

WebSphere Business Integration
Server Express and Express Plus



Adapter for eMatrix User Guide

Adapter Version 2.2.0

Note!

Before using this information and the product it supports, read the information in "Notices" on page 89

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This edition of this document applies to WebSphere Business Integration Server Express Adapter for eMatrix (5724-G87), version 2.2.0.

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Contents

About this document	v
Audience	v
Related documents	v
Typographic conventions	v
New in this release	vii
New in release 2.2.0	vii
Chapter 1. Overview of the adapter	1
Adapter architecture	1
How the adapter works	3
Sample scenario	5
Chapter 2. Installing the adapter	7
Adapter environment	7
Overview of installation tasks	8
Installing the adapter and related files	8
Installed file structure	8
Chapter 3. Configuring the adapter	11
Configuring the adapter	11
Creating multiple connector instances	14
Starting the connector	15
Starting the eMatrix adapter	16
Stopping the connector	16
Using log and trace files	16
Chapter 4. Understanding business objects	19
Defining metadata	19
Overview of business object structure	19
Business objects for eMatrix	20
Generating business objects	29
Chapter 5. Generating business object definitions	31
Overview of the ODA for eMatrix	31
Generating business object definitions	31
Uploading your files	38
Chapter 6. Troubleshooting and error handling	39
Processing errors	39
Troubleshooting	40
Appendix A. Standard configuration properties for connectors	45
New properties	45
Standard connector properties overview	45
Standard properties quick-reference	46
Standard properties	51
Appendix B. Connector Configurator Express	65
Overview of Connector Configurator Express	65
Starting Connector Configurator Express	66
Running Configurator from System Manager	66
Creating a connector-specific property template	67

Creating a new configuration file	69
Using an existing file	70
Completing a configuration file.	71
Setting the configuration file properties	72
Saving your configuration file	79
Changing a configuration file	79
Completing the configuration	79
Using Connector Configurator Express in a globalized environment	79
Appendix C. Sample scenario	81
Overview	81
Assumptions	81
Installing the scenario	81
Running the scenario	85
Notices	89
Programming interface information	90
Trademarks and service marks	90

About this document

The IBM^(R) WebSphere^(R) Business Integration Server Express and IBM^(R) WebSphere^(R) Business Integration Server Express Plus are made up of the following components: InterChange Server Express, the associated Toolset Express, Collaboration-Foundation, and a set of software integration adapters. The tools in Toolset Express help you to create, modify, and manage business processes. You can choose from among the prepackaged adapters for your business processes that span applications. The standard processes template--CollaborationFoundation--allows you to quickly create customized processes.

This document describes the installation, configuration, and business object development, and troubleshooting for this specific software integration adapter.

Except where noted, all the information in this guide applies to both IBM WebSphere Business Integration Server Express and Express Plus. The term "WebSphere Business Integration Server Express" and its variants refer to both products.

Audience

This document is for consultants, developers, and system administrators who use the connector at customer sites.

Related documents

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

You can download, install, and view the documentation from the following site:
<http://www.ibm.com/websphere/wbiserverexpress/infocenter>

Typographic conventions

This document uses the following conventions:

<code>courier font</code>	Indicates a literal value, such as a command name, file name, information that you type, or information that the system prints on the screen.
bold	Indicates a new term the first time that it appears.
<i>italic, italic</i>	Indicates a variable name or a cross-reference.
<i>blue outline</i>	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 this document backslashes (\) are used as the convention for directory paths. All WebSphere Business Integration Server Express product pathnames are relative to the directory where the product is installed on your system.
<i>ProductDir</i>	Represents the directory where the WebSphere Business Integration Server Express Adapters product is installed. The default product directory for each platform is: \IBM\WebSphereServer.

{ }	In a syntax line, curly braces surround a set of options from which you must choose one and only one.
	In a syntax line, a pipe separates 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, <code>option[...]</code> means that you can enter multiple, comma-separated options.
< >	Angle brackets surround individual elements of a name to distinguish them from each other, as in <code><server_name><connector_name>tmp.log</code> .

New in this release

New in release 2.2.0

Support is no longer provided for Solaris 7.0.

Connector definition file format has changed from .txt to .xsd.

Chapter 1. Overview of the adapter

This chapter describes the IBM(R) WebSphere(R) Business Integration adapter for eMatrix(R) and the associated system architecture.

MatrixOne eMatrix(TM) is a product lifecycle management solution that enables users to centralize control over all documents and data flows related to the product life cycle, and to monitor access to them. The adapter for eMatrix enables bidirectional, real-time integration between the eMatrix global collaboration platform and other enterprise applications.

The adapter communicates with the eMatrix collaboration server, which is installed separately from the application itself. For details on downloading and installing the eMatrix collaboration server, refer to the eMatrix documentation.

For more information about the relationship of the integration broker to the adapter, see the *System Administration Guide*.

This chapter contains the following sections:

- “Adapter architecture” on page 1
- “Architectural overview” on page 2
- “Event notification” on page 3

Adapter architecture

The adapter for eMatrix consists of a connector, the Java Program Object (JPO), and an Object Discovery agent (ODA) with the adapter framework. Together they enable eMatrix to exchange information with an integration broker, and thereby to communicate with external applications such as accounting and CRM packages.

The adapter includes three primary components:

- **Connector**
Acts as an intermediary between the integration broker and the application in the transfer of data. The connector is metadata-driven.
- **Java Program Object (JPO)**
There may be more than one. They run within eMatrix and they store information about events in the eMatrix database.
- **Object Discovery Agent (ODA)**
A design-time tool that queries the application to determine existing eMatrix business object types and relationships. These form the basis of the WebSphere business object definitions. The connector uses these definitions at run time to convert application data into business objects.

The adapter manipulates eMatrix business objects and connections within eMatrix. It may also execute MQL statements. Through the use of MQL commands, the adapter can perform almost any action supported by eMatrix.

The adapter communicates with the eMatrix application using a Java-based API called the eMatrix adapter development kit (ADK) and a separate eMatrix

collaboration server. The eMatrix ADK enables the adapter to query and manipulate objects in the application by passing requests to the application through the eMatrix collaboration server.

Architectural overview

The adapter mediates data flows to and from the integration broker and the application. The flows are:

- Request processing, initiated by the integration broker (InterChange Server Express)
- Event processing, initiated by the eMatrix application

These flows are described in detail below.

Request processing

Request processing starts with the integration broker. The integration broker passes business objects to the adapter for eMatrix, which communicates with the eMatrix collaboration server using its Java-based eMatrix ADK. Figure 1 on page 2 provides an architectural overview of the data flow.

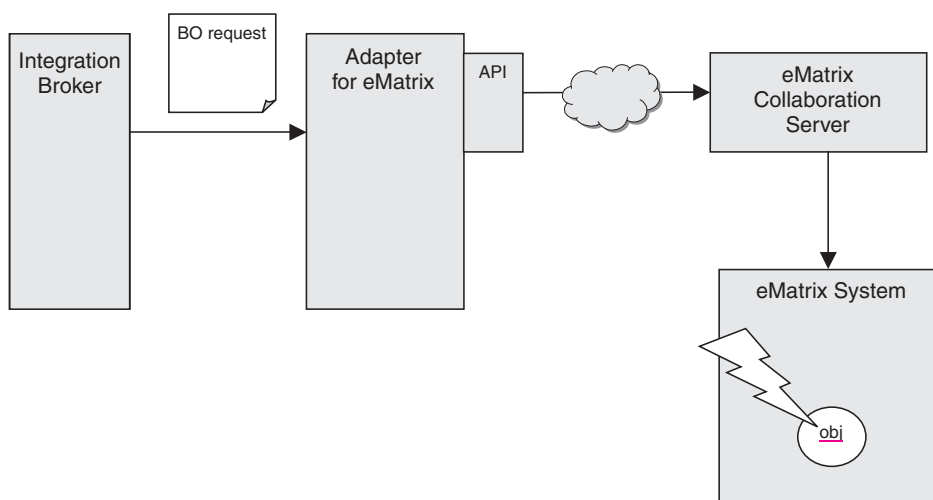


Figure 1. Request processing in the eMatrix adapter

Request processing takes place as follows.

1. The integration broker issues a request to the adapter in the form of a business object, which contains type information and a business object verb.
2. The adapter processes the business object by invoking the appropriate eMatrix ADK calls.
3. Each time an eMatrix ADK call is made, the collaboration server performs the specified action on the corresponding object in the eMatrix system and returns the result to the connector.
4. Once the adapter has finished processing the request, it returns a status code and if required, a business object with the resulting changes, to the integration broker.

Event notification

The adapter for eMatrix uses event polling to detect events in the eMatrix system at run-time. Figure 2 on page 3 illustrates the sequence of events that occurs when the application is polled by the integration broker through the adapter.

Note: For polling to work, you must first configure an eMatrix trigger for the event or events you wish to monitor. This is done during the initial setup. For details, refer to “Configuring the adapter” on page 11.

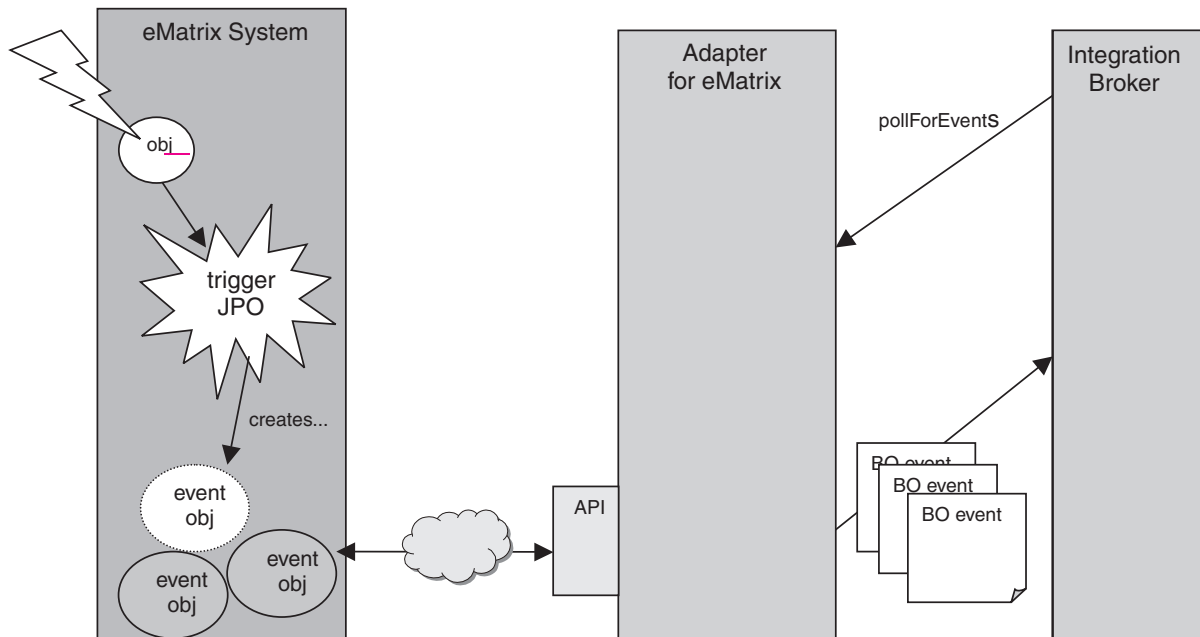


Figure 2. Event notification in the eMatrix adapter

Event notification takes place as follows.

1. An action is performed in the eMatrix system, causing a trigger to fire. Triggers can be invoked in many different ways, for example, such as modifying an eMatrix object with a configured trigger.
2. When the trigger is fired, the eMatrix system executes the associated Java Program Object (JPO), which creates a new event object in eMatrix.
3. At specified intervals, the adapter polls eMatrix for any new event objects that the JPO has created.
4. The adapter retrieves the event object.
5. It then retrieves the relevant eMatrix entities, translates them to business objects, and publishes them to the integration broker. The adapter can retrieve both eMatrix business objects and relationships.

How the adapter works

The adapter for eMatrix is bi-directional. It can process events originating from the eMatrix system, and requests sent by the integration broker to the eMatrix system.

Event notification

The adapter detects and processes events through a polling mechanism. This allows you, as the user, to set event priorities and control the frequency of event detections and the number of events that the adapter can process. With this level of control, you can balance the adapter load within the larger system and smooth the path of any critical events. These values are set in the adapter's configurable properties (see "Configuring the connector" on page 12).

The adapter makes use of Java Program Objects (JPOs) and eMatrix business object definitions to store and transmit information about events. IBM provides two default JPOs, which you may use if you choose. They are:

- The `WBIEventLogger` JPO, which creates the business object type that records events
- The `InstallEventTables` JPO, which creates the business object type that stores event

The text assumes that you are using the default `WBIEventLogger` JPO. For details on the structure of eMatrix objects, refer to Chapter 4, "Understanding business objects," on page 19.

The `WBIEventLogger` JPO is the crux of event notification. You can define triggers to invoke this JPO whenever any action is associated with a specific business object or relationship. The JPO uses the object ID and the specified options to create a new event business object or relationship in eMatrix.

