iWay Software

An Information Builders Company

iWay

iWay Java Adapter for Mainframe Introduction

Preface

This documentation provides an introduction to the iWay Java Adapter for Mainframe 5.1 (iWay JAM).

How This Manual Is Organized

The following table lists the titles and numbers of the chapters for this manual with a brief description of the contents of each chapter.

Chapter		Contents
1	Introducing the iWay Java Adapter for Mainframe	Provides an overview of the business benefits and components that comprise iWay JAM.
2	Using iWay Java Adapter for Mainframe	Lists the tasks and documentation available for getting started with iWay JAM.

Documentation Conventions

The following table lists and describes the conventions that apply throughout this manual.

Convention	Description
`THIS TYPEFACE` or `this typeface`	Denotes syntax that you must enter exactly as shown.
this typeface	Represents a placeholder (or variable) in syntax for a value that you or the system must supply.
<u>underscore</u>	Indicates a default setting.
this typeface	Represents a placeholder (or variable) in a text paragraph, a cross-reference, or an important term.
this typeface	Highlights a file name or command in a text paragraph that must be lowercase.
this typeface	Indicates a button, menu item, or dialog box option you can click or select.
Key + Key	Indicates keys that you must press simultaneously.
`{  }`	Indicates two or three choices; type one of them, not the braces.
|	Separates mutually exclusive choices in syntax. Type one of them, not the symbol.
`...`	Indicates that you can enter a parameter multiple times. Type only the parameter, not the ellipsis points (…).
. . .	Indicates that there are (or could be) intervening or additional commands.

Customer Support

Do you have questions about the iWay Java Adapter for Mainframe?

If you bought the product from a vendor other than iWay Software, contact your distributor.

If you bought the product directly from iWay Software, call Information Builders Customer Support Service (CSS) at (800) 736-6130 or (212) 736-6130. Customer Support Consultants are available Monday through Friday between 8:00 a.m. and 8:00 p.m. EST to address all

your iWay Java Adapter for Mainframe questions. iWay Software consultants can also give you general guidance regarding product capabilities and documentation. Please be ready to provide your six-digit site code number (*xxxx.xx*) when you call.

You can also access support services electronically, 24 hours a day, with InfoResponse Online. InfoResponse Online is accessible through our World Wide Web site, http://www.iwaysoftware.com. It connects you to the tracking system and known-problem database at the iWay Software support center. Registered users can open, update, and view the status of cases in the tracking system and read descriptions of reported software issues. New users can register immediately for this service. The technical support section of www.iwaysoftware.com also provides usage techniques, diagnostic tips, and answers to frequently asked questions.

To learn about the full range of available support services, ask your iWay Software representative about InfoResponse Online, or call (800) 969-INFO.

Help Us to Serve You Better

To help our consultants answer your questions effectively, please be prepared to provide specifications and sample files and to answer questions about errors and problems.

The following tables list the specifications our consultants require.

WebLogic Server Platform Operating System and Operating System Version	
WebLogic Server Version and Service Pack / special patch	
iWay JAM CRM Platform Operating System	
CICS or IMS Operating System and Operating System Version	
CICS or IMS Version Information	
Third party SNA stack product and version	

The following table lists components. Specify the version in the column provided.

Component	
iWay JAM Gateway Build / Fix Level	
iWay JAM CRM Build / Fix Level	
Pre-existing eGen Application Compiles? Specify Yes or No.	

In the following table, specify the JVM version and vendor in the columns provided.

Version	Vendor

The following table lists additional questions to help us serve you better.

Request/Question	Error/Problem Details or Information
Provide usage scenarios or summarize the application that produces the problem.	
Did this happen previously?	
Is this configuration working on any other system?	
Can you reproduce this problem consistently?	

Request/Question	Error/Problem Details or Information
Any **change in the application environment** including: • Migrating to a new WebLogic Server service pack or version. • Installing a new operating system on WebLogic Server side or CRM component side. • Migrating to a new CICS or IMS region, version, or operating system.	
Under what circumstance does the problem *not* occur?	
Describe the **steps** to reproduce the problem.	
Describe the **problem**.	
Specify the **error** message(s).	

The following table lists error/problem files that might be applicable.

