 36
- "Specifying business object attribute level application text" on page 36

For information on the Object Discovery Agent (ODA) utility that automates the creation of business objects for the IBM WebSphere Business Integration Adapter for iSeries, see Chapter 5, Chapter 5, "Creating and modifying business objects," on page 39.

## Defining connector metadata

The iSeries connector is metadata-driven. In the WebSphere Business Integration system, metadata is application-specific information stored in a business object that helps the connector interact with the application. A metadata-driven connector handles each business object that it supports based on the metadata encoded in the business object definition, rather than on instructions hardcoded in the connector. Business object metadata includes the structure of the business object, the settings of its attribute properties, and the content of its application-specific information. Because the connector is metadata-driven, it can handle new or modified business objects without requiring modifications to the connector code.

The connector makes assumptions about the structure of its supported business objects and the format of the application-specific information.

Therefore, when you create or modify a business object, your modifications must conform to the rules the connector is designed to follow, or the connector will not be able to process new or modified business objects correctly.

## Overview of business object structure

In the WebSphere Business Integration system, a business object definition consists of a type name, supported verbs, and attributes. An application business object is an instance of a business object definition. It reflects a specific application's data structure and attribute properties.

Some attributes, instead of containing data, point to child business objects or arrays of child business objects that contain the data for these objects.

WebSphere Business Integration Adapter business objects can be flat or hierarchical. A flat business object contains only simple attributes, that is, attributes that represent a single value (such as a String). A hierarchical business object contains both simple attributes and child business objects or arrays of child business objects that contain the values.

A cardinality 1 container object, or single-cardinality relationship, occurs when an attribute in a parent business object contains a single child business object. In this case, the child business object represents a collection that can contain only one record. The type of the attribute is the same as that of the child business object.

A cardinality n container object, or multiple-cardinality relationship, occurs when an attribute in the parent business object contains an array of child business objects. In this case, the child business object represents a collection that can contain multiple records. The type of the attribute is the same as the type of the array of child business objects.

A hierarchical business object can have simple attributes and can also have attributes that represent either a single-cardinality child business object or an array of child business objects. In turn, each of these business objects can contain single-cardinality child business objects and arrays of business objects, and so on.

## Business Object structure for RPG, COBOL, and Java programs

The business object for the iSeries adapter is a flat business object. The attributes can be input, output or inout parameters. One of the attributes needs to be a key for the business object designer.

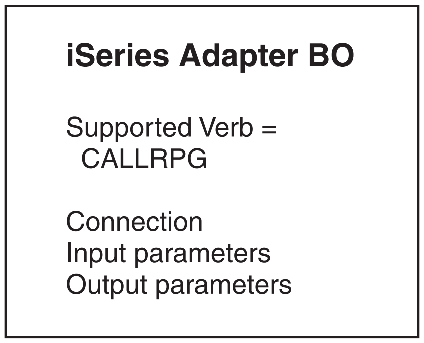


*Figure 3. The iSeries parent business object*

Also, there is a child attribute of type Connection. This contains information about the connection to the AS/400 machine; the HostName, UserName and Password. These attributes are all mandatory and thus `is Required` is set true for all of them. This Connection business object is a child attribute to all the iSeries business objects.

**Note:** In the iSeries business object, the connection business object's application-specific information can be blank. This is because the business object ASI is not processed by the adapter.

The information within brackets in Figure 5 represents the business object's application-specific information.

**Note:** Verb names are not case sensitive. For example, the verb getqueue can be spelt as GETQUEUE or GetQueue.

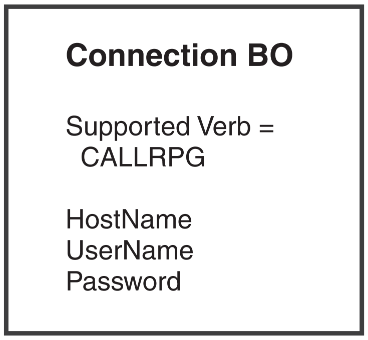


*Figure 4. The iSeries child business object*

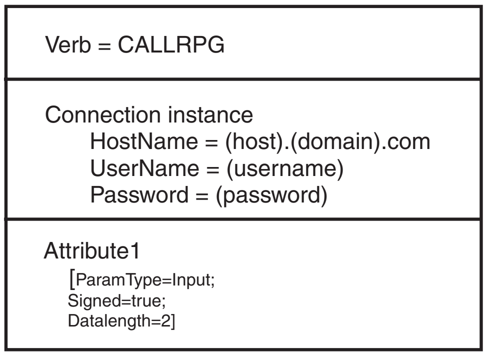
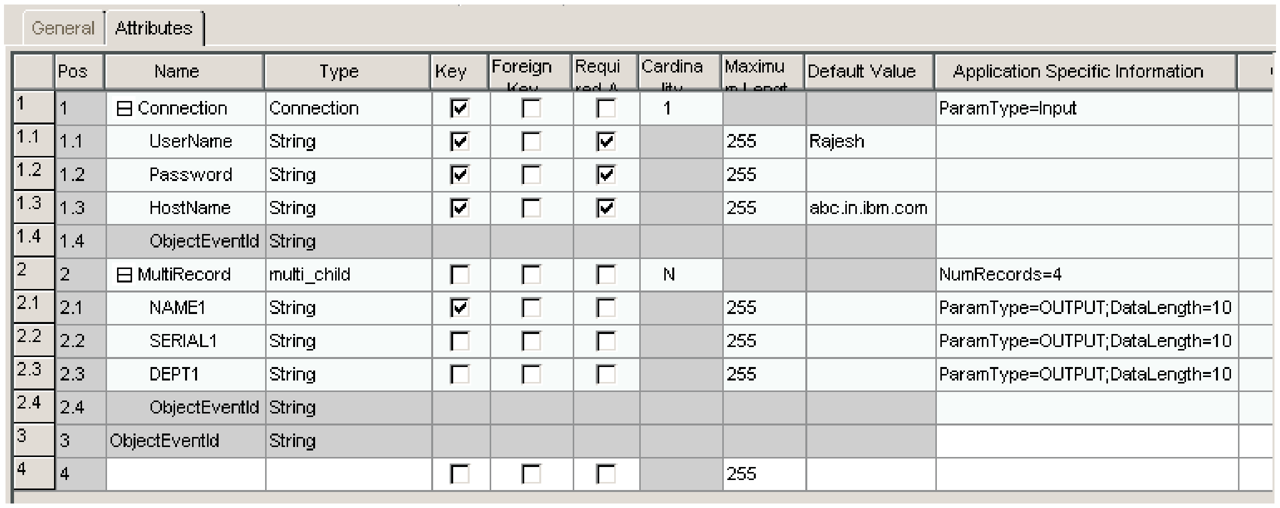


*Figure 5. Example of a RPG business object*

The RPG business object consists of either of the verbs CALLRPG or CALLPGM and the program name (the full path of the IFSFile) is set as the verb's ASI. CALLRPG is used for calling RPG programs and CALLPGM is used to call any PGM (including RPG, COBOL, and Java programs). Apart from the Connection child attribute, the RPG business object has attributes corresponding to the RPG program parameters. The Name of the attribute is same as the name of the corresponding parameter specified in the source program. The MaxLength property of the attributes (representing an RPG Parameter) is derived from the corresponding parameter length specified in the PARM Spec of the source program. If the parameter is a number, the corresponding decimal part's length is also mentioned in the ASI as `DecimalPositions=n` and `packedDec=true`.

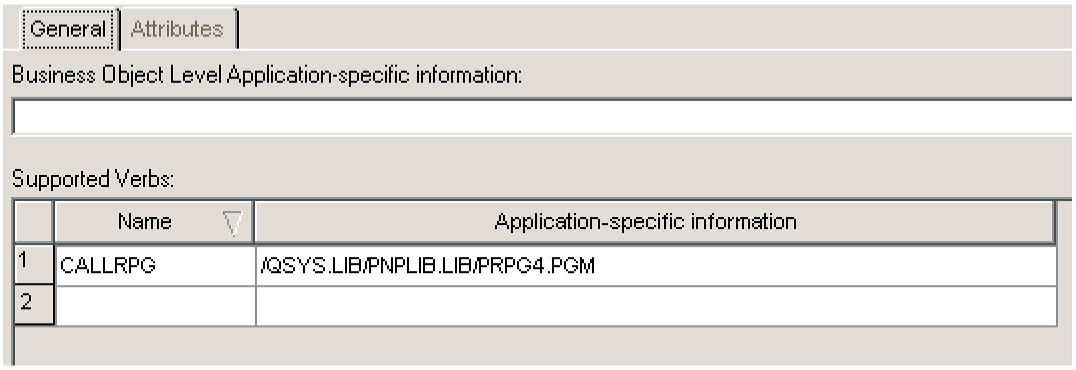
The adapter can be used to call a PGM multiple times with a single Request business object with multiple instances. An example is shown in Figure 6.


General | Attributes

| | Pos | Name | Type | Key | Foreign Key | Required | Cardinality | Maximum Length | Default Value | Application Specific Information |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | ⊟ Connection | Connection | ☑ | ☐ | ☐ | 1 | | | ParamType=Input |
| 1.1 | 1.1 | UserName | String | ☑ | ☐ | ☑ | | 255 | Rajesh | |
| 1.2 | 1.2 | Password | String | ☑ | ☐ | ☑ | | 255 | | |
| 1.3 | 1.3 | HostName | String | ☑ | ☐ | ☑ | | 255 | abc.in.ibm.com | |
| 1.4 | 1.4 | ObjectEventId | String | | | | | | | |
| 2 | 2 | ⊟ MultiRecord | multi_child | ☐ | ☐ | ☐ | N | | | NumRecords=4 |
| 2.1 | 2.1 | NAME1 | String | ☑ | ☐ | ☐ | | 255 | | ParamType=OUTPUT;DataLength=10 |
| 2.2 | 2.2 | SERIAL1 | String | ☐ | ☐ | ☐ | | 255 | | ParamType=OUTPUT;DataLength=10 |
| 2.3 | 2.3 | DEPT1 | String | ☐ | ☐ | ☐ | | 255 | | ParamType=OUTPUT;DataLength=10 |
| 2.4 | 2.4 | ObjectEventId | String | | | | | | | |
| 3 | 3 | ObjectEventId | String | | | | | | | |
| 4 | 4 | | | ☐ | ☐ | ☐ | | 255 | | |

*Figure 6. Single Request business object with multiple instances*

Figure 7 shows the Parent business object with connection information and the Child business object with the PGM's parameter information. The connection information is available in the Connection business object and the Verb ASI is the same as the path of the program to be called.


General | Attributes

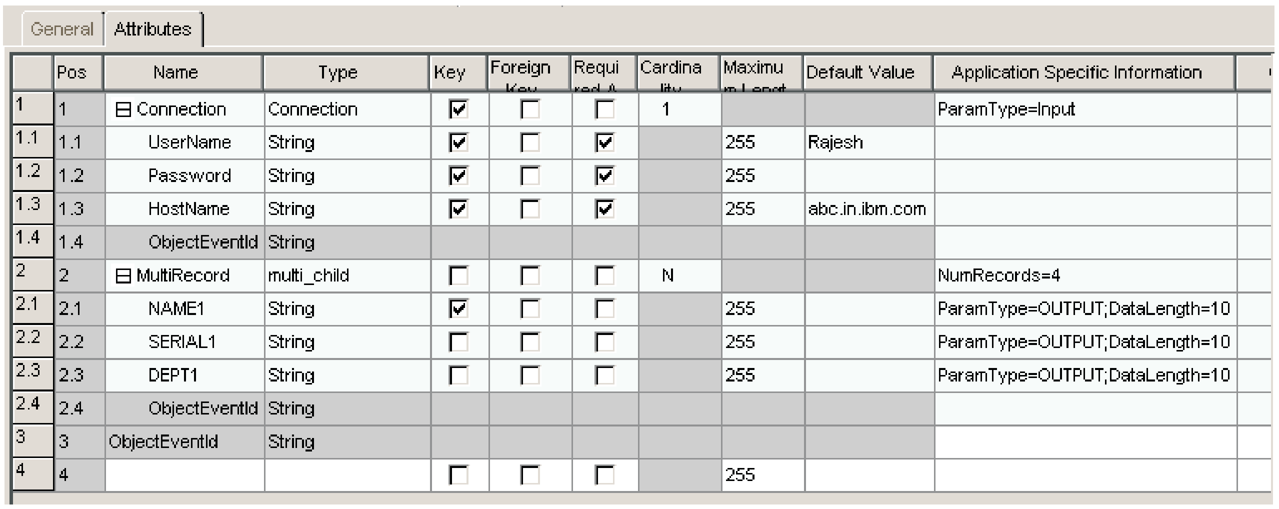
Business Object Level Application-specific information:

Supported Verbs:

| | Name | Application-specific information |
|---|---|---|
| 1 | CALLRPG | /QSYS.LIB/PNPLIB.LIB/PRPG4.PGM |
| 2 | | |

*Figure 7. Parent business object with connection information*

The child business object is shown in Figure 8 with attributes corresponding to parameter information of the program.

