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Integrating Foreign JMS Providers with BEA WebLogic Server

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Learning Objectives

- As a result of this presentation, you will be able to:
  - Understand why BEA WebLogic Server can work with different JMS providers
  - Configure an EJB, servlet, or the Messaging Bridge to use various JMS providers
  - Use these features in a flexible and efficient way

Speaker's Qualifications

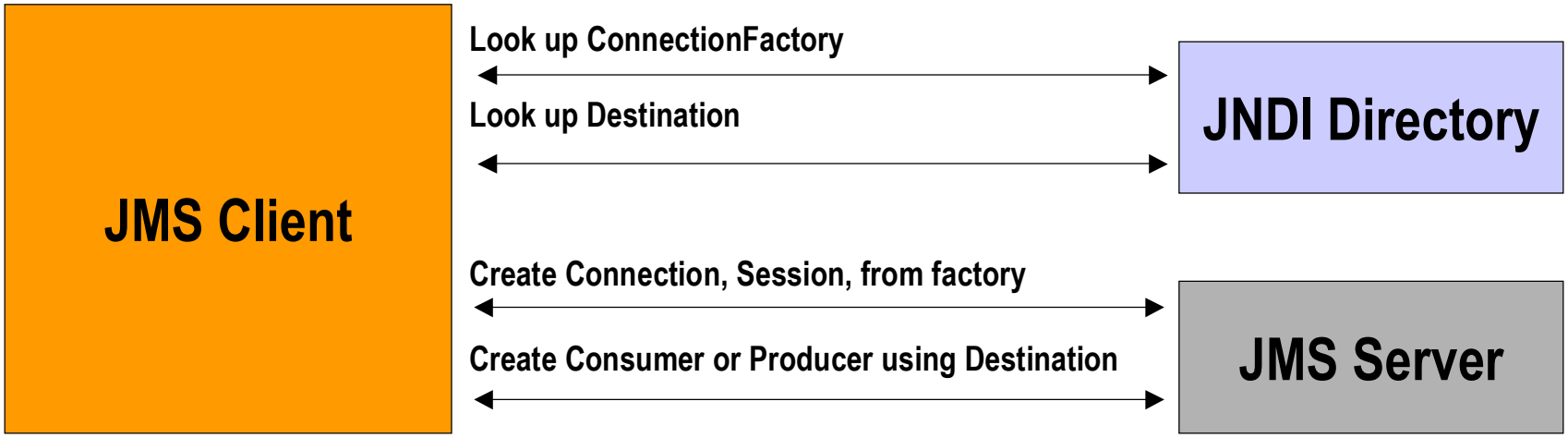
- **Greg Brail** is a software developer at BEA Systems, Inc.
- **Greg Brail** works on the BEA messaging team, and has implemented some of the features described here
- **Greg Brail** has had more than ten years experience designing and using messaging systems at BEA, IBM, and Transarc

Presentation Agenda

- JMS Interoperability Concepts
- Message-Driven Beans
- The Messaging Bridge
- Using JMS in J2EE Components
- Foreign JMS Provider Definitions

