Building an application to process variable length and multiple segment IMS transaction output messages

Time required

To complete this tutorial, you will need approximately **30 minutes**. If you decide to explore other facets of the J2C Java bean wizard while working on the tutorial, it could take longer to finish.

Prerequisites

In order to complete this tutorial end to end, you should be familiar with:

- J2EE and Java programming
- Basic IMS Transaction Manager (IMS TM) concepts

Learning objectives

This tutorial is divided into several exercises that must be completed in sequence for the tutorial to work properly. This tutorial teaches you how to use the J2C Java bean wizard to create a Java bean that runs a transaction in IMS. While completing the exercises, you will:

- Use the J2C Java Bean wizard to create a J2C Java bean that runs an IMS transaction.
- Create a message buffer class, `CCIBuffer.java`, and edit this class using doclet annotations.
- Create a method for the J2C Java bean to run the IMS transaction and provide input and output data types for the method.
- CreateJava data bindings for the segments of the output message.
- Create atest Java class, TestMultiSeg.java, to invoke the J2C Java bean method that runs the IMS transaction, then populate the output segments from the buffer of data returned by the IMS transaction.

  NOTE: The test Java class was created for an English locale; you may have to make modifications in the code for other locales.

When you are ready, begin Exercise 1.1: Selecting the resource adapter

Exercise 1.1: Selecting the resource adapter

This tutorial leads you through the detailed steps to generate a J2C application that processes variable length and multiple segment IMS transaction output messages.

Before you can begin this tutorial, you must first obtain the required resources:

- **Information about your IMS**: In this tutorial, your application interacts with an IMS application program in IMS. You need to obtain information such as the host name and port number of IMS Connect and the name of the IMS datastore where the transaction will run. Contact your IMS systems administrator for thisinformation. Specifically, you need to perform some setup work in IMSif you want to run the IMS\MultiSegmentOutput IMS program. This information is provided below.
- **A copy of the COBOL file `MSOut.cbl`** You may locate this file in your product installation directory: `\rad\eclipse\plugins\com.ibm.j2c.cheatsheet.content_6.0.0 \samples\IMS\MultiSegmentOutput`. If you wish to store it locally, you can copy the code from here:

MSOut.cbl

```
       IDENTIFICATION DIVISION.
       program-id. pgm1.
       ENVIRONMENT DIVISION.
       CONFIGURATION SECTION.
       DATA DIVISION.
       *
       *    IMS TOC Connector for Java, Multi-segment Output Example
       *
       ****************************************************************,
       *                                                               *,
       * (c) Copyright IBM Corp. 1998                                  *,
       * All Rights Reserved                                           *,
       * Licensed Materials - Property of IBM                          *,
       *                                                               *,
       * DISCLAIMER OF WARRANTIES.                                     *,
       *                                                               *,
       * The following (enclosed) code is provided to you solely for the   *,
       * purpose of assisting you in the development of your applications. *,
       * The code is provided "AS IS." IBM MAKES NO WARRANTIES, EXPRESS OR *,
       * IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF   *,
       * MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, REGARDING   *,
       * THE FUNCTION OR PERFORMANCE OF THIS CODE.                         *,
       * IBM shall not be liable for any damages arising out of your use   *,
       * of the generated code, even if they have been advised of the      *,
       * possibility of such damages.                                      *,
       *                                                               *,
       * DISTRIBUTION.                                                 *,
       *                                                               *,
       * This generated code can be freely distributed, copied, altered,   *,
       * and incorporated into other software, provided that:              *,
       *   - It bears the above Copyright notice and DISCLAIMER intact     *,
       *   - The software is not for resale                                *,
       *                                                               *,
       ****************************************************************,
       *
         LINKAGE SECTION.

         01  INPUT-MSG.
             02  IN-LL          PICTURE S9(3) COMP.
             02  IN-ZZ          PICTURE S9(3) COMP.
             02  IN-TRCD        PICTURE X(5).
             02  IN-DATA1       PICTURE X(6).
```

```
           02  IN-DATA2       PICTURE X(6).

       01  OUTPUT-MSG.
           02  OUT-ALLSEGS  PICTURE X(99) VALUE SPACES.

       01  OUTPUT-SEG1.
           02  OUT-LL       PICTURE S9(3) COMP VALUE +0.
           02  OUT-ZZ       PICTURE S9(3) COMP VALUE +0.
           02  OUT-DATA1    PICTURE X(12) VALUE SPACES.

       01  OUTPUT-SEG2.
           02  OUT-LL       PICTURE S9(3) COMP VALUE +0.
           02  OUT-ZZ       PICTURE S9(3) COMP VALUE +0.
           02  OUT-DATA1    PICTURE X(13) VALUE SPACES.
           02  OUT-DATA2    PICTURE X(14) VALUE SPACES.

       01  OUTPUT-SEG3.
           02  OUT-LL       PICTURE S9(3) COMP VALUE +0.
           02  OUT-ZZ       PICTURE S9(3) COMP VALUE +0.
           02  OUT-DATA1    PICTURE X(15) VALUE SPACES.
           02  OUT-DATA2    PICTURE X(16) VALUE SPACES.
           02  OUT-DATA3    PICTURE X(17) VALUE SPACES.

       PROCEDURE DIVISION.
```