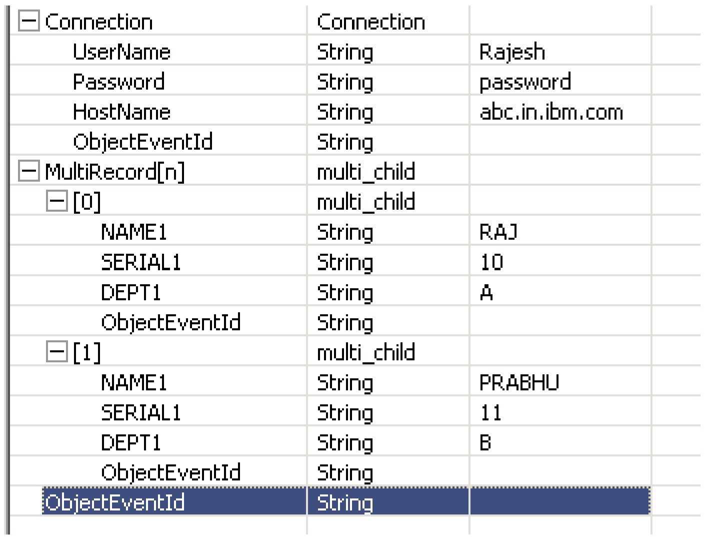


General | Attributes

| | Pos | Name | Type | Key | Foreign Key | Required | Cardinality | Maximum Length | Default Value | Application Specific Information |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | ⊟ Connection | Connection | ☑ | ☐ | ☐ | 1 | | | ParamType=Input |
| 1.1 | 1.1 | UserName | String | ☑ | ☐ | ☑ | | 255 | Rajesh | |
| 1.2 | 1.2 | Password | String | ☑ | ☐ | ☑ | | 255 | | |
| 1.3 | 1.3 | HostName | String | ☑ | ☐ | ☑ | | 255 | abc.in.ibm.com | |
| 1.4 | 1.4 | ObjectEventId | String | | | | | | | |
| 2 | 2 | ⊟ MultiRecord | multi_child | ☐ | ☐ | ☐ | N | | | NumRecords=4 |
| 2.1 | 2.1 | NAME1 | String | ☑ | ☐ | ☐ | | 255 | | ParamType=OUTPUT;DataLength=10 |
| 2.2 | 2.2 | SERIAL1 | String | ☐ | ☐ | ☐ | | 255 | | ParamType=OUTPUT;DataLength=10 |
| 2.3 | 2.3 | DEPT1 | String | ☐ | ☐ | ☐ | | 255 | | ParamType=OUTPUT;DataLength=10 |
| 2.4 | 2.4 | ObjectEventId | String | | | | | | | |
| 3 | 3 | ObjectEventId | String | | | | | | | |
| 4 | 4 | | | ☐ | ☐ | ☐ | | 255 | | |

*Figure 8. Child business object with corresponding parameter information*

The example in Figure 9 shows a Business object with 2 instances of multi_child Business Object, thus the program will be executed twice. Make sure you use the appropriate XSD files for Multi record retrieval.



| | | |
|---|---|---|
| ⊟ Connection | Connection | |
| UserName | String | Rajesh |
| Password | String | password |
| HostName | String | abc.in.ibm.com |
| ObjectEventId | String | |
| ⊟ MultiRecord[n] | multi_child | |
| ⊟ [0] | multi_child | |
| NAME1 | String | RAJ |
| SERIAL1 | String | 10 |
| DEPT1 | String | A |
| ObjectEventId | String | |
| ⊟ [1] | multi_child | |
| NAME1 | String | PRABHU |
| SERIAL1 | String | 11 |
| DEPT1 | String | B |
| ObjectEventId | String | |
| ObjectEventId | String | |

*Figure 9. Business object with 2 instances of a multi-child business object*

## Connector business object processing

The connector passes business objects between the integration broker and the AS/400 system.

When an integration broker passes a business object to the connector, the connector performs the following operations:

1. Uses the information in the connection child attribute to connect to the AS/400 system.
2. Builds the parameter list for the RPG program based on the attributes in the business object.
3. Executes the RPG program corresponding to the business object.
4. Returns the result of executing the program: success or failure.

Use Business Object Designer ODA to create the business objects. Create the business object definition, and add the required attributes. Then configure the connector to support the business object. For more information regarding the Business Object Designer ODA, see Chapter 5, "Creating and modifying business objects," on page 39.

## Business Object structure for iSeries data queues

For the data queues business object, the attributes represent the data queue fields. Apart from these, it has a child Connection attribute. There can be parent-child kind of relationship if there is a AS400Structure as part of the data queue fields. The valid verbs supported are GETQUEUE and PUTQUEUE.

**Note:** All verb names are case insensitive. For example, the verb GetQueue can be spelt as GETQUEUE or GetQueue.

The application-specific information for the queues will be at the business object level. The value will be the absolute IFSFile path of the data queue. The total length of the attributes should be equal to the maximum length of an element in the queue. This value is defined when you create the queue on the iSeries machine.

The parameter type can be Input, Output or InOut. Both the Connection Object and all its attributes are set as required. The iSeries ODA generates all the attributes with ASI as `ParamType=InOut` by default. The user can however change them to Input or Output after making sure the change is validated against the program logic.

An example of a data queue business object:

```
Verb=GETQUEUE
BO LEVEL ASI
QSYS.LIB/MYLIB.LIB/MYQUEUE.DTAQ

Connection Instance
        HostName=ibm.siberia.in.com
        UserName=Prapulla
        Password=Prapulla

Attribute1
```

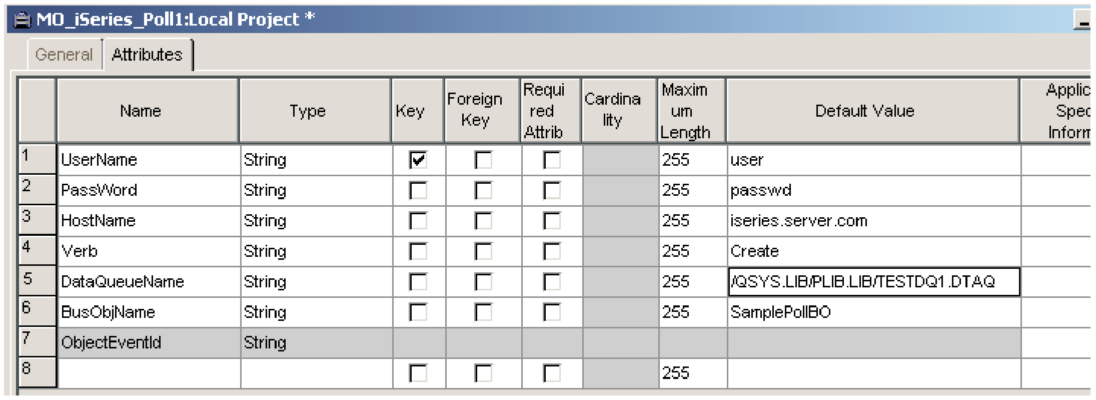
## Configuring meta objects for polling

The iSeries adapter uses meta-objects for all the data queues that receive complete data queue message for changes to either the database or to the data files. You need to configure the meta-objects for all the data queues that receive complete data queue messages.

The meta-object name always starts with `MO_iSeries`. Each meta-object holds information about the data queues. You need to add a dummy verb to all the meta-objects.

The attributes (hostname, username, and password) within the meta objects have a static default value. These default attributes cannot be changed dynamically once the connector is started, since these values are cached in the connector agent. To access the same data queue on a different machine, you must either change the default value and restart the iSeries adapter instance or configure another meta-object for the new machine information.

The verb in the Business object is set to appropriate string, while the DataQueueName attribute is set to the IFS File path of the data queue. The BusObjName attribute contains the name of the corresponding Business object (which contains the verb mentioned in the metaobject).The details read from the queue are filled in this Business object. The attributes of the metaobject are shown in the example below (Figure 11). The corresponding SamplePollBO is shown in Figure 12.

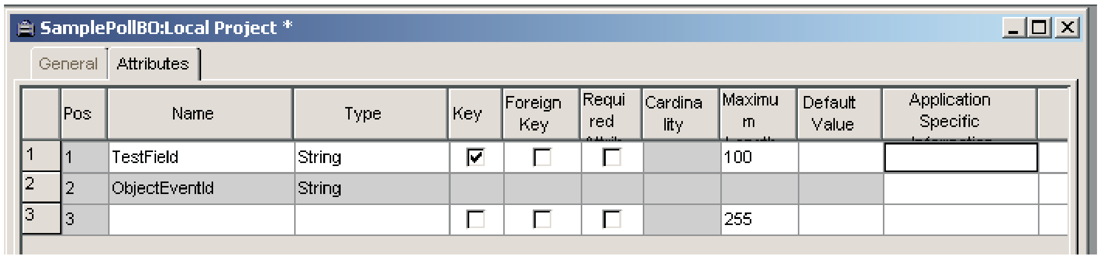


MO_iSeries_Poll1:Local Project *

General | Attributes

| | Name | Type | Key | Foreign Key | Requi red Attrib | Cardina lity | Maxim um Length | Default Value | Applic Spec Inform |
|---|---|---|---|---|---|---|---|---|---|
| 1 | UserName | String | ☑ | ☐ | ☐ | | 255 | user | |
| 2 | PassWord | String | ☐ | ☐ | ☐ | | 255 | passwd | |
| 3 | HostName | String | ☐ | ☐ | ☐ | | 255 | iseries.server.com | |
| 4 | Verb | String | ☐ | ☐ | ☐ | | 255 | Create | |
| 5 | DataQueueName | String | ☐ | ☐ | ☐ | | 255 | /QSYS.LIB/PLIB.LIB/TESTDQ1.DTAQ | |
| 6 | BusObjName | String | ☐ | ☐ | ☐ | | 255 | SamplePollBO | |
| 7 | ObjectEventId | String | | | | | | | |
| 8 | | | ☐ | ☐ | ☐ | | 255 | | |

Figure 10. Example poll business object for a sequential data queue



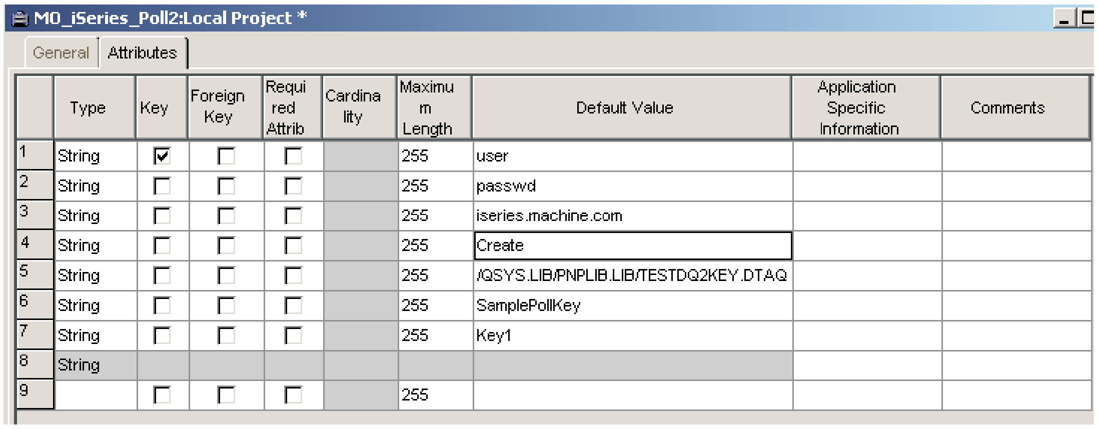
SamplePollBO:Local Project *

General | Attributes

| | Pos | Name | Type | Key | Foreign Key | Requi red | Cardina lity | Maximu m | Default Value | Application Specific |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | TestField | String | ☑ | ☐ | ☐ | | 100 | | |
| 2 | 2 | ObjectEventId | String | | | | | | | |
| 3 | 3 | | | ☐ | ☐ | ☐ | | 255 | | |

Figure 11. Corresponding SamplePollBO

For keyed data queues, a key attribute called "key" will be added to the meta object as shown in Figure 13. The poll call will use the key information to get the corresponding message from the keyed data queue.



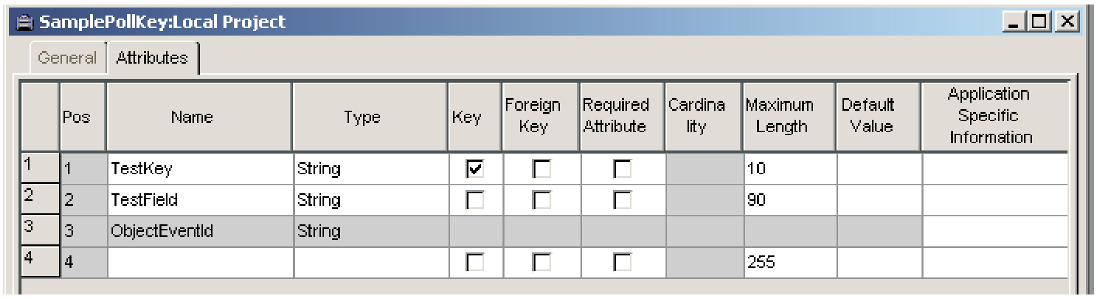
MO_iSeries_Poll2:Local Project *

General | Attributes

| | Type | Key | Foreign Key | Requi red Attrib | Cardina lity | Maximu m Length | Default Value | Application Specific Information | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 1 | String | ☑ | ☐ | ☐ | | 255 | user | | |
| 2 | String | ☐ | ☐ | ☐ | | 255 | passwd | | |
| 3 | String | ☐ | ☐ | ☐ | | 255 | iseries.machine.com | | |
| 4 | String | ☐ | ☐ | ☐ | | 255 | Create | | |
| 5 | String | ☐ | ☐ | ☐ | | 255 | /QSYS.LIB/PNPLIB.LIB/TESTDQ2KEY.DTAQ | | |
| 6 | String | ☐ | ☐ | ☐ | | 255 | SamplePollKey | | |
| 7 | String | ☐ | ☐ | ☐ | | 255 | Key1 | | |
| 8 | String | | | | | | | | |
| 9 | | ☐ | ☐ | ☐ | | 255 | | | |

Figure 12. Example poll business object for keyed data queue

The corresponding example poll business object for keyed data queue is shown in Figure 14.



| | Pos | Name | Type | Key | Foreign Key | Required Attribute | Cardina lity | Maximum Length | Default Value | Application Specific Information |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | TestKey | String | ☑ | ☐ | ☐ | | 10 | | |
| 2 | 2 | TestField | String | ☐ | ☐ | ☐ | | 90 | | |
| 3 | 3 | ObjectEventId | String | | | | | | | |
| 4 | 4 | | | ☐ | ☐ | ☐ | | 255 | | |

Figure 13. Sample poll business object for a keyed data queue

## Specifying business object attribute properties

The iSeries connector has various properties that you can set on its business object attributes. This section describes how the connector interprets several of these properties and describes how to set them when modifying a business object.

