

E85

IMS Connector for Java: Developing Web Application for Accessing IMS Transactions

Haley Fung



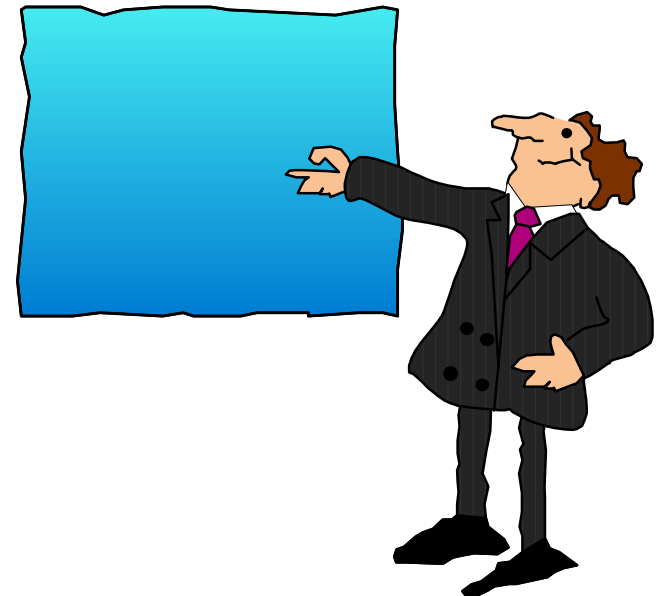
Anaheim, California

October 23 - 27, 2000

Agenda



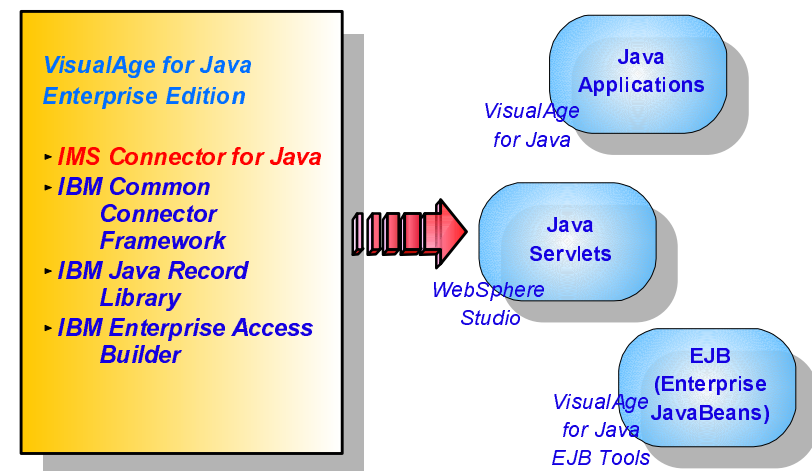
- IMS Connector for Java
- Build, Test and Deploy a Web Application to access an IMS Transaction
- References



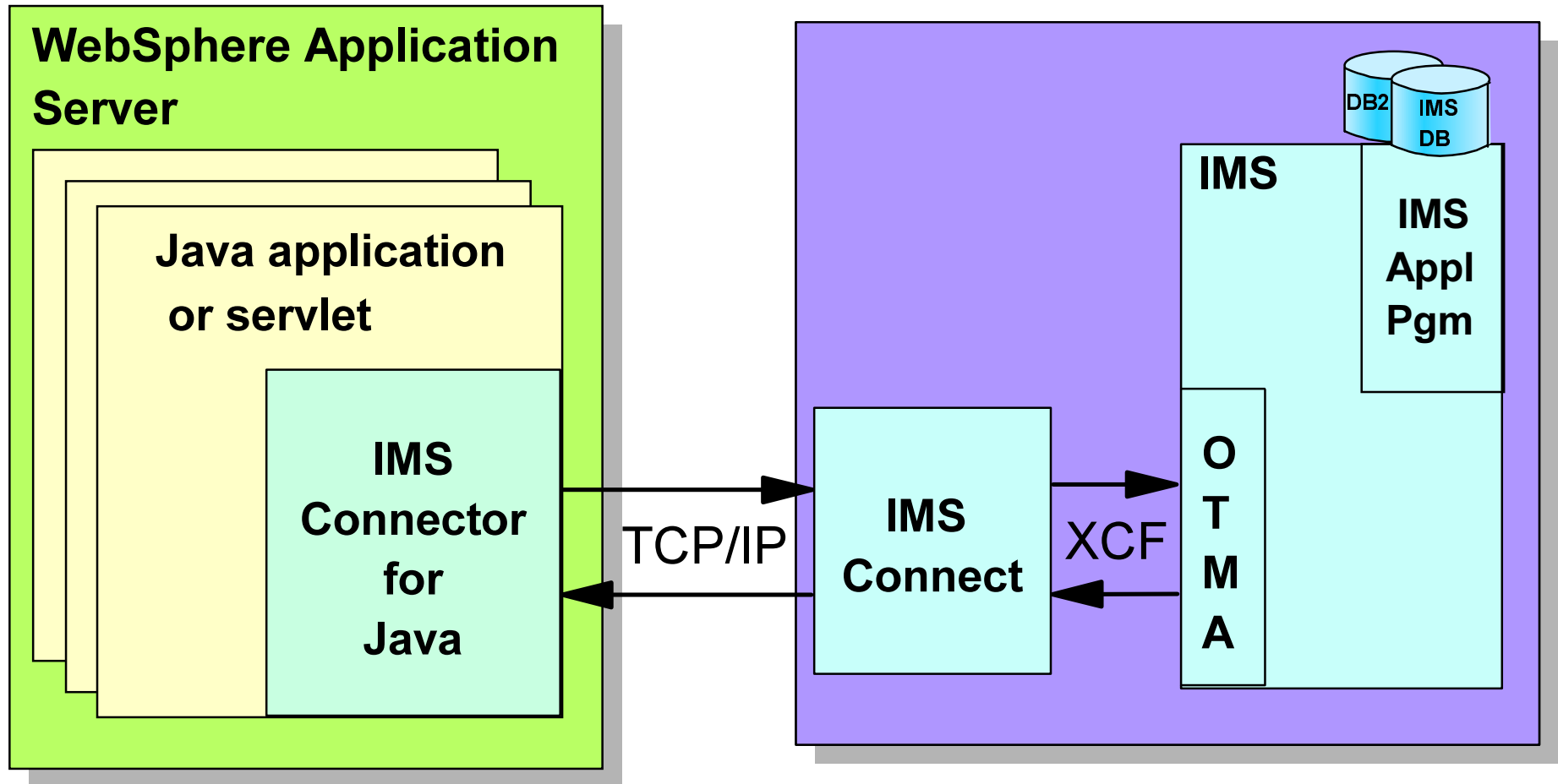
IMS Connector for Java



- One of the IBM e-business Connectors included in VisualAge for Java Enterprise Edition
- Allows Java applications and servlets to submit IMS transactions via IMS Connect
- Implements the Common Connector Framework architecture
- Consists of Java components and class libraries



IMS Connector for Java



Developing with IMS Connector



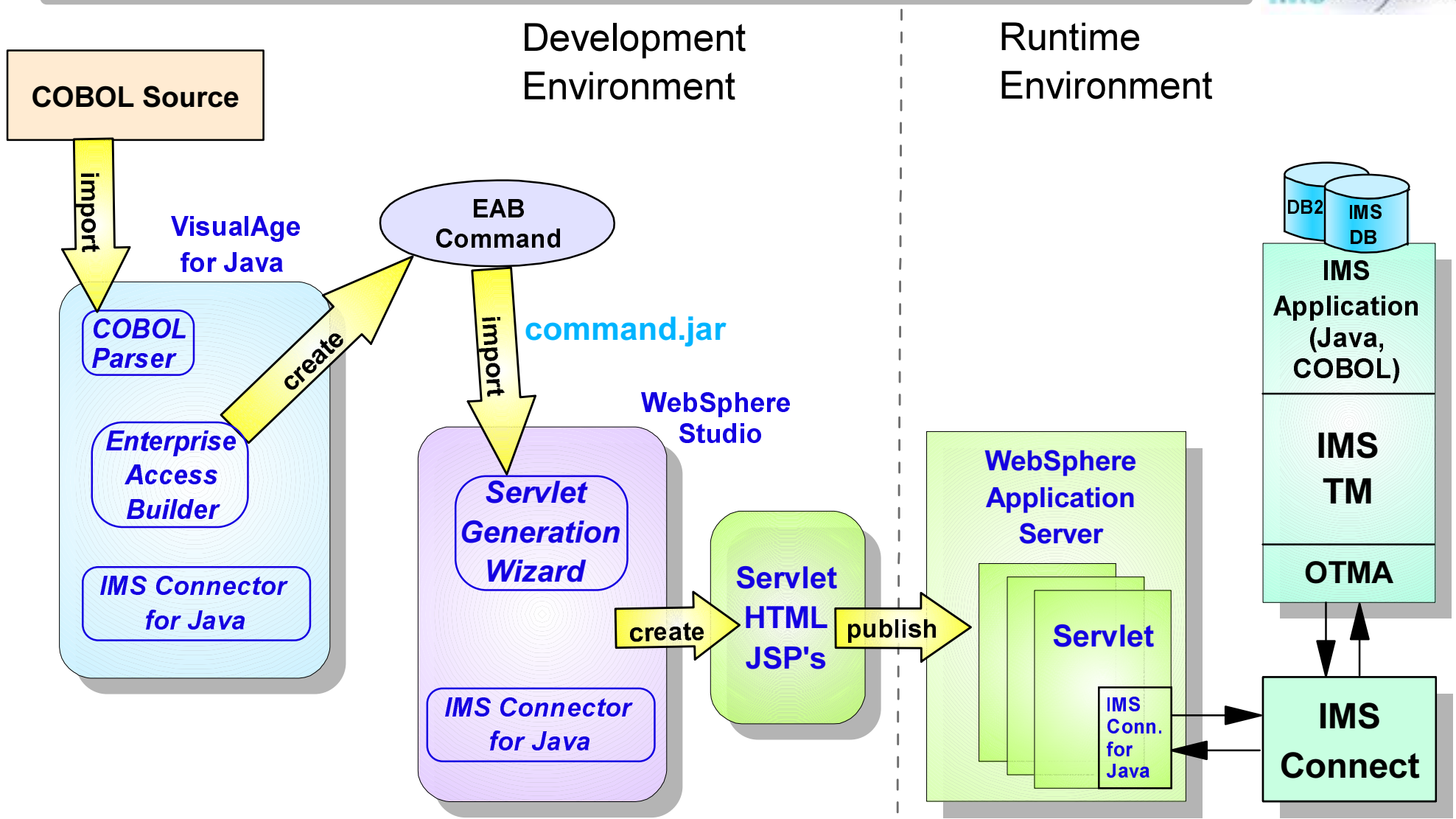
4 Easy Steps

1. Create record beans representing the IMS transaction's input message and its output message(s)
2. Create an EAB command representing the IMS transaction
3. Use the EAB command to create a:
 - Java application
 - Web application using WebSphere Studio
4. Test and Deploy the web application to your WebSphere Application Server environment