- **A clean workspace.**

NOTE: The IMS transaction that is used in this tutorial is *not* one of the IMS Installation Verification Programs. This tutorial uses DFSDDLT0, an IMS application program that issues calls to IMS based on control statement information. The DFSDDLT0 control statements for this tutorial are provided below. However, to run this tutorial you must configure your environment for DFSDDLT0 and provide the necessary JCL. This tutorial uses SKS2 as the transaction code for the DFSDDLT0 application.

DFSDDLT0 control statements

```
S11 1 1 1 1    TP     1
L        GU
E      OK
E  Z0017 DATA  SKS2 M2 SI1M3 SI1
WTO SEGMENT SI1 RECEIVED
L        GN
E      QD
WTO END OF INPUT SEGMENTS
L        ISRT  IW06OUT
L  Z0012 DATA  *******M1SO1
E      OK
WTO SEGMENT SO1 INSERTTED
L        ISRT
L  Z0027 DATA  ********M1SO2*********M2SO2
E      OK
WTO SEGMENT SO2 INSERTTED
L        ISRT
L  Z0048 DATA  **********M1SO3***********M2SO3************M3SO3
E      OK
WTO SEGMENT SO3 INSERTTED
WTO CURRENT PROGRAM STLDDLT2 TERMINATED
L        GU
```

This tutorial uses COBOL data structures to describe the IMS transaction input and output messages. Note

that the output message returned by IMS consists of three fixed length segments:

- OUTPUT-SEG1 (16 bytes)
- OUTPUT-SEG2 (31 bytes)
- OUTPUT-SEG3 (52 bytes)

The output message returned by this particular IMS application is a fixed size of 99 bytes and is represented by the COBOL 01 structure OUTPUT-MSG.

One way of developing this multi-segment application is to use the COBOL definition OUTPUT-MSG to define the output of the transaction. A second way is to create an output message for the output of the transaction. The code provided with this tutorial uses the second method, since it can also be used to build an application that processes a variable length output message. The COBOL definitions for the individual message segments will continue to be used to simplify access to the data of the individual segments.

Selecting the resource adapter

Switching to the J2EE Perspective

If the J2EE icon,  , does not appear in the top right tab of the workspace, you need to switch to the J2EE perspective.

1. From the menu bar, select **Window** > **Open Perspective** > **Other**. The Select Perspective window opens.
2. Select **J2EE**.
3. Click **OK**. The J2EE perspective opens.