For example, if you want to track events involving an object type called "Part Assembly", you can configure eMatrix to invoke the JPO when such actions occur. When the trigger fires, the JPO records the `PartAssembly` ID and the type of action taken during the event.

For details on defining triggers, refer to "Configuring the JPOs" on page 11..

Note: Event notification is an asynchronous process. The adapter does not support synchronous event notification.

Event retrieval

When the adapter polls the application, it queries eMatrix for unprocessed events. It checks for all events that have a value of `READY_FOR_POLL` for the configuration property `EventStatus`. The adapter retrieves the event records that the `WBIEventLogger` JPO has created.

All events exist in the same vault. The adapter reads the `EventVault` property value in at startup.

The adapter then retrieves the associated eMatrix object and sends it to the integration broker. The adapter may also archive the event in eMatrix once it has been published to the integration broker.

Information about events is held in the eMatrix objects called "`<prefix>_Event`" for unprocessed events, and "`<prefix>_Archived_Event`" for processed events. The adapter uses status codes to track the state of events.

If the adapter terminates unexpectedly, it may report "in-doubt" events when it is restarted. An event is labeled in-doubt when the adapter is unable to determine whether it was successfully published to the integration broker or not. The adapter

must process these events before it attends to any normal events. For details on what actions it takes, refer to “Processing errors” on page 39.

Sample scenario

The adapter for eMatrix includes a sample scenario that illustrates how the adapter handles request processing and event notification. For information on installing, configuring and running this scenario, refer to Appendix C, “Sample scenario,” on page 81.

Chapter 2. Installing the adapter

This chapter describes how to install the IBM WebSphere Business Integration Server Express adapter for eMatrix. It contains the following sections:

- “Adapter environment”
- “Overview of installation tasks” on page 8
- “Installing the adapter and related files” on page 8
- “Installed file structure” on page 8

Adapter environment

Before installing, configuring, and using the adapter, you must understand its environment requirements. They are listed in the following section.

- “Adapter platforms”
- “Adapter dependencies”
- “Globalization”

Adapter platforms

The adapter is supported on the following software.

Windows 2000

Databases:

- DB2 7.2
- Oracle 8.1.7.4, Oracle 9.2.0.1

Third-party software:

- eMatrix Server versions 9.6.01, 10.0.0.0
- eMatrix Collaboration Server versions 9.6.01, 10.0.0.0

Adapter dependencies

The adapter client library/API resides in eMatrixServletRMI.jar version 10.0.0.0.

The adapter requires access to the eMatrix ADK at run time. The ADK is distributed with the eMatrix collaboration server and in a stand-alone version.

If you have the adapter installed on the same machine as the eMatrix collaboration server, you need not download the stand-alone version of the ADK. However, if the adapter and collaboration server are on two different machines, you must install the stand-alone ADK on the same machine as the adapter.

Globalization

This adapter is DBCS (double-byte character set)-enabled and is translated.

Overview of installation tasks

Follow these steps to install the adapter for eMatrix.

1. Make sure the integration broker is installed.
2. Make sure all the prerequisite software is installed.
3. Make sure you know the names and locations of any remote eMatrix servers.
4. Install the adapter for eMatrix and related files.
5. Configure the adapter for eMatrix.

The installation instructions in this guide cover steps 4 and 5.

Installing the adapter and related files

For information on installing WebSphere Business Integration Server Express adapter products, refer to the *WebSphere Business Integration Server Express Installation Guide for Windows*. The guide is located in the WebSphere Business Integration Server Express Adapters Infocenter at the following site:
<http://www.ibm.com/websphere/wbiserverexpress/infocenter>.

Installed file structure

Table 1 shows the file structure used by the adapter and lists the files that are installed on the system.

Notes:

1. This document uses (\) backslashes as the convention for directory paths.
2. All product path names are relative to the directory where the product is installed on your system.

Table 1. Adapter files installed on system

Subdirectory of <i>ProductDir</i>	Description
\bin\Data\App\eMatrixConnectorTemplate	Template for the eMatrix connector
connectors\eMatrix	Contains: <ul style="list-style-type: none">• CWeMatrix.jar• start_eMatrix.bat
connectors\eMatrix	Contains the startup script for the connector service: eMatrix_service.bat
connectors\eMatrix\dependencies	Contains default JPOs: <ul style="list-style-type: none">• InstallEventTables.java• WBIEventLogger.java
connectors\eMatrix\samples	Contains sample connector configuration files: <ul style="list-style-type: none">• EmatrixConnector.cfg• PortConnector.cfg• repos• sound_card_update.bo

Table 1. Adapter files installed on system (continued)

Subdirectory of <i>ProductDir</i>	Description
connectors\eMatrix\samples\repos	Contains sample business and relationship objects: <ul style="list-style-type: none"> • wbi_bundle.xsd • wbi_computer.xsd • wbi_computer_bundle_to_computer.xsd • wbi_computer_computer_to_pci_component.xsd • wbi_computer_to_pci_component.xsd • wbi_cpu.xsd • wbi_cw_event.xsd • wbi_expand_bo.xsd • wbi_input.xsd • wbi_network_card.xsd • wbi_sound_card.xsd • wbi_sound_card_sound_card_to_sound_chip.xsd • wbi_sound_chip.xsd • wbi_usb_2_0_card.xsd
connectors\messages	Contains the eMatrixConnector.txt file, which lists error and other messages.
ODA\eMatrix	Contains: <ul style="list-style-type: none"> • eMatrixODA.jar The Object Discovery Agent, which has the ODA code • start_eMatrixODA.bat
ODA\messages	Contains the eMatrixODAAgent.txt file, which lists error and other messages.

Chapter 3. Configuring the adapter

This chapter describes how to configure and start the adapter for eMatrix. It contains the following sections:

- “Configuring the adapter”
- “Creating multiple connector instances” on page 14
- “Starting the connector” on page 15
- “Starting the eMatrix adapter” on page 16
- “Stopping the connector” on page 16
- “Using log and trace files” on page 16

Configuring the adapter

After installation and before startup, configure the adapter components as follows.

Configuring the JPOs

The JPO triggers require certain configuration properties to be set before they will work. To set these configuration properties, you have to edit the source code for each JPO.

The JPOs installed with the adapter for eMatrix are `WBIEventLogger` and `InstallEventTables`. After you have installed them, you must locate each JPO in the eMatrix Business Modeler and edit the source code.

The fields that need to be edited are listed below in Table 2 on page 11.

Table 2. JPO configuration properties

Property name	Description	Default value
<code>wbiPrefix</code>	The prefix used to provide all WebSphere Business Integration eMatrix meta-entities (types, attributes and policies) with their own namespace within eMatrix. The value specified for <code>wbiPrefix</code> in the connector configuration properties must match the <code>wbiPrefix</code> declared in the <code>InstallEventTables</code> and <code>WBIEventLogger.java</code> files.	<code>wbi_</code>
<code>vault</code>	Name of the eMatrix vault in which new events will be created. Must match the value specified for the <code>EventVault</code> connector configuration property.	<code>WBI_Events</code>
<code>adapterUser</code>	The ID that the adapter uses when making requests in the eMatrix system. Must match the value specified for the <code>ApplicationUserName</code> connector configuration property. Important for preventing the “Ping-pong” effect (see below).	<code>adapter</code>

Preventing the ping-pong effect

When the adapter modifies an object in the eMatrix system for which a trigger is assigned, that trigger may in turn generate a new event to be published back to the broker. The following mechanism prevents this from happening.

When a JPO is invoked, it receives a `Context` object that contains, among other things, the `userID` associated with the user who invoked the JPO. This user ID is

set in the JPO property `adapterUser`. When it is triggered, the `WBIEventLogger` JPO checks the user ID it receives from the eMatrix Context object.

If the user was the adapter for eMatrix, the value of the JPO's `adapterUser` property will match the value of the connector's `ApplicationUserName` property. In this case, the JPO will ignore the event, and it is not logged. If the user IDs do not match, the JPO creates a new event.

Note: It is important to set the `adapterUser` property in the JPO and the `ApplicationUserName` property in the adapter to the same values, otherwise you get the ping-pong effect.

Configuring the connector

The connector component of the adapter has two types of configuration properties: standard configuration properties, which apply to most adapters, and application-specific configuration properties, which apply only to your adapter. You must set the values of these properties before running the connector.

Standard configuration properties

To configure the standard connector properties, use the Connector Configurator Express tool. Details are given in Appendix B, "Connector Configurator Express," on page 65. This tool provides a graphical user interface for configuring the connector. Select the **Standard Config Properties** tab to add or modify configuration properties.

When you have finished specifying values for the connector's configuration properties, Connector Configurator Express saves the values in the adapter repository for InterChange Server Express.

A connector obtains its configuration values at startup. During a run-time session, you may want to change the values of one or more connector properties.

- Changes to some connector configuration properties, such as `AgentTraceLevel`, are dynamic, taking effect immediately.
- Changes to other connector properties are static, requiring component restart or system restart after a change.

To determine whether a property is dynamic or static, refer to the update method column in Connector Configurator Express.

Application-specific configuration properties

Application-specific connector configuration properties provide information related to the application and needed by the connector at run time. They also provide a way for you to change static information or logic within the connector without having to recode and rebuild it.

To configure these properties, use Connector Configurator Express. Select the **Application Config Properties** tab to add or modify configuration properties. For more information, see Appendix B, "Connector Configurator Express," on page 65.

Table 3 lists the application-specific configuration properties for the connector, along with their descriptions and possible values.

Table 3. Application-specific configuration properties for eMatrix

Property	Description	Possible values	Default value	Required
ApplicationUserName	Name used when connecting to the eMatrix system.	<any> Must match the value set for the adapterUser JPO configuration property	WBI	Yes
ApplicationPassword	Password used when connecting to the eMatrix system.	<any>	WBI	Yes
EventVault	Vault in which the adapter searches for events.	<any> Must match the value set for the vault JPO configuration property	WBIEventVault	Yes
inDoubtEvents	Recovery strategy for in-doubt events. If no value is given, the adapter will fail on start-up.	One of: <ul style="list-style-type: none"> • FailOnStartup • Reprocess • LogError • Ignore 	Reprocess	Yes
ArchiveProcessed	If True, the adapter archives all events. If False or undefined, the adapter deletes events from eMatrix after they have been processed.	true or false	false	
DefaultVault	Default vault in which the adapter creates new objects and manipulates existing ones.	<any>	DefaultWBIVault	
DefaultPolicy	Default policy used by the adapter when it creates new objects in eMatrix.	<any>	DefaultWBIPolicy	
KeepRelations	If true, the adapter maintains relationships when it updates business objects. If false, it destroys any relationships that are not defined in Update requests.	true or false	false	
UseDefaults	The adapter uses the defaults set in the business object definition if UseDefaults is set to true.	true or false	true	
PollQuantity	The maximum number of events that the adapter can process for each poll call.	<any positive integer>	1	

Table 3. Application-specific configuration properties for eMatrix (continued)

Property	Description	Possible values	Default value	Required
WBIPrefix	The prefix of all business objects and attributes related to event notification in the eMatrix system. Note: No pre-existing business objects or attributes may start with this value.	<any> Must match the value specified for the JPO wbiPrefix configuration property.	wbi_	
EmatrixServer	The name of the remote business object server.	<any>	:bos	
Hostname	The URL of the collaboration server.	<any>	localhost:1099	

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

For Windows, the directory is ProductDir\connectors\connectorInstance

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

where *connectorInstance* uniquely identifies the connector instance.

You can specify the InterChange Server Express server name as a parameter of startup.bat; an example is: start_EMATRIX.bat connName serverName.

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 Express 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 Express. 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 business object definitions" on page 14.
3. Create a startup script shortcut.
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.

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.

Table 4. Startup scripts for a connector

Operating system	Startup script
Windows	start_ <i>connName</i> .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.

Starting the connector on the Windows system:

- From the **Start** menu, select **Programs>IBM WebSphere Business Integration Express>Adapters>Connectors**. By default, the program name is "IBM WebSphere Business Integration Server Express". However, it can be customized. Alternatively, you can create a desktop shortcut to your connector.
- From the Windows command line: start_*connName* *connName* *brokerName* {-configFile}.
- 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).

Starting the eMatrix adapter

The connector starts when the `start_eMatrix.bat` or `start_eMatrix.sh` script is run. These start files contain two variables that must be set before the adapter will run. They are:

- **EMADK:** This must be set to the location of the eMatrix ADK .jar file.
- **EM_LIB:** This must be set to the path of the directory containing the eMatrix shared library files.

For example:

```
set EMADK=c:\ematrix96\java\lib\eMatrixServletRMI.jar
set EM_LIB=c:\ematrix96\bin\winnt
```

Note: You do not need to set `EM_LIB` if you are running the eMatrix collaboration server on a separate machine and you have installed the stand-alone eMatrix ADK .jar file on it.

Stopping the connector

The way to stop a connector depends on the way that the connector was started.

