WebSphere®

IBM

Clips and Tacks: Getting started with the IBM BPM suite of products

Contents

Chapter 1. Introduction

This end-to-end tutorial introduces you to IBM® business process management (BPM) functionality by showing you how to build and deploy a business process using IBM® WebSphere® Business Process Management Version 6.2. No prior knowledge of the BPM products is required to complete the steps in this tutorial.

Printable version of this tutorial

This tutorial focuses on the technical details that are related to building, running, and monitoring the sample application. One Lotus® form is used throughout the process to convey information from one user to the next. You will use WebSphere® Business Modeler to model the sample and WebSphere Integration Developer to complete the development. You will use WebSphere Business Services Fabric to select the best shipping service endpoint based on policies, WebSphere Process Server and WebSphere Business Monitor Server to run the completed sample and WebSphere Business Monitor to monitor the business process and view business performance using a dashboard. The dashboard is created in Business Space powered by WebSphere, which provides an integrated visual environment.

In addition to this introduction, the tutorial has four major sections:

Overview
: Explains the scenario used in this tutorial, the data model, and the human tasks that are involved.

Build it yourself
: Contains step-by-step instructions to build the sample from scratch.

Run the sample
: Explains how to run the sample using either the artifacts that you download or the artifacts that you created in the Build It Yourself section.

Download and import the sample
: Explains how to install the downloaded pre-built solutions for this sample

Time required

This tutorial could take approximately four to five days to complete, depending on your familiarity with the products.

Skill level

This tutorial-style sample is designed for new users. Step-by-step instructions are provided to guide you through the process development life cycle, from the beginning to setting up a test runtime server, to designing and developing a process, to finally monitoring the process. You are expected to have some familiarity with the eclipse environment.

System requirements

The sample that is included with this tutorial runs on Microsoft® Windows® operating systems.

Prerequisite software

Before you build the sample, you must install the following products. For the tutorial steps, it is assumed that the products are installed according to the instructions provided in the *Installation Details* section.

Any deviation from the specific versions or instructions may result in differences from the tutorial steps or screenshots. You are advised to follow the installation instructions exactly.

- WebSphere Business Modeler Advanced V6.2.0.1
- WebSphere Integration Developer V6.2.0.1
- WebSphere Business Monitor development toolkit V6.2.0.1
- WebSphere Business Services Fabric tool pack V6.2.0.1
- Lotus® Forms Designer V3.5
- Lotus Forms Viewer V3.5 Fix pack 1
- Lotus Forms Server V3.5

Note: Lotus® Forms Designer and Lotus Forms Viewer are included with WebSphere Business Modeler and WebSphere Integration Developer. Lotus Forms Server is included with WebSphere Integration Developer.

For more information about the products that are involved in this tutorial, refer to the product documentation.

Installation Details

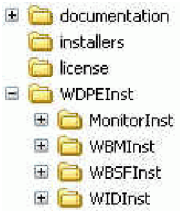
1. Install the WebSphere V6.2 products

   There are two options for installing the required WebSphere products, choose the appropriate option for your environment.

   a. WebSphere Dynamic Process Edition (WDPE) Installation

      Use this option if the machine you are installing on does not have any other products installed with IBM Installation Manager. Check in your Start > Programs menu for IBM Installation Manager. If you see this entry, skip this step and continue at step 1b: Individual Product Installation

      1) Extract the files of the WDPE V6.2 installer. This will create the following directory structure:



      2) Download the files for each product and extract them into the appropriate subdirectory in WDPEInst

      3) Run installers/install_wdpe_win.exe and follow the instructions in the installer

      Continue at Step 2: Update the WebSphere Products to V6.2.0.1

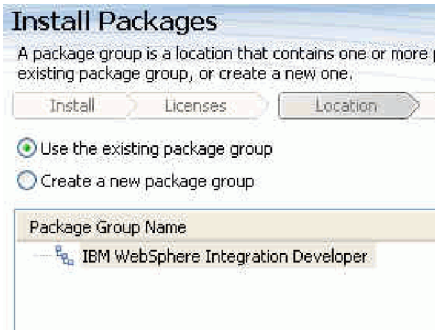
   b. Individual Product Installation

      Run this installation procedure only if you did not install the WebSphere Dynamic Process Edition in step 1a.

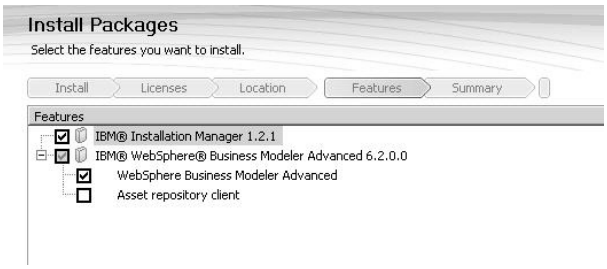
      1) Install WebSphere Integration Developer with the following features:
         - Integrated development workbench (selected by default)
         - The test environment without a profile. Be sure to uncheck the profile

Note: IBM Installation Manager will install or upgrade with the first product that is installed from the IBM WebSphere Dynamic Process Edition suite. In this sample, the IBM Installation Manager will be installed when WebSphere Integration Developer is installed.

2) Install WebSphere Business Modeler Advanced V6.2
   a) Install into the WebSphere Integration Developer package group

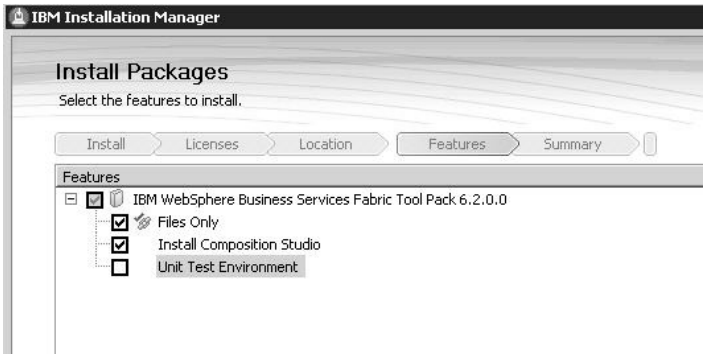


   b) Use default installation features:



3) Install WebSphere Business Monitor Toolkit
   a) Install into the WebSphere Integration Developer package group as you did for WebSphere Business Modeler
   b) Select features:
      - Monitor Development Environment: Monitor Model Editor
      - Monitor Development Environment: WebSphere Integration Developer support for monitor model generation
      - Monitor Test Environment: WebSphere Business Monitor profile on WebSphere Process Server

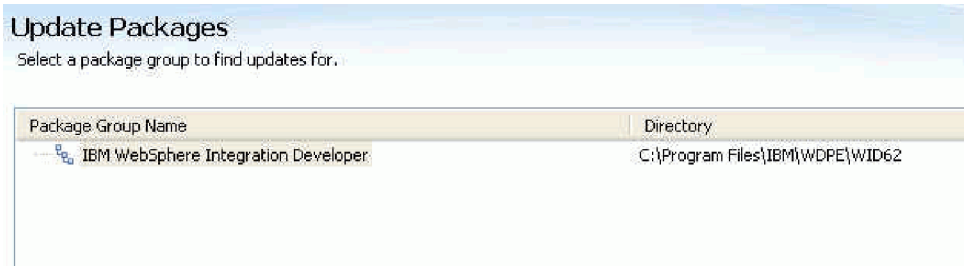
4) Install WebSphere Business Services Fabric tool pack V6.2 into WebSphere Integration Developer with the **Files Only** and the **Install Composition Studio** features selected.



5) Augment the Monitor server profile with Fabric functionality.
   a) In order to start the augmented monitor profile without exceptions the OSGi cache needs to be flushed. Delete all folders starting with org.* in `<WID62_Install>\pf\WBMonSrv_wps\configuration`.
   b) Run the Profile Management Tool (PMT). This can be found at: `<WID62_Install>\runtimes\bi_v62\bin\ProfileManagement\pmt.bat` .
   c) Click **Augment** to augment the existing monitor profile. If the defaults were used this will be named *WBMonSrv_wps*.
   d) Select **WebSphere Business Services Fabric** as the augment to apply to the monitor profile.
   e) Select **Typical profile augmentation** as the profile augmentation option.
   f) Enter the user id and the password for the monitor profile created during the installation of the WebSphere Business Monitor toolkit. The default username is *admin* and the default password is also *admin*.
   g) Review the summary and then click **Augment**

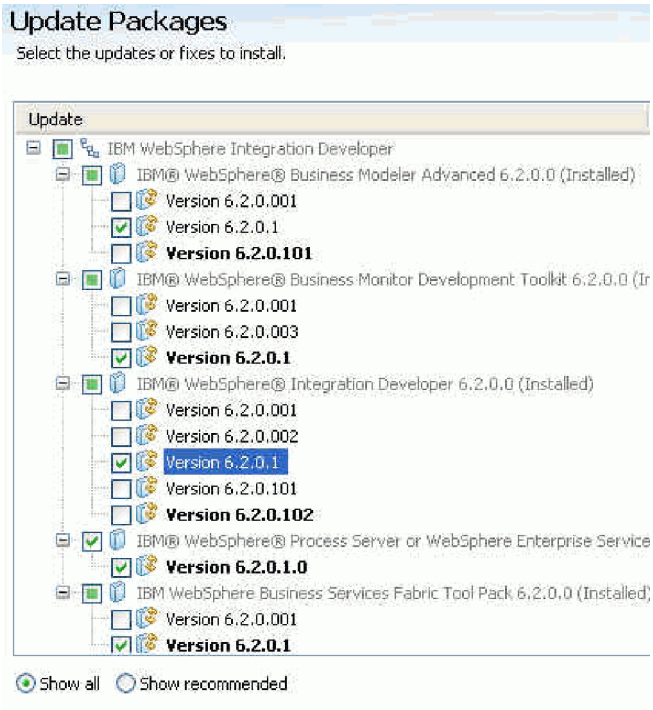
h) Validate that the augment was successful by reviewing the log. The log is located at `<WID62_Install>\bi_v62\logs\mangeprofiles\WBMonServ_sps_augment.log`. Near the end of the log, there should be a message Profile augmentation succeeded.

2. Update the Websphere Products to V6.2.0.1
   a. Use IBM Installation Manager to update the products to V6.2.0.1. All products are installed into the WebSphere Integration Developer package, so this is the only package that needs to be updated.



   b. On the next screen, select **Show All** and select Version 6.2.0.1 for each product

Note: Other versions may be recommended and highlighted, however the steps and screenshots in this tutorial are for Version 6.2.0.1 and are not guaranteed to be the same in later versions.



Note: You may receive a message informing you that you need to update the IBM Installation Manager. If this is your first time using the IBM Installation Manager to update an installed package. Select **yes**.

Follow the prompts for the remainder of the update installation.

3. Create the FabricAdministrators group and add the admin user to that group

Note: Even though there is a user created by the installer that has WebSphere Process Server administrative privileges, this user does not automatically have Administrator privileges to do Governance in Business Space. To grant this user Administrator privileges, a group called FabricAdministrators must be created and the admin user (or other users) must be added to the group. In this sample, which uses the default *VMM*, this can be done in the WebSphere Process Server administrative console. If you were using LDAP, Local OS, etc. you would create this group in the appropriate system.

a. Start WebSphere Integration Developer with the default workspace
b. In the Servers view, right click the server **WebSphere Business Monitor Server** and select **Start**. (This will take a few minutes)
c. When the Server status is **Synchronized**, right click the server again and select **Administration > Run administrative console**
d. Log into the WebSphere Monitor Server admin console. Navigate to "Users and Groups/Manage Groups". Create a new group with name `FabricAdministrators`.

e. Add user ID admin to the FabricAdministrators group.

f. Close the Administrative console.

g. In the servers view, right click the WebSphere Business Monitor server and select **stop**.

h. After the server status changes to stopped, exit WebSphere Integration Developer.

4. Install Lotus Forms Designer V3.5 into WebSphere Integration Developer. This will also enable it in WebSphere Business Modeler.

   a. Create a directory called `forms_designer` in the same parent directory where you extracted the Websphere Integration Developer installation files. This directory should now contain 3 directories: `disk1`, `disk2` and `forms_designer`.

   b. Extract the Lotus Forms Designer V3.5 files in the new `forms_designer` directory.

   c. Run the WebSphere Integration Developer launchpad and select the option to Install Lotus Forms Designer

   d. During the installation you will be prompted for a valid installation directory where an IBM Software Development Platform package is installed. This is the WebSphere Integration Developer directory. For example, if you installed using the WDPE installer, the default directory is `C:\ProgramFiles\IBM\WDPE\WID62`. If you installed the WebSphere products individually, the default directory is `C:\ProgramFiles\IBM\WID62`

   Refer to Installing Lotus Forms software in the WebSphere Integration Developer product documentation for full install information.

5. Install Lotus Forms Viewer V3.5 Fix pack 1 into WebSphere Integration Developer. This will also enable it in WebSphere Business Modeler.

   Because this is a fix pack, You must use a different install procedure, not the launchpad. To install IBM Lotus Forms Viewer 3.5 fix pack 1 perform the following steps:

a. In your Web browser, go to http://www.ibm.com/support/fixcentral.
b. Download IBM Lotus Forms Viewer 3.5 fix pack 1.
c. Double-click the downloaded file.
d. Follow the instructions in the installation wizard.
e. When prompted for the install location, enter the WebSphere Integration Developer installation directory.

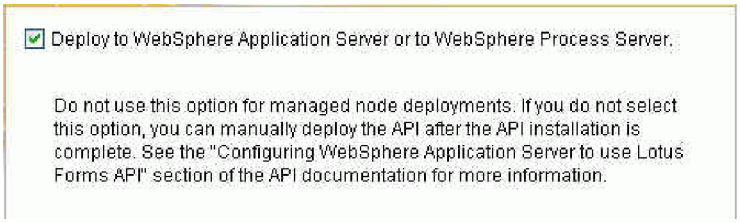
Refer to Installing Lotus Forms software in the WebSphere Business Modeler product documentation for full install information.

6. Install Lotus Forms Sever into WebSphere Integration Developer.

   Refer to Installing Lotus Forms software in the WebSphere Integration Developer product documentation for full install information.

   a. Create a directory called `forms_server` in the same parent directory where you extracted the Websphere Integration Developer installation files. This directory should now contain 4 directories: `disk1`, `disk2`, `forms_designer` and `forms_designer`.
   b. Extract the Lotus Forms Designer V3.5 files in the new `forms_designer` directory.
   c. Run the WebSphere Integration Developer launchpad and select the option to Install Lotus Forms Server - API
   d. When prompted for the install location, enter the WebSphere Integration Developer directory.
   e. Install the SDK version of the server

   f. Select the checkbox for deploy to WebSphere Process Server



   g. For the location of the server, use `<WID62_Install>\runtimes\bi_v62`

Chapter 2. Overview

Clips and Tacks is a fictional office supply company. In this business scenario, Clips and Tacks is processing orders for office supplies and shipping them to customers.

The following sequence of events describes the Clips and Tacks business process for handling incoming orders.

1. The business process is initiated when a customer submits an order.
2. A business rule evaluates the data from the order form and determines whether the order can be automatically approved or if it needs human approval. When the total purchase price of the order is $750.00 or less, the order is automatically approved. When the total purchase price of the order exceeds $750.00, it is sent to a person for review.
3. For orders that are automatically approved, the customer account is checked to determine if it is in good standing. If the customer account is in good standing, the order is sent for shipment; otherwise, the order is sent to a person for review.
4. If the order is approved by reviewer, then it is sent for shipment; otherwise, the order is canceled and a notification is sent to the customer.
5. The orders that are ready for shipment are given a packaging slip number and are sent to the customer.

Clips and Tacks recently determined that it could save money by using external shipping carriers instead of shipping all orders directly. Initially, Clips and Tacks decided to use Better Shipping for large domestic orders (an order that is greater than $50), which charges a flat fee of $8 per order. For small or large international orders, Clips and Tacks decided to use International Express™, which charges a flat fee of $25. (Better Shipping and International Express are fictional shipping companies.) For small domestic orders, Clips and Tacks decided to continue shipping directly, which costs $10 per order.

Change 1

A few months after this new shipping structure was implemented, Clips and Tacks decided to outsource all domestic shipping to Better Shipping, even for small orders at the same flat fee of $8 per order.

Change 2

After another few months, Clips and Tacks was offered a great deal for shipping in and around North Carolina. LocalShippers charges a flat fee of $5 for small and large orders for customers located in North Carolina, South Carolina, and Virginia. Clips and Tacks decided to change to the following shipping structure:

- LocalShippers for orders in and around North Carolina, South Carolina, and Virginia at a flat fee of $5 per order
- Better Shipping for all other domestic orders at a flat fee of $8 per order
- International Express for all international orders at a flat fee of $25 per order

Data model

There are two business objects (also known as business items) in this tutorial. A business object called Order stores the following information for the business process:

- Customer information
- Items ordered
- Automatic approval field, which the business rule uses
- Current® status of the order, which is modified as the order progresses through the process
- The packing slip number, which is used to ship the order

- The shipping charges, which are set after it is determined which shipping service is used

The Notification business object is used to send notification to a customer about a canceled order. It has two fields: a text field and an e-mail field. There are two ways to generate business objects:

- By importing the complete object from an XSD file
- By manually creating the object through the authoring tools

To create the Order business object you will use the authoring tools, and to create the Notification business object you will import `Order.xsd`.

Human tasks

There are three human tasks in this business process:

- A human task for entering data into the order entry form. This human task starts the business process. It is not modeled in the process; it is the process-initiating action.
- A modeled human task that represents the employee activity of reviewing the order when the total purchase amount is more than $750.00 or when the customer account is not in good standing.
- A modeled human task that represents the employee activity of shipping the order to the customer.

Lessons in this module

1. "Modeling the business process" on page 11

   Use WebSphere Business Modeler to build a model that represents the Clips and Tacks business process for handling incoming orders.
2. "Integration development" on page 55

   Import the generated model into WebSphere Integration Developer to convert it into a runnable business process that includes business rules, Java™ components, and a user interface.
3. "Identifying WebSphere Monitor Server on WebSphere Process Server ports" on page 70

   Identify the WebSphere Monitor Server ports for use in later lessons.
4. "Creating a WebSphere Business Services Fabric project" on page 70

   Create a project to act as a container for all the WebSphere Business Service Fabric artifacts created.
5. "Creating the Clips and Tacks Business Space" on page 76

   Create a Business Space to enable an integrated and customized user experience allowing access to business process information from a single user interface.
6. "Leveraging Business Services" on page 84

   Use WebSphere Business Service Fabric policies and assertions to enable dynamic business processes.
7. "Monitoring the Order Handling business process" on page 109

   Import the monitor model generated by WebSphere Business Modeler into WebSphere Business Monitor Server V6.2 and add the missing elements to the monitor model.
8. "Testing the Order Handling business process" on page 128

   Use the Business Space dashboard to run process instances.
9. "Creating a business dashboard in Business Space" on page 129

   Create a business dashboard in Business Space to monitor the Order Handling process.

Chapter 3. Build it yourself

As you complete this tutorial, check your work carefully. Consider working from a printed copy of the documentation so that you can check off each step as you do it.

Before you begin, you must install all items listed in "Prerequisite software" on page 1.

The following artifacts are used in building the application. Refer to Chapter 5, "Download and import samples," on page 141 for download instructions and copy the files now to a convenient location on your local machine.

Order.xsd
The XML schema to be used in WebSphere Business Modeler.

Order.xfdl
The Lotus® form used in this tutorial. It is imported in WebSphere Business Modeler.

ClipsAndTacksEndpoints.zip
Web service endpoints to be called by WebSphere Business Services Fabric. These are not really Business Process Management artifacts, but rather external artifacts necessary to run the application.

CancelOrderandSendNotificationImpl.java
The Java file used to generate notifications. It is the implementation for one of the components in the WebSphere Integration Developer.

CreditRating.java
The Java file used to check the customer account status. It is the implementation for one of the components in the WebSphere Integration Developer.

ContextExtractorImpl.java
A file used by the Dynamic Assembler component in Websphere Integration Developer to extract data from the incoming request and pass it to Websphere Business Services Fabric.

ClipsAndTacks-Core_ontology.fca
Custom ontology (vocabulary) required for Websphere Business Services Fabric.

ClipsTacks_initial_scenario-owl.zip
WebSphere Business Services Fabric repository project.

DeclinedOrderEvent.xsd
An XML schema for the Declined Order event that is monitored in Websphere Business Monitor.

LateAverageOrderShippedEvent.xsd
An XML schema for the Order Fulfillment event that is monitored in Websphere Business Monitor.

Modeling the business process

During the modeling phase, use WebSphere Business Modeler to build a model that represents the Clips and Tacks business process for handling incoming orders.

To model the process, complete the following tasks:

1. Create the basic process by performing these steps:
   a. "Creating the business process" on page 12.
   b. "Importing the Order business item and related data types" on page 15.
   c. "Building the model of the Order Handling process" on page 17.

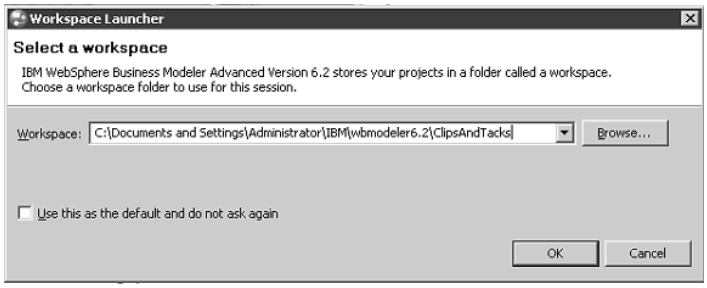
d. “Connecting the tasks and associating data” on page 21.

2. Replacing the generated form:
   a. “Associating a form to the human tasks” on page 24.
   b. “Replacing the generated form” on page 26.
3. Add details for the process to run by performing these steps:
   a. “Creating the notification business item” on page 30.
   b. “Implementing the decision branch conditions” on page 31.
   c. “Setting the input criterion for the process” on page 35.
   d. “Setting the input specification for the process” on page 35.
   e. “Synchronizing forms and human tasks” on page 36.
   f. “Implementing the business rule for automatic approval” on page 37.
4. Add details for process monitoring by performing these steps:
   a. “Specifying monitoring criteria” on page 42.
   b. “Creating a location dimension” on page 43.
   c. “Creating the Percentage of Orders Shipped key performance indicator” on page 44.
   d. “Creating the Average Process Duration key performance indicator” on page 46.
   e. “Creating the Price per Order instance metric” on page 48.
   f. “Creating the Order Price Total aggregate metric” on page 49.
   g. “Creating the Order Price Average aggregate metric” on page 50.
5. Export the model by performing this step: “Exporting the model for further development” on page 52.

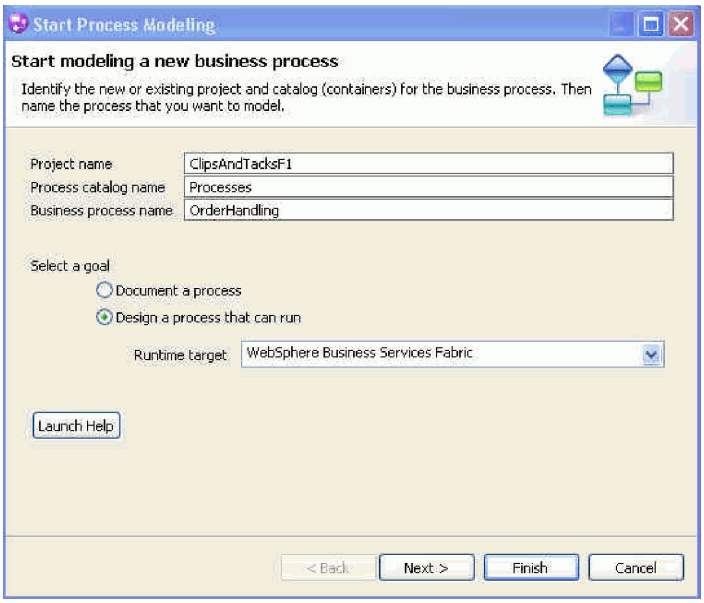
Creating the business process

In this lesson, you will create the business process.

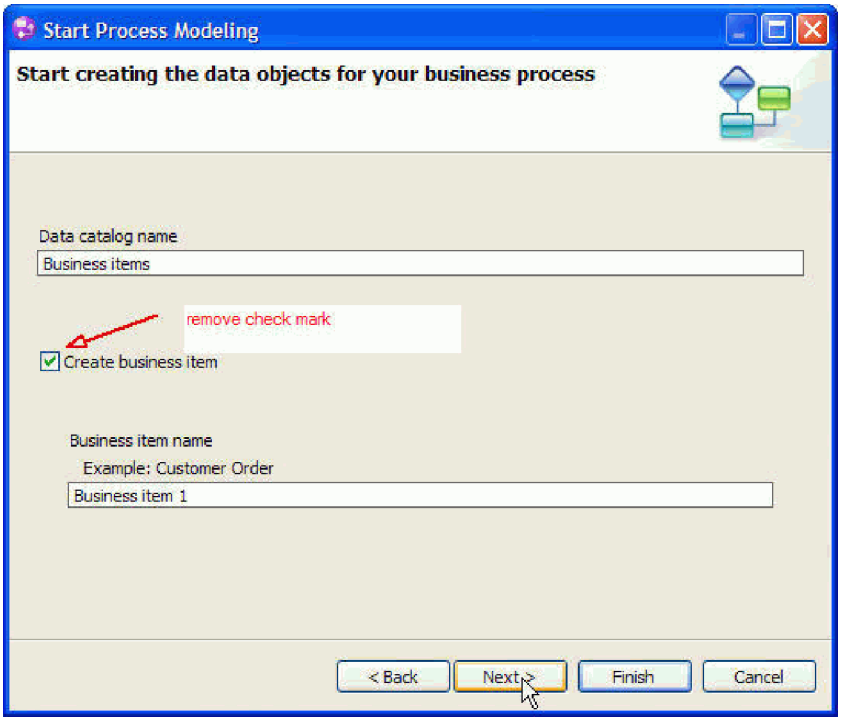
1. Start WebSphere Business Modeler Advanced V6.2. The Workspace Launcher wizard opens.
2. Create a new workspace for this tutorial, such as `C:\Documents and Settings\Administrator\IBM\wbmodeler6.2\ClipsAndTacks`. Do not select **Use this as the default and do not ask again**. Click **OK**.



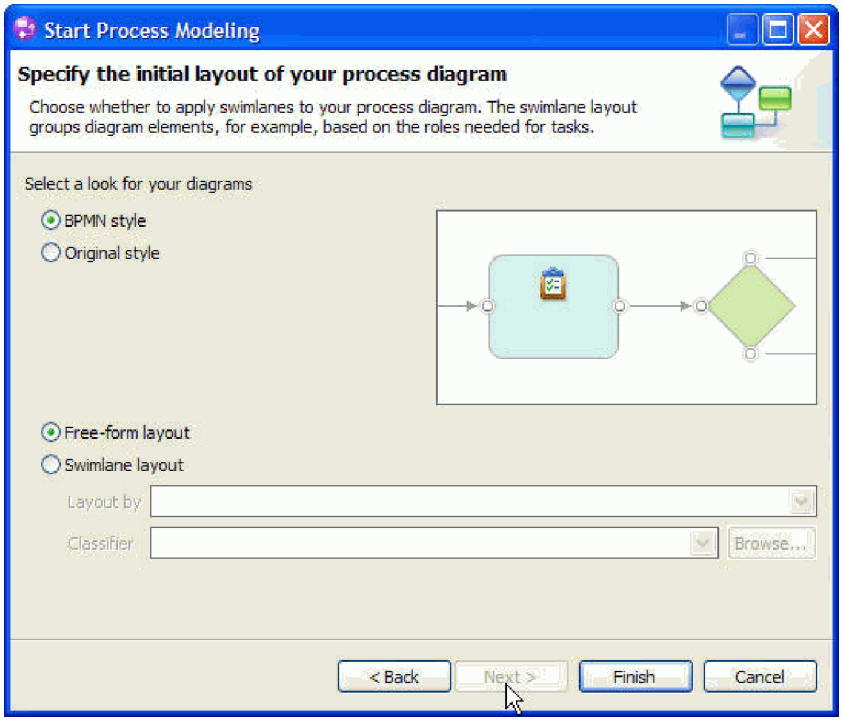
3. On the Welcome window, click **Close Product Welcome**. The Start Process Modeling wizard opens.
4. Enter `ClipsAndTacksF1` as the project name, leave `Processes` as the process catalog name, and enter `OrderHandling` as the business process name. Select **Design a process that can run** and choose **WebSphere Business Services Fabric** as the runtime target. Then click **Next**.



5. Clear the **Create business item** check box and then click **Next**.

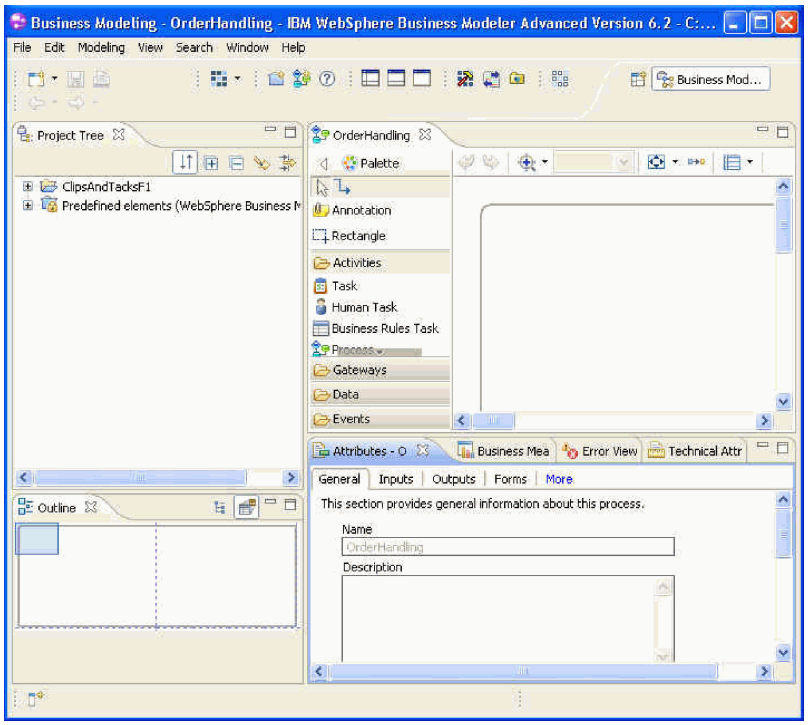


6. Select **BPMN style** and click **Finish**.

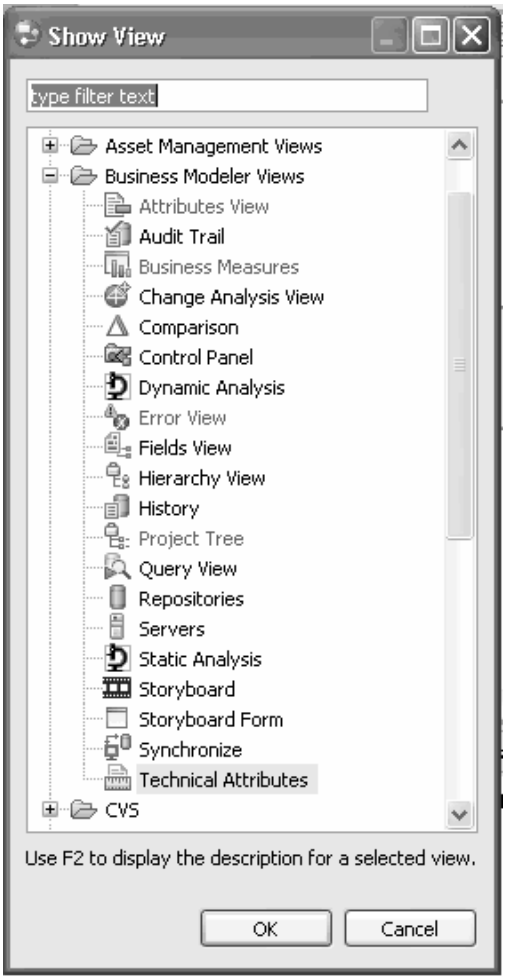


The project and the business process are created. The Order Handling process opens.

7. Click the **Apply 4-Pane Layout** icon in the toolbar at the top of the window.



8. Optional: If the **Technical Attributes** view is not showing, you can display it by selecting **Window** → **Show View** → **Other**, expanding **Business Modeler Views**, and selecting the **Technical Attributes** view.

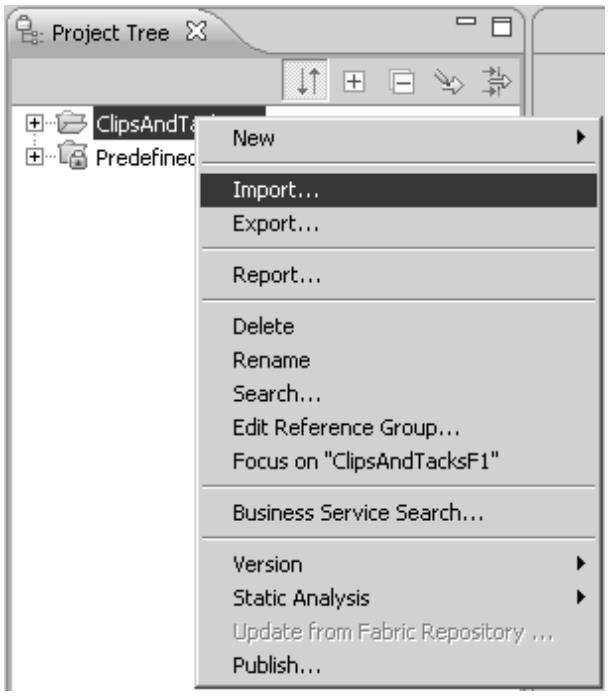


Importing the Order business item and related data types

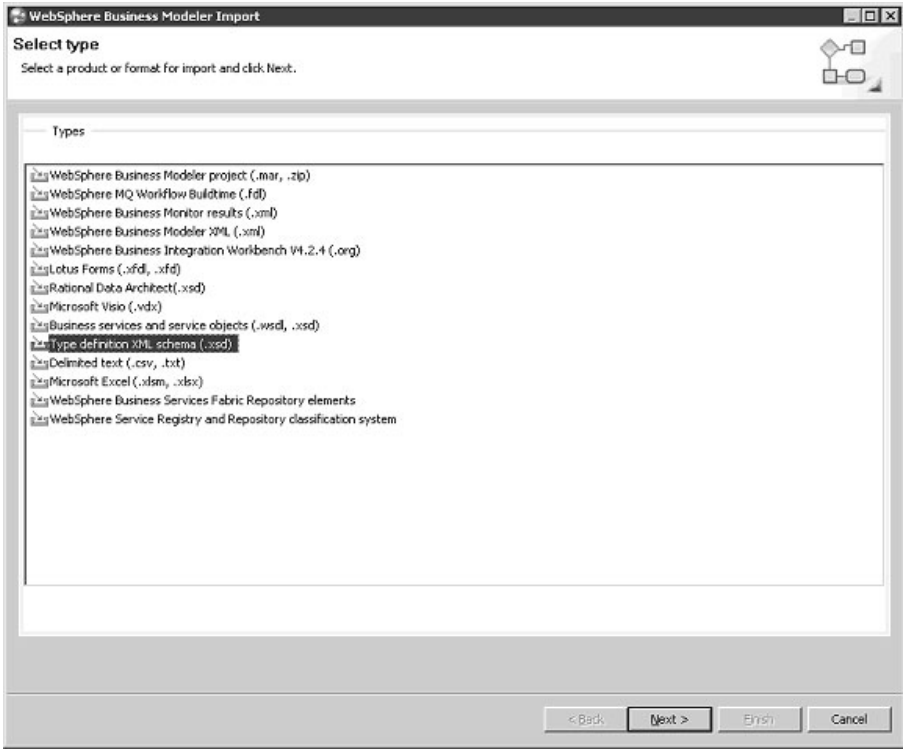
In this lesson, you will learn how to import the business items and identify and import related data types.

The files needed for this tutorial are available in Chapter 5, “Download and import samples,” on page 141, such as the data definition file `Order.xsd`.

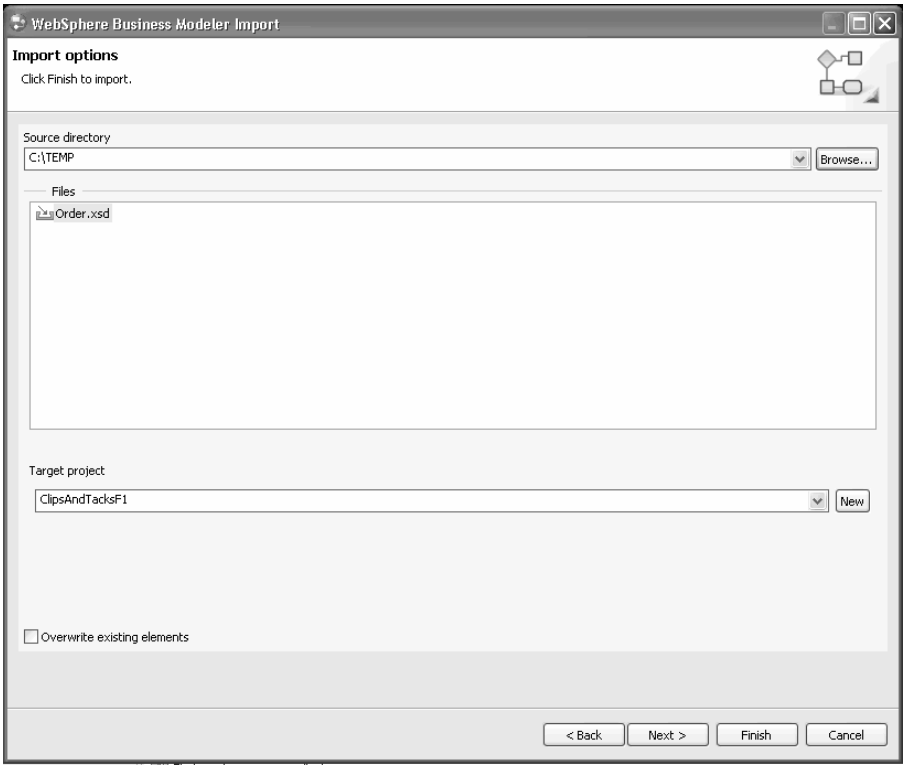
1. In the navigation tree, right-click **ClipsAndTacksF1** then select **Import**.



2. Select **Type definition XML schema (.xsd)**, and then click **Next**.

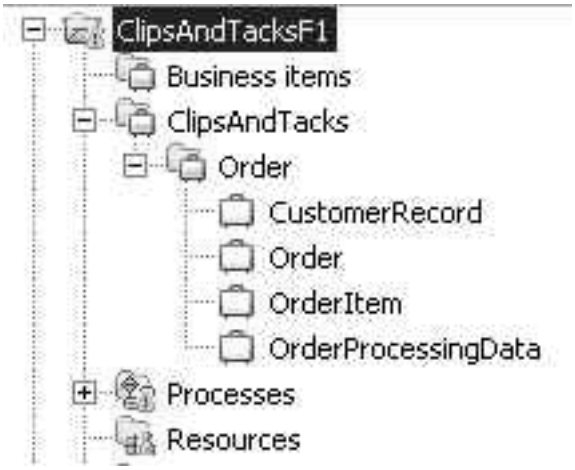


3. Click **Browse** and select the directory containing the downloaded tutorial artifact files, then select `Order.xsd` from the list of files. Click **Next**.



4. Click **Finish**.

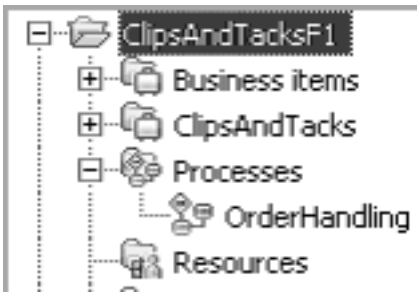
The Order business item is imported with three other business items (CustomerRecord, OrderItem, and OrderProcessingData) that the Order business item requires. All of the business items are imported into a catalog called ClipsAndTacks, which was also defined in the XSD file.



Building the model of the Order Handling process

In this lesson, you will build the model of the Order Handling process.

1. If the **OrderHandling** process is not open already, expand **ClipsAndTacksF1 >Processes > OrderHandling**, and then double-click **OrderHandling**.

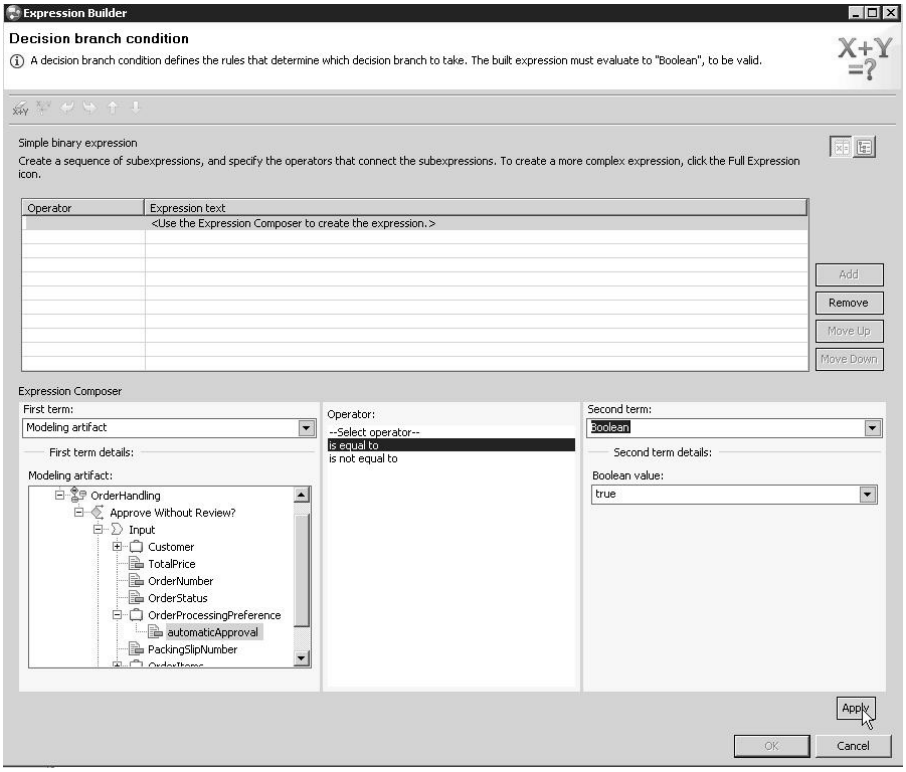


Tip: The canvas is currently much larger than the area visible within the window. From the toolbar, click the **Resize Diagram** icon and choose from the options to resize the process diagram. To reduce the width of the canvas, use the Decrease Horizontal Space icon . To reduce the height of the canvas, use the Decrease Vertical Space icon .

2. On the palette, click **Business Rules Task** and then click the canvas. Rename the local business rules task to `Check Order Handling Policy for Automatic Approval`. You can resize the task to fully display the text if you want.

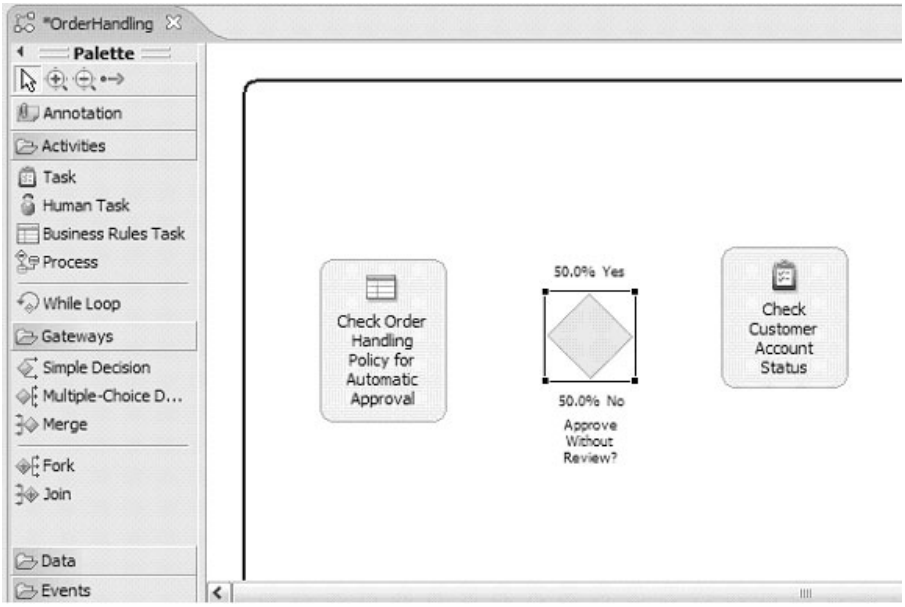
   Tip: You can also drag elements from the palette to the canvas.

   Add new elements to the right of the previously added item. An image with all the elements in the process is included in the "Connecting the tasks and associating data" on page 21 section.



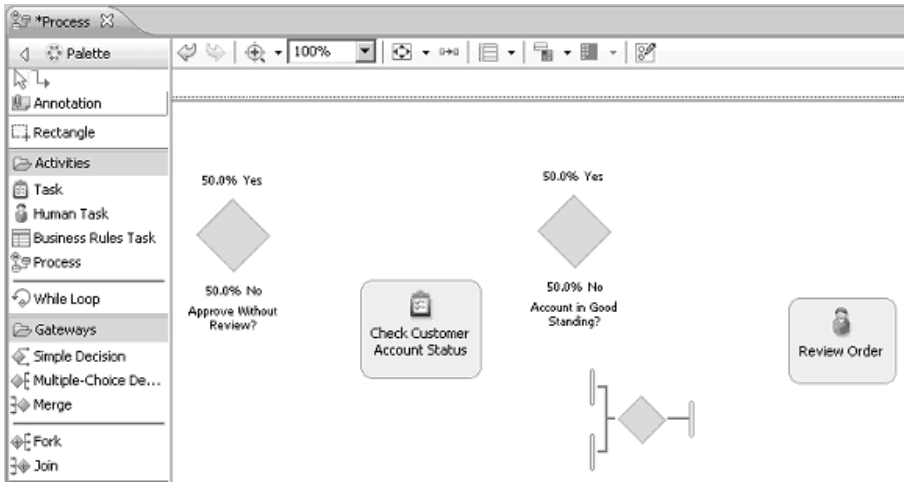
3. On the palette, click **Gateways** to expand it. Click **Simple Decision**, and then click the canvas. Rename the simple decision to `Approve Without Review?`
4. On the palette, click **Task**, and then click the canvas. Rename the task to `Check Customer Account Status`. The generic task icon can be used to represent any call to an automated service.

Note: You might experience errors during this part of the tutorial because you are in the Fabric mode by default. If you do not want to experience those errors, change to the Basic mode.

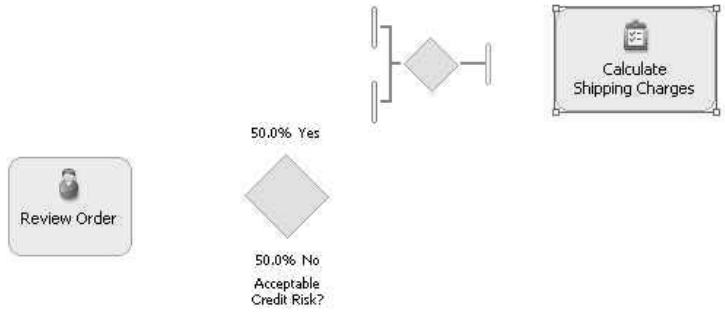


5. Click **Simple Decision**, and then click the canvas to the right of the **Check Customer Account Status** task. Rename the simple decision to `Account in Good Standing?`
6. On the palette, click **Merge**, and then click the canvas.