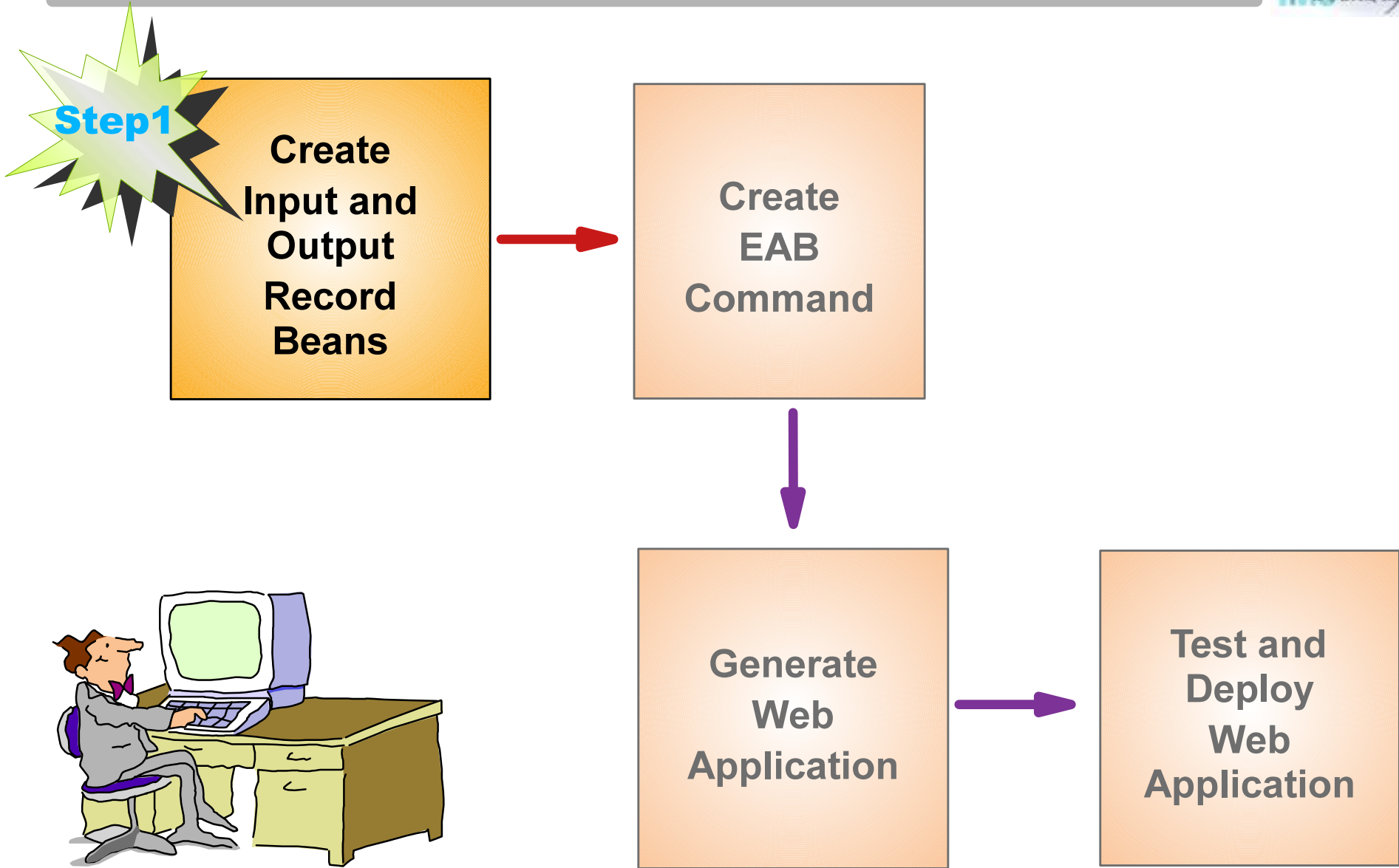




Developing with IMS Connector



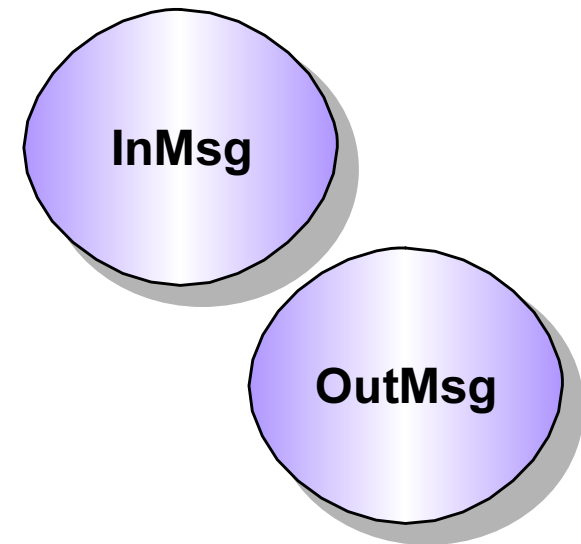
Building a Web Application



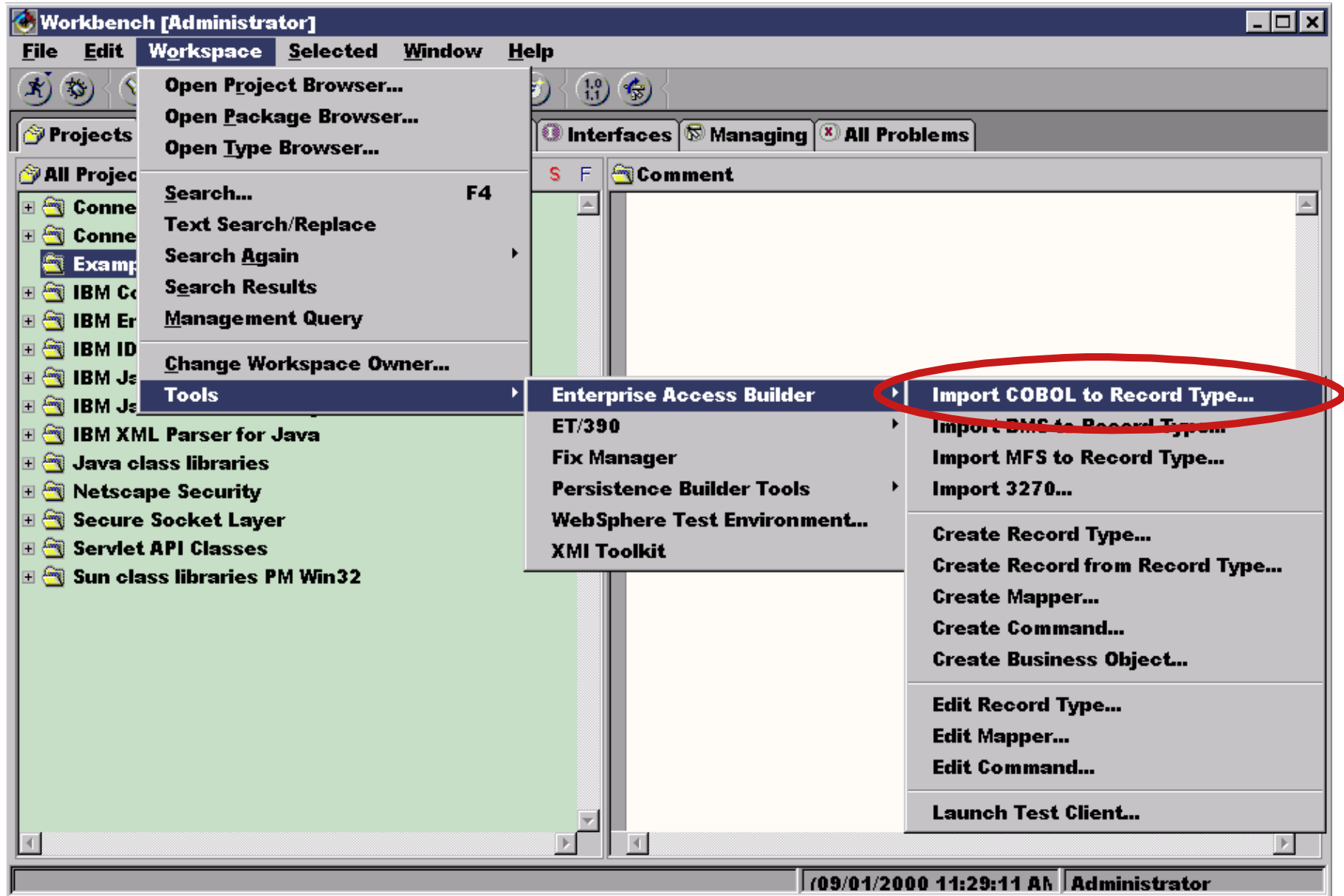
Step 1: Create IMS Transaction Message Beans



- Create Java Record beans representing the IMS transaction's input message and its output message(s)
- Created using VisualAge for Java's Enterprise Access Builder tool
- Create beans from COBOL data structures
 - ▶ Use the data structures (01 commareas) for the I/O PCB input/output area descriptors
- EAB tool uses a two-step process to create beans:
 - ▶ Import COBOL source to generate record type
 - ▶ Create record bean from record type



Create IMS Transaction Message Beans



Create IMS Transaction Message Beans



SmartGuide [X]

Import COBOL to Record Type

Enter the COBOL file containing the commareas to import:

COBOL File:

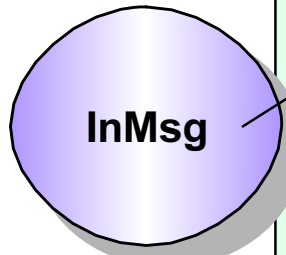
Code to be imported is:

A CICS Transaction

An IMS Application Program

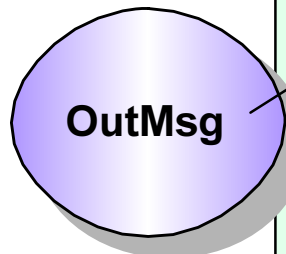
Generic COBOL code

Create IMS Transaction Message Beans



01 INPUT-MSG.

02 IN-LL	PICTURE S9(3) COMP.
02 IN-ZZ	PICTURE S9(3) COMP.
02 IN-TRCD	PICTURE X(10).
02 IN-CMD	PICTURE X(8).
02 IN-NAME1	PICTURE X(10).
02 IN-NAME2	PICTURE X(10).
02 IN-EXTN	PICTURE X(10).
02 IN-ZIP	PICTURE X(7).