Windows:

- You can invoke the startup script which creates a separate “console” window for the connector. In this window, type “q” and press Enter to stop the connector.
- You can configure the connector to start as a Windows service. In this case, the connector stops when the Windows system shuts down.

Using log and trace files

The adapter components provide several levels of message logging and tracing.

The **connector** uses the adapter framework to log error, informational and trace messages. Error and informational messages are recorded in an external log file, and the trace messages and trace level (0 to 5) are recorded in a trace file. The default message file name is `eMatrixConnector.txt`.

Table 5 describes the type of messages logged at each tracing level.

Table 5. Trace file tracing levels

Trace Level	Description
0	<ul style="list-style-type: none">• Logs errors and fatal errors from the eMatrix ODA• Logs warnings that require a system administrator’s attention• Logs important messages from the application
1	Traces all entering and exiting messages for method
2	Traces the ODA’s properties and their values
3	Traces the names of all business objects
4	Traces business object properties and the values received
5	<ul style="list-style-type: none">• Indicates the ODA initialization values for all of its properties• Traces the business object definition dump

You configure both the log and trace files names, as well as the trace level, in Connector Configurator Express. Refer to Appendix B, “Connector Configurator Express,” on page 65 for details.

The **ODA** has no logging capability; error messages are sent directly to the user interface. Trace files and the trace level are configured in Business Object Designer Express. The process is described in “Configure the agent” on page 33. The ODA trace levels are the same as the connector trace levels, shown in Table 5 on page 16 above.

For more details on error handling and troubleshooting, refer to Chapter 6, “Troubleshooting and error handling,” on page 39.

Chapter 4. Understanding business objects

This chapter describes the structure of business objects, how the adapter processes the business objects, and the assumptions the adapter makes about them.

The chapter contains the following sections:

- “Defining metadata” on page 19
- “Overview of business object structure” on page 19
- “Business objects for eMatrix” on page 20
- “Generating business objects” on page 29

Defining metadata

The adapter for eMatrix is metadata-driven. In the WebSphere business integration system, metadata is defined as application-specific information that describes its data structures. The metadata is used to construct business object and relationship definitions that the connector uses at run time to build business objects.

A metadata-driven adapter handles each business object that it supports according to the metadata encoded in the business object definition. This enables the adapter to handle new or modified business object definitions without requiring modifications to the code. You can make changes to the business object definitions by editing them in Business Object Designer Express.

Application-specific metadata may represent business object types, relationships, their properties, or attributes. Actual data values for each business object are conveyed at run time. The data values are encapsulated in the business objects that are passed between adapter and broker.

The adapter makes assumptions about the structure of its supported business objects, the relationships between parent and child business objects, and the format of the data. Therefore, it is important that the structure of the business object exactly match the structure defined for the corresponding object within eMatrix or the adapter will not be able to process business objects correctly.

Note: If you need to make changes to the business object structure, IBM recommends that you make them to the corresponding object in eMatrix, using the ODA. Refer to Chapter 5, “Generating business object definitions,” on page 31 for details.

For more information on modifying business object definitions, see the *Business Object Development Guide*.

Overview of business object structure

In the WebSphere business integration system, a business object definition consists of:

- A type name
- Supported verbs
- Attributes
- Application-specific information (ASI)

An application-specific business object definition is a particular type 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. For instance, attributes may reference child business objects that represent relationships.

Business objects for adapters can be flat or hierarchical. A flat business object only contains simple attributes, that is, attributes that represent a single value (such as a string) and do not point to child business objects. A hierarchical business object contains both simple attributes and child business objects or arrays of child business objects.

Hierarchical business objects can contain child business objects that have single or multiple cardinality. The child objects are stored in their parents' attributes. Attributes that contain child business objects with multiple cardinality are arrays of business objects. Attributes that represent child business objects with single cardinality contain only one such object.

Business objects for eMatrix

Valid application-specific business objects in the WebSphere Business Integration Server Express system model the essential components of the eMatrix system. The following eMatrix components can be modelled as business objects:

- **Business object types:**
Used to organize information. Instances of business objects store information.
- **Relationships:** Defines a relationship between two business objects
- **Commands:**
Used to perform custom operations or invoke eMatrix programs

A business object definition specifies the components it represents in the `ematrix_class` value of its application-specific information (ASI), defined at the business object level. The three valid `ematrix_class` values, corresponding to the eMatrix components listed above, are discussed in the next section.

Business object types

eMatrix business object types are represented in the WebSphere Business Integration Server Express system by business object definitions with business object-level ASI that specify an `ematrix_class` with the value of `business_object`. The ASI must also contain an `object_type` parameter that specifies the name of the eMatrix business object type that this particular business object will model. For example:

```
ematrix_class=business_object; object_type=<name of eMatrix business object type>
```

The eMatrix business object types, and hence their business object definitions in the system, contain two sets of fields. They are:

- Properties, which are fixed and shared by all eMatrix business object types. They include business object owner, policy and revision.
- Attributes, which are defined by the user (not to be confused with WebSphere Business Integration Server Express system attributes).

The eMatrix properties available to you through the business object are listed in Table 6 on page 21.

Note: Use an attribute of type “String” to represent a date. For supported date formats, refer to the eMatrix documentation.

Table 6. eMatrix business object properties

Property	Description	Expected attribute type
object_id	Unique ID for eMatrix object	String
Name	Name of eMatrix object	String
Revision	eMatrix object revision number	String
Policy	The governing policy for the eMatrix object	String
Owner	The owner of the eMatrix object	String
State	The current state of the eMatrix object	String
Vault	The eMatrix vault that contains this object	String
to_relationship	One or more “to” eMatrix relationships that this object supports	Child object modeling an eMatrix relationship Cardinality = 1..n
from_relationship	One or more “from” eMatrix relationships that this object supports	Child object modeling an eMatrix relationship Cardinality = 1..n

eMatrix lets the user identify objects either through an object ID or through a combination of type, name and revision. Therefore, all business objects must contain either:

- An attribute that maps to the property object_id, or
- Two attributes, mapping to the properties name and revision, respectively.

These will be key values in the business object definition. For illustrations, refer to “Business object definition examples” on page 21.

To specify that a particular business object attribute should be mapped to an eMatrix attribute:

1. Define the attribute as a simple type, such as a string or integer
2. Include

```
attr=<eMatrix attribute name>
```

in the business object definition attribute-level ASI.

Business object definition examples

Table 7 on page 21 shows a business object definition that includes two user-defined eMatrix attributes, PartNumber and Size, and maps to the ASI property object_id.

Table 7. Business object definition #1

Attribute name	Type	Default value	Application-specific information	IsKey?
ObjectId	String		prop=object_id	Yes
State	String		prop=state	No
PartNumber	String	ASX31	attr=PartNumber	No
Size	Integer	15	attr=Size	No

Table 8 on page 22 shows the same business object definition, but it now maps to the eMatrix properties, name and revision.

Table 8. Business object definition #2

Attribute name	Type	Default value	Application-specific information	IsKey?
Name	String	AllSeasonX31	prop=name	Yes
Revision	String	1	prop=revision	Yes
State	String		prop=state	No
PartNumber	String	ASX31	attr=PartNumber	No
Size	Integer	15	attr=Size	No

Relationships

eMatrix relationships are represented in the WebSphere Business Integration Server Express system by business object definitions with business object-level ASI that specify an `ematrix_class` with the value of `relationship`. The ASI must also contain an `object_type` parameter that specifies the name of the eMatrix relationship that this particular business object will model. For example:

```
ematrix_class=relationship; object_type=<name of eMatrix relationship type>
```

Like the business object definitions described above, the business object definitions that reflect eMatrix relationships may contain a combination of eMatrix properties (fixed) and attributes (user-defined).

Table 9 on page 22 lists the relationship properties.

Table 9. eMatrix relationship object properties

Property	Description	Expected attribute type
<code>relationship_id</code>	Unique ID for eMatrix relationship	String
<code>to_object</code>	eMatrix object to which this relationship extends	Child object modeling an eMatrix business object Cardinality = 1
<code>from_object</code>	eMatrix object from which this relationship extends	Child object modeling an eMatrix business object Cardinality = 1

All relationship business object definitions must contain:

- An attribute that maps to the property `relationship_id`
- Instances of `to_object` or `from_object` attributes (see Note below)
- Attributes with application-specific information categorizing them as `to_object` or `from_object` child business object containers.

Note: A relationship object may contain many instances of the `to_object` or `from_object` attribute, as a single relationship can support many object types. However, if the relationship is defined as a `to_relationship` in the parent business object, then the relationship object may contain only `to_object` identifiers. Likewise, if a `from_relationship` is defined in the parent business object, the relationship object may contain only `from_object` identifiers.

The relationship definition takes this form:

```
--Business_Object_A
  | -- to_relationship = Relationship_A_to_B
  | -- to_object = Business_Object_B
```

or

```
--Business_Object_A
  | -- from_relationship = Relationship_A_to_B
  | -- from_object = Business_Object_B
```

See “Relationship examples” on page 23 for an illustration.

Defining relationships

The adapter can only recognize relationships between different objects if you define these relationships explicitly in the business object definition. When business objects are related, the adapter requires a relationship object to connect the business objects. If business objects are not connected by a relationship object, they are assumed to be unrelated.

For example, if you define this business object:

```
--Business_Object_A
  | -- to_relationship = Relationship_A_to_B
  | -- to_object = Business_Object_B
```

and then perform a Retrieve on the parent business object (object A), the adapter will retrieve A and **only** those objects of type B that are related to A through the A-to-B relationship.

However, if you define this business object:

```
--Business_Object_D
  | -- Business_Object_E
```

and then perform a Retrieve on the parent business object (object D), the adapter will retrieve D and objects of type E regardless of whether they are related to D. In this case, business object E must have attributes containing valid search criteria, or you will get an error.

You can combine related and unrelated business objects in a definition, depending on the business scenario and relationships. For example, you can define this business object:

```
--Business_Object_A
  | -- to_relationship = Relationship_A_to_B
  | -- to_object = Business_Object_B
  | -- Business_Object_D
```

Here, business objects A and B are related to each other, but business object D is not related to either of them.

Relationship examples

The two examples shown below are related in the same way, though the relationship is defined differently in each business object definition.

```
--Car
  | -- to_relationship = CarToTireRelationship
  | -- to_object = Tire

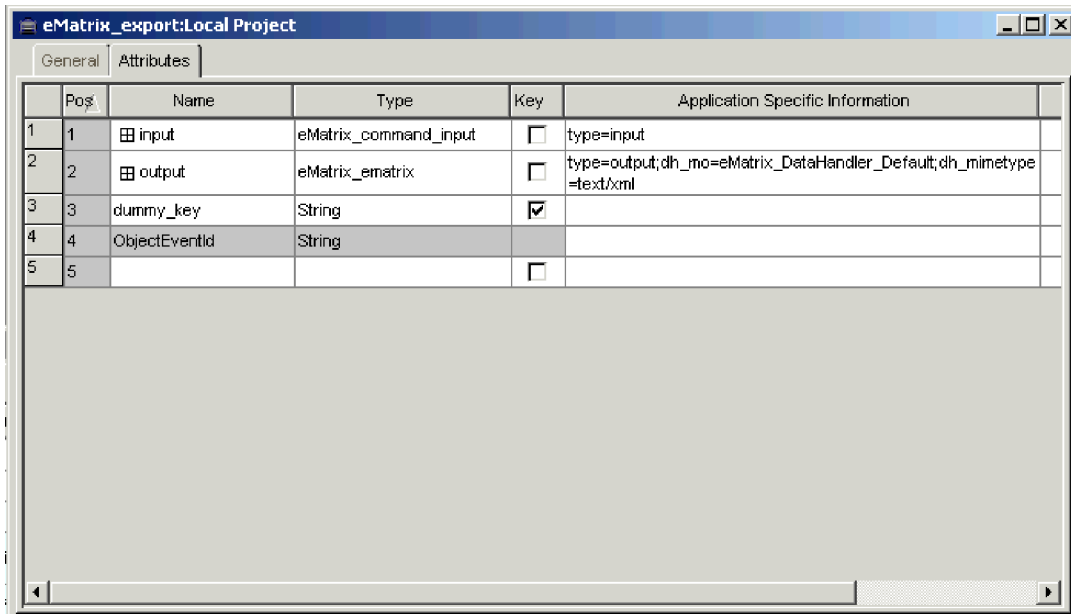
--Tire
  | -- from_relationship = CarToTireRelationship
  | -- from_object = Car
```

Command objects

eMatrix commands are represented in the WebSphere Business Integration Server Express system by business object definitions with business object-level ASI that specify an `ematrix_class` with the value of command. For example:

```
ematrix_class=command
```

Command business object definitions are structured as follows:



	Pos.	Name	Type	Key	Application Specific Information
1	1	input	eMatrix_command_input	<input type="checkbox"/>	type=input
2	2	output	eMatrix_ematrix	<input type="checkbox"/>	type=output;dh_mo=eMatrix_DataHandler_Default;dh_mimetype=text/xml
3	3	dummy_key	String	<input checked="" type="checkbox"/>	
4	4	ObjectEventId	String	<input type="checkbox"/>	
5	5			<input type="checkbox"/>	

Figure 3. Structure of command business object definitions

The command object has two attributes: one representing the command's input and the other representing the command's output. The input attribute is required and must be an object. The output attribute is optional and may be either a String or an object. Both the input and output attributes are identified by the corresponding attribute level ASI; either `type=input` or `type=output`.