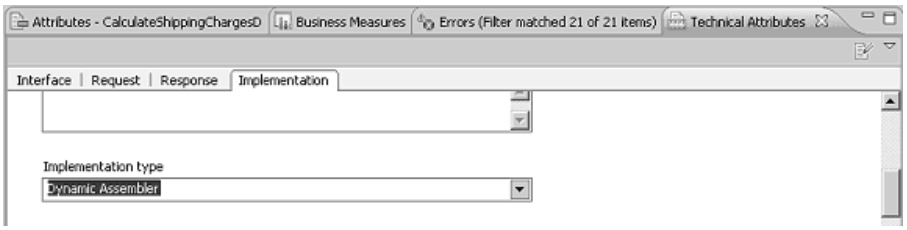
   Tip: Place the merge elements on the canvas from left to right as you define them.
7. On the palette, click **Human Task**, and then click the canvas. Rename the human task to `Review Order`.



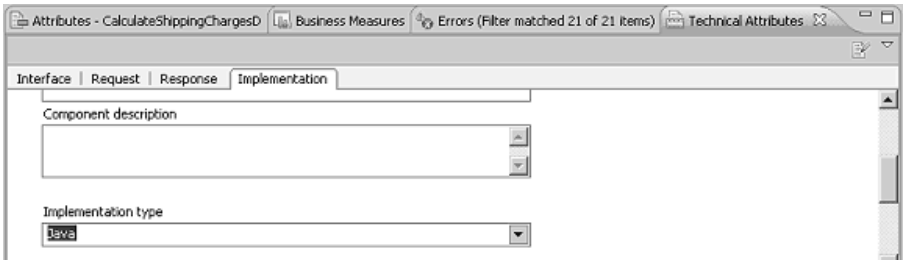
8. Add a simple decision called `Acceptable Credit Risk?` to the right of the previous item, a merge item to the canvas to the right of the **Acceptable Credit Risk?** simple decision, and a task called `Calculate Shipping Charges` to the canvas to the right of the merge item.



9. You can now indicate what type of task this represents. Select **CalculateShippingCharges** and select the **Implementation** tab in the Technical Attributes view. Scroll down and select Dynamic Assembler for the **Implementation Type**. This setting enables you to add dynamic behavior to the process.



10. Add a human task called `Ship Order to Customer`, a task called `Update Order Database`, and a task called `Cancel Order and Send Notification` to the canvas. **Note:** Exact spelling and capitalization is required for the Cancel Order and Send Notification task. In the integration section of this tutorial, you will associate an implementation to this task. The implementation file is supplied for you and the name must match.
11. Set the implementation types for the Check Customer Account Status, Update Order Database, and Cancel Order and Send Notification tasks to **Java**.



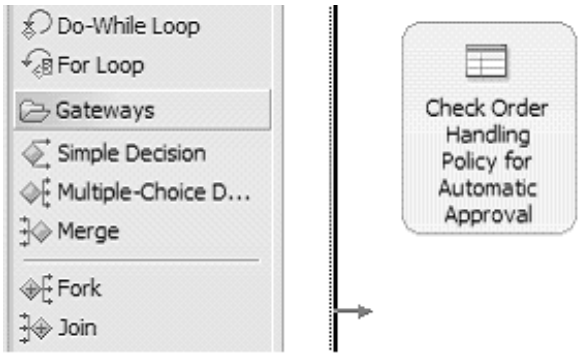
12. Add a Terminate node by clicking the **Terminate** icon on the palette and then clicking the canvas. (The Terminate icon is located under the Events group.)
13. Add a second Terminate node.

Connecting the tasks and associating data

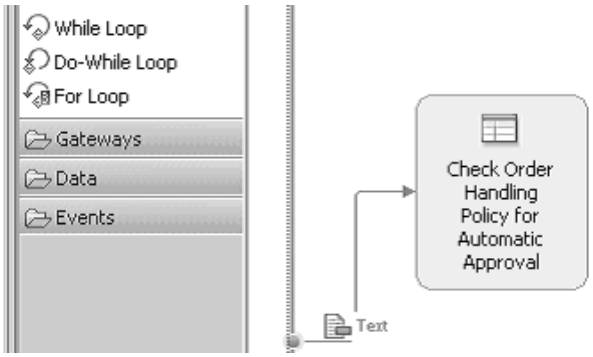
In this lesson, you will connect tasks, subprocesses, and other elements to model the flow of control and data through the business process.

Connecting tasks is also called wiring the tasks. There are two parts to wiring the tasks: you must create a wire to show that the output from one element becomes the input to another, and then you must indicate what data is passed between those two elements.

1. Hover over the inner edge of the process diagram until you see an arrow.

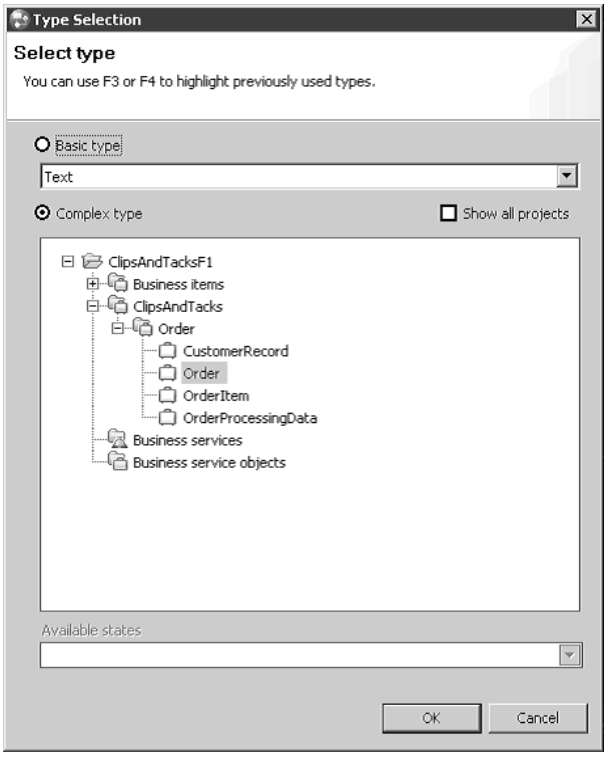


2. Click and hold the left mouse button. Move the mouse with the connection to the **Check Order Handling Policy for Automatic Approval** task. Release the left mouse button to form a connection.



3. Right-click the newly created connection and select **Associate Data**. Navigate to the ClipsAndTacksF1 project, select **Order**, and then click **OK**.

Tip: An alternative method is to drag a business item from the project tree to a connection.

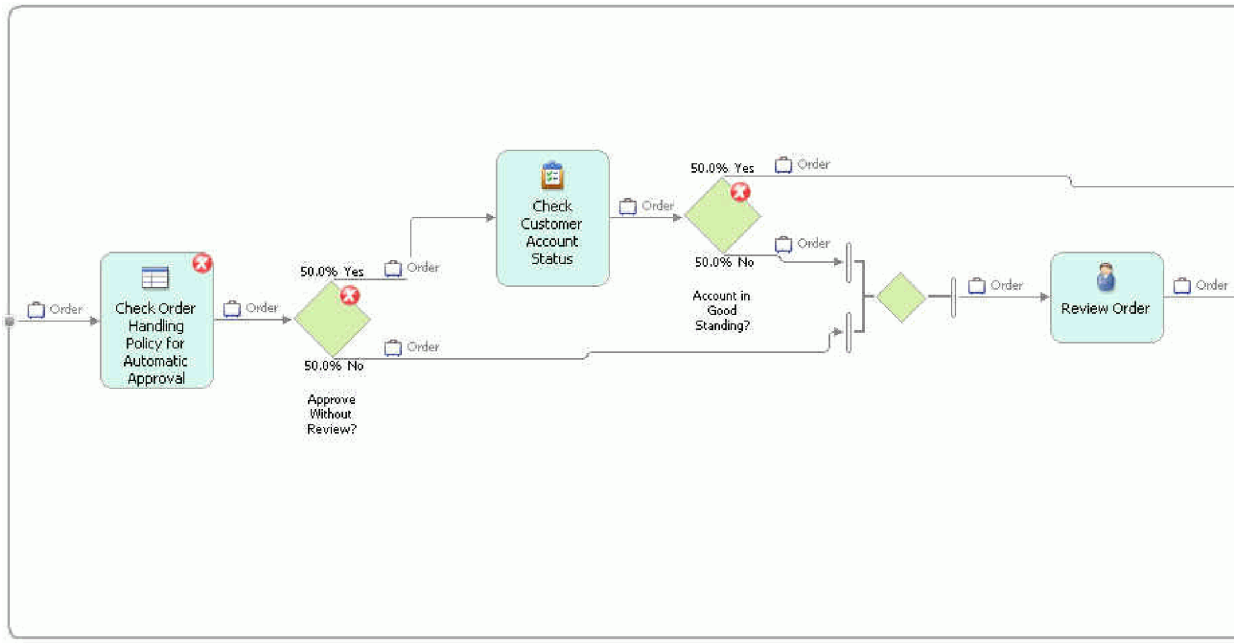


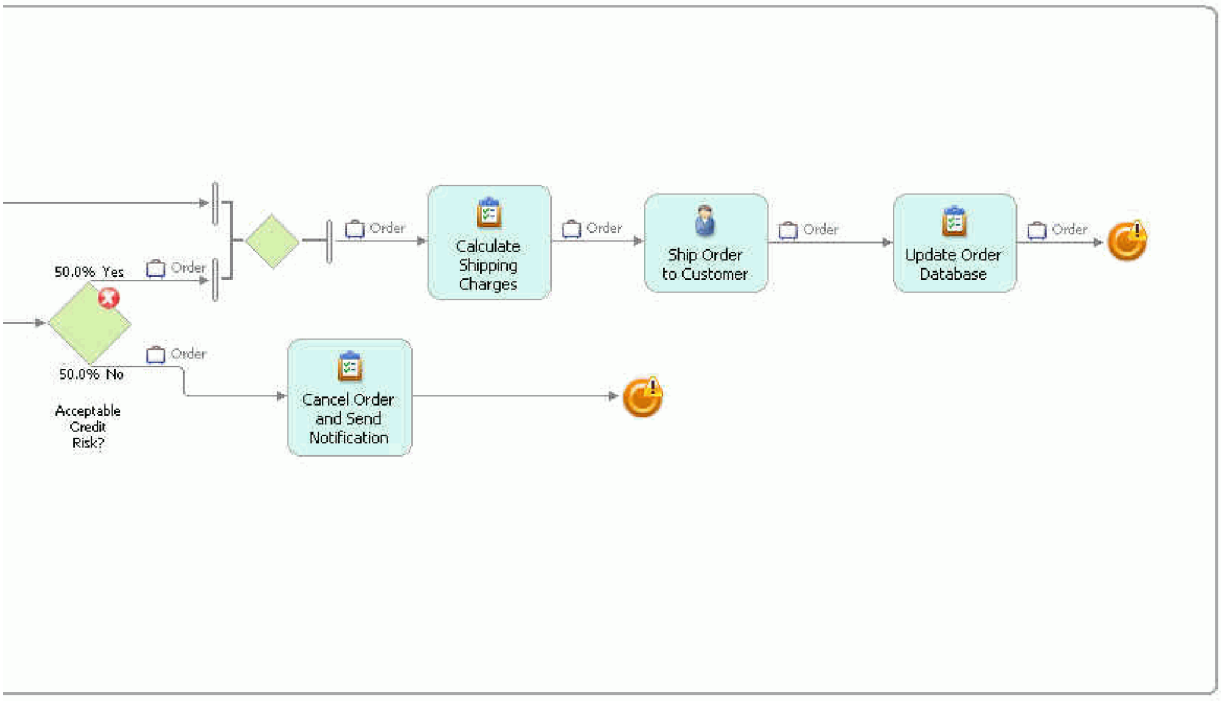
4. Wire the remainder of the process diagram by repeating steps 1 and 2 for all of the elements, but review these tips before proceeding with wiring:

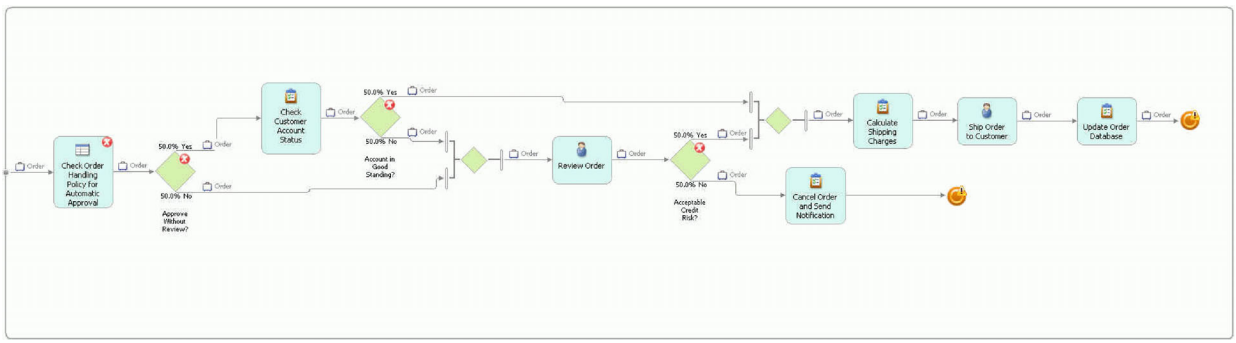
   Important:

   - All of the links must have the Order business item with the exception of the link from **Cancel Order and Send Notification** to the Terminate node.
   - If the **Order** icon is not automatically added to the link, add it using the **Associate Data** context menu option before continuing with the wiring.
   - Press Ctrl+Z or click **Edit** → **Undo** to reverse your last change instead of deleting recent work.
   - If the **Connections** wiring tool is still enabled, select the white arrow icon at the top of the palette to enable the regular mouse pointer before you try to right-click an item. Alternatively, pressing the Esc key disables the connection tool.
   - To prevent yourself from inadvertently creating extra input or output ports on the elements, click the center of each element that you are connecting.

   The following three images show the completed wired diagram. The first image shows the left half and the second image shows the right half. The third image is the completed wired diagram.


Order
Check Order Handling Policy for Automatic Approval
50.0% Yes
50.0% No
Approve Without Review?
Check Customer Account Status
Account in Good Standing?
Review Order


Order
50.0% Yes
50.0% No
Acceptable Credit Risk?
Calculate Shipping Charges
Ship Order to Customer
Update Order Database
Cancel Order and Send Notification



5. Right-click the canvas and select **Auto-Layout left to right**. Save your work by using one of these combinations:
   - Click **File → Save**
   - Click **File → Save All**
   - Press Ctrl+S.

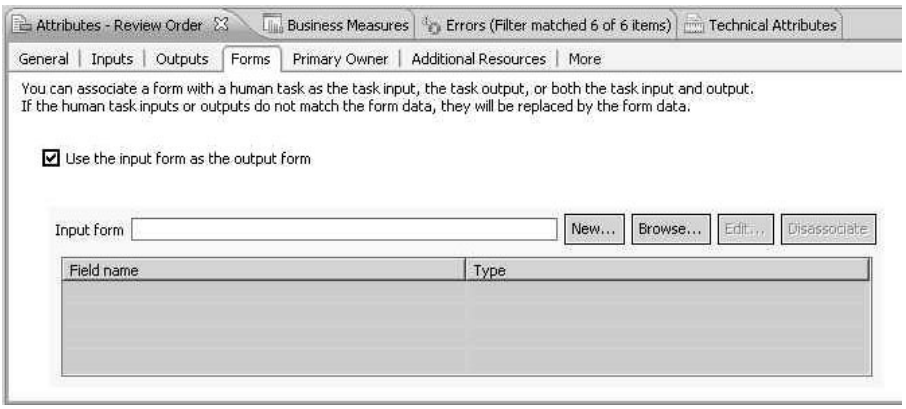
   Note: When you save your work errors appear on some elements. These errors are corrected during the following lessons when you provide more details in your model.

Associating a form to the human tasks

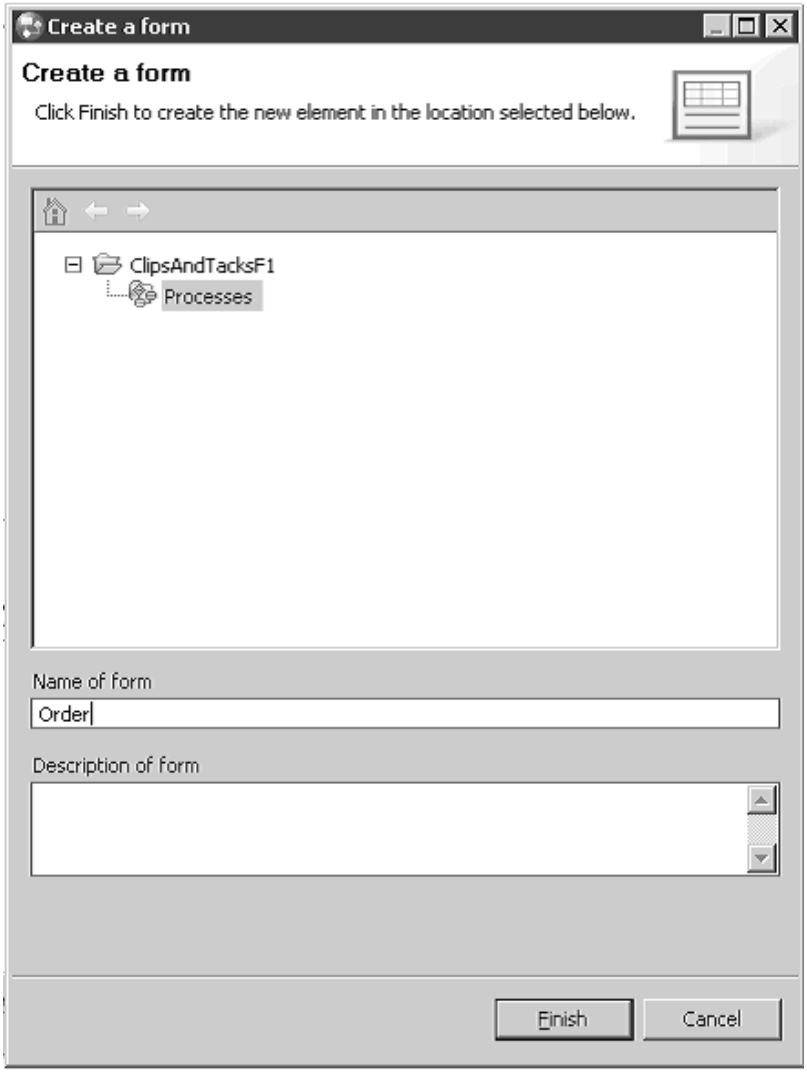
In this lesson, you will associate an Order form with the two human tasks, **Review Order** and **Ship Order to Customer**.

An Order form has been created and is available for download. Refer to Chapter 5, "Download and import samples," on page 141 to get the `Order.xfdl` Lotus® form. In this lesson you generate a placeholder form within WebSphere Business Modeler. Later you will replace the placeholder form with the one that you downloaded.

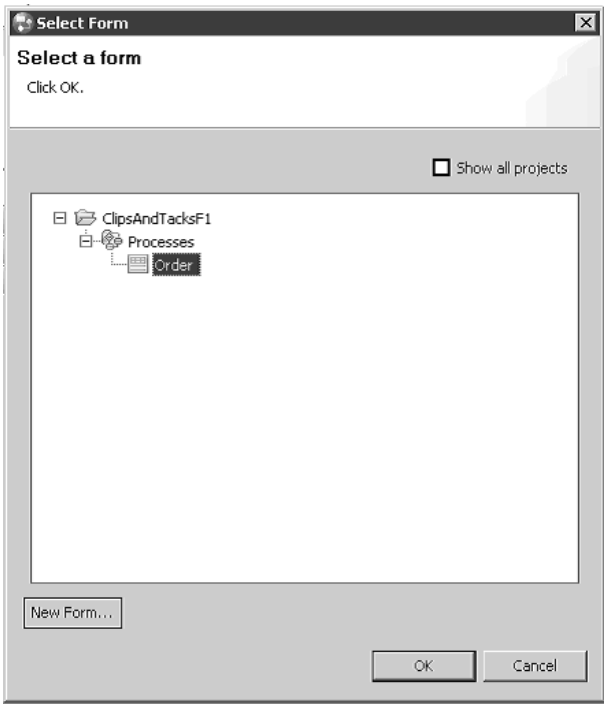
1. In the process that you just created, select the **Review Order** human task and, in the lower pane, click the **Attributes Review Order** tab, and then click **Forms**.



2. Because you will use the same form for the input and output, leave the check box selected. Then click **New** for the input form.
3. Enter `Order` for the name of the form and click **Finish**.



4. Right-click the **Ship Order to Customer** human task, select **Associate Form**, and click **Browse**.
5. From the ClipsAndTacksF1 tree, select **Order** and click **OK**. Click **OK** on the Associate Form window.



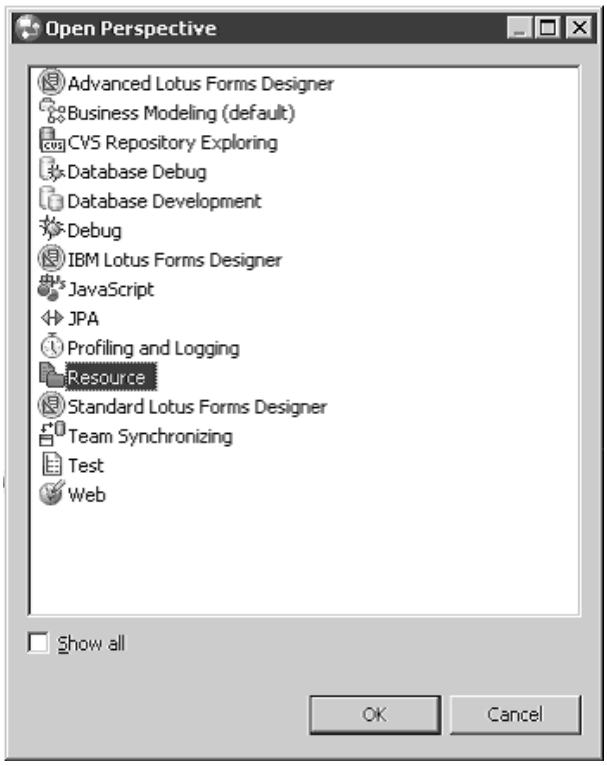
6. Save your work.

Replacing the generated form

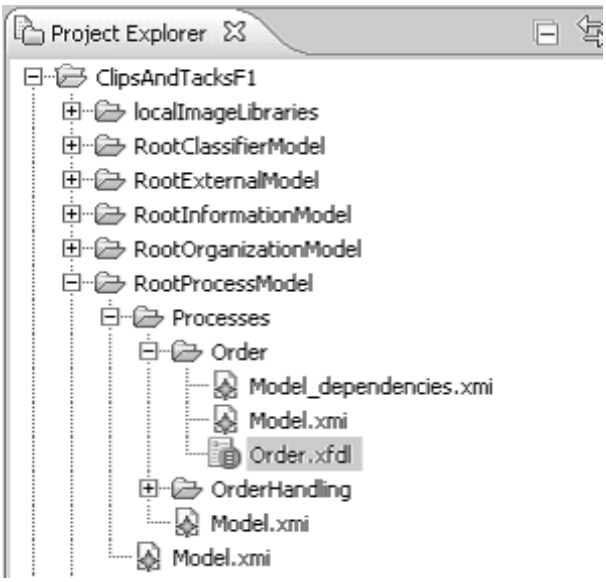
In this lesson, you will replace the generated form with the provided order form to provide the appropriate fields necessary to complete this tutorial.

Refer to Chapter 5, “Download and import samples,” on page 141 to get the `Order.xfdl` Lotus® form.

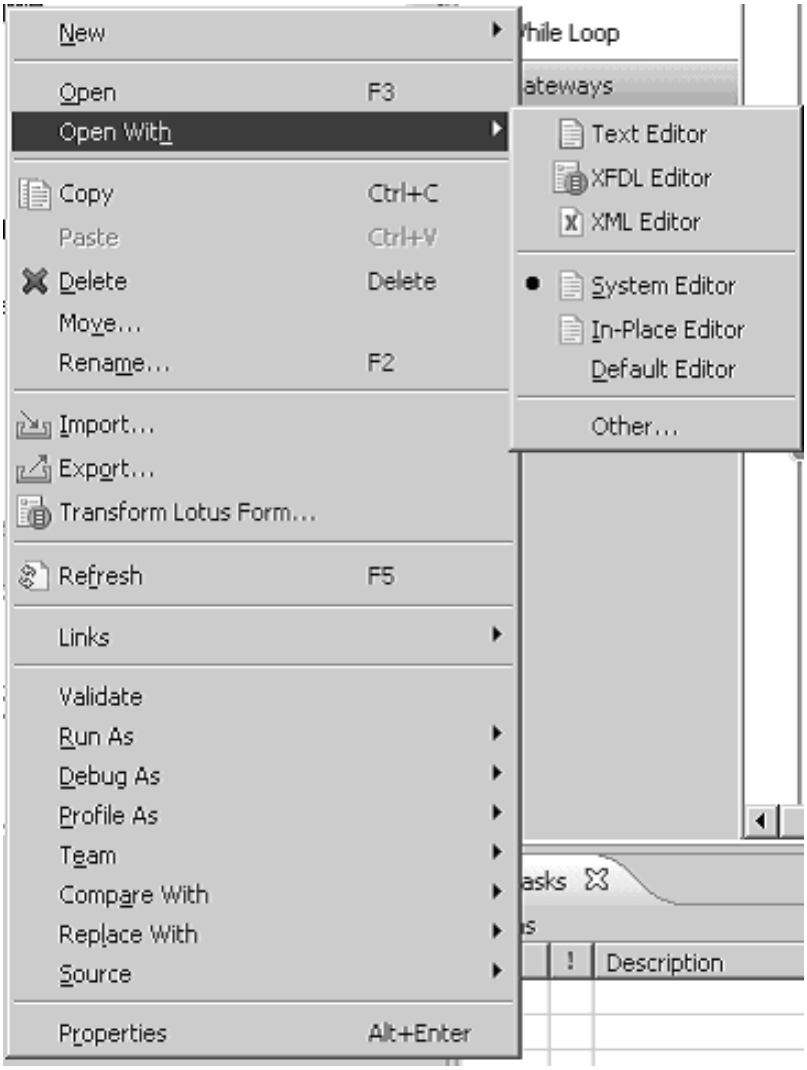
1. Switch to the Resource perspective, which contains the underlying implementation files. To see them, click the **Open Perspective** icon and select **Other**.
2. Select **Resource** and click **OK**.



3. Expand the ClipsAndTacksF1 tree to expose the `Order.xfdl` form.

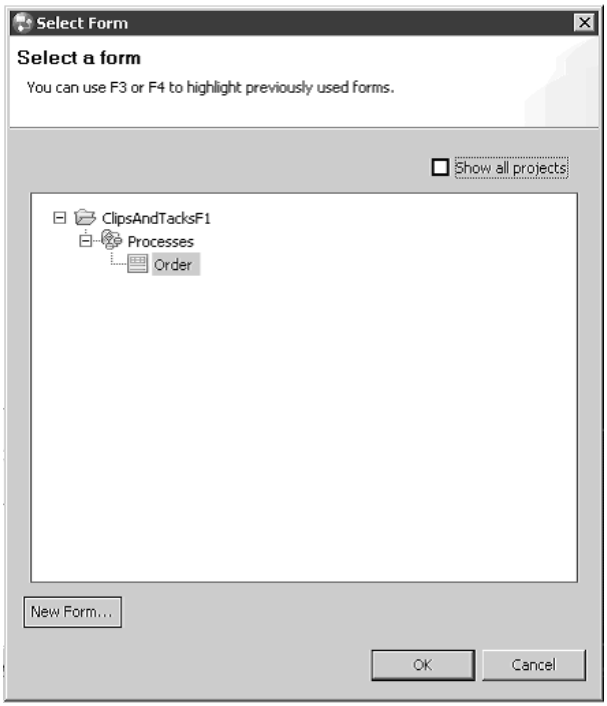


4. Right-click the `Order.xfdl` entry and select **Delete**. Click **OK**.
5. From a file system explorer window, drag the `Order.xfdl` form to the Order folder in the Modeler Project explorer.
6. To check that you have the correct form, right-click the `Order.xfdl` form and select **Open With → System Editor**.



7. Validate that the form was replaced.

8. Close the window that opens.
9. Associate the new order form with the Review Order and Ship Order to Customer human tasks. Right-click each human task and select **Associate Form**. Click **Browse** and select **Order**. Click **OK** and then click **OK** again.



10. Save your work

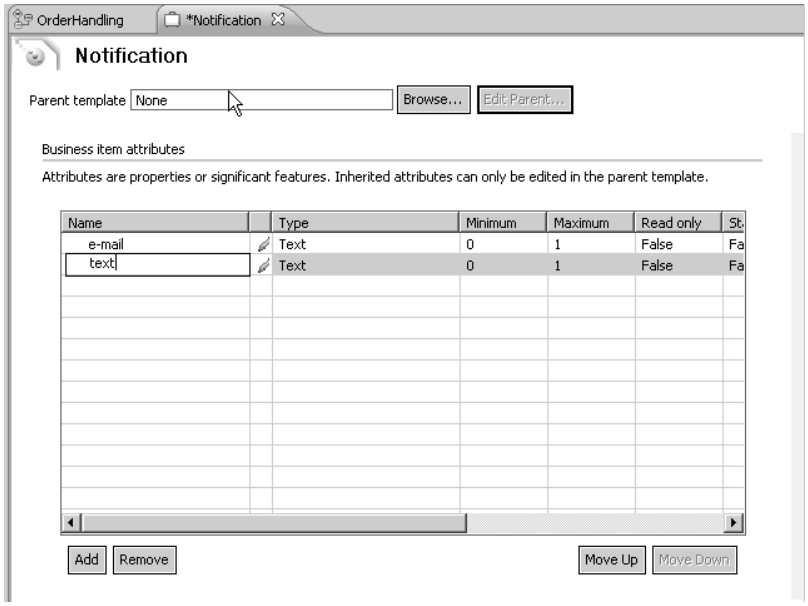
Creating the notification business item

In this lesson, you will create a new business item called Notification.

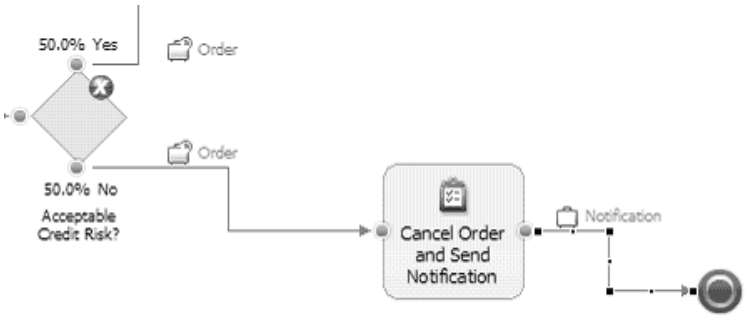
The Cancel Order and Send Notification task does not use Order as an output business item. To send notification to customers that their orders were canceled, you need to create a new business item.

To create the Notification business item, complete the following steps:

1. Switch to the Business Modeling perspective.
2. From the Project Tree, right-click **Business items** and click **New → Business Item**.
3. Name the new business item `Notification` and click **Finish**. The Notification business item appears.
4. Under Business item attributes, click **Add**, replace the new attribute name with `e-mail`, and select **Text** for the type. Repeat this step to add the second attribute named `text` with the same type.



5. Save your changes and then close the Notification business item panel by clicking the **X** on its tab.
6. Right-click the wire between **Cancel Order and Send Notification** and the Terminate node and select **Associate Data**. Select **Notification** from Business Items and click **OK**.



Implementing the decision branch conditions

In this lesson, you will set the criteria, based on the input data, for which branch to take when decisions are made in the business process.

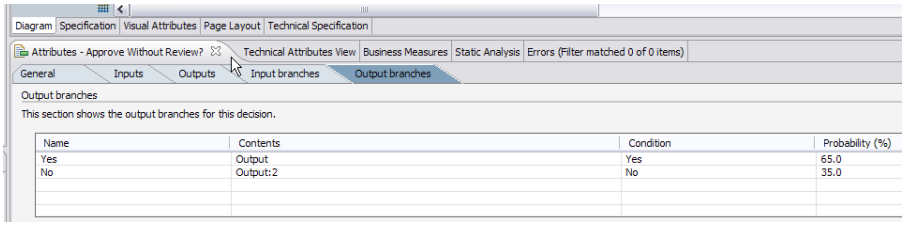
The decision elements of the process currently have errors because there is no automated way to determine which branch should be taken for a given order.

The branch options are listed in the following table.

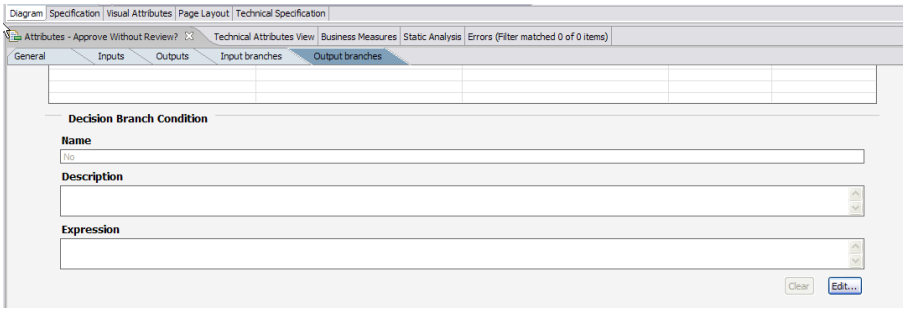
Table 1. Summary of Decision Criteria

Decision	Criteria
Approve without Review?	The previous task set the value of the **OrderProcessingPreference - automaticApproval** input field. Check if this field is true or false. If this field is true, then the order is automatically approved. If this field is false then the order must be reviewed before it is approved.
Account in Good Standing?	Check whether the total price of the order is less than the customer's available credit.
Acceptable Credit Risk?	In the previous task, the reviewer sets the value of the OrderStatus field. Check this field for **APPROVED**.

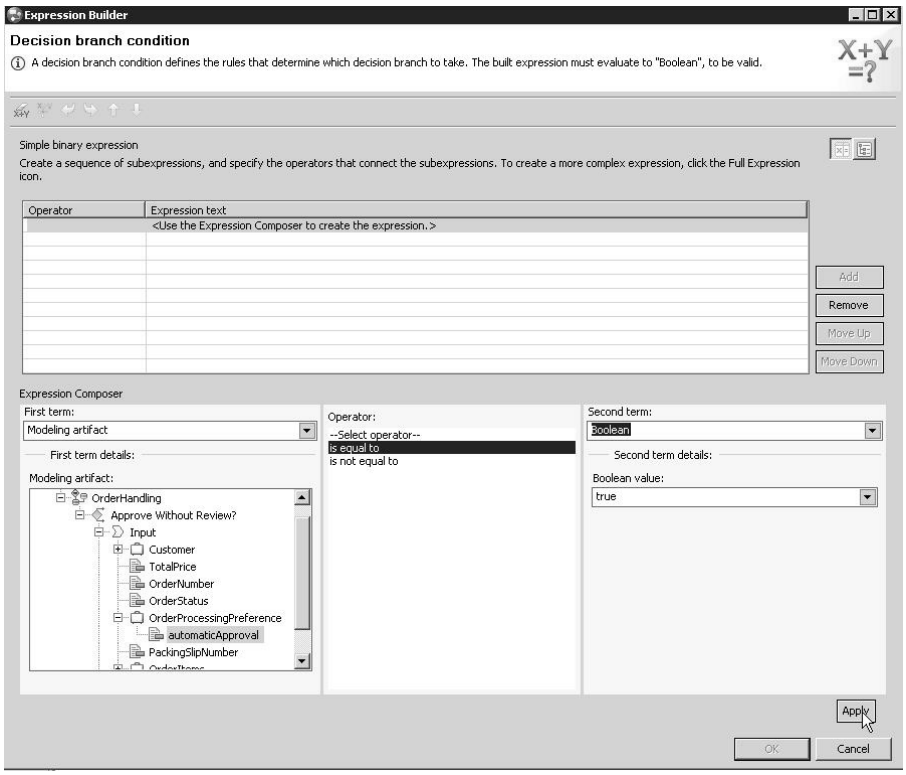
1. In the process diagram, click the **Approve Without Review?** simple decision. In the Attributes view, click the **Attributes – Approve without Review?** tab and then click the **Output branches** tab.



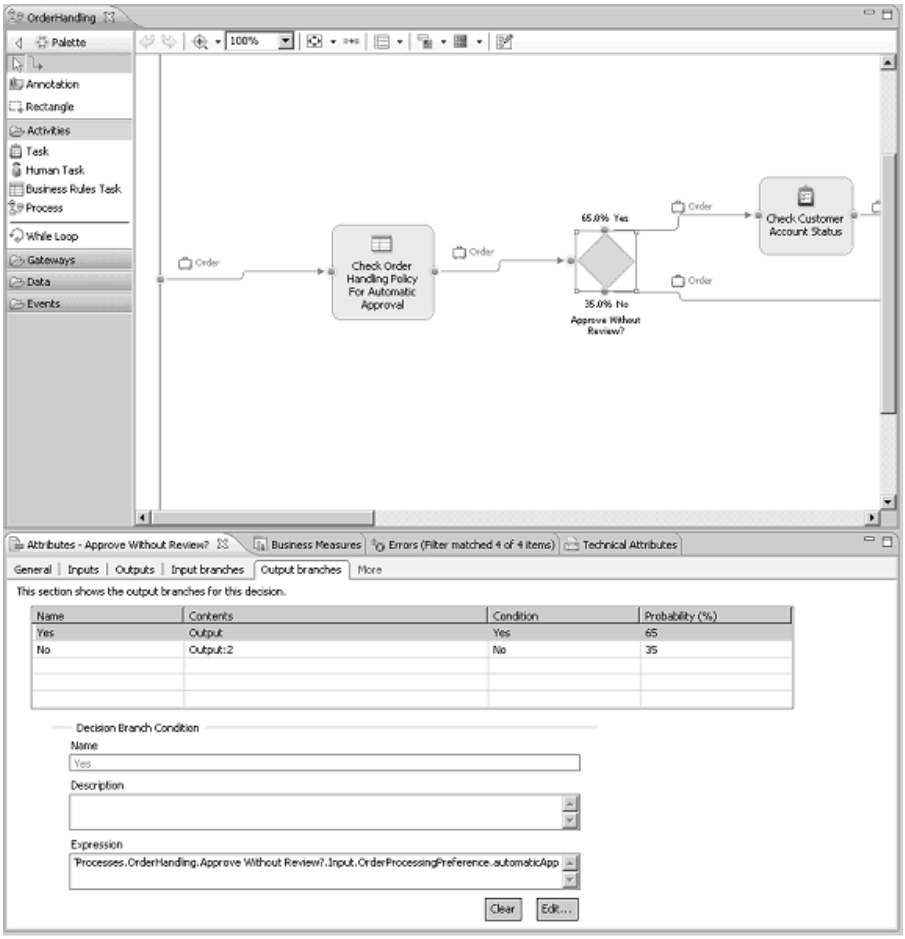
   a. Click the **Yes** cell and change the probability field to 65. Similarly, change the **No** probability field to 35. These probabilities are used during simulation.
   b. Click the **Yes** cell again. Scroll down to the Expression field and click **Edit** (you can size the panes in the 4-pane layout by selecting and dragging the borders). The Expression Builder wizard opens.



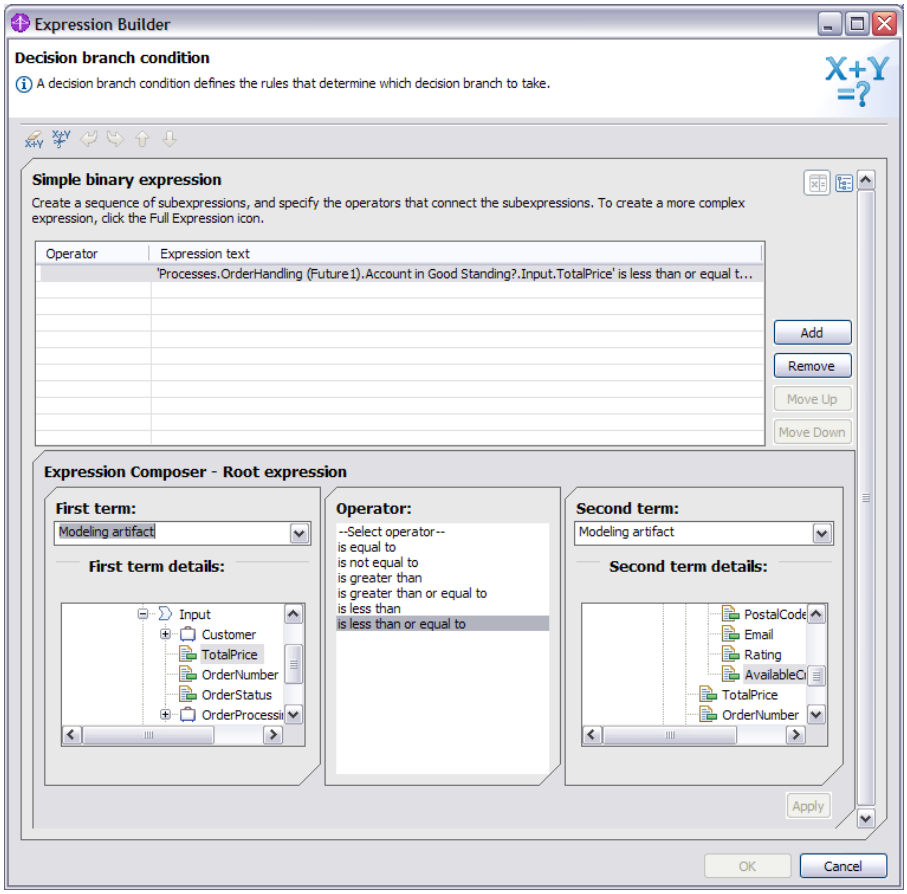
   c. In Expression Builder, complete the following steps:
      1) Click **Add**.
      2) Under the **Expression Composer**, ensure Modeling artifact is selected as the first term. Expand **Processes** → **OrderHandling** → **Approve Without Review?** → **Input** → **OrderProcessingPreference** and select **automaticApproval**.
      3) For **Operator**, select **is equal to**.
      4) For the second term, select **Boolean** and set the Boolean value to **true**.



5) Click **Apply**, and then click **OK**. You might need to scroll down to find the **OK** button.

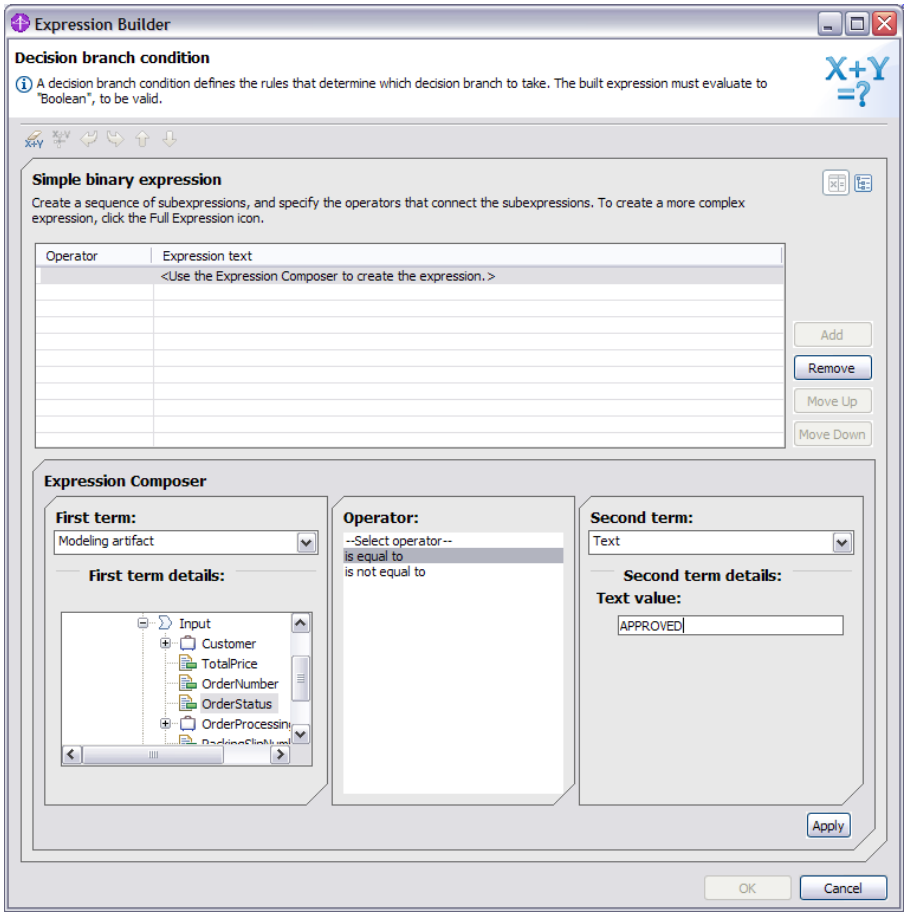


2. In the process diagram, click the **Account in Good Standing?** simple decision. In the Attributes view, click the **Output branches** tab and change the **Yes** probability to 85 and the **No** probability to 15.
   a. Select the **Yes** line, scroll down and click **Edit** under the **Expression** field.
   b. In the Expression Builder, complete the following steps:
      1) Click **Add**.
      2) Ensure that **Modeling artifact** is selected as the first term. Under **First term details**, expand **Processes** → **OrderHandling** → **Account in Good Standing?** → **Input** and select **TotalPrice**.
      3) For the **Operator**, select **is less than or equal to**.
      4) For the second term, select **Modeling artifact** and then expand **Processes** → **OrderHandling** → **Account in Good Standing** → **? Input** → **Customer** and select **AvailableCredit**.



5) Click **Apply**, click **OK**, and then save your work.

3. Click the **Acceptable Credit Risk?** task. In the Attributes view, select the **Output branches** tab. Make the following changes:
   a. Change the **Yes** probability to `70` and the **No** probability to `30`.
   b. Select the **Yes** line, scroll down and click **Edit** under the **Expression** field.
   c. In Expression Builder, complete the following steps:
      1) Click **Add**.
      2) Ensure **Modeling artifact** is selected as the first term. Under **First term details** expand **Processes** → **OrderHandling** → **Acceptable Credit Risk** → **Input** and select **OrderStatus**.
      3) For **Operator**, select **is equal to**.
      4) For the second term, select **Text** and enter the value as `APPROVED`.



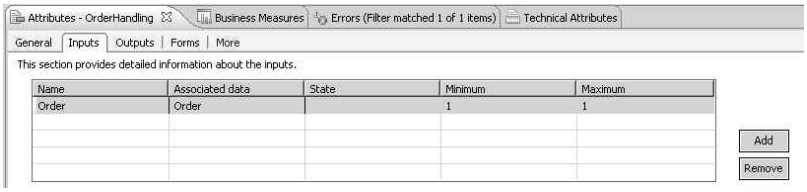
5) Click **Apply**, click **OK**, and then save your work. You should have no more errors (red Xs) on the decision elements of your process diagram.

Setting the input criterion for the process

In this lesson, you will set the input criterion for the process to ensure that the input parameter name matches the name in the form.

Complete the following steps:

1. Click the canvas and then click the **Attributes - OrderHandling** tab and then the **Inputs** tab.
2. Select the **Input** row.
3. For the name, type `Order`.



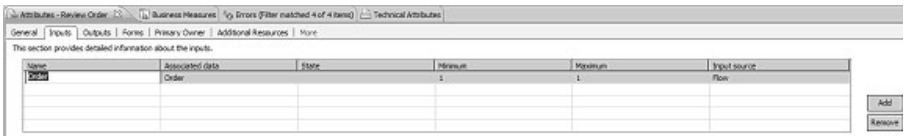
4. Save your work.