Error/Problem Files	Error/Problem File Detail or Information
WebLogic Server Application logs or error messages	
CICS or IMS application logs or error messages	
WebLogic Server configuration file	
iWay JAM configuration file	
Third party stack SNA configuration	
VTAM Logical Unit definitions	
iWay JAM CRM startup script and script messages	
iWay JAM CRM JCL and JOB information (JESMSGLG, JESJCL, JEYSYSMSG)	
iWay JAM gateway trace diagnostics	
iWay JAM CRM trace diagnostics	
APPC trace files	

Collecting iWay JAM Diagnostics

If you are requested to collect additional iWay JAM diagnostic files, see the Diagnostics section in the *iWay Java Adapter for Mainframe Programming Guide*.

iWay JAM runtime traces are sent to the WebLogic log as "Debug" messages. Debug messages are written to each WebLogic Server's log file but are not sent to the administration server. In addition, these messages are only sent to the server's `stdout` if the server's configuration has both the *Log to Stdout* and *Debug to Stdout* options selected on the server's Logging/General page.

For instructions on accessing Gateway tracing options, see the *iWay Java Adapter for Mainframe Configuration and Administration Guide*.

User Feedback

In an effort to produce effective documentation, the Documentation Services staff welcomes your opinions regarding this manual. Please use the Reader Comments form at the end of this manual to communicate suggestions for improving this publication or to alert us to corrections. You also can go to our Web site, http://www.iwaysoftware.com and use the Documentation Feedback form.

Thank you, in advance, for your comments.

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Interested in technical assistance for your implementation? Our Professional Services department provides expert design, systems architecture, implementation, and project management services for all your business integration projects. For information, visit our World Wide Web site, http://www.iwaysoftware.com.

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Contents

Introducing the iWay Java Adapter for Mainframe

Topics:

- Overview
- Business Benefits
- iWay Java Adapter for Mainframe Components
- iWay Java Adapter for Mainframe Features

The following topic provides an introduction to the iWay Java Adapter for Mainframe.

Overview

To succeed in the new economy, your e-business depends on application integration. Specifically, integration of back-end systems with Web-based e-business applications. As the complexity of these Web-based applications evolve, the business transactions supported by these applications often require direct integration with existing mainframe legacy applications. In order to meet the rigorous demands for fast and flawless request execution, e-business transactions must integrate with mainframe applications in real time.

iWay Java Adapter for Mainframe (hereafter referred to as iWay JAM) fulfills this requirement by providing bi-directional, request-response integration between Java applications and mainframe applications.

With iWay JAM, you can extend the life of existing mainframe applications by integrating them with J2EE applications running on WebLogic Server. Once configured and deployed, iWay JAM allows WebLogic Server applications to invoke or be invoked by mainframe applications.

The following figure provides an overview of iWay JAM components and connectivity.
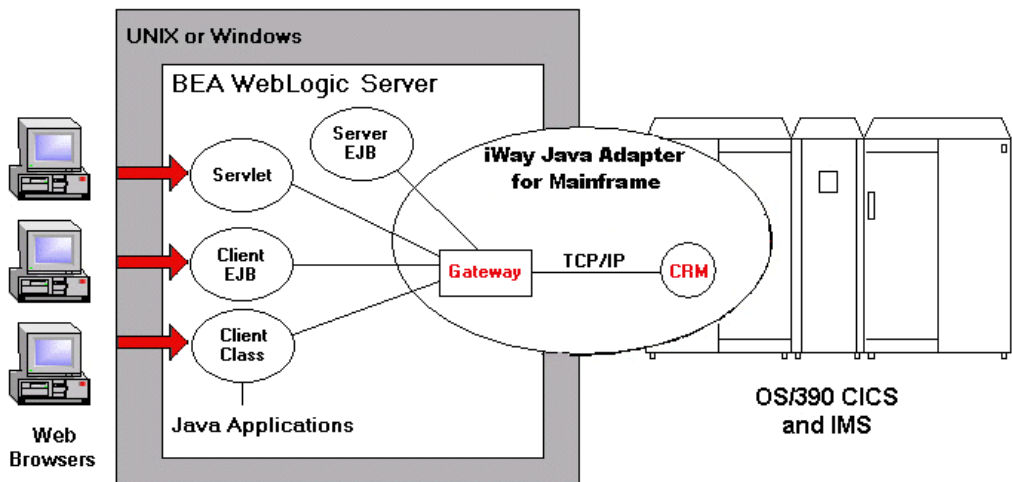
iWay JAM enables applications running on BEA WebLogic Server and mainframe systems to interact using two main components: the Gateway and the Communications Resource Manager (CRM). The Gateway is a Java application that runs in an instance of WebLogic Server. The CRM typically runs on the mainframe. The Gateway and the CRM communicate using TCP/IP. These two iWay JAM components work together to allow applications to communicate even though the applications are running in disparate environments.