01 OUTPUT-MSG.

02 OUT-LL	PICTURE S9(3) COMP VALUE +0.
02 OUT-ZZ	PICTURE S9(3) COMP VALUE +0.
02 OUT-MSG	PICTURE X(40) VALUE SPACES.
02 OUT-CMD	PICTURE X(8) VALUE SPACES.
02 OUT-NAME1	PICTURE X(10) VALUE SPACES.
02 OUT-NAME2	PICTURE X(10) VALUE SPACES.
02 OUT-EXTN	PICTURE X(10) VALUE SPACES.
02 OUT-ZIP	PICTURE X(7) VALUE SPACES.
02 OUT-SEGNO	PICTURE X(4) VALUE SPACES.

Create IMS Transaction Message Beans



SmartGuide [X]

Import COBOL to Record Type

Select commareas to import.

Available level 01 commareas:

- INPUT-MSG
- OUTPUT-MSG

Selected commareas:

Specify non-level 01 commarea:

Use BigDecimal

Add transaction code field

Field Name:

Length:

Value:

< Back Next > Finish Cancel

Create IMS Transaction Message Beans



SmartGuide [X]

Import COBOL to Record Type

Project:

Package:

Class name:

Continue working with newly created record type...

Edit record type

Create record from record type

< Back Next > Finish Cancel

Create IMS Transaction Message Beans



SmartGuide [X]

Create Record from Record Type

Project: Browse...

Package: Browse...

Class name:

Select generation options:

Access Method: Direct Hierarchical

Record Style: Dynamic Records Custom Records

Additional Options: Generate with Notification
 Use Inner Classes
 Shorten Names

< Back Next > Finish Cancel

Create IMS Transaction Message Beans



SmartGuide [X]

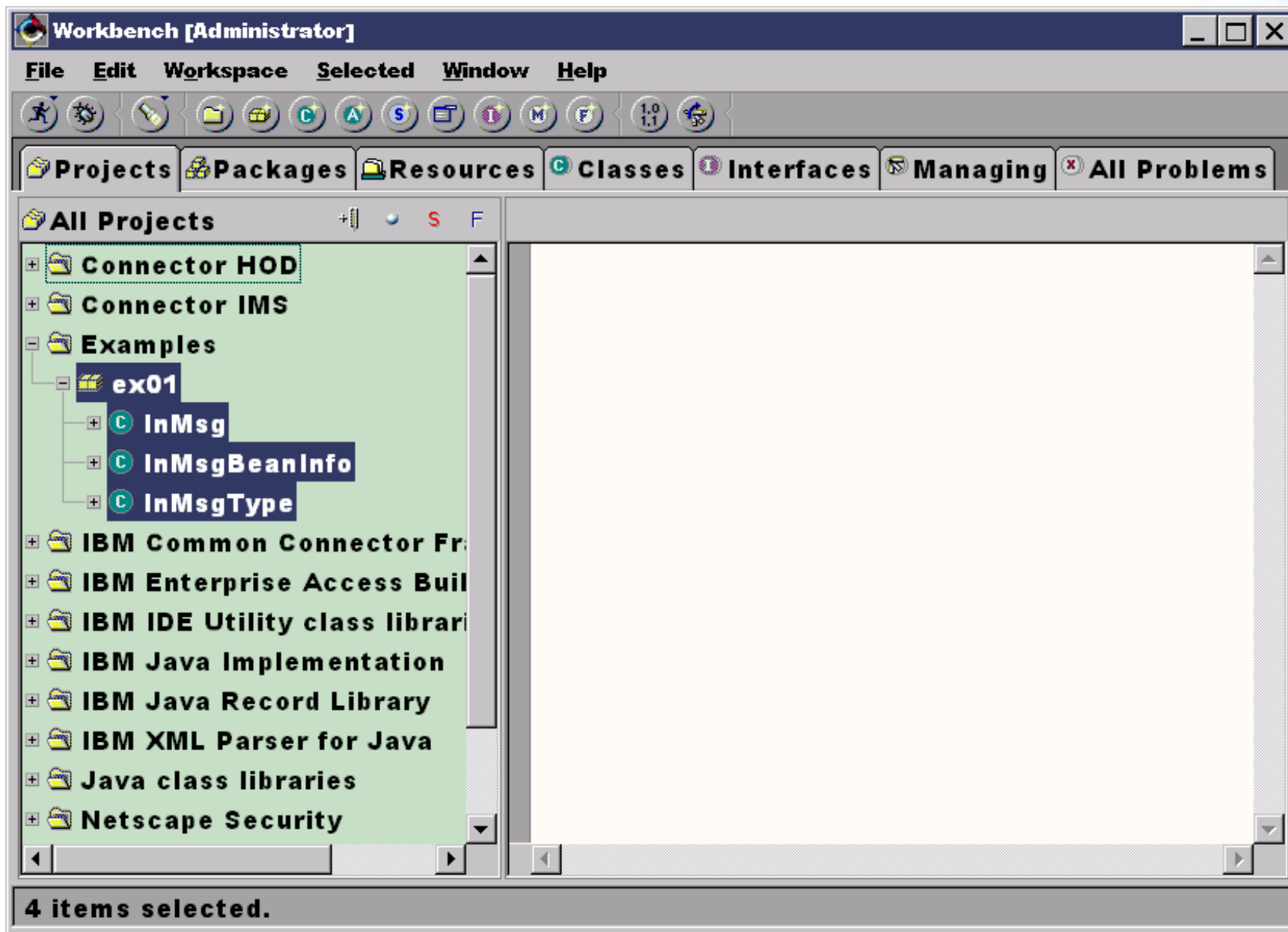
Create Record from Record Type

Change properties of the Record Attributes Bean

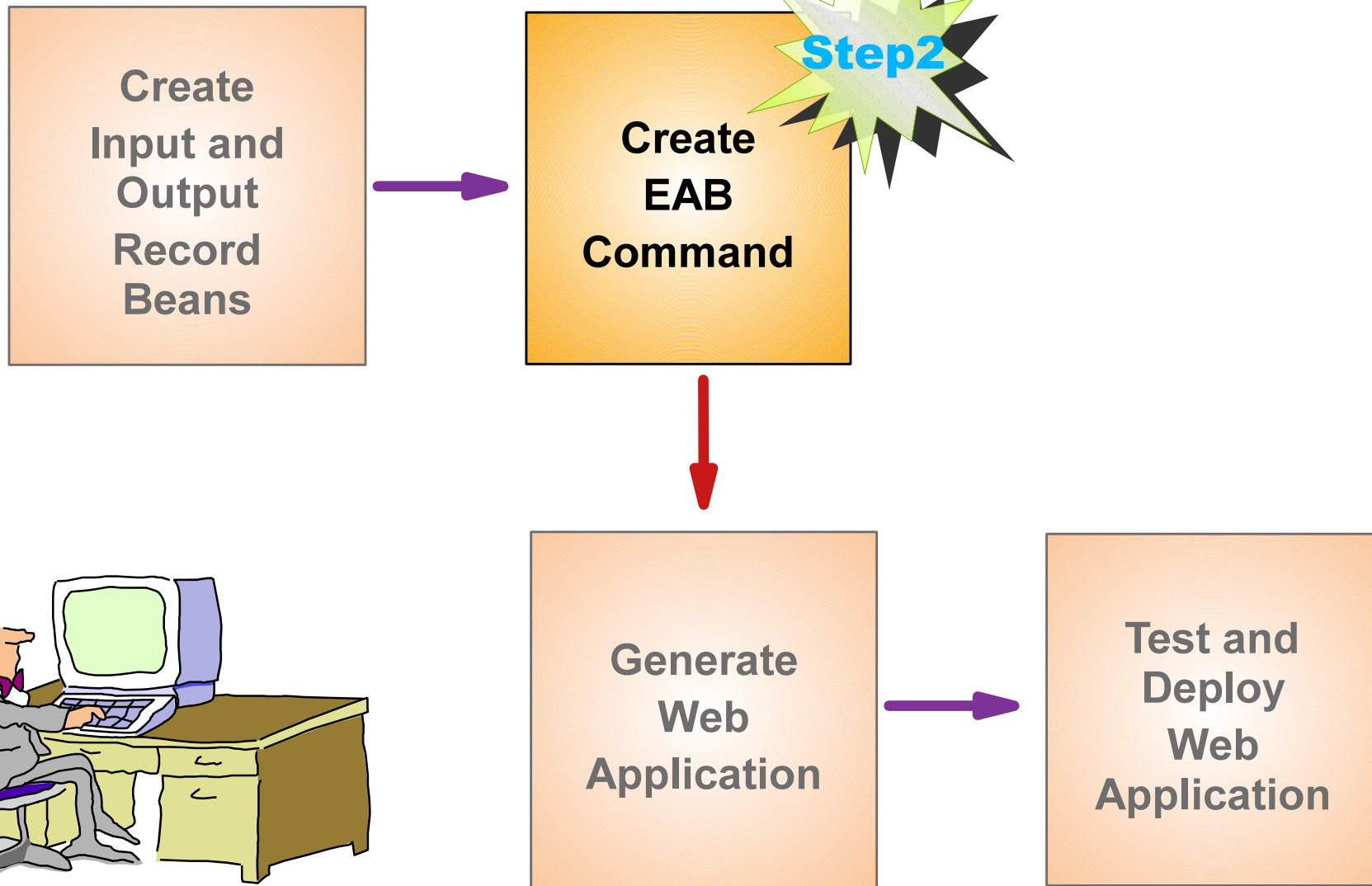
Property	Value
Floating Point Format	IBM
Remote Integer Endian	Big Endian
Endian	Big Endian
Code Page	037
Machine Type	MVS