Setting the input specification for the process

In this lesson, you will set the input specification for the process to ensure that the input and output parameter names for the human tasks match the names in the form.

Complete the following steps:

1. Click the **Review Order** human task icon, then click the **Attributes – Review Order** tab and then the **Inputs** tab.
2. Select the **Input** row.
3. For the name, type `Order` and save your work.



4. Click the **Review Order** human task icon and the **Attributes – Review Order** tab again, but this time select the **Outputs** tab.
5. Select the **Output** row.
6. For the name, type `Order` and save your work.
7. Repeat these steps for the **Ship Order to Customer** human task.

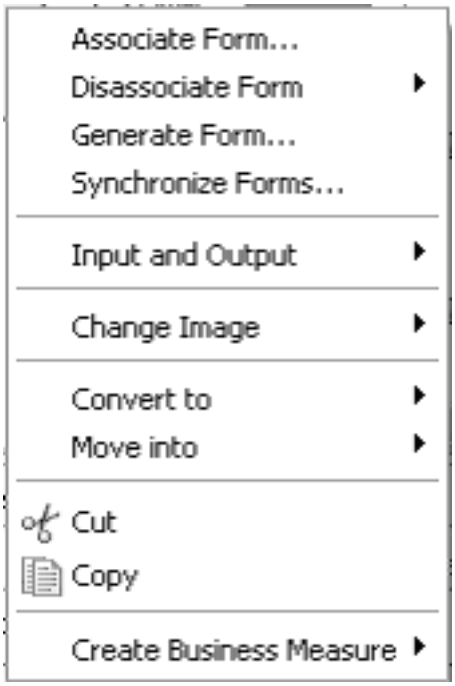
   Note: Errors are expected for both human tasks. You will correct these errors in "Synchronizing forms and human tasks."

Synchronizing forms and human tasks

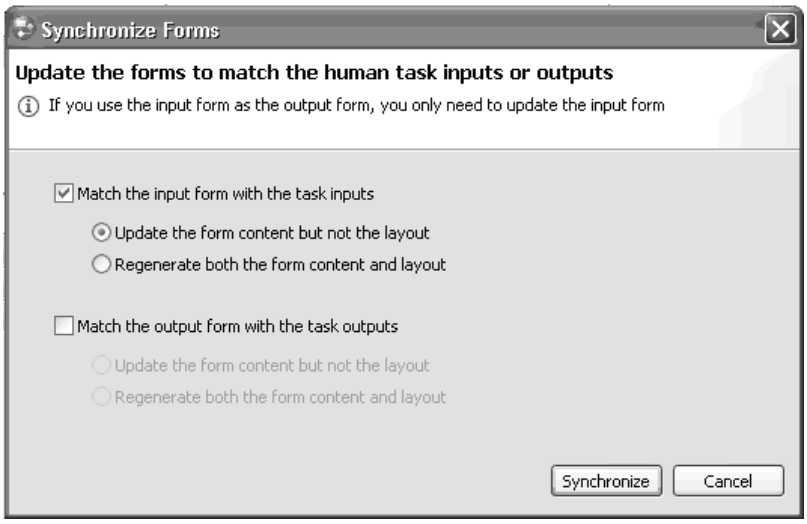
In this lesson, you will synchronize the Order form and the available human tasks to avoid XPath problems when exporting the Project Interchange file to WebSphere Integration Developer.

Complete the following steps:

1. Right-click the **Review Order** human task and select **Synchronize Forms**.



2. Select **Match the input form with the task inputs** and make sure that the **Update the form content but not the layout** entry is selected.
3. Click **Synchronize**.



The errors are corrected.

Note: Because the two human tasks, **Review Order** and **Ship Order to Customer**, use the same form, you do not need to repeat the previous steps for the Ship Order to Customer human task.

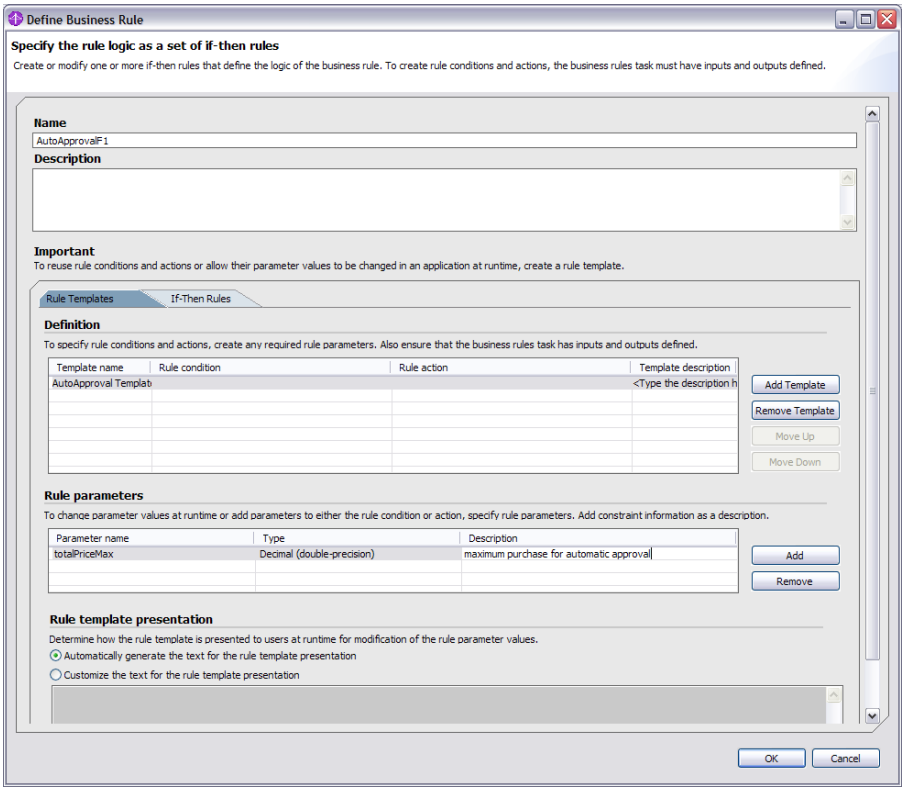
Implementing the business rule for automatic approval

In this lesson, you will set up a business rule to allow automatic approval of certain orders.

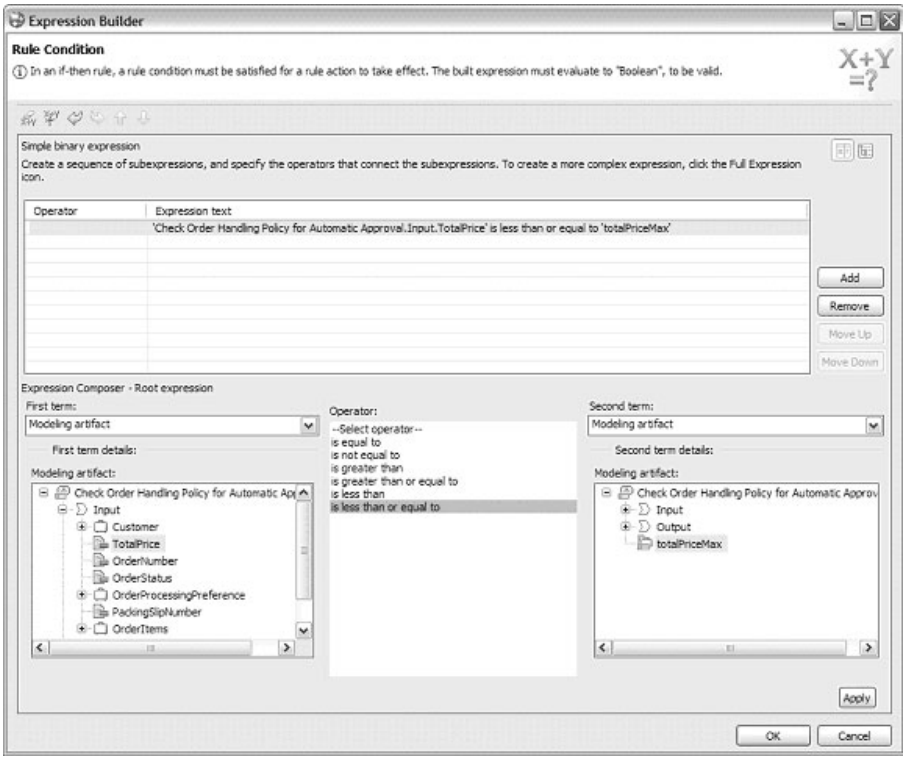
The business rules task uses the Order business item as the input and checks the TotalPrice variable. If the total price is less than or equal to a specified fixed amount (in this case $750.00), then the rules task sets the AutomaticApproval variable in the Order business item to true; otherwise, the variable is set to false. The business rules component returns the modified Order business item as the output.

To implement the business rules task, you will first create a template and then create an if-then rule instantiating the template.

1. In the process diagram, click the **Check Order Handling Policy for Automatic Approval** task and then, in the Attributes view, click the **Business Rules** tab.
2. Click **Add**. The Define Business Rule wizard opens.
3. Enter `AutoApprovalF1` as the name of the business rule.
4. Click the **Rule Templates** tab and then click **Add Template**.
5. Change the template name from `Rule template:1` to `AutoApproval Template` by selecting the name and typing over it.
6. Under **Rule parameters**, click **Add**.
7. Define the rule parameter by completing the following steps:
   a. Change the parameter name to `totalPriceMax` by selecting it and typing over the generated name.
   b. Select **Decimal (double-precision)** as the type.
   c. For the description, enter `maximum purchase price for automatic approval`.

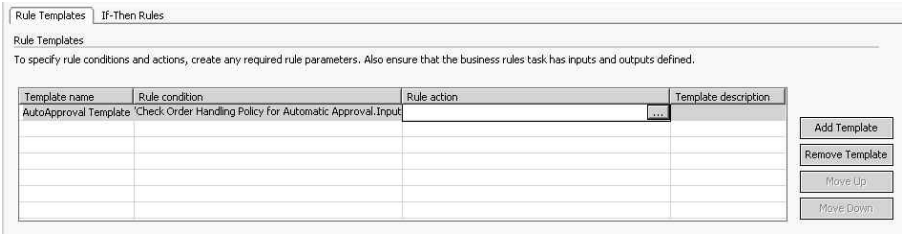


8. In the Rule Templates table, click the rule condition cell for **AutoApproval Template** and then click the  to open a Rule Condition wizard.
9. In the Expression Builder for the rule condition, complete the following steps:
   a. Add a simple binary expression by clicking **Add**.
   b. For the first term, select **Modeling Artifact**. Expand **Check Order Handling Policy for Automatic Approval** → **Input** and select **TotalPrice**.
   c. For the **Operator**, select **is less than or equal to**.
   d. For the second term, select **Modeling Artifact**. Expand **Check Order Handling Policy for Automatic Approval** and select **totalPriceMax**.



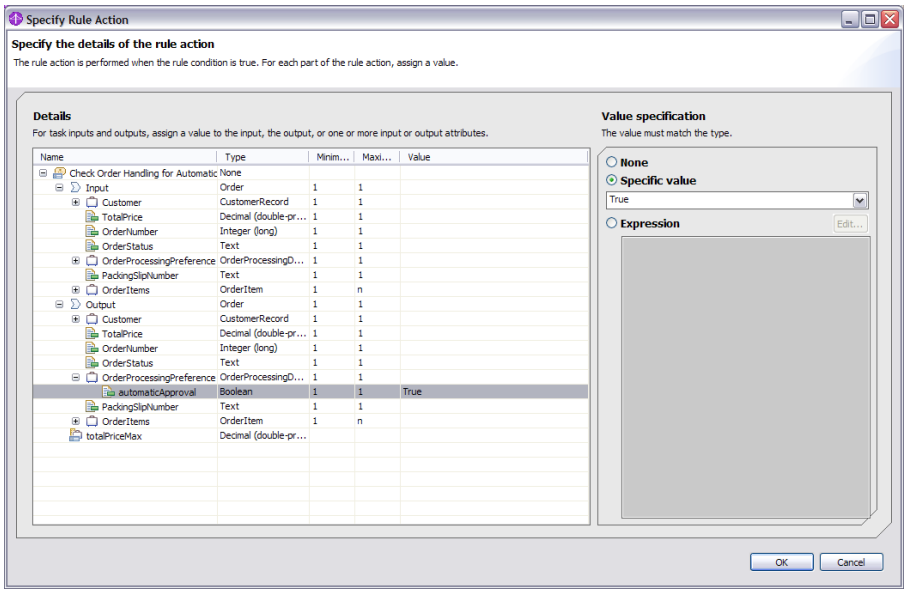
e. Click **Apply**, and then click **OK**.

10. Click in the **Rule action** cell for AutoApproval Template and then click the  .

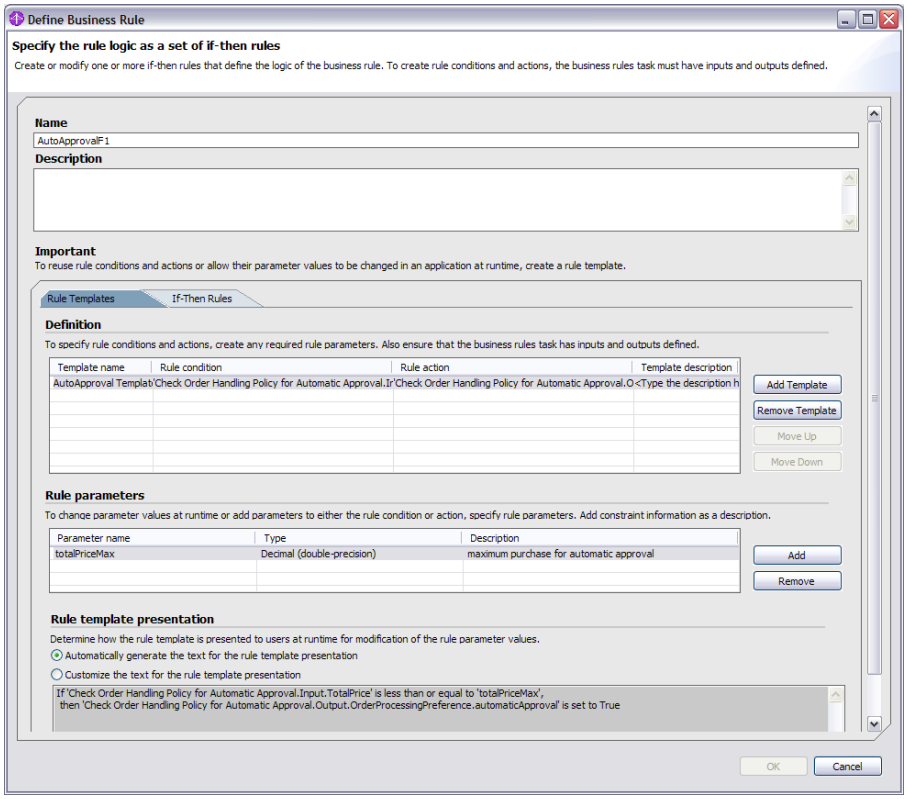


The Specify Rule Action wizard opens.

11. Specify the rule action by completing the following steps:
    a. Expand and select **Check Order Handling Policy for Automatic Approval** → **Output** → **OrderProcessingPreference** → **automaticApproval**. Then select **Value specification** → **Specific value** and **True**. Click **OK**.



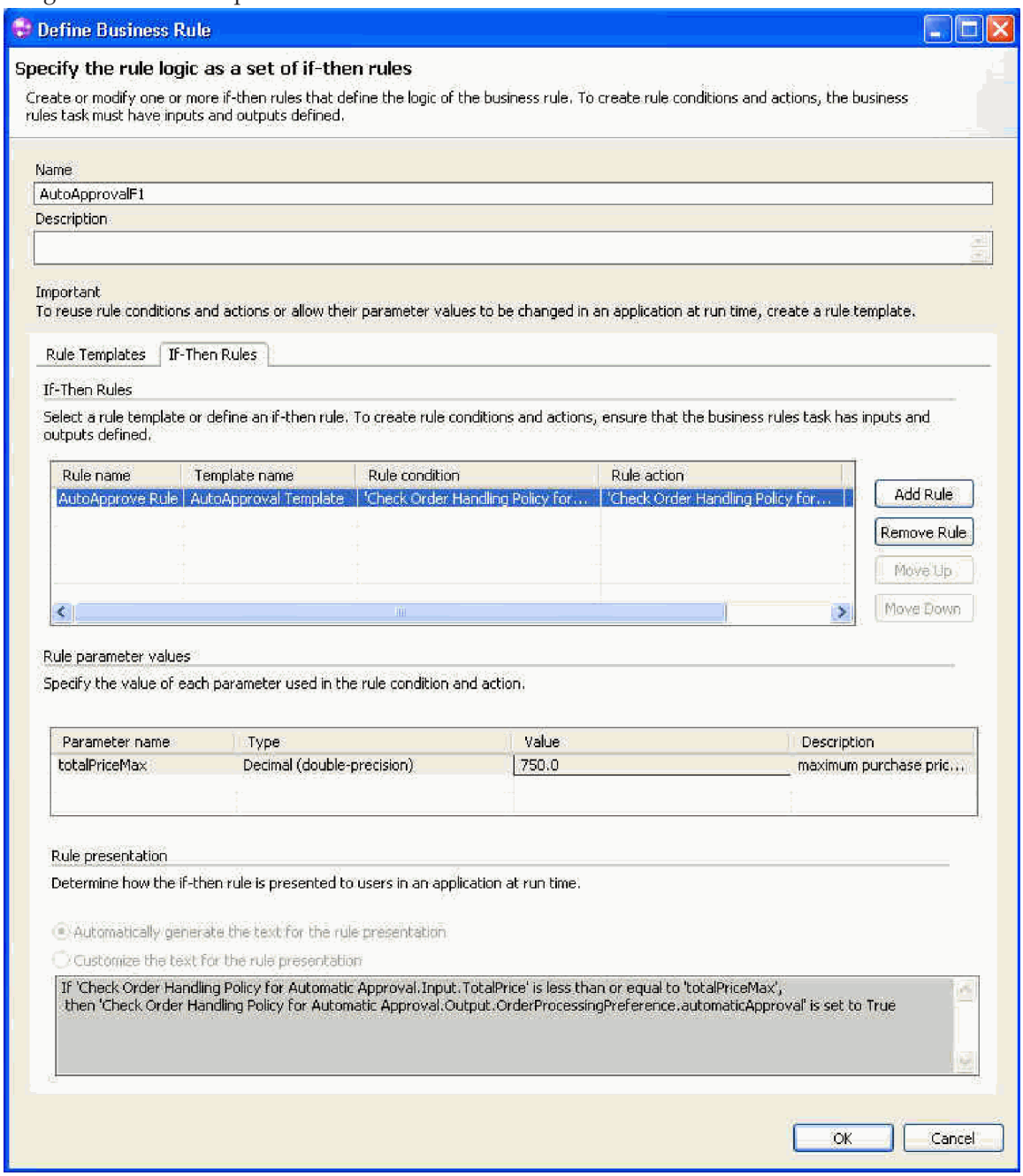
The following figure shows the completed business rule template.



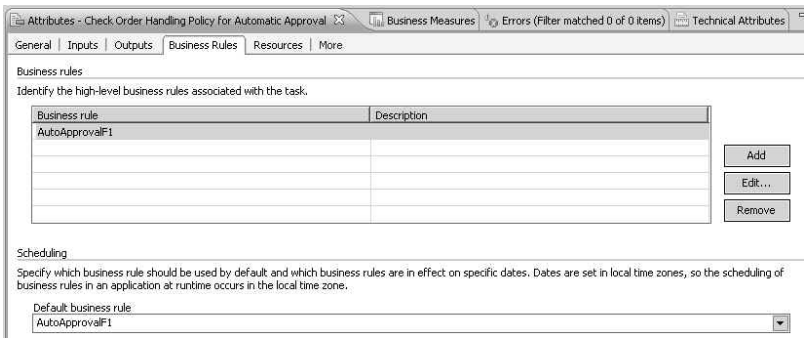
You must now create an if-then instance of this rule template.

12. Click the **If-Then Rules** tab.
13. Click **Add Rule**.
14. Change the name of the new rule to `AutoApprove Rule`.
15. For Template name select **AutoApproval Template**.
16. After selecting the template, a pop-up will ask if you want to overwrite the rule conditions and actions, click OK. This will fill in the rest of the fields.

17. Under Rule parameter values, change the Value of totalPriceMax from 0.0 to `750.0` The following image shows the completed business rule.



18. Close the Define Business Rule wizard by clicking **OK**.
19. In the Attributes view, select the **Business Rules** tab and scroll down to the **Scheduling** section. For Default business rule, select **AutomaticApprovalF1** from the list. Save your work.



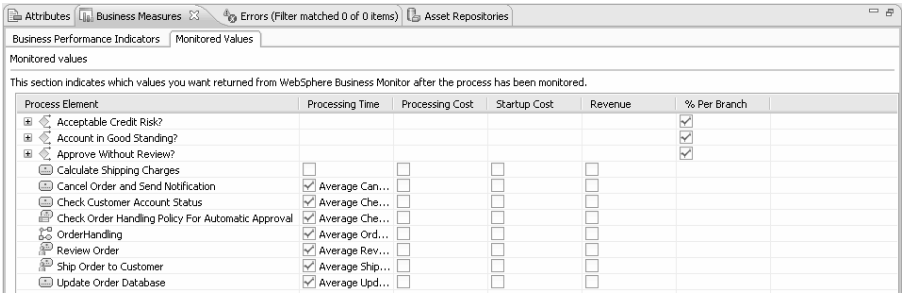
Specifying monitoring criteria

In this lesson, you will define the measurements you want to show to the executives.

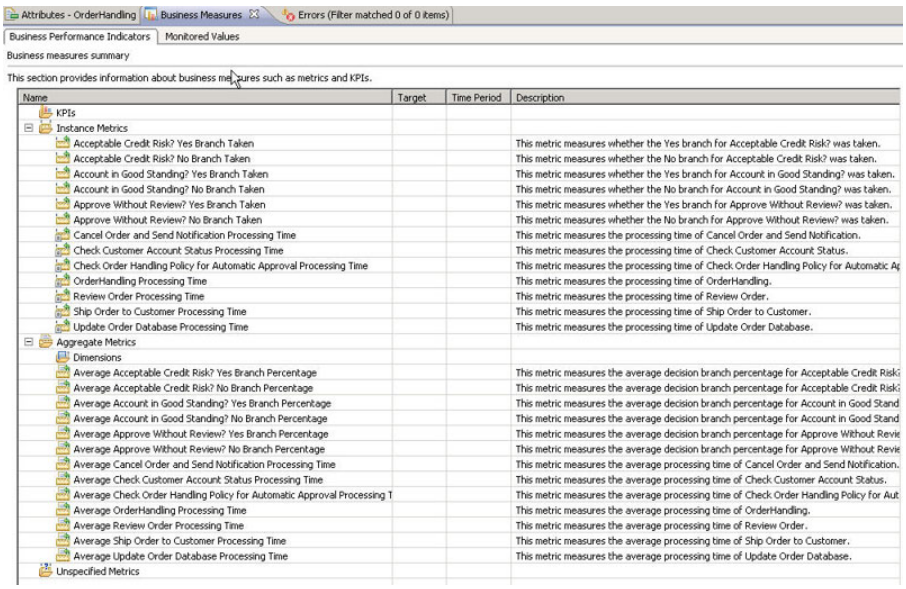
IBM WebSphere Business Monitor retrieves business measures, the raw data from running business process, and displays them in a business space. For this tutorial, the executives want to see the data by country and city, which is known as dimensional analysis. First, you create a dimension. Then you create several key performance indicators (KPIs), which are calculated values that are significant to running the business. Two of these KPIs are Percentage of Orders Shipped and Average process Duration.

To specify what should be monitored, complete the following steps:

1. Click the canvas, and then click **Business Measures** tab and then the **Monitored Values** tab.
2. In the **% Per Branch** column, select the three check boxes (See the image in the next step.)
3. In the **Processing Time** column, Select the check box for each process element except the Calculate Shipping Charges process element. Save your work.



4. Click the **Business Performance Indicators** tab, review the metrics that are created based on the monitored value selections.

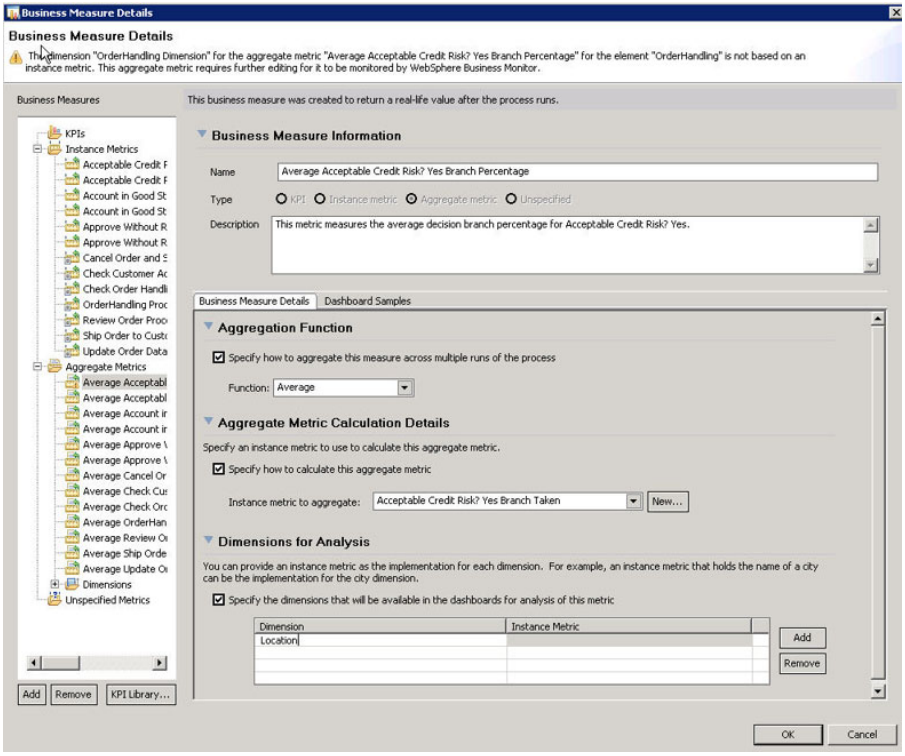


Creating a location dimension

In this lesson, you will create the Location dimension to allow you to do dimensional analysis by country and city.

You cannot specify a two-level dimension in IBM WebSphere Business Modeler, so you just create a single level in WebSphere Business Modeler and then you complete the implementation in the WebSphere Business Monitor development toolkit.

1. On the **Business Performance Indicators** tab, double-click the first aggregate metric in the list (Average Acceptable Credit Risk? Yes Branch Percentage). This opens the **Business Measures Details** window.
2. On the Business Measure Details window, in the Dimension Analysis section, select the check box **Specify the dimensions that will be available in the dashboards for analysis of this metric**.
3. Click **Add**, and change the name of the dimension to `Location`.
4. Click **OK**.



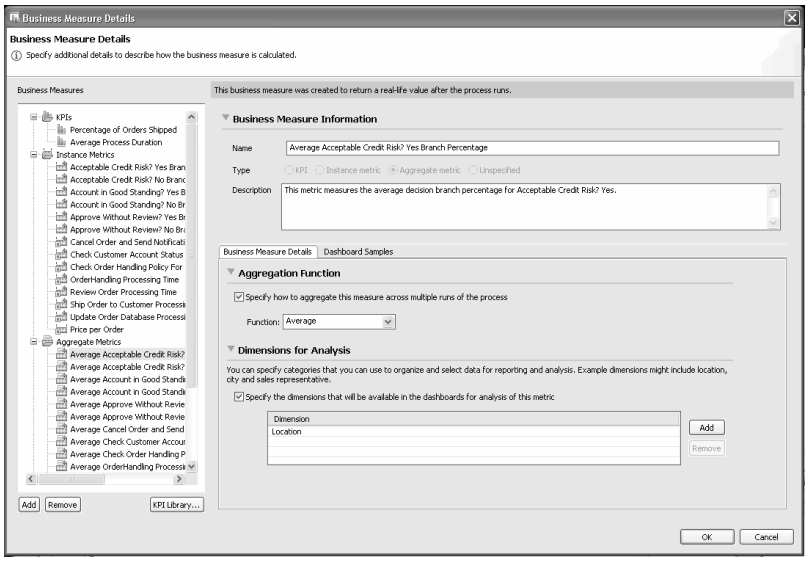
Creating the Percentage of Orders Shipped key performance indicator

In this lesson, you will set up the percentage of orders shipped as a key performance indicator (KPI).

One of the KPIs that we need to track is the percentage of orders shipped. By tracking this KPI you can determine, automatically, if your business is being successful as defined by predetermined criteria.

Complete the following steps:

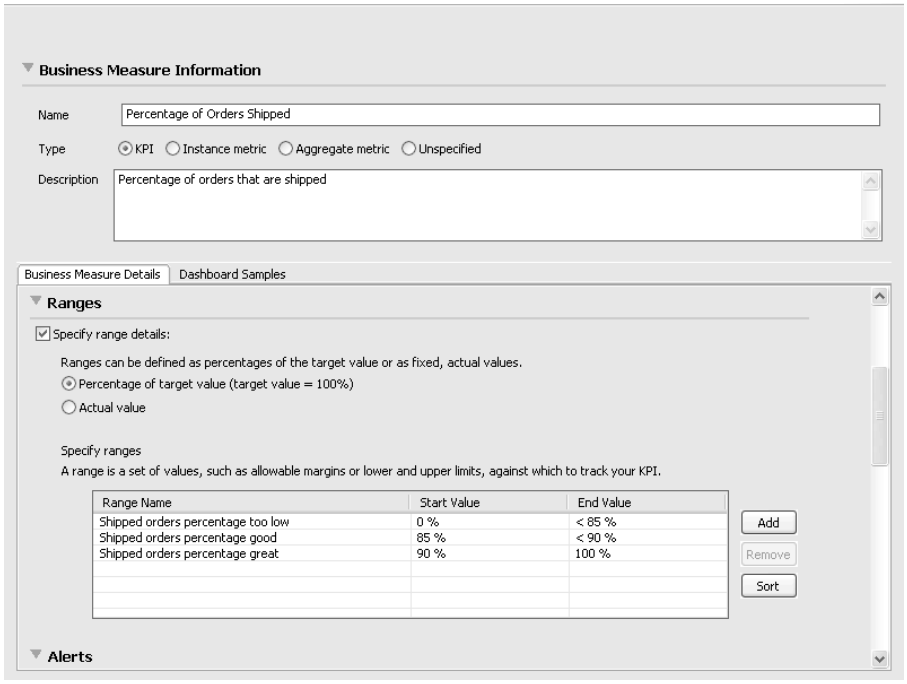
1. Click the **Business Performance Indicators** tab in the Business Measures view, and then click **Add.**
2. In Business Measure Details wizard, name the business measure `Percentage of Orders Shipped`.
3. For the **Type**, select **KPI**.
4. In the **Description** field, type `Percentage of orders that are shipped`.
5. Click the **Dashboard Samples** tab and preview the different KPI representations. You can select each of the highlighted values, such as KPI Gauge or KPI Bar to see how the KPI is represented as a gauge or bar graph. You can change the selection from KPI to one of the other values (instance metric, aggregate metric, or unspecified) to see the various ways they are displayed on a dashboard. When you are finished exploring the dashboards, ensure the **Type** field is selected as **KPI** before proceeding.



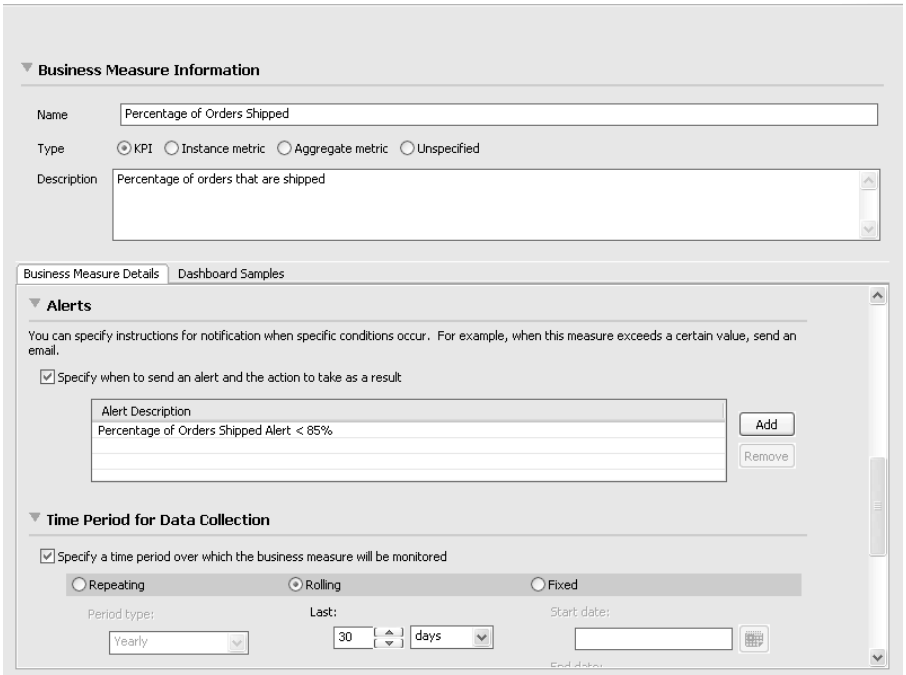
6. Click **Business Measure Details** tab. Select **Specify a target type and value**. Select the type as **Number** and change the target value to **90**.
7. Select **Specify range details** and **Percentage of target value (target value = 100%)**.
8. Under **Specify ranges**, click **Add** and change the **Range name** to `Shipped orders percentage too low`. Set the start value as `0` and the end value as `85`. Perform the same actions for the following ranges:

Range name	Start value	End value
Shipped orders percentage good	85	90
Shipped orders percentage great	90	100

Tip: In many tables that have an **Add** button, you can click **Add** or double-click in a row in the table to add a row.



9. Select **Specify when to send an alert and the action to take as a result**. Click **Add**. The Percentage of Orders Shipped Alert is added. Change it to `Percentage of Orders Shipped < 85%`.
10. Select **Specify a time period over which the business measure will be monitored**. Select **Rolling** and **Last 30 days**.



11. Click **OK** and save your work.

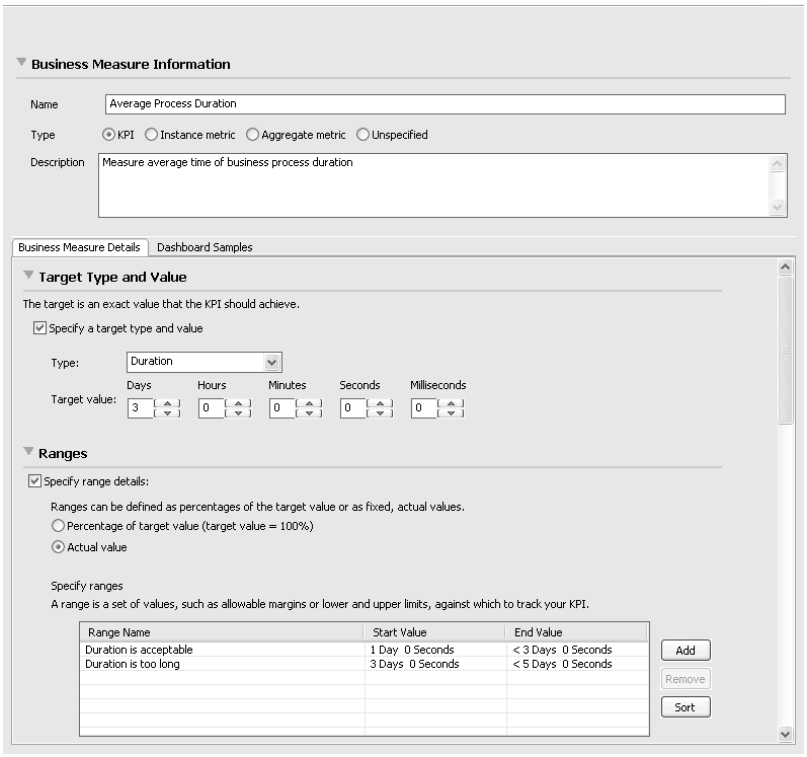
Creating the Average Process Duration key performance indicator

In this lesson, you will set up the average process duration as a KPI.

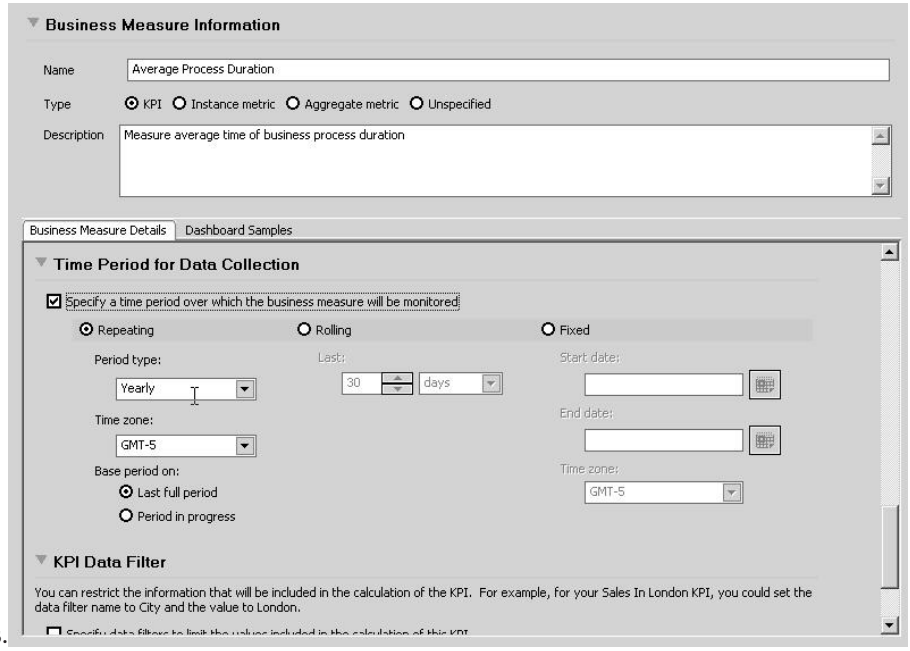
Another KPI to track is the average process duration. By tracking this KPI you can determine, automatically, if your business is being successful as defined by predetermined criteria.

Complete the following steps:

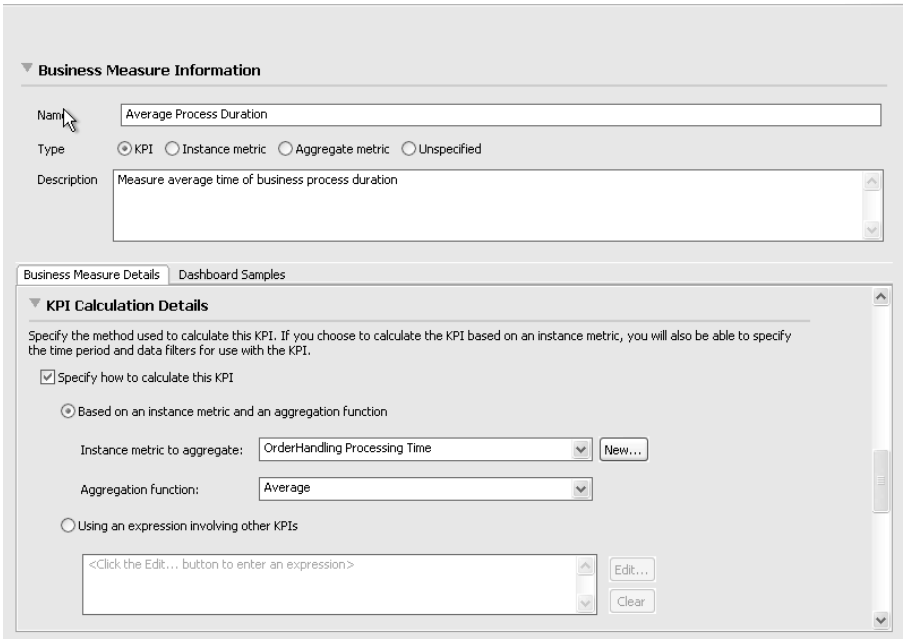
1. Click **Add** to add a new business performance indicator.
2. In the Business Measure Details wizard, enter the name `Average Process Duration` and click **KPI**.
3. In the **Description** field, type `Measure average time of business process duration`.
4. Select **Specify a target value and type**.
5. In the **Type** field, select **Duration** .
6. Specify 3 in the **Days** field.
7. Select **Specify range details** and click **Actual value**.
8. Under **Specify ranges**, click **Add**. Change the range name to `Duration is acceptable`, the start value to **1 Day** and the end value to **3 days**.
9. Click **Add** again. Change the range name to `Duration is too long`, the start value to **3 Days** and the end value to **5 days**.



10. Select **Specify when to send an alert and the action to take as a result**.
11. Click **Add**. An **Average Process Duration Alert** is added. Change it to **Average Process Duration > 3 days**.
12. Select **Specify a time period over which the business measure will be monitored**. Select **Repeating**, and choose the period type as **Yearly**, the time zone as **GMT-5**, and the base period as **Period in progress**.



13. Select **Specify how to calculate this KPI**. In the **Instance metric to aggregate** field, select **OrderHandling Processing Time**. In the **Aggregation function** field, select **Average**



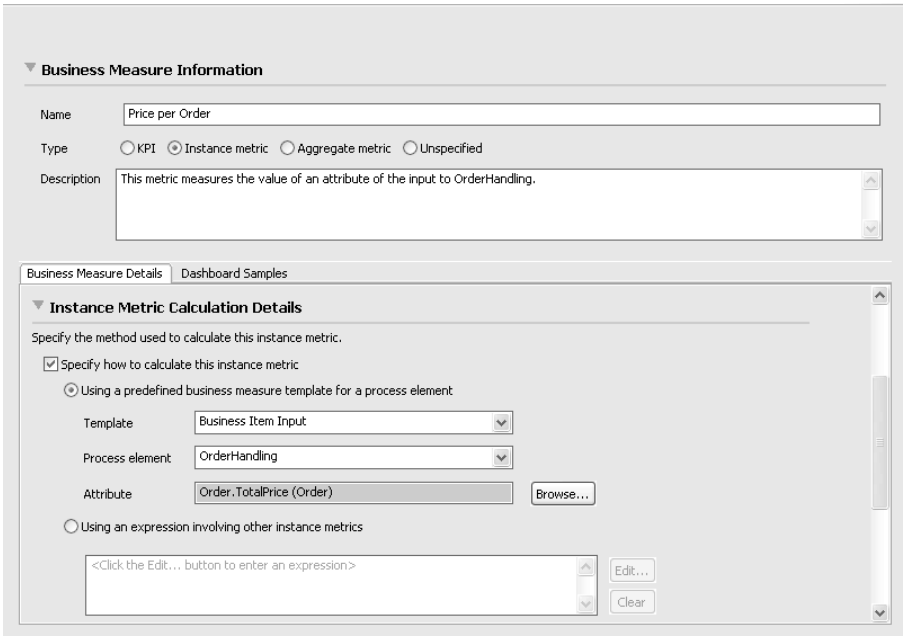
14. Click **OK** and save your work.

Creating the Price per Order instance metric

In this lesson, you will create an instance metric for price per order.

The Price per Order metric is used as a source for aggregations that average the order prices and also total the order prices.

1. Click **Add** to add a new instance metric.
2. Enter the name as `Price per Order`.
3. For the **Type**, select **Instance metric**.
4. In the **Description** field, type `price per order`.
5. Under Instance Metric Calculation Details, select **Specify how to calculate this instance metric**. In the **Template** field, select **Business Item Input**. In the **Process element** field, select **OrderHandling**. For the **Attribute** field, click on the **Browse** button. In the Business Item Attribute Selection window, expand **Order (Order)** and select **TotalPrice**. Click **OK**. The selection displays as **Order.TotalPrice (Order)**.
6. Click **OK** and save your work.



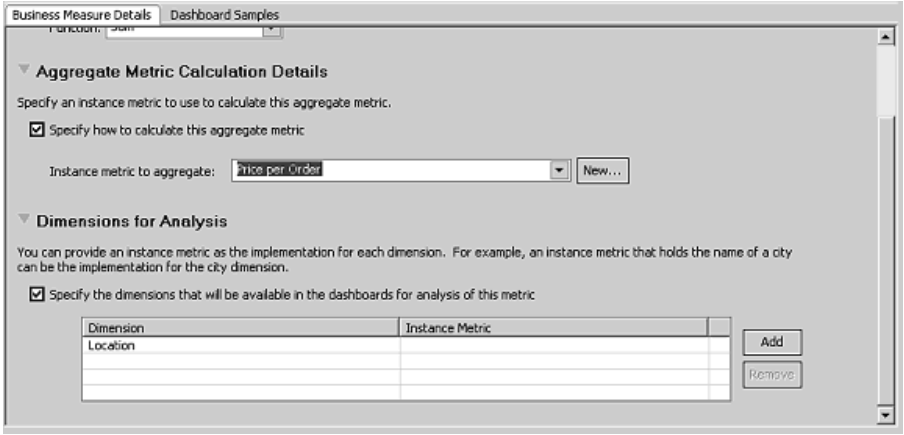
Creating the Order Price Total aggregate metric

In this lesson, you will create the order price total aggregate metric.

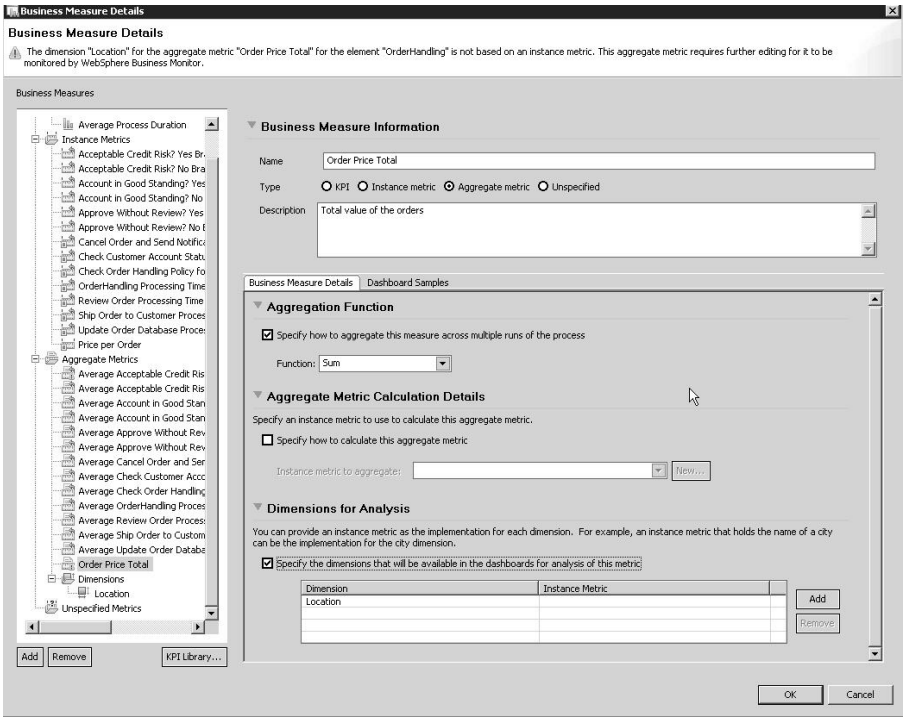
The order price total aggregate metric is another parameter necessary to measure the success of the business.

Complete the following steps:

1. Click **Add** to add a new aggregate metric.
2. Enter the name as `Order Price Total`.
3. For the **Type**, select **Aggregate metric**.
4. In the **Description** field, type `Total value of the orders`.
5. Select **Specify how to aggregate this measure across multiple runs of the process**. In the **Function** field, select `Sum`.
6. In the Aggregate Metric Calculation Details section, select **Specify how to calculate this aggregate metric** . In the **Instance metric to aggregate** field, select `Price per Order`.