Business Benefits

iWay JAM delivers the following business benefits to help your e-business grow and succeed:

- Leverage existing IT investments with fast, easy integration of mainframe application functionality into Java/Web-based environments. iWay JAM enables mainframe applications to be invoked from the WebLogic environment without coding changes. This frees your developers to focus on building new applications that focus on your competitive edge, rather than creating and maintaining a custom mainframe integration solution.

- An easy-to-use Web-based Administration Console to configure and administer iWay JAM. The console is an extension of the WebLogic Server console and provides a localized administration point for the configuration of the iWay JAM product.

- Support for distributed transactions using the two-phase commit protocol. This protocol guarantees data integrity by ensuring that transactional updates are committed by all participating transaction managers, or are fully rolled back by all transaction managers. This support enables you to coordinate mainframe resources and resources in your WebLogic Server environment atomically.

- Generate J2EE applications from your mainframe application source code. The eGen Application Generator development tool generates Java applications from COBOL data structure definitions. The eGen utility can generate EJBs, servlets, or stand-alone clients from data structures defined in a COBOL copybook. These generated applications contain the data translation code needed to translate data between Java and COBOL data types. This enables your development team to avoid having to modify your existing mainframe applications, and focus on developing new applications.

- Data translation between Java, XML, and COBOL mainframe data types (packed decimal, binary, arrays, redefines and occurs) and full EBCDIC conversion is supported.

- Support for using mainframe security credentials. iWay JAM can be configured so that mainframe security credentials (user id/password) have to be supplied by client applications. These security credentials are then sent to the mainframe system for authentication, prior to invoking the specified mainframe application.

- Clustering with BEA WebLogic Server provides the highest levels of scalability and availability. Multiple instances of iWay JAM can be configured in a cluster, providing load balancing and failover of the integration services provided by iWay JAM.

- Interoperability with the proven BEA WebLogic E-Business Platform provides a reliable infrastructure for B2C and B2B e-business applications. BEA also provides the convenience and support of a global, 24x7 support organization.

- iWay JAM JCA Adapter provides a client interface using standard JCA system contracts to access iWay JAM services.

The following sections provide an overview of the iWay Java Adapter for Mainframe product:

- iWay Java Adapter for Mainframe Components
- iWay Java Adapter for Mainframe Features

iWay Java Adapter for Mainframe Components

iWay JAM enables applications running on WebLogic Server and mainframe systems to interact using two main components:

- The Communication Resource Manager
- The Gateway

These two iWay JAM Components work together to enable applications to communicate even though the applications are running in disparate environments. The following figure provides an overview of iWay JAM components and connectivity.
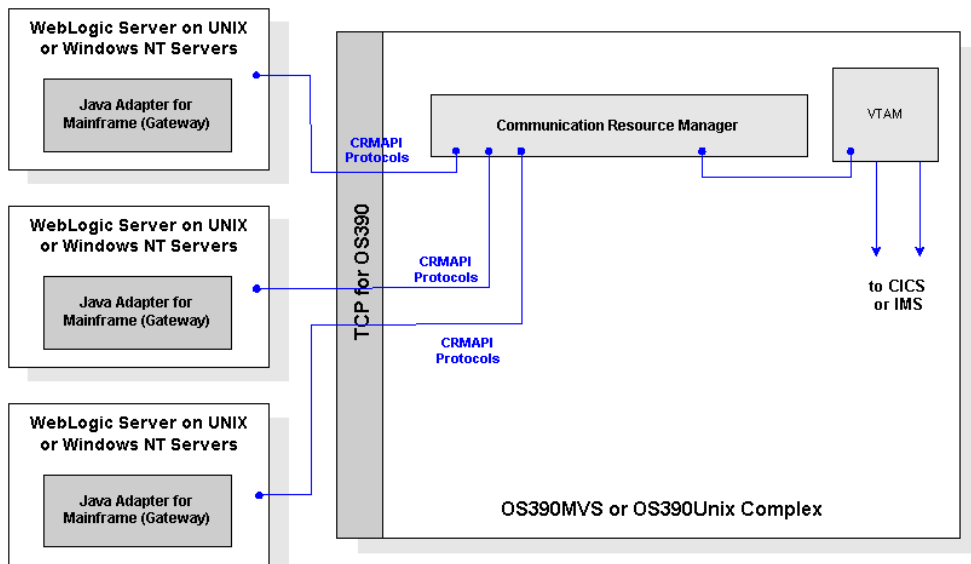
The Communication Resource Manager