< Back Next > Finish Cancel

Create IMS Transaction Message Beans



Building a Web Application



Step 2: Create EAB Command



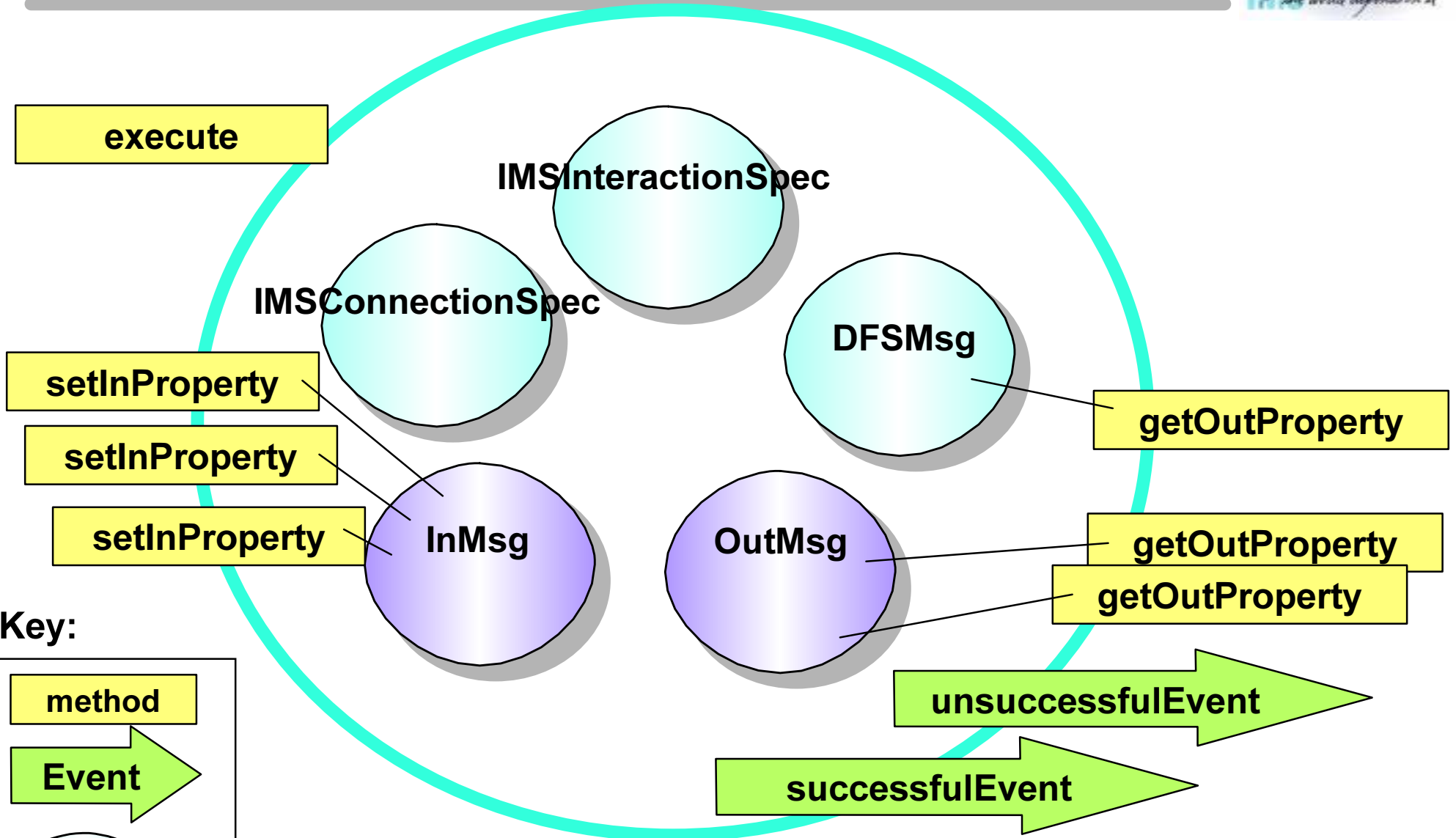
- Create an EAB command representing the IMS transaction using Command Editor
- An EAB command represents an interaction with a back-end system such as IMS
 - ▶ A typical interaction would be to send transaction input data to an IMS application program and receive the transaction output data back from IMS
- An EAB command is a composite Java bean made up of other Java beans

EAB Command



- EAB Command contains:
 - ▶ Connection beans
 - IMSConnectionSpec
 - IMSInteractionSpec
 - ▶ Input record bean
 - A record bean representing IMS transaction input message
 - ▶ Output record bean(s)
 - Record bean(s) representing IMS transaction output message(s)
 - DFMSG

EAB Command



Key:

- method
- Event
- Java bean

IMSConnectionSpec



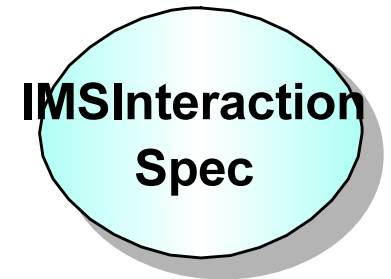
- Defines properties of the connection between the Java application or servlet and IMS Connect
- IMS Connector specific properties are:
 - ▶ TCP/IP host name of machine running IMS Connect
 - ▶ TCP/IP port number of IMS Connect
- Additional IMSConnectionSpec properties are defined by the Common Connector Framework
 - ▶ Connection management properties

IMSConnection
Spec

IMSInteractionSpec



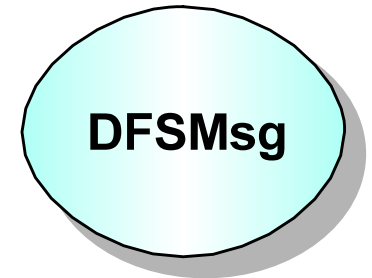
- Defines interaction between Java application or servlet and IMS accessed via IMS Connect and OTMA
- IMS Connector for Java specific properties are:
 - ▶ Type of interaction
 - MODE_SEND_RECEIVE
 - SYNC_LEVEL_CONFIRM
 - ▶ Name of IMS datastore



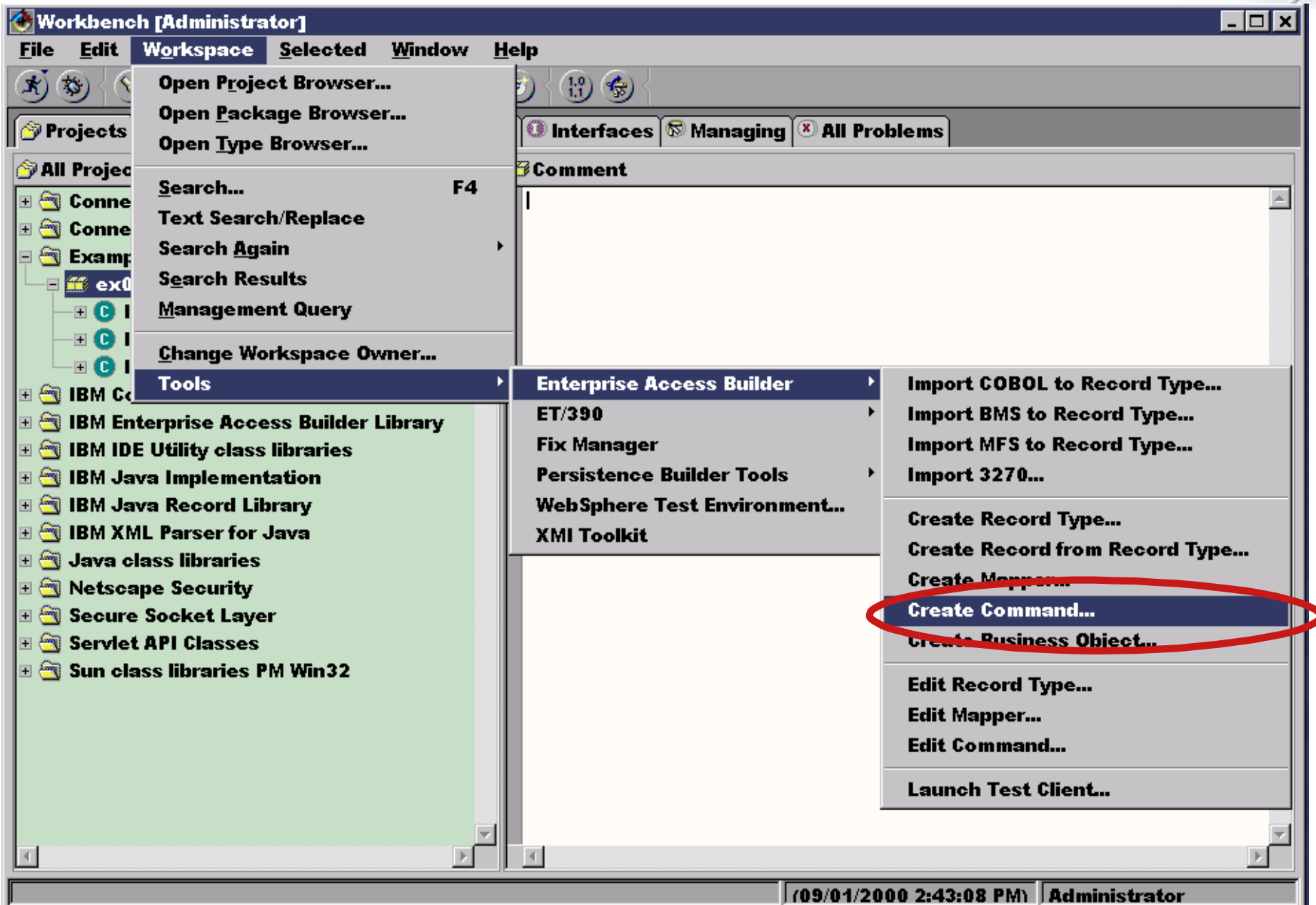
DFSMsg



- Represents IMS "DFS" messages
- "DFS" messages are always a possibility instead of transaction output
- At runtime, the Enterprise Access Builder populates either the EAB command's DFSMsg bean or (one of) the transaction output bean(s)



Create EAB Command



Create EAB Command



SmartGuide [X]

Create Command

Project: Browse...

Package: Browse...

Class name:

Edit when finished

ConnectionSpec:

Class name: Browse...
Edit...

InteractionSpec:

Class name: Browse...
Edit...

com.ibm.connector.imstoc.IMSInteractionSpec

< Back Next > Finish Cancel

IMSConnection
Spec

IMSInteraction
Spec

Create EAB Command



InMsg

SmartGuide [X]

Add Input/Output Beans

Input record bean:

Implements IByteBuffer

Class name: Browse...

Mapper class: Browse...