7. Select **Specify the dimensions that will be available in the dashboards for analysis of this metric**. Keep the dimension as **Location**.



8. Click **OK** and save your work.

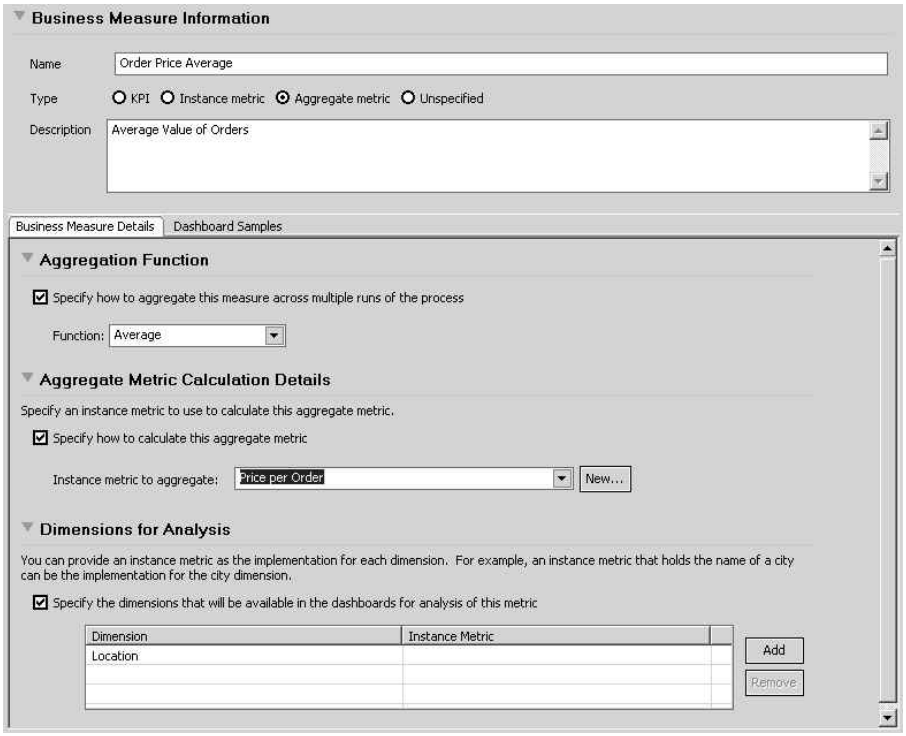
Creating the Order Price Average aggregate metric

In this lesson, you will create the order price average aggregate metric.

The order price average is another parameter you use to measure the success of the business.

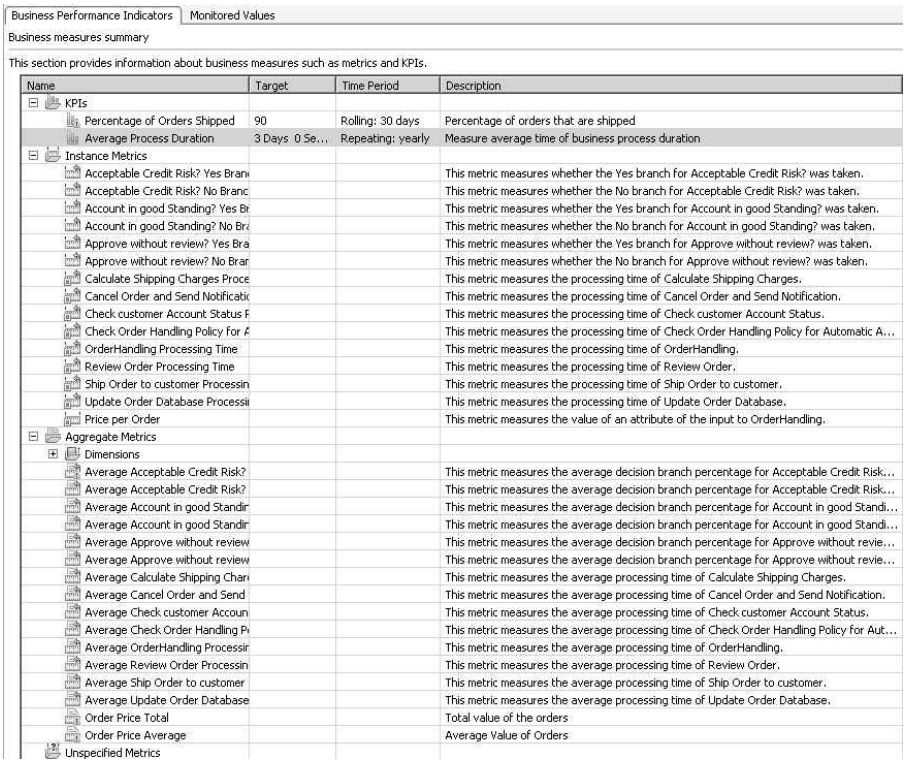
Complete the following steps:

1. Click **Add** to add a new Business Performance Indicator.
2. Enter the name as `Order Price Average`.
3. In the **Type** field, select **Aggregate metric**.
4. In the **Description** field, type `Average value of orders`.
5. Select **Specify how to aggregate this measure across multiple runs of the process**. In the **Function** field, select **Average**.
6. In the Aggregate Metric Calculation Details section, select **Specify how to calculate this aggregate metric**. In the **Instance metric to aggregate** field, select **Price per Order**.
7. In the Dimensions for Analysis section, select **Specify the dimensions that will be available in the dashboards for analysis of this metric**. Keep the dimension as **Location**.



8. Click **OK** and save your work.

The business performance indicators you added are listed in the business measures summary. The business measures summary is located under the **Business Performance Indicators** tab.



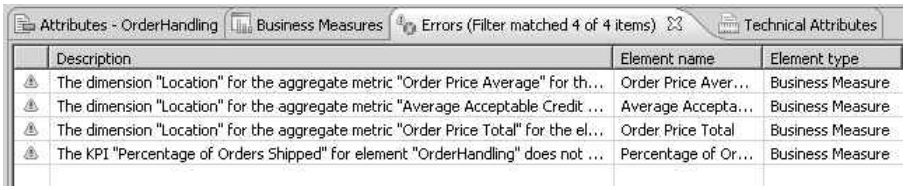
Exporting the model for further development

In this lesson, you will export the business process model from IBM WebSphere Business Modeler in a format that you will import into WebSphere Integration Developer.

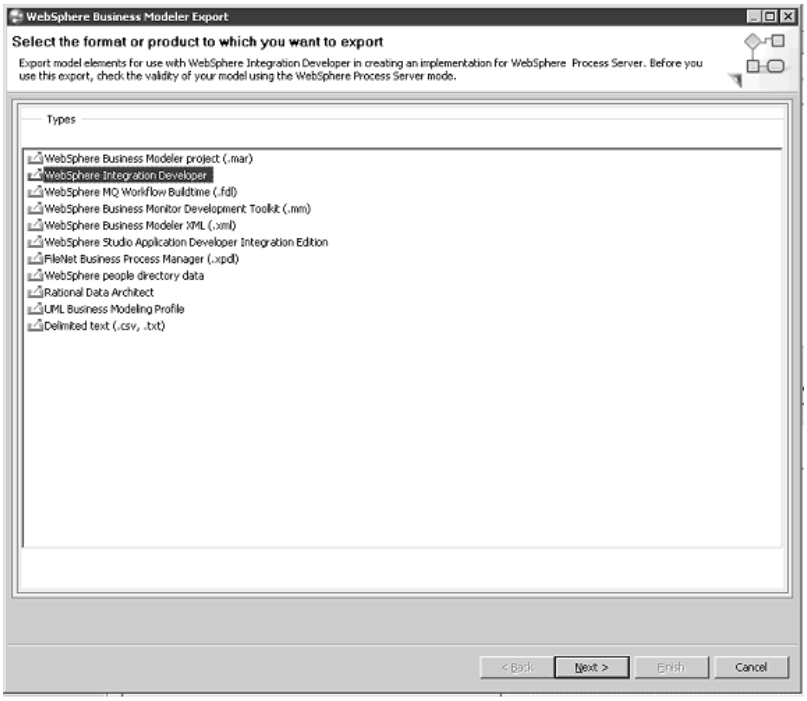
You have completed modeling the Clips and Tacks business process. Now you will export this model from IBM WebSphere Business Modeler and import it into WebSphere Integration Developer for further development. You will also use it in the WebSphere Business Monitor development toolkit.

Complete the following steps:

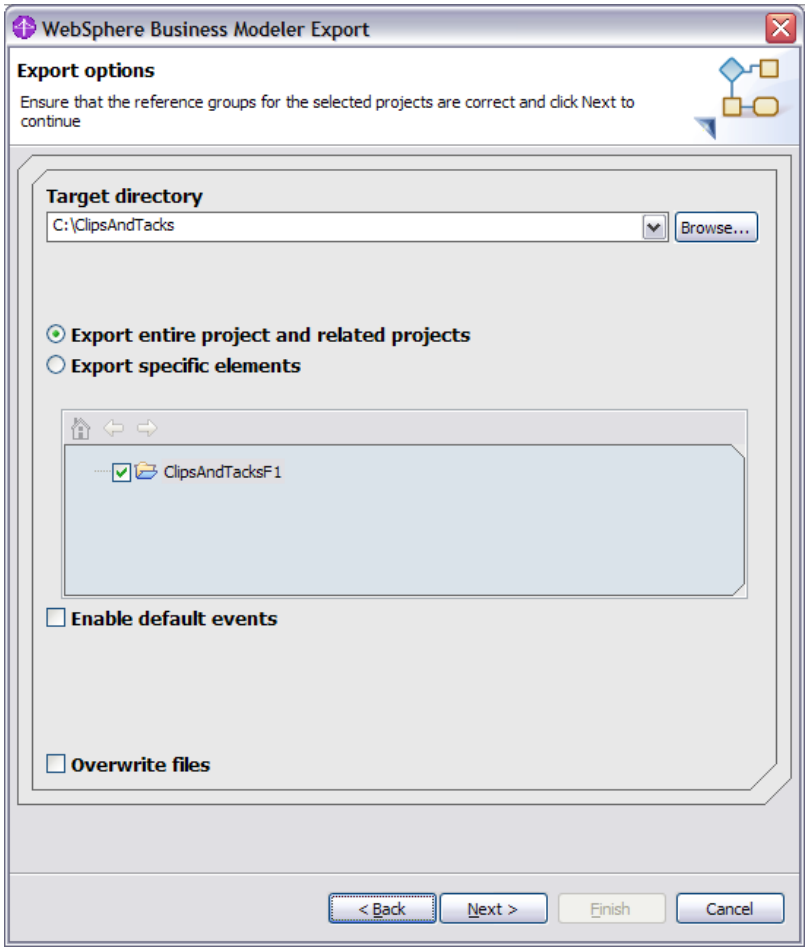
1. Select the **Errors** tab and ensure there are no errors in the model. If there are errors, then correct them. You have four warnings in your model at this point, but they will be resolved during integration development. If other warnings are displayed, they are acceptable.



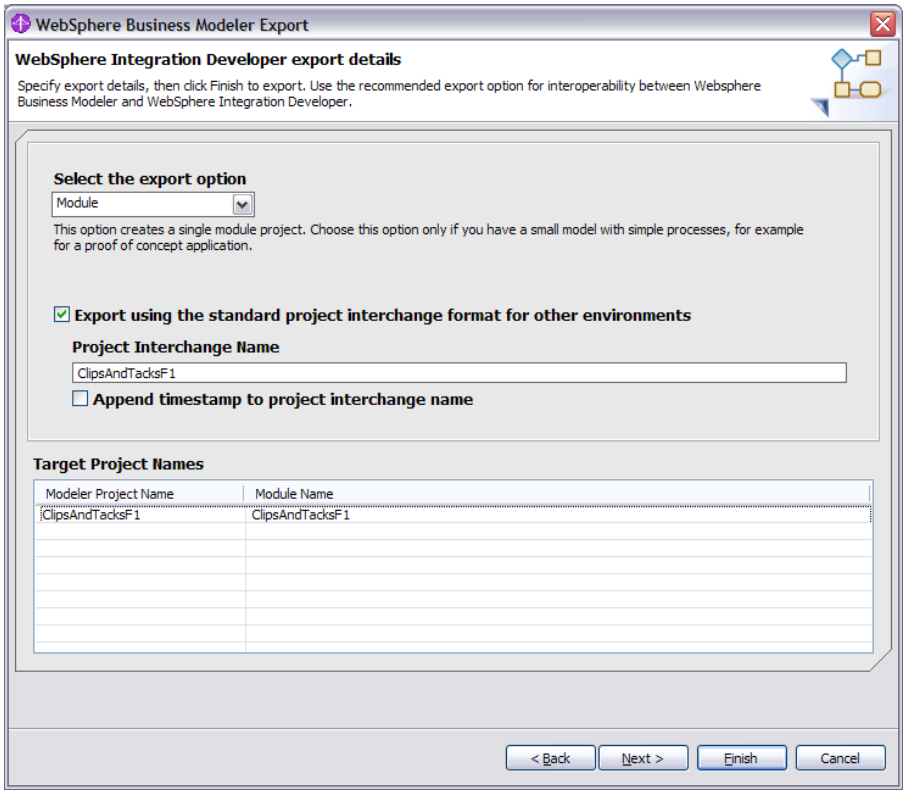
2. Right-click **ClipsAndTacksF1** on the project tree and select **Export**.



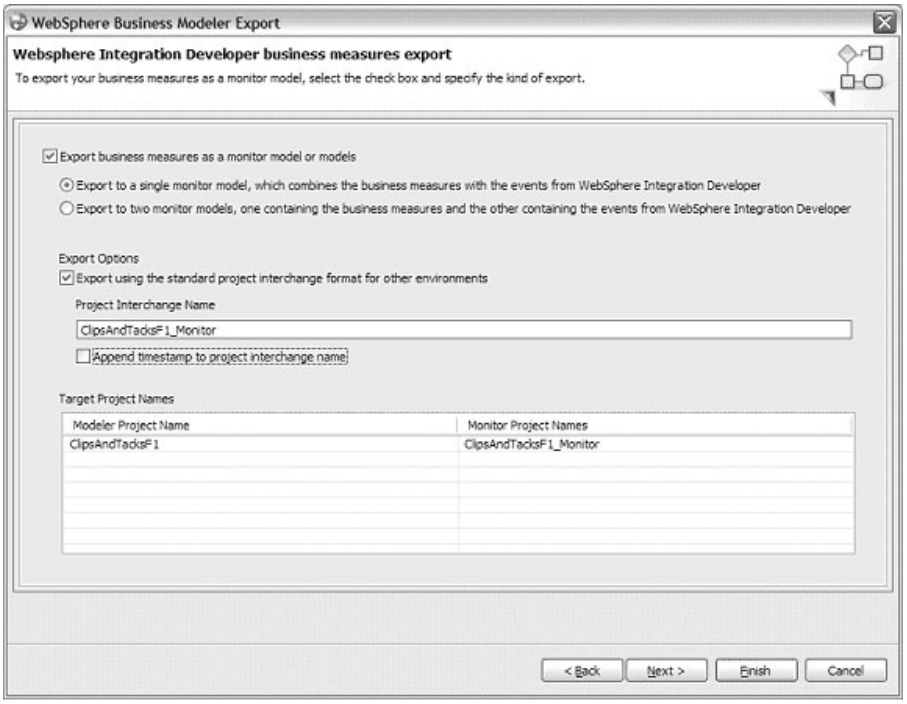
3. Select **WebSphere Integration Developer** and then click **Next**.
4. Select a target directory (for example, `C:\ClipsAndTacks`).



5. Select **Export entire project and related projects** and click **Next**.
6. Select the **Module** export option.
7. Ensure **Export using the standard project interchange format for other environments** is selected.
8. Clear **Append timestamp to project interchange name** (so that it is easier to define the name in this tutorial) and click **Next**.



9. Select **Export business measures as a monitor model or models**.
10. Clear **Append timestamp to project interchange name** (to simplify the name in this tutorial) and click **Finish**. The Export finished window is displayed, informing you that the export finished warnings.



11. You can ignore the warning because you will be running the application on a server that has been augmented with WebSphere Business Services Fabric. To view the warning, click **Details**; otherwise, click **OK**.

The project is placed in a ZIP file, **ClipsAndTacksF1.zip**, that can be imported into WebSphere Integration Developer as a single file.

Integration development

During the integration development phase, use IBM WebSphere Integration Developer to develop a business process and business rules, generate Java components, create a WebSphere Business Services Fabric project, and create the user interface.

In the integration development phase, complete the following tasks:

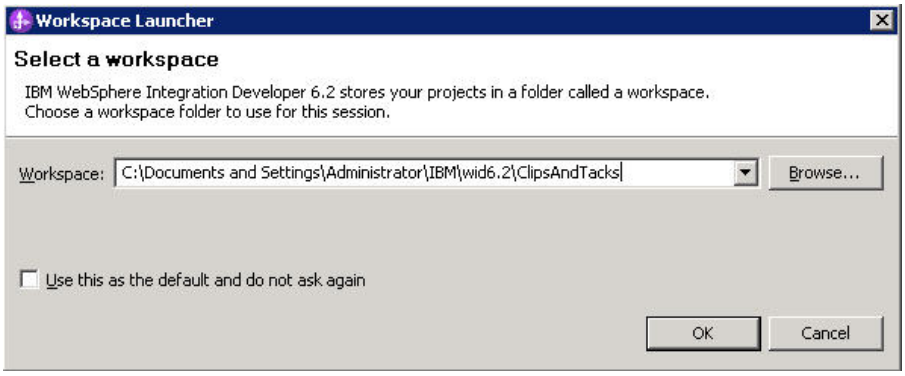
1. "Importing model files into WebSphere Integration Developer"
2. "Setting up the Lotus Forms Server API workspace" on page 57
3. "Setting up the project to use the WebSphere Business Services Fabric runtime APIs" on page 58
4. "Importing web services endpoints into WebSphere Integration Developer" on page 59
5. "Defining business rules" on page 60
6. "Generating Java components" on page 62
7. "Adding a Dynamic Assembler extension" on page 65
8. "Creating the process invocation method" on page 67

Importing model files into WebSphere Integration Developer

In this lesson, you will import the exported file from IBM WebSphere Business Modeler into WebSphere Integration Developer. You can use the `ClipsAndTacksF1.zip` file that you created with the previous tasks, or you can use the `ClipsAndTacksF1.zip` provided with this tutorial. See the Chapter 5, "Download and import samples," on page 141 section for instructions on downloading the provided project interchange file.

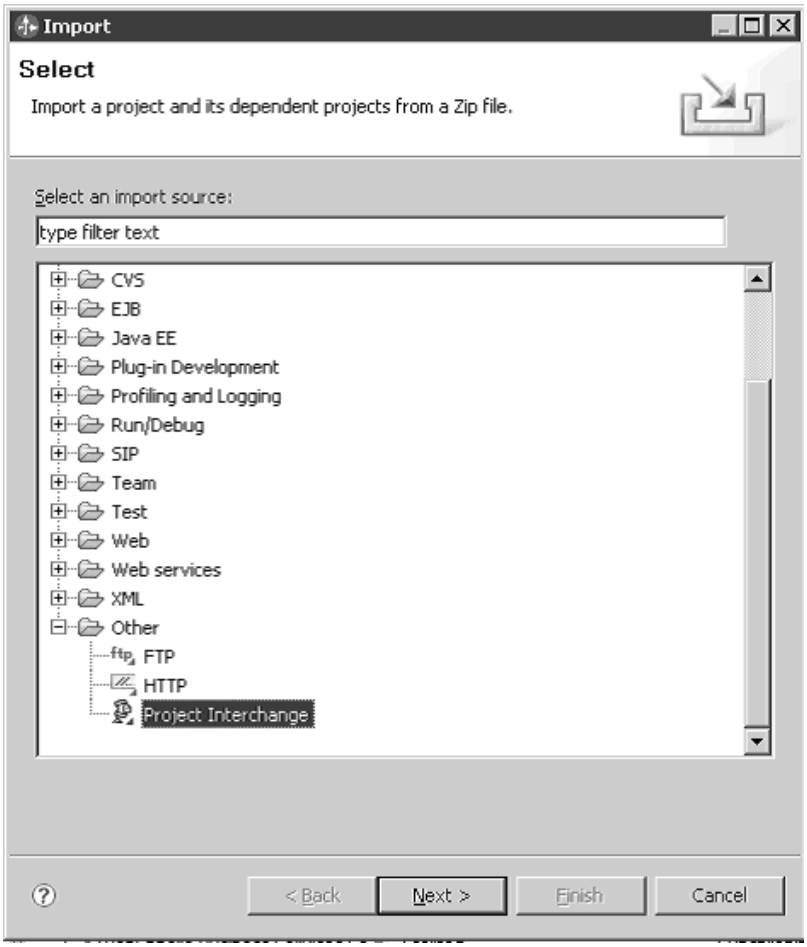
Complete the following steps:

1. Start WebSphere Integration Developer V6.2. The Workspace Launcher opens.



2. Create a new workspace for this tutorial, for example `C:\Documents and Settings\Administrator\IBM\wid6.2\ClipsAndTacks`.

   Note: Do not select **Use this as the default and do not ask again** so you will be prompted for a workspace location each time you open the application.
3. Click **OK**. WebSphere Integration Developer opens. If the Welcome page is displayed, close it.
4. To import the PI file, select **File > Import**. The Import wizard opens.
5. Select **Other > Project Interchange** and click **Next**.



6. From the Import Project Interchange Contents wizard, in the **From zip file** field, click **Browse** and select the `ClipsAndTacksF1.zip` file of your choice (either the supplied file or the one you built in the previous section).

7. Select **ClipsAndTacksF1** and click **Finish**.

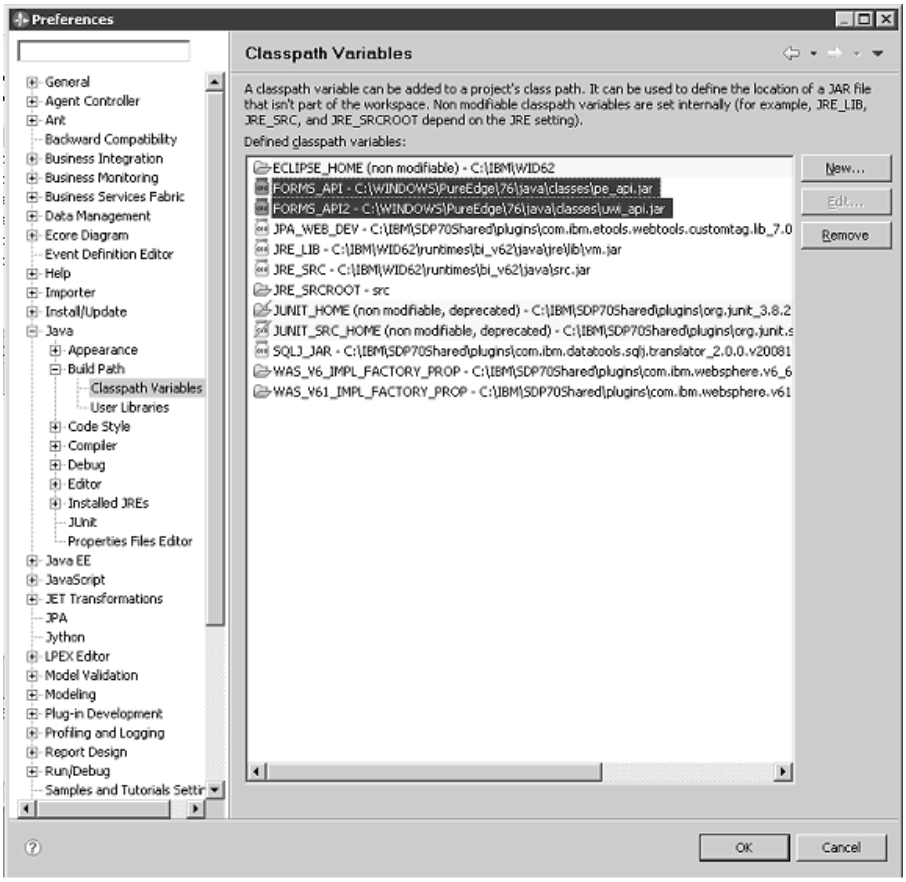
Setting up the Lotus Forms Server API workspace

In this lesson, you will add two .jar files to enable the Lotus Forms Server API to compute some of the values in the Order form automatically.

To add the two .jar files, complete the following steps.

1. In WebSphere Integration Developer, select **Window** → **Preferences** and expand the list of configurable items by clicking the .
2. Select **Java** → **BuildPath** → **Classpath Variables**.

   Note: If Java does not display as an option, switch to a Java perspective. Select **Window** → **Preferences** and switch back to the Business Integration perspective.
3. Add two variables named *FORMS_API* and *FORMS_API2* as shown in the following figure. These variables point to the location of the .jar files, pe_api.jar and uwi_api.jar. The location of these files depends on how Lotus Forms Server was installed. If Lotus Forms Server was installed into WebSphere Integration Developer, these files are typically located at: `<WID62_Install>\API\lib\java`. If not, these files are typically located at `C:\Windows\PureEdge\76\java\classes`.



4. Click **OK**.

Note: The ClipsAndTacksF1 project has some errors at this stage of the tutorial. These errors will be corrected as the tutorial progresses.

Setting up the project to use the WebSphere Business Services Fabric runtime APIs

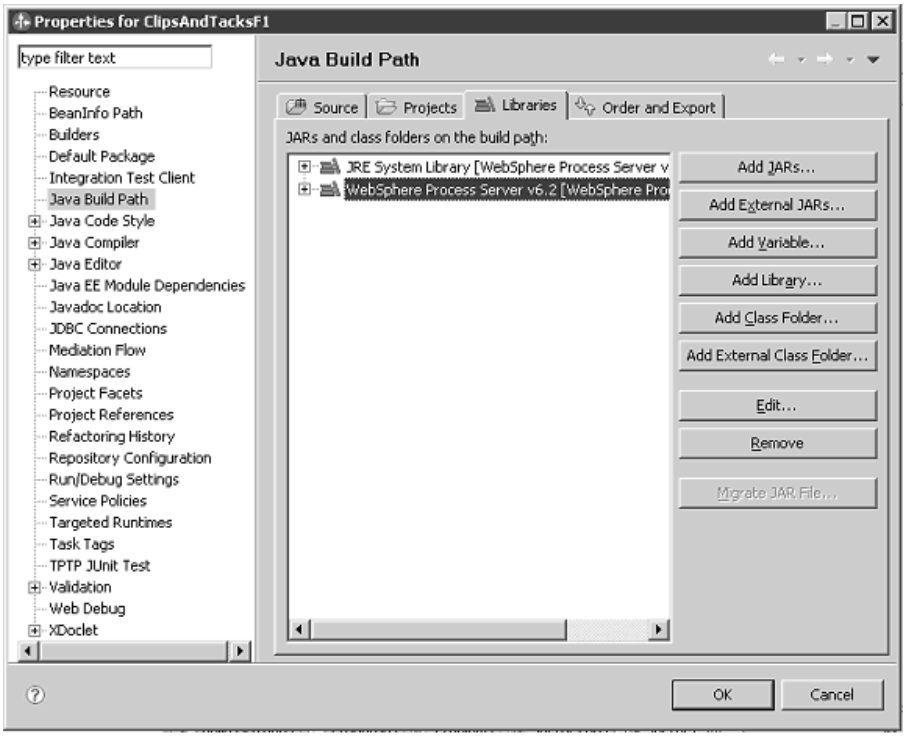
In this lesson, you will replace the WebSphere Process Server V6.2 runtime library with the WebSphere Business Services Fabric V6.2 runtime library.

This project includes implementations and functionality that use several of the WebSphere Business Services Fabric V6.2 runtime APIs. To use the WebSphere Business Services Fabric V6.2 runtime APIs, its runtime library must replace the existing WebSphere Process Server V6.2 runtime library in the project's preferences.

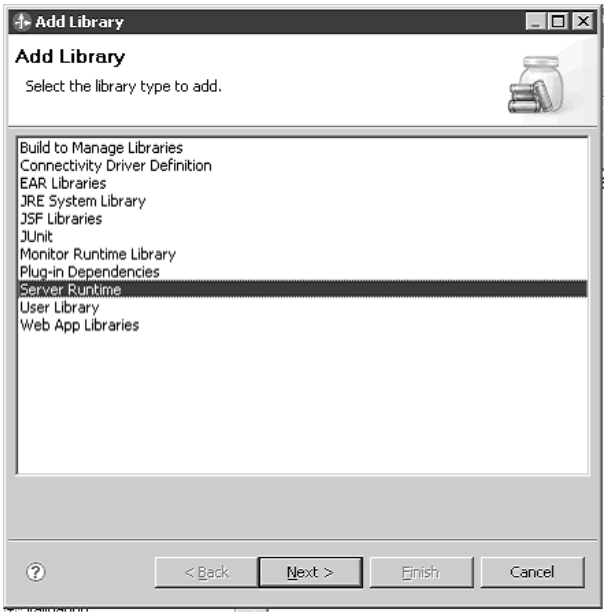
Note: WebSphere Business Services Fabric V6.2 runs on WebSphere Process Server V6.2. The WebSphere Process Server runtime library and all of its APIs are still available during development.

Complete the following steps:

1. Right-click **ClipsAndTacksF1**, and then select **Properties**.
2. Click **Java Build Path** and select the **Libraries** tab. Select **WebSphere Process Server V6.2** and click **Remove**. If WebSphere Business Services Fabric server V6.2 is already listed, click **Cancel**.



3. Click **Add Library**, select **Server Runtime**, and then click **Next**.



4. Select **WebSphere Business Services Fabric server V6.2** , and then click **Finish** and **OK** in the next window.

Importing web services endpoints into WebSphere Integration Developer

In this lesson, you will import information about previously created web services and their endpoints into WebSphere Integration Developer. See the Chapter 5, “Download and import samples,” on page 141 section for instructions on downloading the necessary files.

While working through the Clips and Tacks sample, you will use several web services that were previously created. These web services could be hosted on any server, but for simplicity the services will be hosted on the same test server where you are running the sample.

Complete the following steps:

1. Click **File** → **Import** to import the `ClipsAndTacksEndpoints.zip`.
2. On the Import page, click **Other** → **Project Interchange** and click **Next**.
3. On the Import Project Interchange Contents page, click **Browse** and select **ClipsAndTacksEndpoints.zip**.

4. Select all the entries that are available and click **Finish**. WebSphere Integration Developer displays the Business Integration perspective.

Before continuing, wait for Building Workspace to complete. The status is located in the bottom right-hand corner of the workspace.

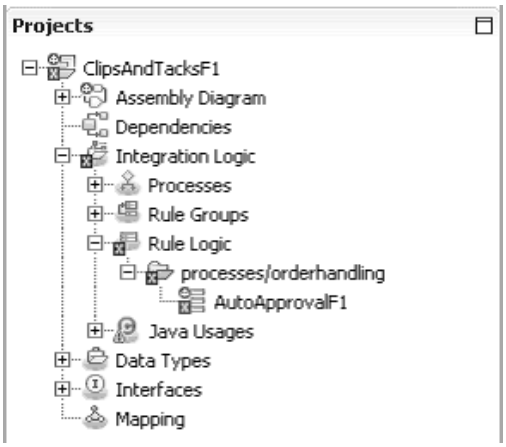
Defining business rules

In this lesson, you will convert the artifacts from WebSphere Business Modeler into an artifact that you can deploy to the server.

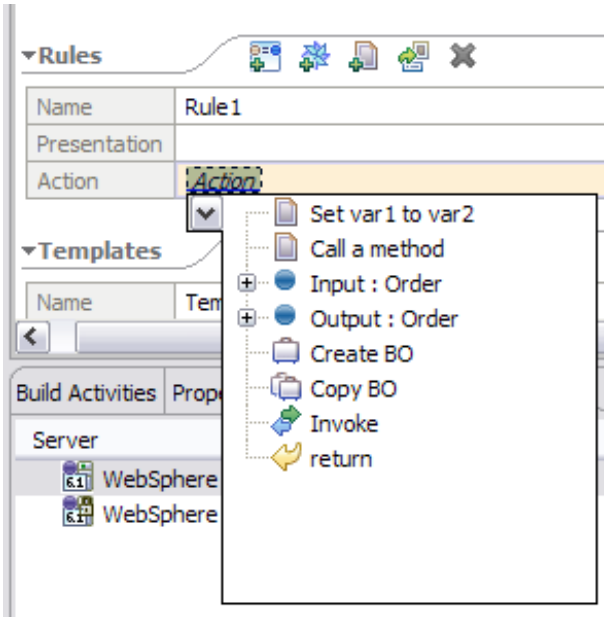
Business rules must exist to specify criteria that allow the automated processes to run without further human intervention. In WebSphere Business Modeler you defined the template and if-then rule for autoApproval. However, the one implementation details that is still missing is to initialize the output variable before running the if-then rule.

Complete the following steps:

1. In the project tree, expand **ClipsAndTacksF1** and select **Integration Logic** → **Rule Logic** → **processes/orderhandling**.

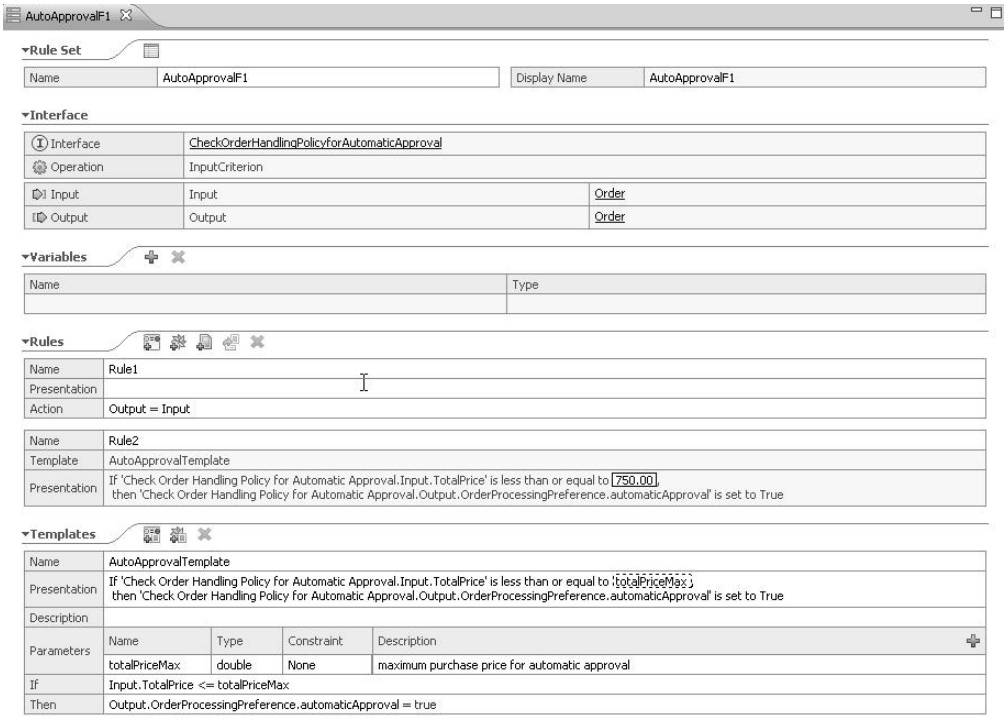


2. Double-click **AutoApprovalF1**. If the Generated File Warning displays, click **Yes**. The business rule set editor opens.
3. Click the **Add Action Rule** icon  under **Rules**.
4. To copy the input variable to the output variable, click **Action** and select **Output:Order**. Then select **=** and then **Input:Order**.



5. Right click on the new rule and select **Move Rule Up**
6. Save your work.

At this point, all of the errors are resolved. The following image shows the completed rule logic.



Generating Java components

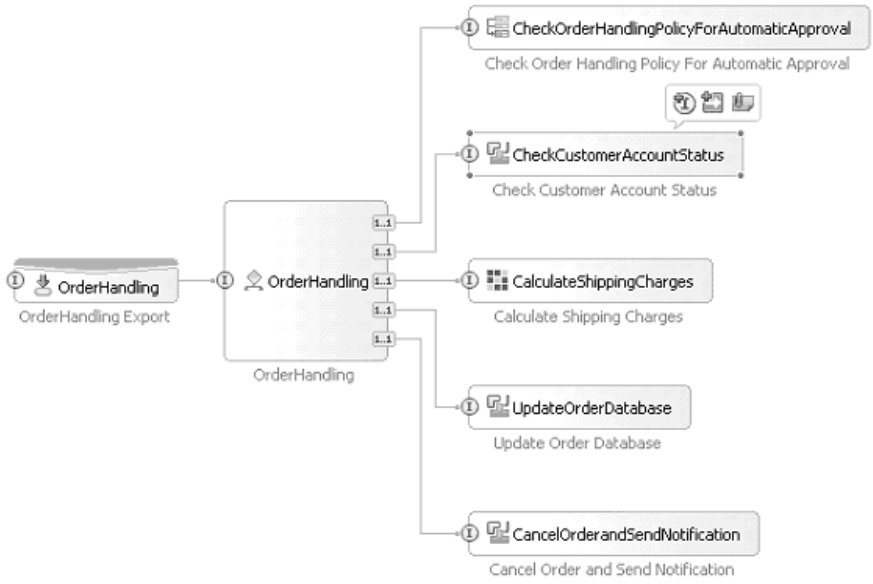
In this lesson, you will generate Java components to provide implementation code for the tasks created in WebSphere® Business Modeler.

This section discusses how to provide the implementation code for the following Java components:

- CheckCustomerAccountStatus
- UpdateOrderDatabase
- CancelOrderandSendNotification
- CreditRating

Complete the following steps:

1. Double-click the assembly diagram.
2. Right-click in a blank area on the assembly diagram panel and select **Automatic Layout**. Save your work.
3. Double-click **CheckCustomerAccountStatus**.



The CheckCustomerAccountStatusImpl.java window opens.

4. Replace the contents of the following method:

```
public commonj.sdo.DataObject InputCriterion(commonj.sdo.DataObject Input) {
  //TODO Needs to be implemented.
  return null;
 }
```

with the following content:

```
public DataObject InputCriterion(DataObject input) {
  System.out.println(
"Check Customer Account Status Invoked");
    // create CreditRating bean
  com.clipstacks.credit.CreditRating creditRating =
  new com.clipstacks.credit.CreditRating();
    // call CreditRating bean to update the BO
  DataObject orderOut = creditRating.calculateCreditRating(input);
  return orderOut;
 }
```

5. Save your work. Ignore the errors at this time because they will be fixed after you create the Java™ components in the next steps.
6. For UpdateOrderDatabase, replace the contents of the following method:

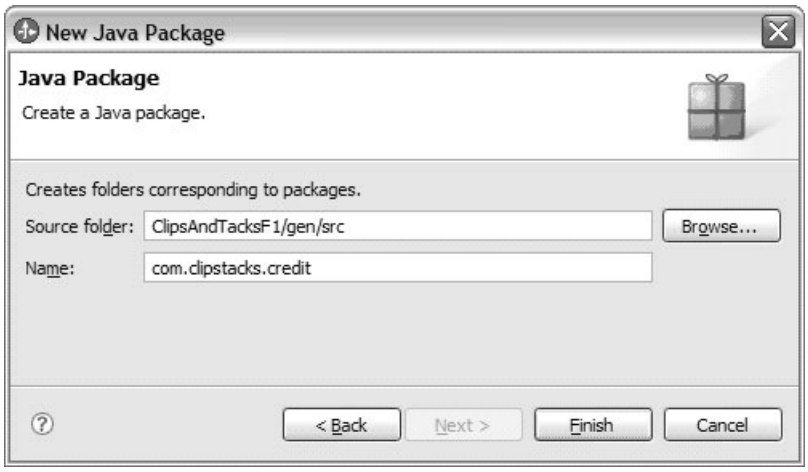
```
public commonj.sdo.DataObject InputCriterion(commonj.sdo.DataObject input) {
  //TODO Needs to be implemented.
  return null;
 }
```

with the following content:

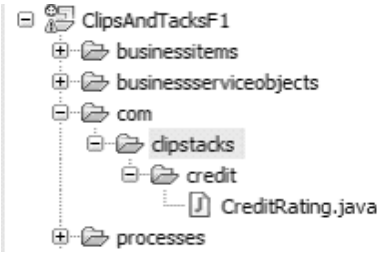
```
public DataObject InputCriterion(DataObject input) {
    System.out.println("Update Order Database invoked");
    return input;
}
```

7. For CancelOrderandSendNotification,
   a. Select all of the text on the CancelOrderandSendNotificationImpl.java window and delete it.
   b. Open the CancelOrderandSendNotificationImpl.java file, then copy and paste its contents into the CancelOrderandSendNotificationImpl.java window.
8. Save your work and close the window.

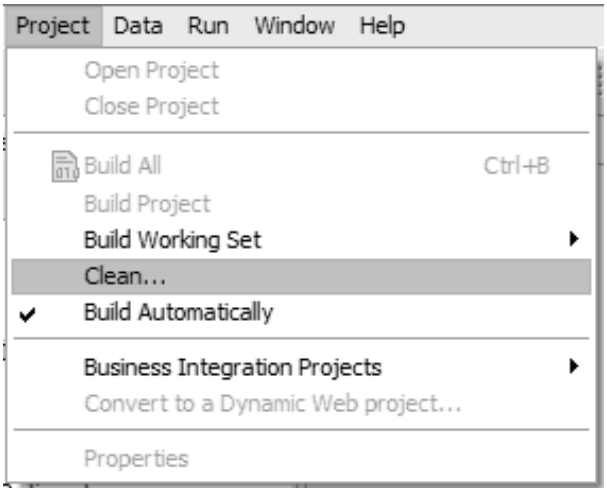
9. Create a Java package to implement calculation of customer credit rating by clicking **File** → **New** → **Other** and then **Java** → **Package**. Click **Next** .
10. In the **Source folder** field, click **Browse** and select **ClipsAndTacksF1** → **gen/src**. Click **OK**.
11. For the Java package name, enter `com.clipstacks.credit` and then click **Finish**.



12. Switch to the Physical Resources view by clicking the **Physical Resources** tab (located in the same area as the Business Integration tab).
13. Expand **ClipsAndTacksF1** → **com** → **clipstacks** → **credit** and copy the `CreditRating.java` file that you downloaded following the directions in Chapter 5, "Download and import samples," on page 141. Then paste the file into the credit folder.



14. Switch back to the assembly diagram editor and save it.
15. Save any unsaved items. An open window with an asterisk (*) on the tab indicates that it is not saved. You should not have errors now.
16. Rebuild all the projects by clicking **Project** → **Clean**, and then click **OK**.



Adding a Dynamic Assembler extension

In this lesson, you will implement a Dynamic Assembler extension for the CalculateShippingCharges component.

WebSphere Business Services Fabric uses a component called Dynamic Assembler (DA) to select the appropriate endpoint based on assertions and policies.

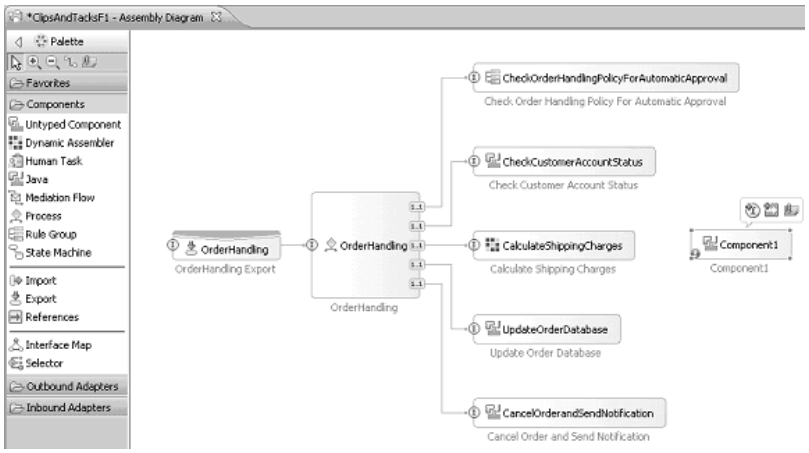
An *assertion* is a concept in the WebSphere Business Services Fabric meta-model that is used to specify a policy requirement and evaluate endpoints at run time. It is also used to describe the capabilities of an endpoint. For example, Endpoint A supports service invocations for EXISTING customers and accountSize = SMALL.

A *policy* defines the business requirements that have to be met when a consumer requests a service. A policy is a set of assertions that represents requirements, constraints, or capabilities for a business service, for example IF [customerType = PLATINUM] THEN [responseTime < 20ms]

The CalculateShippingCharges component is a DA. It needs extensions to extract context information from the message body and insert it into its invocation context. DA extensions are implemented as Java components

To implement a ContextExtractor extension for the CalculateShippingCharge DA, complete the following steps:

1. Select the Java component type from the component group on the palette and drag it to the assembly diagram.



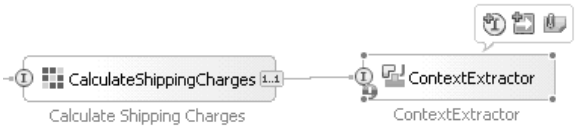
2. Rename the component `ContextExtractor`
3. Select the **ContextExtractor** component and click the **Add Interface** icon to specify one or more interfaces. A window opens.

4. To add the interface to the component, perform these steps:
   a. Select the **Show WSDL and Java** radio button.
   b. In the **Filter by interface or qualifier** field, enter `ContextExtractor`.

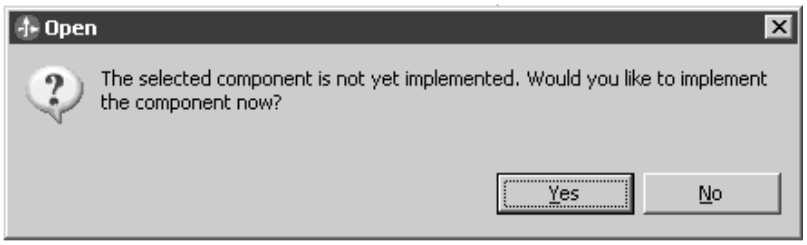
c. In the **Matching interfaces** text box, select **ContextExtractor**.
d. Click **OK**.

The component is updated with the selected interface.

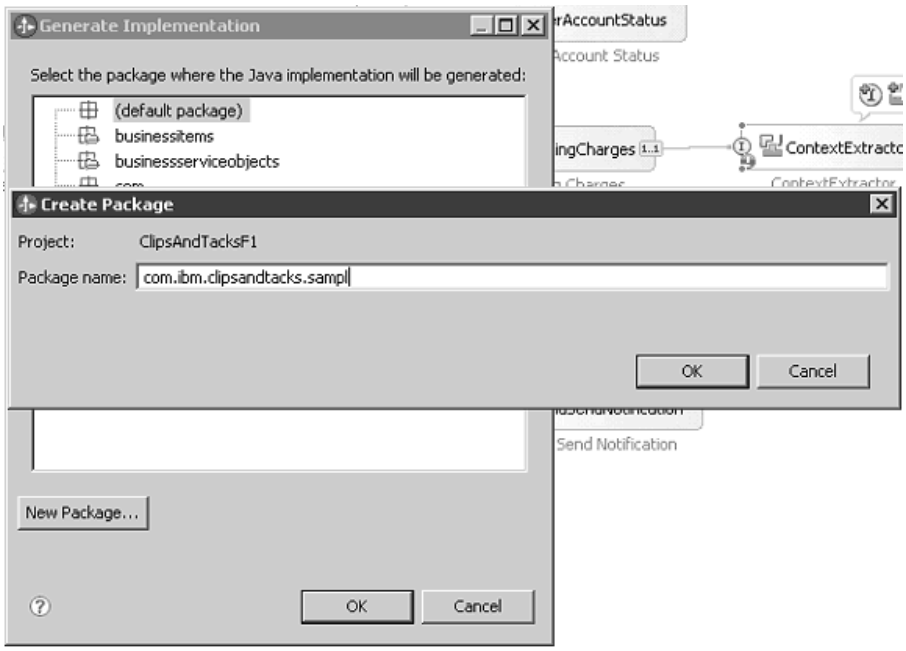
5. Click the reference wire for the **CalculateShippingCharges** component and drag it to the ContextExtractor interface on the ContextExtractor component. When the Add Wire window opens, click **OK**.