The input object contains the command string that will be executed as well as several variables whose values will be interpolated into the command. The command string is stored in the input object's business object level ASI and is identified by the `command=` prefix. The following screenshots show an input object, including the command and input variables.

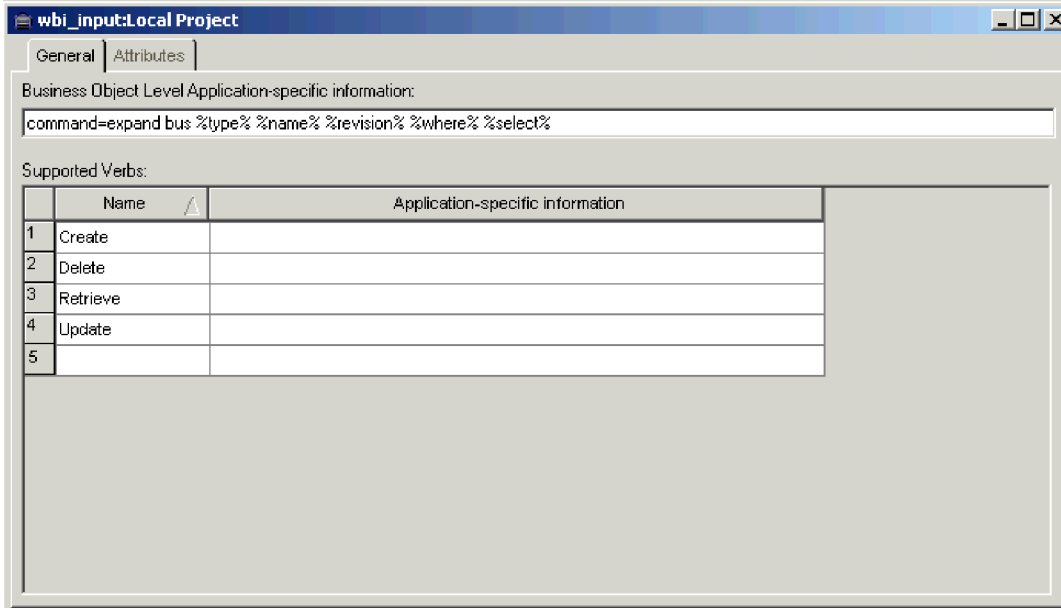


Figure 4. Input object commands

Notice that this screenshot includes the expand bus command. The attributes of the input object represent the variables which will be interpolated into this command string before being sent to the MQL interpreter (shown in Figure 5).

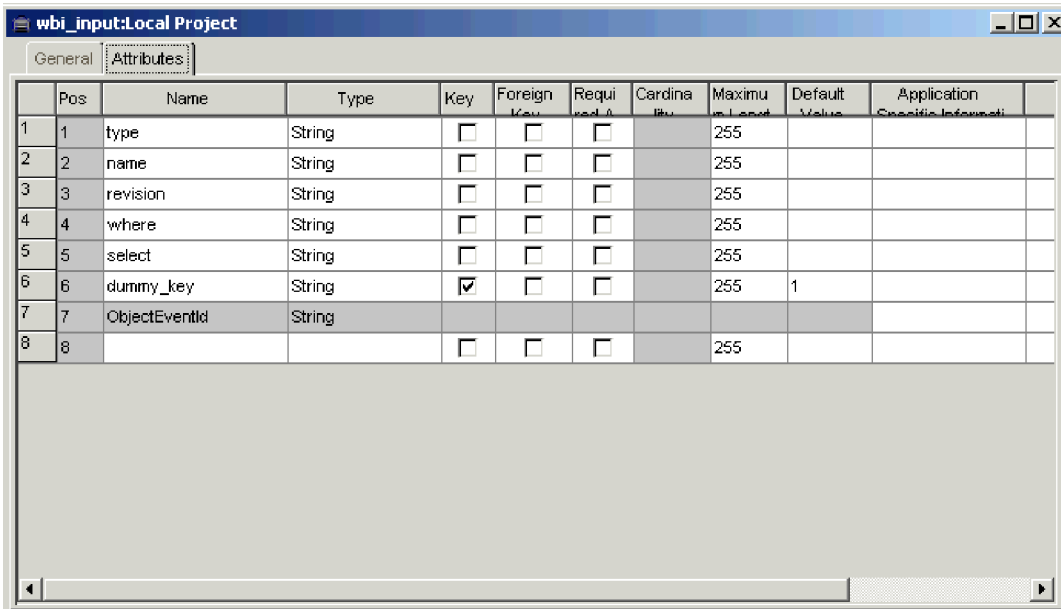


Figure 5. Input object attributes

The output attribute may be either a string or a business object. When the output attribute of the business object is a string, it will contain the text returned by the command. When the output attribute is an object, the results of the command will be passed through a data handler and then translated into a business object hierarchy. In this case, the output attribute of the command object must contain information that will invoke the data handler. The following fields may be added

to the ASI of the output attribute:

Table 10. Asi output attributes

ASI output attribute	Description
dh_mo	Specifies the data handler meta-object name
dh_mimetype	Specifies the mime-type content that is passed to the data handler
dh_classname	Specifies the fully qualified data handler Java class name

The following screenshots show an example of an output attribute and its corresponding output object. These screenshots are not related to the input object screenshots found above.

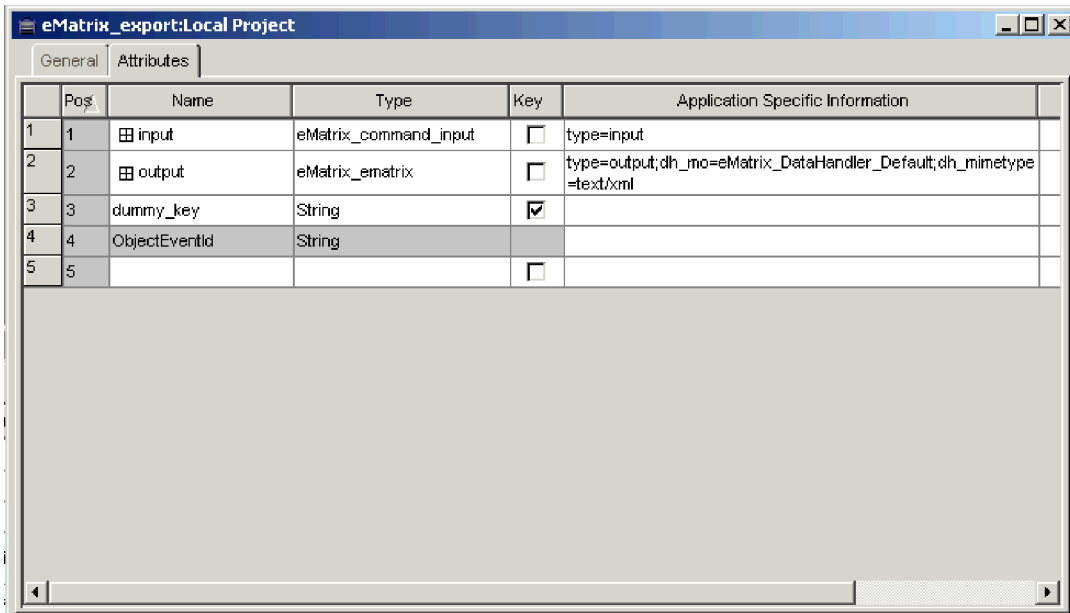


Figure 6. Command object

Note: The output attribute is identified in Figure 6 by the attribute level ASI type=output. Also, the ASI contains additional information to identify and invoke the XML data handler.

Note: The input and output objects shown above are not child objects of the command object.

Pos	Name	Type	Key	Foreign Key	Required	Cardinality	Maximum Length	Default Value	Application Specific Information
1	1	instruction	String	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	255	xml	type=pi
2	2	doctype	String	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	255		type=doctype
3	3	TLO	eMatrix_TLO_ematrix	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1		ematrix;type=pcdata
3.1	3.1	creationProperties	eMatrix_creationProperties	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1		creationProperties;type=pcdata
3.1.1	3.1.1	release	String	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	255		release;type=pcdata
3.1.2	3.1.2	datetime	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	255		datetime;type=pcdata
3.1.3	3.1.3	event	String	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	255		event;type=pcdata
3.1.4	3.1.4	dtclInfo	String	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	255		dtclInfo;type=pcdata
3.1.5	3.1.5	ObjectEventId	String						
3.2	3.2	ObjectEventId	String						
4	4	ObjectEventId	String						
5	5			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	255		

Figure 7. A business object hierarchy assigned to capture the command output

Note: The business hierarchy shown above represents a simple XML DTD that will encapsulate the output of an MQL command.

Note: The only verb supported for command business objects is Create.

Business object verbs

Every business object contains a verb, which describes how the data in the application-specific business object should be handled by the eMatrix adapter.

The adapter identifies a business object using either its unique objectId or a combination of type, name and revision. These are all user-defined properties. For details, see “Business object types” on page 20.

The adapter interprets the same verb differently for different classes of eMatrix objects. It checks the value of ematrix_class in the business object definition before processing the business object.

Table 11 on page 27 lists the business object verbs available to the adapter for eMatrix and describes the actions that the adapter performs with each one.

Table 11. Business object verbs and actions

Verb	eMatrix class	Action
Create	Business objects	Creates one or more new business objects in eMatrix, along with any relationships. Uses name, type and revision specified in the request. Uses vault and policy values if specified, otherwise uses the default. Creates any specified child objects and relationships.
	Relationships	Cannot create relationships independently, because all child objects must have the same verb as the parent object. To create a new relationship between objects with an already existing relationship, use Update.
	Commands	Executes the command in the eMatrix system and returns any results to the request object.

Table 11. Business object verbs and actions (continued)

Verb	eMatrix class	Action
Update	Business objects and relationships	Updates one or more specified business objects and their relationships. For an example, see below.
Delete	Business objects	Deletes the specified business object and automatically deletes any relationships bound to it. All deletes are physical deletes.
	Relationships	Deletes the relationship denoted by the relationship ID. Disconnects the business objects bound to the relationship; does not delete them.
Retrieve	Business objects and relationships	Retrieves the entire business object from eMatrix, including relationships and any eMatrix business objects that correspond to attributes in the business object. The business object returned to the integration broker should accurately reflect the structure in the business object definition.
RetrieveBy Content	Business objects and relationships	Retrieves the entire business object from eMatrix, using key and/or non-key information. If it finds more than one match, it returns the first one and sends a message saying "Multiple hits".
Exists	Business objects and relationships	Verifies whether the top-level business object exists in eMatrix.

The verb is contained within the application-specific business object. Its value is set by the broker that creates the business object. The adapter will perform different operations on the eMatrix application, depending on the verb and the contents of the business object.

Once the adapter has processed the business object, and invoked the requisite actions in the eMatrix system, it returns a status code. It may also return a new business object containing information about the state of the application to the integration broker.

Attribute properties

The business object definitions have various properties that you can set on their business object attributes. The tables below list the attributes and their values.

Table 12 lists simple attributes.

Table 12. Simple attributes

Attribute	Property
Name	Specifies the business object field name.
Type	Specifies the business object field type.
MaxLength	255 by default.
IsKey	Each business object must have at least one key attribute, which you specify by setting the key property to true for an attribute.
IsForeignKey	Not used.
Is Required	Not used.
AppSpecInfo	Stores the application-specific information (ASI), such as attr=<attribute name>.
DefaultValue	Specifies a default value that the connector uses for a simple attribute in the inbound business object if the attribute is not set and is a required attribute.

Application-specific information

Application-specific information (ASI) provides the connector with application-dependent instructions on how to process business objects. If you extend or modify a business object definition, you must make sure that the application-specific information in the definition matches the syntax that the connector expects.

Application-specific information can be specified on the business object, on each business object attribute, and for each verb. For simple attributes, the ASI specifies either the type of the eMatrix attribute or the name of the eMatrix property (such as name, revision, or vault). For child business objects, the ASI specifies the direction of the relationship (for object hierarchies representing eMatrix business objects and relationships).

Generating business objects

Business Object Designer Express provides a graphical interface that enables you to generate business object definitions for use at run time. For details, see Chapter 5, “Generating business object definitions,” on page 31

If the object model in eMatrix is changed, use the ODA in Business Object Designer Express to modify the original business object definition to reflect the update, or to create a new definition.

Chapter 5. Generating business object definitions

This chapter describes the Object Discovery Agent (ODA) for eMatrix, and how to use it to generate business object definitions for the adapter for eMatrix.