Output record beans:

Use input bean type as output bean type

Select output record beans:

Output record beans:

Output	Mapper
OutMsg	
DFSMsg	

Add...
Modify...
Delete

< Back Next > Finish Cancel

OutMsg

DFSMsg

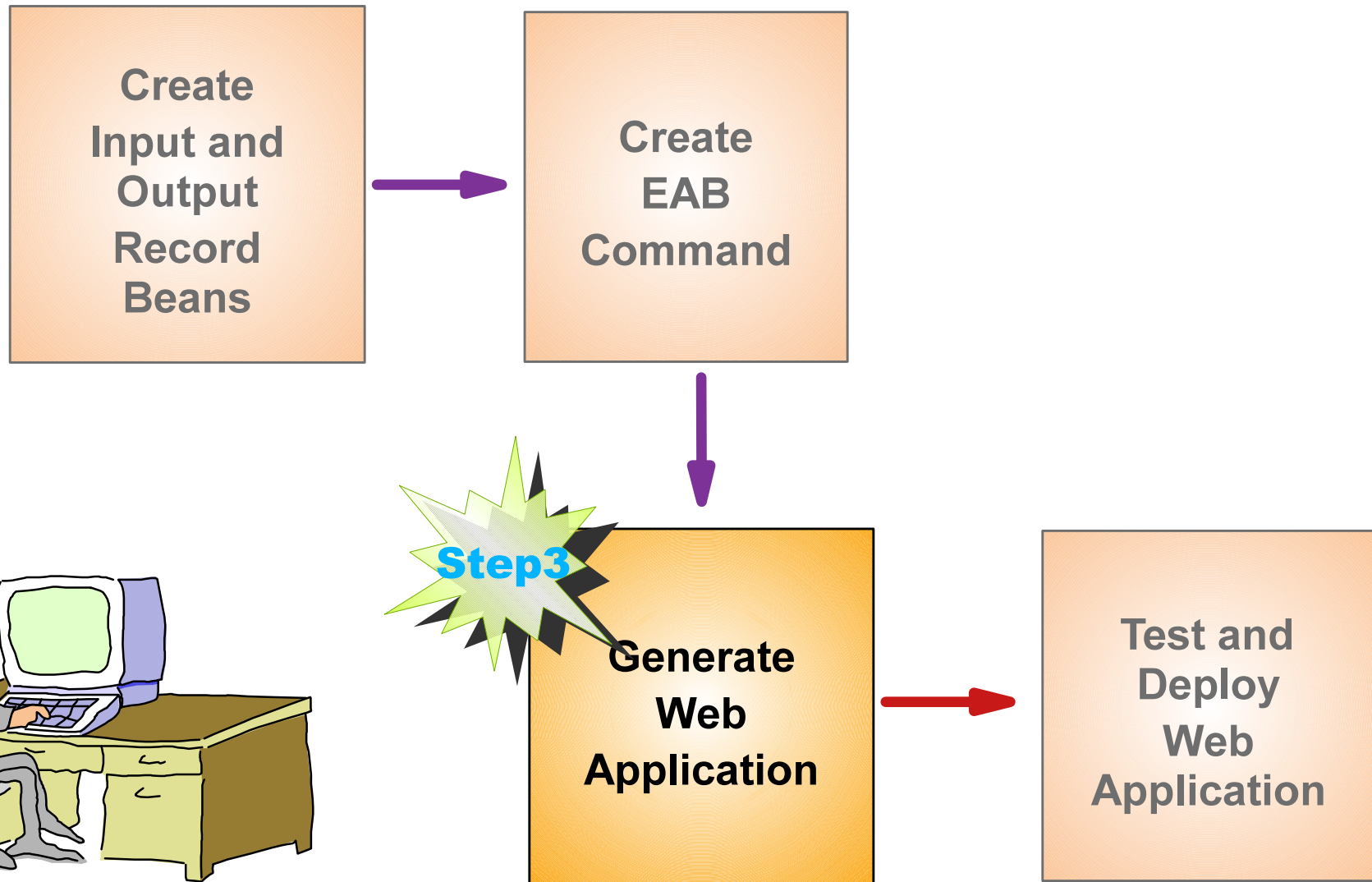
Create EAB Command



The screenshot shows the 'Command Editor' window. On the left, a tree view shows the project structure: 'ex01.Ex01 Command' containing 'Connector', 'Input', and 'Output' folders. The main area on the right shows 'ex01.InMsg'. Below this is a table with two columns: 'Property' and 'Value'. The 'Property' column lists several properties: 'IN_NAME1', 'IN_CMD', 'IN_EXTN', 'IN_TRCD', 'IN_LL', 'IN_ZIP', 'IN_ZZ', and 'IN_NAME2'. A context menu is open over 'IN_NAME1', with 'Promote Property' highlighted by a red circle. Other menu items include 'Depromote Property', 'Change Promote Name', 'Reset Property', 'New Item', 'Remove Item', 'Show All Properties', and 'Show Expert Properties'. The 'Value' column shows '0' for 'IN_LL' and 'IN_ZZ'.

Property	Value
IN_NAME1	
IN_CMD	
IN_EXTN	
IN_TRCD	
IN_LL	0
IN_ZIP	
IN_ZZ	0
IN_NAME2	

Building a Web Application

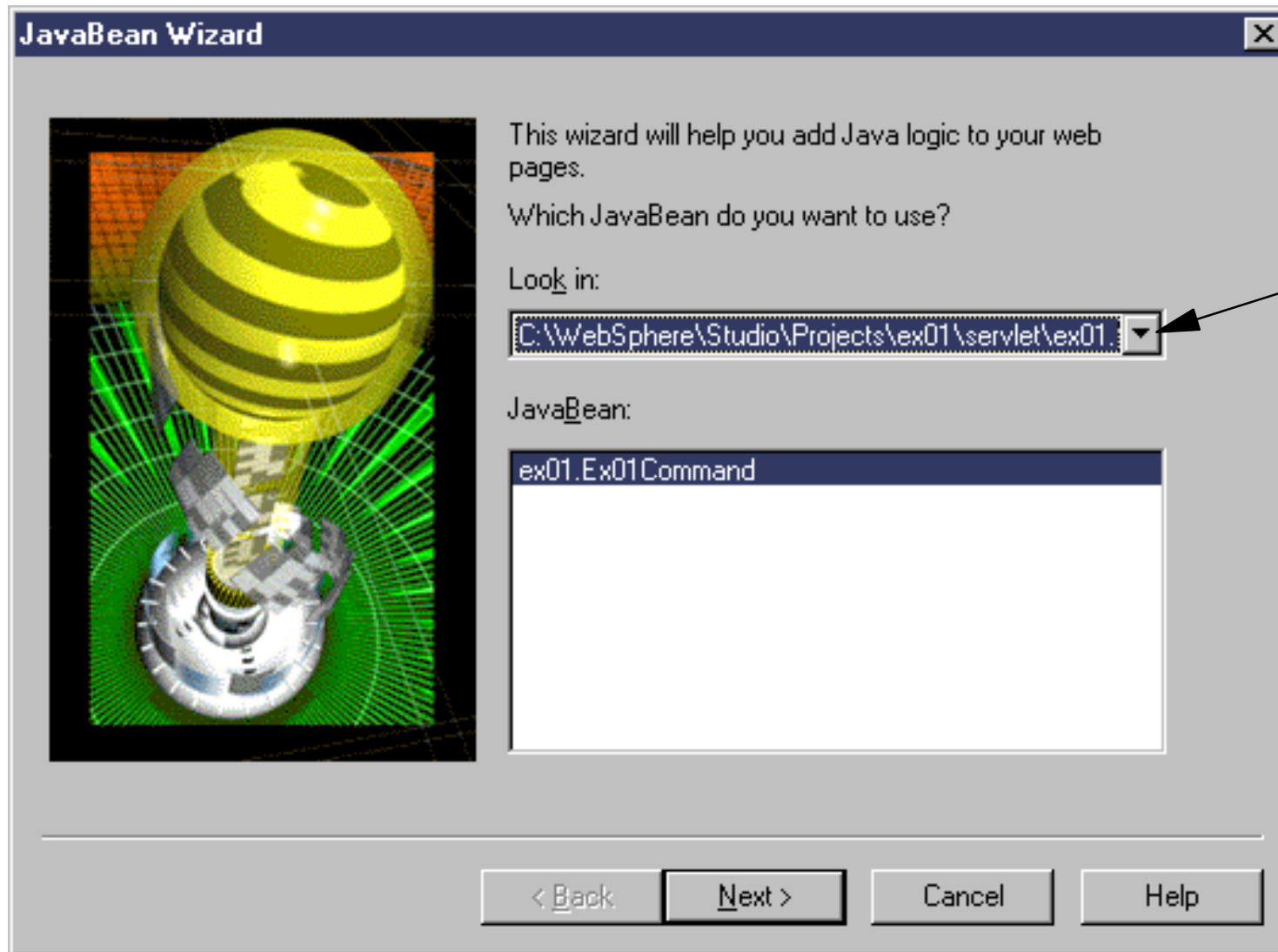


Step 3: Generate Web Application



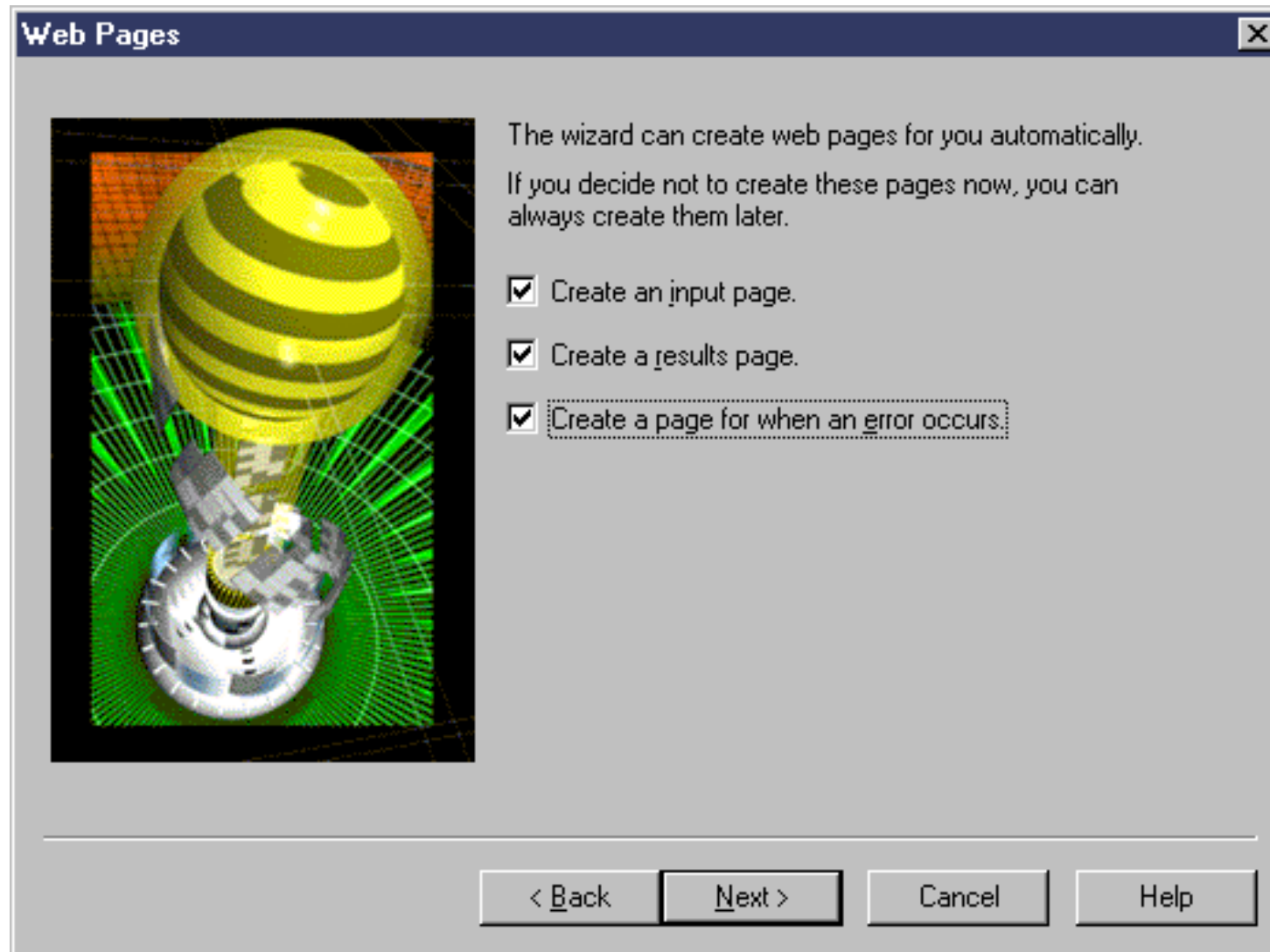
- Use the EAB command to generate the Web application using WebSphere Studio's Javabeen Wizard
- Generated Web application files:
 - ▶ Input HTML page (.html) for input of IMS transaction data
 - ▶ Output JavaServer page (.jsp) for dynamic output of IMS transaction data
 - ▶ Output JavaServer page (.jsp) for dynamic output of error data
 - ▶ Java source (.java) for the servlet
 - ▶ Servlet configuration file (.servlet)
 - ▶ Style sheet (Master.css)

