



EJB3: Message-Driven Beans

Originals of Slides and Source Code for Examples:
<http://courses.coreservlets.com/Course-Materials/msajsp.html>

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Taught by the author of *Core Servlets and JSP*, *More Servlets and JSP*, and this tutorial. Available at public venues, or customized versions can be held on-site at your organization. Contact hall@coreservlets.com for details.

Agenda

- Distinguishing message-driven beans (MDBs) from session beans
- Types of messages
- Making an MDB for receiving TextMessages
- Making a client to send TextMessages

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Overview

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Session Beans vs. Message-Driven Beans (MDBs)

- **Session beans**
 - Called directly
 - Client accesses specific bean (via interface)
 - Invoked synchronously
 - Client waits until bean finishes response
 - Can return values to client
 - Client can receive return value from method call
 - Based on interfaces
 - EJB is interface plus concrete class
 - Client refers to interface
- **Message-driven beans**
 - Called indirectly
 - Client puts message in queue. Queue later decides on which bean gets the message.
 - Invoked asynchronously
 - No waiting for bean to process request. Messages not always handled in order sent.
 - Do not return values to client (“fire and forget”)
 - Client can send data, but cannot get response value
 - Not based on interfaces
 - EJB can be concrete class only
 - Client does not refer to class in any way (only to queue)

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General Approach

- **Server**
 - Class implements `MessageListener`
 - Overrides `onMessage`
 - Tagged with `@MessageDriven`
 - Usually with `activationConfig` giving queue type & name
 - `Blah-service.xml`
 - Gives server-specific definition of message queue
- **Client**
 - Main class
 - Finds `ConnectionFactory` and `Queue` from `InitialContext`
 - Creates `Session` and `MessageProducer`
 - Repeatedly sends `TextMessage`, `ObjectMessage`, or other `Message` type
 - `jndi.properties`
 - Same as in section on session beans

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Message Types

- **There are five predefined Message types**
 - TextMessage
 - To send Strings
 - ObjectMessage
 - To send Serializable Objects
 - MapMessage
 - To send sets of names (Strings) and values (primitives).
 - ByteMessage
 - To send binary messages (streams of bytes)
 - StreamMessage
 - To send a series of Java primitives
- **Server casts onMessage's arg to this type**
 - Server can do instanceof if same MDB will receive more than one type of Message

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MDB for TextMessages

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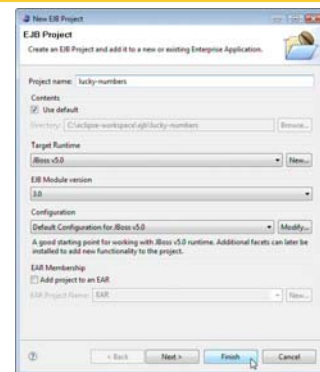
Approach

- **Make new EJB project**
 - File → New → EJB Project
- **Implement MessageListener**
 - Override onMessage, cast argument to TextMessage, extract message String with getText
 - Tag with @MessageDriven
 - Usually define activationConfig in annotation, but can be defined programmatically
 - destinationType is usually javax.jms.Queue
 - destination is queue/YourQueueName
- **Put YourQueueName-service.xml in src**
 - Contains server-specific info (see upcoming slide)
- **Deploy to app server**
 - R-click server, Add/Remove Projects, start server

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EJB Project

- **Making project**
 - File → New → EJB Project
 - Pick a name
 - JBoss as target runtime
 - Deploying to different server later requires changing server-specific Blah-service.xml file
 - Optional: add to an EAR
 - If you make Dynamic Web project later that wants to use @EJB, you can add it to the same EAR
- **Deploying project**
 - R-click on JBoss, Add and Remove Projects, choose Project, Add, Finish
 - R-click on JBoss, Start



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Listener Class

```
@MessageDriven(activationConfig =
{
    @ActivationConfigProperty(propertyName="destinationType",
        propertyValue="javax.jms.Queue"),
    @ActivationConfigProperty(propertyName="destination",
        propertyValue="queue/SimpleMessageQ")
})
public class SimpleMessageBean implements MessageListener {
    public void onMessage(Message msg) {
        TextMessage txtMsg = (TextMessage)msg;
        try {
            String message = txtMsg.getText();
            System.out.printf("Received message: %s", message);
        } catch (JMSEException e) {
            e.printStackTrace();
        }
    }
}
```

Type is usually JMS Queue.

Matches name in Blah-service.xml. Client will refer to this name.

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SimpleQ-service.xml (JBoss-Specific!)

```
<server>
  <mbean code="org.jboss.jms.server.destination.QueueService"
    name="jboss.messaging.destination:service=Queue,name=SimpleMessageQ"
    xmbean-dd="xmdesc/Queue-xmbean.xml">
    <depends optional-attribute-name="ServerPeer">
      jboss.messaging:service=ServerPeer
    </depends>
    <depends>jboss.messaging:service=PostOffice</depends>
  </mbean>
</server>
```

Matches destination name in activationConfig of MDB. Client will refer to this name.

File should go in 'src' folder in Eclipse, and be called *Something-service.xml*.