Connecting to the IMS server

1. In the J2EE perspective, select **File** > **New** > **Other**.
2. In the New page, select **J2C** > **J2C Java Bean**. Click **Next**
   Note: If you do not see the J2C option in the wizard list, you need to Enable J2C Capabilities.
   1. From the menu bar, click **Window** > **Preferences**.
   2. On the left side of the Preferences window, expand Workbench.
   3. Click **Capabilities**. The Capabilities pane is displayed. If you would like to receive a prompt when a feature is first used that requires an enabled capability, select **Prompt when enabling capabilities**.
   4. Expand Enterprise Java.
   5. Select **Enterprise Java**. The necessary J2C capability is now enabled. Alternatively, you can select the Enterprise Java capability folder to enable all of the capabilities that folder contains. To set the list of enabled capabilities back to its state at product install time, click **Restore Defaults**.
   6. To save your changes, click **Apply**, and then click **OK**. Enabling Enterprise Java capabilities will automatically enable any other capabilities that are required to develop and debug J2C applications.
3. In the Resource Adapters Selection page, select either the J2C 1.0 or J2C 1.5 IMS resource adapter. For this tutorial select **IMS Connector for Java (IBM : 9.1.0.2)**. Click **Next**.
4. In the Connection Properties page, clear the **Managed Connection** check box and select **Non-managed Connection**. (For this tutorial, you will use a non-managed connection to directly access IMS, so you do not need to provide a JNDI name.) Accept the default Connection class name of `com.ibm.connector2.ims.ico.IMSManagedConnectionFactory`. In the blank fields, provide all the required connection information. Required fields, indicated by an asterisk (*), include the following:
   For TCP/IP connection:
   - **Host name**: (Required) The IP address or host name of IMS Connect.
   - **Port Number**: (Required) The number of the port used by the target IMS Connect.

   For local option connection:

- **IMS Connect name**: (Required) The name of the target IMS Connect.

For both:

- **Data Store Name**: (Required) The name of the target IMS datastore.

You may obtain the connection information from your IMS system administrator. When you have provided the required connection information, click **Next**.

Now you are ready to begin Exercise 1.2: Setting up the Web project and Java Interface and Implementations .

Exercise 1.2: Setting up the Web project and Java Interface and Implementations

Before you begin, you must complete Exercise 1.1: Selecting the resource adapter.

Exercise 1.2 steps you through the creation of a J2C application. In this exercise you will

- Create a J2C Java Bean
- Create a dynamic Web project

Creating a J2C Java bean

All work done in the workbench must be associated with a project. Projects provide an organized view of the work files and directories, optimized with functions based on the type of project. In the workbench, all files must reside in a project, so before you create the J2C Java bean, you need to create a project to put it in.

1. In the New J2C Java Bean page, type the value `MultiSegOutput` in the **Project Name** field.
2. Click the **New** button beside the **Project Name** field to create the new project.
3. In the New Source Project Creation page, click **Web project**, and click **Next**.
4. In the New Dynamic Web Project page, click **Show Advanced**.
5. Ensure that the following values are selected:
    - **Name**: MultiSegOutput
    - **Project location**: accept default
    - **Servlet version**: 2.4
    - **Target server**: WebSphere Application Server v6.0
    - **EAR Project**: MultiSegOutputEAR
    - **Context Root**: MultiSegOutput
6. Click **Finish**.
7. A dialog box may appear asking if you would like to switch to the Dynamic Web perspective. Click **Yes**.
8. On the J2C Java Bean Output Properties page, ensure that the following values appear:
    - The **Package Name** field contains `sample.ims`.
    - In the **Interface Name** field, type `MSO`.
    - In the **Implementation Name** field, type `MSOImpl`.
9. Click **Finish**.

Now you are ready to begin Exercise 1.3: Creating a message buffer class.