This chapter contains the following sections:

- “Overview of the ODA for eMatrix” on page 31
- “Generating business object definitions” on page 31
- “Uploading your files” on page 38

Overview of the ODA for eMatrix

An ODA (Object Discovery Agent) enables you to generate application-specific 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 Express provides a graphical interface to access the Object Discovery Agent and to work with it interactively.

The Object Discovery Agent (ODA) for eMatrix supports both business object and relationship types. The ODA connects to the eMatrix database using the initialization properties that you provide in Business Object Designer Express.

It then retrieves all the business object type names from the eMatrix database and presents them in Business Object Designer Express. You can expand any of the business object types to see the relationships associated with them, and you can also expand these relationships. You can then select one or more of these business object types (parent or child) and relationship types and generate a business object definition for it.

The Business Object Designer Express wizard automates the process of creating these definitions, using the eMatrix business object attributes retrieved by the ODA. Business object definitions created for child business object and relationship types are associated with the parent business object definition. You can view or make modifications to a business object definition before you save it to the server.

You use the ODA to generate business object definitions at two different stages:

1. **When the system is first set up:** You must create a set of business object definitions for all the events defined within eMatrix.
2. **Whenever an object or relationship type used in an event is modified in eMatrix:** You must run the ODA in Business Object Designer Express to pick up the changed metadata for the object and export a new business object definition to the broker repository.

Generating business object definitions

This section describes how to use eMatrix ODA in Business Object Designer Express to generate business object definitions. For detailed information on launching and using Business Object Designer Express, see the *Business Object Development Guide*.

Before you begin

The eMatrix RMI collaboration server must be installed before you can run the eMatrix ODA. Once the collaboration server is installed, you must run the RMI daemon for the ODA to connect to the server.

You can run the ODA and the server on different machines. If you do, you need to know the hostname, port and name of the collaboration server on the remote machine.

Regardless of whether your ODA and collaboration server are run on different machines, verify that the RMI server and ODA connection string are running on the same port. To do this, follow either of these suggestions:

- Go to the server installation directory `eMatrix\bin\winnt` and double-click the `rmiereg.bat` file. This will start the RMI server and display the port number in a pop-up window.
- Go to the `framework.properties` file in the `RMI Server Installation Dir\java\properties` directory and examine the `ematirx.server.host` property. This property lists both the hostname and the port.

Starting the ODA

The ODA for eMatrix has a default name of `eMatrixODA`. The name can be changed by changing the value of the `AGENTNAME` variable in the start script.

- To start the ODA from Windows, select:
Start>Programs>IBM WebSphere Business Integration Adapters Adapters>Object Discovery Agent>eMatrix Object Discovery Agent
- To start the ODA from the command line, run this command:
`start_eMatrixODA`

Running Business Object Designer Express

Business Object Designer Express provides a wizard that guides you through the steps to generate a business object definition using the ODA. The steps are as follows:

Start Business Object Designer Express

To run Business Object Designer Express from Windows:

1. Select **Start>Programs>IBM WebSphere Business Integration Express Adapters>Tools>Business Object Designer Express**
2. The Business Object Designer Express main window opens.
3. To choose an ODA, Select **File > New Using ODA**. The *Business Object Wizard - Step 1 of 6 - Select Agent* screen appears (see Figure 8 on page 33).

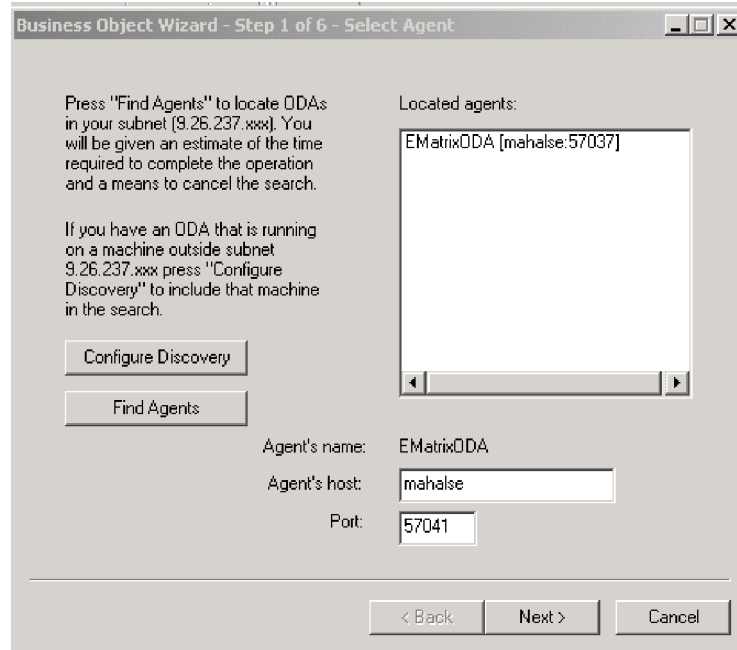


Figure 8. Select Agent screen

4. Click **Find Agents**. The system finds ODAs running on your system, including eMatrixODA, and lists them in the **Located agents:** window.
5. Select eMatrixODA and select **Next**.

Configure the agent

The *Business Object Wizard - Step 2 of 6 - Configure Agent* screen appears.

In this screen you enter the information that the ODA needs to establish a context to communicate with the eMatrix database. The required properties and their values are shown in Table 13 on page 34.

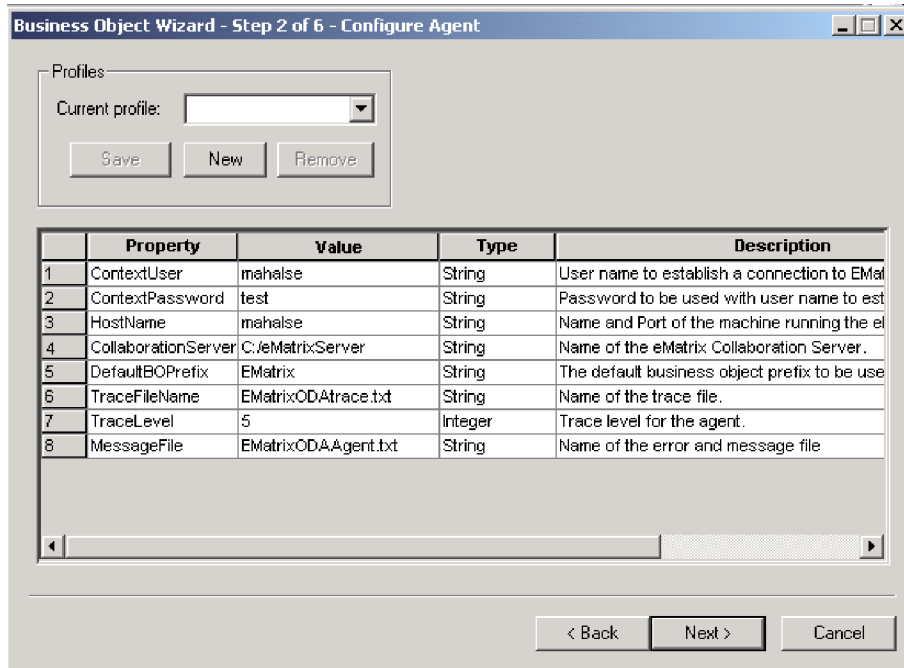


Figure 9. Configure Agent screen

1. Use the Profiles menu to create a new profile. You may also select an existing profile.
2. Type the name of each property, its value, type and description.

Note: If you use a profile, the property values are filled in for you.

Table 13. Property values for configuring the ODA

Property name	Property type	Default value	Description	Required
ContextUser	String	Creator	The user name that is used to establish a context object to connect to the eMatrix database.	Yes
ContextPassword	String	None	The password that is used to establish a context object to connect to the eMatrix database. May be left empty.	Yes
HostName	String		The host name and port for the eMatrix collaboration server. For example; katari:1099	Yes
DefaultBOPrefix	String	EMatrix	The default prefix for the business object definition.	Nos
TraceFileName	String	<agentname> Trace.txt	The name of the trace file.	No
TraceLevel	Integer	5	Trace level enabled for the ODA.	Yes
MessageFile	String	<agentname> Agent.txt	The name of the error and message file.	Yes

All messages displayed by the eMatrix ODA appear in the eMatrix0DAAgent.txt file, which has a standard message file format.

Note: If the name of the message file is not correctly specified, the ODA will run without messages.

Creating a Profile

You can also save all the values you enter on this screen to a profile. Instead of re-typing all the data the next time you run the ODA, you simply select a profile from the drop-down menu and use the saved values.

You can save multiple profiles, each with a different set of specified values for the same properties.

When you have finished, click **Next**.

Select a business object

The *Business Object Wizard - Step 3 of 6 - Select Source* screen appears. Use this screen to select any number of business object or relationship types for which the ODA will generate business object definitions.

The screen lists the types that have been defined in eMatrix. If eMatrix has not been initialized, the list will be empty.

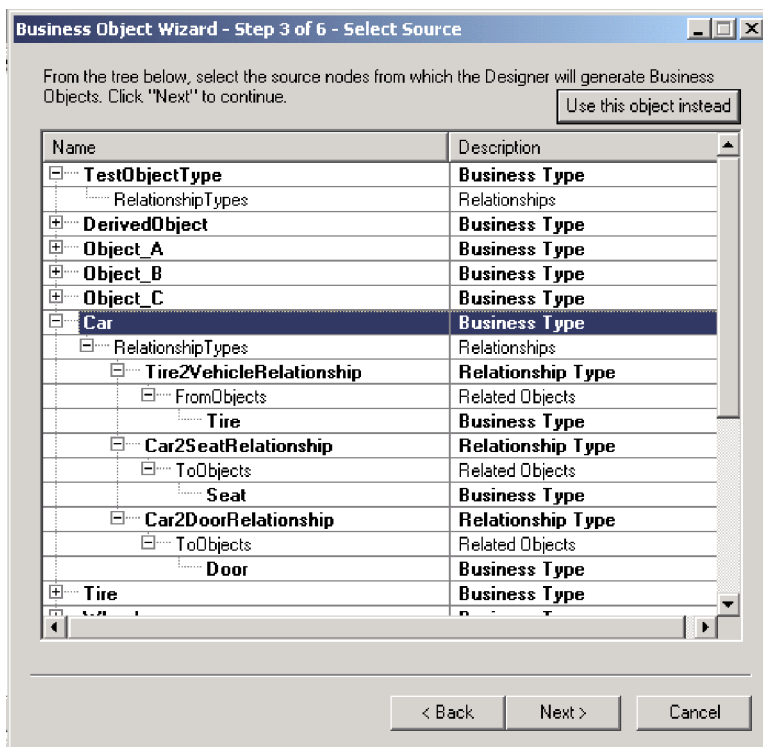


Figure 10. Select Source screen

- Expand a parent business object to see a list of its relationship types.
 - Expand a relationship type to see a list of the business objects to or from which it extends.
1. Select the business object types you want to use.
 2. Click **Next**.

Confirm selection

The *Business Object Wizard - Step 4 of 6 - Confirm source nodes for business object definitions* screen appears. It shows the source nodes you selected.

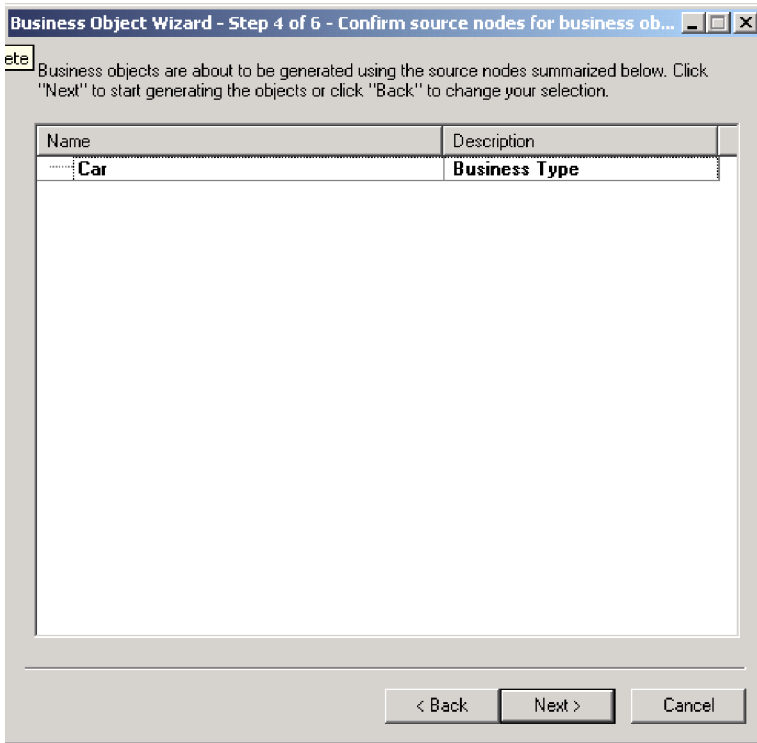


Figure 11. Confirm source nodes screen

Click **Back** to make changes or **Next** to confirm the list is correct.