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Clients for MDBs that Expect TextMessages

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Approach


- **Make new project**
 - File → New → Java Project or
 - For standalone/desktop client
 - File → New → Dynamic Web Project
 - For Web apps that invoke MDBs
- **Send messages**
 - Get InitialContext, look up ConnectionFactory & Queue
 - Make Connection, Session, and MessageProducer
 - Use MessageProducer to send TextMessages
- **Put jndi.properties in src**
 - As in section on session beans
- **Deploy to app server**
 - R-click server, Add/Remove Projects, start server
 - For Web projects but not for desktop Java projects

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Remote Desktop Client

```
public class SimpleMessageClient {
    public static void main(String[] args) throws Exception {
        InitialContext context = new InitialContext();
        ConnectionFactory cf =
            (ConnectionFactory)context.lookup("/ConnectionFactory");
        Queue queue = (Queue)context.lookup("queue/SimpleMessageQ");
        Connection connection = cf.createConnection();
        Session session =
            connection.createSession(false, Session.AUTO_ACKNOWLEDGE);
        MessageProducer sender = session.createProducer(queue);
```

Matches name destination name in
activationConfig on server.



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Remote Desktop Client (Continued)

```
        for(int i=1; i<=10; i++) {
            String messageText =
                String.format("This is message number %s.", i);
            TextMessage message =
                session.createTextMessage(messageText);
            sender.send(message);
        }
    }
}
```

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Remote Client: jndi.properties

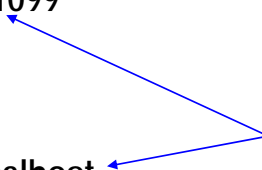
- **For JBoss**

```
java.naming.factory.initial=org.jnp.interfaces.NamingContextFactory
java.naming.factory.url.pkgs=org.jboss.naming:org.jnp.interfaces
java.naming.provider.url=localhost:1099
```

- **For Glassfish**

```
org.omg.CORBA.ORBInitialHost=localhost
```

Change this hostname if app server is on different host than client.



- **Notes**

- Put in “src” folder in Eclipse to be sure it is in classpath
- The Eclipse project you can download has both versions. Just copy/rename jboss-jndi.properties or glassfish-jndi.properties.

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Remote Standalone Client: Deploying

- **messages (EJB Project)**

- Deployed to JBoss.
- SimpleQ-service.xml has JBoss-specific info

- **messages-client (Dynamic Web Project)**

- Not yet deployed to any server.
- jndi.properties has JBoss-specific info

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Remote Standalone Client: Results (JBoss server.log)

```
2009-06-24 16:31:28,472 INFO [STDOUT] (WorkManager(2)-7) Received message:
2009-06-24 16:31:28,472 INFO [STDOUT] (WorkManager(2)-7) This is message number 5.
2009-06-24 16:31:28,473 INFO [STDOUT] (WorkManager(2)-9) Received message:
2009-06-24 16:31:28,473 INFO [STDOUT] (WorkManager(2)-9) This is message number 7.
2009-06-24 16:31:28,475 INFO [STDOUT] (WorkManager(2)-10) Received message:
2009-06-24 16:31:28,475 INFO [STDOUT] (WorkManager(2)-10) This is message number 8.
2009-06-24 16:31:28,476 INFO [STDOUT] (WorkManager(2)-11) Received message:
2009-06-24 16:31:28,479 INFO [STDOUT] (WorkManager(2)-11) This is message number 9.
2009-06-24 16:31:28,488 INFO [STDOUT] (WorkManager(2)-8) Received message:
2009-06-24 16:31:28,488 INFO [STDOUT] (WorkManager(2)-8) This is message number 6.
2009-06-24 16:31:28,488 INFO [STDOUT] (WorkManager(2)-12) Received message:
2009-06-24 16:31:28,493 INFO [STDOUT] (WorkManager(2)-12) This is message number 10.
2009-06-24 16:31:28,494 INFO [STDOUT] (WorkManager(2)-5) Received message:
2009-06-24 16:31:28,494 INFO [STDOUT] (WorkManager(2)-5) This is message number 3.
2009-06-24 16:31:28,494 INFO [STDOUT] (WorkManager(2)-3) Received message:
2009-06-24 16:31:28,494 INFO [STDOUT] (WorkManager(2)-3) This is message number 1.
2009-06-24 16:31:28,494 INFO [STDOUT] (WorkManager(2)-6) Received message:
2009-06-24 16:31:28,494 INFO [STDOUT] (WorkManager(2)-6) This is message number 4.
2009-06-24 16:31:28,496 INFO [STDOUT] (WorkManager(2)-4) Received message:
2009-06-24 16:31:28,496 INFO [STDOUT] (WorkManager(2)-4) This is message number 2.
```

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Wrap-up

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Summary

- **Server**

- Implement `MessageListener`
 - Override `onMessage`, cast argument to `TextMessage`, extract message String with `getText`
 - Tag with `@MessageDriven`
 - Usually define `activationConfig` in annotation
- Put `YourQueueName-service.xml` in `src`

- **Client**

- Java class
 - Get `InitialContext`, look up `ConnectionFactory` & `Queue`
 - Make `Connection`, `Session`, and `MessageProducer`
 - Use `MessageProducer` to send `TextMessages`
- Put `jndi.properties` in `src`

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Questions?

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