Exercise 1.3: Creating a message buffer class

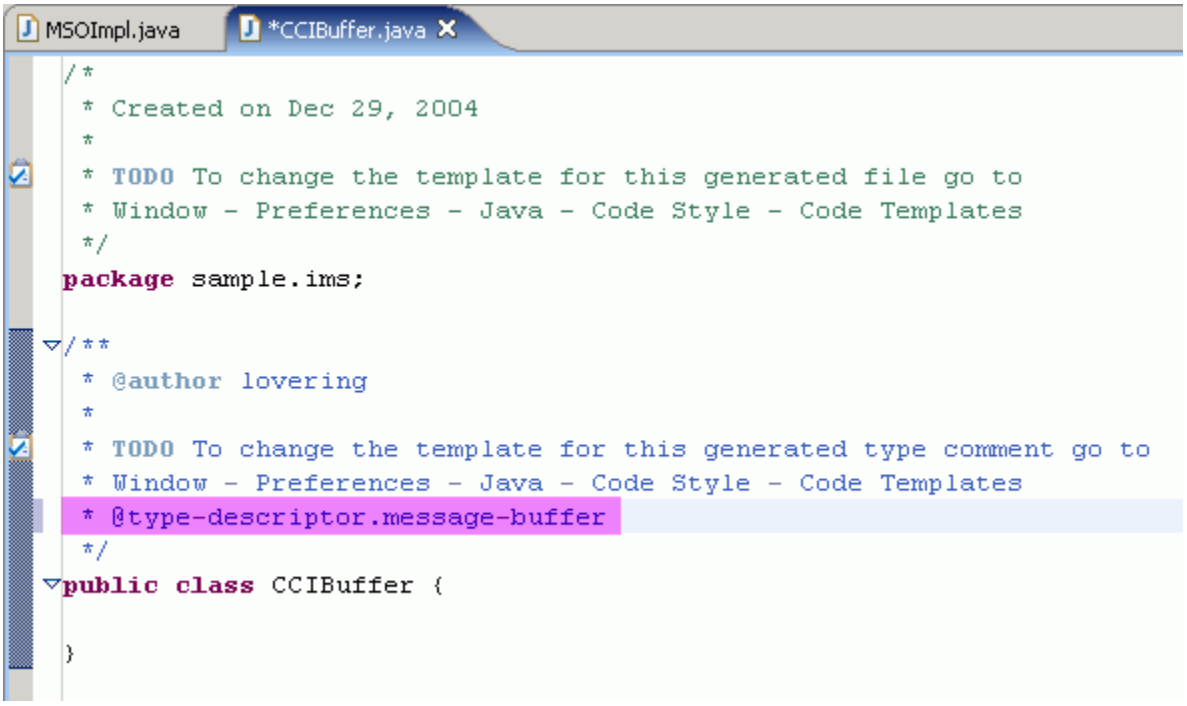
Before you begin, you must complete Exercise 1.2: Setting up the Web project and Java Interface and Implementations .

Exercise 1.3 leads you through the creation of a message buffer class. In this exercise you will

- Create a message buffer class
- Edit the message buffer class using doclet annotations
- Create the input and output binding operations
- Create the output segment data mappings

Creating a message buffer class

1. Expand the MultiSegOutput project, expand **Java Resources**, and expand **JavaSource**.
2. Right click on the **sample.ims** package, and select **New** > **Class** to launch the New Class wizard.
3. Type `CCIBuffer` as the name of the class. Accept all default settings.
4. Click **Finish**. The CCIBuffer class opens in the Java editor.
5. In the comment section of the CCIBuffer class, add the tag `@type-descriptor.message-buffer`.