The following table shows the properties for simple attributes.

Table 4. Business object attribute properties

| Attribute | Description |
|---|---|
| Name | Unique name of the attribute |
| Type | All simple attributes should be of type String |
| MaxLength | If the attribute value length is greater than the MaxLength specified for the attribute and the attribute represents an input parameter, the value is trimmed to the Maxlength value. If the value length is less than MaxLength, then spaces are padded. |
| IsKey | Not used |
| IsForeignKey | Not used |
| Isrequired | All the input parameters need to have this attribute set to `true`. |
| AppSpecInfo | `ParamType=<value>:Offset=<value>: Signed=<True/False>:DataLength= <value>:PackedDec=<True/False>: ZonedDec=<True/False>: DecimalPositions=<value>` |
| DefaultValue | If set for the attribute, this value shall be used by the connector if one is not set for the input parameter. |

## Specifying business object attribute level application text

The following information is part of the business object attribute -level application text.

Table 5. Business object attributes

| Property | Values | Description |
|---|---|---|
| `ParamType` | Input/Output/InOut | Indicates what type of parameter the attribute represents. |
| `Offset` | Any integer value | Indicates the offset in the byte array from where the parameter value starts. |
| `Signed` | True/false | For integer/short/long types, the property indicates if it is signed. If not set, the value is taken as unsigned. |
| `DataLength` | Any integer value | Applies to integer/short/long types. Used to distinguish the data length for the signed/unsigned types. If not set, a default of `4` is assumed. |
| `DecimalPositions` | Any integer value | Applies for zoned decimal and packed decimal types. The value represents the number of decimal positions. |
| `PackedDec` | True/false | If set to `true`, the attribute represents a packed decimal. |
| `ZonedDec` | True/false | If set to `true`, the attribute represents a zoned decimal. |

## Data conversion from the iSeries or AS/400 toolbox

The Toolbox for iSeries/AS400 has data conversion classes included. The following table matches the iSeries/AS400 data types with the corresponding IBM WebSphere Business Integration datatypes, along with the data conversion class used.

Table 6. Conversion datatypes and classes

| iSeries/AS400 data type | IBM WBI datatype | Data conversion class |
|---|---|---|
| Signed two byte AS/400 number. | Integer - The app specific info - Signed=true; DataLength=2 | AS400Bin2 |
| Signed four byte AS/400 number. | Integer - The app specific info - Signed=true; DataLength=4 | AS400Bin4 |
| Signed two byte AS/400 floating point number. | Float | AS400Float4 |
| Signed four byte AS/400 floating point number. | Double | AS400Float8 |
| Unsigned two byte AS/400 number. | Integer - the app specific info Signed=false; DataLength=2 | AS400UnsignedBin2 |
| Unsigned four byte AS/400 number. | Integer - the app specific info Signed=false; DataLength=4 | AS400UnsignedBin4 |
| Packed-Decimal AS/400 number. | String - the MaxLength attribute property needs to have the number of digits. App specific info - DecimalPositions=<number of decimal positions>; PackedDec=true | AS400PackedDecimal |

*Table 6. Conversion datatypes and classes (continued)*

| **iSeries/AS400 data type** | **IBM WBI datatype** | **Data conversion class** |
|---|---|---|
| Zoned-Decimal AS/400 number. | String - the MaxLength attribute property needs to have the number of digits. App specific info - DecimalPositions=<number of decimal positions>; ZonedDec=true | AS400ZonedDecimal |
| Character data | String - MaxLength has the maximum length for the character data. | AS400Text |
| Date data | String - MaxLength has the maximum length for the date data. | AS400Text |

# Chapter 5. Creating and modifying business objects

This chapter describes the Object Discovery Agent (ODA) for iSeries, and how to use it to generate business object definitions for the IBM WebSphere Business Integration Adapter for iSeries.

This chapter contains the following sections:
- "Overview of the ODA for iSeries"
- "Generating business object definitions"
- "Specifying business object information" on page 45
- "Uploading business objects" on page 47

## Overview of the ODA for iSeries

An Object Discovery Agent (ODA) enables you to generate business object definitions. A business object definition is a template for a business object. The ODA examines specified application objects, "discovers" the elements of those objects that correspond to business object attributes, and generates business object definitions to represent the information. Business Object Designer provides a graphical interface to access the Object Discovery Agent and to work with it interactively.

The ODA for iSeries generates business object definitions for accessing RPG and RPGLE programs as well as data queue objects on the iSeries system. The Business Object Designer wizard automates the process of creating these definitions. You use the ODA to create business objects and Connector Configurator to configure the connector to support them.

## Generating business object definitions

This section describes how to use the iSeries ODA in Business Object Designer to generate business object definitions. For information on launching and using Business Object Designer, see *IBM WebSphere Business Integration Adapters Business Object Development Guide*.

### Starting the iSeries ODA

You can start the iSeries ODA using one of the following scripts:
- Windows – `start_iSeriesODA.bat`

  **Note:** You can also start the iSeries ODA using the shortcut that the Installer automatically creates for Windows environments.
- UNIX – `start_iSeriesODA.sh`

You select, configure, and run the iSeries ODA using Business Object Designer. Business Object Designer locates each ODA by the name specified in the `AGENTNAME` variable of each script or batch file.

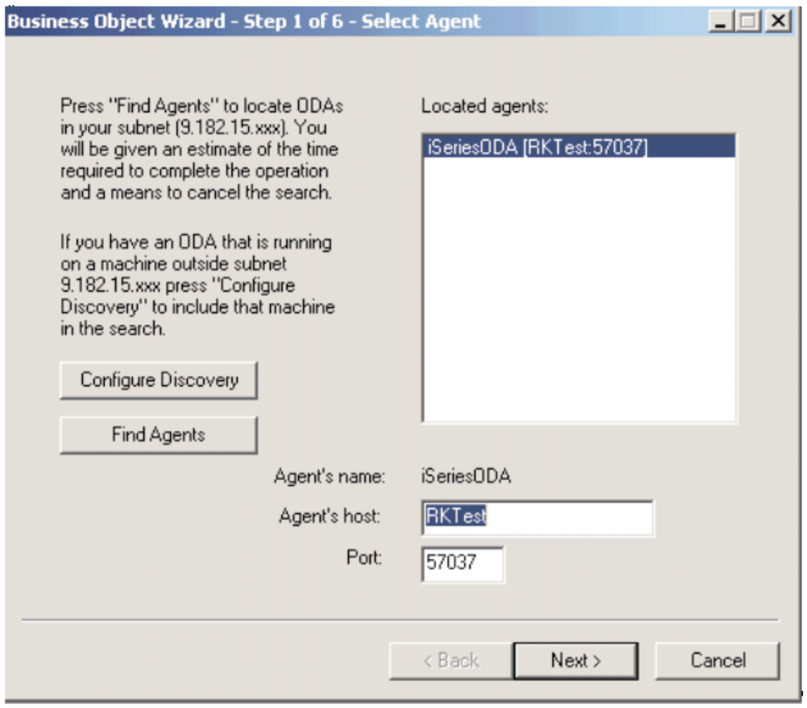
### Running Business Object Designer

Business Object Designer provides a wizard that guides you through the steps to generate a business object definition using the ODA.

## Selecting the agent

You must first select the ODA agent.

1. Open Business Object Designer.
2. Click **File** > **New Using ODA**. The Business Object Wizard - Step 1 of 6 - Select Agent window opens.
3. Select the ODA/AGENTNAME (from the start_iSeriesODA script) in the Located agents list and click Next. (You may have to click Find Agents if desired agent is not listed.)


Business Object Wizard - Step 1 of 6 - Select Agent

Press "Find Agents" to locate ODAs in your subnet (9.182.15.xxx). You will be given an estimate of the time required to complete the operation and a means to cancel the search.

If you have an ODA that is running on a machine outside subnet 9.182.15.xxx press "Configure Discovery" to include that machine in the search.

Located agents: iSeriesODA [RKTest:57037]

Agent's name: iSeriesODA

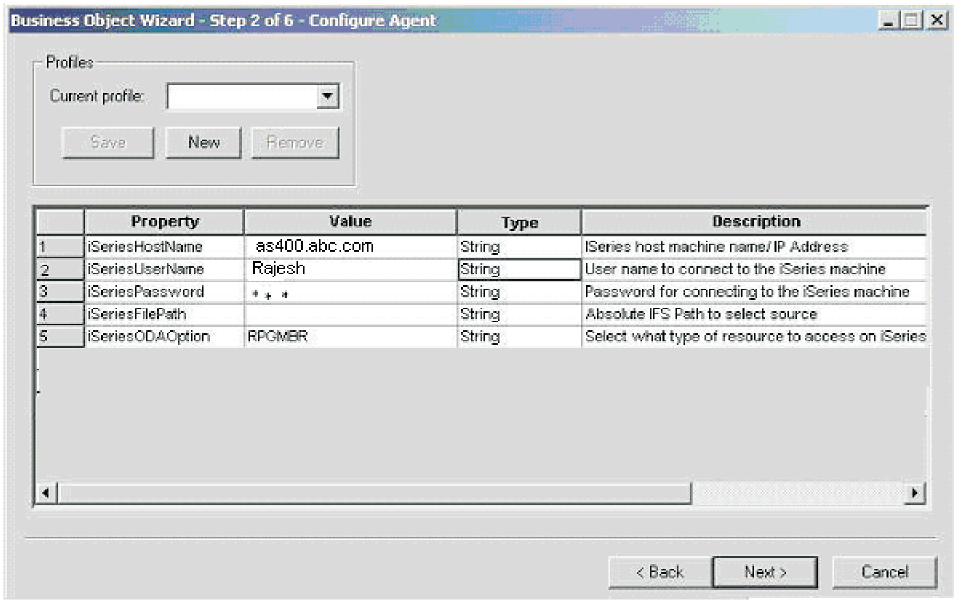
Agent's host: RKTest

Port: 57037

*Figure 14. Select Agent window*

## Configuring the agent

After you click Next on the Select Agent window, the Business Object Wizard - Step 2 of 6 - Configure Agent window opens.


Business Object Wizard - Step 2 of 6 - Configure Agent

Profiles

Current profile:

|  | Property | Value | Type | Description |
|---|---|---|---|---|
| 1 | iSeriesHostName | as400.abc.com | String | ISeries host machine name/ IP Address |
| 2 | iSeriesUserName | Rajesh | String | User name to connect to the iSeries machine |
| 3 | iSeriesPassword | * * * | String | Password for connecting to the iSeries machine |
| 4 | iSeriesFilePath |  | String | Absolute IFS Path to select source |
| 5 | iSeriesODAOption | RPGMBR | String | Select what type of resource to access on iSeries |

*Figure 15. Configure Agent window*

The properties you set on this screen are described in Table 5. You can save all the values you enter on this screen to a profile. Instead of retyping the property data the next time you run the ODA, you simply select a profile from the drop-down menu and re-use the saved values. You can save multiple profiles, each with a different set of specified values.

*Table 7. Configure Agent properties*

| Property name | Default value | Type | Description |
|---|---|---|---|
| iSeriesHostName |  | String | (required) The iSeries host machine name. |
| iSeriesUserName |  | String | (required) The User name used to connect to the iSeries machine. |
| iSeriesPassword |  | String | (required) The Password used for connecting to the iSeries machine. |
| iSeriesFilePath | `/QSYS.LIB/` | String | Absolute IFS path to the select source. |

Table 7. Configure Agent properties (continued)

| Property name | Default value | Type | Description |
|---|---|---|---|
| iSeriesODAOption | | String | The type of resource to access on iSeries. Currently there are 3 options: RPGMBR, RPGLEMBR, and DTAQ.<br>If RPGMBR is selected, the IFSFiles entered are considered as RPG format source programs. If RPGLE is entered, the IFSFiles selected are considered as RPGLE format source programs.<br>DTAQ implies the selected IFS file is a DataQueue, can be a Sequential or Keyed Data Queue.<br>Based on this selection, the source files are accessed to create corresponding business object definitions. |

**Note:** RPG and RPGLE source programs of different record lengths are supported as per language format specifications.

Use the New and Save buttons in the Profiles group box any time you want the ODA to create a new profile. When you use the ODA again, you can select an existing profile. Type the value of each property, as defined in Table 7 on page 41.