Generate Web Application



**EAB
Command**

Generate Web Application



Generate Web Application



Select the promoted input properties of the EAB command to be displayed on the input HTML page

Input Page [X]

Check the fields you want to display on your input page. You can also change the settings for each field and reorder the fields.

Name	Type	Caption	Size	Maximum ...	
<input checked="" type="checkbox"/> IN_CMD	java.lang.String	IN_CMD	20	20	
<input checked="" type="checkbox"/> IN_EXTN	java.lang.String	IN_EXTN	20	20	
<input type="checkbox"/> IN_LL	short	IN_LL	20	20	
<input checked="" type="checkbox"/> IN_NAME1	java.lang.String	IN_NAM...	20	20	
<input checked="" type="checkbox"/> IN_NAME2	java.lang.String	IN_NAM...	20	20	
<input type="checkbox"/> IN_TRCD	java.lang.String	IN_TRCD	20	20	
<input checked="" type="checkbox"/> IN_ZIP	java.lang.String	IN_ZIP	20	20	
<input type="checkbox"/> IN_ZZ	short	IN_ZZ	20	20	
<input type="checkbox"/> inputSetAtRuntime	boolean	inputSetAt...	20	20	
<input type="checkbox"/> OUT_CMD	java.lang.String	OUT C...	20	20	

Change... Check All Uncheck All

< Back Next > Cancel Help

Generate Web Application



Select the promoted output properties of the EAB command to be displayed on the output JSP page

Results Page

Check the fields you want to display on your results page. You can also change the settings for each field and reorder the fields.

Name	Type	Caption	Signature
<input type="checkbox"/> class	java.lang.Class	class	
<input type="checkbox"/> communication	com.ibm.connector.C...	communicati...	
<input type="checkbox"/> connectionSpec	com.ibm.connector.C...	connectionS...	
<input type="checkbox"/> dataStoreName	java.lang.String	dataStoreNa...	
<input type="checkbox"/> DFSDATA1	java.lang.String	DFSDATA1	
<input type="checkbox"/> disconnectCommunication	boolean	disconnectC...	
<input type="checkbox"/> expectedTriggerClass	java.lang.Class	expectedTri...	
<input type="checkbox"/> hostName	java.lang.String	hostName	
<input type="checkbox"/> IN_CMD	java.lang.String	IN_CMD	
<input type="checkbox"/> IN_EXTN	java.lang.String	IN_EXTN	
<input type="checkbox"/> IN_LL	short	IN_LL	

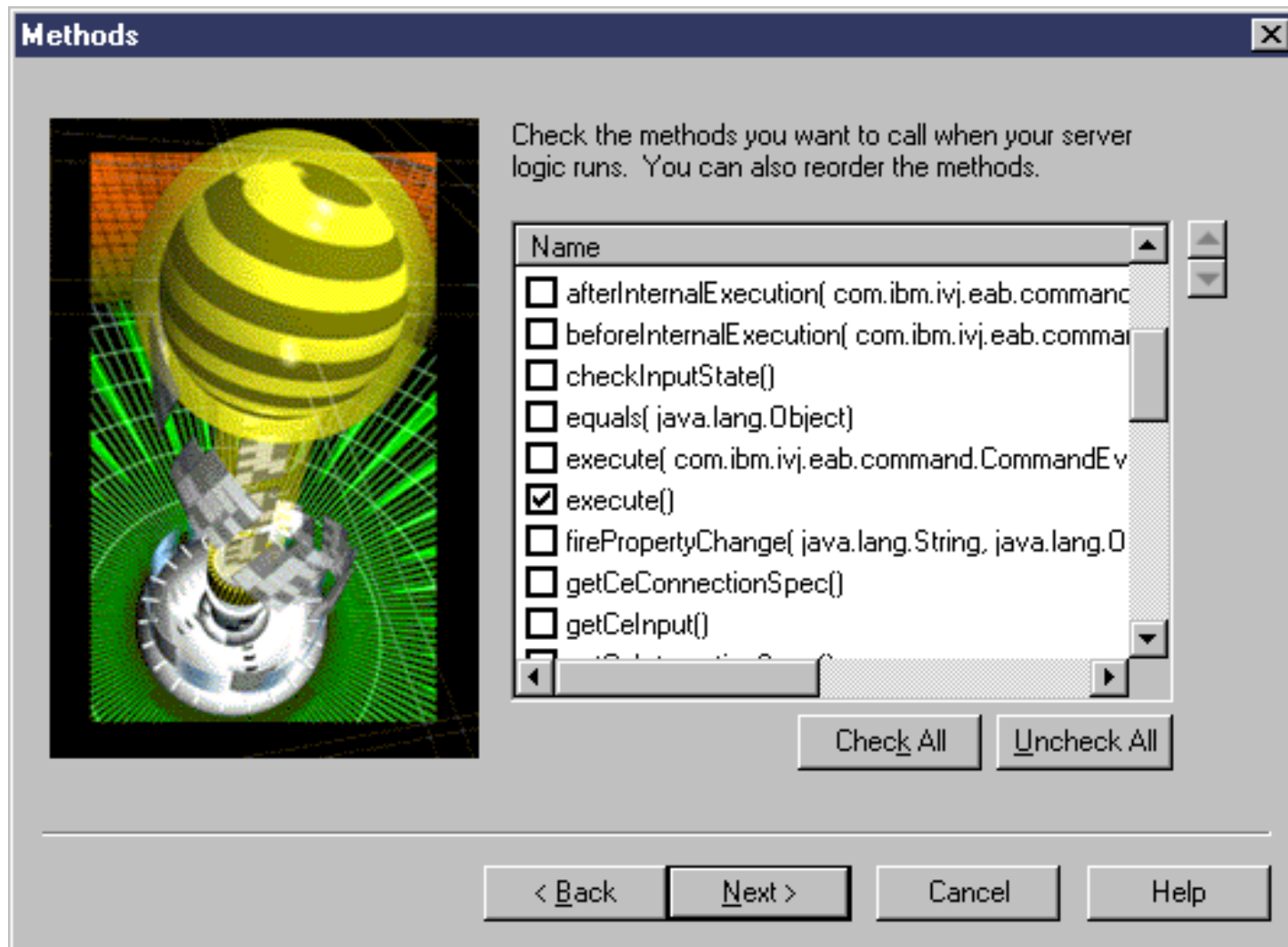
Change... Check All Uncheck All

How would you like to format the data? Table List

Limit number of records on a page to

< Back Next > Cancel Help

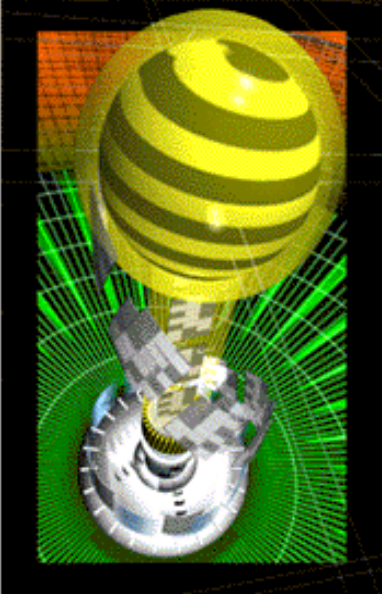
Generate Web Application



Generate Web Application



Finish [X]



That's it. When you click finish, the following files will be created for you.

Description	File Names
Input Page	Ex01ServletHTMLInput.h...
Results Page	Ex01ServletHTMLResult...
Standard Error Page	Ex01ServletHTMLError.j...
Servlet Source	Ex01Servlet.java
Servlet Configuration	Ex01Servlet.servlet

Rename...

