



IBM Software Services for WebSphere

Connecting Enterprise Systems to WebSphere Application Server

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Introduction

- **Many organisations have data held in enterprise systems with non-standard interfaces**
- **There are many options for connecting J2EE applications to these systems**
- **This presentation will compare and contrast some of these options**
- **Particular focus will be given to one of these options: the J2EE Connector Architecture, and in IBM extension: the WebSphere Adapters**

Agenda

- Introduction
- **Overview of options**
- J2EE Connector Architecture details
- WebSphere Adapters and Adapter Framework

Aspects to consider

- **API**
- **Deployment**
- **Administration**
- **Directionality**
- **Security**
- **Scalability**
- **Reliability**
- **Transactionality**

Java library

- **API – documented Java interface accessed via static factory**
- **Deployment – dependent JAR file or shared library**
- **Administration – property file**
- **Directionality – outbound only**
- **Security – dependent on underlying transport protocol, credentials specified by application**
- **Scalability – no connection pooling**
- **Reliability – synchronous**
- **Transactionality – none**

HTTP

- **API – message format and URI**
- **Deployment – none**
- **Administration – URL provider**
- **Directionality – bi-directional**
- **Security – SSL, certificates/basic-auth**
- **Scalability – web container for inbound**
- **Reliability – synchronous**
- **Transactionality – none**

Messaging

- **API – JMS, message format, destinations**
- **Deployment – dependent on provider**
- **Administration – administered objects**
- **Directionality – bi-directional**
- **Security – dependent on provider, credentials from container**
- **Scalability – connection pooling, EJB container for inbound**
- **Reliability – asynchronous or pseudo-synchronous**
- **Transactionality – local and XA transactions**

Messaging – Default messaging provider

- **Messaging system a component of the application server**
- **Administration integrated with that of the application server**
- **High availability provided via application server clustering**
- **Transport protocol can be layered over HTTP and under SSL**
- **Access from outside application server environment via:**
 - IBM Client for JMS on J2SE with IBM WebSphere Application Server
 - IA94: IBM Message Service Client for C/C++
 - IA9H: IBM Message Service Client for .NET

Messaging – WebSphere MQ

- **Messaging system provided by external queue manager**
- **Queue managers may be collocated with application server and enterprise system (80+ supported platforms)**
 - Local connection to queue manager
 - Store and forward to other queue manager
- **Client and server channels may be protected via SSL**
- **Client access via MQI (Java, C, Cobol, PL/I), JMS and XMS (C/C++, .Net)**

Web services

- **API – WSDL, JAX-RPC**
- **Deployment – none**
- **Administration – UDDI/WSRR/ESB**
- **Directionality – bi-directional**
- **Security – protocol level and WS-Security**
- **Scalability – web container for inbound**
- **Reliability – dependent on protocol, WS-ReliableMessaging**
- **Transactionality – WS-AtomicTransaction/BusinessActivity**

J2EE Connector Architecture

- **API – Common Client Interface (optional)**
- **Deployment – resource archive**
- **Administration – administered objects**
- **Directionality – bi-directional**
- **Security – dependent on provider, credentials from container**
- **Scalability – connection pooling/sharing, EJB container for inbound**
- **Reliability – dependent on protocol**
- **Transactionality – local and XA transaction APIs**

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JCA – API

- **JCA specification defines Common Client Interface API for use by J2EE clients**

```
ConnectionFactory factory = ....
```

```
ConnectionSpec connectionSpec = new MyEisConnectionSpec();
```

```
connectionSpec.setUserName("david");
```

```
ConnectionFactory connection = factory.createConnection(connectionSpec);
```

```
RecordFactory recordFactory = factory.getRecordFactory();
```

```
MappedRecord record = recordFactory.createMappedRecord();
```

```
record.put("key", "david");
```

```
Interaction interaction = connection.createInteraction();
```

```
InteractionSpec interactionSpec = new MyEisInteractionSpec();
```

```
interactionSpec.setFunctionName("retrieve");
```

```
interactionSpec.setInteractionVerb(InteractionSpec.SYNC_SEND_RECEIVE);
```

```
Record result = interaction.execute(interactionSpec, record);
```

JCA – deployment

- **Packaged as resource archive (RAR) containing:**
 - deployment descriptor (ra.xml)
 - documentation
 - images
 - message files
 - JAR files
 - native code
- **Deployment descriptor defines:**
 - implementation classes
 - connection factory and administered object properties
 - transaction and security support

JCA – administration

- **Once deployed, information in deployment descriptor enables application server administrator to define:**
 - Connection factories
 - Administered objects
 - Activation specifications (for inbound work)

JCA – directionality

- **JCA 1.0 supported outbound communication**
- **JCA 1.5 defines the SPIs that enable a resource adapter to invoke a message driven bean**
- **CCI defines *MessageListener* interface**
 - *Record onMessage(Record inputData)*
- **Activation specification defines properties to connect EIS and MDB**
- **JCA 1.5 lifecycle contract provides resource adapter with mechanism to manage interactions with the EIS outside of the J2EE component invocation**