The Communications Resource Manager (CRM) is the iWay JAM component that manages communications resources. The CRM coordinates the flow of data between Java applications running on a WebLogic Server platform and applications running on a mainframe.

The CRM uses SNA and TCP/IP communication protocols to communicate with the mainframe and iWay JAM Gateway respectively. TCP/IP protocols always flow between the iWay JAM Gateway and the CRM. SNA protocols always flow from the CRM to the mainframe and from VTAM on the mainframe to the CRM depending upon the configuration option.

For a complete list of supported operating systems, see the *iWay Java Adapter for Mainframe Release Notes*.

The Gateway

The iWay JAM Gateway component is a server that runs within WebLogic Server and communicates with the CRM using the TCP/IP protocol. The iWay JAM Gateway acts as a gateway to route requests and responses between WebLogic Server (Java) and mainframe systems, such as CICS and IMS. The Gateway component also forwards configuration information to the CRM at start-up.

A iWay JAM Gateway used in conjunction with the CRM enables applications running on an instance of WebLogic Server to connect to back-end applications. Each WebLogic Server instance that needs to access back-end applications should have a iWay JAM Gateway defined for it. This iWay JAM Gateway routes requests received from Java client applications running on this instance of WebLogic Server to the CRM, which then will forward them to the back-end application. The Gateway also routes requests made by mainframe client applications that have come through the CRM to the necessary WebLogic Server applications.

iWay Java Adapter for Mainframe Features

The following sections describe features in iWay JAM:

- WebLogic Server Support

- Communication Protocol Support

- Distributed Transaction Support

- JCA Adapter Support

- Scalability

- WebLogic Administration Console

- eGen Application Generator
- Samples

WebLogic Server Support

iWay JAM is used in conjunction with WebLogic Server to integrate existing mainframe applications with applications developed for WebLogic Server.

BEA WebLogic Server provides a tightly integrated, comprehensive infrastructure that delivers commerce, personalization, campaign management, enterprise integration, workflow management, and business-to-business collaboration.

BEA WebLogic Server supports a broad variety of clients, including Web browsers, wireless devices, and programmatic clients. On the server, BEA WebLogic Server supports the leading Unix, Linux, Windows, and mainframe operating systems. On the back-end, BEA WebLogic Server integrates with relational databases, message queues, and legacy systems.

BEA WebLogic Server implements the Java 2 Enterprise Edition (J2EE) platform specification that includes Servlets, Java Server Pages (JSPs), Enterprise JavaBeans (EJBs), Java Messaging Service (JMS), and other platform services. J2EE services provide access to standard network protocols, database, and messaging systems. When developing applications, developers can create, assemble, and deploy components that use these services.

iWay JAM enables Servlets, JSPs and EJBs to invoke CICS, IMS or batch applications that exist on your mainframe systems. iWay JAM also enables CICS, IMS, or batch applications to invoke EJBs or JMS services. Data is accessed via Java methods, XML, or JCA access.

Communication Protocol Support

As previously mentioned, iWay JAM provides bi-directional, online request-response between Java applications and mainframe applications. iWay JAM facilitates Java applications making requests of mainframe services as well as mainframe clients making requests of Java services.

iWay JAM is especially useful as it enables Java applications to integrate with CICS programs using DPL and integrates with IMS programs using implicit APPC. Java client applications can link with CICS programs, and CICS clients can link with Java applications with the same ease as DPL between CICS programs on different regions. Similarly, Java client applications can communicate with IMS programs with the same ease as implicit APPC between different IMS programs. iWay JAM supports the following communications protocols:

- CICS DPL
- CICS DTP using CICS or CPI-C programming APIs
- IMS Implicit APPC

- IMS Explicit APPC using APPC/MVS or CPI-C programming APIs

- Batch APPC using APPC/MVS or CPI-C programming APIs

Distributed Transaction Support

iWay JAM supports distributed transactions for enterprise applications using the two-phase commit protocol. This support enables iWay JAM to coordinate operations against mainframe resources and resources in your WebLogic Server environment atomically.