JMS Interoperability Concepts

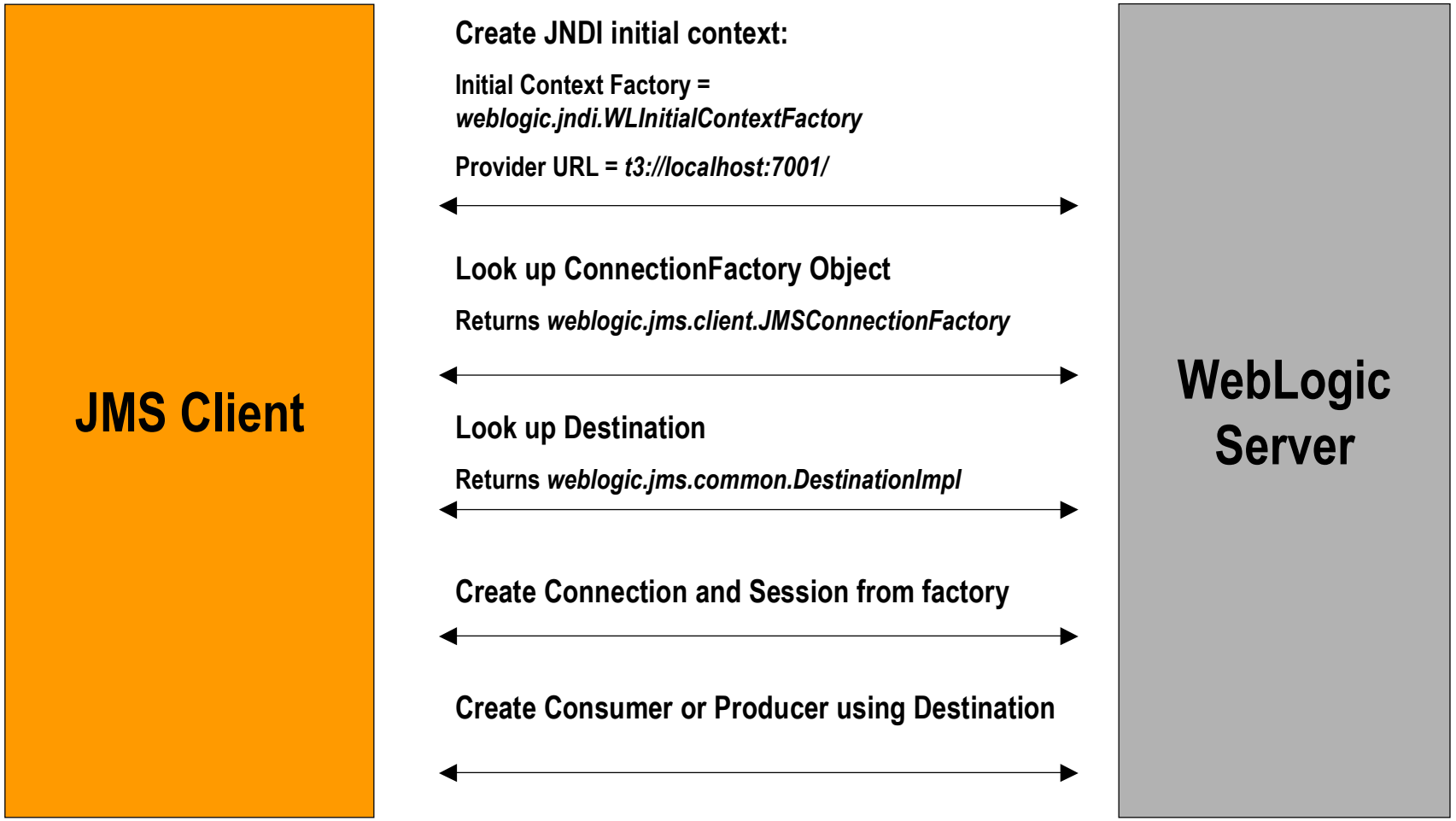
- To support any JMS provider, a client must:
  - Look up the *ConnectionFactory* and *Destination* objects using JNDI
  - Create all other JMS objects using the *ConnectionFactory* object



The Four Common Properties

- You need **four common properties** to connect to a JMS provider
  - The “initial context factory” name
    - This is the name of the class that implements the JNDI directory
  - The URL to reach the JNDI provider
  - The name of the JMS connection factory object to look up in JNDI
  - The name of the JMS destination object to look up in JNDI