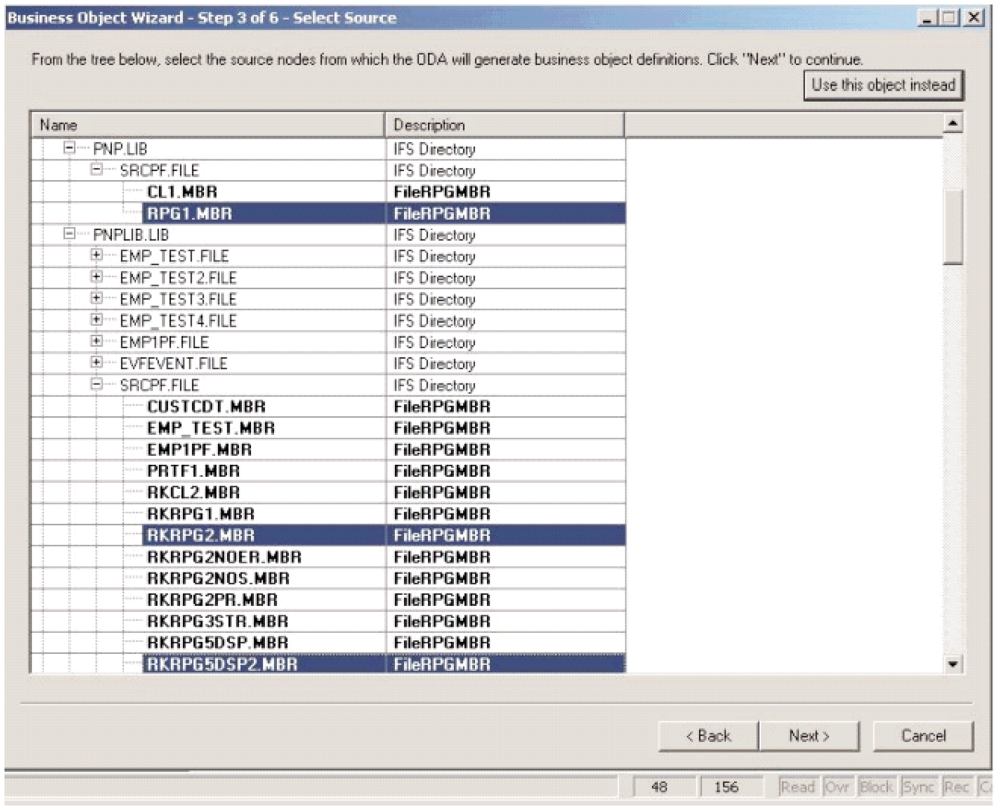
Whenever any required field is left blank or during any error, (for example an invalid username), a pop up message is displayed with the corresponding error message.

**Note:** If you use a profile, the property values are filled in for you, though you can modify the values as needed. You can also save new values.

## Selecting a business object

The Business Object Wizard - Step 3 of 6 - Select Source window opens, as illustrated in Figure 17.

This screen lists either the *.MBRs for RPG or RPGLE source files or *.DTAQ files for data queues, where users can select the names of those files. The file type is decided by the iSeriesODAOption Agent property. The IFS Directories are represented as expandable tree nodes while the source names (MBRs or DTAQs) are shown as leaf nodes. You can select more than one source (leaf nodes only) either in the same IFS directory or in different IFS directories. Use this screen to select any number of source files for which the ODA will generate business object definitions.



From the tree below, select the source nodes from which the ODA will generate business object definitions. Click "Next" to continue.

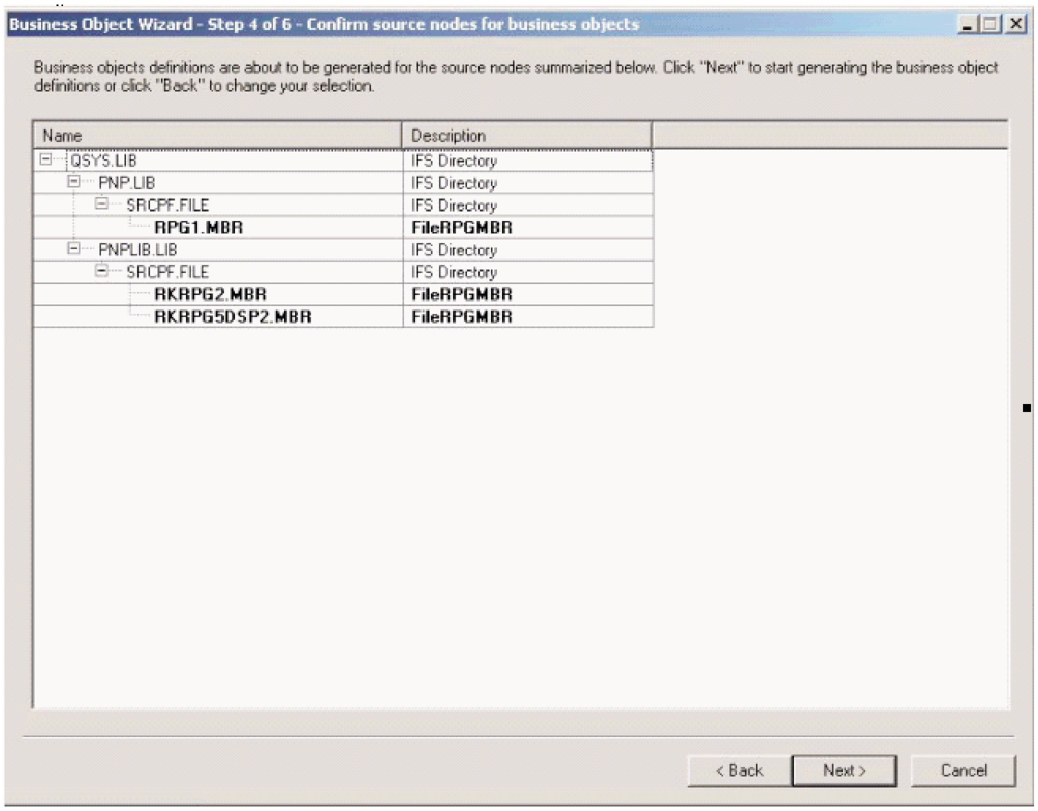
| Name | Description |
|---|---|
| PNP.LIB | IFS Directory |
| SRCPF.FILE | IFS Directory |
| CL1.MBR | FileRPGMBR |
| RPG1.MBR | FileRPGMBR |
| PNPLIB.LIB | IFS Directory |
| EMP_TEST.FILE | IFS Directory |
| EMP_TEST2.FILE | IFS Directory |
| EMP_TEST3.FILE | IFS Directory |
| EMP_TEST4.FILE | IFS Directory |
| EMP1PF.FILE | IFS Directory |
| EVFEVENT.FILE | IFS Directory |
| SRCPF.FILE | IFS Directory |
| CUSTCDT.MBR | FileRPGMBR |
| EMP_TEST.MBR | FileRPGMBR |
| EMP1PF.MBR | FileRPGMBR |
| PRTF1.MBR | FileRPGMBR |
| RKCL2.MBR | FileRPGMBR |
| RKRPG1.MBR | FileRPGMBR |
| RKRPG2.MBR | FileRPGMBR |
| RKRPG2NOER.MBR | FileRPGMBR |
| RKRPG2NOS.MBR | FileRPGMBR |
| RKRPG2PR.MBR | FileRPGMBR |
| RKRPG3STR.MBR | FileRPGMBR |
| RKRPG5DSP.MBR | FileRPGMBR |
| RKRPG5DSP2.MBR | FileRPGMBR |

Figure 16. Select Source window

1. If necessary, expand a node to see a list of sub nodes.
2. Select the source file(s) you want to use. Click Next.
3. To select multiple nodes, see the *Business Object Development Guide* for more information regarding tree structures.

## Confirming the object selection

The Business Object Wizard - Step 4 of 6 - Confirm source nodes for business object definitions window opens. It shows the object(s) you selected.


Business Object Wizard - Step 4 of 6 - Confirm source nodes for business objects

Business objects definitions are about to be generated for the source nodes summarized below. Click "Next" to start generating the business object definitions or click "Back" to change your selection.

| Name | Description |
|---|---|
| QSYS.LIB | IFS Directory |
| PNP.LIB | IFS Directory |
| SRCPF.FILE | IFS Directory |
| **RPG1.MBR** | **FileRPGMBR** |
| PNPLIB.LIB | IFS Directory |
| SRCPF.FILE | IFS Directory |
| **RKRPG2.MBR** | **FileRPGMBR** |
| **RKRPG5DSP2.MBR** | **FileRPGMBR** |

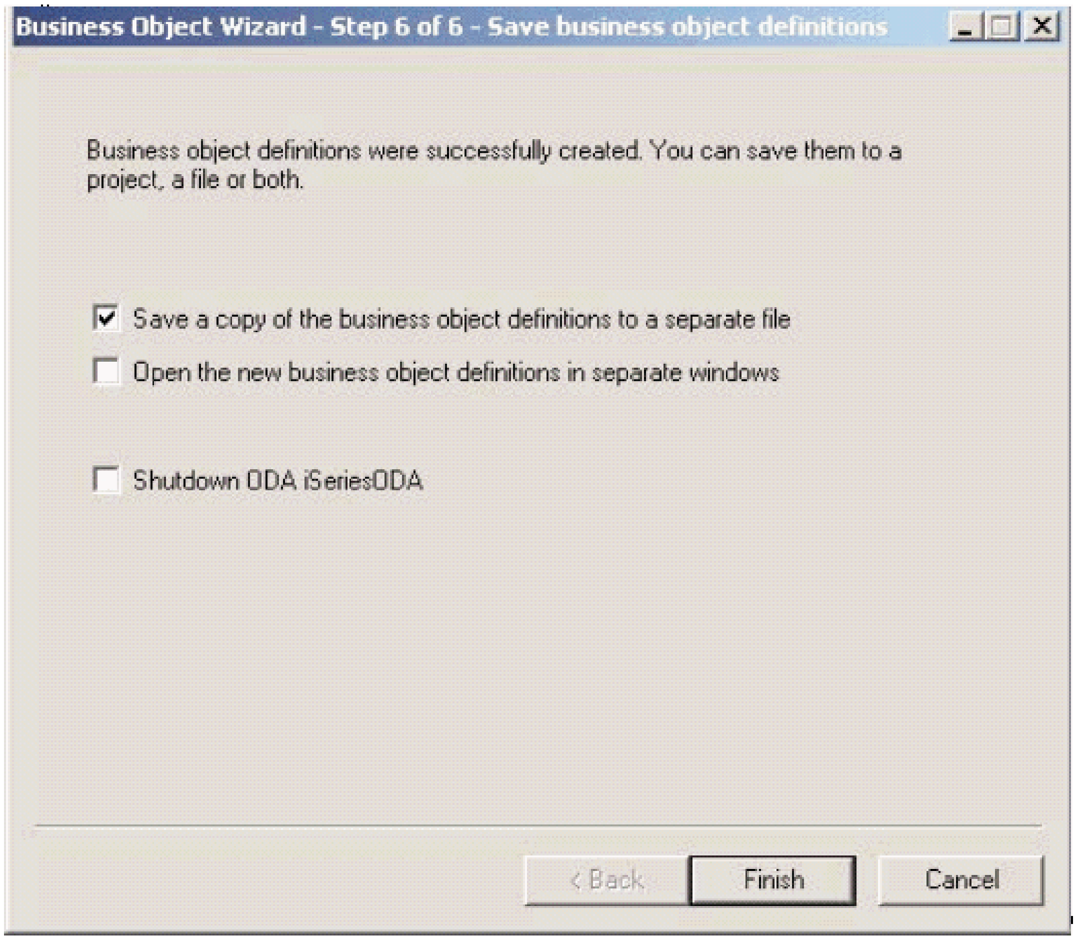
*Figure 17. Confirm source node window*

Click Back to make changes or Next to confirm that the list is correct. The Business Object Wizard - Step 5 of 6 - Generating business objects... window opens with a message stating that the wizard is generating the business objects.

## Generating the business objects

After you confirm your node sources, the iSeries ODA generates the business objects. The Business Object Wizard - Step 6 of 6 - Saving business object definitions... window opens.

1. Check either window Save a copy of the business object definitions to a separate file, or check Open the new business object definitions in separate windows. The latter choice launches the Business Object Designer and opens the business objects in that application.
2. If you are finished and want to close the ODA, check Shutdown ODA and click Finish.


Business Object Wizard - Step 6 of 6 - Save business object definitions

Business object definitions were successfully created. You can save them to a project, a file or both.

[✓] Save a copy of the business object definitions to a separate file

[ ] Open the new business object definitions in separate windows

[ ] Shutdown ODA iSeriesODA

*Figure 18. Save business objects window*

## Specifying business object information

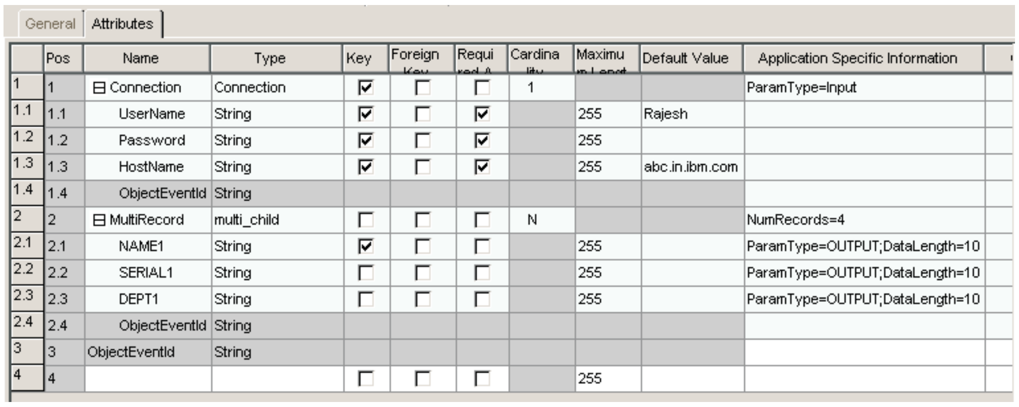
After you create a business object, you can specify the business object-level ASI and the attribute-level ASI.