JCA Adapter Support

The iWay JAM JCA Adapter is a JCA 1.0-compliant adapter that installs into the Connector Container of WebLogic Server and provides a standard API interface to iWay JAM services.

The iWay JAM JCA Adapter implements all functionality documented in the J2EE Connector Architecture Specification Version 1.0 (JSR 016) including support for:

- Local and XA transactions

- J2EE Connector Common Client Interfaces (CCI)

- Resource Adapter and Connection Metadata

- Container-managed security

In addition, the following extensions are supported:

- DataView record type allowing DataViews generated using the eGen utility to be used as input or output of a mainframe service invocation.

- XML record type allowing a properly constructed XML document to be used as input or returned as the response of a mainframe service.

Scalability

iWay JAM can scale as your mainframe integration needs to grow. iWay JAM takes advantage of WebLogic Server clusters to provide load balancing and failover.

The following sections provide descriptions of the various iWay JAM scalability features.

- Gateway Cluster Support

- Multiple-Gateway Support

- Multiple Region Support

Gateway Cluster Support

iWay JAM enables clients within WebLogic Server to request mainframe services. Clients can run on any machine with network access to the WebLogic Server cluster hosting one or more iWay JAM Gateways. When clients request a mainframe service, this request will be transparently processed by one of the iWay JAM Gateways in the WebLogic Server cluster. This redundancy provides failover for the service request if one of the iWay JAM Gateways becomes unavailable. Thus, the iWay JAM Gateway cluster support enables reliable access to mainframe systems.

In terms of making your systems more scalable, iWay JAM takes advantage of the sophisticated load balancing features of WebLogic clusters for WebLogic Server to mainframe requests so that all load-balancing in iWay JAM occurs among a group of servers arranged in a WebLogic cluster. When requests are made to remote iWay JAM services, load balancing occurs among all iWay JAM Gateways in the cluster that offer the service. Mainframe to WebLogic Server request load balancing is accomplished by the iWay JAM CRM. The CRM load balances between all connected gateways without regard to their cluster arrangement.

Multiple-Gateway Support

iWay JAM multiple gateway support provides a feature that enables a single instance of the CRM to service multiple instances of iWay JAM Gateways. As a result, multiple WebLogic Servers can share a single instance of the CRM as a common access point to mainframe systems.

The resulting configuration, administration, and operational requirements are similar to those for a single CRM, and resource requirements are substantially less than those for an equivalent multiple CRM configuration. This feature provides the following advantages:

- Overall, a single CRM consumes less system resources than multiple CRMs.

- The CRM has a single configuration which is common to all WebLogic Servers.

- Transactional requests are tightly integrated when distributed across multiple gateways to a single CRM.

- The resulting configuration is much easier to understand, configure, administer, and operate.

- The CRM can load balance mainframe requests for services provided by the connected WebLogic Servers.

The following figure shows a sample multi-gateway non-clustered configuration.
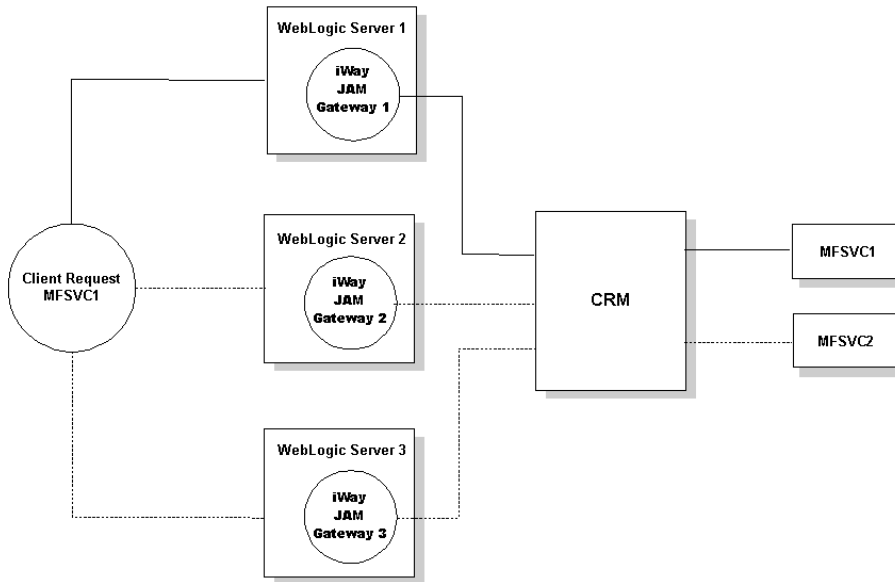
Multiple Region Support