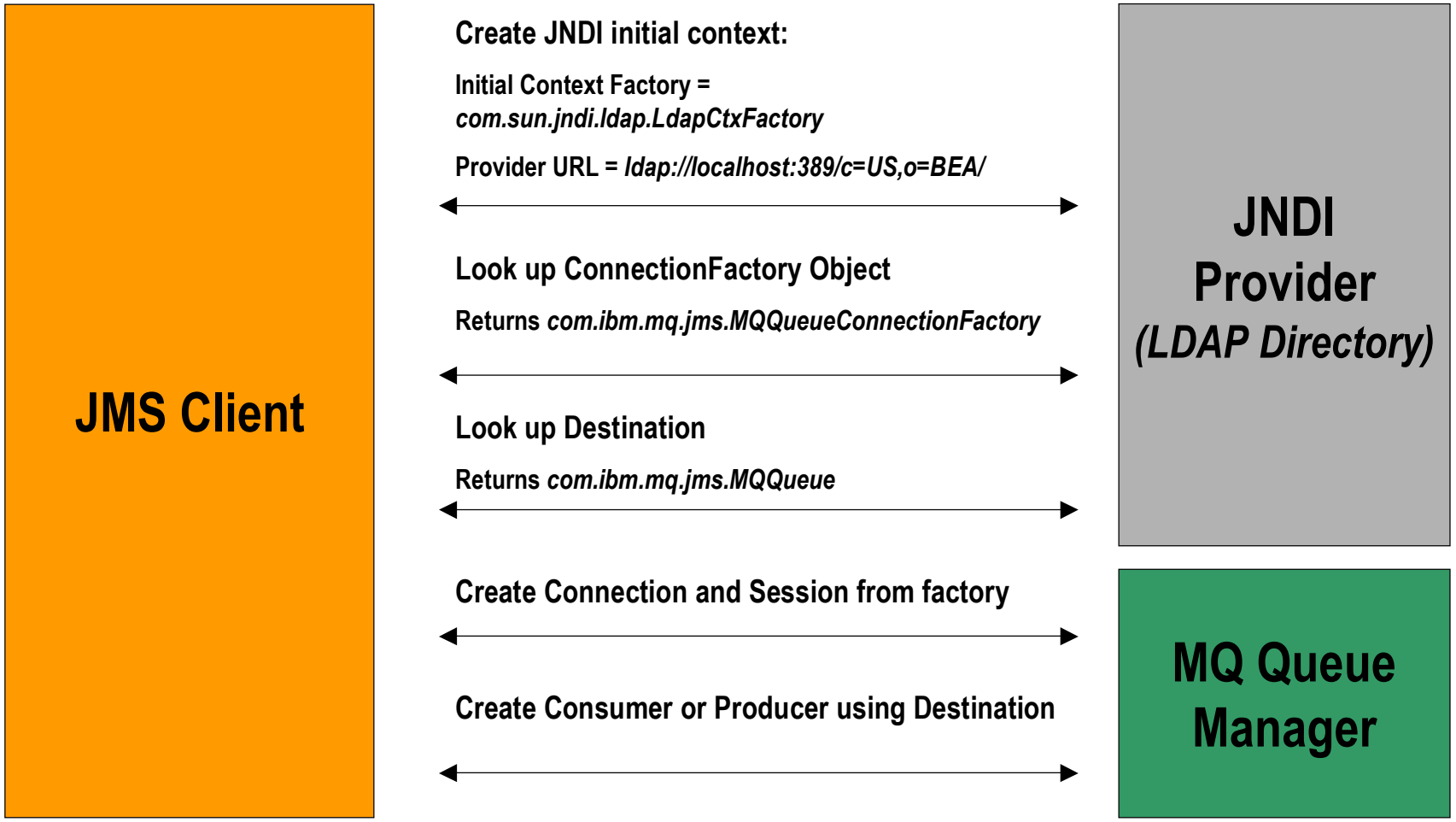
Example: BEA WebLogic JMS



Example: BEA WebLogic JMS

- When you configure a BEA WebLogic JMS connection factory, you specify “JNDI Name”
  - This is the name that you look up
- When you configure a WLS JMS queue or topic, you also specify a “JNDI Name”
- When using WLS JMS, from within the same cluster, you should not specify a URL

Example: IBM MQSeries JMS



Message-Driven Beans

- A Message-Driven Bean (MDB) is
  - An Enterprise Java Bean (EJB)
  - Invoked every time a message is received from a JMS queue or topic
  - The MDB is a full-fledged EJB that can use transactions, security, JDBC, call other EJBs, and so forth