6. Double-click the **ContextExtractor** component to specify its implementation. Click **Yes** to implement the component.



7. Select **New Package** and type `com.ibm.clipsandtacks.sample` as the package name.
8. Click **OK** twice.



9. Select all of the text on the ContextExtractorImpl.java window and delete it.
10. Open the `ContextExtractorImpl.java` file, and then copy and paste its contents on the ContextExtractorImpl.java window.
11. Save your work.

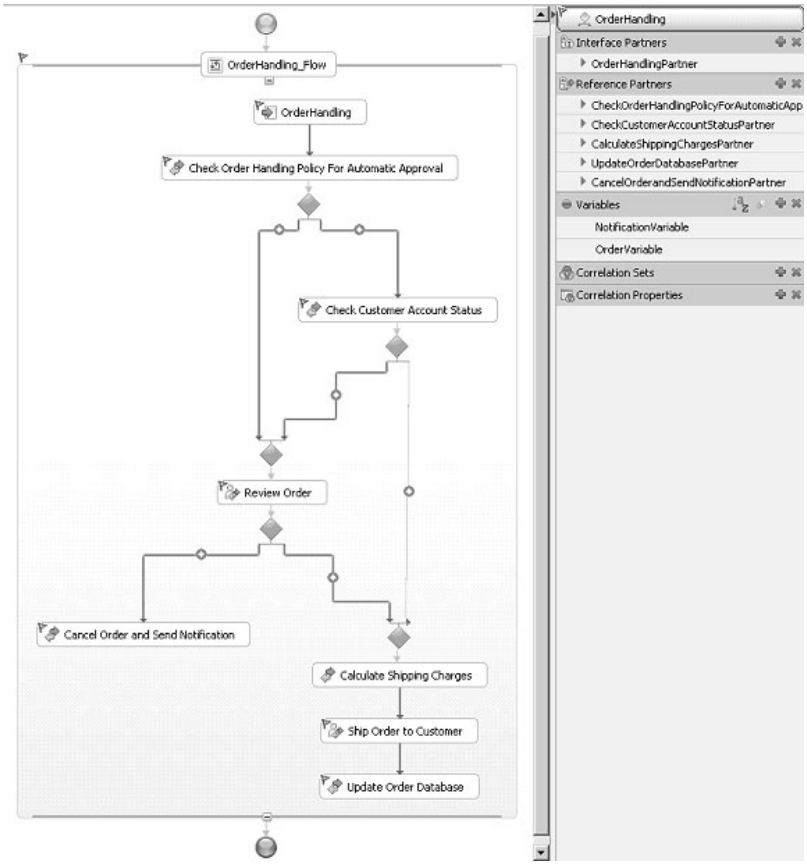
Creating the process invocation method

In this lesson, you will create a method to invoke the process. This lesson gives you a way to enter data into the order form to start the automated process.

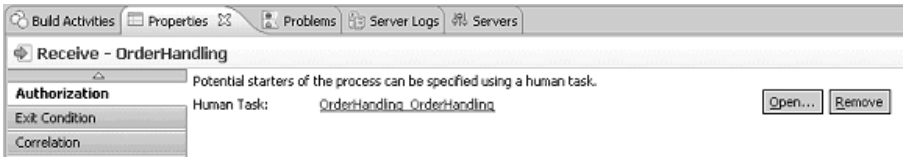
Complete the following steps:

1. In the Business Integration view, expand **ClipsAndTacksF1** → **Integration Logic** → **Processes** → **processes/orderhandling** and double-click **OrderHandling**. The process OrderHandling opens.

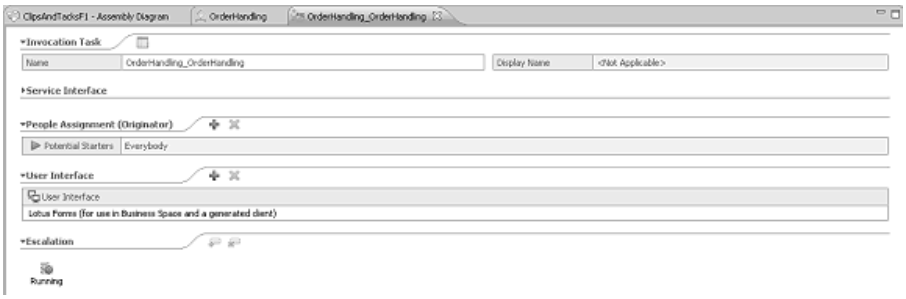
Note: If the Generated File Warning opens, click **Yes**. The business process editor opens.



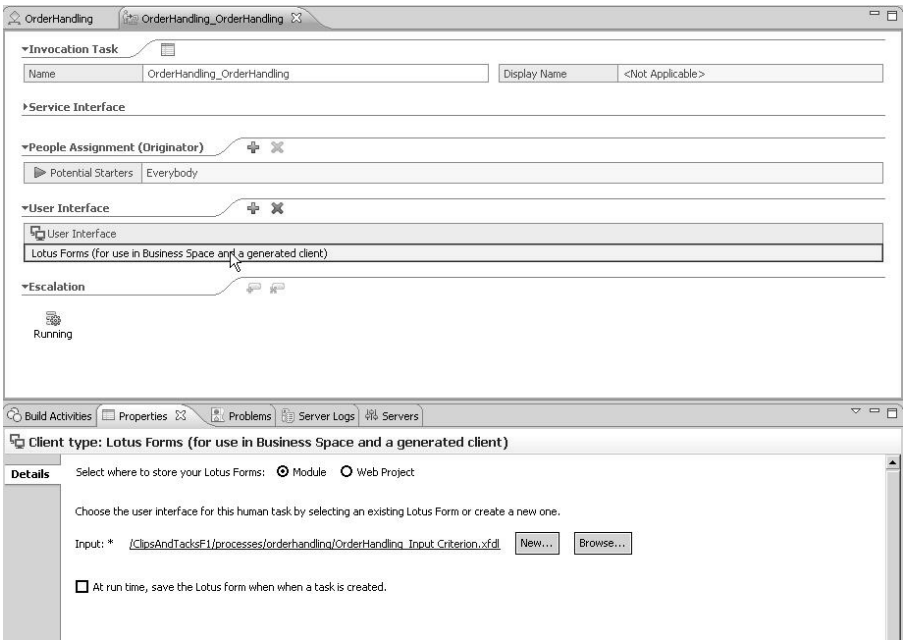
2. Select **OrderHandling**, and then select the **Properties** tab and **Authorization**.



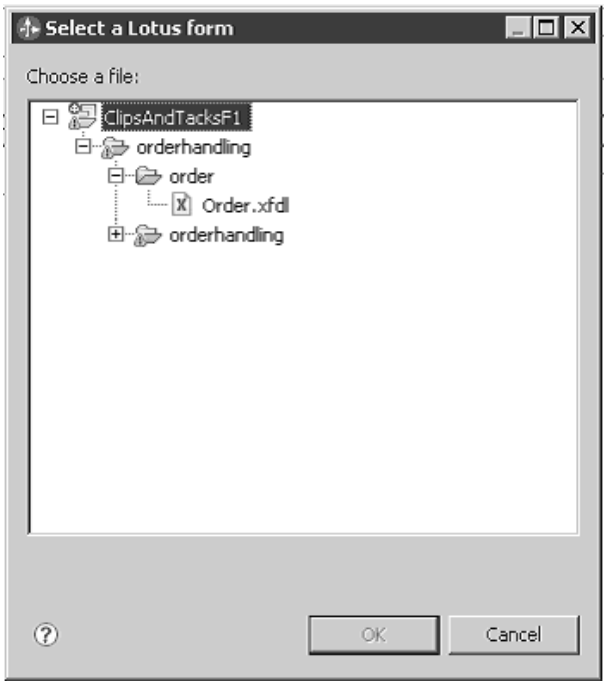
3. Click the **OrderHandling_OrderHandling** link (click **Yes** if a warning window displays). The human task editor opens.



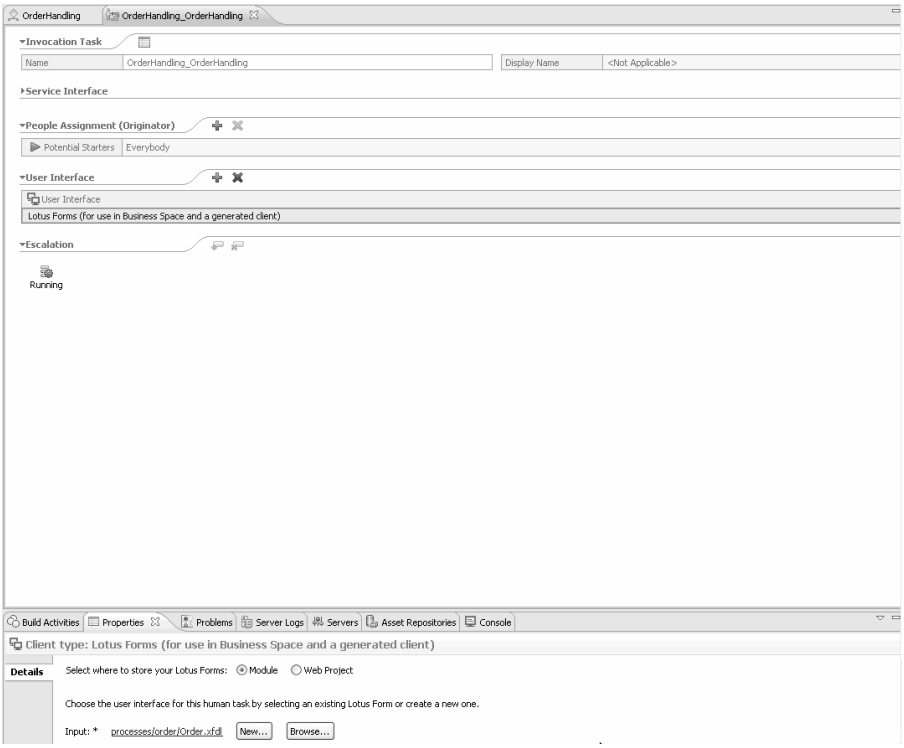
4. In the **OrderHandling_OrderHandling** window, click on **Lotus Forms (for use in Business Space and a generated client)** in the User Interface section. The Properties view will now show the Client type: Lotus Forms (for use in Business Space and a generated client).



5. Click **browse**. The Select a Lotus form window opens.
6. Expand **ClipsAndTacksF1 > order** and select **Order.xfdl**. Click **OK**.



7. In the human task editor, save your work. The following screen capture shows the completed task.



8. Close the human task editor.
9. Save your work. You no longer have errors.

Identifying WebSphere Monitor Server on WebSphere Process Server ports

In this lesson, you will identify the ports being used by WebSphere Monitor Server on WebSphere Process Server.

Depending on the order of install and what else was previously installed on a user's machine, the WebSphere Monitor Server may not be using the default ports. So it is necessary to identify the ports to use before running the sample.

1. Open the file AboutThisProfile.txt located at: `<WebSphere Integration Developer 62 install directory>\pf\WBMonitor Srv_wps\logs`.
2. Check the entries for HTTP transport port and HTTPS transport port. Anywhere in this tutorial where you see **<Server_Port>**, substitute the value found for the HTTP transport port. Anywhere in this tutorial where you see **<Secure_Server_Port>**, substitute the value found for the HTTPS transport port.

Creating a WebSphere Business Services Fabric project

In this lesson, you will create a WebSphere Business Services Fabric project to be the container of all the WebSphere Service Fabric artifacts created (for example: endpoints, assertions, etc.).

To create a project, two main steps need to occur:

1. WebSphere Business Services Fabric is set up with the vocabulary and project interchange file.
2. WebSphere Integration Developer is set up with a Business Service project that has a name that is the same as the name of the WebSphere Business Services Fabric project name.

The link between the two projects is established by using the same name in both projects.

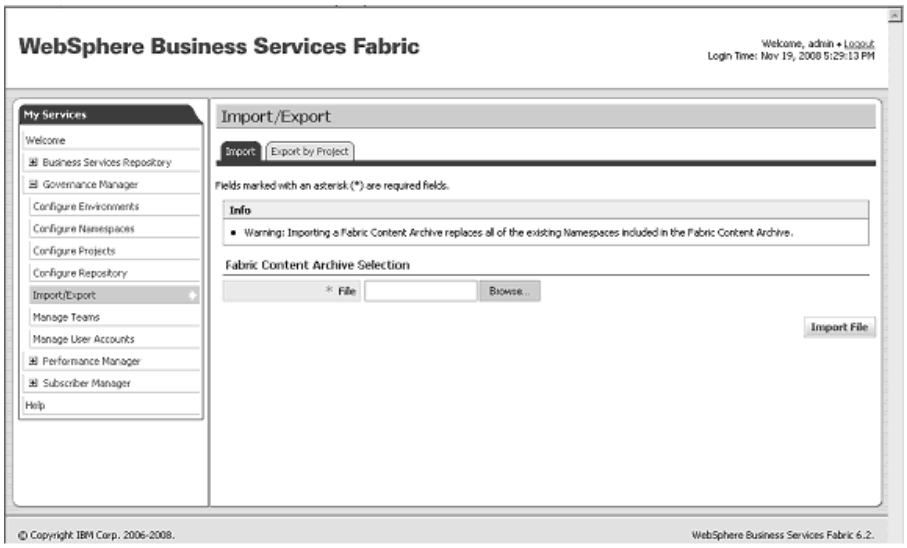
WebSphere Business Services Fabric runs on the server and has a browser based interface that will be used in this sample to import the vocabulary and the project interchange file. The vocabulary and the project interchange file contain the meta-data needed for the dynamic assembler (DA) implementation. With version 6.2, similar artifacts would be developed using the Business Space Authoring space. The Business Space Authoring space and the development of the artifacts are not covered in this sample.

Complete the following steps:

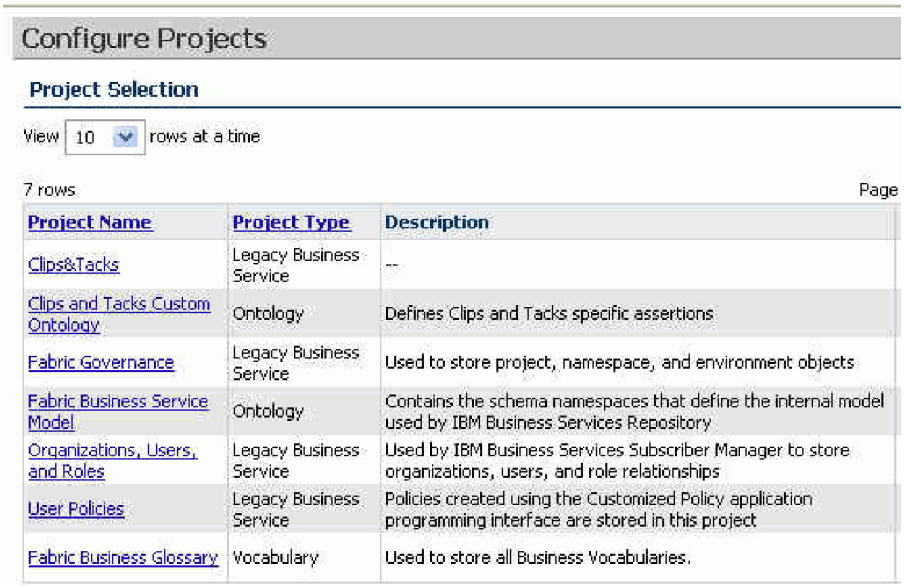
1. Click the **Servers** tab.
2. If the server is not already running, right-click the **WebSphere Business Monitor Server V6.2** server and select **Start**.
3. When the server has started, which takes several minutes, open a Web browser to `http://localhost:<Server_Port>/fabric/login.jsp` and log in to WebSphere Business Services Fabric as the administrator. For <Server_Port> use the value you identified in "Identifying WebSphere Monitor Server on WebSphere Process Server ports" on page 70.

   Note: For purposes of this tutorial, log in using `admin` for the user ID and for the password.

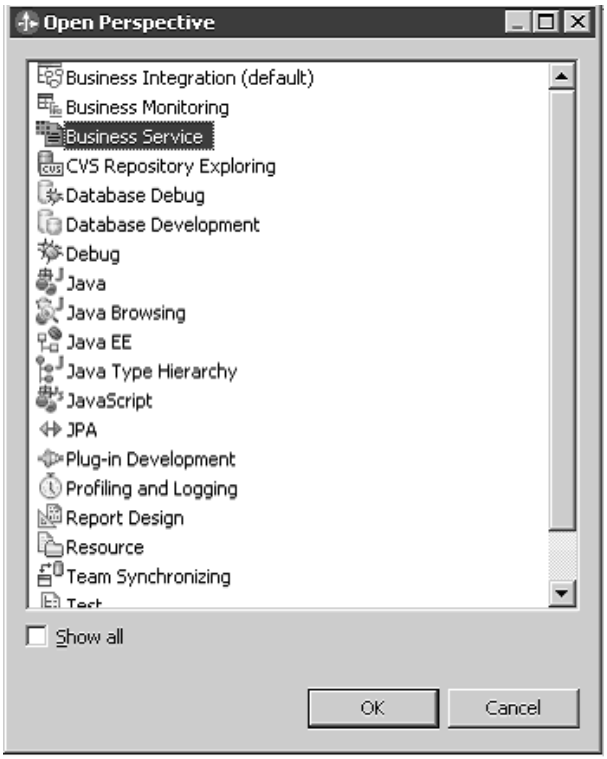
4. In the My Services section, expand the **Governance Manager** menu and select **Import/Export**.



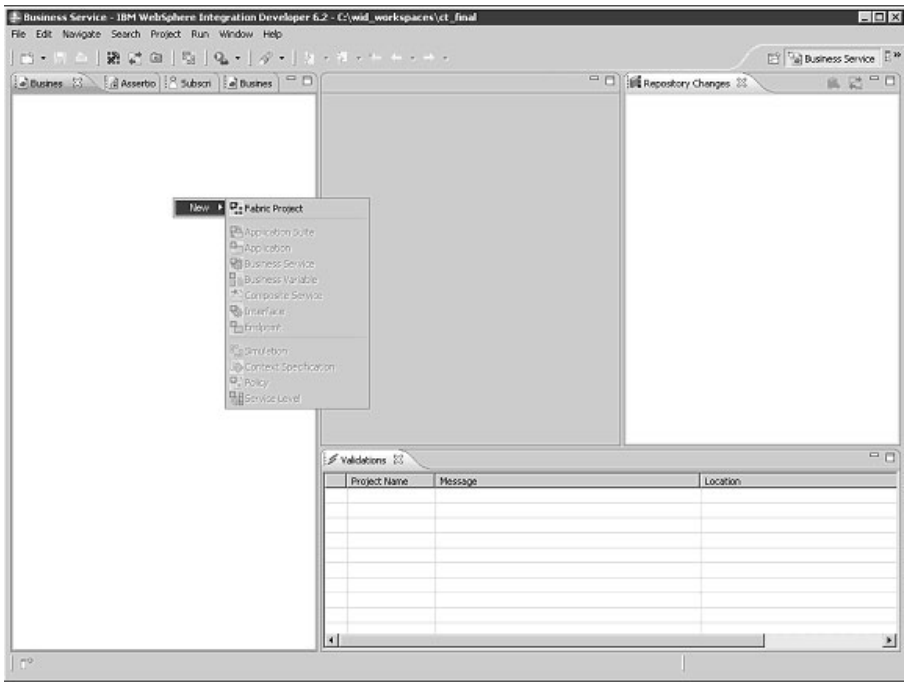
5. Click **Browse** and navigate to the directory where the `ClipsAndTacks-Core_ontology.fca` file is located. Click **Import File**. This file contains the Clips and Tacks custom ontology or vocabulary (For example, OrderSizeAssertion and its values SMALL and LARGE are defined in this file).
6. If the previous step was successful, click **Browse** again and navigate to the directory where the `ClipsTacks_initial_scenario-owl.zip` file is located. This project interchange file contains the definition of all of the WebSphere Business Services Fabric components that are needed to recreate the Clips and Tacks scenario. Click **Import File** and watch for error messages.
7. Under **Governance Manager**, click **Configure Projects** to see the following entries:



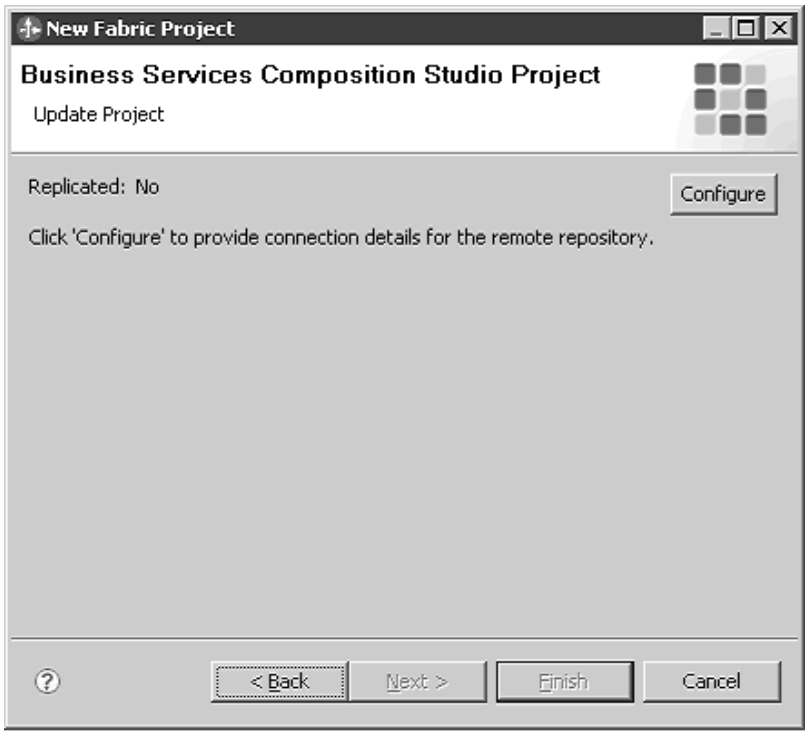
8. Logout of WebSphere Business Services Fabric and return to WebSphere Integration Developer. Open the Business Services perspective and click **OK**.



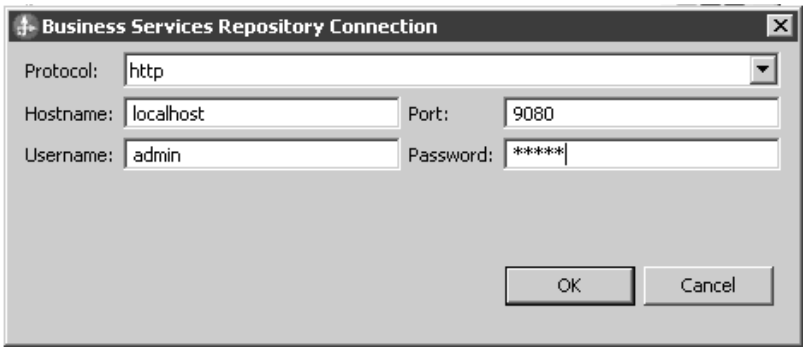
9. From the **Business** tab, right-click **New** and select **Fabric Project**.



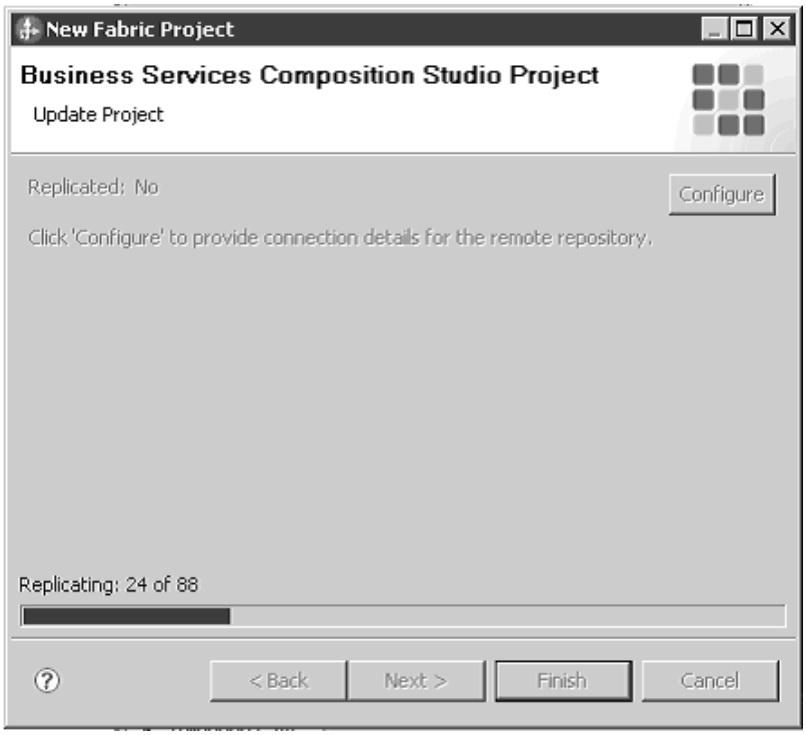
10. In **Project name**, type `Clips&Tacks` and click **Next** and then click **Configure**.



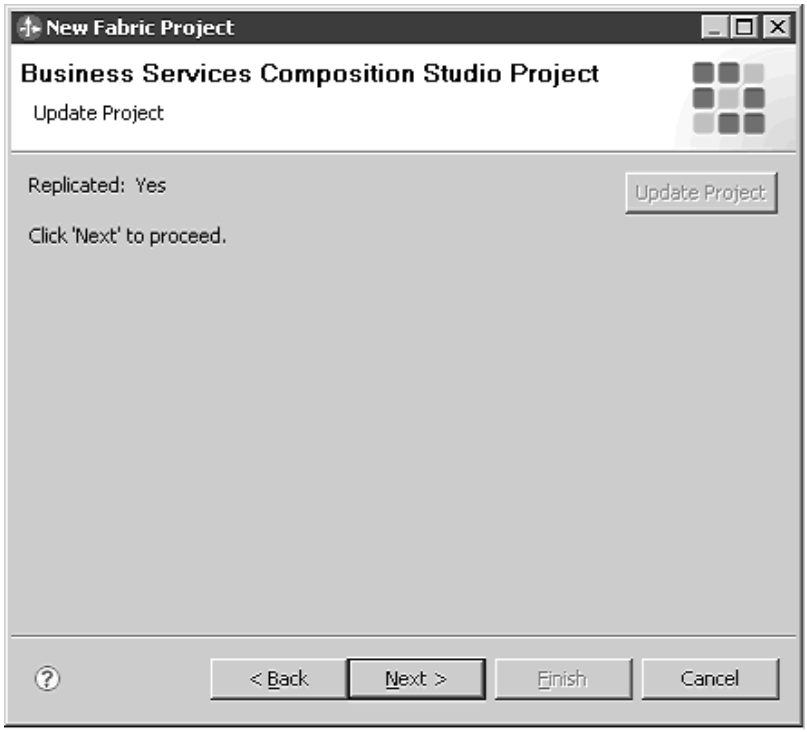
11. Enter the Business Services Repository information (the port might be different in your system. Use the same port that you used to log in to the WebSphere Business Service Fabric page). Use `admin` for the user ID and for the password. Click **OK**. The replication process starts momentarily. The entire metadata repository is replicated to the Eclipse workspace and is referred to by Composition Studio as a local working copy.



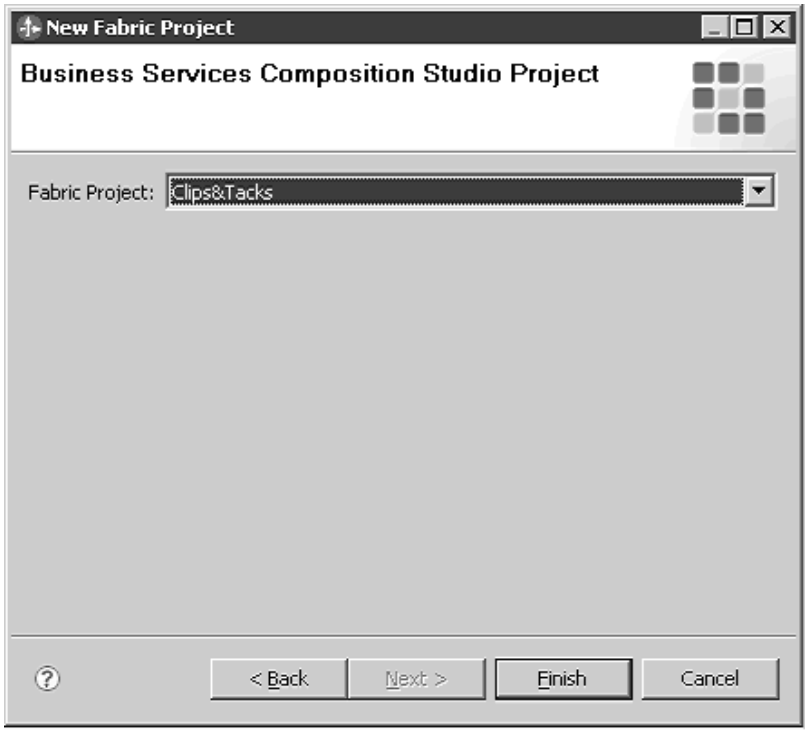
Wait until the replication finishes (do not click **Configure** again).



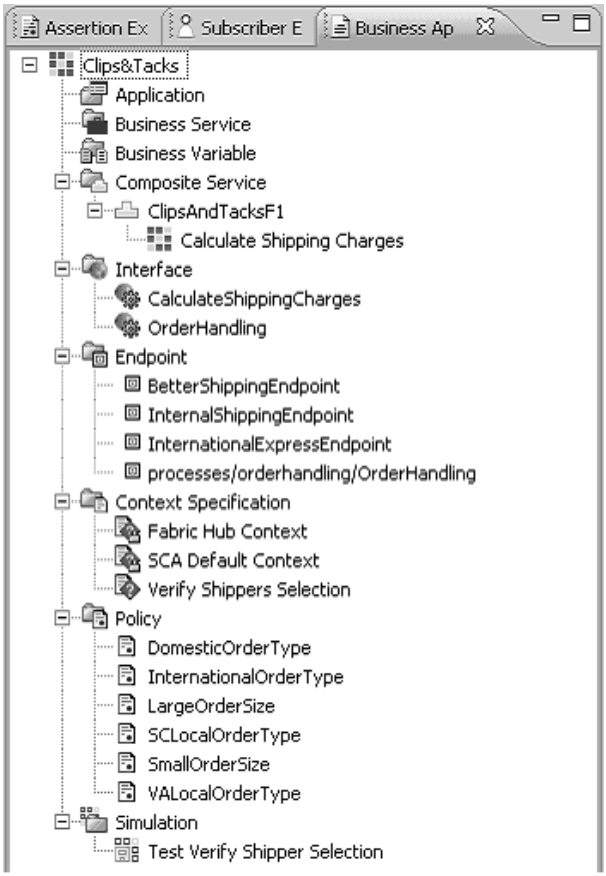
12. When the replication is complete, click **Next**.



13. In the **Fabric Project** field, select **Clips&Tacks** and click **Finish**.



The **Clips and Tacks** Fabric project is created.



Creating the Clips and Tacks Business Space

During this phase, you will create a Business Space to enable an integrated and customized user experience, allowing access of business process information from a single user interface.

During the creation of the Business Space, the project will be deployed and the business spaces needed to interact with the deployed project will be created.

To create the Clips and Tacks business spaces, complete the following tasks:

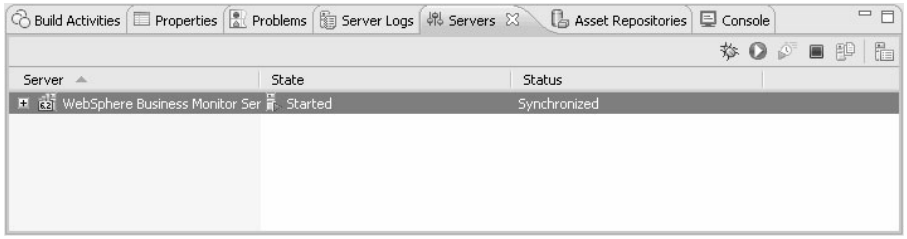
1. "Deploying the Clips and Tacks Order Handling business process and endpoints"
2. "Setting up the Clips and Tacks business space" on page 78
3. "Setting up the Fabric business space" on page 83

Deploying the Clips and Tacks Order Handling business process and endpoints

In this lesson, you will deploy the sample to the WebSphere® Process Server.

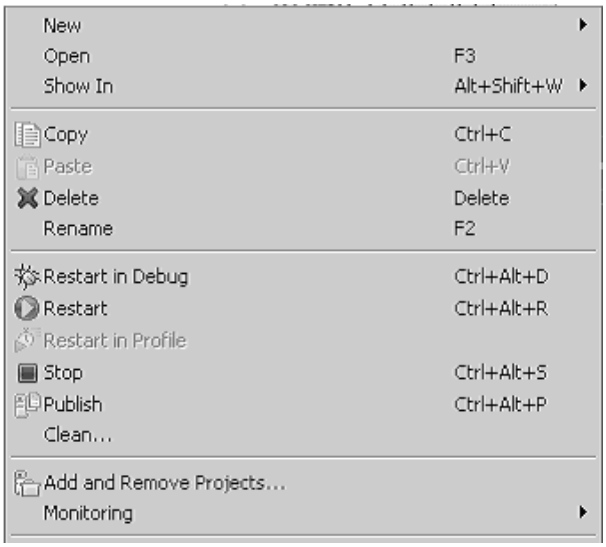
Complete the following steps:

1. Switch back to the Business Integration perspective.
   a. Click the **Servers** tab.
   b. Right-click **WebSphere Business Monitor Server V6.2 on WebSphere Process Server**.
   c. Click **Start** (if it is not started already).

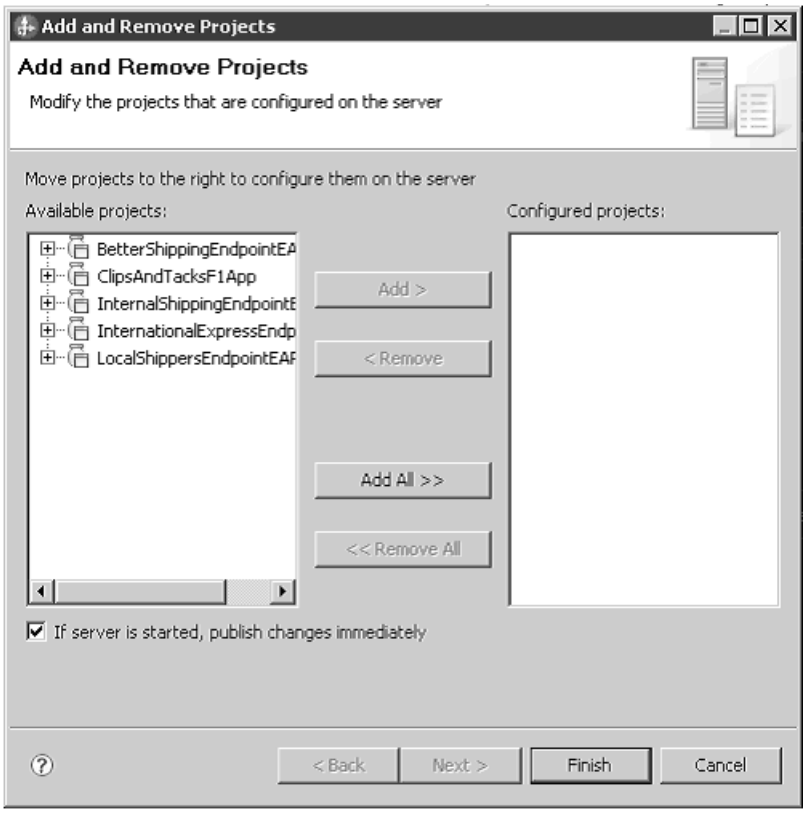


It takes a few minutes for the server to start. When the server starts (the server status changes from **Stopped** to **Started**).

2. Right-click the started server and select **Add and Remove Projects**.



3. Add all the projects that are available by selecting **Add All** and click **Finish**. It takes a few minutes for the applications to be published to the server.



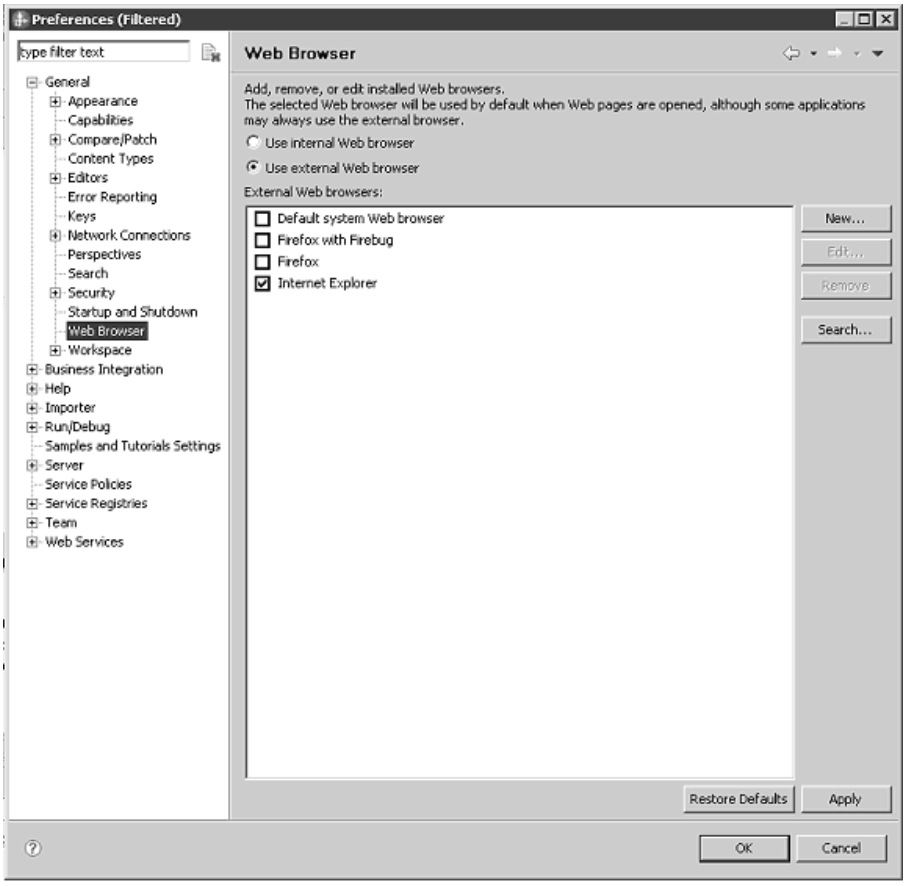
Setting up the Clips and Tacks business space

In this lesson, you will set up a Clips and Tacks business space.

In order to effectively use the Clips and Tacks project you must first set up a Clips and Tacks business space.

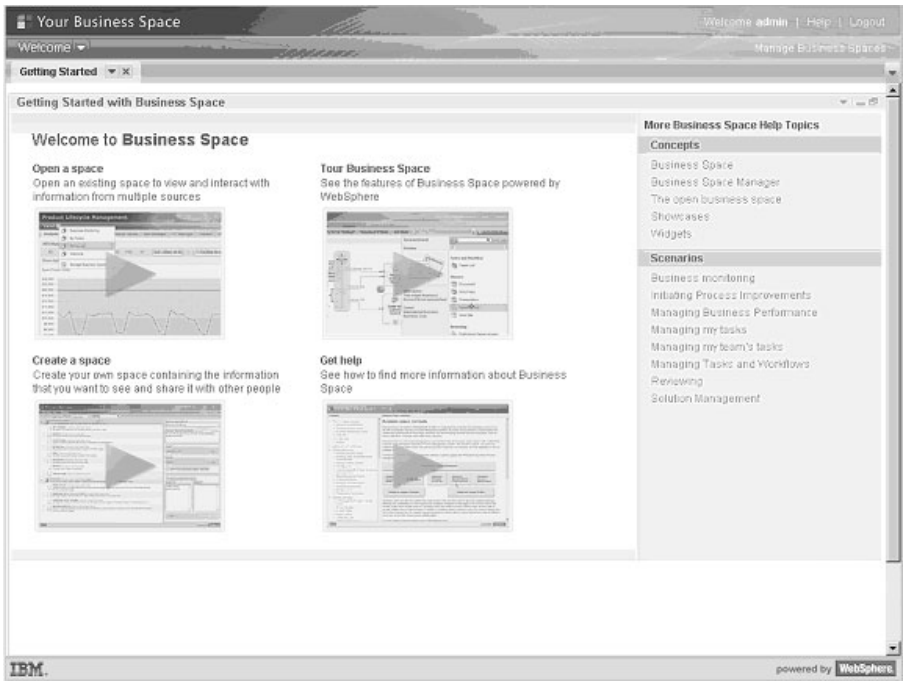
1. Set the WebSphere Integration Developer default browser and log into Business Space.
   a. In WebSphere Integration Developer, click **Window > Preferences > General > Web Browser**. The default browser might be **Internal Web Browser**, but it does not have all of the functions that you need. Select **Use external Web browser** and **Default system Web browser** or another listed browser other than the internal browser. Click **Apply** and then click **OK**.

      Note: This allows Clips and Tacks to use the default browser for your system, rather than the default browser built into Clips and Tacks.

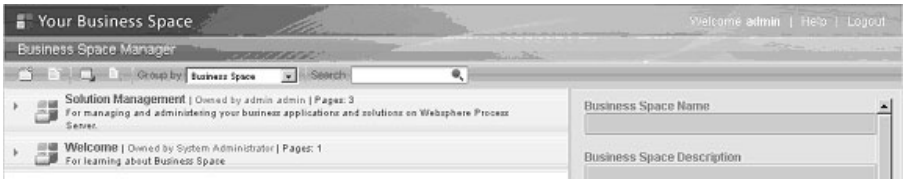


b. In WebSphere Integration Developer, in the Servers view, right-click **WebSphere Business Monitor Server V6.2** and select **Launch → Business Space**. If a Security Alert warning window opens, click **Yes**.

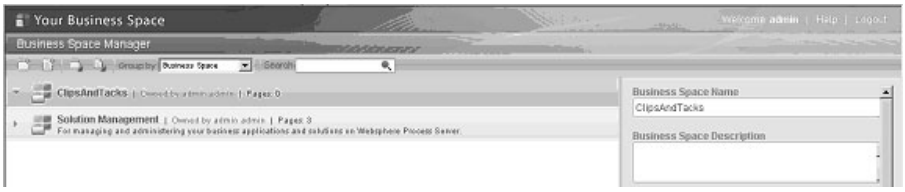
c. When prompted, enter `admin` for the user ID and enter `admin` for the password (or enter the current administrator ID and password if you changed them from the default values). A Business Space Manager window opens.



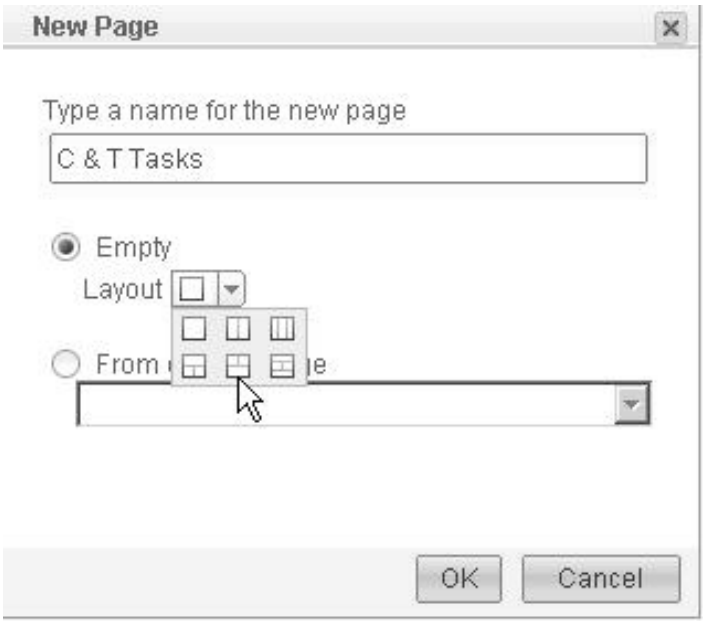
2. Click the **Manage Business Spaces** link in the top-right corner of the page. The **Business Space Manager** page contains several default business spaces and their respective sample pages, such as the **Welcome** space and the **Getting Started** page.



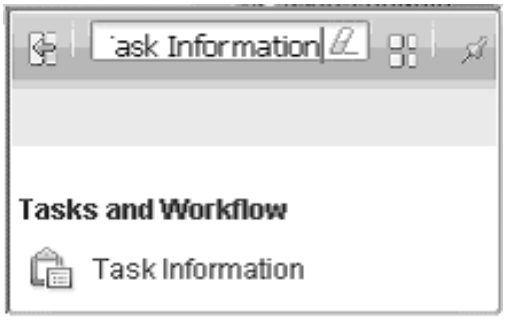
3. Click the **Create new Business Space** icon  . Name the business space `ClipsAndTacks`, and then click **OK**. You can create a Business Space from a template, such as one for monitoring or managing human tasks, however in this sample we show you how to create Business Spaces from scratch using the wizard. This is the resulting ClipsAndTacks business space. You can change the owner and theme by clicking the corresponding **Change** buttons.



4. Click the **Create new Page** icon  . Name the page `C & T Tasks`, select the second layout on the second row, and click **OK**. This is the resulting C & T Tasks page within the business space.



5. Click the **C & T Tasks** link to open it. Click **Add Widgets**, which is located on the center of the page. The widget palette opens on the right and the cursor is moved to a search field. Type `Task Information` to filter the widget palette. Click the **Task Information** widget and drag the item to the top right hand corner of the page.

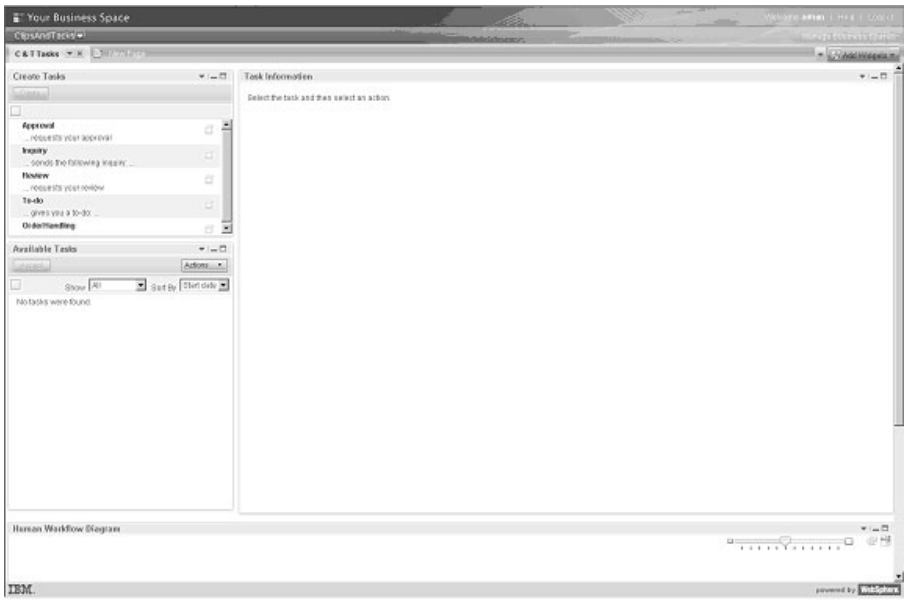


6. Next you will add the **Create Tasks**, **Available Tasks** and **Human Workflow Diagram** widgets to your page. Click the **Add Widgets** in the upper right hand corner to open the palette and add the first two widgets to the left of your page so that they display underneath each other with the **Available Tasks** widget on the bottom of the top left section of the page. Place the **Human Workflow Diagram** widget in the bottom section of the page. Placing the **Human Workflow Diagram** widget is easier if the **Available Tasks** and **Task Information** widgets are minimized.
   a. Click **Available Tasks** to minimize it. The button is located in the top-right corner of the widget. Repeat with the **Task Information** widget.

   b. Resize the bottom edge of the **Task Information** widget to be side by side with the bottom edge of the Available Task widget.