This section describes how to specify this information using the ODA with Business Object Designer. For a detailed description of these categories of information and what they mean for business object structure in the iSeries connector, seeChapter 4, “Understanding business objects for the connector,” on page 29.

### Specifying the attribute-level ASI

Business Object Designer displays the attributes for the business object. For details about the attribute-level ASI in the iSeries connector, see “Specifying business object attribute level application text” on page 36.

The attributes are listed on the Attributes tab in the order in which they appear in the business object structure, as defined by the numeric value in the Pos column.



General | Attributes

| | Pos | Name | Type | Key | Foreign | Requi | Cardina | Maximu | Default Value | Application Specific Information |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | ⊟ Connection | Connection | ☑ | ☐ | ☐ | 1 | | | ParamType=Input |
| 1.1 | 1.1 | UserName | String | ☑ | ☐ | ☑ | | 255 | Rajesh | |
| 1.2 | 1.2 | Password | String | ☑ | ☐ | ☑ | | 255 | | |
| 1.3 | 1.3 | HostName | String | ☑ | ☐ | ☑ | | 255 | abc.in.ibm.com | |
| 1.4 | 1.4 | ObjectEventId | String | | | | | | | |
| 2 | 2 | ⊟ MultiRecord | multi_child | ☐ | ☐ | ☐ | N | | | NumRecords=4 |
| 2.1 | 2.1 | NAME1 | String | ☑ | ☐ | ☐ | | 255 | | ParamType=OUTPUT;DataLength=10 |
| 2.2 | 2.2 | SERIAL1 | String | ☐ | ☐ | ☐ | | 255 | | ParamType=OUTPUT;DataLength=10 |
| 2.3 | 2.3 | DEPT1 | String | ☐ | ☐ | ☐ | | 255 | | ParamType=OUTPUT;DataLength=10 |
| 2.4 | 2.4 | ObjectEventId | String | | | | | | | |
| 3 | 3 | ObjectEventId | String | | | | | | | |
| 4 | 4 | | | ☐ | ☐ | ☐ | | 255 | | |

*Figure 19. Setting the Attribute ASI*

For each attribute, the window provides the name of the attribute, its type, and the ASI information. On this window, you need to specify a key (required by Business Object Designer to validate and save a business object) for each business object for which the ODA has not already specified a key.

In the business objects, passwords are not set as default value and not traced due to security reasons. The Business object generated for a sequential data queue has one attribute corresponding to its data length. For keyed data queues, there are 2 attributes of which the first one corresponds to the key while the other has the remaining length i.e. Data Length - Key Length. For a business object with an attribute with ASI DataLength = X and DecimalPositions=Y and when a BO is sent with the value of that attribute with greater than X digits (with the number of digits in Decimal Positions are greater than Y) the Connector will truncate this value to a length of decimal part to Y and maintain the Data Length to X and process the Business object successfully. If the integer part exceeds the length X-Y then Connector should throw an error. For example, if the ASI for an attribute is PackedDecimal=True;Datalength=10;DecimalPositions=2, then the values 112345678, 12345678.1, and 12345678.12 are accepted, but the extraneous decimal digits after the maximum limit of 2 in 12345678.123 will be truncated, and the value is taken as 12345678.12. A trace message is given for it as ″Truncated String Value:<12345678.12> for DecimalPositions=2″. The value 123456789.12 will log an error :″ Length is not valid.″

You can also use this window to set child object keys as needed and specify the following information:

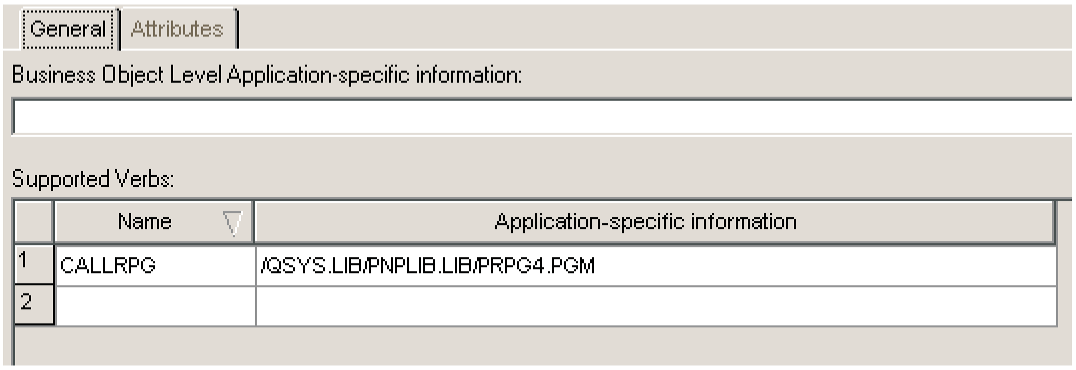
- Is the attribute required for the connector to process the business object? If so, click the Required check box.
- Is the maximum length of the attribute different from the value that appears in the Maximum Length column.
- Does the attribute have a default value? If so, type the value in the Default column.

## Specifying the business object-level ASI

After specifying the attribute-level ASI, you can view and modify the business object-level ASI. For details about business object-level ASI, see “Specifying business object attribute level application text” on page 36.

The business object-level ASI is listed on the General tab. The ASI value that appears in the field Business Object Level Application-specific information contains the name of the proxy class that represents this business object. The connector uses this information to map a proxy class to a business object, and, in the case of a server-side business object (when the connector also runs as a server), the connector uses this information to map an implementation class to a business object.

This screen also lists all the verbs that are supported by the business object and provides the ASI for each verb. On this screen you can modify the ASI of the business object and its supporting verbs.



| | Name | Application-specific information |
|---|---|---|
| 1 | CALLRPG | /QSYS.LIB/PNPLIB.LIB/PRPG4.PGM |
| 2 | | |

Figure 20. Setting the business object-level ASI

## Uploading business objects

The newly created business object definition files must be uploaded to the integration broker once they have been created. The process for uploading depends on whether you are running WebSphere InterChange Server, WebSphere MQ Integrator Broker, or WebSphere Application Server:

- WebSphere InterChange Server: If you have saved your business object definition files to a local machine and need to upload them to the repository on the server, refer to the *Implementation Guide for WebSphere InterChange Server*.
- WebSphere MQ Integrator Broker: You must export the business object definitions out of Business Object Designer and into the integration broker. For details, refer to *Implementing Adapters with WebSphere MQ Integrator Broker*.
- WebSphere Application Server: For details, see *Implementing Adapters with WebSphere Application Server*.

# Chapter 6. Troubleshooting and error handling

This chapter describes how the adapter for iSeries handles errors. The adapter generates logging and tracing messages. The chapter contains the following sections:

This chapter contains the following sections:
- "Error handling"
- "Logging"
- "Tracing messages"

## Error handling

All error messages generated by the connector are stored in a message file named `BIA_ISERIESAdapter.txt`. (The name of the file is determined by the `LogFileName` standard connector configuration property.)

All errors translate to `VerbProcessingFailedException`.

## Logging

The adapter logs an error message whenever it encounters an abnormal condition during processing, regardless of the trace level. When such an error occurs, the connector also prints a textual representation of the failed business object as it was received. It writes the text to the iSeries Adapter log file, whose file name corresponds to the connector property LogFileName. The message contains a detailed description of the condition and the outcome and may also include extra information that may aid in debugging, such as business object dumps or stack traces (for exceptions).

The message IDs for the iSeries adapter range from 93000 to 94000.

## Tracing messages

Tracing is an optional debugging feature you can turn on to closely follow a connector's behavior. Tracing messages are configurable and can be changed dynamically. You set various levels depending on the desired detail. Trace messages, by default, are written to `STDOUT`.

You can also configure tracing to write to a file. The following table describes the types of tracing messages that the iSeries connector outputs at each trace level. All the trace messages appear in the file specified by the connector property TraceFileName. These messages are in addition to any tracing messages output by the IBM WebSphere Business Integration Adapter architecture. For more on configuring trace messages, see the connector configuration properties in "Configuring the connector." For more information on tracing, including how to enable and set it, see the Connector Development Guide.

Table 6 lists the recommended content for connector tracing message levels.

*Table 8. Tracing messages content level description*

| Tracing level | Tracing messages |
|---|---|
| Level 0 | Use this trace level for trace messages that identify the connector version. No other tracing is performed at this level. |
| Level 1 | N/A |
| Level 2 | Use this trace level for trace messages that:<br>• Identify the BO handler used for each object that the connector processes.<br>• Log each time a business object is posted to the integration broker<br>• Indicate each time a request business object is received |
| Level 3 | N/A |
| Level 4 | Use this trace level for trace messages that:<br>• Identify application-specific information. Examples of this include the values returned by the methods that process the application-specific information fields in business objects.<br>• Identify when the connector enters or exits a function. These messages help trace the process flow of the connector.<br>• Record any thread-specific processing. For example, if the connector spawns multiple threads, a message logs the creation of each new thread. |
| Level 5 | Use this trace level for trace messages that:<br>• Indicate connector initialization. This type of message can include, for example, the value of each connector configurator property that has been retrieved from the broker.<br>• Detail the status of each thread that the connector spawns while it is running.<br>• Represent statements executed in the application. The connector log file contains all statements executed in the target application and the value of any variables that are substituted, where applicable.<br>• Record business object dumps. The connector should output a text representation of a business object before it begins processing (showing the object that the connector receives from the collaboration) as well as after it finishes processing the object (showing the object that the connector returns to the collaboration). |

# Appendix. Standard configuration properties for connectors

This appendix describes the standard configuration properties for the connector component of WebSphere Business Integration adapters. The information covers connectors running with the following integration brokers:

- WebSphere InterChange Server (ICS)
- WebSphere MQ Integrator, WebSphere MQ Integrator Broker, and WebSphere Business Integration Message Broker, collectively referred to as the WebSphere Message Brokers (and shown as WMQI in the Connector Configurator).
- Information Integrator (II)
- WebSphere Application Server (WAS)

If your adapter supports DB2 Information Integrator, use the WMQI options and the DB2 II standard properties (see the Notes column in Table 9 on page 53.)

The properties you set for the adapter depend on which integration broker you use. You choose the integration broker using Connector Configurator. After you choose the broker, Connector Configurator lists the standard properties you must configure for the adapter.

For information about properties specific to this connector, see the relevant section in this guide.

## New properties

This standard property was added in this release:

- BOTrace

## Standard connector properties overview

Connectors have two types of configuration properties:

- Standard configuration properties, which are used by the framework
- Application, or connector-specific, configuration properties, which are used by the agent

These properties determine the adapter framework and the agent run-time behavior.

This section describes how to start Connector Configurator and describes characteristics common to all properties. For information on configuration properties specific to a connector, see its adapter user guide.

### Starting Connector Configurator

You configure connector properties from Connector Configurator, which you access from System Manager. For more information on using Connector Configurator, refer to the sections on Connector Configurator in this guide.

Connector Configurator and System Manager run only on the Windows system. If you are running the connector on a UNIX system, you must have a Windows machine with these tools installed.

To set connector properties for a connector that runs on UNIX, you must start up System Manager on the Windows machine, connect to the UNIX integration broker, and bring up Connector Configurator for the connector.

## Configuration property values overview

The connector uses the following order to determine a property's value:

1. Default
2. Repository (valid only if WebSphere InterChange Server (ICS) is the integration broker)
3. Local configuration file
4. Command line

The default length of a property field is 255 characters. There is no limit on the length of a STRING property type. The length of an INTEGER type is determined by the server on which the adapter is running.

A connector obtains its configuration values at startup. If you change the value of one or more connector properties during a run-time session, the property's update method determines how the change takes effect.

The update characteristics of a property, that is, how and when a change to the connector properties takes effect, depend on the nature of the property.

There are four update methods for standard connector properties:

- **Dynamic**
  The new value takes effect immediately after the change is saved in System Manager. However, if the connector is in stand-alone mode (independently of System Manager), for example, if it is running with one of the WebSphere message brokers, you can change properties only through the configuration file. In this case, a dynamic update is not possible.
- **Agent restart (ICS only)**
  The new value takes effect only after you stop and restart the connector agent.
- **Component restart**
  The new value takes effect only after the connector is stopped and then restarted in System Manager. You do not need to stop and restart the agent or the server process.
- **System restart**
  The new value takes effect only after you stop and restart the connector agent and the server.

To determine how a specific property is updated, refer to the **Update Method** column in the Connector Configurator window, or see the Update Method column in Table 9 on page 53.

There are three locations in which a standard property can reside. Some properties can reside in more than one location.

- **ReposController**
  The property resides in the connector controller and is effective only there. If you change the value on the agent side, it does not affect the controller.
- **ReposAgent**
  The property resides in the agent and is effective only there. A local configuration can override this value, depending on the property.

- **LocalConfig**
  The property resides in the configuration file for the connector and can act only through the configuration file. The controller cannot change the value of the property, and is not aware of changes made to the configuration file unless the system is redeployed to update the controller explicitly.

## Standard properties quick-reference

Table 9 provides a quick-reference to the standard connector configuration properties. Not all connectors require all of these properties, and property settings may differ from integration broker to integration broker.

See the section following the table for a description of each property.