Configuring an MDB

- Here's what goes in weblogic-ejb-jar.xml:

```
<weblogic-enterprise-bean>
  <ejb-name>UseMQHere</ejb-name>
  <message-driven-descriptor>
    <pool>
      <max-beans-in-free-pool>4</max-beans-in-free-pool>
      <initial-beans-in-free-pool>1</initial-beans-in-free-pool>
    </pool>
    <destination-jndi-name>AnMQQueue</destination-jndi-name>
    <initial-context-factory>
      com.sun.jndi.ldap.LdapCtxFactory
    </initial-context-factory>
    <provider-url>
      ldap://bigserver/c=US,o=BEA,ou=JMSTeam
    </provider-url>
    <connection-factory-jndi-name>
      QCF
    </connection-factory-jndi-name>
  </message-driven-descriptor>
</weblogic-enterprise-bean>
```

Configuring an MDB for BEA WebLogic Server

- When using WLS JMS with an MDB:
  - Do not specify “initial context factory”
  - Do not specify connection factory name
  - Only specify URL if the MDB and JMS destination are in different clusters

```
<weblogic-enterprise-bean>
  <ejb-name>WLSJMSIsGreat</ejb-name>
  <message-driven-descriptor>
    <pool>
      <max-beans-in-free-pool>4</max-beans-in-free-pool>
      <initial-beans-in-free-pool>1</initial-beans-in-free-pool>
    </pool>
    <destination-jndi-name>AnMQQueue</destination-jndi-name>
  </message-driven-descriptor>
</weblogic-enterprise-bean>
```

MDBs and Transactions

- When an MDB has in its descriptor files
  - A “transaction-type” of “Container”
  - A “trans-attribute” of “Required”
- Then the MDB’s “onMessage” method and the JMS provider are part of the same two-phase commit transaction

MDBs and Transactions

- In BEA WebLogic Server 6.1, MDBs support two-phase commit transactions with WebLogic JMS only
- In BEA WebLogic Server 7.0, MDBs support two phase commit transactions with foreign JMS providers that support XA

The Messaging Bridge

- The Messaging Bridge is a feature that forwards messages
  - From one JMS queue or topic (the “source”)
  - To another (the “target”)
  - Either one may be any JMS provider

The Messaging Bridge

- An instance of the Bridge moves messages between two “Bridge Destinations”
- Each Bridge Destination is configured in using the **four common properties:**
  - Initial Context Factory
  - Connection URL
  - Connection Factory JNDI Name
  - Destination JNDI Name

Configuring the Bridge

- Here's an example of the config.xml:

```
<Application Name="jms-xa-adp"
    Path="D:\weblogic\server\lib"
    StagingMode="nostage" TwoPhase="true">
    <ConnectorComponent Name="jms-xa-adp" Targets="myserver" URI="jms-xa-
    adp.rar"/>
</Application>
<JMSBridgeDestination ConnectionFactoryJNDIName="XAQCF"
    ConnectionURL="file:/D:/JNDI/" DestinationJNDIName="Test1"
    InitialContextFactory="com.sun.fscontext.RefFSContextFactory"
    Name="MQInput"/>
<JMSBridgeDestination
    ConnectionFactoryJNDIName="weblogic.jms.XAConnectionFactory"
    DestinationJNDIName="Test2" Name="WLSOutput"/>
<MessagingBridge Name="MQToWLSBridge" SourceDestination="MQInput"
   TargetDestination="WLSOutput"/>
```

Using JMS In J2EE Components

- Inside an EJB or a servlet, use JMS by including *resource-ref* elements in the deployment descriptors
- For instance, inside ejb-jar.xml:

```
<resource-ref>
   <res-ref-name>jms/QCF</res-ref-name>
   <res-type>javax.jms.QueueConnectionFactory</res-type>
   <res-auth>Container</res-auth>
   <res-sharing-scope>Shareable</res-sharing-scope>
</resource-ref>
<resource-env-ref>
    <resource-env-ref-name>jms/MYQUEUE</resource-env-ref-name>
    <resource-env-ref-type>javax.jms.Queue</resource-env-ref-type>
</resource-env-ref>
```