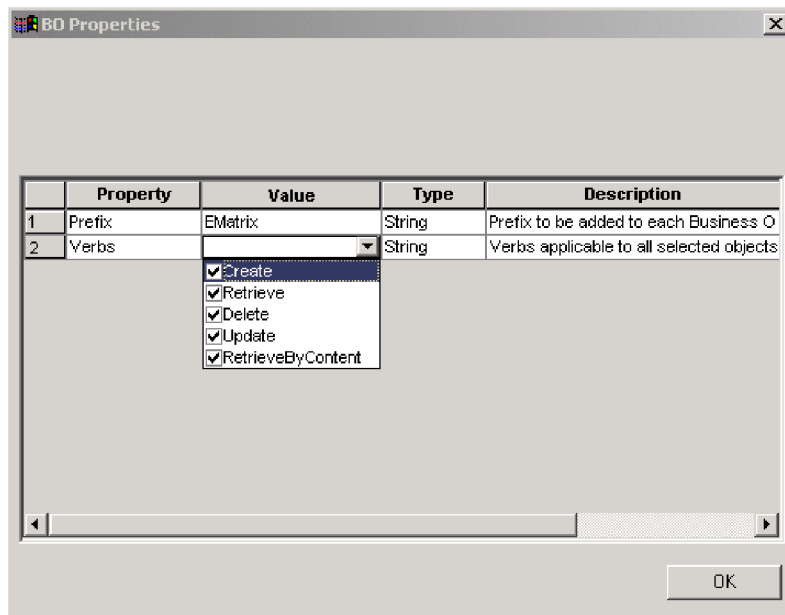


Figure 12. Generating business objects screen

The next screen requires you to set the business object properties. Here you can select the business object prefix and the verb or verbs that the business objects will use. Deselect any of the verb values that you do not want your business objects to use.

Click **OK** to move on.

Save the business object definition

The *Business Object Wizard - Step 6 of 6 - Save business objects* screen appears.

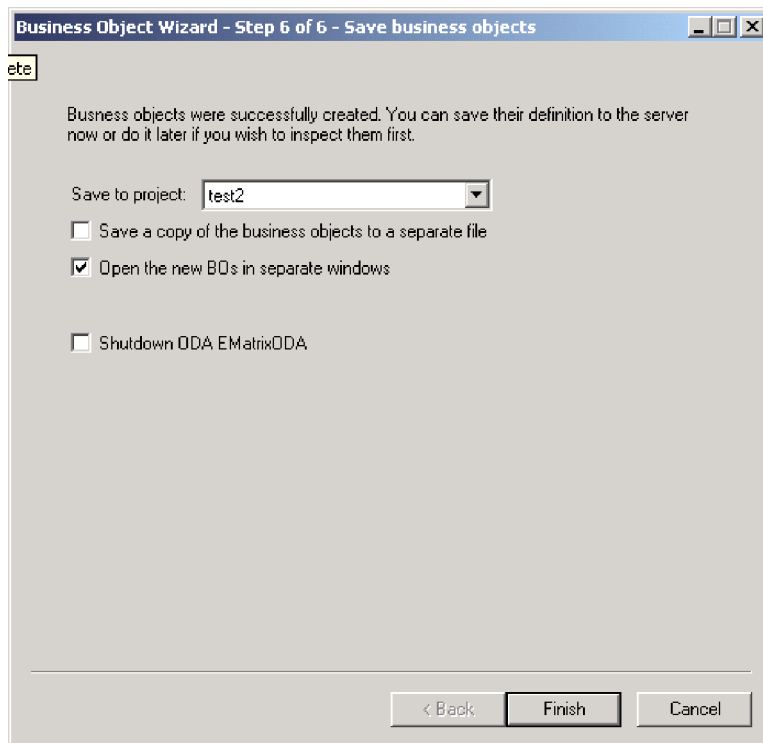


Figure 13. Save business objects screen

Here you choose the location to which your business object definition will be saved.

You can optionally save the generated business object definitions to a file. To do so:

1. Check **Save business objects to a file**. A dialog box appears.
2. Type the location in which you want the copy of the new business object definitions to be saved.

Business Object Designer Express saves the files to the specified location.

Note: If you create new custom objects in eMatrix, you must add new business object definitions for them, using the ODA as described in this chapter.

If you have finished working with the ODA, you can shut it down by checking **Shutdown ODA: eMatrix ODA** before clicking **Finish**.

Uploading your files

The newly created business object definition files must be uploaded to the integration broker once they have been created.

For InterChange Server Express, 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 *System Implementation Guide*.

Chapter 6. Troubleshooting and error handling

This chapter describes how the adapter handles some common errors and offers advice on troubleshooting common problems.

This chapter covers:

- “Processing errors” on page 39
- “Troubleshooting” on page 40

Processing errors

In general, whenever the adapter encounters an error, it logs an error message through the connector API.

All error messages are stored in an external message file, as described in “Using log and trace files” on page 16.

For all operations, if a connection cannot be established to eMatrix or if the connection is lost during processing, the adapter returns the code APPRESPONSETIMEOUT and logs a fatal error. This causes the connector to be terminated and an e-mail notification is sent to the administrator.

Unresolved events

The adapter takes action to recover from unresolved or incomplete events depending on the value of the configuration property s.

The options are listed in Table 14.

Table 14. Processing in-doubt events

Value of “inDoubtEvents”	Action to take
FailOnStartUp	Log a fatal error and terminate.
Reprocess	Publish the event to the broker like a normal event.
LogError	Ignore the event and log an error.
Ignore	Ignore the event.

Polling errors

Several errors may occur in the polling process. The most common are listed in Table 15.

Table 15. Processing polling errors

Error	Action
Cannot publish event because it is not subscribed.	Logs an error message, may archive the event, and continues processing events.
Cannot publish event because connector controller is not active.	Sets event status to 0 and returns SUCCESS code.
Error is specific to this event, for example, invalid value specified in event.	Logs an error message, may archive the event, and continues processing events.

Table 15. Processing polling errors (continued)

Error	Action
Broker rejects event with an error message.	Logs an error message, may archive the event and the error message, and returns FAIL code.
Cannot communicate with eMatrix; other unrecoverable errors	Logs a fatal error messages and returns APPRESPONSETIMEOUT code

Verb processing errors

The adapter requires a unique business object ID or combination of values (type, name and revision) to identify a business object. If the values that are supplied are incorrect or do not match any existing business object, an error is reported.

These are some of the most common verb processing errors.

- When creating business objects, if the adapter is successful, it posts the newly created business object to the integration broker and returns the value SUCCEED.
If a business object with the specified values already exists, the adapter returns VALDUPES and does not create the new business object.
- When updating business objects, if the adapter is successful, it posts the newly updated business object to the integration broker and returns the value VALCHANGE.
- If any error occurs during processing, the adapter returns the FAIL code to the broker, and logs an explanatory error message.

Troubleshooting

This sections describes some simple troubleshooting techniques for common problems you may encounter when using the adapter for eMatrix.

Event notification

This section describes four common problems that may arise during event notification. They are:

- Faulty event generation
- Incorrect eMatrix event business object names
- The event vault not found
- Incorrect business object hierarchies

Checking for event generation

When you debug the event notification functionality, you will first want to check whether you are successfully generating any events. To do this:

1. Perform an action that you know will invoke a trigger which calls WBIEventLogger.
2. Next, perform a query to see if the event was generated; for example:
`temp query bus wbi_Event **;`
3. If no events are being generated, make sure you have installed a trigger that will invoke WBIEventLogger.
You can check whether a trigger was installed by opening up the appropriate business object type or relationship definition in the eMatrix Business Modeler. See Appendix C, "Sample scenario," on page 81 for an example of how to install an event notification trigger.

Note: No events are generated when the user name of the user whose actions invoke the trigger matches the `adapterUser` constant specified in `WBIEventLogger`. The `adapterUser` constant specifies the user name that the adapter should be using to log in to the eMatrix system. The point of ignoring such events is to prevent situations where the adapter modifies an entity in the eMatrix system and thereby causes an event to be logged. We assume that the adapter is aware of its own activities and does not need to log them. Keep this in mind when testing.

4. If you wish to test whether a trigger that executes `WBIEventLogger` is being invoked, set the following property in the `matrix.ini` file:

```
MX_MQL_TRACE=TRUE
```

When you perform an action which invokes the trigger you'll see a message similar to this:

```
18:15:00.826 MQL t@2900 Session: mx3f20221364f87ac7
18:15:00.826 MQL t@2900 Program: WBIEventLogger
18:15:00.826 MQL t@2900 args: -method recordEvent ${OBJECTID} n=wbi_cpu
v=Update p=1
18:15:08.417 MQL t@2900 End Program:MQL<3>
```

This tells you that the trigger has executed `WBIEventLogger` with the arguments listed above.

Checking eMatrix event business object names

If you know that events are being generated, but you still get an error every time you poll the eMatrix application, take a closer look at the name of the event business object. The business object name should look something like this:

```
wbi_22032.41802.50936.705_1058897313350_1892833611
```

If you notice upper-case words, such as `FROMOBJECT`, appearing in business object names, you may have specified an invalid `MARCO` value as an argument to the trigger. To resolve this:

1. Check all business object type definitions in the Business Modeler.
2. Review the triggers they use to invoke `WBIEventLogger` and make sure any `MARCO` values you provide as arguments are correct.

Finding the event vault

If you receive the following error during event polling, it means the adapter cannot find the `EventVault` referenced in your connector properties. The error is:

```
System Error: #1600039: vault 'WBI_Events' does not exist
```

You may get this error for one of two reasons:

- You are referencing the wrong vault in your properties, or
- You have not created the vault.

Run `InstallEventTables` to make sure your vault was created, and check the name of `EventVault` in the connector properties.

Checking business object hierarchies

When you create a business object hierarchy that will be used for event notification, make sure the hierarchy does not include any child business object definitions that represent an eMatrix business object type and whose parent also represents an eMatrix business object type.

If such an object exists, the adapter will fail when polling and log a message similar to this:

```
An error occurred while trying to validate your WBI business object instance hierarchy.
```

The reason for this is that business objects which represent eMatrix business objects cannot contain attributes that also represent eMatrix business objects but are null.

Request processing

This section describes two common problems that may arise during request processing. They are:

- Incorrect string values in commands
- Incorrect hierarchical business object values

Processing strings in commands

The values of string-typed attributes of business objects representing eMatrix commands are not quoted when they are interpolated into the command template prior to command processing. Therefore, an unquoted attribute value containing white space will be interpreted as two words of an MQL command.

Values in business object hierarchies

When sending a request, you may have child business objects in the hierarchy representing eMatrix business objects that have parent objects also representing eMatrix business objects. Make sure that any child business object is not null. The adapter will throw an error if such a hierarchy is encountered.

General tips

Here are two general problems and their resolution.

Unsupported business objects

You may receive a message like this in your log or trace file:

```
Unable to find version "*" of business object definition  
"wbi_computer_bundle_to_computer"
```

To resolve it, you need to add the business object mentioned in the message to the list of supported business objects in Connector Configurator Express.

Incomplete business object relationships

When you use the ODA, you may wish to model two business object types and their connecting relationship. Be sure to select all three in a hierarchical fashion as displayed in Figure 14 on page 43.

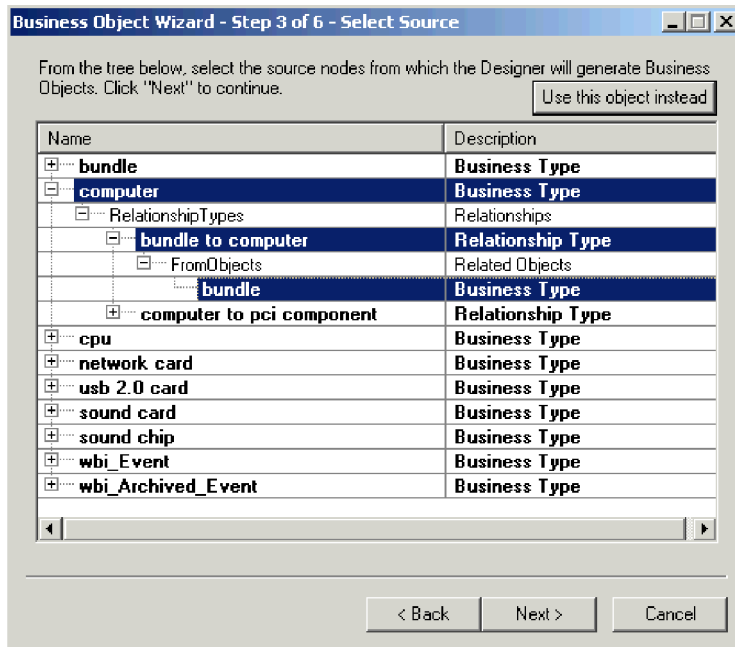


Figure 14. Selecting business object relationships

If you do not do this, the ODA will create an incomplete model of the types and their shared relationship.

Appendix A. Standard configuration properties for connectors

This appendix describes the standard configuration properties for the connector component of WebSphere Business Integration Server Express adapters. The information covers InterChange Server Express.