**Note:** In the Notes column in Table 9, the phrase “RepositoryDirectory is set to <REMOTE>” indicates that the broker is InterChange Server. When the broker is WMQI or WAS, the repository directory is set to *<ProductDir>*\repository

*Table 9. Summary of standard configuration properties*

| **Property name** | **Possible values** | **Default value** | **Update method** | **Notes** |
|---|---|---|---|---|
| AdapterHelpName | One of the valid subdirectories in *<ProductDir>*\bin\Data \App\Help\ that contains a valid *<RegionalSetting>* directory | Template name, if valid, or blank field | Component restart | Supported regional settings. Include `chs_chn`, `cht_twn`, `deu_deu`, `esn_esp`, `fra_fra`, `ita_ita`, `jpn_jpn`, `kor_kor`, `ptb_bra`, and `enu_usa` (default). |
| AdminInQueue | Valid JMS queue name | `<CONNECTORNAME>` `/ADMININQUEUE` | Component restart | This property is valid only when the value of DeliveryTransport is `JMS` |
| AdminOutQueue | Valid JMS queue name | `<CONNECTORNAME>` `/ADMINOUTQUEUE` | Component restart | This property is valid only when the value of DeliveryTransport is `JMS` |
| AgentConnections | `1` through `4` | `1` | Component restart | This property is valid only when the value of DeliveryTransport is `MQ` or `IDL`, the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| AgentTraceLevel | `0` through `5` | `0` | Dynamic if broker is ICS; otherwise Component restart | |
| ApplicationName | Application name | The value specified for the connector application name | Component restart | |

*Table 9. Summary of standard configuration properties (continued)*

| Property name | Possible values | Default value | Update method | Notes |
|---|---|---|---|---|
| BiDi.Application | Any valid combination of these bidirectional attributes:<br><br>1st letter: I,V<br>2nd letter: L,R<br>3rd letter: Y, N<br>4th letter: S, N<br>5th letter: H, C, N | ILYNN (five letters) | Component restart | This property is valid only if the value of BiDi.Transforma tion is true |
| BiDi.Broker | Any valid combination of these bidirectional attributes:<br><br>1st letter: I,V<br>2nd letter: L,R<br>3rd letter: Y, N<br>4th letter: S, N<br>5th letter: H, C, N | ILYNN (five letters) | Component restart | This property is valid only if the value of BiDi.Transformation is true. If the value of BrokerType is ICS, the property is read-only. |
| BiDi.Metadata | Any valid combination of these bidirectional attributes:<br><br>1st letter: I,V<br>2nd letter: L,R<br>3rd letter: Y, N<br>4th letter: S, N<br>5th letter: H, C, N | ILYNN (five letters) | Component restart | This property is valid only if the value of BiDi.Transformation is true. |
| BiDi.Transformation | true or false | false | Component restart | This property is valid only if the value of BrokerType is not WAS. |
| BOTrace | none or keys or full | none | Agent restart | This property is valid only if the value of AgentTraceLevel is lower than 5. |
| BrokerType | ICS, WMQI, WAS | ICS | Component restart | |
| CharacterEncoding | Any supported code. The list shows this subset: ascii7, ascii8, SJIS, Cp949, GBK, Big5, Cp297, Cp273, Cp280, Cp284, Cp037, Cp437<br>. | ascii7 | Component restart | This property is valid only for C++ connectors. |
| CommonEventInfrastruc ture | true or false | false | Component restart | |
| CommonEventInfrastruc tureURL | A URL string, for example, corbaloc:iiop: host:2809. | No default value. | Component restart | This property is valid only if the value of CommonEvent Infrastructure is true. |
| ConcurrentEventTrig geredFlows | 1 through 32,767 | 1 | Component restart | This property is valid only if the value of RepositoryDirectory is set to &lt;REMOTE&gt; and the value of BrokerType is ICS. |
| ContainerManagedEvents | Blank or JMS | Blank | Component restart | This property is valid only when the value of Delivery Transport is JMS. |

*Table 9. Summary of standard configuration properties (continued)*

| Property name | Possible values | Default value | Update method | Notes |
|---|---|---|---|---|
| ControllerEventSequencing | `true` or `false` | `true` | Dynamic | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| ControllerStoreAndForwardMode | `true` or `false` | `true` | Dynamic | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| ControllerTraceLevel | `0` through `5` | `0` | Dynamic | This property is valid only if the value of RepositoryDirectory is set to <REMOTE> and the value of BrokerType is ICS. |
| DeliveryQueue | Any valid JMS queue name | *<CONNECTORNAME>* /DELIVERYQUEUE | Component restart | This property is valid only when the value of Delivery Transport is `JMS`. |
| DeliveryTransport | `MQ`, `IDL`, or `JMS` | `IDL` when the value of RepositoryDirectory is <REMOTE>, otherwise `JMS` | Component restart | If the value of RepositoryDirectory is not <REMOTE>, the only valid value for this property is `JMS`. |
| DuplicateEventElimination | `true` or `false` | `false` | Component restart | This property is valid only if the value of DeliveryTransport is `JMS`. |
| EnableOidForFlowMonitoring | `true` or `false` | `false` | Component restart | This property is valid only if the value of BrokerType is ICS. |
| FaultQueue | Any valid queue name. | *<CONNECTORNAME>* /FAULTQUEUE | Component restart | This property is valid only if the value of DeliveryTransport is `JMS`. |
| jms.FactoryClassName | `CxCommon.Messaging.jms .IBMMQSeriesFactory`, `CxCommon.Messaging .jms.SonicMQFactory`, or any Java class name | `CxCommon.Messaging. jms.IBMMQSeriesFactory` | Component restart | This property is valid only if the value of DeliveryTransport is `JMS`. |
| jms.ListenerConcurrency | `1` through `32767` | `1` | Component restart | This property is valid only if the value of jms.TransportOptimized is `true`. |
| jms.MessageBrokerName | If the value of jms.FactoryClassName is `IBM`, use `crossworlds.queue. manager`. | `crossworlds.queue. manager` | Component restart | This property is valid only if the value of DeliveryTransport is `JMS` . |
| jms.NumConcurrentRequests | Positive integer | `10` | Component restart | This property is valid only if the value of DeliveryTransport is `JMS` . |

*Table 9. Summary of standard configuration properties (continued)*

| **Property name** | **Possible values** | **Default value** | **Update method** | **Notes** |
|---|---|---|---|---|
| jms.Password | Any valid password | | Component restart | This property is valid only if the value of DeliveryTransport is `JMS` . |
| jms.TransportOptimized | `true` or `false` | `false` | Component restart | This property is valid only if the value of DeliveryTransport is `JMS` and the value of BrokerType is `ICS`. |
| jms.UserName | Any valid name | | Component restart | This property is valid only if the value of Delivery Transport is `JMS`. |
| JvmMaxHeapSize | Heap size in megabytes | `128m` | Component restart | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| JvmMaxNativeStackSize | Size of stack in kilobytes | `128k` | Component restart | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| JvmMinHeapSize | Heap size in megabytes | `1m` | Component restart | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| ListenerConcurrency | `1` through `100` | `1` | Component restart | This property is valid only if the value of DeliveryTransport is `MQ`. |
| Locale | This is a subset of the supported locales: `en_US`, `ja_JP`, `ko_KR`, `zh_CN`, `zh_TW`, `fr_FR`, `de_DE`, `it_IT`, `es_ES`, `pt_BR` | `en_US` | Component restart | |
| LogAtInterchangeEnd | `true` or `false` | `false` | Component restart | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| MaxEventCapacity | `1` through `2147483647` | `2147483647` | Dynamic | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| MessageFileName | Valid file name | `InterchangeSystem.txt` | Component restart | |

Table 9. Summary of standard configuration properties (continued)

| Property name | Possible values | Default value | Update method | Notes |
|---|---|---|---|---|
| MonitorQueue | Any valid queue name | <CONNECTORNAME> /MONITORQUEUE | Component restart | This property is valid only if the value of DuplicateEventElimination is true and ContainerManagedEvents has no value. |
| OADAutoRestartAgent | true or false | false | Dynamic | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| OADMaxNumRetry | A positive integer | 1000 | Dynamic | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| OADRetryTimeInterval | A positive integer in minutes | 10 | Dynamic | This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS. |
| PollEndTime | HH = 0 through 23 MM = 0 through 59 | HH:MM | Component restart | |
| PollFrequency | A positive integer (in milliseconds) | 10000 | Dynamic if broker is ICS; otherwise Component restart | |
| PollQuantity | 1 through 500 | 1 | Agent restart | This property is valid only if the value of ContainerManagedEvents is JMS. |
| PollStartTime | HH = 0 through 23 MM = 0 through 59 | HH:MM | Component restart | |
| RepositoryDirectory | <REMOTE> if the broker is ICS; otherwise any valid local directory. | For ICS, the value is set to <REMOTE><br><br>For WMQI and WAS, the value is <ProductDir \repository | Agent restart | |
| RequestQueue | Valid JMS queue name | <CONNECTORNAME> /REQUESTQUEUE | Component restart | This property is valid only if the value of DeliveryTransport is JMS |
| ResponseQueue | Valid JMS queue name | <CONNECTORNAME> /RESPONSEQUEUE | Component restart | This property is valid only if the value of DeliveryTransport is JMS. |
| RestartRetryCount | 0 through 99 | 7 | Dynamic if ICS; otherwise Component restart | |

*Table 9. Summary of standard configuration properties (continued)*

| Property name | Possible values | Default value | Update method | Notes |
|---|---|---|---|---|
| RestartRetryInterval | A value in minutes from 1 through `2147483647` | 1 | Dynamic if ICS; otherwise Component restart | |
| ResultsSetEnabled | `true` or `false` | `false` | Component restart | Used only by connectors that support DB2II.<br><br>This property is valid only if the value of DeliveryTransport is `JMS`, and the value of BrokerType is `WMQI`. |
| ResultsSetSize | Positive integer | 0 (means the results set size is unlimited) | Component restart | Used only by connectors that support DB2II.<br><br>This property is valid only if the value of ResultsSetEnabled is `true`. |
| RHF2MessageDomain | `mrm` or `xml` | `mrm` | Component restart | This property is valid only if the value of DeliveryTransport is `JMS` and the value of WireFormat is `CwXML`. |
| SourceQueue | Any valid WebSphere MQ queue name | *<CONNECTORNAME>* `/SOURCEQUEUE` | Agent restart | This property is valid only if the value of ContainerManagedEvents is `JMS`. |
| SynchronousRequest Queue | Any valid queue name. | *<CONNECTORNAME>* `/SYNCHRONOUSREQUEST QUEUE` | Component restart | This property is valid only if the value of DeliveryTransport is `JMS`. |
| SynchronousRequest Timeout | `0` to any number (milliseconds) | `0` | Component restart | This property is valid only if the value of DeliveryTransport is `JMS`. |
| SynchronousResponse Queue | Any valid queue name | *<CONNECTORNAME>* `/SYNCHRONOUSRESPONSE QUEUE` | Component restart | This property is valid only if the value of DeliveryTransport is `JMS`. |
| TivoliMonitorTransaction Performance | `true` or `false` | `false` | Component restart | |
| WireFormat | `CwXML` or `CwBO` | `CwXML` | Agent restart | The value of this property must be `CwXML` if the value of RepositoryDirectory is not set to <REMOTE>. The value must be `CwBO` if the value of RepositoryDirectory is set to <REMOTE>. |
| WsifSynchronousRequest Timeout | `0` to any number (milliseconds) | `0` | Component restart | This property is valid only if the value of BrokerType is `WAS`. |

*Table 9. Summary of standard configuration properties (continued)*

| Property name | Possible values | Default value | Update method | Notes |
|---|---|---|---|---|
| XMLNameSpaceFormat | `short` or `long` or `no` | `short` | Agent restart | This property is valid only if the value of BrokerType is WMQI or WAS |

## Standard properties

This section describes the standard connector configuration properties.

### AdapterHelpName

The AdapterHelpName property is the name of a directory in which connector-specific extended help files are located. The directory must be located in <*ProductDir*>\bin\Data\App\Help and must contain at least the language directory enu_usa. It may contain other directories according to locale.

The default value is the template name if it is valid, or it is blank.

### AdminInQueue

The AdminInQueue property specifies the queue that is used by the integration broker to send administrative messages to the connector.

The default value is `<CONNECTORNAME>/ADMININQUEUE`

### AdminOutQueue

The AdminOutQueue property specifies the queue that is used by the connector to send administrative messages to the integration broker.

The default value is `<CONNECTORNAME>/ADMINOUTQUEUE`

### AgentConnections

The AgentConnections property controls the number of ORB (Object Request Broker) connections opened when the ORB initializes.

It is valid only if the value of the RepositoryDirectory is set to <REMOTE> and the value of the DeliveryTransport property is MQ or IDL.

The default value of this property is `1`.

### AgentTraceLevel

The AgentTraceLevel property sets the level of trace messages for the application-specific component. The connector delivers all trace messages applicable at the tracing level set and lower.

The default value is `0`.

## ApplicationName

The ApplicationName property uniquely identifies the name of the connector application. This name is used by the system administrator to monitor the integration environment. This property must have a value before you can run the connector.

The default is the name of the connector.

## BiDi.Application

The BiDi.Application property specifies the bidirectional format for data coming from an external application into the adapter in the form of any business object supported by this adapter. The property defines the bidirectional attributes of the application data. These attributes are:

- Type of text: implicit or visual (`I` or `V`)
- Text direction: left-to-right or right-to-left (`L` or `R`)
- Symmetric swapping: on or off (`Y` or `N`)
- Shaping (Arabic): on or off (`S` or `N`)
- Numerical shaping (Arabic): Hindi, contextual, or nominal (`H`, `C`, or `N`)

This property is valid only if the BiDi.Transformation property value is set to true.

The default value is `ILYNN` (implicit, left-to-right, on, off, nominal).

## BiDi.Broker

The BiDi.Broker property specifies the bidirectional script format for data sent from the adapter to the integration broker in the form of any supported business object. It defines the bidirectional attributes of the data, which are as listed under `BiDi.Application` above.

This property is valid only if the BiDi.Transformation property value is set to true. If the BrokerType property is ICS, the property value is read-only.