Using the *resource-ref*

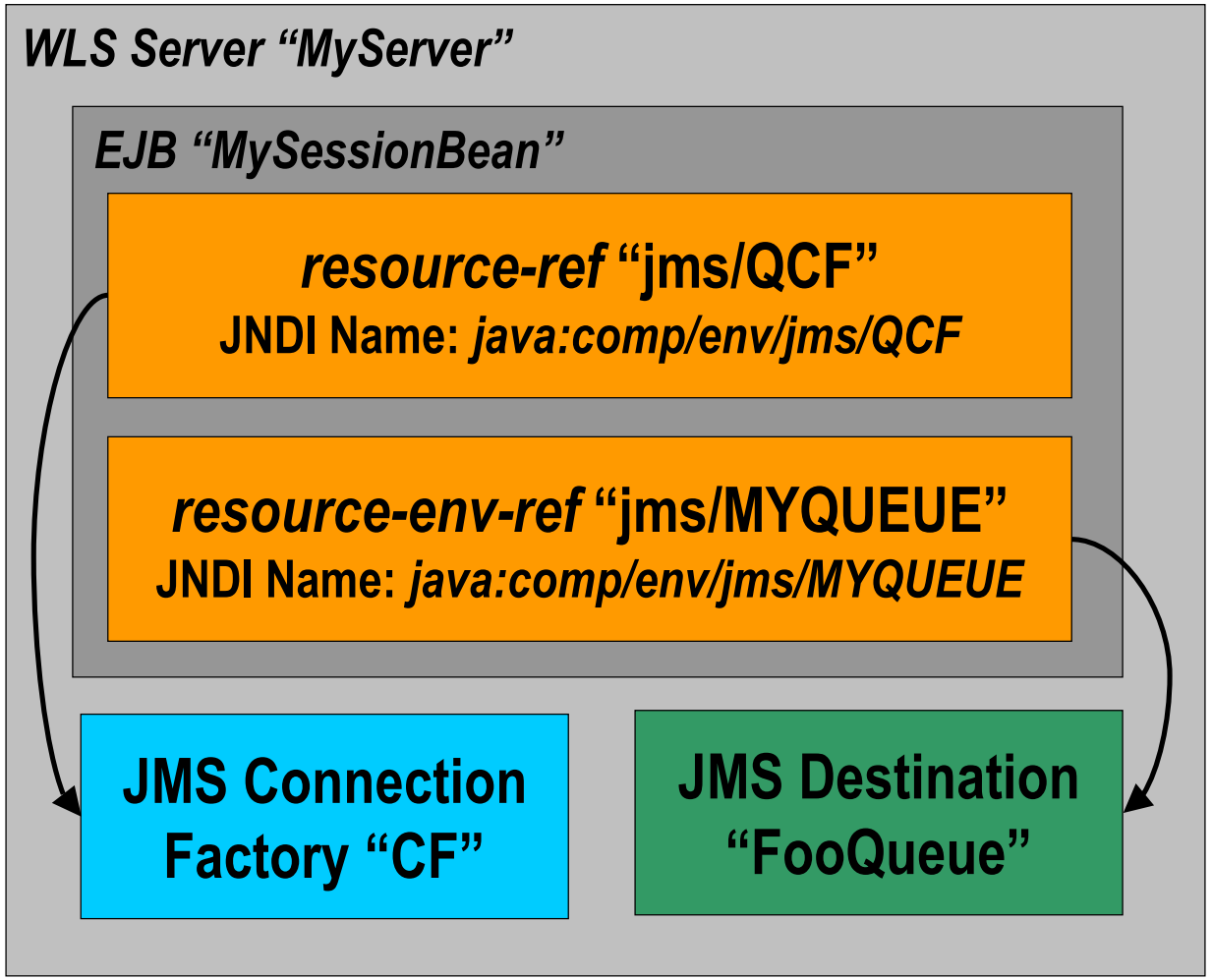
- And in weblogic-ejb-jar.xml:

```
<reference-descriptor>
   <resource-description>
      <res-ref-name>jms/QCF</res-ref-name>
      <jndi-name>JmsFactories.CF</jndi-name>
   </resource-description>
</reference-descriptor>
<resource-env-description>
   <res-env-ref-name>jms/MYQUEUE</res-env-ref-name>
   <jndi-name>JmsQueues.FooQueue</jndi-name>
</resource-env-description>
```