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

New properties

These standard properties have been added in this release:

- AdapterHelpName
- ControllerEventSequencing
- jms.ListenerConcurrency
- jms.TransportOptimized
- TivoliTransactionMonitorPerformance

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 Express and describes characteristics common to all properties. For information on configuration properties specific to a connector, see its adapter user guide.

Starting Connector Configurator Express

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

Connector Configurator Express and System Manager run only on the Windows system.

Configuration property values overview

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

1. Default
2. Repository for InterChange Server Express 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).
- **Agent restart (InterChange Server Express 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 Express window, or see the Update Method column in Table 16 on page 47.

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 16 on page 47 provides a quick-reference to the standard connector configuration properties. Not all connectors require all of these properties, and property settings may differ. .

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

Note: In the Notes column in Table 16, the phrase “RepositoryDirectory is set to <REMOTE>” indicates that the broker is InterChange Server Express.

Table 16. 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 has a valid <Regional Setting> 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 for ICS; otherwise Component restart	
ApplicationName	Application name	The value specified for the connector application name	Component restart	
CharacterEncoding	Any supported code. The list shows this subset: ascii7, ascii8, SJIS, Cp949, GBK, Big5, Cp297, Cp273, Cp280, Cp284, Cp037, Cp437	ascii7	Component restart	This property is valid only for C++ connectors.
CommonEventInfrastructure	true or false	false	Component restart	
CommonEventInfrastructureURL	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.
ConcurrentEventTriggeredFlows	1 through 32,767	1	Component restart	This property is valid only if the value of RepositoryDirectory is set to <REMOTE> 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 16. 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 RepositoryDirectory 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 RepositoryDirectory 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 DeliveryTransport is JMS.
DeliveryTransport	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 16. 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 16. 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>	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	3	Dynamic if ICS; otherwise Component restart	
RestartRetryInterval	A value in minutes from 1 through 2147483647	1	Dynamic if ICS; otherwise Component restart	

Table 16. Summary of standard configuration properties (continued)

Property name	Possible values	Default value	Update method	Notes
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 CwB0	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 CwB0 if the value of RepositoryDirectory is set to <REMOTE>.
WsifSynchronousRequest Timeout	0 to any number (milliseconds)	0	Component restart	This property is not valid if the value of BrokerType is ICS.
XMLNameSpaceFormat	short or long	short	Agent restart	This property is not valid if the value of BrokerType is ICS.

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.

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.

BrokerType

The BrokerType property identifies the integration broker type that you are using. The value is ICS, , or .

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 Express appendix in this guide.

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 be 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.

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 Express.

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 InterChange Server Express (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. For Java Messaging Service, the value is JMS.

- If the value of the RepositoryDirectory property is set to <REMOTE>, the value of the DeliveryTransport property can be 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 IDL.

The default value is JMS.

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 Express. 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 when InterChange Server Express (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 *WebSphere Business Integration Server Express Installation Guide for Windows*.

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 is 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 Express 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 *WebSphere Business Integration Server Express Installation Guide for Windows*.

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 Express 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 InterChange Server Express (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 3.

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.

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 not valid if the value of BrokerType is ICS. 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 53.

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 CwB0.

Appendix B. Connector Configurator Express

This appendix describes how to use Connector Configurator Express to set configuration property values for your adapter.

You use Connector Configurator Express to:

- Create a connector-specific property template for configuring your connector
- Create a configuration file
- Set properties in a configuration file

The topics covered in this appendix are:

- “Overview of Connector Configurator Express”
- “Creating a connector-specific property template” on page 67
- “Creating a new configuration file” on page 69
- “Setting the configuration file properties” on page 72

Overview of Connector Configurator Express

Connector Configurator Express allows you to configure the connector component of your adapter for use with the InterChange Server Express integration broker.

You use Connector Configurator Express 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 InterChange Server Express, maps for use with collaborations as well as specify messaging, logging and tracing, and data handler parameters, as required.

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 Express 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 Express.

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 Express 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 67 to set up a new one.

Starting Connector Configurator Express

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

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

Running Configurator in stand-alone mode

You can run Connector Configurator Express without running System Manager and work with connector configuration files, irrespective of your broker.

To do so:

- **Start>All Programs**, click **IBM WebSphere Business Integration Express>Toolset Express>Development>Connector Configurator Express**.
- Select **File>New>Connector Configuration**.
- When you click the pull-down menu next to **System Connectivity Integration Broker**, you can select ICS.

You may choose to run Connector Configurator Express 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 71.)

Running Configurator from System Manager

You can run Connector Configurator Express from System Manager.

To run Connector Configurator Express:

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 Express**. The Connector Configurator Express 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.

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 Express opens and displays the configuration file with the integration broker type and file name at the top.
- From Connector Configurator Express, 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” on page 67.
- To use an existing file, simply modify an existing template and save it under the new name. You can find existing templates in your \ProductDir\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 Express:

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
 - Property Subtype
 - Updated Method
 - Description
- **Flags**
 - Standard flags
- **Custom Flag**
 - Flag

The **Property Subtype** can be selected when **Property Type** is a String. It is an optional value which provides syntax checking when you save the configuration file. The default is a blank space, and means that the property has not been subtyped.

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. Right-click on the square to the left of the Value column heading.
2. From the pop-up menu, select **Add** to display the Property Value dialog box. Depending on the property type, the dialog box allows you to enter either a value, or both a value and a range.
3. Enter 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, `Pol1Quantity` 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 Express stores the information you have entered as an XML document, under \data\app in the \bin directory where you have installed Connector Configurator Express.

Setting pathnames

Some general rules for setting pathnames are:

- The maximum length of a filename in Windows is 255 characters.
- In Windows, the absolute pathname must follow the format [Drive:][Directory]\filename: for example, C:\WebSphereAdapters\bin\Data\Std\StdConnProps.xml
- Queue names may not have leading or embedded spaces.

Creating a new configuration file

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

You also select an operating system for extended validation on the file. The toolbar has a droplist called **Target System** that allows you to select the target operating system for extended validation of the properties. The available options for Windows is no extended validation (switches off extended validation). The default on startup is Windows.

To start Connector Configurator Express:

- In the System Manager window, select **Connector Configurator Express** from the **Tools** menu. Connector Configurator Express opens.
- In stand-alone mode, launch Connector Configurator Express.

To set the operating system for extended validation of the configuration file:

- Pull down the **Target System:** droplist on the menu bar.
- Select the operating system you are running on.

Then 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.

- Complete 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. Set the operating system for extended validation of the configuration file using the **Target System:** droplist on the menu bar (see “Creating a new configuration file” above).
2. Click **File>New>Connector Configuration**.
3. 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 Express does not check the spelling of the name that you enter. You must ensure that the name is correct.

- **System Connectivity**

Click ICS.

- **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**.

4. A configuration screen appears for the connector that you are configuring. The title bar shows the integration broker and connector name. You can fill in all the field values to complete the definition now, or you can save the file and complete the fields later.
5. 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 Express 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.

6. To complete the connector definition, enter values in the fields for each of the tabs of the Connector Configurator Express 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_JMS.txt for the JMS 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 Express, 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 Express, 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 Express.
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 Express 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.

2. The Standard Properties tab will display the connector properties associated with the selected broker. The table shows **Property name**, **Value**, **Type**, **Subtype** (if the Type is a string), **Description**, and **Update Method**.
3. You can save the file now or complete the remaining configuration fields, as described in “Specifying supported business object definitions” on page 75..
4. 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 you created the configuration file, you used the **Target System** droplist that allows you to select the target operating system for extended validation of the properties.

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

If you have elected to use the extended validation feature by selecting a value of Windows from the **Target System** droplist, the system will validate the property subtype s well as the type, and it displays a warning message if the validation fails.

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 Express displays a configuration screen with tabs for the categories of required configuration values.

Connector Configurator Express 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 InterChange Server Express, values for these properties are also required:

- Associated Maps
- Security

Important: Connector Configurator Express 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

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.

Note: If the property has a Type of String, it may have a subtype value in the Subtype column. This subtype is used for extended validation of the property.

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 Express, click **File>Exit** (or close the window), and click **No** when prompted to save changes.
 - To enter values for other categories in Connector Configurator Express, 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.

To get more information on a particular standard property, left-click the entry in the Description column for that property in the Standard Properties tabbed sheet. If you have Extended Help installed, an arrow button will appear on the right. When you click on the button, a Help window will open and display details of the standard property.

Note: If the hot button does not appear, no Extended Help was found for that property.

If installed, the Extended Help files are located in
<ProductDir>\bin\Data\Std\Help\<RegionalSetting>\.

Setting connector-specific configuration properties

For connector-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.

Note: If the property has a Type of String, you can select a subtype from the Subtype droplist. This subtype is used for extended validation of the property.

3. To encrypt a property, select the **Encrypt** box.
4. To get more information on a particular property, left-click the entry in the Description column for that property. If you have Extended Help installed, a hot button will appear. When you click on the hot button, a Help window will open and display details of the standard property.

Note: If the hot button does not appear, no Extended Help was found for that property.

5. Choose to save or discard changes, as described for “Setting standard connector properties” on page 73.

If the Extended Help files are installed and the AdapterHelpName property is blank, Connector Configurator Express will point to the adapter-specific Extended Help files located in <ProductDir>\bin\Data\App\Help\<RegionalSetting>\. Otherwise, Connector Configurator Express will point to the adapter-specific Extended Help files located in <ProductDir>\bin\Data\App\Help\<AdapterHelpName>\<RegionalSetting>\. See the AdapterHelpName property described in the Standard Properties appendix.

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 Properties appendix, under "Standard connector properties overview""Standard connector properties overview" on page 45.

Specifying supported business object definitions

Use the **Supported Business Objects** tab in Connector Configurator Express 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.

InterChange Server Express as 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 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 Express 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 Express 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 Express 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.

Associated maps

Each connector supports a list of business object definitions and their associated maps that are currently active in InterChange Server Express. 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 Express 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 Binding**

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 InterChange Server Express 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 Express window, click **Save to Project**.
4. Deploy the project to InterChange Server Express.
5. Reboot the server for the changes to take effect.

Security

You can use the **Security** tab in Connector Configurator Express to set various privacy levels for a message. You can only use this feature when the `DeliveryTransport` property is set to JMS.

By default, Privacy is turned off. Check the **Privacy** box to enable it.

The **Keystore Target System Absolute Pathname** is:

For Windows:

```
<ProductDir>\connectors\security\<connectorname>.jks
```

This path and file should be on the system where you plan to start the connector, that is, the target system.

You can use the Browse button at the right only if the target system is the one currently running. It is greyed out unless **Privacy** is enabled and the **Target System** in the menu bar is set to Windows.

The **Message Privacy Level** may be set as follows for the three messages categories (All Messages, All Administrative Messages, and All Business Object Messages):

- `""`: is the default; used when no privacy levels for a message category have been set.
- `none`: Not the same as the default: use this to deliberately set a privacy level of none for a message category.
- `integrity`
- `privacy`
- `integrity_plus_privacy`

The **Key Maintenance** feature lets you generate, import and export public keys for the server and adapter.

- When you select **Generate Keys**, the Generate Keys dialog box appears with the defaults for the keytool that will generate the keys.
- The keystore value defaults to the value you entered in **Keystore Target System Absolute Pathname** on the Security tab.
- When you select OK, the entries are validated, the key certificate is generated and the output is sent to the Connector Configurator Express log window.

Before you can import a certificate into the adapter keystore, you must export it from the server keystore. When you select **Export Adapter Public Key**, the Export Adapter Public Key dialog box appears.

- The export certificate defaults to the same value as the keystore, except that the file extension is <filename>.cer.

When you select **Import Server Public Key**, the Import Server Public Key dialog box appears.

- The import certificate defaults to <ProductDir>\bin\ics.cer (if the file exists on the system).
- The import Certificate Association should be the server name. If a server is registered, you can select it from the droplist.

The **Adapter Access Control** feature is enabled only when the value of DeliveryTransport is IDL. By default, the adapter logs in with the guest identity. If the **Use guest identity** box is not checked, the **Adapter Identity** and **Adapter Password** fields are enabled.

Setting trace/log file values

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

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.

Saving your configuration file

When you have finished configuring your connector, save the connector configuration file. Connector Configurator Express saves the file in the broker mode that you selected during configuration. The title bar of Connector Configurator Express always displays the broker mode that InterChange Server Express 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.

For details about using projects in System Manager, and for further information about deployment, see the System Implementation Guide.