The default value is `ILYNN` (implicit, left-to-right, on, off, nominal).

## BiDi.Metadata

The BiDi.Metadata property defines the bidirectional format or attributes for the metadata, which is used by the connector to establish and maintain a link to the external application. The attribute settings are specific to each adapter using the bidirectional capabilities. If your adapter supports bidirectional processing, refer to the section on adapter-specific properties for more information.

This property is valid only if the BiDi.Transformation property value is set to true.

The default value is `ILYNN` (implicit, left-to-right, on, off, nominal).

## BiDi.Transformation

The BiDi.Transformation property defines whether or not the system performs a bidirectional transformation at run time.

If the property value is set to `true`, the BiDi.Application, BiDi.Broker, and BiDi.Metadata properties are available. If the property value is set to `false`, they are hidden.

The default value is `false`.

## BOTrace

The BOTrace property specifies whether or not business object trace messages are enabled at run time.

**Note:** It applies only when the AgentTraceLevel property is set to less than 5.

When the trace level is set to less than 5, you can use these command line parameters to reset the value of BOTrace.

- Enter `-xBOTrace=Full` to dump all the business object's attributes.
- Enter `-xBOTrace=Keys` to dump only the business object's keys.
- Enter `-xBOTrace=None` to disable business object attribute dumping.

The default value is `false`.

## BrokerType

The BrokerType property identifies the integration broker type that you are using. The possible values are `ICS`, `WMQI (for WMQI, WMQIB or WBIMB)`, or `WAS`.

## CharacterEncoding

The CharacterEncoding property specifies the character code set used to map from a character (such as a letter of the alphabet, a numeric representation, or a punctuation mark) to a numeric value.

**Note:** Java-based connectors do not use this property. C++ connectors use the value `ascii7` for this property.

By default, only a subset of supported character encodings is displayed. To add other supported values to the list, you must manually modify the \Data\Std\stdConnProps.xml file in the product directory (<*ProductDir*>). For more information, see the Connector Configurator appendix in this guide.

## CommonEventInfrastructure

The Common Event Infrastructure (CEI) is a simple event management function handling generated events. The CommonEventInfrastructure property specifies whether the CEI should be invoked at run time.

The default value is `false`.

## CommonEventInfrastructureContextURL

The CommonEventInfrastructureContextURL is used to gain access to the WAS server that executes the Common Event Infrastructure (CEI) server application. This property specifies the URL to be used.

This property is valid only if the value of CommonEventInfrastructure is set to `true.`

The default value is a blank field.

## ConcurrentEventTriggeredFlows

The ConcurrentEventTriggeredFlows property determines how many business objects can be concurrently processed by the connector for event delivery. You set the value of this attribute to the number of business objects that are mapped and delivered concurrently. For example, if you set the value of this property to `5`, five business objects are processed concurrently.

Setting this property to a value greater than 1 allows a connector for a source application to map multiple event business objects at the same time and deliver them to multiple collaboration instances simultaneously. This speeds delivery of business objects to the integration broker, particularly if the business objects use complex maps. Increasing the arrival rate of business objects to collaborations can improve overall performance in the system.

To implement concurrent processing for an entire flow (from a source application to a destination application), the following properties must configured:

- The collaboration must be configured to use multiple threads by setting its `Maximum number of concurrent events` property high enough to use multiple threads.
- The destination application's application-specific component must be configured to process requests concurrently. That is, it must be multithreaded, or it must be able to use connector agent parallelism and be configured for multiple processes. The Parallel Process Degree configuration property must be set to a value larger than `1`.

The ConcurrentEventTriggeredFlows property has no effect on connector polling, which is single-threaded and is performed serially.

This property is valid only if the value of the RepositoryDirectory property is set to <REMOTE>.

The default value is `1`.

## ContainerManagedEvents

The ContainerManagedEvents property allows a JMS-enabled connector with a JMS event store to provide guaranteed event delivery, in which an event is removed from the source queue and placed on the destination queue as one JMS transaction.

When this property is set to `JMS`, the following properties must also be set to enable guaranteed event delivery:

- PollQuantity = `1` to `500`
- SourceQueue = `/SOURCEQUEUE`

You must also configure a data handler with the MimeType and DHClass (data handler class) properties. You can also add DataHandlerConfigMOName (the meta-object name, which is optional). To set those values, use the **Data Handler** tab in Connector Configurator.

Although these properties are adapter-specific, here are some example values:

- MimeType = `text\xml`
- DHClass = `com.crossworlds.DataHandlers.text.xml`
- DataHandlerConfigMOName = `MO_DataHandler_Default`

The fields for these values in the **Data Handler** tab are displayed only if you have set the ContainerManagedEvents property to the value `JMS`.

**Note:** When ContainerManagedEvents is set to `JMS`, the connector does not call its pollForEvents() method, thereby disabling that method's functionality.

The ContainerManagedEvents property is valid only if the value of the DeliveryTransport property is set to `JMS`.

There is no default value.

## ControllerEventSequencing

The ControllerEventSequencing property enables event sequencing in the connector controller.

This property is valid only if the value of the RepositoryDirectory property is set to set to <REMOTE> (`BrokerType` is `ICS`).

The default value is `true`.

## ControllerStoreAndForwardMode

The ControllerStoreAndForwardMode property sets the behavior of the connector controller after it detects that the destination application-specific component is unavailable.

If this property is set to `true` and the destination application-specific component is unavailable when an event reaches ICS, the connector controller blocks the request to the application-specific component. When the application-specific component becomes operational, the controller forwards the request to it.

However, if the destination application's application-specific component becomes unavailable after the connector controller forwards a service call request to it, the connector controller fails the request.

If this property is set to `false`, the connector controller begins failing all service call requests as soon as it detects that the destination application-specific component is unavailable.

This property is valid only if the value of the RepositoryDirectory property is set to <REMOTE> (the value of the BrokerType property is ICS).

The default value is `true`.

## ControllerTraceLevel

The ControllerTraceLevel property sets the level of trace messages for the connector controller.

This property is valid only if the value of the RepositoryDirectory property is set to set to <REMOTE>.

The default value is `0`.

## DeliveryQueue

The DeliveryQueue property defines the queue that is used by the connector to send business objects to the integration broker.

This property is valid only if the value of the DeliveryTransport property is set to `JMS`.

The default value is `<`*`CONNECTORNAME`*`>/DELIVERYQUEUE`.

## DeliveryTransport

The DeliveryTransport property specifies the transport mechanism for the delivery of events. Possible values are `MQ` for WebSphere MQ, `IDL` for CORBA IIOP, or `JMS` for Java Messaging Service.

- If the value of the RepositoryDirectory property is set to <REMOTE>, the value of the DeliveryTransport property can be `MQ`, `IDL`, or `JMS`, and the default is `IDL`.
- If the value of the RepositoryDirectory property is a local directory, the value can be only `JMS`.

The connector sends service-call requests and administrative messages over CORBA IIOP if the value of the RepositoryDirectory property is `MQ` or `IDL`.

If the value of the DeliveryTransport property is `MQ`, you can set the command-line parameter `WhenServerAbsent` in the adapter start script to indicate whether the adapter should pause or shut down when the InterChange Server is shut down.

- Enter `WhenServerAbsent=pause` to pause the adapter when ICS is not available.
- Enter `WhenServerAbsent=shutdown` to shut down the adapter when ICS is not available.

### WebSphere MQ and IDL

Use WebSphere MQ rather than IDL for event delivery transport, unless you must have only one product. WebSphere MQ offers the following advantages over IDL:

- Asynchronous communication:
  WebSphere MQ allows the application-specific component to poll and persistently store events even when the server is not available.
- Server side performance:
  WebSphere MQ provides faster performance on the server side. In optimized mode, WebSphere MQ stores only the pointer to an event in the repository database, while the actual event remains in the WebSphere MQ queue. This prevents writing potentially large events to the repository database.
- Agent side performance:
  WebSphere MQ provides faster performance on the application-specific component side. Using WebSphere MQ, the connector polling thread picks up an event, places it in the connector queue, then picks up the next event. This is faster than IDL, which requires the connector polling thread to pick up an event, go across the network into the server process, store the event persistently in the repository database, then pick up the next event.

### JMS

The JMS transport mechanism enables communication between the connector and client connector framework using Java Messaging Service (JMS).

If you select JMS as the delivery transport, additional JMS properties such as `jms.MessageBrokerName`, `jms.FactoryClassName`, `jms.Password`, and `jms.UserName` are listed in Connector Configurator. The properties `jms.MessageBrokerName` and `jms.FactoryClassName` are required for this transport.

There may be a memory limitation if you use the JMS transport mechanism for a connector in the following environment:

- AIX 5.0
- WebSphere MQ 5.3.0.1
- ICS is the integration broker

In this environment, you may experience difficulty starting both the connector controller (on the server side) and the connector (on the client side) due to memory use within the WebSphere MQ client. If your installation uses less than 768MB of process heap size, set the following variable and property:

- Set the LDR_CNTRL environment variable in the CWSharedEnv.sh script.

  This script is located in the \bin directory below the product directory (<*ProductDir*>). Using a text editor, add the following line as the first line in the CWSharedEnv.sh script:

  ```
  export LDR_CNTRL=MAXDATA=0x30000000
  ```

  This line restricts heap memory usage to a maximum of 768 MB (3 segments * 256 MB). If the process memory grows larger than this limit, page swapping can occur, which can adversely affect the performance of your system.
- Set the value of the IPCCBaseAddress property to 11 or 12. For more information on this property, see the *System Installation Guide for UNIX*.

## DuplicateEventElimination

When the value of this property is `true`, a JMS-enabled connector can ensure that duplicate events are not delivered to the delivery queue. To use this feature, during connector development, the connector must have a unique event identifier set as the business object ObjectEventId attribute in the application-specific code.

**Note:** When the value of this property is `true`, the MonitorQueue property must be enabled to provide guaranteed event delivery.

The default value is `false`.

## EnableOidForFlowMonitoring

When the value of this property is `true`, the adapter runtime will mark the incoming ObjectEventID as a foreign key for flow monitoring.

This property is only valid if the BrokerType property is set to ICS.

The default value is `false`.

## FaultQueue

If the connector experiences an error while processing a message, it moves the message (and a status indicator and description of the problem) to the queue specified in the FaultQueue property.

The default value is `<`*`CONNECTORNAME`*`>/FAULTQUEUE`.

## jms.FactoryClassName

The jms.FactoryClassName property specifies the class name to instantiate for a JMS provider. This property must be set if the value of the DeliveryTransport property is `JMS`.

The default is `CxCommon.Messaging.jms.IBMMQSeriesFactory`.

## jms.ListenerConcurrency

The jms.ListenerConcurrency property specifies the number of concurrent listeners for the JMS controller. It specifies the number of threads that fetch and process messages concurrently within a controller.

This property is valid only if the value of the jms.OptimizedTransport property is `true`.

The default value is `1`.

## jms.MessageBrokerName

The jms.MessageBrokerName specifies the broker name to use for the JMS provider. You must set this connector property if you specify `JMS` as the delivery transport mechanism (in the DeliveryTransport property).

When you connect to a remote message broker, this property requires the following values:
*QueueMgrName*:*Channel*:*HostName*:*PortNumber*
where:
*QueueMgrName* is the name of the queue manager.
*Channel* is the channel used by the client.
*HostName* is the name of the machine where the queue manager is to reside.
*PortNumber*is the port number used by the queue manager for listening

For example:
```
jms.MessageBrokerName = WBIMB.Queue.Manager:CHANNEL1:RemoteMachine:1456
```

The default value is `crossworlds.queue.manager`. Use the default when connecting to a local message broker.

## jms.NumConcurrentRequests

The jms.NumConcurrentRequests property specifies the maximum number of concurrent service call requests that can be sent to a connector at the same time. Once that maximum is reached, new service calls are blocked and must wait for another request to complete before proceeding.

The default value is `10`.

## jms.Password

The jms.Password property specifies the password for the JMS provider. A value for this property is optional.

There is no default value.

## jms.TransportOptimized

The jms.TransportOptimized property determines if the WIP (work in progress) is optimized. You must have a WebSphere MQ provider to optimize the WIP. For optimized WIP to operate, the messaging provider must be able to:

1. Read a message without taking it off the queue
2. Delete a message with a specific ID without transferring the entire message to the receiver's memory space
3. Read a message by using a specific ID (needed for recovery purposes)
4. Track the point at which events that have not been read appear.

The JMS APIs cannot be used for optimized WIP because they do not meet conditions 2 and 4 above, but the MQ Java APIs meet all four conditions, and hence are required for optimized WIP.

This property is valid only if the value of DeliveryTransport is `JMS` and the value of BrokerType is `ICS`.

The default value is `false`.

## jms.UserName

the jms.UserName property specifies the user name for the JMS provider. A value for this property is optional.

There is no default value.

## JvmMaxHeapSize

The JvmMaxHeapSize property specifies the maximum heap size for the agent (in megabytes).

This property is valid only if the value for the RepositoryDirectory property is set to <REMOTE>.

The default value is 128m.

## JvmMaxNativeStackSize

The JvmMaxNativeStackSize property specifies the maximum native stack size for the agent (in kilobytes).

This property is valid only if the value for the RepositoryDirectory property is set to <REMOTE>.

The default value is 128k.

## JvmMinHeapSize

The JvmMinHeapSize property specifies the minimum heap size for the agent (in megabytes).

This property is valid only if the value for the RepositoryDirectory property is set to <REMOTE>.

The default value is 1m.

## ListenerConcurrency

The ListenerConcurrency property supports multithreading in WebSphere MQ Listener when ICS is the integration broker. It enables batch writing of multiple events to the database, thereby improving system performance.