Using the *resource-ref*

- In this example, we have:
  - Created two JNDI entries that may be looked up inside the EJB or servlet:
    - java:comp/env/jms/QCF
    - java:comp/env/jms/MYQUEUE
  - When looked up, these will actually return:
    - JmsFactories.CF
    - JmsQueues.FooQueue

resource-ref Example



resource-ref Example

- Then, you can send a JMS message like this:

```
public void sendAMessage() {
  InitialContext c = new InitialContext();
  Queue q = c.lookup("java.comp/env/jms/MYQUEUE");
  QueueConnectionFactory qcf = c.lookup("java:comp/env/jms/QCF");
  c.close();
  QueueConnection conn = qcf.createQueueConnection();
  try {
    QueueSession session = conn.createQueueSession(false, 0);
    QueueSender sender = session.createQueueSender(q);
    TextMessage msg = session.createTextMessage("Hello, World!");
    sender.send(msg);
  } finally {
    conn.close();
  }
}
```

Why use a *resource-ref?*

- Why should you use a *resource-ref*?
  - Ensures application portability
  - Change JMS objects by changing descriptors
    - No re-compilation required
- New features in WebLogic Server 8.1:
  - Automatic pooling of *Connection*, *Session*, and *MessageProducer* objects
  - Automatic re-connection after failure
  - Automatic transaction enlistment

J2EE Components & Transactions

- If a JMS resource defined using a *resource-ref* is used inside a JTA transaction, it becomes part of the transaction
  - A new feature in WebLogic Server 8.1
  - Requires XA support in the JMS provider
  - This does not happen in 7.0 and earlier

Using JMS In J2EE Components

- **But**, a *resource-ref* just lets you bind to a JNDI name
  - There is no place to specify the “initial context factory” and URL
- In BEA WebLogic Server 7.0 and before, this means you can’t use it with a foreign JMS provider
- In BEA WebLogic Server 8.1, you can, using a **Foreign JMS Server** definition

Foreign JMS Server Definitions

- A Foreign JMS Server Definition makes a sort of “symbolic link” between:
  - A JNDI object in another JNDI directory, like a JMS connection factory or destination object
  - A JNDI name in the JNDI name space for your WebLogic Server cluster
- You can set these up:
  - In the console, under “JMS”
  - In config.xml