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 Express.
- 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 in the properties window 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 Express in a globalized environment

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

Connector Configurator Express 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>
```

Appendix C. Sample scenario

This appendix contains a working sample of an eMatrix scenario. It demonstrates how you can use the adapter for eMatrix to integrate eMatrix with other applications and technologies supported by WebSphere Business Integration adapters.

Topics covered in this appendix include:

- “Overview” on page 81
- “Assumptions” on page 81
- “Installing the scenario” on page 81
- “Running the scenario” on page 85

Overview

In this simple example, the eMatrix adapter exchanges information with the Visual Test Connector. We will assume that the Visual Test Connector represents a computer parts procurement system. As parts become available, their availability is communicated to the computer manufacturer, who uses the eMatrix adapter to automatically update their eMatrix system. When the computer manufacturer’s parts requirements change, the changes are automatically detected and sent to the procurement system.

Assumptions

The assumptions are:

1. You have installed, and are experienced with, one of the supported integration brokers (see Chapter 2 for details).
2. You have installed and are experienced with eMatrix version 9.6.0.1 and one of its collaboration servers.

Installing the scenario

The first step is to set up eMatrix and create the eMatrix business object types.

Note: %SAMPLE_FOLDER% refers to the folder in which you found this document.
%WBIA% refers to the folder containing your current WebSphere Business Integration Adapters installation.

Defining eMatrix business object types

First, you define the types which represent the parts of a computer system. To do this:

1. Open the eMatrix MQL shell.
2. Cut and paste the following commands into the shell:

```
#BEGIN
#1. create the attributes

add attribute "component cost"           type real;
add attribute "in stock"                 type boolean;
add attribute "date available"          type date;
```

```

add attribute "component manufacturer"      type string;
add attribute megahertz                    type integer;
add attribute slot                         type integer;

#2. create the types

add type bundle;
add type computer;
add type cpu attribute "component cost" attribute "in stock" attribute
"date available"
attribute "component manufacturer" attribute megahertz;
add type "network card" attribute "component cost" attribute "in stock"
attribute "date available" attribute "component manufacturer";
add type "usb 2.0 card" attribute "component cost" attribute "in stock"
attribute "date available" attribute "component manufacturer";
add type "sound card" attribute "component cost" attribute "in stock"
attribute "date available" attribute "component manufacturer";
add type "sound chip" attribute "component cost" attribute "in stock"
attribute "date available" attribute "component manufacturer"
attribute megahertz;

#3. create the relationships
add relationship "bundle to computer" to type computer cardinality n from
type bundle cardinality n;
add relationship "computer to pci component" to type "network card",
"sound card", "usb 2.0 card" cardinality n from type computer
cardinality 1 attribute slot;
add relationship "sound card to sound chip" to type "sound chip"
cardinality 1 from type "sound card" cardinality 1;

#4. create policy

add policy "computer manufacturing" type bundle, computer, cpu,
"network card", "usb 2.0 card", "sound card", "sound chip" state
"pre production" state "ready for production";

#5. create vault

add vault "wbi computer manufacturer";

#6. create the "adapter" person

add person adapter password wbia type business, system access all admin all;

#END

```

Note that step 6 above gives the user "adapter" permission to perform all operations in the system. Not all these privileges are required to run this example. The following MQL command provides all those necessary:

```

add person adapter password wbia type business access all
admin none;

```

However, if you use the eMatrix adapter for tasks not covered in these samples, you may need the privileges provided in step 6.

Creating eMatrix business object types

Next, you create the data that represents the computer system of the hypothetical computer manufacturer. To do this:

1. Open the eMatrix MQL shell.
2. Cut and paste the following commands into the shell:

```

#business objects
add bus bundle "home office and entertainment" 1
  policy      "computer manufacturing"
  vault      "wbi computer manufacturer";
add bus computer "gamer deluxe" 1

```

```

        policy                "computer manufacturing"
        vault                  "wbi computer manufacturer";
add bus cpu "max processor" 1
    policy                "computer manufacturing"
    vault                  "wbi computer manufacturer"
    megahertz              2000
    "in stock"              " true
    'date available'       " 9/30/01
    "component manufacturer" acetech
    "component cost"       " 67;
add bus "sound card" "super sonic" 1
    policy                "computer manufacturing"
    vault                  "wbi computer manufacturer"
    "in stock"              " false
    "date available"       6/12/03
    "component cost"       50
    "component manufacturer" "feedback inc.";
add bus "sound chip" "super sound chip" 1
    policy                "computer manufacturing"
    vault                  "wbi computer manufacturer"
    "component manufacturer" ChipsWeMake
    megahertz              100;
add bus "usb 2.0 card" "usb enabler" 1
    policy                "computer manufacturing"
    vault                  "wbi computer manufacturer"
    "in stock"              ' true
    "date available"       " 2/10/02
    "component manufacturer" usbworks
    "component cost"       " 12;
add bus "network card" "net connector" 1
    policy                "computer manufacturing"
    vault                  "wbi computer manufacturer"
    "in stock"              " true
    "date available"       " 8/12/02
    "component cost"       " 10
    "component manufacturer" "tcp specialists";
#relationships
connect bus bundle "home office and entertainment" 1 relationship
"bundle to computer" to computer "gamer deluxe" 1;
connect bus computer "gamer deluxe" 1 relationship "computer to pci component"
to "sound card" "super sonic" 1
slot 1;
connect bus computer "gamer deluxe" 1 relationship "computer to pci component"
to "usb 2.0 card" "usb enable" 1
slot 2;
connect bus "sound card" "super sonic" 1 relationship "sound card to
sound chip" to "sound chip" "super sound chip" 1;

```

Installing the JPOs

You will need to install two JPOs, one to create the WebSphere Business Integration Server Express event and archive event types, and one to act as a trigger when detecting events.

1. Open the eMatrix Business Modeler and log in as a user with the ability to create a program.
2. Select **Object>new>program**.
3. In the text box titled **Name**, enter **WBIEventLogger**.
4. Choose **Java** for the **Type**.
5. Click the **Code** tab.
6. Cut and paste the code from the %WBIA%\connector\ematrix\dependencies\WBIEventLogger.java file into the text box on this tab.

You may need to set the 'wbiPrefix' and 'vault' values in the source code. Please review the comments in the code for more information.

7. Click **Create**.

Follow the same steps to create the InstallEventTables program, with these differences:

- Name the program InstallEventTables.
- Cut and paste the code from the %WBIA%\connector\eMatrix\dependencies\InstallEventTables.java file.

Installing the triggers

In this section, you create a trigger which will detect when the hypothetical computer design changes. You create the trigger on the 'computer to pci component' relationship. To do this:

1. In the eMatrix Business Modeler, click on the binoculars in the upper left-hand corner of the window.
2. Select **Relationship** and click **Find**.
3. Double-click the 'computer to pci component' business object.
4. In the new window, select the **Triggers** tab and click **Add**.
5. Select the **Create** trigger and click **OK**.
6. In the new window, type **WBIEventLogger** in the **Action** text box.
7. Type the following into the **Input** text box:
-method recordEvent \${FROMOBJECTID} n=wbi_computer_poll v=Update
8. Click **OK**, then click **Edit** to finish creating the trigger.

Installing the event business objects

The final step in installing the scenario is to install the event business objects. To do so, execute this command from the MQL command line:

```
exec program InstallEventTables;
```

Configuring the eMatrix adapter

The first step is to configure the eMatrix connector. To do this:

1. Run the Connector Configurator Express.
2. Open %SAMPLE_FOLDER%\eMatrixConnector.cfg and set these properties:
RepositoryDirectory property = %SAMPLE_FOLDER%\repos
PollFrequency property = key
3. Set the ApplicationUserName and ApplicationPassword properties to the user on whose behalf the connector will be running.
4. Set the eMatrixServer property to the name of the eMatrix server you will be connecting to.
5. Set the HostName property to the URL, including the port, of the eMatrix collaboration server that the adapter will be communicating with.
6. Set the EventVault property to the name of the vault which will store your events.
You may create a new vault to store events. To do so, run the MQL eMatrix client and type 'add vault <vaultname>' in the text box at the bottom of the window. Make sure that the this value matches the value of the **vault** string in the WBIEventLogger JPO. By default both values should be 'WBI_Events'.
7. Set the KeepRelations property to 'true'.

8. Open %SAMPLE_FOLDER%\PortConnector.cfg and set these properties:
RepositoryDirectory = %SAMPLE_FOLDER%\repos

Supporting business objects

For the adapter to use business objects, it must first support them. To provide support for the business objects you want to use, do this:

1. With the Connector Configurator Express open, select the **Supported Business Objects** tab and add these business objects:
 - wbi_computer
 - wbi_computer_poll
2. Check the **Agent supported** box next to each business object.
3. Repeat the steps above with the Port connector.

Creating queues

This sample scenario requires that several queues be defined in your queue manager. To create the necessary queues, type:

```
RUNMQSC crossworlds.queue.manager
```

from the command line and issue the following commands:

```
DEFINE QL("ADMININQUEUE")
DEFINE QL("ADMINOUTQUEUE")
DEFINE QL("DELIVERYQUEUE")
DEFINE QL("FAULTQUEUE")
DEFINE QL("REQUESTQUEUE")
DEFINE QL("RESPONSEQUEUE")
DEFINE QL("EMATRIXCONNECTOR/RESPONSEQUEUE")
DEFINE QL("SYNCHRONOUSREQUESTQUEUE")
DEFINE QL("SYNCHRONOUSRESPONSEQUEUE")
DEFINE QL("PORTCONNECTOR/SYNCHRONOUSREQUESTQUEUE")
DEFINE QL("PORTCONNECTOR/SYNCHRONOUSRESPONSEQUEUE")
```

Update the start script by opening either the start_eMatrix.bat or start_eMatrix.sh file (depending on your platform) and setting the EMADK and EM_LIB variables in these files.

Running the scenario

This example provides scenarios for two activities; request processing and event notification.

Scenario 1: request processing

In the request processing scenario the procurement system informs the eMatrix system that one of the components used in a design is now available. The system sends a business object that represents the updated system component.

Start the Visual test connector

1. Select **Start>Programs>WebSphere Business Integration Adapters>Tools>Visual Test Connector**. The connector starts.
2. In the connector window, select **File>Create/Select Profile**. The Connector Profile window appears.
3. If you have not already done so, create a profile that emulates the Port Connector in the profile window, as follows:
 - Select **File>New Profile**.
 - Click **Browse** and select the %SAMPLE_FOLDER%\PortConnector.cfg file.

- In the Connector Name text box, type Port Connector.
From the Broker Type drop-down menu, select WMQL.
 - Click **OK**.
4. If you have already created a profile, select it and click **OK**.
 5. Once you have a profile, select **File>Connect**.

Start the adapter for eMatrix

Start the adapter for eMatrix by running this command:

```
%WBIA%\connectors\eMatrix\start_eMatrix.bat eMatrix wmqi
-c%SAMPLE_FOLDER%\EmatrixConnector.cfg
```

You can substitute any combination of alphanumeric characters (starting with a letter) for the value of “wmqi”.

Start the eMatrix components

Start the eMatrix Collaboration server. Make sure that the instance of Oracle in which the eMatrix system exists is running. Then open an MQL Command window.

Check the current status in eMatrix

At the MQL command line, type this command:

```
expand bus "computer" "gamer deluxe" 1 select bus
"attribute[in stock]";
```

Note that the supersonic sound card is not in stock.

Send a request

To do this, follow these steps.

1. In the Visual Test Connector, select **Edit>Load BO**.
2. Select the file %SAMPLE_FOLDER%\sound_card_update.bo.
3. Enter any name in the popup window and click **OK**.
4. Click **Send BO** in the upper left-hand corner of the Visual Test Connector. The icon contains one yellow arrow.
You will see text messages appear in the window containing the adapter for eMatrix. These message indicate that the request is being processed.

Check the updated status in eMatrix

Type the following at the MQL command line:

```
expand bus "computer" "gamer deluxe" 1 select bus
"attribute[in stock]";
```

Note that the supersonic sound card is now in stock.

Reset the status in the database

In order to run this scenario again, you must reset the supersonic sound card so that it is not in stock. To do so, run this MQL command:

```
modify bus "sound card" "super sonic" 1 "in stock" false;
```

Scenario 2: event notification

In this scenario, the computer manufacturer changes the configuration of one of its computer systems. The change will trigger a notification to be forwarded to the procurement system.

1. Repeat steps 1 through 3 from scenario 1 above.
2. Follow the steps below.

Update the computer configuration

The computer configuration has changed. The computer manufacturer is adding a network card to the computer. At the MQL command line, run:

```
connect bus "computer" "gamer deluxe" 1 relationship  
"computer to pci component" to "network card" "net  
connector" 1 slot 3;
```

Poll the event

Go to the command window containing the adapter for eMatrix. At the bottom of the window, type 'p'. This causes the adapter to poll.

View the event

The adapter will record the new computer configuration and forward it to the procurement system (in this case, the Visual Test Connector).

Look in the window pane on the right of the Visual Test Connector. You will see a line containing the text 'wbi_computer.Update'. This is the new computer configuration represented as a WebSphere business object. You can double-click on it to see its contents.

Reset the computer configuration

To run this scenario again, you must disconnect the eMatrix business objects. To do so, run this command:

```
disconnect bus "computer" "gamer deluxe" 1 relationship  
"computer to pci component" to "network card"  
"net connector" 1;
```

This completes the installation and testing of the sample scenarios. If you have performed all the steps above successfully, you should have a working sample that enables the adapter for eMatrix.

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