This property valid only with connectors that use MQ transport. The value of the DeliveryTransport property must be `MQ`.

The default value is 1.

## Locale

The Locale property specifies the language code, country or territory, and, optionally, the associated character code set. The value of this property determines cultural conventions such as collation and sort order of data, date and time formats, and the symbols used in monetary specifications.

A locale name has the following format:

*`ll_TT.codeset`*

where:
*ll* is a two-character language code (in lowercase letters)
*TT* is a two-letter country or territory code (in uppercase letters)
*codeset* is the name of the associated character code set (may be optional).

By default, only a subset of supported locales are listed. To add other supported values to the list, you modify the \Data\Std\stdConnProps.xml file in the <*ProductDir*>\bin directory. For more information, refer to the Connector Configurator appendix in this guide.

If the connector has not been internationalized, the only valid value for this property is `en_US`. To determine whether a specific connector has been globalized, refer to the user guide for that adapter.

The default value is `en_US`.

## LogAtInterchangeEnd

The LogAtInterchangeEnd property specifies whether to log errors to the log destination of the integration broker.

Logging to the log destination also turns on e-mail notification, which generates e-mail messages for the recipient specified as the value of MESSAGE_RECIPIENT in the InterchangeSystem.cfg file when errors or fatal errors occur. For example, when a connector loses its connection to the application, if the value of LogAtInterChangeEnd is `true`, an e-mail message is sent to the specified message recipient.

This property is valid only if the value of the RespositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The default value is `false`.

## MaxEventCapacity

The MaxEventCapacity property specifies maximum number of events in the controller buffer. This property is used by the flow control feature.

This property is valid only if the value of the RespositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The value can be a positive integer between 1 and 2147483647.

The default value is 2147483647.

## MessageFileName

The MessageFileName property specifies the name of the connector message file. The standard location for the message file is \connectors\messages in the product directory. Specify the message file name in an absolute path if the message file is not located in the standard location.

If a connector message file does not exist, the connector uses `InterchangeSystem.txt` as the message file. This file is located in the product directory.

**Note:** To determine whether a connector has its own message file, see the individual adapter user guide.

The default value is `InterchangeSystem.txt`.

## MonitorQueue

The MonitorQueue property specifies the logical queue that the connector uses to monitor duplicate events.

It is valid only if the value of the DeliveryTransport property is `JMS` and the value of the DuplicateEventElimination is `true`.

The default value is `<`*`CONNECTORNAME`*`>/MONITORQUEUE`

## OADAutoRestartAgent

the OADAutoRestartAgent property specifies whether the connector uses the automatic and remote restart feature. This feature uses the WebSphere MQ-triggered Object Activation Daemon (OAD) to restart the connector after an abnormal shutdown, or to start a remote connector from System Monitor.

This property must be set to `true` to enable the automatic and remote restart feature. For information on how to configure the WebSphere MQ-triggered OAD feature. see the *Installation Guide for Windows* or *for UNIX*.

This property is valid only if the value of the RespositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The default value is `false`.

## OADMaxNumRetry

The OADMaxNumRetry property specifies the maximum number of times that the WebSphere MQ-triggered Object Activation Daemon (OAD) automatically attempts to restart the connector after an abnormal shutdown. The OADAutoRestartAgent property must be set to `true` for this property to take effect.

This property is valid only if the value of the RespositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The default value is `1000`.

## OADRetryTimeInterval

The OADRetryTimeInterval property specifies the number of minutes in the retry-time interval for the WebSphere MQ-triggered Object Activation Daemon (OAD). If the connector agent does not restart within this retry-time interval, the connector controller asks the OAD to restart the connector agent again. The OAD repeats this retry process as many times as specified by the OADMaxNumRetry property. The OADAutoRestartAgent property must be set to `true` for this property to take effect.

This property is valid only if the value of the RespositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The default value is `10`.

## PollEndTime

The PollEndTime property specifies the time to stop polling the event queue. The format is *`HH:MM`*, where *`HH`* is 0 through 23 hours, and *`MM`* represents 0 through 59 minutes.

You must provide a valid value for this property. The default value is `HH:MM` without a value, and it must be changed.

If the adapter runtime detects:
- PollStartTime set and PollEndTime not set, or
- PollEndTime set and PollStartTime not set

it will poll using the value configured for the PollFrequency property.

## PollFrequency

The PollFrequency property specifies the amount of time (in milliseconds) between the end of one polling action and the start of the next polling action. This is not the interval between polling actions. Rather, the logic is as follows:
- Poll to obtain the number of objects specified by the value of the PollQuantity property.
- Process these objects. For some connectors, this may be partly done on separate threads, which execute asynchronously to the next polling action.
- Delay for the interval specified by the PollFrequency property.
- Repeat the cycle.

The following values are valid for this property:
- The number of milliseconds between polling actions (a positive integer).
- The word `no`, which causes the connector not to poll. Enter the word in lowercase.
- The word `key`, which causes the connector to poll only when you type the letter `p` in the connector Command Prompt window. Enter the word in lowercase.

The default is `10000`.

**Important:** Some connectors have restrictions on the use of this property. Where they exist, these restrictions are documented in the chapter on installing and configuring the adapter.

## PollQuantity

The PollQuantity property designates the number of items from the application that the connector polls for. If the adapter has a connector-specific property for setting the poll quantity, the value set in the connector-specific property overrides the standard property value.

This property is valid only if the value of the `DeliveryTransport` property is `JMS`, and the `ContainerManagedEvents` property has a value.

An e-mail message is also considered an event. The connector actions are as follows when it is polled for e-mail.

- When it is polled once, the connector detects the body of the message, which it reads as an attachment. Since no data handler was specified for this mime type, it will then ignore the message.
- The connector processes the first BO attachment. The data handler is available for this MIME type, so it sends the business object to Visual Test Connector.
- When it is polled for the second time, the connector processes the second BO attachment. The data handler is available for this MIME type, so it sends the business object to Visual Test Connector.
- Once it is accepted, the third BO attachment should be transmitted.

## PollStartTime

The PollStartTime property specifies the time to start polling the event queue. The format is *`HH:MM`*, where *`HH`* is 0 through 23 hours, and *`MM`* represents 0 through 59 minutes.

You must provide a valid value for this property. The default value is `HH:MM` without a value, and it must be changed.

If the adapter runtime detects:

- PollStartTime set and PollEndTime not set, or
- PollEndTime set and PollStartTime not set

it will poll using the value configured for the PollFrequency property.

## RepositoryDirectory

The RepositoryDirectory property is the location of the repository from which the connector reads the XML schema documents that store the metadata for business object definitions.

If the integration broker is ICS, this value must be set to set to <REMOTE> because the connector obtains this information from the InterChange Server repository.

When the integration broker is a WebSphere message broker or WAS, this value is set to <*ProductDir*>\repository by default. However, it may be set to any valid directory name.

## RequestQueue

The RequestQueue property specifies the queue that is used by the integration broker to send business objects to the connector.

This property is valid only if the value of the DeliveryTransport property is `JMS`.

The default value is `<CONNECTORNAME>/REQUESTQUEUE`.

## ResponseQueue

The ResponseQueue property specifies the JMS response queue, which delivers a response message from the connector framework to the integration broker. When the integration broker is ICS, the server sends the request and waits for a response message in the JMS response queue.

This property is valid only if the value of the DeliveryTransport property is `JMS`.

The default value is `<CONNECTORNAME>/RESPONSEQUEUE`.

## RestartRetryCount

The RestartRetryCount property specifies the number of times the connector attempts to restart itself. When this property is used for a connector that is connected in parallel, it specifies the number of times the master connector application-specific component attempts to restart the client connector application-specific component.

The default value is `7`.

## RestartRetryInterval

The RestartRetryInterval property specifies the interval in minutes at which the connector attempts to restart itself. When this property is used for a connector that is linked in parallel, it specifies the interval at which the master connector application-specific component attempts to restart the client connector application-specific component.

Possible values for the property range from 1 through 2147483647.

The default value is `1`.

## ResultsSetEnabled

The ResultsSetEnabled property enables or disables results set support when Information Integrator is active. This property can be used only if the adapter supports DB2 Information Integrator.

This property is valid only if the value of the DeliveryTransport property is `JMS`, and the value of BrokerType is `WMQI`.

The default value is `false`.

## ResultsSetSize

The ResultsSetSize property defines the maximum number of business objects that can be returned to Information Integrator. This property can be used only if the adapter supports DB2 Information Integrator.

This property is valid only if the value of the ResultsSetEnabled property is `true`.

The default value is `0`. This means that the size of the results set is unlimited.

## RHF2MessageDomain

The RHF2MessageDomain property allows you to configure the value of the field domain name in the JMS header. When data is sent to a WebSphere message broker over JMS transport, the adapter framework writes JMS header information, with a domain name and a fixed value of `mrm`. A configurable domain name lets you track how the WebSphere message broker processes the message data.

This is an example header:

```
<mcd><Msd>mrm</Msd><Set>3</Set><Type>
Retek_POPhyDesc</Type><Fmt>CwXML</Fmt></mcd>
```

This property is valid only if the value of BrokerType is WMQI or WAS. Also, it is valid only if the value of the DeliveryTransport property is `JMS`, and the value of the WireFormat property is `CwXML`.

Possible values are `mrm` and `xml`. The default value is `mrm`.

## SourceQueue

The SourceQueue property designates the JMS source queue for the connector framework in support of guaranteed event delivery for JMS-enabled connectors that use a JMS event store. For further information, see "ContainerManagedEvents" on page 62.

This property is valid only if the value of DeliveryTransport is `JMS`, and a value for ContainerManagedEvents is specified.

The default value is `<`*`CONNECTORNAME`*`>/SOURCEQUEUE`.

## SynchronousRequestQueue

The SynchronousRequestQueue property delivers request messages that require a synchronous response from the connector framework to the broker. This queue is necessary only if the connector uses synchronous execution. With synchronous execution, the connector framework sends a message to the synchronous request queue and waits for a response from the broker on the synchronous response queue. The response message sent to the connector has a correlation ID that matches the ID of the original message.

This property is valid only if the value of DeliveryTransport is `JMS`.

The default value is `<`*`CONNECTORNAME`*`>/SYNCHRONOUSREQUESTQUEUE`

## SynchronousRequestTimeout

The SynchronousRequestTimeout property specifies the time in milliseconds that the connector waits for a response to a synchronous request. If the response is not received within the specified time, the connector moves the original synchronous request message (and error message) to the fault queue.

This property is valid only if the value of DeliveryTransport is `JMS`.

The default value is `0`.

## SynchronousResponseQueue

The SynchronousResponseQueue property delivers response messages in reply to a synchronous request from the broker to the connector framework. This queue is necessary only if the connector uses synchronous execution.

This property is valid only if the value of DeliveryTransport is `JMS`.

The default is `<`*`CONNECTORNAME`*`>/SYNCHRONOUSRESPONSEQUEUE`

## TivoliMonitorTransactionPerformance

The TivoliMonitorTransactionPerformance property specifies whether IBM Tivoli Monitoring for Transaction Performance (ITMTP) is invoked at run time.

The default value is `false`.

## WireFormat

The WireFormat property specifies the message format on the transport:

- If the value of the RepositoryDirectory property is a local directory, the value is `CwXML.`
- If the value of the RepositoryDirectory property is a remote directory, the value is `CwBO`.

## WsifSynchronousRequestTimeout

The WsifSynchronousRequestTimeout property specifies the time in milliseconds that the connector waits for a response to a synchronous request. If the response is not received within the specified time, the connector moves the original synchronous request message (and an error message) to the fault queue.

This property is valid only if the value of BrokerType is `WAS`.

The default value is 0.

## XMLNameSpaceFormat

The XMLNameSpaceFormat property specifies short or long namespaces in the XML format of business object definitions.

This property is valid only if the value of BrokerType is set to WMQI or WAS.

The default value is `short`.

# Index

## A

Application-specific configuration properties
- setting 18

Attribute-level ASI
- specifying 45

## B

Business Object Designer
- running 39

Business object-level ASI
- specifying 46

Business objects
- creating and modifying 39
- data queue structure 34
- generating 44
- generating definitions 39
- processing 3
- specifying attribute properties 36
- specifying attribute-level application text 36
- specifying information 45
- specifying supported definitions 19
- structure overview 29
- Understanding 29
- uploading 47

Business Objects
- RPG programs structure 30

## C

Configuration
- completing 23

Configuration file
- changing 23
- completing 15
- Creating a new 13
- creating from a connector-specific template 13
- saving 22
- setting properties 16
- using an existing file 14

Connector Configurator
- overview 9
- running from System Manager 11
- running in stand-alone mode 10
- starting 10
- using in globalized environments 23

Connector instances
- creating multiple 26

Connector-specific properties 17

Connector-specific property template
- creating 11

## D

Data conversion
- iSeries or AS/400 toolbox 37

Data handlers 22

Data queues
- overview 3

## E

Error handling 49

## H

How the adapter works 3

## I

Installed file structure 7

iSeries adapter
- broker compatibility 5
- configuring 9
- environment 5
- installing 5
- installing and related files 7
- operations 3
- overview 1
- platforms 6
- prerequisites 6
- starting the connector 24
- stopping the connector 25
- troubleshooting 49

iSeries and AS/400 systems
- overview 1

## L

Logging 49

## M

Maps 20

Messaging 22

Meta objects
- configuring for polling 34

Metadata
- defining 29

## O

Object Discovery Agent (ODA)
- overview 39
- starting 39

## P

Post installation
- tasks 7

## R

Resources 21

## S

Standard configuration properties for connectors 51

Standard connector properties
- setting 17

## T

Trace/log file values
- setting 22

Tracing messages 49

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