JCA – security

- **Credentials for authentication may be specified:**
 - by the application on the *ConnectionSpec*
 - by the administrator on the connection factory or activation specification
- **JCA specification provides for use of *PasswordCredential* and *GSSCCredential***
- **Mechanisms for performing authentication, authorization and transport level security determined by resource adapter/EIS**
- **Currently no mechanism for importing security context**

JCA – scalability

- **Connection management SPI enables:**
 - connection pooling
 - connection sharing
- **Use of MDBs for inbound endpoints builds on scalability of EJB container**

JCA – reliability

- **Communication may be synchronous or asynchronous**
- **Reliability of transport dependent on protocol used by adapter/EIS**

JCA – transactionality

- **Resource adapter declares transaction capabilities in deployment descriptor**
- **CCI defines local transaction API for use by application**
- **Transaction management contract enables application server to obtain *LocalTransaction* or *XAResource***
- **Transactions can be imported from the EIS to the application server as part of message inflow**

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WebSphere Adapters

- **Adapters based on JCA 1.5**
- **Require WebSphere ESB or Process Server runtime**
- **Tooling support in WebSphere Integration Developer**
- **Application adapters: SAP Applications, PeopleSoft Enterprise, Siebel Business Applications, JD Edwards EnterpriseOne, Oracle E-business Suite**
- **Technology adapters: Flat file, JDBC, E-mail, FTP**
- **Custom adapters can also be implemented**

WebSphere Technology Adapters

- **WebSphere Adapter for E-mail**
 - Bi-directional integration to systems via exchange of emails using IMAP/POP3 and SMTP
- **WebSphere Adapter for JDBC**
 - Bi-directional integration to JDBC 2.0 data sources
 - Access tables views, functions and stored procedures
- **WebSphere Adapter for FTP**
 - Bi-directional integration to systems via exchange of remote flat files, supports FTPS (FTP over SSL)
- **WebSphere Adapter for Flat File**
 - Bi-directional integration to systems via exchange of local flat files

Business Objects for data representation

- **Hierarchical representation of data based on Service Data Objects standard**
- **Used widely in WebSphere ESB and Process Server**
- **Business graph wraps business object and verb**
 - Create
 - Update
 - Delete
 - UpdateWithDelete
- **Graph may represent AfterImage (snapshot of data) or Delta**
- **WBIRecord implements CCI *Record* and holds data object**

Enterprise Metadata Discovery

- **Standard defined by IBM and BEA in collaboration**
- **Define a common API that adapters can use to expose their services and business objects to tools for the generation of JCA based applications**
- **Used by Enterprise Service Discovery wizard in WebSphere Integration Developer to create EIS import and export bindings**

Assured Event Delivery

- **Ensures “once and once only” delivery of events**
- **Supports sequenced ordering of events**
- **EIS does not need to support transactions**
- **Uses local event store database via JDBC**
- **Adapters can either:**
 - Poll for events in event store
 - Register listener to listen for events in EIS

WebSphere Adapter Foundation Classes

- **Foundation classes provide common framework for implementation of WebSphere Adapters**
- **Adapter architecture based on design patterns**
 - Visitor to traverse data graph
 - Command to implement EIS operation on data object

WebSphere Adapter Toolkit

- **Resource adapter deployment descriptor editor**
- **Simple wizard used to generate stubs when using WebSphere Adapter Foundation Classes**
- **Installs as Eclipse 3.0 plug-in**

QUESTIONS

Summary

- **There are lots of options for connection Enterprise Systems to WebSphere Application Server, some of which we have reviewed**
- **The J2EE Connector Architecture is one such option with ticks in all of the relevant boxes**
- **The WebSphere Adapters may provide an out-of-the-box solution and the framework alone eases the creation and use of a custom adapter with WebSphere ESB or Process Server**

References

- **IBM Client for JMS on J2SE with IBM WebSphere Application Server**
 - <http://www.ibm.com/support/docview.wss?uid=swg24012804>
- **IA94: IBM Message Service Client for C/C++**
 - <http://www.ibm.com/support/docview.wss?uid=swg24007092>
- **IA9H: IBM Message Service Client for .NET**
 - <http://www.ibm.com/support/docview.wss?uid=swg24011756>
- **Introduction to J2EE Connector Architecture**
 - <http://www.ibm.com/developerworks/java/edu/j-dw-javajca-i.html>
- **J2EE Connector Architecture 1.5**
 - <http://www.ibm.com/developerworks/java/library/j-jca3/>
- **Enterprise Metadata Discovery**
 - <http://www.ibm.com/developerworks/library/specification/j-emd/index.html>
- **WebSphere Adapter Development**
 - <http://www.redbooks.ibm.com/redpieces/abstracts/sg246387.html>
- **IBM WebSphere Adapter Toolkit**
 - <http://www.ibm.com/developerworks/websphere/downloads/wat/>

Thank

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