7. Resize the widgets using the following suggestions:
   a. Restore the **Task Information** widgets by clicking the **Restore** icon. Leave **Available Tasks** minimized.
   b. Resize the bottom edge of the **Task Information** widget to be side by side with the bottom edge of the **Available Task** widget.
   c. Resize the **Create Tasks** widget to half of its original width. Hover the mouse pointer over the edge of the widget until the mouse pointer changes to a double arrow. Click and drag it to the left to resize the widget.
   d. Resize the **Create Tasks** widget so the bottom edge is as close as possible to the **OrderHandling** entry in the **Create Tasks** widget.
   e. Restore the **Available Tasks** widgets by clicking the **Restore** icon.

The finished C & T Tasks page should look like this image.



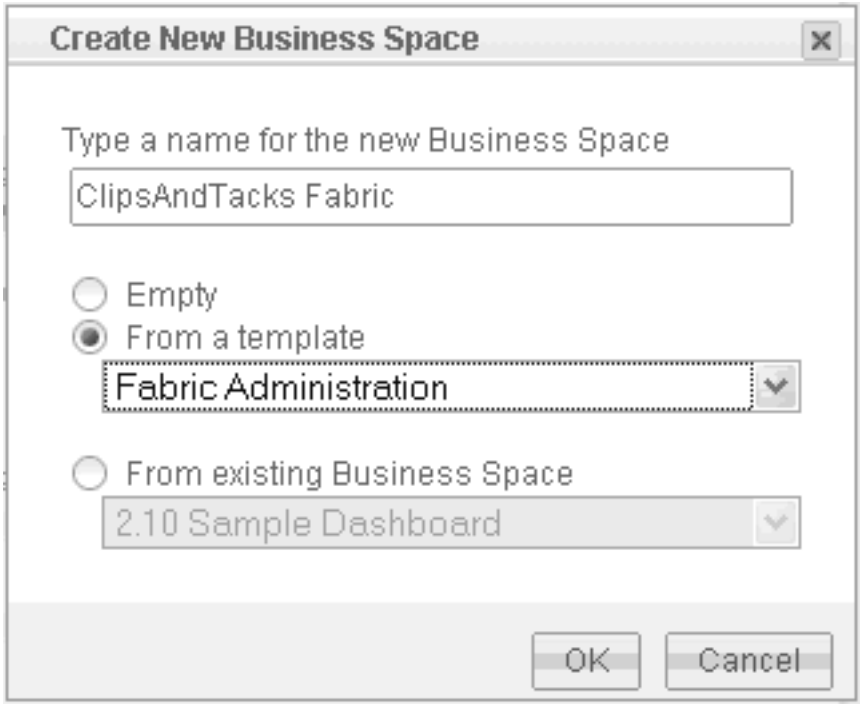
Setting up the Fabric business space

In this lesson, you will set up a Fabric business space.

A Fabric business space contains all the pages used to interact with the Fabric Runtime. There are pages to operate on tasks, and to deal with governance.

Complete the following steps:

1. If you are still logged in to the Business Space, click **Manage Business Spaces** to return to the **Business Space Manager**. If not, log into Business Space as described in the Setting up the Clips and Tacks Business Space topic.
2. Click the **Create new Business Space** icon  .
3. Type `ClipsAndTacks Fabric` as the business space name.
4. Select **From a template** and **Fabric Administration**, and then click **OK**. The ClipsAndTacks Fabric business space opens automatically.



5. Select the **Manage Business Spaces** link in the right-hand corner of the page to go back to the main page.

Leveraging Business Services

WebSphere Business Services Fabric delivers dynamic business processes based on Business Service Policy. During this phase, WebSphere Business Services Fabric tool pack will be used to organize and use business services to quickly adapt the process to changing business needs.

WebSphere Business Services Fabric uses customer context and message content, among other pieces of information, to generate a merged business policy contract to provision the correct service. The service providers available to Clips and Tacks are implemented as endpoints, which have capabilities, or assertions. The assertions are stored in the WebSphere Business Services Fabric meta-model, which is inside the business services repository.

At run-time, the Dynamic Assembler uses these endpoint assertions, the service consumer's information, and declarative business policies to select the best service provider endpoint that meets the requirements.

There are five dimensions along which assertions can be applied:

- Performance
- Reliability
- Interoperability
- Security
- Manageability

In this tutorial, only the interoperability assertions are applied.

Understanding endpoints and business services policies

Most of the Clips and Tacks WebSphere Business Services Fabric artifacts are already created and were retrieved from the repository in "Creating a WebSphere Business Services Fabric project" on page 70. These artifacts needed to implement the initial scenario in which Clips and Tacks uses Better Shipping for large domestic orders, International Express for all international orders, and internal shipping for domestic and small orders.

To implement **Change 1** (in which Clips and Tacks decides to outsource all domestic shipping to Better Shipping, even for small orders at the same flat fee of $8 per order) and **Change 2** (in which Clips and Tacks decides to use LocalShippers for orders in and around North Carolina, South Carolina, and Virginia, Better Shipping for all other domestic orders, and International Express for all international orders), you need to create additional artifacts.

The initial scenario has the following endpoints and assertions.

Endpoint	Assertion
Internal Shipping	domestic, small orders
International Express	international orders only
Better Shipping	domestic, large orders

To make the process dynamic, complete the following tasks:

1. "Updating the web services endpoint URLs"
2. "Simulating the initial shipping policies" on page 86
3. "Testing the initial shipping policies" on page 89
4. "Updating the shipping policies for small orders" on page 93
5. "Using Governance to manage changes" on page 96
6. "Updating the shipping policies with Local Shipping Option" on page 100

Updating the web services endpoint URLs

In this lesson, you will update the web services endpoint URL.

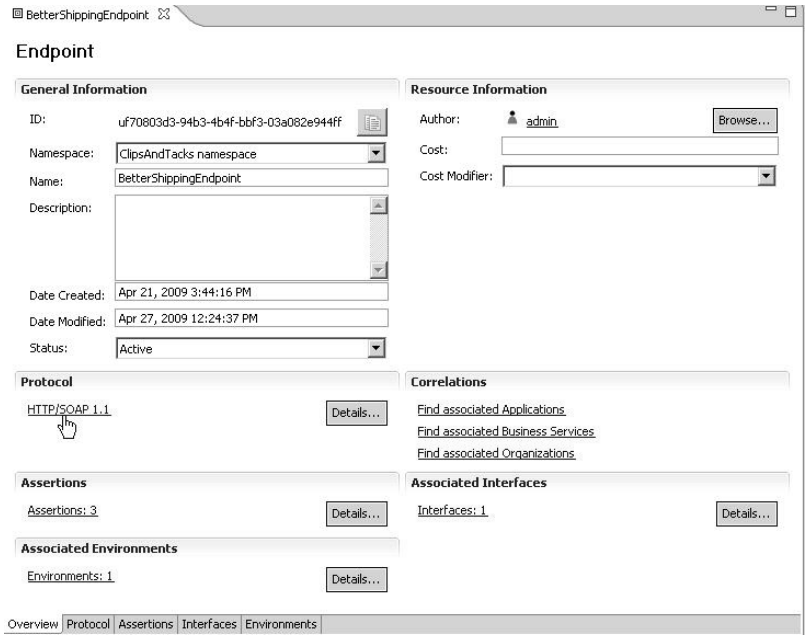
So far, you have:

- Identified the ports used in your installation of WebSphere Monitor Server on WebSphere Process Sever in the section "Identifying WebSphere Monitor Server on WebSphere Process Server ports" on page 70.
- Imported the Fabric artifacts (including the web services endpoints definition and metadata) into the business repository in the section "Creating a WebSphere Business Services Fabric project" on page 70.
- Deployed three web services on to the WebSphere Monitor Server on WebSphere Process Sever in the section "Deploying the Clips and Tacks Order Handling business process and endpoints" on page 76.

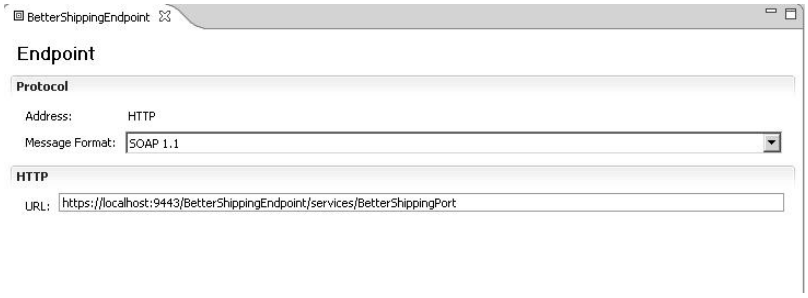
Now it is time to verify that the web services endpoint as defined in the business repository matches the actual port used by your installation of WebSphere Monitor Server on WebSphere Process Server.

The three web services metadata that you need to verify and maybe update are BetterShippingEndpoint, InternalShippingEndpoint, and InternationalShippingEndpoint. The three endpoints may need to have their endpoint URL adjusted to use the appropriate WebSphere port.

1. Switch to the Business Services perspective in WebSphere Integration Developer. In the **Business Services Explorer**, expand the **Endpoint** folder in the Clips&Tacks project.
2. Double-click on **BetterShippingEndpoint** to bring up the editor.
3. Click on the **HTTP/SOAP 1.1** link in the **Protocol** section.



4. Verify that the URL field is using the correct port. The initial value is **9443**, but it must match <Secure_Server_Port> on your system.



5. If the port listed here is not the correct port used by your system, update the URL field so that the port is correct. Save the change and close the editor.
6. Repeat these steps for the two remaining web service endpoints, **InternalShippingEndpoint** and **InternationalShippingEndpoint**.
7. Perform the remaining steps only if you made changes to the port numbers in the URLs. You need to publish your local changes to the business services repository.
   a. If you have not already setup a fabric business space, do so now by following the instructions in "Setting up the Fabric business space" on page 83
   b. Follow the steps as outlined in the section "Using Governance to manage changes" on page 96. On the **Governance** page of the **Clips And Tacks Fabric** space, update your comments to be appropriate for this change.

Simulating the initial shipping policies

In this lesson, you will simulate using the Clips and Tacks policy.

You will use the Business Services perspective of WebSphere Business Services Fabric in WebSphere Integration Developer to simulate the initial shipping policies and their impact on the Order Handling process. Simulation allows you to run and validate polices and assertions that are part of the initial scenario. The initial scenario is pre-built for this sample and the Clips and Tacks policy is ready for simulation.

The following table represents the Clips and Tacks service-provider endpoint capabilities (assertions) and the use cases for service consumers for the initial scenario. The top row depicts the available service providers, and the left column represents the service consumer use cases. The X represents the service-provider endpoint that is to be selected based on the context, content, and contract of the service consumer's request.

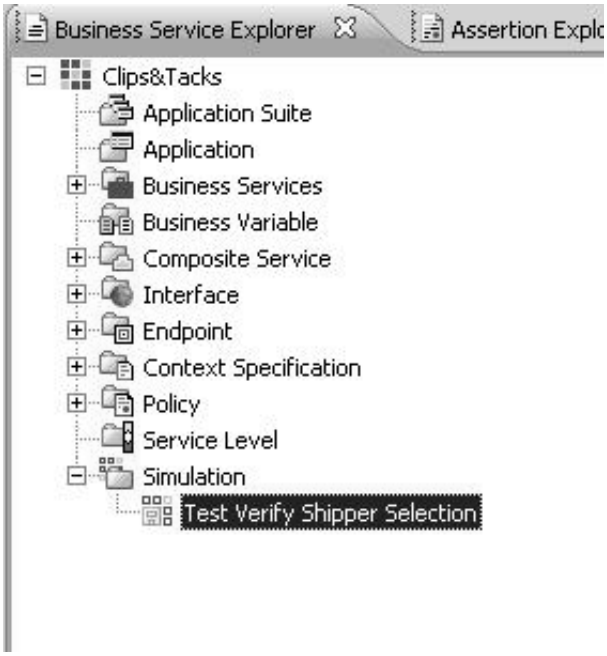
Table 2. Clips and Tacks service-provider endpoint capabilities and use cases

	Internal Shipping	**Better Shipping**	**International Express**
Order Size = SMALL and Order Type = DOMESTIC	X		
Order Size = LARGE and Order Type = DOMESTIC		X	
Order Type = INTERNATIONAL			X

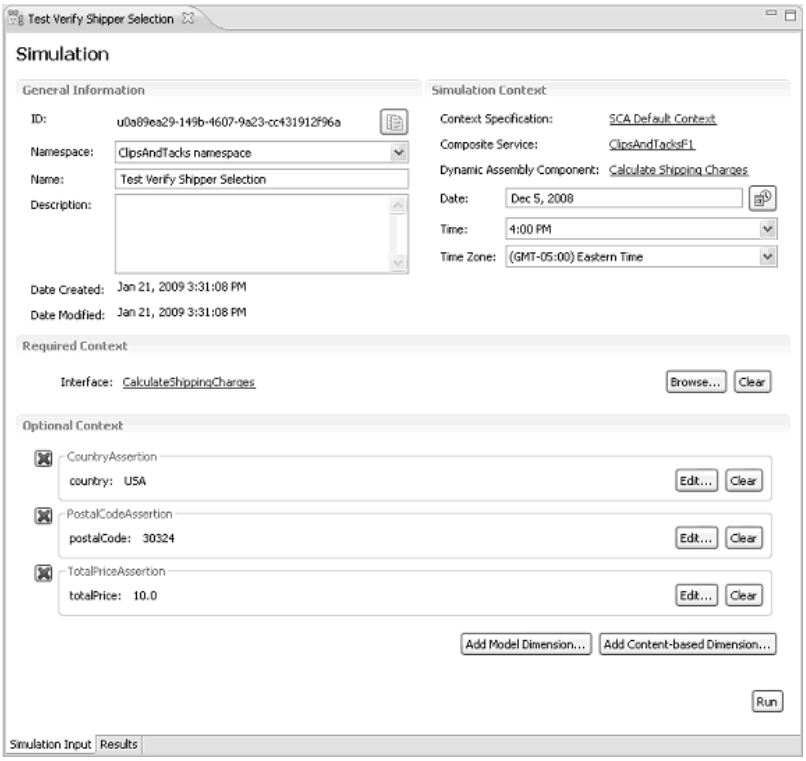
The business services policies for the initial Clips and Tacks scenario were created based on this table.

To start the policy usage simulation, complete the following steps:

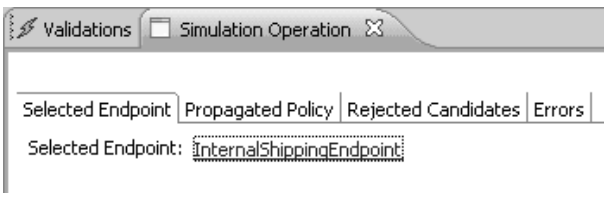
1. Logout of Business Space if you have not done so and switch to WebSphere Integration Developer.
2. Select the Business Service perspective and the **Business Service Explorer** tab. Expand the **Simulation** node and double-click **Test Verify Shipper Selection**.



3. Verify the Simulation values against the screen below and click **Run**.



The Simulation Operations panel shows only green check marks and the **InternalShippingEndpoint** is selected.



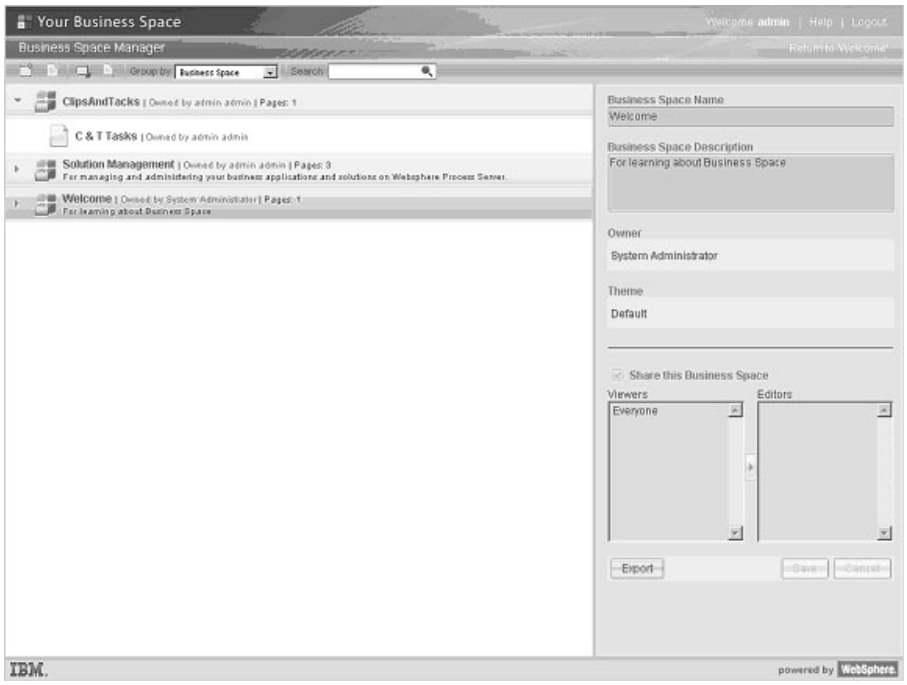
When the simulation confirms that the correct policy is being selected, it is time to try a runtime test.

Testing the initial shipping policies

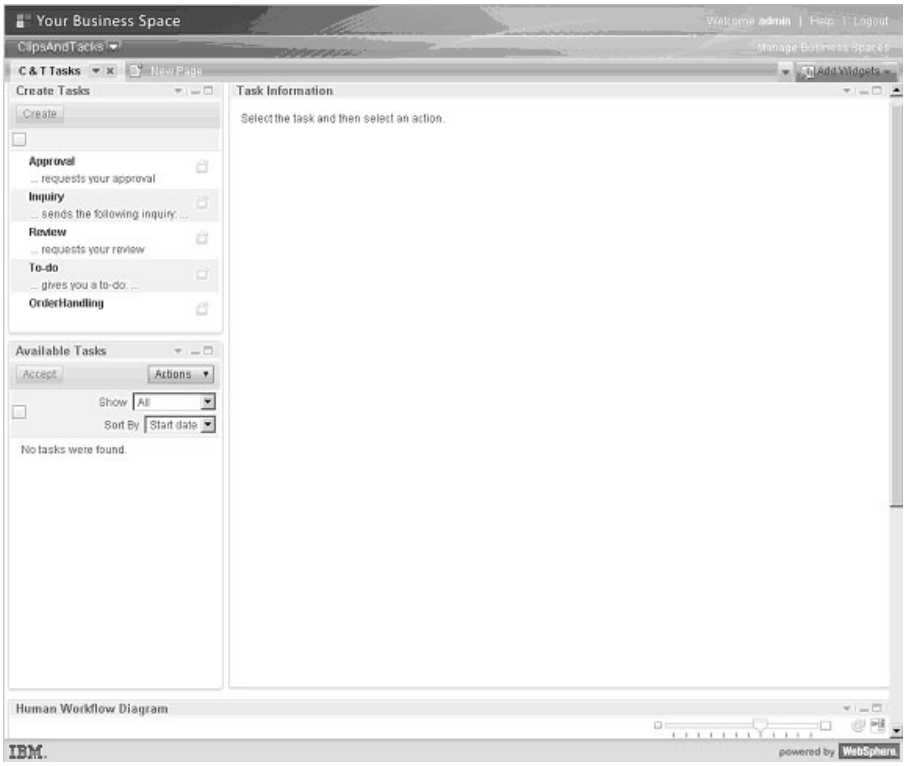
In this lesson, you will initiate an instance of the process in order to test the policies in run time.

To perform a runtime test using Business Space complete the following steps:

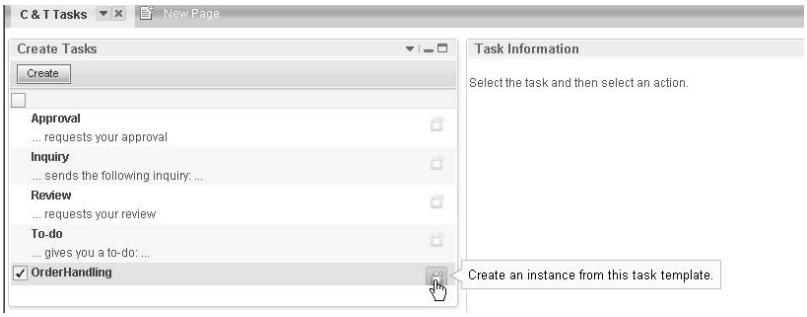
1. In WebSphere Integration Developer, Select the **Business Integration** perspective and in the Servers view, right-click the **WebSphere Business Monitor Server V6.2** server and select **Launch → Business Space**.
2. When prompted, enter `admin` for the user ID and for the password (or the administrator ID and password if you have changed it). A **Business Space Manager** window opens.



3. Click the **C & T Tasks** link to open the page.



4. Create a new instance of the Clips and Tacks Order Handling process by selecting the **OrderHandling** task in the **Create Tasks** widget. Click the icon on the right side.



5. The **Clips and Tacks Order Form** appears in the **Task Information** widget. Complete the top part of the form using the following values:

   Note: Scroll down the page to show the form and the entry fields to complete.

Table 3. Clips and Tacks Customer Information window

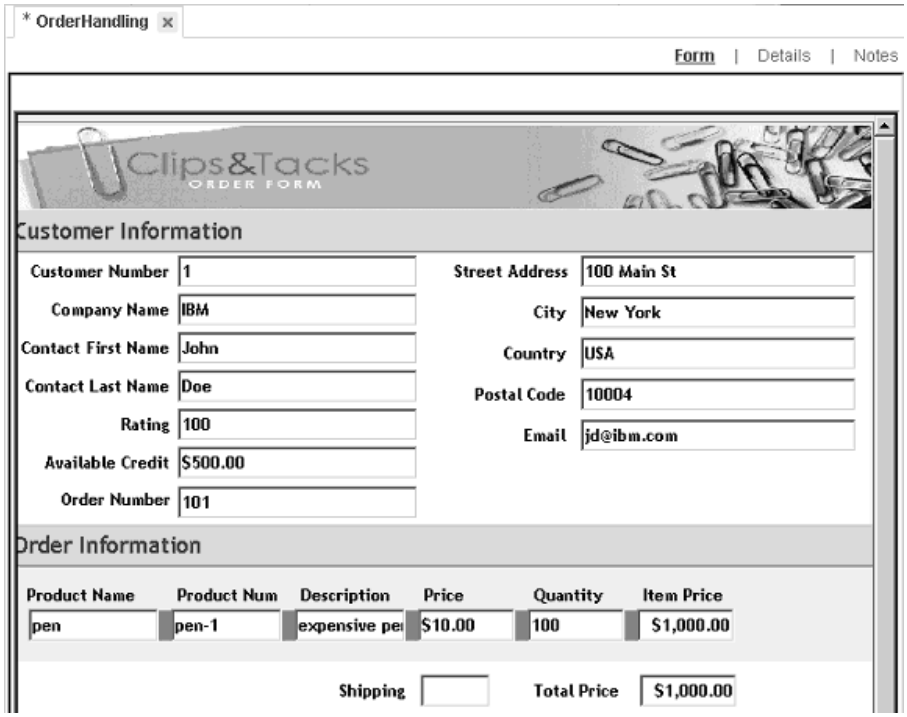
Field	**Value**
Customer Number	1
Company Name	IBM
Contact First Name	John
Contact Last Name	Doe
Rating	100
Available Credit	$500.00
Order Number	101
Street Address	100 Main St.

Table 3. Clips and Tacks Customer Information window (continued)

Field	Value
Country	USA
Postal Code	10004
E-mail	jd@ibm.com

6. Complete the rest of the form. Make the **Total Price** greater than $750.00 to force the process to flow to the Review Order task. As a result, the Order Size assertion is set to LARGE, which causes the Better Shipping endpoint to be selected (make sure the **Country** field is set to *USA* and the **Postal Code** field is set to *10004*.

   Note: Do not type underneath **For Office Use Only**.
7. Click **Submit**

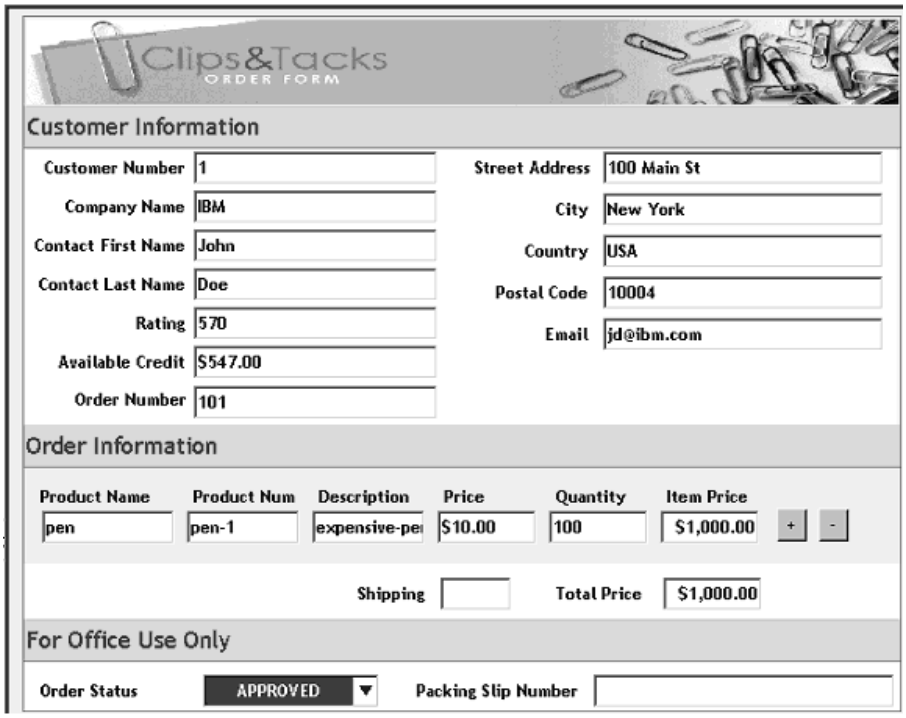


.

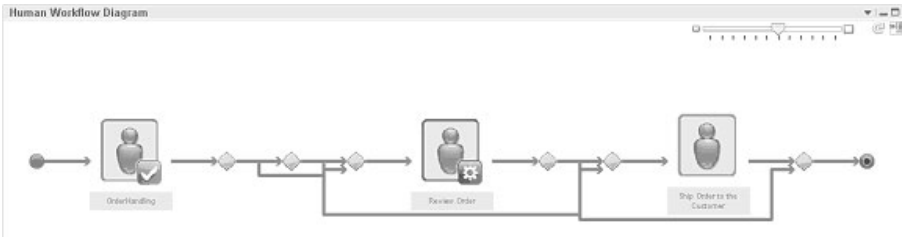
8. The **Order Handling** process is waiting for the **Review Order** task to be Approved, as shown in the **Available Tasks** widget.

   Note: If the **Review Order** task is not displayed, select the down arrow icon and click **Refresh**.

9. Select **Review Order** and click the icon on the right side of the **Available Tasks** window. The **Task Information** widget now displays the **Review Order** form.

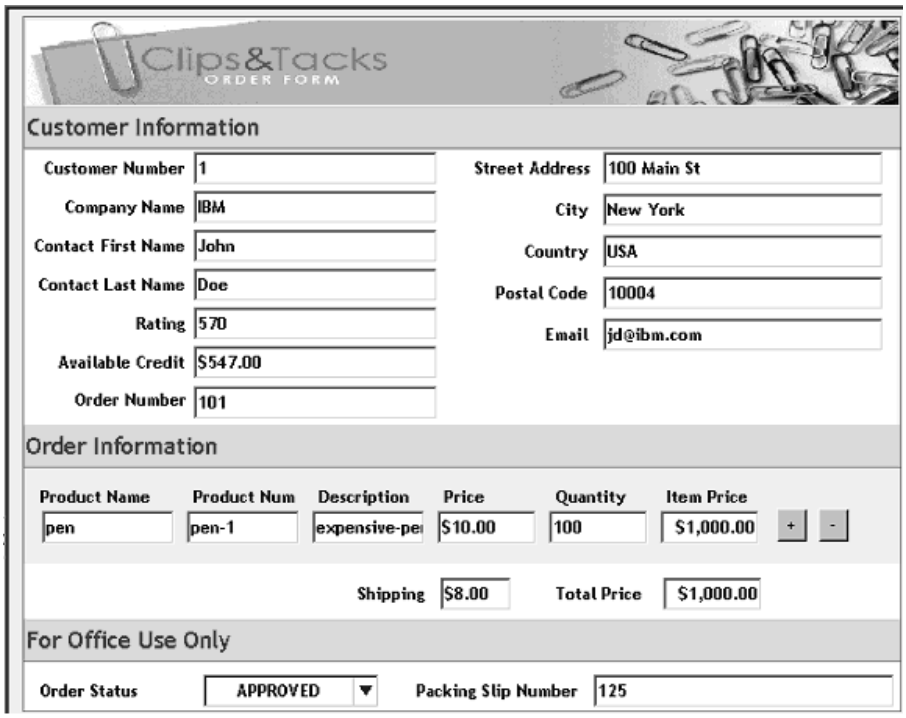


10. For **Order Status**, select **APPROVED**.
11. Scroll down to see the **Human Workflow Diagram** widget displaying the state of all the human tasks in the process instance.

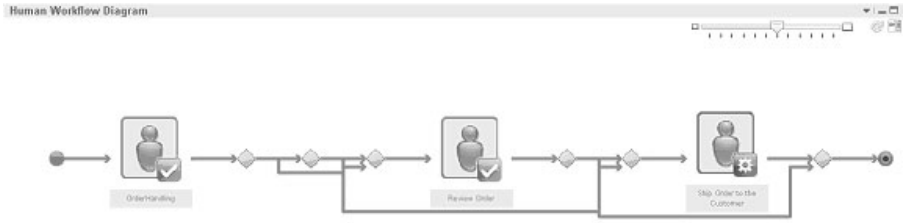


12. Scroll back up to the **Task Information** widget and click **Submit**. The process progresses to the **Ship Order to Customer** tasks. The Available Tasks widget now lists the Ship Order to Customer task.

    Note: If the **Ship Order to Customer** task is not in the **Available Tasks** widget, select **Refresh**.
13. Claim the Ship Order to Customer task by selecting **Ship Order to Customer** and clicking the icon on the right side of the **Available Tasks** window.
14. The process now completes for this instance and you can review the completion information by:
    a. The **Task Information** widget now displays the updated **Ship Order to Customer** form.

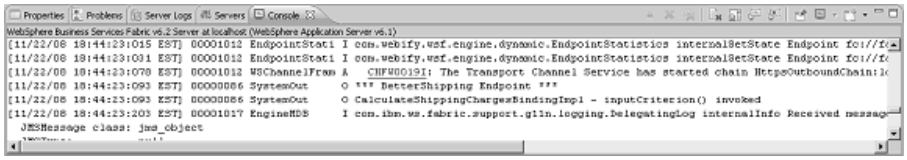


b. The **Human Workflow Diagram** widget displays the state of all the **human tasks** in the process. Hover the mouse over each task to see the state and the owner.



c. The Shipping Charge field shows the amount that the endpoint charges by using the Calculate Shipping Charges Dynamic Assembler. In this case, the Better Shipping endpoint was selected, given the values of the input data, and the fact that this particular carrier charges an $8 flat fee.

You can also see the selected endpoint in WebSphere Integration Developer in the console view.



Updating the shipping policies for small orders

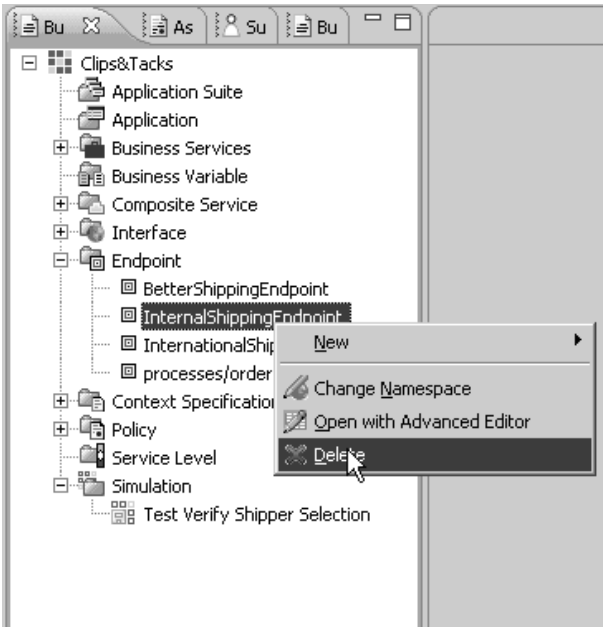
In this lesson, you will implement a change in the shipping policies for small orders.

Clips and Tacks made a business decision to update the shipping policies for all domestic shipping including small orders. You will implement **Change 1** to the Clips and Tacks policy. The following table represents the Clips and Tacks service-provider endpoint capabilities (assertions) and use cases for service consumers for **Change 1**.

Table 4. Clips and Tacks service-provider endpoint capabilities and use cases for **Change 1**

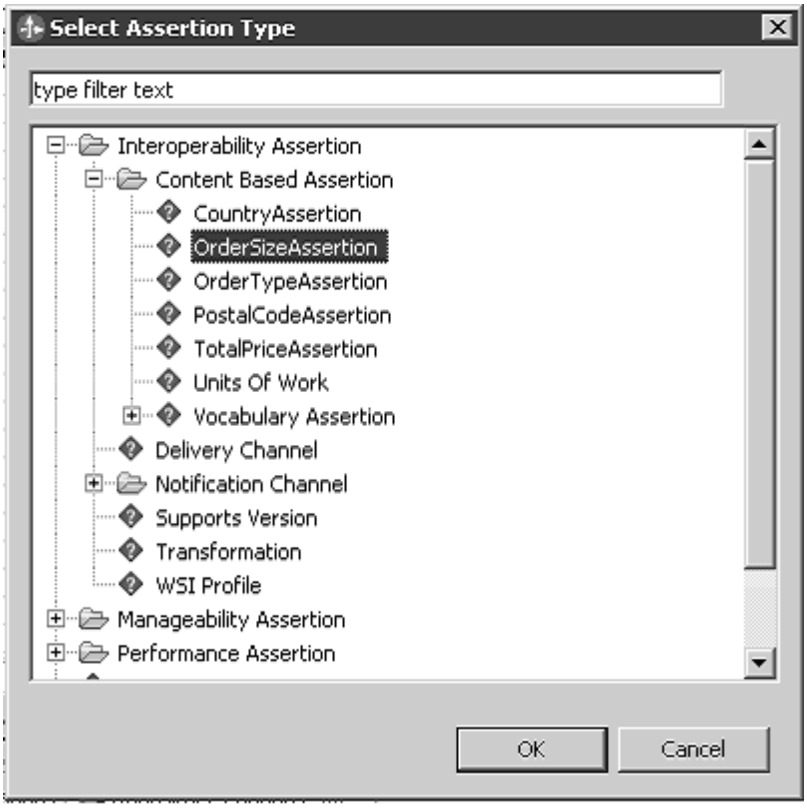
Size and Type of Order	Internal Shipping	Better Shipping	International Express
Order Size = SMALL and Order Type = DOMESTIC		X	
Order Size = Large and Order Type = DOMESTIC		X	
Order Type = INTERNATIONAL			X

1. Switch back to the Business Services perspective in WebSphere Integration Developer. Remove the InternalShipping endpoint by right-clicking InternalShippingEndpoint and selecting Delete.

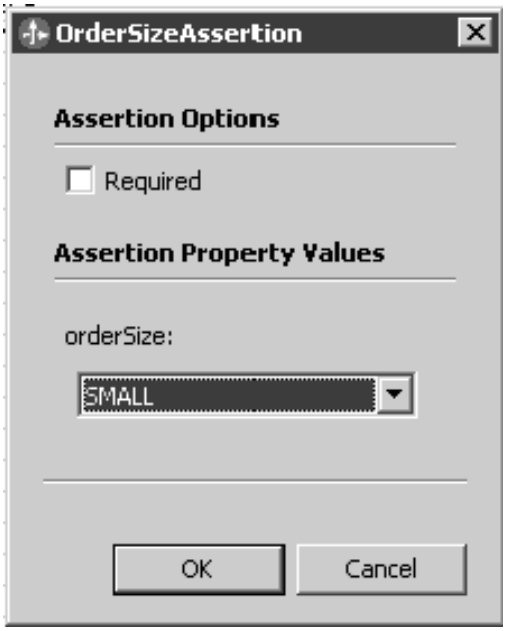


2. Modify the BetterShipping endpoint.
   a. Double-click **BetterShippingEndpoint** to open its editor. Select the **Assertions** tab and click **Add**, which is in the upper-right corner of the **Endpoint Capabilities** table.

   b. Expand the **Interoperability** folder, expand the **Content Based Assertion** folder, and then select **OrderSizeAssertion** and click **OK**.



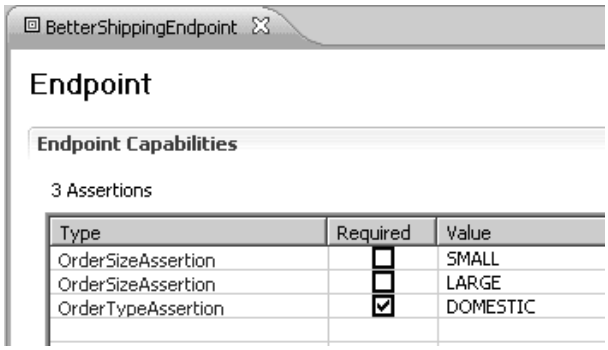
c. In the window that opens, select **SMALL** for the order size, and then click **OK**.



You have created an instance of this assertion type and associated it with this endpoint. There is now a row for this assertion in the table.

d. In the **Capabilities** table, clear the check box in the **Required** column for OrderSizeAssertion with a value that equals LARGE. Save your work.

e. Verify that you have three rows in the **Endpoint Capabilities** assertions table and close the editor.



3. Simulate **Change 1** by following the steps as outlined in the section "Simulating the initial shipping policies" on page 86, changing the values of the **Test Verify Shipper** selection page to the following values:
   - CountryAssertion = USA
   - PostalCodeAssertion = 30324
   - TotalPriceAssertion = 10

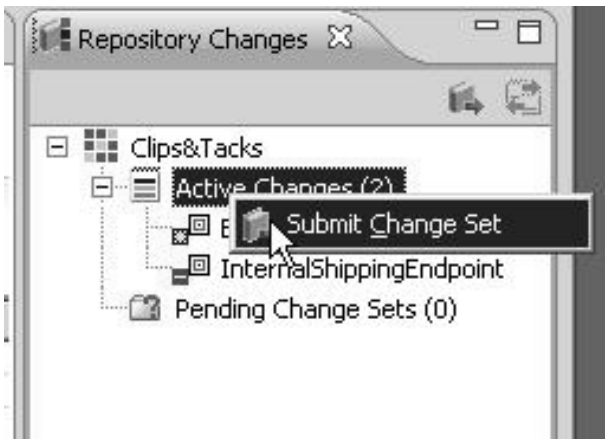
   Then click **Run**. The Simulation Operations panel shows only green check marks and the BetterShippingEndpoint is selected. After observing the simulation results close the simulation tab without saving it.

Using Governance to manage changes

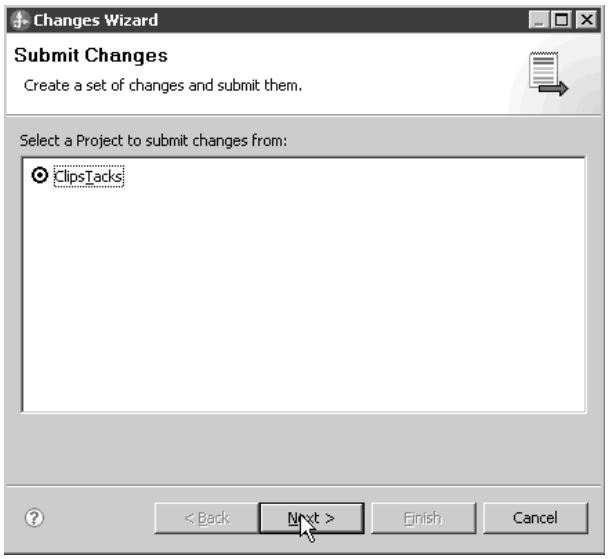
In this lesson, you will publish your local changes to the WebSphere Business Services Fabric business services repository.

The business services repository is used by the Dynamic Assembler when an actual process runs in production or when you run your runtime test. To publish your local changes, Governance is used to submit your local change list to update the business services repository. A change list is a collection of related metadata changes that an individual developer makes in the localized project.

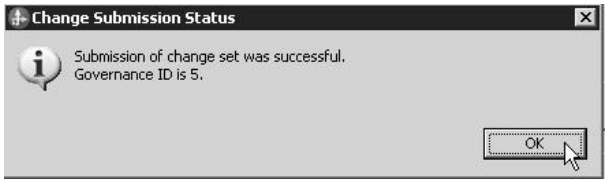
1. Locate the **Repository Changes** view on the left of your WebSphere Integration Developer workspace. Expand the **Active Changes** folder to see the list of 2 outstanding active changes.
2. Right-click **Active Changes** and click **Submit Change Set**.



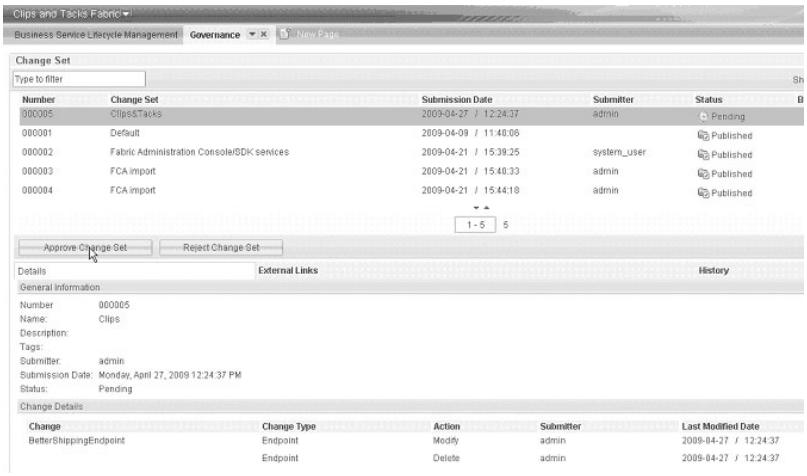
3. On the first page of the Change Wizard keep the default Project and click **Next**.



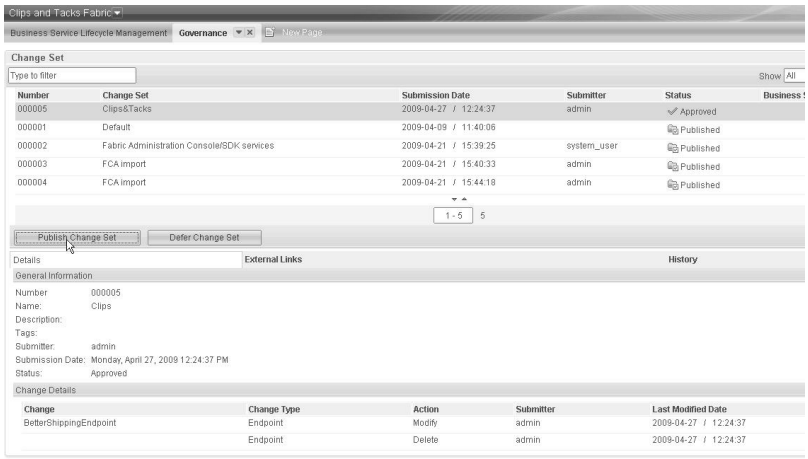
4. To move all of your development changes to the Selected Changes window, Click **Add All >** and then click **Finish**.
5. In the Confirm Submit to Business Services Repository window, click **Yes**.
6. In the Change Submission Status window click OK. Notice that the Active Changes has gone to zero.



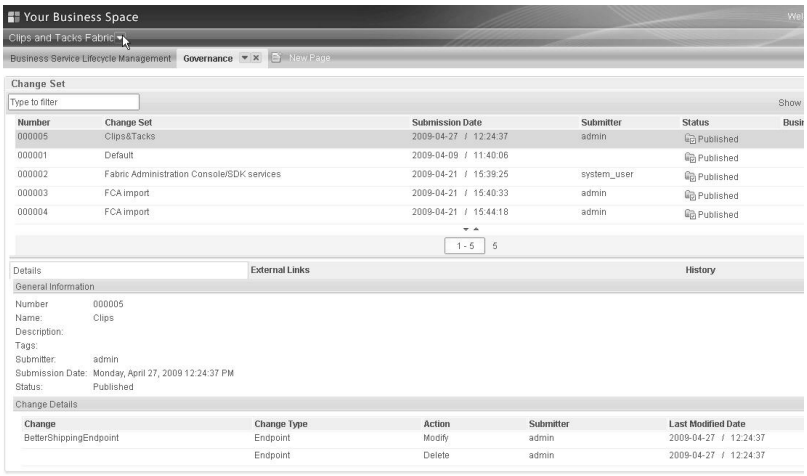
7. Log in to Business Space with the `admin` id and open up the **Governance** page of the **Clips And Tacks Fabric** space.
   a. To get to the Business Space, in the Business Integration perspective of WebSphere Integration Developer, in the Servers view, right-click the WebSphere Business Monitor Server V6.2 server and select **Launch → Business Space**. (If a Security window displays, select the option to continue to the Web site or add this connection as an exception, depending on the browser being used).
   b. When prompted, enter admin for the user ID and for the password (or the administrator ID and password if you have changed it).
   c. Navigate to the **Governance** page of the **Clips and Tacks Fabric** space.
8. On the **Change Set** widget, select the row corresponding to the **Clips&Tacks** change set with the status column set to **Pending**. This change set is the list of changes that you submitted from WebSphere Integration Developer.
9. Click **Approve Change Set**.



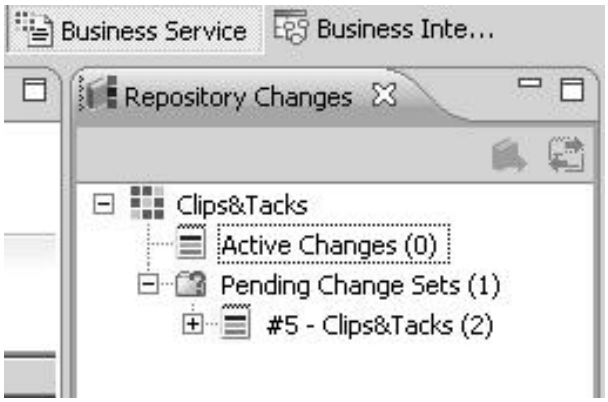
10. For the comment, type **Shipping Changes for Change 1** and click **OK**.
11. Click **Publish Change Set**.