Services provided to the iWay JAM application can be physically located on different CICS or IMS regions. The calling application does not have to know the physical location of the mainframe application. If a service is advertised on multiple regions, then iWay JAM provides load balancing and failover of the service across the multiple regions.

WebLogic Administration Console

iWay JAM provides an easy-to-use interface for configuring and administering connectivity between WebLogic Server, CICS, and IMS application servers. iWay JAM provides an extension of the WebLogic Server Administration Console and presents a set of objects that can be manipulated in order to create or modify a configuration. These objects consist of Regions, Gateways, CRMs, Services, and Exports.

The iWay JAM Administration Console makes configuration information available by utilizing the Java Management Extensions (JMX) specification. JMX is an architecture specification for the management of enterprise applications. WebLogic Server provides a JMX implementation that allows applications to register manageable objects.

A start-up class of the iWay JAM product reads the XML configuration file and converts the information into JMX-manageable objects. This configuration information can then be remotely administered using the Administration Console and is available throughout the WebLogic Server domain to all instances of the iWay JAM product.

The console displays the iWay JAM components it administers, including Regions, Gateways, CRMs, Services, and Exports in a graphical tree in the left pane. The right pane displays details about the object selected in the left pane.
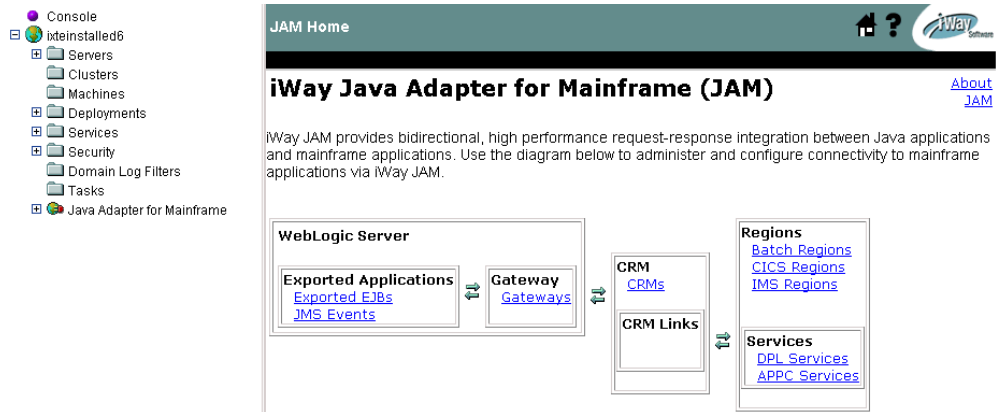
To use the console to configure or administer the iWay JAM product, select an item in the left pane, and then choose the desired informational tab in the right pane. The console displays the configurable attributes in the right pane. You can use the online help to find detailed information about the displayed attributes and fields.

The console allows you to configure the connectivity between the WebLogic Server domain and multiple CICS or IMS regions and to define the configuration of multiple instances of iWay JAM, distributed across a WebLogic domain.

For administrative purposes, the console allows you to administer the iWay JAM components as follows:

• Monitor CRM status

• Control diagnostics tracing within the CRM

• Monitor Gateway status

• Control diagnostic tracing within the Gateway

• Start/Stop Gateway components

• Start/Stop CRM links

• Enable/Disable remote service definitions (DPL and APPC services)

• Enable/Disable local service definitions (export EJB definitions and JMS events)

For complete information and instructions for configuring iWay JAM, see the *iWay Java Adapter for Mainframe Configuration and Administration Guide*.

Configuration of a iWay JAM Gateway

iWay JAM enables you to change configuration information dynamically, that is, while iWay JAM is running. In many cases, you do not need to restart iWay JAM for your changes to take effect. When a configuration attribute is modified, the new value is immediately reflected in both the current run-time value of the attribute and the persistent value stored in the XML configuration file.