6. Press CTRL-S to save the changes. Note that new code is automatically generated in the CCIBuffer.java class.

CCIBuffer.java

```
/*
 * Created on Oct 13, 2004
 *
 * TODO To change the template for this generated file go to
 * Window - Preferences - Java - Code Style - Code Templates
 */
package sample.ims;
```

```
/**
 * @author ivyho
 *
 * TODO To change the template for this generated type comment go to
 * Window - Preferences - Java - Code Style - Code Templates
 * @type-descriptor.message-buffer
 */
public class CCIBuffer implements javax.resource.cci.Record,
                javax.resource.cci.Streamable, com.ibm.etools.marshall.Recc

        private byte[] buffer_ = null;

        /**
         * @generated
         */
        public CCIBuffer() {
                return;
        }

        /**
         * @generated
         * @see javax.resource.cci.Record#getRecordShortDescription()
         */
        public String getRecordShortDescription() {
                return (this.getClass().getName());
        }

        /**
         * @generated
         * @see javax.resource.cci.Record#hashCode()
         */
        public int hashCode() {
                return (super.hashCode());
        }

        /**
         * @generated
         * @see javax.resource.cci.Streamable#write(OutputStream)
         */
        public void write(java.io.OutputStream outputStream)
                        throws java.io.IOException {
                outputStream.write(buffer_);
        }

        /**
         * @generated
         * @see javax.resource.cci.Record#setRecordShortDescription(String)
         */
        public void setRecordShortDescription(String shortDescription) {
                return;
        }

        /**
         * @generated
         */
        public int getSize() {
                if (buffer_ != null)
                        return (buffer_.length);
                else
                        return (0);
        }
```

```
/**
 * @generated
 * @see java.lang.Object#toString
 */
public String toString() {
        StringBuffer sb = new StringBuffer(super.toString());
        sb.append("\n");
        com.ibm.etools.marshall.util.ConversionUtils.dumpBytes(sb,
        return (sb.toString());
}

/**
 * @generated
 * @see javax.resource.cci.Record#getRecordName()
 */
public String getRecordName() {
        return (this.getClass().getName());
}

/**
 * @generated
 */
public byte[] getBytes() {
        return (buffer_);
}

/**
 * @generated
 * @see javax.resource.cci.Record#clone()
 */
public Object clone() throws CloneNotSupportedException {
        return (super.clone());
}

/**
 * @generated
 * @see javax.resource.cci.Record#setRecordName(String)
 */
public void setRecordName(String recordName) {
        return;
}

/**
 * @generated
 * @see javax.resource.cci.Record#equals()
 */
public boolean equals(Object object) {
        return (super.equals(object));
}

/**
 * @generated
 * @see javax.resource.cci.Streamable#read(InputStream)
 */
public void read(java.io.InputStream inputStream)
                throws java.io.IOException {
        byte[] input = new byte[inputStream.available()];
        inputStream.read(input);
        buffer_ = input;
}

/**
```

```
     * @generated
     */
    public void setBytes(byte[] bytes) {
            buffer_ = bytes;
    }

}
```

Creating the method to run the IMS transaction and the input message data type

1. In the Project Explorer view, right click on `MSOImpl.java`, and select **Source** > **Add method to J2C Java bean.**
2. In the New Java Method page, click **Add**.
3. Type `runMultiSegOutput` as the Java method name. Click **Next** .
4. Click the **New** button to define the Input type.
5. Select **COBOL_to_Java** mapping. Click the **Browse** button.
6. Locate the MSO.cbl cobol file. Click **Open**.
7. Click **Next**.
8. In the COBOL Importer page, click on **Show Advanced**.
    - Select the following options:

Parameter	Value
Platform Name	Z/OS
codepage	037
Floating point format name	IBM 390 Hexadecimal
External decimal sign	EBCDIC
Endian name	Big
Remote integer endian name	Big
Quote name	DOUBLE
Trunc name	STD
Nsymbol name	DBCS

    - Click the **Query** button to load the data.
    - A list of data structures is shown. Select INPUT-MSG in the **Data structures** field. Click **Next** .
9. In the Saving Properties page, the default java class name is **INPUTMSG**. Overwrite the Java class Name with **InputMsg**. Click **Finish**.