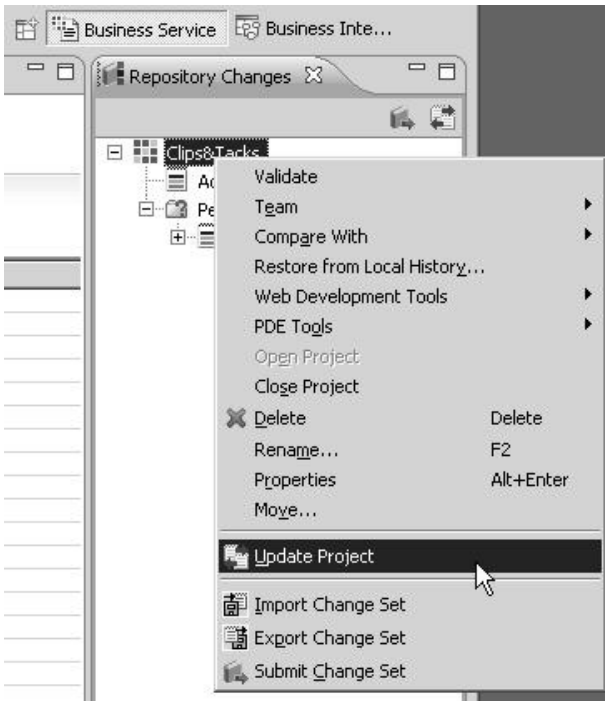
12. Click **OK**. The Clips&Tacks row shows **Published** in the **Status** column.



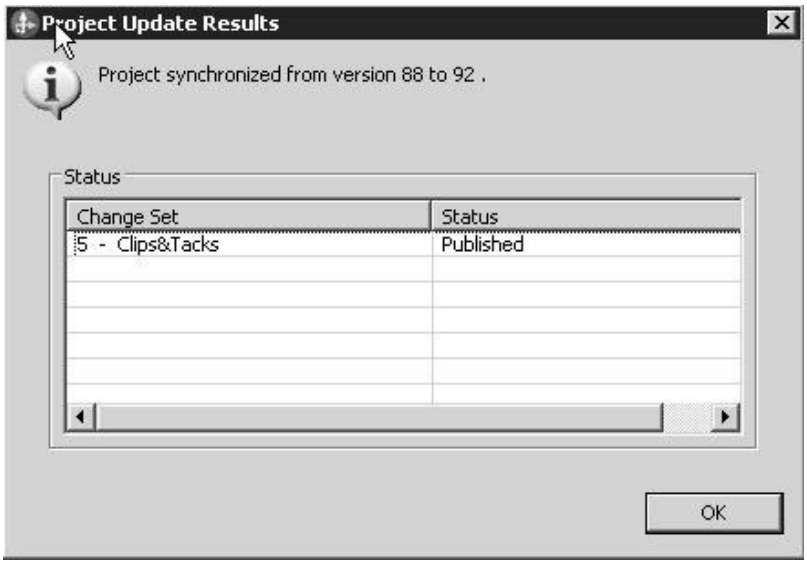
13. Switch back to the WebSphere Integration Developer workspace and the **Business Service** perspective, notice that there is now an entry in the **Pending Change Sets** folder under the **Repository Changes** tab.



14. At the root of the tree, right-click **Clips&Tacks** and select **Update Project**.



15. In the Update Project window, click **Finish**.
16. In the Project Update Results window, click **OK**.



Performing these steps moved your changes to the run time business services repository. The WebSphere Business Services Fabric server now has access to this metadata during run time. Additionally, you have re-synchronized your local Composition Studio environment.

To complete **Change 1**, you need to run a runtime test. For the actual runtime test, follow steps as outlined in the section "Testing the initial shipping policies" on page 89. Use the same input values provided there for the form except for the **Total Price**, which you should set to 10, to show that the Better Shipping endpoint now handles small orders as well.

Updating the shipping policies with Local Shipping Option

In this lesson, you will implement a change to the shipping policy for local orders.

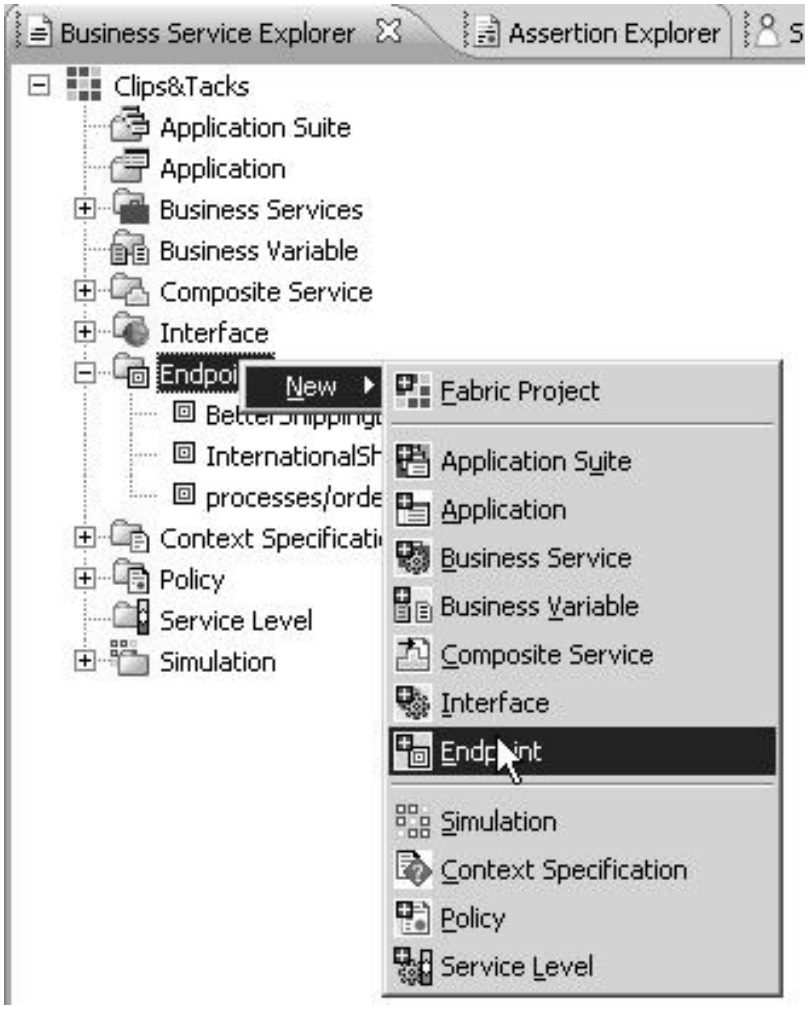
Clips and Tacks made a business decision to update the shipping policies on how to handle shipping for all local orders. You will implement **Change 2** to the Clips and Tacks policy. The following table represents the Clips and Tacks service-provider endpoint capabilities (assertions) and use cases for service consumers for **Change 2**.

Table 5. Clips and Tacks service-provider endpoint capabilities and use cases for **Change 2**

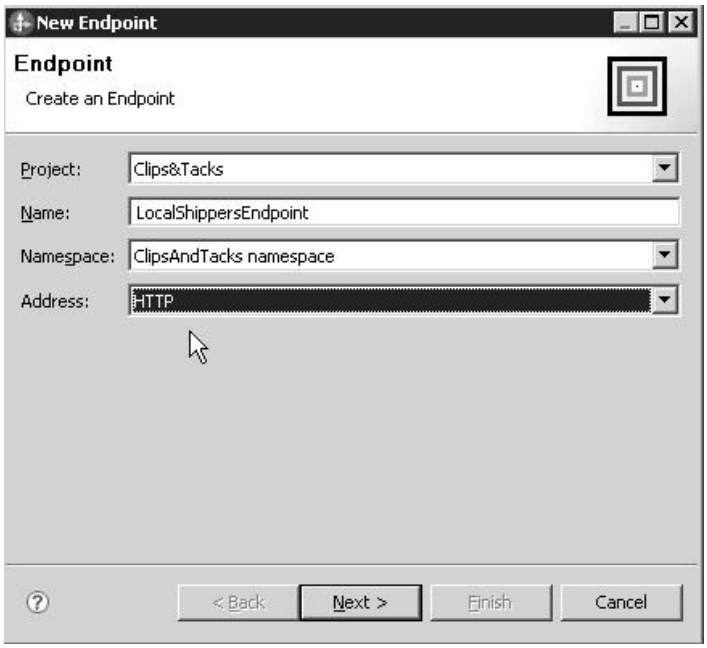
Order Size and Type	Internal Shipping	Better Shipping	International Express	Local Shippers
Order Size = SMALL and Order Type = DOMESTIC		X		
Order Size = LARGE and Order Type = DOMESTIC		X		
Order Type = INTERNATIONAL			X	
Order Type = LOCAL				X

To create the Local Shippers endpoint in your fabric project.

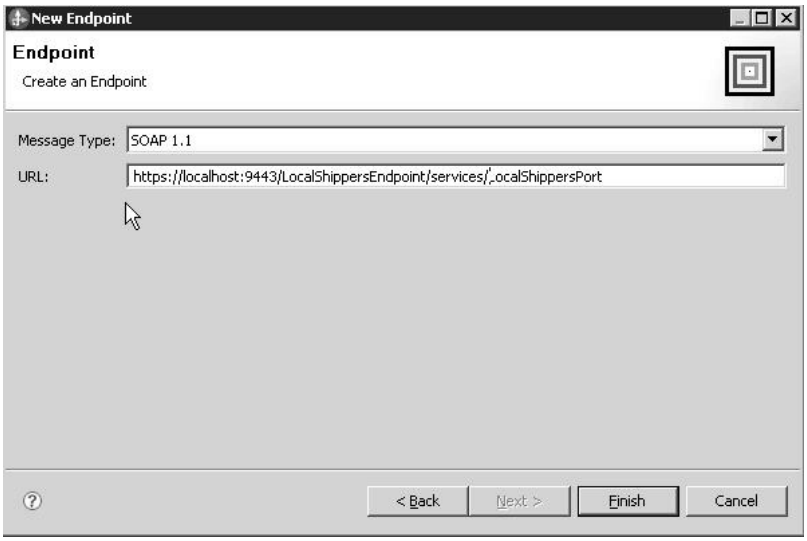
1. Switch back to the Business Services perspective in WebSphere Integration Developer. In the **Business Services Explorer**, right-click **Endpoint** and select **New → Endpoint**.



2. Enter the name **LocalShippersEndpoint**, change the address to **HTTP** and select **Next**.

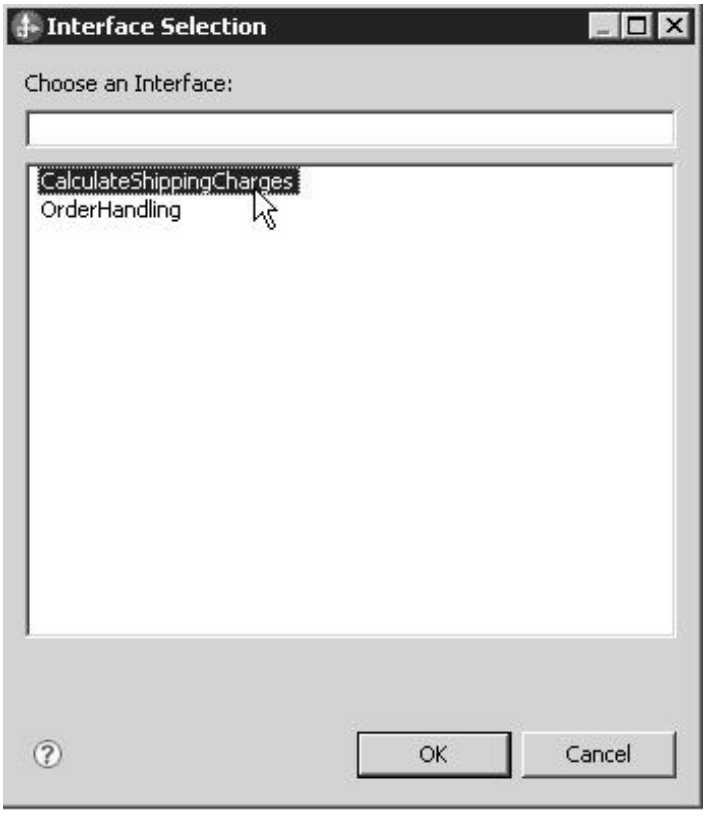


3. Enter the URL; `https://localhost:<SECURE_SERVER_PORT>/LocalShippersEndpoint/services/LocalShippersPort`. Select **Finish**.

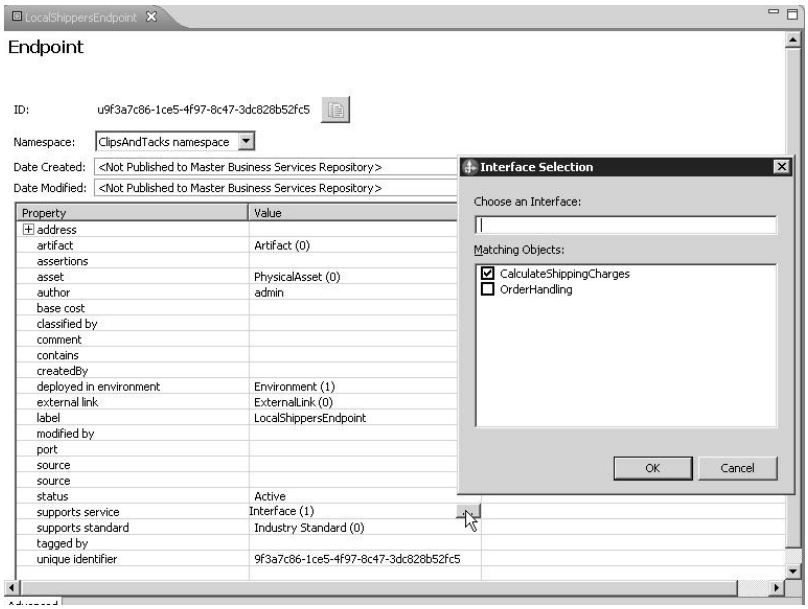


The LocalShippersEndpoint editor opens.

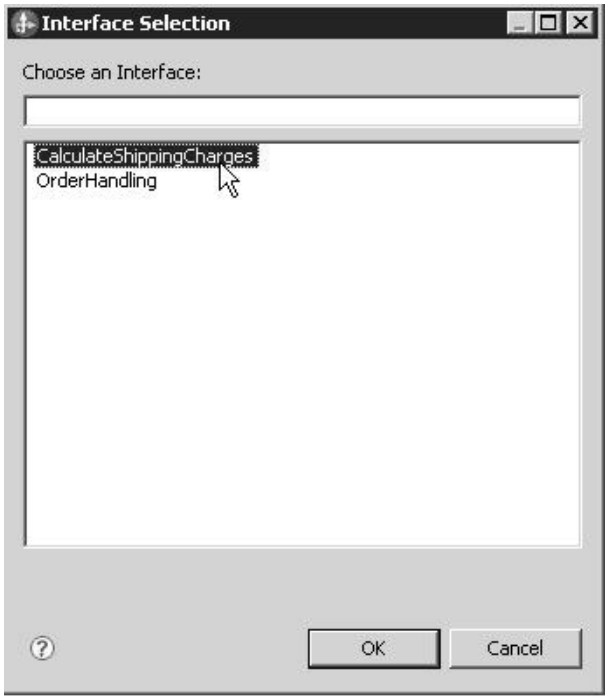
4. Select the **Interfaces** tab for this editor and click **Add Existing**, which is located in the upper-right corner of the **Associated Interfaces** table.



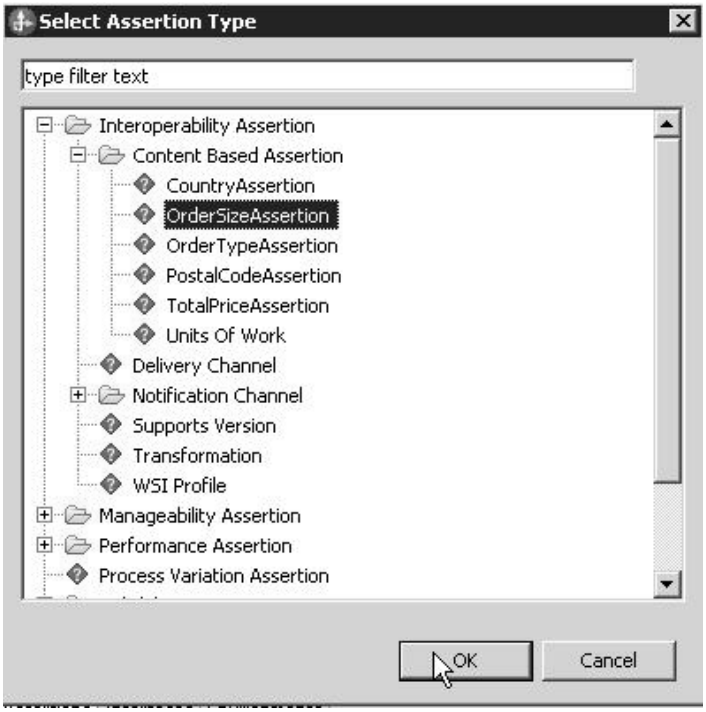
Note: If the **Add Existing** is returns a blank list of interfaces, open up the advanced editor by closing the editor that is currently open, right-clicking on the endpoint and selecting **Open with Advanced Editor**. The advanced editor will open up with the option to select the **supports** service through another window for **Interface Selection**.



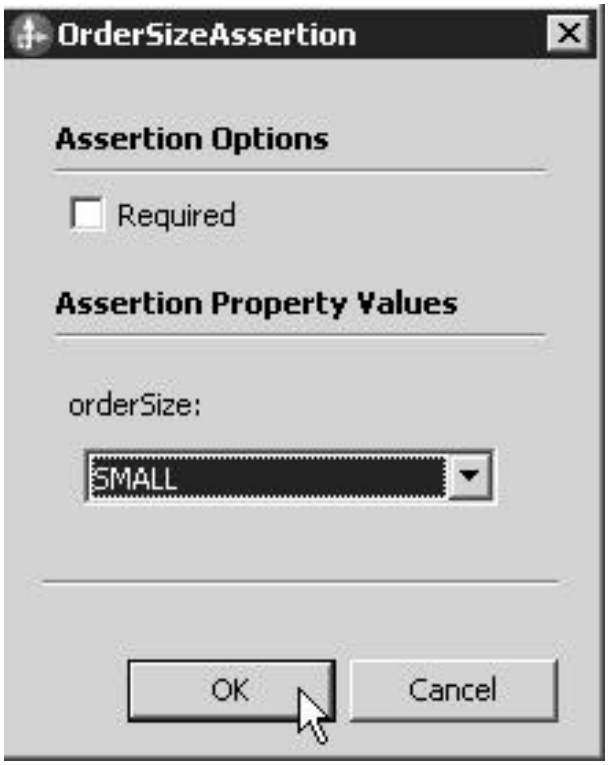
5. Select **CalculateShippingCharges** and click **OK**.



6. Select the **Assertions** tab for this editor and click **Add**, which is located in the upper-right corner of the **Endpoint Capabilities** table.
7. Expand the **Interoperability** folder, expand the **Content Based Assertion** folder and then select **OrderSizeAssertion** and click **OK**.



8. In the window that opens, select **SMALL** for the order size field and click **OK**.

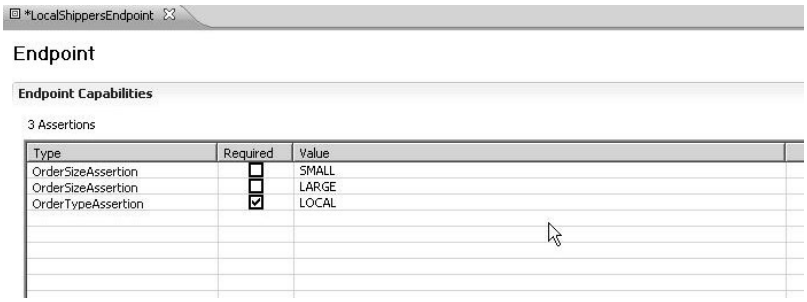


You have created an instance of this assertion type and associated it with this endpoint. There is now a row for this assertion in the table.

9. Create an assertion for **LARGE** orders by repeating the previous steps for adding an assertion but this time select **LARGE** for the order size and click **OK**.
10. Create an assertion for Local orders by repeating the previous steps for adding an assertion but this time select the following:

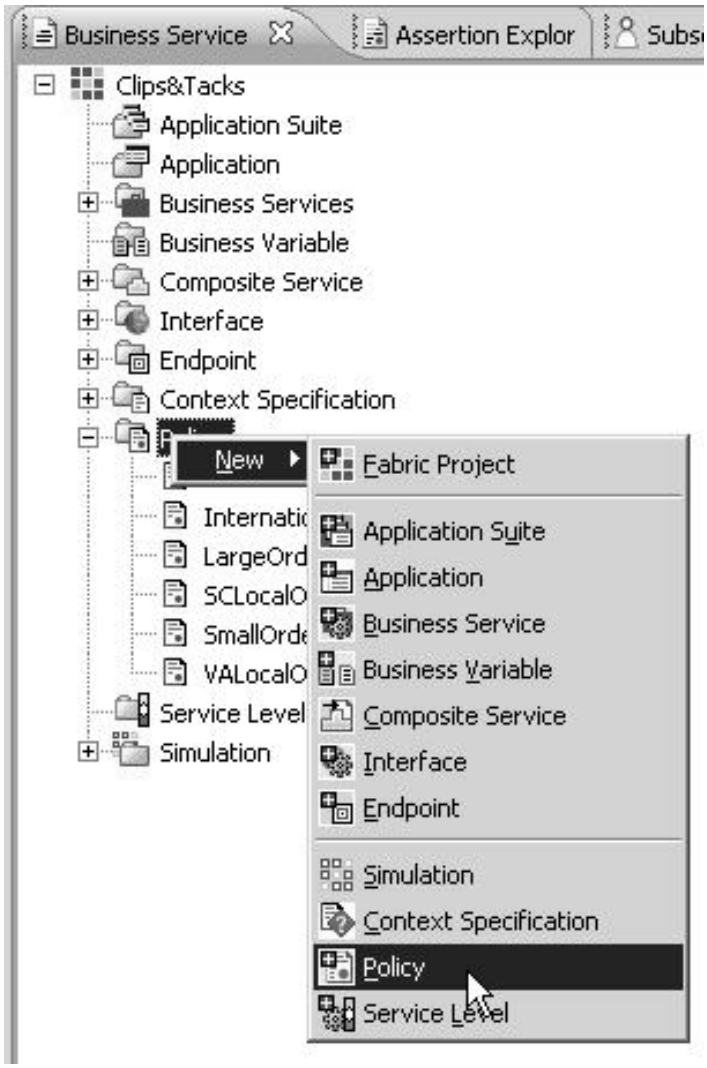
a. type is an **OrderTypeAssertion** in the same folder as the **OrderSizeAssertion** type.
b. select **Required**.
c. select **LOCAL** for the order type.

11. Verify that you have three rows in the **Endpoint Capabilities** assertion table, and close the editor. Save your work.

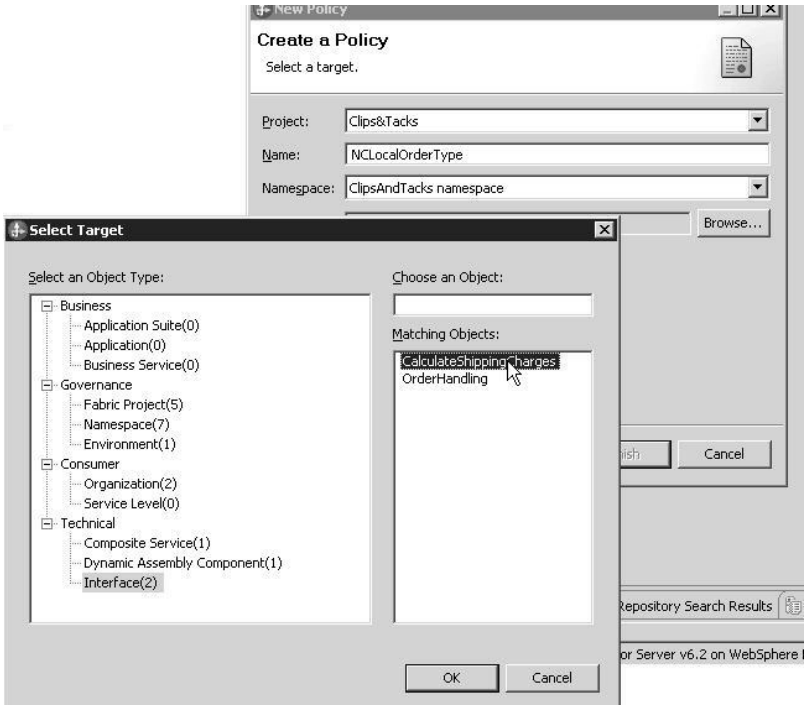


Create the business service policy named **NCLocalOrderType** that will use the Local Shippers endpoint.

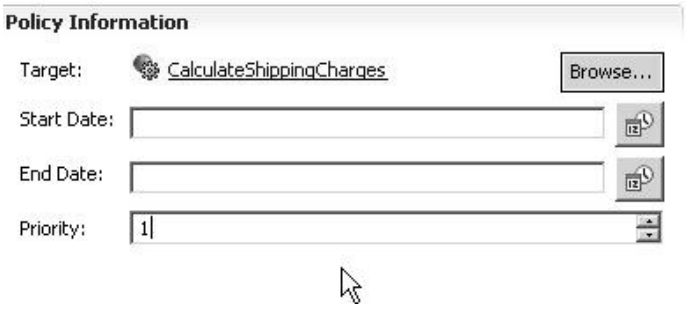
12. Right-click **Policy** and select **New → Policy**.



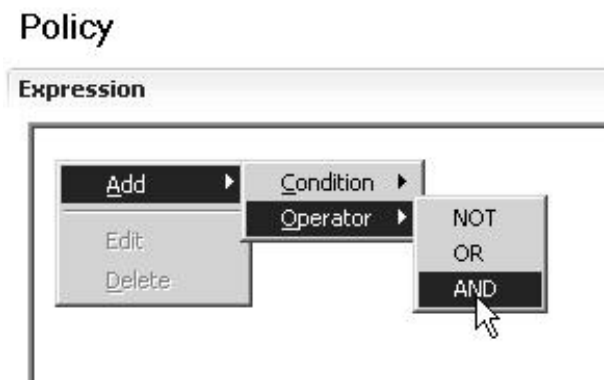
13. For the name, type `NCLocalOrderType`. Then click **Browse** and select **Interface(2) → CalculateShippingCharges** and click **OK**.



14. Click **Finish**.
15. In the **Policy** editor, type 1 for the priority.

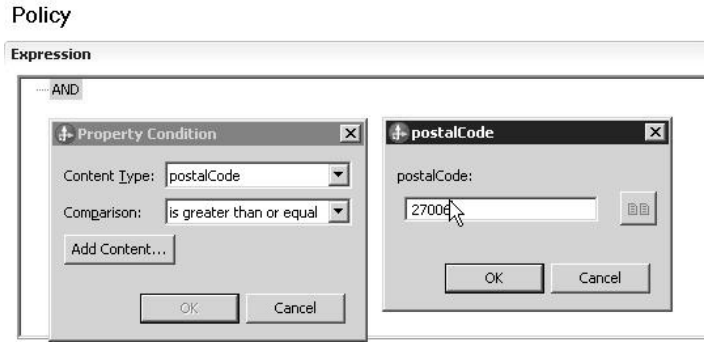


16. Select the **Policy Expression** tab for this editor. Inside the Expression panel and select **Add** → **Operator** → **AND**.

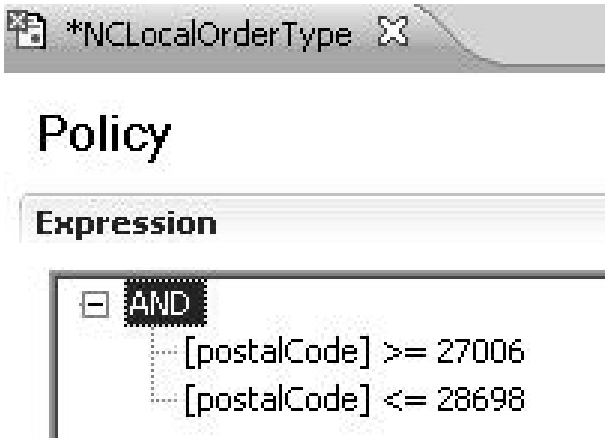


17. Inside the Expression panel, right-click **AND** and select **Add** → **Condition** → **Assertion**.
18. In the window that opens, select **postalCode** for the content type and select **is greater than or equal** in the **Comparison** field.

19. Click **Add Content** and type *27006* for the postal code. Click **OK** twice.

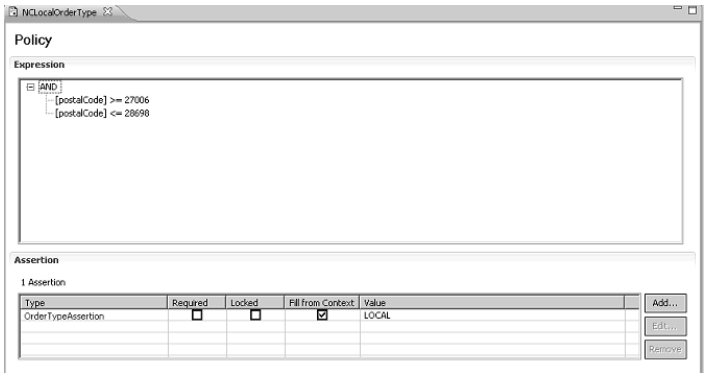


20. Repeat the previous 3 steps to add a condition but this time select **is less than or equal** in the **Comparison** field and *28698* for the postal code.
21. Verify that the content in your **Policy Expression** panel matches what is shown below.



22. Click **Add** in the **Assertion** table of the **Policy Expression** tab for this editor.
23. Expand the **Interoperability** folder, expand the **Content Based Assertion** folder, select **OrderTypeAssertion** this time, and click **OK**.
24. In the window that opens, clear the **Required** check box, select **Fill from Context**, select **LOCAL** for the order type, and click **OK**.

25. Save your work.



26. Browse the Clips&Tacks fabric project. You can see that there are already two other local policies defined:
    - SCLocalOrderType is defined as any postal code between 29001 and 29449.
    - VALocalOrderType is defined as any postal code between 20101 and 22942.

    All of these policies set the OrderTypeAssertion to LOCAL and so will result in the fabric choosing the LocalShippers Endpoint.
27. Simulate **Change 2** by following the steps as outlined in the section "Simulating the initial shipping policies" on page 86, changing the values of the **Test Verify Shipper** selection page to the following values:
    - CountryAssertion = USA
    - PostalCodeAssertion = 27519
    - TotalPriceAssertion = 100

The **Simulation Operations** panel shows only green check marks and the **LocalShippersEndpoint** is selected.

28. Publish your local changes to the business services repository by following the steps as outlined in the section "Using Governance to manage changes" on page 96. On the **Governance** page of the **Clips And Tacks Fabric** space, update your comments to be appropriate for **Change 2**.

To complete **Change 2**, you need to run a runtime test. For the actual runtime test, follow the steps as outlined in the section "Testing the initial shipping policies" on page 89. Use the same input values provided there for the form except for the Postal Code, which should be set to a value between 27006 and 28698 causing the Local Shipping endpoint to be selected. Run a second test with a **Postal Code** outside the three local ranges, any code that does not begin with the digit 2 will work, to see which shipping service is selected.

Monitoring the Order Handling business process

During the monitoring model development phase, you will use WebSphere Business Monitor Toolkit to build a monitor model that represents the Clips and Tacks business process activity and events.

To monitor the process and create a monitor model, complete the following tasks:

1. "Verifying that the business process emits events"
2. "Importing and opening the monitor model" on page 110
3. "Synchronizing the monitor model with the application" on page 112
4. "Adding monitoring details" on page 113
5. "Creating situation events" on page 117
6. "Creating a dimension model" on page 119
7. "Generating executable artifacts for the monitor model and deploying to the server" on page 122
8. "Configuring WebSphere Business Monitor for business situation events" on page 123
9. "Setting up access to the OrderHandling monitor model" on page 126

Verifying that the business process emits events

In this lesson, you will verify that events are emitted for decisions and invocation actions in the process.

Before you create the monitor model, you must select the events that WebSphere Process Server generates. WebSphere Business Monitor uses the generated events to monitor the process.

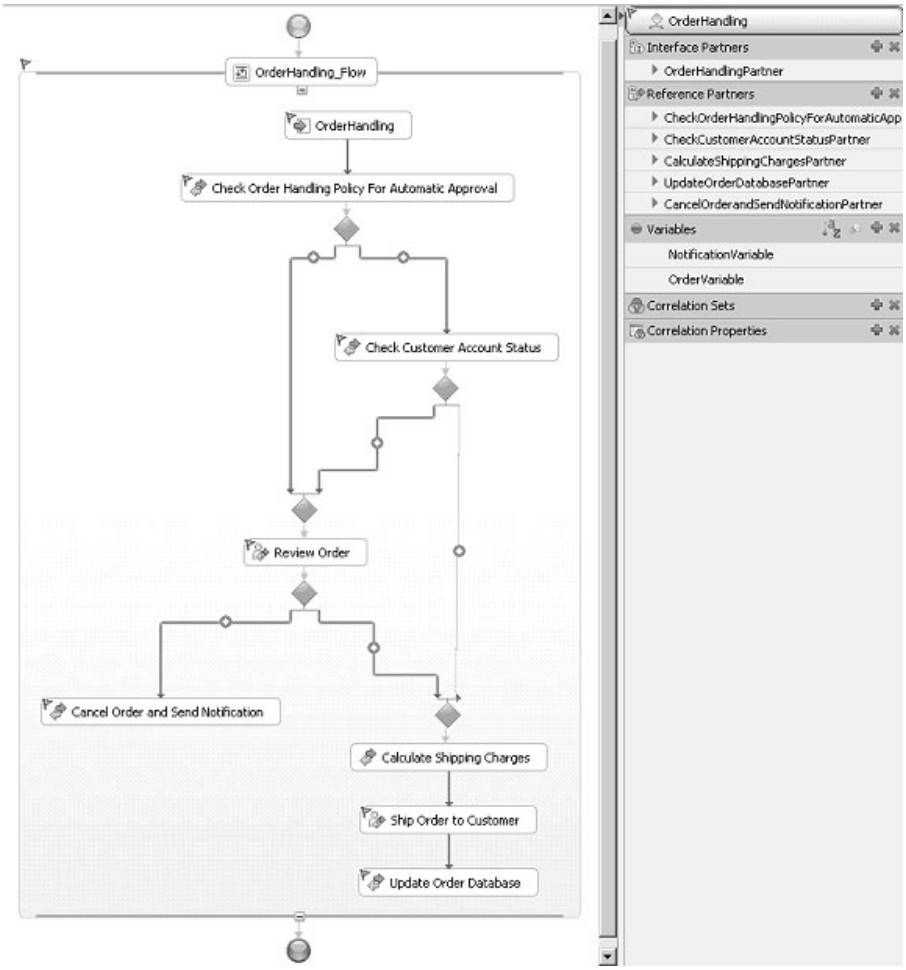
When you export the business model from WebSphere Business Modeler, decisions become BPEL links in WebSphere Integration Developer and the events required for monitoring are already selected.

To verify that events are available for monitoring, complete the following steps.

1. In the Business Integration view, select **ClipsAndTacksF1** → **Integration Logic** → **Processes** → **processes/orderhandling** and then double-click **OrderHandling** to open the BPEL editor.
2. Click the white background of the process outside of the Generalized Flow (OrderHandlingFlow) element, which is the large rectangle that contains elements such as a receive activity, human tasks, and an invoke activity.
3. Click the **Properties** tab under the BPEL diagram, and then click the **Event Monitor** tab (if you have to scroll down, scroll from the left side, not the right side). Verify that **All** is selected.

4. Click inside the **OrderHandling_Flow** parallel activity element, and then verify that **All** on the **Event Monitor** tab is selected.

The following screen capture shows the yellow flag icon on the OrderHandling process (right side of the diagram), which indicates that events are selected to be emitted for all the components inside the OrderHandling process.



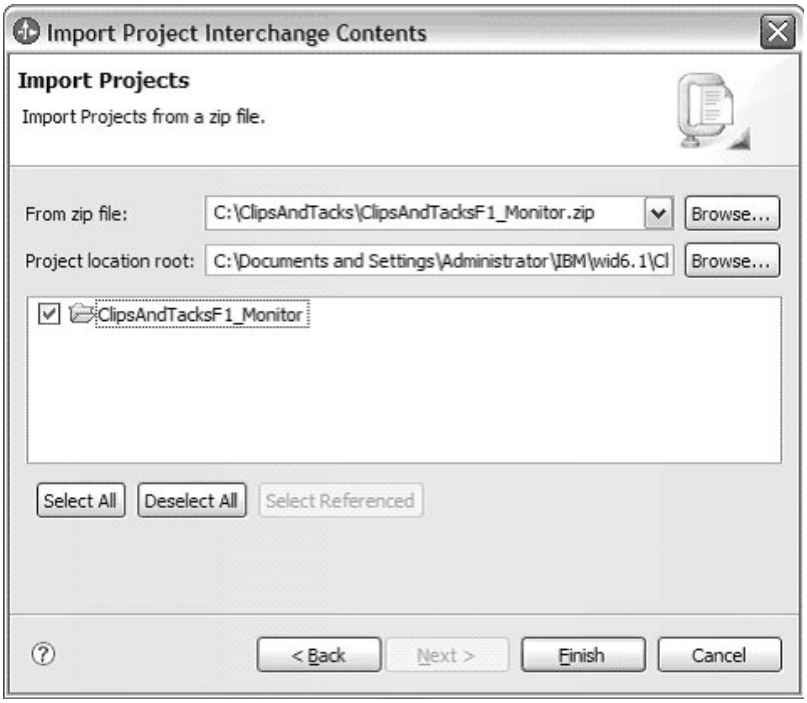
Importing and opening the monitor model

In this lesson, you will import the business measures model from WebSphere Business Modeler to monitor the business process.

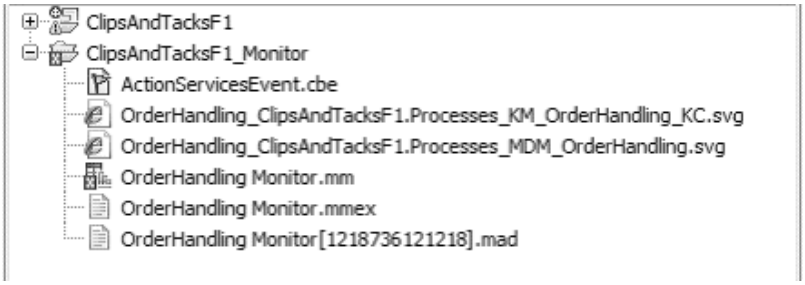
Note: Errors will result from the following actions, but these are corrected as you progress through the steps.

Complete the following steps:

1. In the Business Integration view, click **File** → **Import**.
2. Expand **Other**, select **Project Interchange**, and click **Next**.
3. Browse to and select **ClipsAndTacksF1_Monitor.zip**.
4. Select **ClipsAndTacksF1_Monitor** and click **Finish**.



5. Verify that the ClipsAndTacksF1_Monitor project is added to the project tree on the left pane.



Note: The monitor model name can vary slightly from OrderHandling_Monitor.mm to OrderHandling_Mon.mm.

6. Switch the Perspective to Business Monitoring Perspective by clicking the icon on the right corner and selecting Business Monitoring.

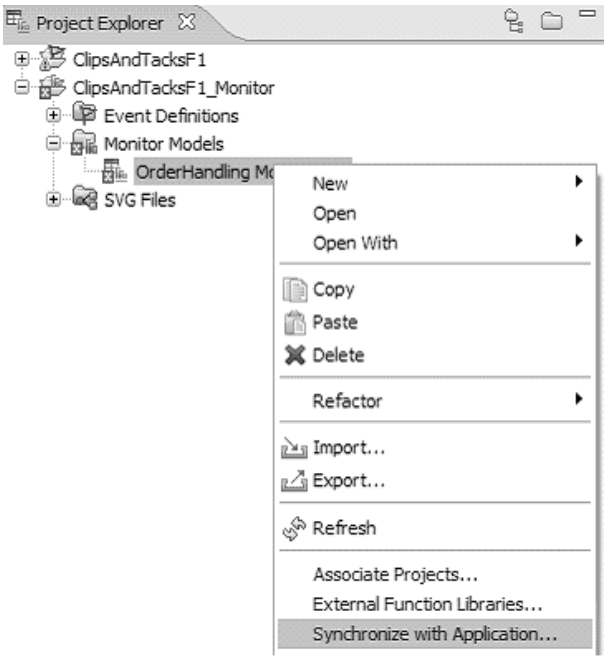
7. Close the **Technology Quickstarts** and the **Help** tabs.
8. In the project tree expand **ClipsAndTacksF1_Monitor** and double click the **Orderhandling Monitor.mm** to open the monitor model.

Synchronizing the monitor model with the application

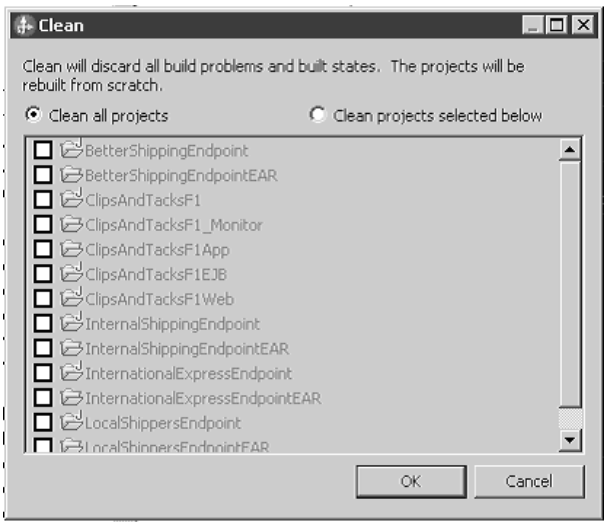
In this lesson, because you changed an interface, you will synchronize the monitor model, clean the project, and build the workspace.

Complete the following steps:

1. Right-click **OrderHandling Monitor.mm** and select **Synchronize with Application**, and then click **OK**.



2. Click **Project** → **Clean**. Then click **OK** to build the workspace. This will cleanly rebuild all the artifacts included with the project.

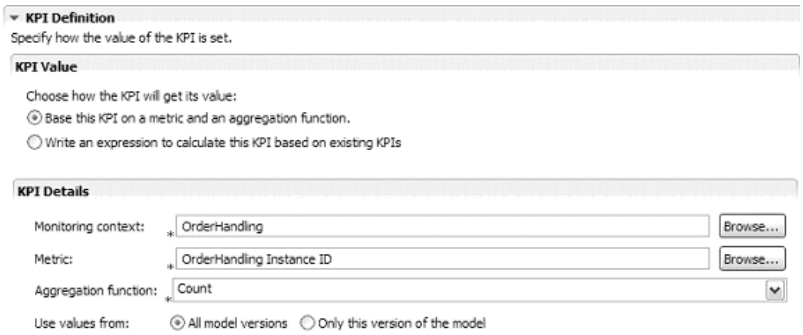


Adding monitoring details

In this lesson, you will add events, triggers, and KPIs to the monitor model.

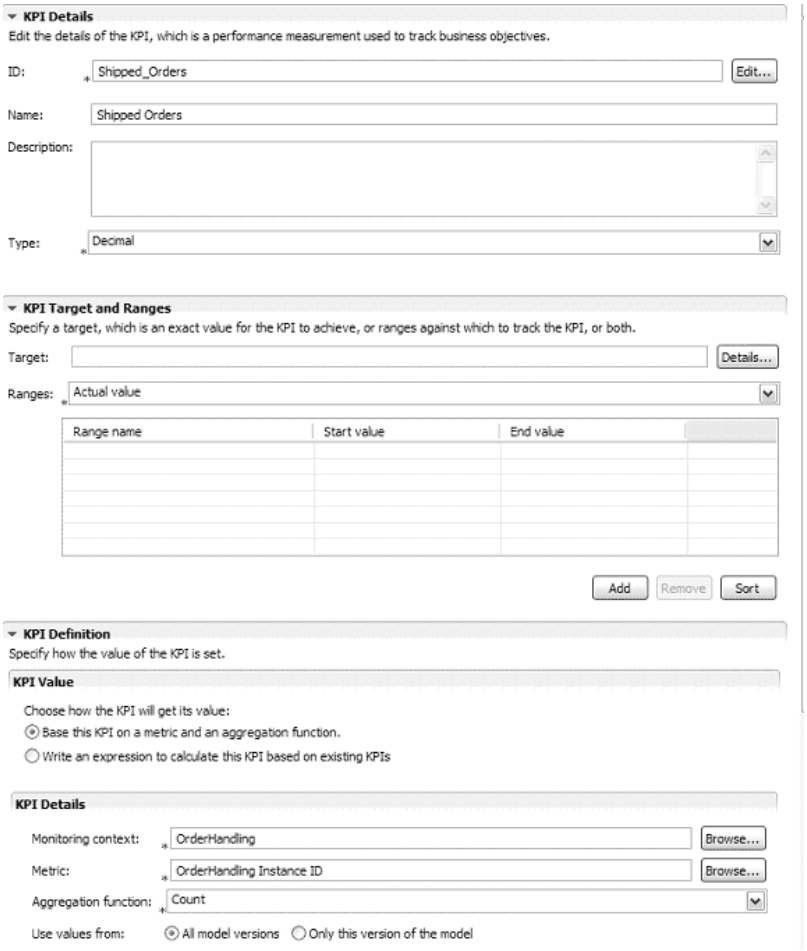
Events are requests or responses sent from one component to another. A trigger is a mechanism that detects an occurrence and can cause additional processing to occur in response. For example, you could define a trigger that causes a metric to be updated, a counter to increment, or a stopwatch to halt each time a task ends. Key performance indicators (KPIs) are quantifiable measurements of the improvement or deterioration in the performance of an activity that is critical to the success of a business.

1. Click **KPI Model** tab and expand **OrderHandling KC**.
2. Click on the **Average Process Duration Trigger 1**. For **Trigger condition**, enter the expression `Average_Process_Duration ge dayTimeDuration('P3DT1H')`.
3. Click on the **Percentage of Orders Shipped Trigger 1**. For **Trigger condition**, enter the expression `Percentage_of_Orders_Shipped < 85`.
4. Click **Average process Duration** (one of the KPIs) and examine how the KPI is calculated. How the KPI gets its value is shown under KPI Value. The metric and the aggregate function are shown under KPI Details. Everything is set up already.
5. Click **Percentage of Orders Shipped**. There is no metric available to calculate this KPI. You need to create a KPI for the number of shipped orders and another KPI for the total number of orders. From that you can calculate the percentage of orders shipped.
6. Create the Total Number of Orders KPI by right-clicking **OrderHandling KC** and selecting **New → KPI**. For the name, enter as `Total Number of Orders` and click **OK**.
   a. Under KPI Value select **Base this KPI on a metric and an aggregation**.
   b. Under KPI Details, select **OrderHandling** as the monitoring context.
   c. Select **OrderHandling Instance ID** as the metric.
   d. Select **Count** as the aggregation function and leave everything else as it appears by default.



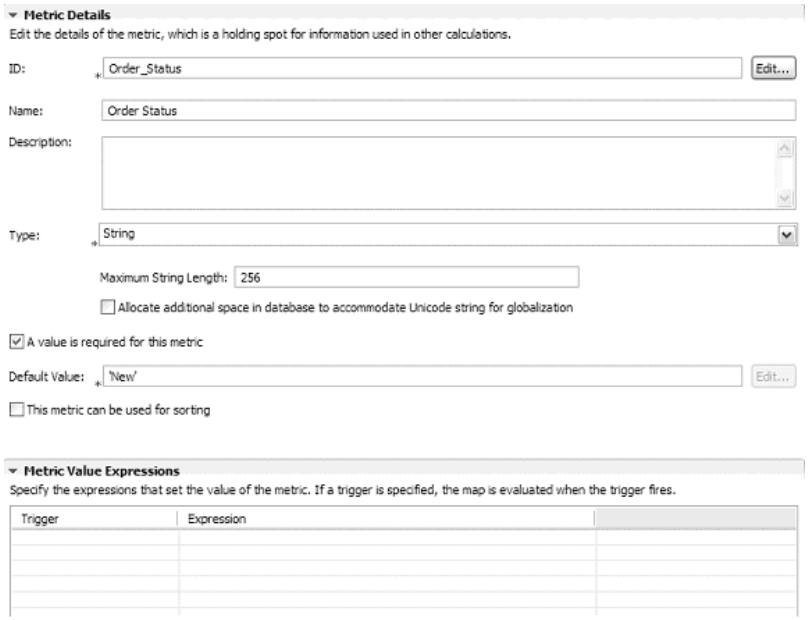
7. Create the Shipped Orders KPI by right-clicking **OrderHandling KC** and selecting **New → KPI**. Enter name as `Shipped Orders` and click **OK**.
   a. Under KPI Value, select **Base this KPI on a metric and an aggregation**.
   b. Under KPI Details, select **OrderHandling** as the monitoring context.
   c. Select **OrderHandling Instance ID** as the metric.
   d. Select **Count** as the aggregation function and leave everything else as it appears by default.