Exceptions do exist. For example, if you change the listen port of the CRM, the new port is not used until the next time you restart the CRM and it must be changed in the startup script or JCL for the CRM.

The Administration Console does a validation check on each attribute that is changed. The errors that are supported are out-of-range errors and datatype mismatch errors. In both cases, a message displays telling you that an error has occurred.

iWay JAM supports the following dynamic configuration changes:

- Adding and removing iWay JAM Gateways

- Enabling and disabling iWay JAM Gateways

- Adding and removing Links

- Enabling and disabling Links

- Adding and removing Services

- Enabling and disabling Services

eGen Application Generator

The eGen utility is an application development tool that assists in quickly integrating a mainframe application. This command line utility generates Java source code using a COBOL copybook and a declarative script file as input. The result is a working Java skeleton application that can be used as a basis for new applications or as an addition to an existing application. The eGen utility can generate Servlets, EJBs or stand-alone clients. All generated skeletons include code that implements connectivity and data translation to mainframe applications.

The four different types of Java application models that can be generated by the eGen utility are described as follows:

- Client Class - the client class is a stand-alone Java class that invokes mainframe services. This class may be incorporated into your own EJB or utilized in some other way within your code.

- Client EJB - the client EJB is a Stateless Session EJB that invokes mainframe services. It can be called by a servlet or other client programs. This is the normal model for building a production application with access to mainframe services. A servlet that invokes the methods of the EJB may be added for testing or demonstration purposes.

- Servlet Only - the servlet-only application is a servlet that presents a simple form and invokes mainframe services directly. This model is useful for testing purposes, but is not suitable for production applications.

- Server EJB - the server EJB is a Stateless Session EJB that provides a service to mainframe client applications.

Samples

iWay JAM includes a set of installation verification samples and a variety of other samples that you can use to demonstrate the broad range of iWay JAM features. The samples illustrate the interaction between Java applications and both applications running under CICS and applications running under IMS. The samples are also designed to step you through the configuration scenario that meets your specific configuration environment.

CHAPTER 2

Using iWay Java Adapter for Mainframe

Topics:

• Getting Started

The following topic provides a clear and easy path to productivity using iWay Java Adapter for Mainframe (iWay JAM). Tasks include installation instructions, running sample applications, configuring and administering iWay JAM, along with topics geared toward providing you with the information you need to get started.

Getting Started

This section lists the tasks and documentation available for getting started with iWay JAM.

To...	Read...
Learn about the functionality provided by iWay Java Adapter for Mainframe.	*iWay Java Adapter for Mainframe Introduction*
Learn about new features, supported platforms, and known limitations.	*iWay Java Adapter for Mainframe Release Notes*
Install iWay Java Adapter for Mainframe.	*iWay Java Adapter for Mainframe Installation Guide*
Set up and run iWay Java Adapter for Mainframe installation verification samples.	*iWay Java Adapter for Mainframe Installation Guide*
Set up and run iWay Java Adapter for Mainframe sample applications.	*iWay Java Adapter for Mainframe Samples Guide*
Configure iWay JAM. • Define where the CRM will run. • Create a logical unit for the CRM. • Connect the CRM to back-end mainframe systems. • Enter connectivity information into the Administration Console. • Define a iWay JAM Gateway. • Verify your iWay JAM Connectivity Configuration. • Modify your configuration.	*iWay Java Adapter for Mainframe Configuration and Administration Guide*
Generate applications using iWay JAM.	*iWay Java Adapter for Mainframe Programming Guide*
Use eGen dataview classes and XML with a Customer Client Interface (CCI	*iWay Java Adapter for Mainframe JCA Adapter Guide*

To...	Read...
Administer iWay JAM. • Monitor the CRM status. • Modify CRM trace level settings. • Monitor CRM links. • Start and Stop CRM links. • List and Monitor Gateways. • Modify Gateway trace level settings. • Start and Stop Gateways. • Enable a service. • Enable an exported application.	*iWay Java Adapter for Mainframe Configuration and Administration Guide*
Perform optional iWay JAM Tasks:	
• Migrate from your previous BEA JAM release to iWay JAM.	*iWay Java Adapter for Mainframe Migration Guide*
• Integrate applications with iWay JAM	*iWay Java Adapter for Mainframe Configuration and Administration Guide*
• Solve common problems when using iWay JAM	*iWay Java Adapter for Mainframe Migration Guide*

Reader Comments

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