Creating the output message data type

1. Click **Browse** to define the output type.
2. Type **CC** in the **Select a data type** field, and **CCIBuffer** will appear in the **Matching types** field. Select **CCIBuffer** as the output type. Click **Finish**.
3. On the Java Method page , click **Finish** to complete the definition of the method.
4. In the Java Methodspage, ensure that the **interactionVerb** is set to **SYNC_SEND_RECEIVE (1)** to indicate that the interaction with IMS involves a send followed by a receive interaction.
5. Click **Finish** to exit.

Creating the output segment data mappings

To accomplish this step, you need to use a standalone data mapping wizard so that you create only the data mapping files.

Creating OutputSeg1.java

1. Go to **File** > **New** > **Other** > **CICS/IMS Java Data Binding** to invoke the Data Binding wizard.
2. Click **Next**.
3. Select COBOL_To_Java in the **Choose mapping** list. For the Cobol file, browse to find the MSO.cbl Cobol copy book. Click **Next.**
4. In the COBOL Importer page, Click **Show Advanced**.
    - Select the following options:

Parameter	Value
Platform Name	Z/OS
codepage	037
Floating point format name	IBM 390 Hexadecimal
External decimal sign	EBCDIC
Endian name	Big
Remote integer endian name	Big
Quote name	DOUBLE
Trunc name	STD
Nsymbol name	DBCS

    - Click the **Query** button to load the data.
    - A list of data structures is shown. Select OUTPUT-SEG1 in the **Data structures** field. Click **Next** .
5. In the Saving properties wizard, click **Browse** to select the **MultiSegOutput** project you created before.
6. Click **Browse** to select the the package name: **sample.ims**.
7. Change the Java Class Name from **OUTPUTSEG1** to **OutputSeg1**.
8. Click **Finish.**

Creating OutputSeg2.java

1. Go to **File** > **New** > **Other** > **J2C** > **CICS/IMS Data Binding** to invoke the Data Binding wizard.
2. Click **Next**.
3. Select COBOL_To_JAVA in the Choose mapping list. For the Cobol File, Browse to find the MSO.cbl Cobol copy book . Click **Next**
4. In the **COBOL Importer** page, Click **Show Advanced**.
    - Select the following options:

Parameter	Value
Platform Name	Z/OS
codepage	037
Floating point format name	IBM 390 Hexadecimal
External decimal sign	EBCDIC
Endian name	Big
Remote integer endian name	Big
Quote name	DOUBLE
Trunc name	STD
Nsymbol name	DBCS

    - Click the **Query** button to load the data.
    - A list of data structures is shown. Select OUTPUT-SEG2 in the **Data structures** field. Click **Next** .
5. In the Saving properties wizard, click **Browse** to select the **MultiSegOutput** project you created

before.
6. Click **Browse** to select the the package name: **sample.ims**.
7. Change the Java Class Name from **OUTPUTSEG2** to **OutputSeg2**.
8. Click **Finish.**

Creating OutputSeg3.java

1. Go to **File** > **New** > **Other** > **J2C** > **CICS/IMS Data Binding** to invoke the Data Binding wizard.
2. Click **Next**.
3. Select COBOL_To_Java in the Choose mapping list. For the Cobol File, Browse to find the `MSO.cbl` Cobol copy book. Click **Next**
4. In the **COBOL Importer** page, click **Show Advanced**.
    - Select the following options:

Parameter	Value
Platform Name	Z/OS
codepage	037
Floating point format name	IBM 390 Hexadecimal
External decimal sign	EBCDIC
Endian name	Big
Remote integer endian name	Big
Quote name	DOUBLE
Trunc name	STD
Nsymbol name	DBCS

    - Click the **Query** button to load the data.
    - A list of data structures is shown. Select OUTPUT-SEG3 in the **Data structures** field. Click **Next** .
5. In the Saving properties wizard, click **Browse** to select the **MultiSegOutput** project you created before.
6. Click **Browse** to select the the package name: **sample.ims**.
7. Change the Java Class Name from **OUTPUTSEG3** to **OutputSeg3**.
8. Click **Finish.**

Now you are ready to begin Exercise 1.4: Creating a Java proxy class to test your application.