< Back **Finish** Cancel Help

Generate Web Application

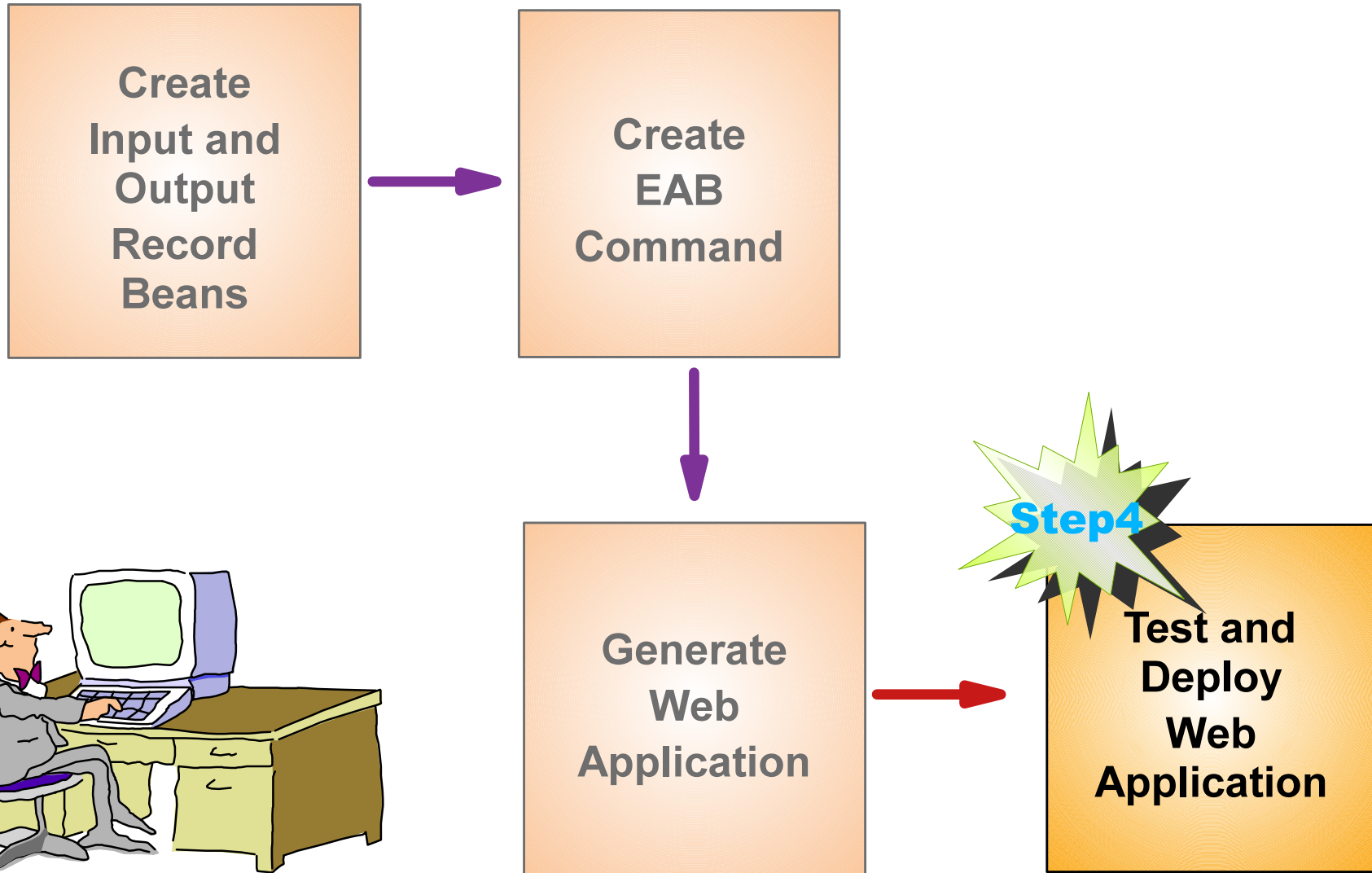


The screenshot displays the WebSphere Studio interface for a project named 'ex01.wao'. The main workspace is divided into three panels:

- Project Explorer (Left):** Shows the project structure. Under 'resources', there is a 'servlet' folder containing an 'ex01' sub-folder with files: 'Ex01Servlet.java', 'Ex01Servlet.class', 'Ex01Servlet.servlet', and 'Ex01Servlet.jar'. Below this is a 'theme' folder containing 'Ex01ServletHTMLResults.jsp', 'Ex01ServletHTMLError.jsp', and 'Ex01ServletHTMLInput.html'.
- Publishing (Top Right):** Shows the deployment structure. It starts with 'localhost', followed by 'resources', 'rules', and 'servlet'. Under 'servlet', there is an 'ex01' folder containing 'Ex01Servlet.class', 'Ex01Servlet.servlet', and 'Ex01Servlet.jar'. Below that is a 'theme' folder containing 'Ex01ServletHTMLError.jsp', 'Ex01ServletHTMLInput.html', and 'Ex01ServletHTMLResults.jsp'.
- Relations (Bottom Right):** Shows a diagram of relationships. A yellow folder icon labeled 'Ex01ServletHTMLInput...' is connected by a line to a junction point. From this junction, two arrows point to 'Maste' and 'Ex01S'.

The status bar at the bottom right indicates 'Stage: Test'.

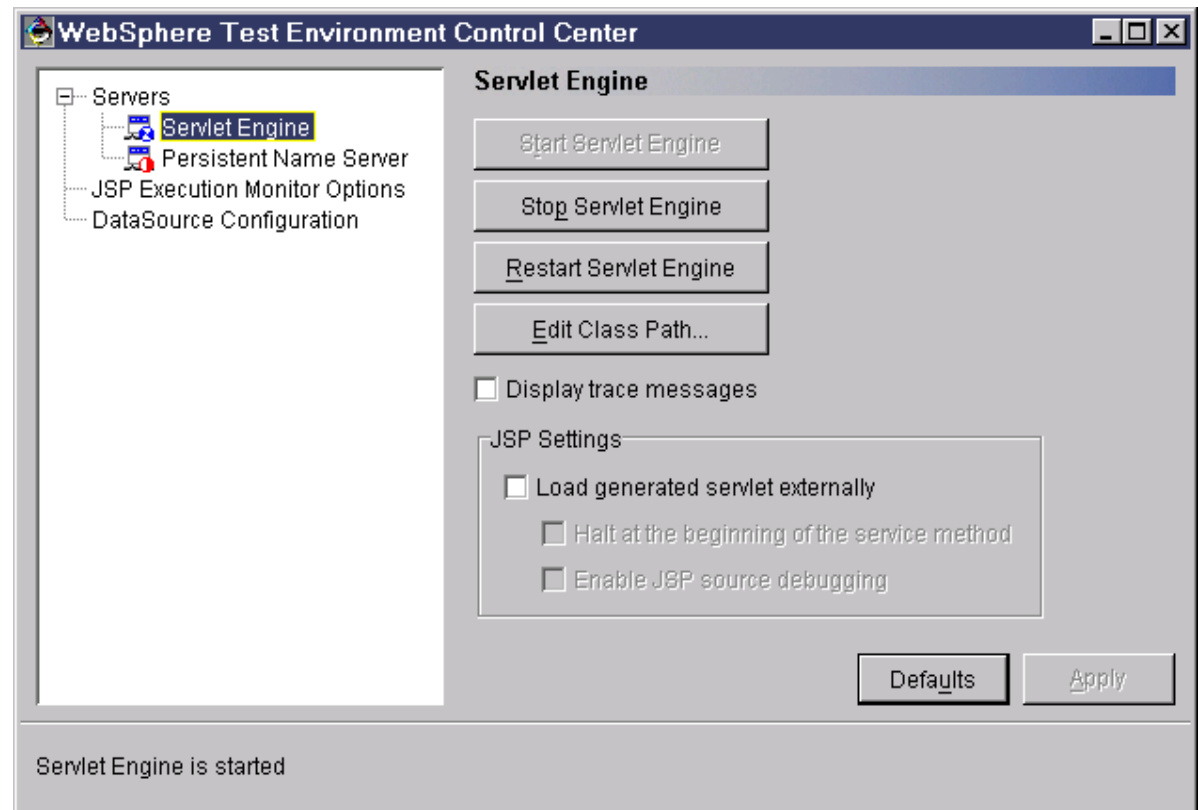
Building a Web Application



Step 4: Test and Deploy Web Application



- Test the web application using VisualAge for Java's WebSphere Test Environment
- Enable easy testing and debugging as the web application executes



Test Web Application



Test/debug
servlets as
they execute

The screenshot shows the IBM Debugger [Administrator] window. The title bar reads "Debugger [Administrator]". The menu bar includes "File", "Edit", "Workspace", "Selected", "Inspector", "Window", and "Help". The toolbar contains various icons for debugging, including a play button, a stop button, and a search icon. Below the toolbar are three tabs: "Debug", "Breakpoints", and "Exceptions".

The main window is divided into two main sections. The top section is titled "All Programs/Threads" and contains a tree view of the execution stack. The selected thread is "Thread[Server Thread,5,WAS_HTTP_TRANSPORT-] (Alive)". The stack includes the following methods:

- IMSCConnIVPServlet.performTask(HttpServletRequest)
- IMSCConnIVPServlet(AbstractStudioServlet).doPost(HttpServletRequest)
- IMSCConnIVPServlet(HttpServlet).service(HttpServletRequest)

To the right of the stack is a "Variable" table with the following entries:

Variable	Value
this	
request	
response	
isRuntime	

The bottom section is titled "Source" and displays the following code:

```
try
{
    // instantiate the beans and store them so they can be accessed by the called
    com.ibm.connector.ims.sample.ivp.IMSCConnIVPCommand IMSCConnIVPCommand = null;
    IMSCConnIVPCommand = (com.ibm.connector.ims.sample.ivp.IMSCConnIVPCommand) java.
    setRequestAttribute("IMSCConnIVPCommand", IMSCConnIVPCommand, request);
    com.ibm.connector.imstoc.IMSLogonInfoItems logon = new c
```

The status bar at the bottom of the window shows the current file path: "com.ibm.connector.ims.sample.ivp.was35.servlet.", the date and time: "(07/14/2000 2:51", and the user: "Administrator".

Test Web Application



Test/debug
JSP as they
execute

JSP Execution Monitor

File Action View Problems

JSP Source

JSP File List

C:/Program Files/IBM/VisualAge for Java/ide/project_resources/IBM WebSphere Test Environment/hosts/default_host/default_app

JSP Source

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<!-- This file was generated by IBM WebSphere Studio 3.0.0 using d:\WebSphere\Studio\BIN
<HEAD>
<META HTTP-EQUIV="Content-Type" content="text/html" charset="UTF-8">
<LINK href="/theme/Master.css" rel="stylesheet" type="text/css">
</HEAD>
<BODY>
```

Java Source