Foreign JMS Server Definitions

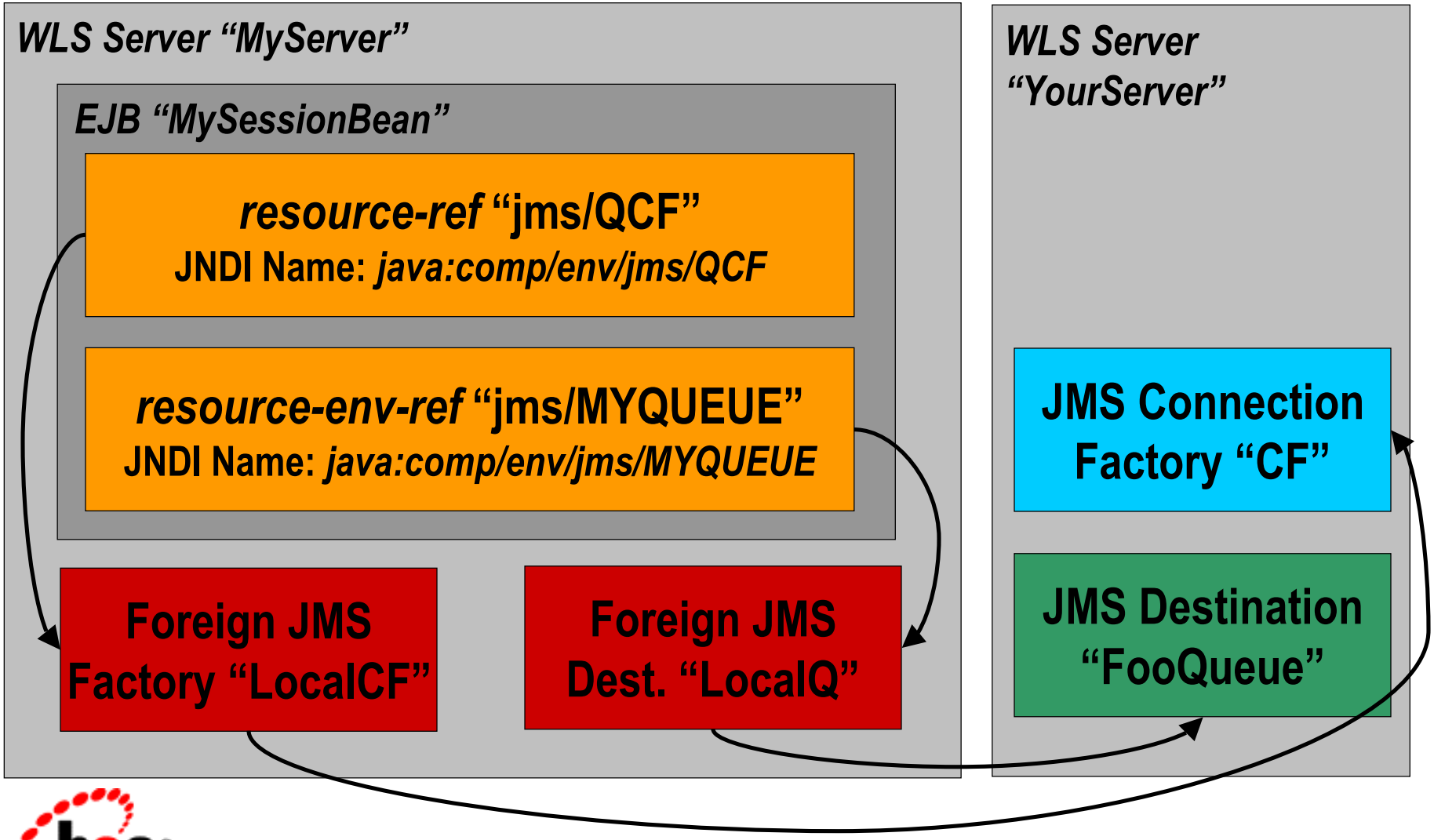
- Here's an example of what goes in config.xml:

```
<ForeignJMSServer ConnectionURL="file:/D:/JNDI/"
    InitialContextFactory="com.sun.fscontext.RefFSContextFactory"
    JNDIProperties="" Name="MQ" Targets="myserver">
    <ForeignJMSConnectionFactory LocalJNDIName="MQObjects.XAQCF"
        Name="XAQCF" RemoteJNDIName="XAQCF"/>
    <ForeignJMSDestination LocalJNDIName="MQObjects.TEST_QUEUE_1"
        Name="MQTestQ" RemoteJNDIName="TEST_QUEUE_1"/>
</ForeignJMSServer>
```

Foreign JMS Server Definitions

- By using a Foreign JMS Server definition in 8.1, you move all those JNDI parameters into one place
- You can share one definition between:
  - EJBs
  - servlets
  - Messaging Bridges
- You can change them without recompiling *or* changing deployment descriptors

Foreign JMS Provider Example



Presentation Summary

- There are four JNDI-related parameters you need to configure to use WebLogic Server with a foreign JMS provider
  - The “initial context factory” name
  - The URL of the JNDI provider
  - The name of the JMS connection factory object
  - The name of the JMS destination object
- These can be used in various places:
  - Message-driven beans
  - The Messaging Bridge (WLS 7.0 and up)
  - Foreign JMS Server definitions (WLS 8.1)

Presentation Summary

- To maximize the flexibility of your J2EE applications:
  - Use *resource-ref* elements to move JMS names out of the source code and in to the deployment descriptors
  - Use Foreign JMS Server definitions to move the names yet further out of the descriptors and in to config.xml
  - This lets you change things at runtime

Q&A

Thank You!