Exercise 1.4: Creating a Java test class to test your application

Before you begin, you must complete Exercise 1.3: Creating a message buffer class.

Creating a Java test class

1. Expand the MultiSegOutput project, expand the **Java Resources** section and select the **sample.ims** package.
2. Right click and select **New**. Select the  class option to create a new Java class.
3. In the **Java class name** field, type `TestMultiSeg`. Note that the TestMultiSeg.java class is provided as an example only; you may need to change the transaction code to your IMS machine specifications. Consult your IMS administrator for the transaction code. You can locate the statement `input.setIn__trcd("SKS6 ")` in the TestMultiSeg.java class and make the modifications.
4. Ensure that **Source Folder** contains `MultiSegOutput/JavaSource` and that the **package name** contains `sample.ims`.
5. Click **Finish.**
6. Open `TestMultiSeg.java` in the Java class editor.
7. Replace all the code in the editor with the following:

TestMultiSeg.java

```
/*********************************************************************************
 * Licensed Materials - Property of IBM
 *
 * com.ibm.j2c.cheatsheet.content
 *
 * © Copyright IBM Corporation 2004. All Rights Reserved.
 *
 * Note to U.S. Government Users Restricted Rights:  Use, duplication or disclosu
 *********************************************************************************/
package sample.ims;

import com.ibm.etools.marshall.util.MarshallIntegerUtils;
import sample.ims.data.*;

public class TestMultiSeg
{
        public static void main (String[] args)
        {
                byte[] segBytes = null;
                int srcPos = 0;
                int dstPos = 0;
                int totalLen = 0;
                int remainLen = 0;
                byte[] buff;
                short LL = 0;
                short ZZ = 0;

                try
                {
                        // -------------------------------------------------
                        // Populate the IMS transaction input message with
                        // data.  Use the input message format handler method
                        // getSize() to set the LL field of the input message.
                        // -------------------------------------------------
                        InputMsg input = new InputMsg();
                        input.setIn__ll((short) input.getSize());
                        input.setIn__zz((short) 0);
                        //-------------------------------------------------
                        // find out the transaction code from your IMS administr
```

```
//-----------------------------------------------------
input.setIn__trcd("SKS6 ");
input.setIn__data1("M2 SI1");
input.setIn__data2("M3 SI1");

// -----------------------------------------------------
// Run the IMS transaction.  The multi-segment output
// message is returned.
// -----------------------------------------------------
MSOImpl proxy = new MSOImpl();

sample.ims.CCIBuffer output = proxy.runMultiSegOutput(ir

// -----------------------------------------------------
// Retrieve the multi-segment output message as a
// byte array using the output message format
// handler method getBytes().
// -----------------------------------------------------
System.out.println(
        "\nSize of output message is: " + output.getSiz
segBytes = output.getBytes();

srcPos = 0;
dstPos = 0;
totalLen = segBytes.length;
remainLen = totalLen;

// -----------------------------------------------------
// Populate first segment object from buffer.
// -----------------------------------------------------
buff = null;
// Get length of segment.
LL =
        MarshallIntegerUtils.unmarshallTwoByteIntegerFr
                segBytes,
                srcPos,
                true,
                MarshallIntegerUtils.SIGN_CODING_TWOS_C

// Put segment in byte array.
buff = new byte[LL];
System.arraycopy(segBytes, srcPos, buff, dstPos, LL);
remainLen -= LL;

// Create and populate segment object from byte array.
OutputSeg1 S1 = new OutputSeg1();
S1.setBytes(buff);
System.out.println(
        "\nOutSeg1 LL is:    "
                + S1.getOut__ll()
                + "\nOutSeg1 ZZ is:    "
                + S1.getOut__zz()
                + "\nOutSeg1_DATA1 is: "
                + S1.getOut__data1());

// -----------------------------------------------------
// Populate second segment object from buffer.
// -----------------------------------------------------
srcPos += LL;
buff = null;
// Get length of segment.
LL =
```

```
                        MarshallIntegerUtils.unmarshallTwoByteIntegerFr
                                segBytes,
                                srcPos,
                                true,
                                MarshallIntegerUtils.SIGN_CODING_TWOS_C

                        // Put segment in byte array.
                        buff = new byte[LL];
                        System.arraycopy(segBytes, srcPos, buff, dstPos, LL);
                        remainLen -= LL;

                        // Create and populate segment object from byte array.

                        OutputSeg2 S2 = new OutputSeg2();
                        S2.setBytes(buff);
                        System.out.println(
                                "\nOutSeg2 LL is:    "
                                        + S2.getOut__ll()
                                        + "\nOutSeg2 ZZ is:    "
                                        + S2.getOut__zz()
                                        + "\nOutSeg2_DATA1 is: "
                                        + S2.getOut__data1()
                                        + "\nOutSeg2_DATA2 is: "
                                        + S2.getOut__data2());
                        // -----------------------------------------------
                        // Populate third segment object from buffer.
                        // -----------------------------------------------
                        srcPos += LL;
                        buff = null;
                        // Get length of segment.
                        LL =
                                MarshallIntegerUtils.unmarshallTwoByteIntegerFr
                                        segBytes,
                                        srcPos,
                                        true,
                                        MarshallIntegerUtils.SIGN_CODING_TWOS_C

                        // Put segment in byte array.
                        buff = new byte[LL];
                        System.arraycopy(segBytes, srcPos, buff, dstPos, LL);
                        remainLen -= LL;

                        // Create and populate segment object from byte array.
                        OutputSeg3 S3 = new OutputSeg3();
                        S3.setBytes(buff);
                        System.out.println(
                                "\nOutSeg3 LL is:    "
                                        + S3.getOut__ll()
                                        + "\nOutSeg3 ZZ is:    "
                                        + S3.getOut__zz()
                                        + "\nOutSeg3_DATA1 is: "
                                        + S3.getOut__data1()
                                        + "\nOutSeg3_DATA2 is: "
                                        + S3.getOut__data2()
                                        + "\nOutSeg3_DATA3 is: "
                                        + S3.getOut__data3());
                }
                catch (Exception e)
                {
                        System.out.println("\nCaught exception is: " + e);
                }
        }
```

```
}
```