```
// begin [file=C:/Program Files/IBM/VisualAge for Java/ide/project_resources/IBM WebSphere Test Environment/hosts/default_host/default_app
out.print(new String(_jspx_html_data[0]));
// end
// begin [file=C:/Program Files/IBM/VisualAge for Java/ide/project_resources/IBM WebSphere Test Environment/hosts/default_host/default_app
out.print(new String(_jspx_html_data[1]));
// end
// begin [file=C:/Program Files/IBM/VisualAge for Java/ide/project_resources/IBM WebSphere Test Environment/hosts/default_host/default_app
out.print(new String(_jspx_html_data[8]));
// end
// begin [file=C:/Program Files/IBM/VisualAge for Java/ide/project_resources/IBM WebSphere Test Environment/hosts/default_host/default_app
out.print(new String(_jspx_html_data[9]));
// end
```

Generated HTML Source

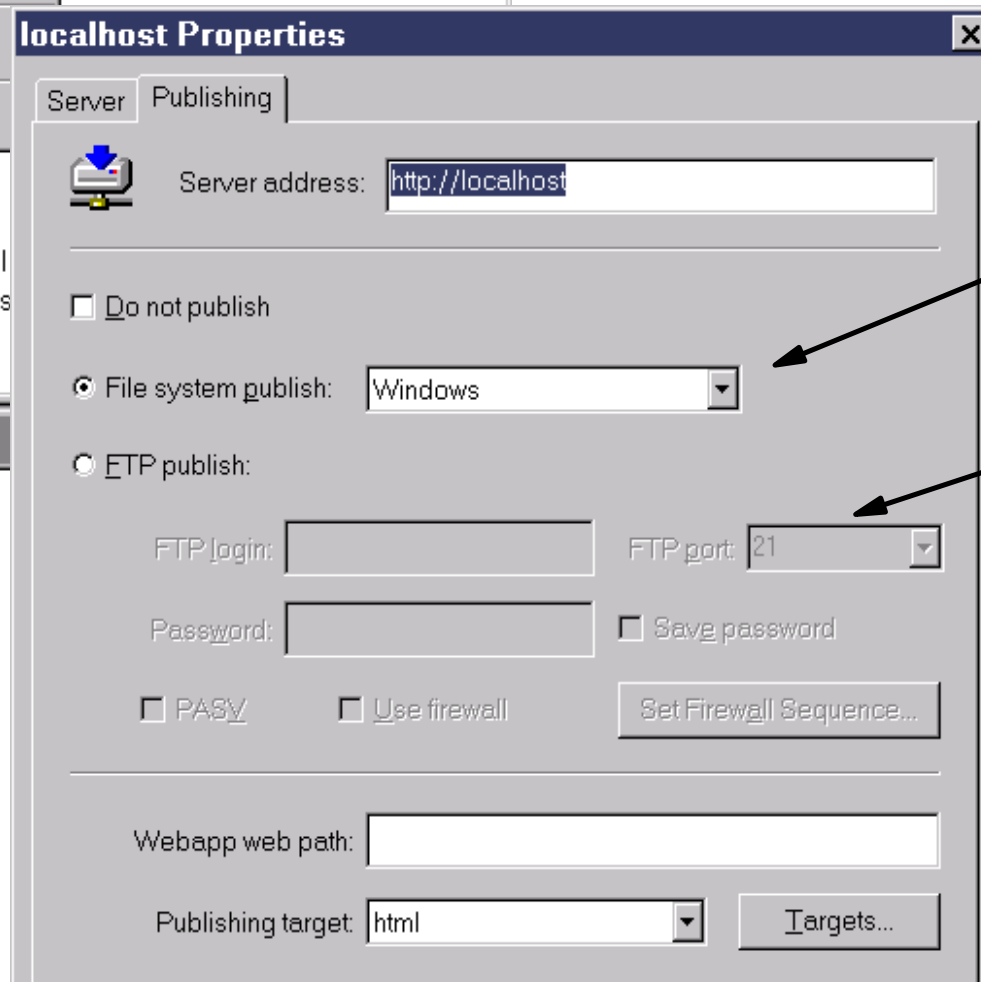
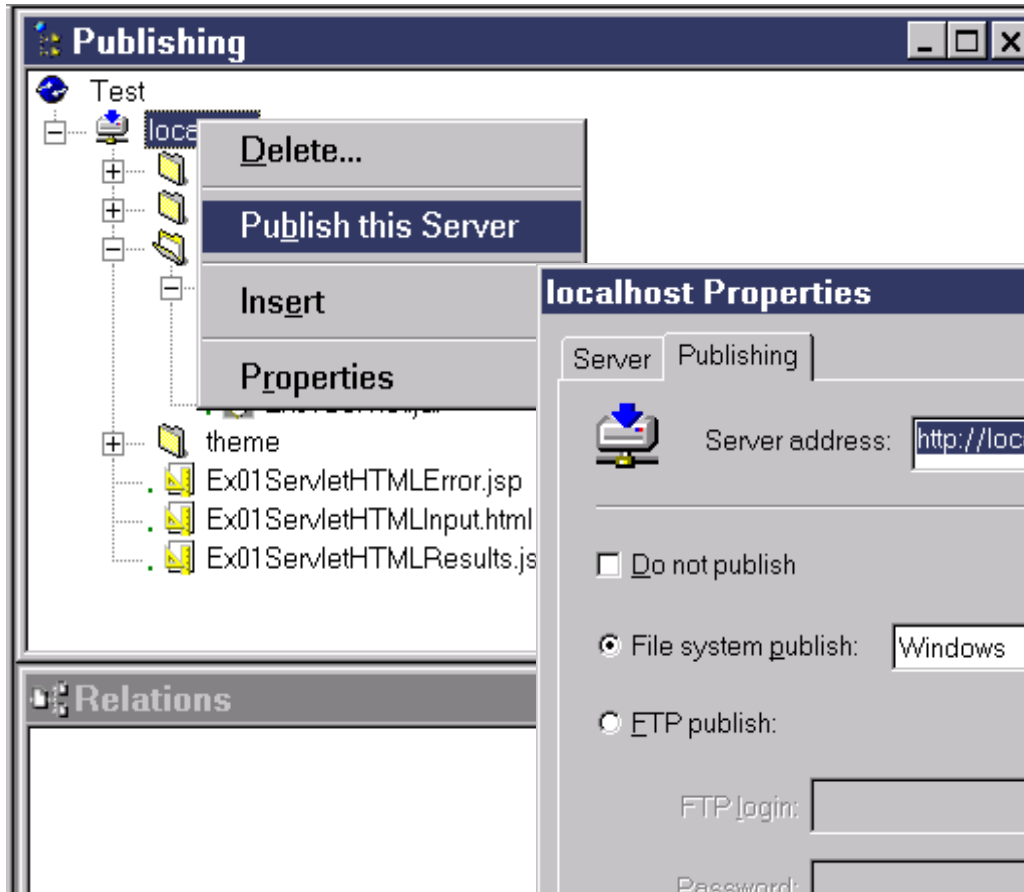
```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<!-- This file was generated by IBM WebSphere Studio 3.0.0 using d:\WebSphere\Studio\BIN
<HEAD>
```


Deploy Web Application



- Deploy the web application
 - ▶ Use WebSphere Studio's Publish facility to move web application files to WebSphere Application Server environment
- Invoke input HTML page from Web browser to run IMS transaction, for example:
 - ▶ `http://<servername>/yourServletInput.html`

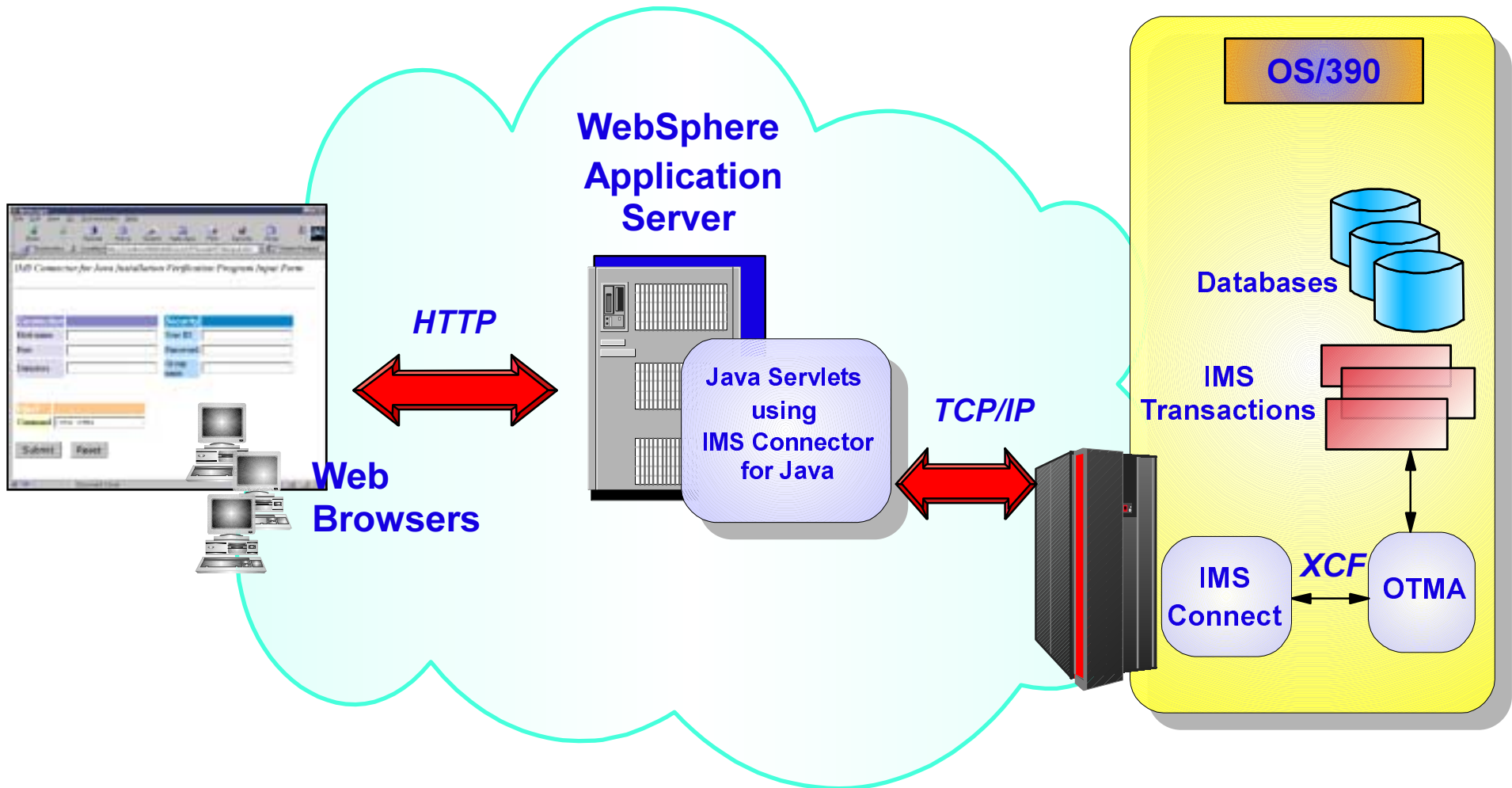
Deploy Web Application



File Copy

FTP

Running Web Application



IMS Connector Documentation



- **Online Help**
 - ▶ Under **Help->Task->Accessing the Enterprise**
 - **User's Guide**
 - ->Accessing transactions with the IMS Connector
 - **Diagnosis Guide**
 - ->Building IMS Applications
- **Softcopy books**
 - ▶ **User's Guide and Reference PDF is accessible in VisualAge for Java Help:**
 - **Help->PDF Index->PDF Documents->IMS Connector for Java**
- **Javadoc for IMS Connector for Java classes**
 - ▶ **Help->Reference->IBM APIs->Connectors-> IMS Connector->Package com.ibm.connector.imstoc**

Related Web Sites



e-business powered by IMS

- **IMS, IMS Connect, IMS Connector for Java**
 - <http://www.ibm.com/ims>
- **VisualAge for Java**
 - <http://www.ibm.com/software/vajava>
- **WebSphere Application Server**
 - <http://www.ibm.com/software/webservers>
- **WebSphere Studio**
 - <http://www.ibm.com/software/webservers/studio>