Testing the application

1. Expand the **MultiSegOutput** project and the **sample.ims** package.
2. Right-click the TestMSOProxy.java class and select **Run.** Select **Run As** > **Java Application**
3. You should see the following output on the console:

```
Size of output message is: 99

OutSeg1 LL is:     16
OutSeg1 ZZ is:     0
OutSeg1_DATA1 is: *******M1SO1

OutSeg2 LL is:     31
OutSeg2 ZZ is:     0
OutSeg2_DATA1 is: ********M1SO2
OutSeg2_DATA2 is: *********M2SO2

OutSeg3 LL is:     52
OutSeg3 ZZ is:     0
OutSeg3_DATA1 is: **********M1SO3
OutSeg3_DATA2 is: ***********M2SO3
OutSeg3_DATA3 is: ************M3SO3
```

Congratulations! You have completed the MultiSegment Output Tutorial.

Finish your tutorial by reviewing the materials in the Summary.

Summary

Completed learning objectives

If you have completed all of the exercises, you should now be able to

- Use the J2C JavaBean wizard to create a J2C Java bean that runs an IMS transaction.
- Create a message buffer class, `CCIBuffer.java` , and edit this class using doclet annotations.
- Create a method for the J2C Java bean to run the IMS transaction and provide input and output data types for the method.
- CreateJava data bindings for the segments of the output message.
- Create a test Java class, `TestMultiSeg.java`, to test the J2C Java bean.