   Note: This KPI should be counting only shipped orders. Under **Data Filter** you will need to filter only the shipped orders. For that you need to create a new metric called **Order Status**. You will create the **Order Status** metric in the next step and later complete the **Data Filter** for this KPI.

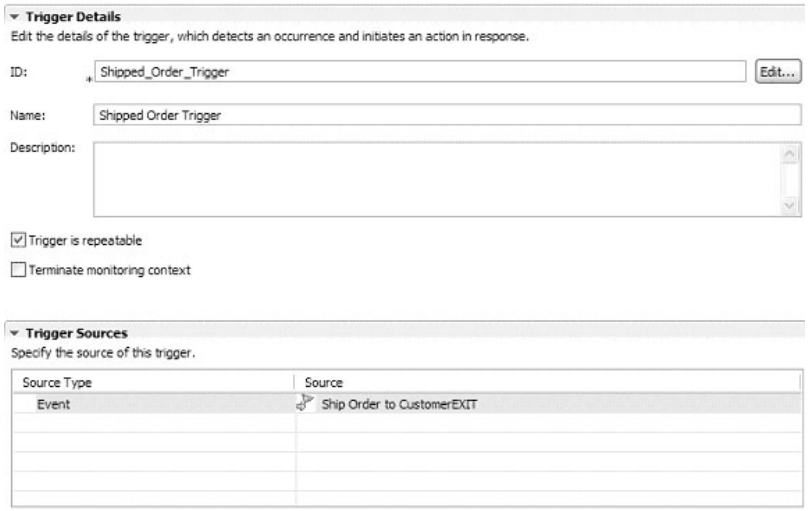


8. Create the Order Status metric.

a. Click the **Monitor Details Model** tab and right-click the **OrderHandling** monitor context. Select **New** → **Metric**.
b. Enter `Order Status` as the name and leave **String** as the type. Click **OK**.
c. Select **A value is required for this metric** because a dimension uses this metric and it requires a value for dimensional analysis.
d. For the default value, enter `'New'` with the single quotation marks. You need to create triggers to set the value of the metric. See the next step to see how to create triggers. You select the triggers later.



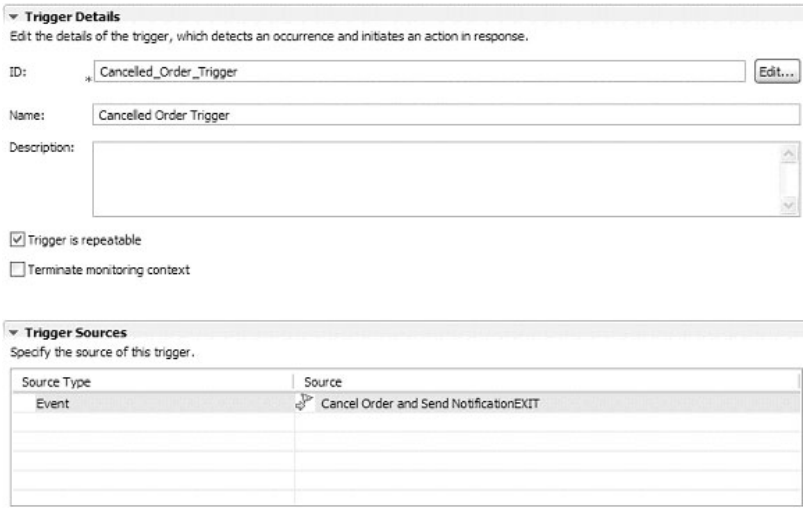
9. Create the Shipped Order and the Canceled Order triggers.
   a. In **Monitor Details Model** tab, right-click the **OrderHandling** monitoring context and select **New** → **Trigger**.
   b. Enter `Shipped Order Trigger` as the name and click **OK**.
   c. Under Trigger Sources, click **Add**. Click **Other source type** and select **OrderHandling** → **Ship Order to Customer** → **Ship Order to CustomerExit**. Click **OK**.



   d. In **Monitor Details Model** tab, right-click the **OrderHandling** monitoring context and select **New** → **Trigger**.

e. Enter `Canceled Order Trigger` as the name and click **OK**

f. Under Trigger Sources, click **Add**. Click **Other source type** and select **OrderHandling → Cancel Order and Send Notification → Cancel Order and Send NotificationExit**. Click **OK**.

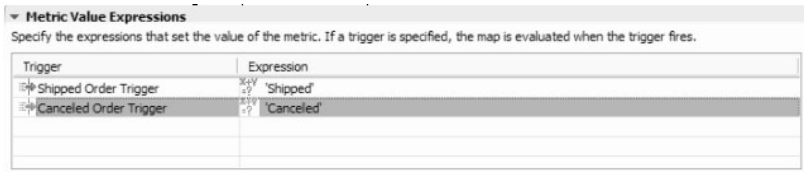


10. Complete the Order Status metric.

a. Click **Order Status**. Under Metric Value Expressions, click **Add** and then click **Trigger Cell** and select **Shipped Order Trigger**.

b. Under Expression, enter `'Shipped'` including the single quotation marks.

c. Repeat steps a and b to add Canceled Order Trigger as the trigger value and `'Canceled'` including the single quotation marks for the expression.

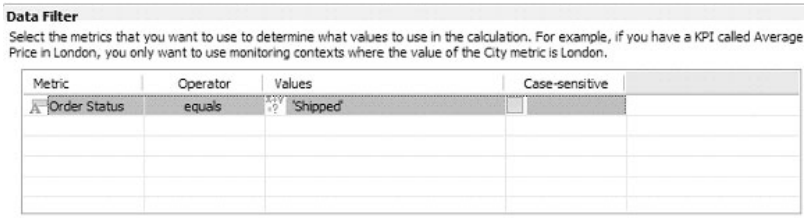


11. Complete the Shipped Orders KPI.

a. Click the **KPI Model** tab and then click **Shipped Orders**.

b. Under **Data Filter**, click **Add** and select **Order Status** as the metric. Click **OK**.

c. Under values type `'Shipped'` with the single quotation marks.

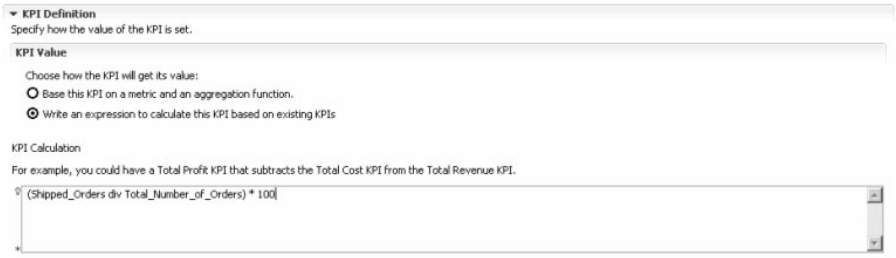


12. Complete the Percentage of Orders Shipped KPI

a. Click **Percentage of Orders Shipped**.

b. For KPI Value, select **Write an expression to calculate this KPI based on existing KPIs**.

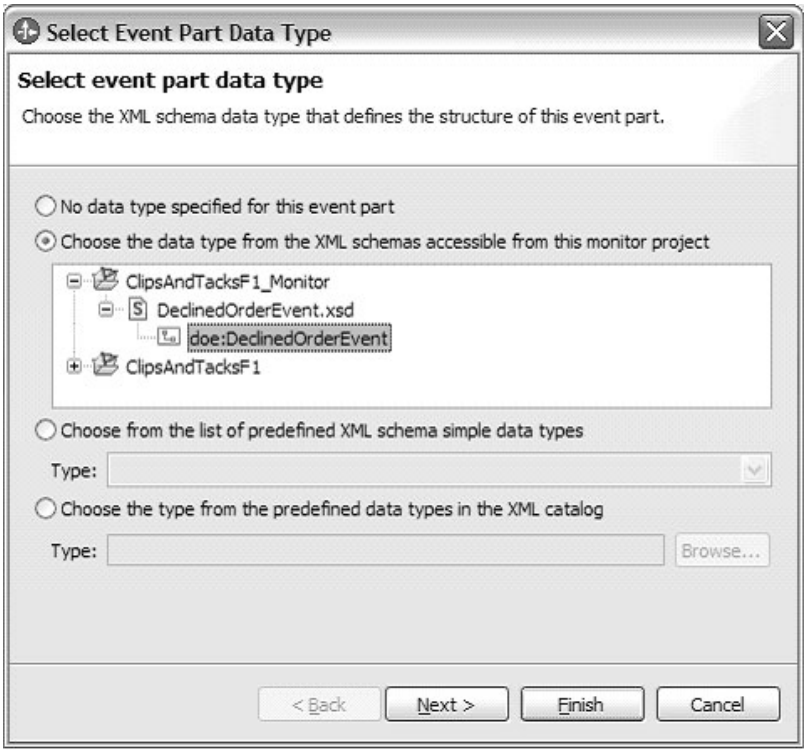
c. For KPI Calculation, enter `( Shipped_Orders div Total_Number_of_Orders ) * 100`. You can use context assistant to complete the expression inside the parentheses.



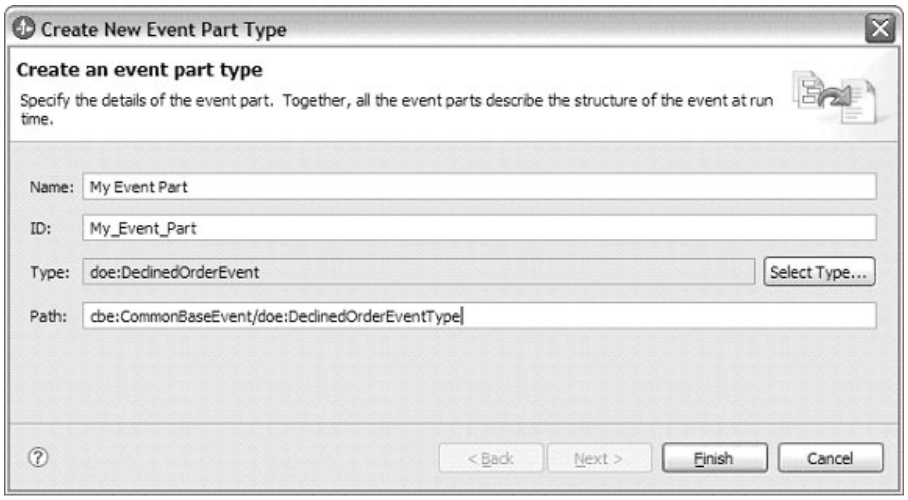
Creating situation events

In this lesson, you will create situation events to allow the outbound events to be visualized as alerts in the Business Space.

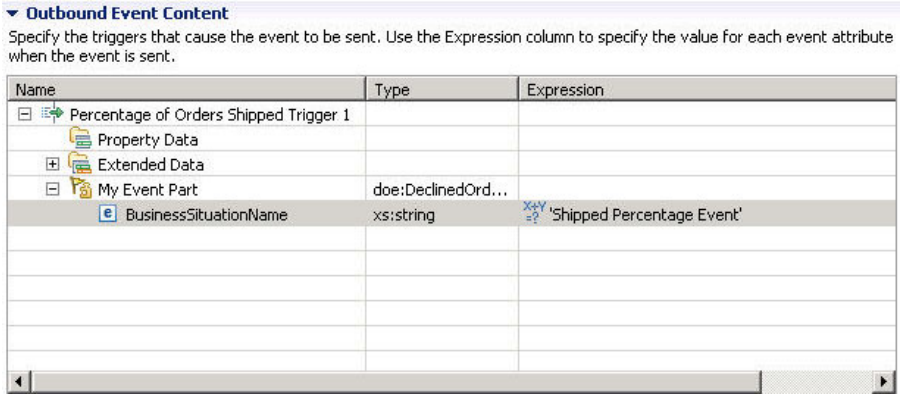
1. Create the Shipped Percentage situation event.
   a. Drag the `DeclinedOrderEvent.xsd` file to under **Event Definitions**.
   b. Create the Shipped Percentage Event outbound event by clicking the **KPI Model** tab (for OrderHandling Monitor.mm), right-clicking the **OrderHandling KC**, selecting **New > Outbound Event**, and entering `Shipped Percentage Event` as the name.
   c. Select **Configure this event to be processed by WebSphere Business Monitor action services**.
   d. For the trigger, browse to **Order Handling KC > Percentage of Orders Shipped Trigger 1** and click **OK** and then click **OK** again.
   e. In Event Type Details, in Event Parts, click **Add** and then click **Select Type**.
   f. In the **Select Event Part Data Type** window, select **Choose the data type from the XML schemas accessible from this monitor project**.
   g. Select **ClipsAndTacksF1_Monitor** → **DeclinedOrderEvent.xsd** → **doe:DeclinedOrderEvent**, click **Next**, then click **Finish**.



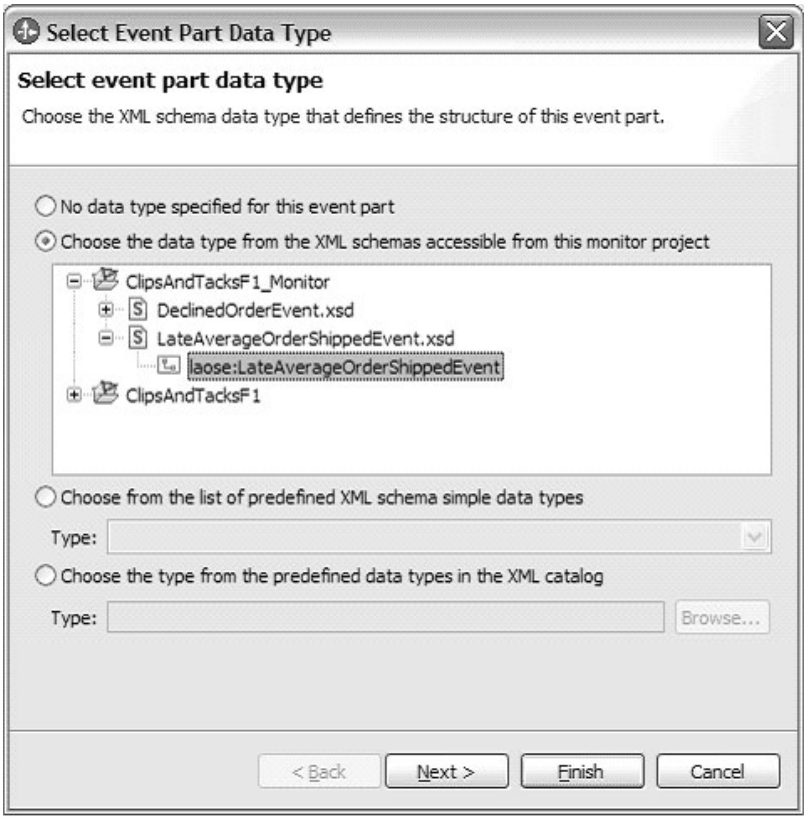
   h. Change the path to **cbe:CommonBaseEvent/doe:DeclinedOrderEventType**, and click **Finish**.



i. In the Outbound Event Content, expand **Percentage of Orders Shipped Trigger1 > My Event Part**. For BusinessSituationName, enter '`Shipped Percentage Event`' for the expression, including the single quotation marks.

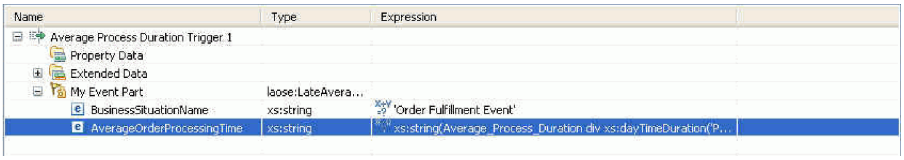


2. Create Order processing Time situation event.
   a. Drag the `LateAverageOrderShippedEvent.xsd` file to under **Event Definitions**.
   b. Create the Order Fulfillment Event outbound event by clicking the **KPI Model** tab (for OrderHandling Monitor.mm), right-clicking **OrderHandling KC**, selecting **New → Outbound Event**, and entering `Order Fulfillment Event` for the name.
   c. Select **Configure this event to be processed by WebSphere Business Monitor action services**.
   d. For the trigger, browse to **Order Handling KC → Average Process Duration Trigger 1** and click **OK** and then click **OK** again.
   e. In Event Type Details, in Event Parts, click **Add** and then click **Select Type**.
   f. In the Select Event Part Data Type window, select **Choose the data type from the XML schemas accessible from this monitor project**.
   g. Select **ClipsAndTacksF1_Monitor → LateAverageOrderShippedEvent.xsd → laose: LateAverageOrderShippedEvent**, then click **Finish**.



h. Change the path to **cbe:CommonBaseEvent/laose:LateAverageOrderShippedEventType** and click **Finish**.

i. In the Outbound Event Content, expand **Average Process Duration Trigger1** → **My Event Part**. For BusinessSituationName under Expression enter `'Order Fulfilment Event'` including the quotes.



j. For AverageOrderProcessingTime, set the expression to `xs:string(Average_Process_Duration div xs:dayTimeDuration('P1D'))`. This expression displays the average process duration in units of days.

3. Click **Ctrl-S** to save your work.

Creating a dimension model

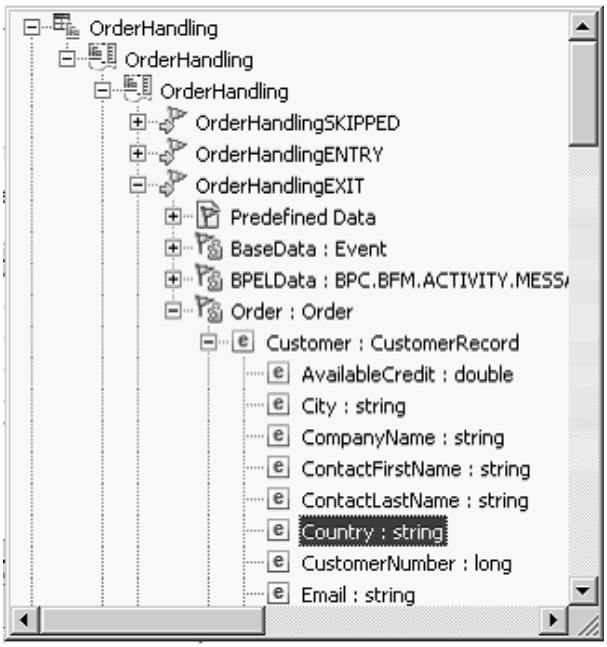
In this lesson, you will create a dimensional model to enable multidimensional analysis of collected data.

The Clips and Tacks dimensional model will be used for the organization of a dimensional analysis widget to be included on the dashboard that will show the aggregation of orders (instances) by their order status.

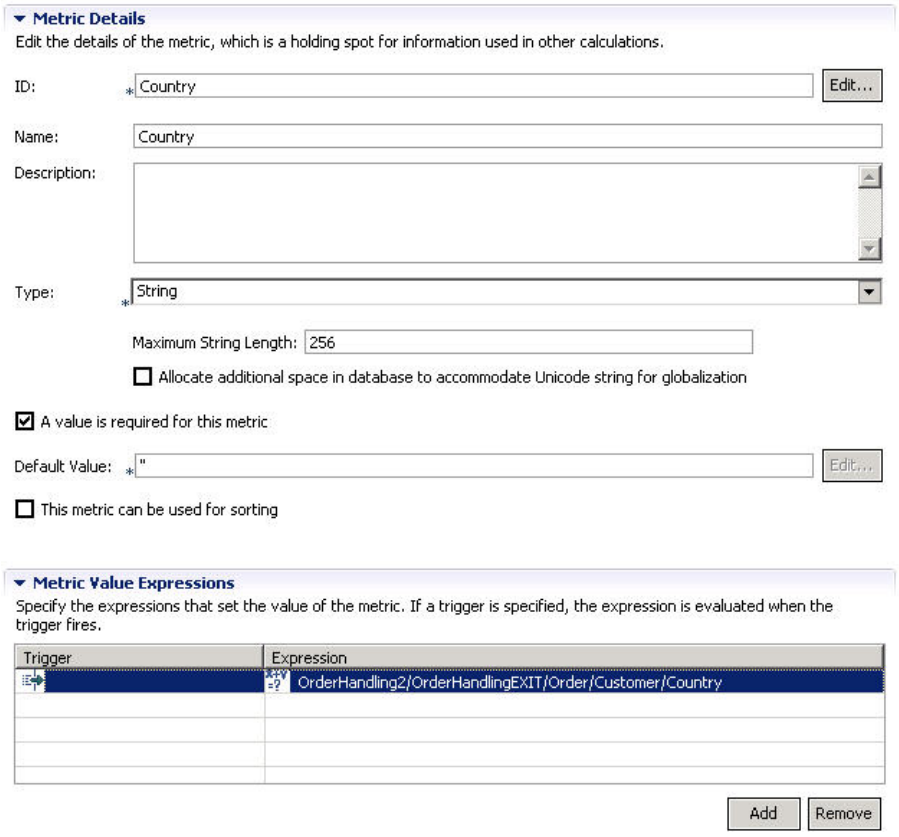
1. Click the **Dimensional Model** tab and expand **OrderHandling** → **Orderhandling Cube**.
2. Create a new dimension.
   a. Right-click the **Orderhandling Cube** and select **New** → **Dimension**.
   b. Enter `Order Status` as the name and click **OK**.
   c. Right-click **Order Status** in the navigation, and then select **New** → **Dimension Level**.

d. Enter `Order Status` as the name and click **Browse** to find the source metric. Select **Order Status**. Click **OK** and then click **OK** again.

3. You want a multilevel dimension called Location that lets you drill down on the country and then the city within the country. To enable the Location dimension, you need to create metrics for the country and city, and then you can complete the Location dimension to refer to these metrics.
   a. Create a metric called `Country` by clicking the **Monitor Details Model** tab, right-clicking the **OrderHandling** monitoring context, and selecting **New → Metric**.
   b. Enter **Country** as the name and leave the type as **String**, then click **OK**.
   c. Select **A value is required for this metric** because a dimension uses this metric and requires a value for dimensional analysis. For the default value, enter an empty string (two single quotation marks).
   d. In **Metric Value Expressions**, click **Add**. In the expression cell, use the content assistant to navigate to the **OrderHandling → OrderHandlingEXIT** event then select **Country** in the order data under **Customer**.

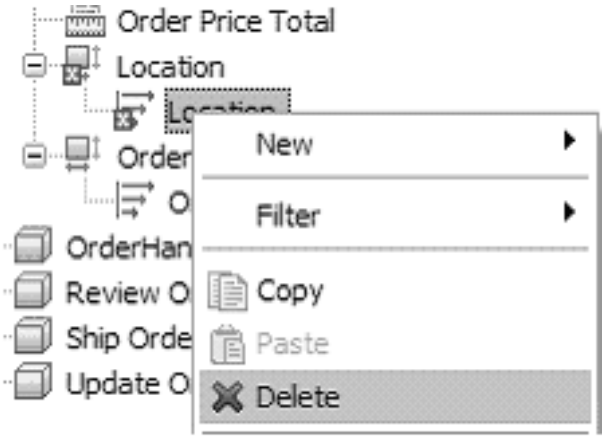


The resulting expression is `OrderHandling2/OrderHandlingEXIT/Order/Customer/Country`.



e. Repeat the necessary steps to create a metric called `City`. The resulting expression is `OrderHandlingReceive/OrderHandlingReceiveEXIT/Order/Customer/City`.

4. Update the Location dimension using the Country and City metrics:
   a. Click **Dimension Model** tab. Navigate to the **Order Handling Cube** → **Location**. Notice that there is a dimension level called Location underneath the Location dimension.
   b. Right-click **Location** underneath the Location dimension and select **Delete**.



   c. Right-click the **Location** dimension and select **New** → **Dimension Level**.
   d. Enter `Country` as the name, and then click **Browse** to find the source metric and select **OrderHandling** → **Country**. Click **OK**.
   e. Right-click the **Location** dimension and select **New** → **Dimension Level**.
   f. Enter `City` for the name, then click **Browse** to find the source metric and select **OrderHandling** > **City**. Click **OK**. The resulting Location is shown in the following screen capture.

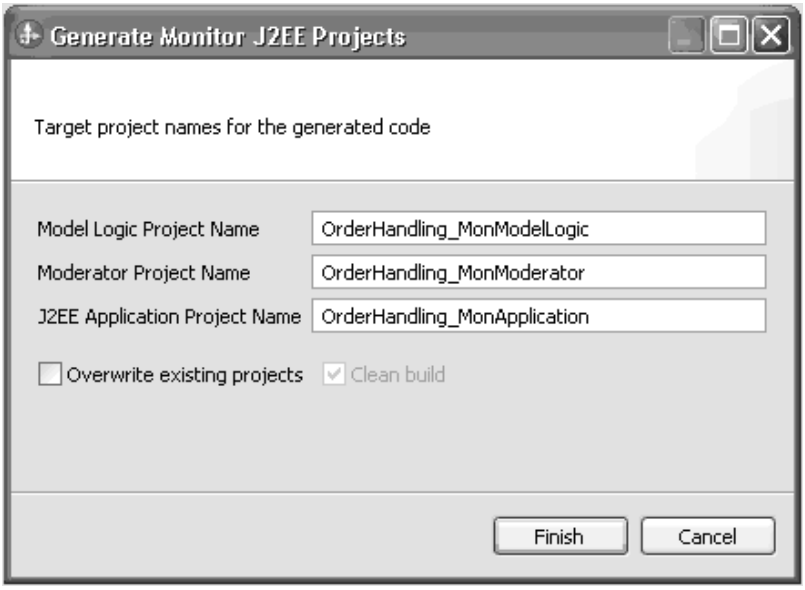
g. Save your work.

5. Select **Project > Clean**, and then select **Clean all projects**. Click **OK**.
   a. Warnings and informational messages might be present and can be ignored. Check for any errors in the Problems view and resolve the errors before continuing.

Generating executable artifacts for the monitor model and deploying to the server

In this lesson, you will use WebSphere Integration Developer to deploy the monitor model to the WebSphere Business Monitor testing environment.

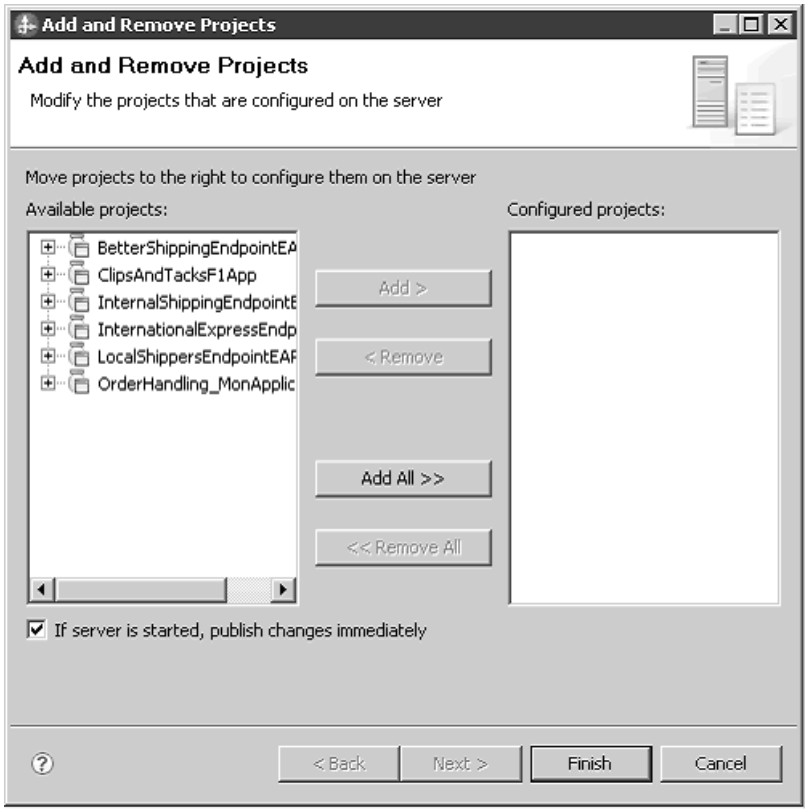
1. Generate the J2EE application from the monitor model.
   a. In the Business Monitoring perspective project tree, expand **ClipsAndTacksF1_Monitor > Monitor Models > Order Handling**, right-click **OrderHandling_Mon.mm** and select **Generate Monitor J2EE Projects** and then click **Finish**.



   A progress window shows the status of the operation and it closes when the operation is complete. This takes a few minutes.

2. Deploy the generated projects.
   a. Click the **Servers** tab and then right-click **WebSphere Monitor Server v6.2 on WebSphere Process Server** and select **Start** to start the server. Starting the server might take a few minutes.
   b. After the server starts, right-click **WebSphere Monitor Server v6.2 on WebSphere Process Server** again and select **Add and Remove Projects**.
   c. Click **Add All** to move ClipsAndTacksF1App, the Endpoints applications, and OrderHandling_MonitorApplication from the list of available projects to the list of configured projects and then click **Finish**. A progress message displays in the lower-right corner of the window. Deploying and starting the applications might take a few minutes.

      Note: At this time, you may be deploying just the WebSphere Business Monitor projects if the Fabric and WebSphere Integration Developer projects are already deployed.



d. Check the messages in the Console view for errors and correct them should they be present before continuing.

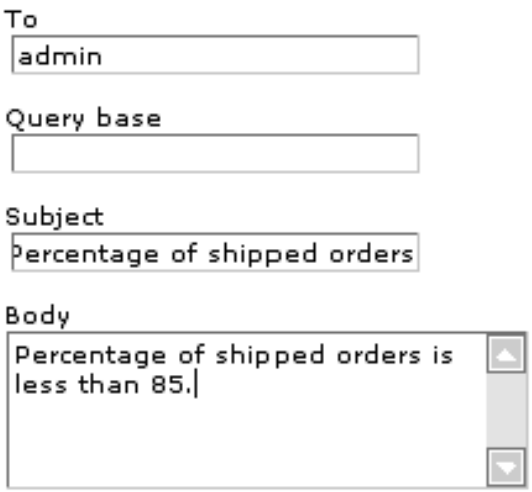
Configuring WebSphere Business Monitor for business situation events

In this lesson, you will configure WebSphere Business Monitor to create alerts by configuring Action Services to send notifications when business situation events are received.

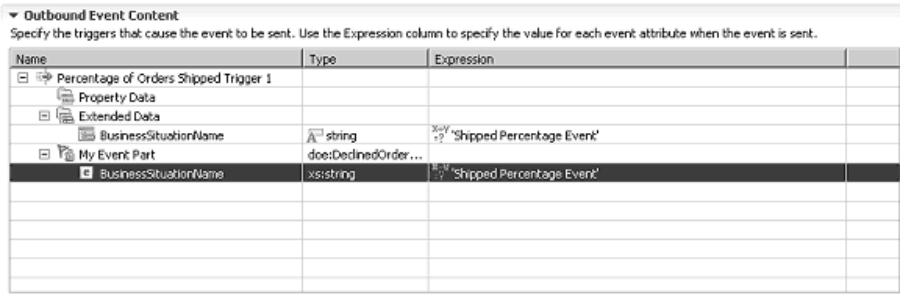
The situation events are defined in and sent by the monitor model as outbound events. The notifications are visible as alerts in the Alert view on your dashboard.

1. Click **Window** → **Preferences**. Expand General and click **Web Browser**. Select *Use external Web browser*. Click **OK**.
2. In the Servers view, right-click **WebSphere Business Monitor Server v6.2 on WebSphere Process Server** and select **Administration** → **Run administrative console**. The administrative console opens in a new window (if a Security page displays, select the option to continue to the website or add this connection as an exception, depending on the browser being used). The administrative console prompts you for a user ID and password. For the user ID, enter `admin`. For the password, enter `admin`. Click **Log in**.
3. Add an alert template for when the percentage of shipped orders needs attention.
   a. In the administrative console, select **Applications** → **Monitor Services** → **Monitor Action Services** → **Template Definitions** → **Notifications** and click **New**.
   b. For the template name, enter `AlertShip`, and then enter any description.
   c. Select **Dashboard Alert**. This indicates an alert is sent to the business dashboard's alert view.
   d. Select **User id**.
   e. In the **To** field, enter `admin`. This user ID is the user logged into the business dashboard that receives the alert. You must log into the business dashboard with this user ID.

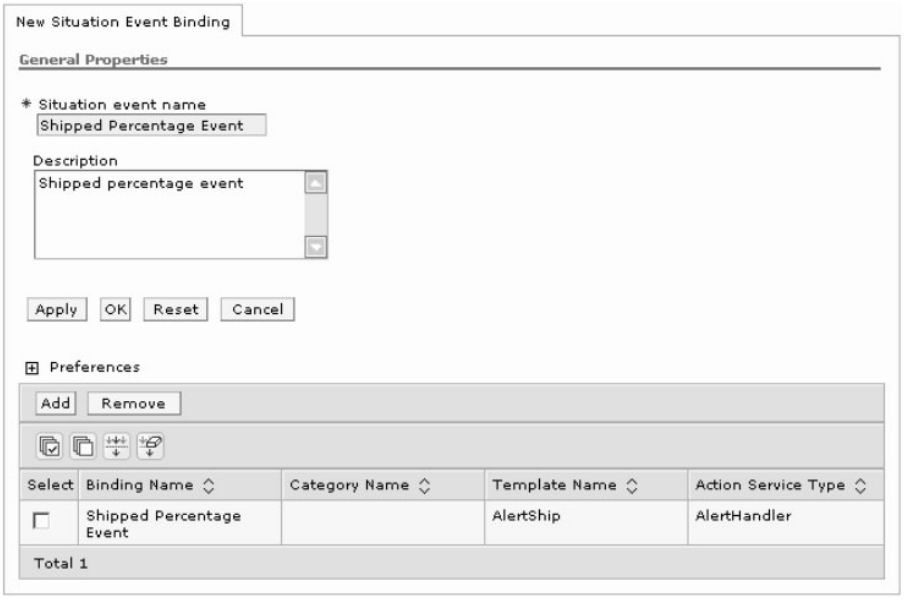
f. In the **Subject** field, enter `Percentage of shipped orders`. This is the title of the alert in the dashboard.
g. In the **Body** field, enter `Percentage of shipped orders is less than 85.`
h. Click **OK**.



4. Add an alert template for when order processing time needs attention.
   a. In the administrative console, select **Applications** → **Monitor Services** → **Monitor Action Services** → **Template Definitions** → **Notifications** and click **New**.
   b. For the template name, enter `AlertTime`, and then enter any description.
   c. Select **Dashboard Alert**. This indicates an alert is sent to the business dashboard's alert view.
   d. Select **User ID**.
   e. For the **To** field, enter `admin`. This user ID is the user logged into the business dashboard that receives the alert. You must log into the business dashboard with this user ID.
   f. For the **Subject** field, enter `Order processing time`.
   g. For the **Body** field, enter `The average order processing time is %AverageOrderprocessingTime% days`.
   h. Click **OK**.
5. Add the binding from the situation event to the action type of the alert template for shipped percentage situations:
   a. In the administrative console, select **Applications** → **Monitor Services** → **Monitor Action Services** → **Installed Situation Event Bindings** and click **New**.
   b. Enter the situation event name you defined in the model. You named the business situation `Shipped Percentage Event`. The name must match the value in the BusinessSituationName field in the outbound event. You might want to copy the name from the monitor model (without the quotation marks).

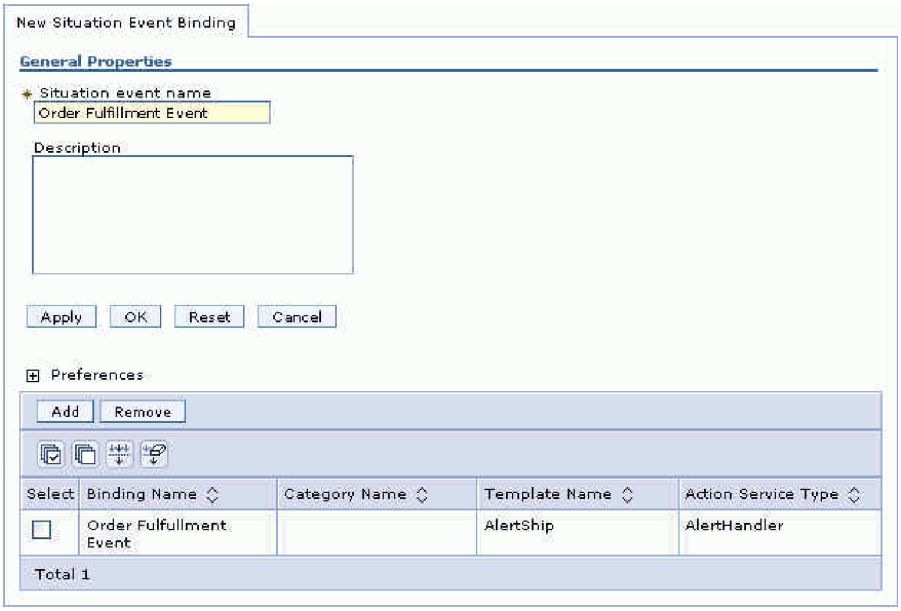


c. Enter any description and then click **Apply**.
d. In the table under Preferences, click **Add**.
e. Enter a binding name, for example `Shipped Percentage Event`, and then select the template **AlertShip**.
f. Click **OK**. Notice you now have one action defined for this situation event. If you had other action templates defined, then you could add more actions to this event and you could send a notification for this situation event to multiple destinations using e-mail, alerts, and Web services.



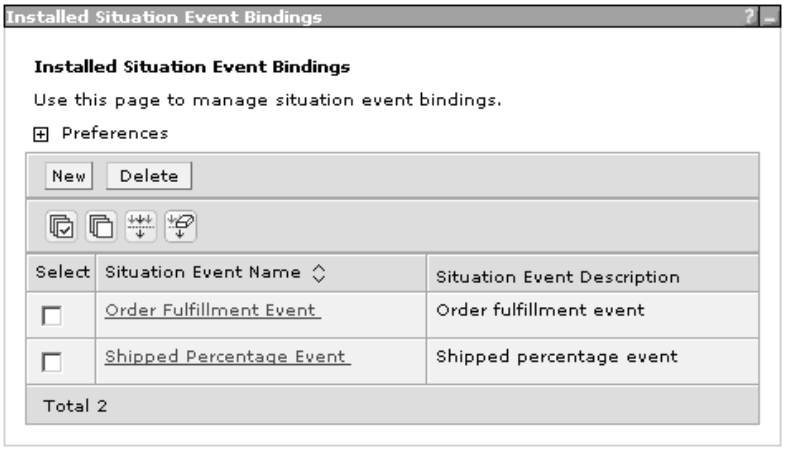
g. Click **Ok**.

6. Add the binding from the situation event to the action type of the alert template for action processing time situations.
   a. In the administrative console, select **Applications** → **Monitor Services** → **Monitor Action Services** → **Installed Situation Event Bindings** and click **New**.
   b. Enter the situation event name that you defined in the model. You named the business situation `Order Fulfillment Event`. The name must match the value in the BusinessSituationName field in the outbound event. You might want to copy the name from the monitor model (without the quotation marks).
   c. Enter any description and then click **Apply**.
   d. In the table under Preferences, click **Add**.
   e. Enter a binding name such as `Order Fulfillment Event`, select the template **AlertTime**, and then click **OK**.



f. Click **OK**.

g. In the administrative console, select **Applications** → **Monitor Services** → **Monitor Action Services** → **Installed Situation Event Bindings**. You see the two bindings you created.

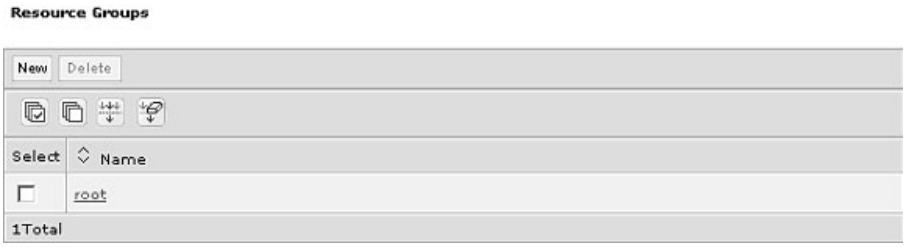


Setting up access to the OrderHandling monitor model

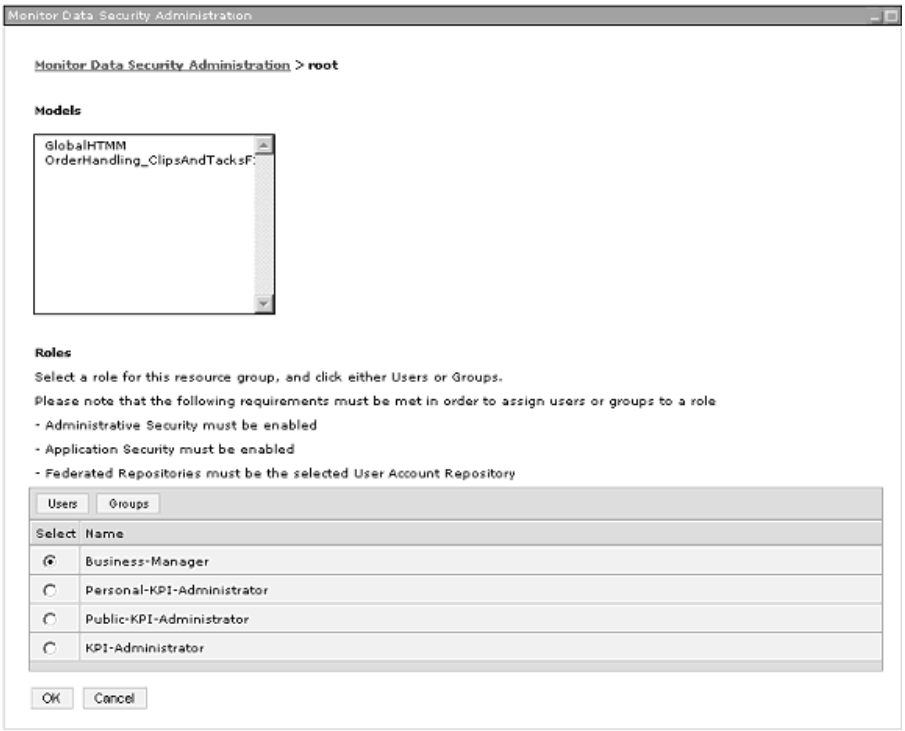
In this lesson, you will configure the Data Security Services in WebSphere® Business Monitor to permit the administrative user access to the OrderHandling_ClipsAndTacksF1 monitor model.

Access is automatically granted when the WebSphere Business Monitor development toolkit is installed. However, because the WebSphere Process Server profile was augmented with the development toolkit profile in this tutorial, you need to manually set up access to this resource. You will grant the administrative user access to the deployed monitor models, OrderHandling_ClipsAndTacksF1 and GlobalHTMM.

1. If you are not still logged in, login to the administrative console of **WebSphere Business Monitor Server V6.2 on WebSphere Process Server**. For the user ID, enter `admin`. For the password, enter `admin`.
2. In the administrative console, select **Security** → **Monitor Data Security** and click the **root** entry in the Resource Groups table.



3. In the Roles section, select **Business-Manager**, and then click **Users**.



4. Click **Search**. When the Available panel is populated, select the entry with **uid=admin** and then click the right arrow to move **uid=admin** to the Selected panel. Click **OK** and then click **OK** again.

5. Repeat steps 3 and 4 for each of the next three available roles: **Personal-KPI-Administrator**, **Public-KPI-Administrator**, and **KPI-Administrator**. Then click **OK**.

Testing the Order Handling business process

The order handling process has been modeled, developed, optimized with points of agility, and is configured to emit events for monitoring. The order handling monitor model has been developed to handle those emitted events for display in the Business Space. The Order Handling projects (executables) have been deployed to the WebSphere Process Server and WebSphere Business Monitor. Now you will test this code to observe the corresponding output and behavior.

Run the process multiple times so there is enough data to display in the Business Space widgets. Create a process instance for each of the following orders. For the non-specified values, any value is acceptable as long as it does not repeat values for value-unique fields, such as the shipping number.

To run the process instances, do the steps that were used during the runtime testing in the section "Testing the initial shipping policies" on page 89.

You can create more scenarios than are listed here.

- **Scenario 1:** Process tasks run; approve without review; account in good standing; ship the order
  1. Form data to start this instance of the process.
     a. Rating: 800
     b. Available Credit: 800
     c. Total Price: 200
  2. Ship task
     a. Packing Slip Number: Any unique value
- **Scenario 2:** Process tasks run; approve without review; account not in good standing; approve the order; ship the order
  1. Form data to start this instance of the process.
     a. Rating: 800
     b. Available Credit: 100
     c. Total Price: 300
  2. Review task
     a. Order Status: APPROVED
  3. Ship task
     a. Packing Slip Number: Any unique value
- **Scenario 3:** Process tasks run; approve without review; account not in good standing; decline the order

1. Form data to start this instance of the process.
   a. Rating: 800
   b. Available Credit: 100
   c. Total Price: 400
2. Review task
   a. Order Status: REJECTED

- **Scenario 4:** Process tasks run; do not approve without review; approve the order, ship the order
  1. Form data to start this instance of the process.
     a. Rating: 10
     b. Available Credit: 100
     c. Total Price: 900
  2. Review task
     a. Order Status: APPROVED
  3. Ship task
     a. Packing Slip Number: Any value
- **Scenario 5:** Process tasks run; do not approve without review; decline the order
  1. Form data to start this instance of the process.
     a. Rating: 10
     b. Available Credit: 100
     c. Total Price: 800
  2. Review task
     a. Order Status: REJECTED
- **Scenario 6:** Repeat Scenario 5

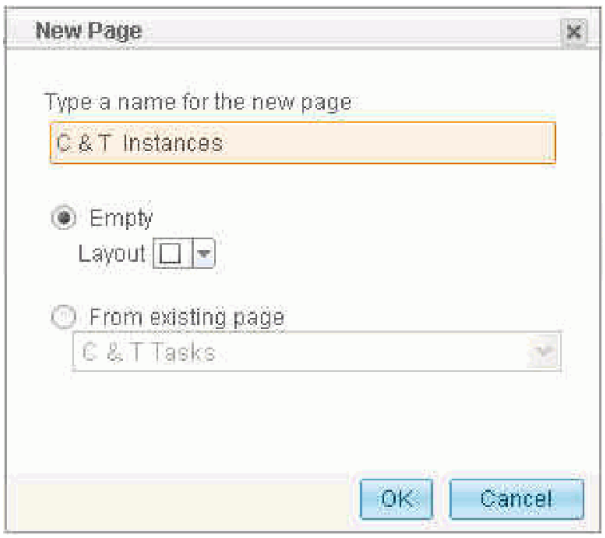
  Repeating the declined order scenario is necessary to see an alert in the Alerts view of the business space dashboard. The monitor model is configured to raise an alert when the number of shipped orders is less than 85 percent of the total number of orders. You will see this alert when you complete the steps in the "Creating a business dashboard in Business Space" section.

Creating a business dashboard in Business Space

In this lesson, you will create a business dashboard to monitor the Order Handling process using Business Space powered by WebSphere.

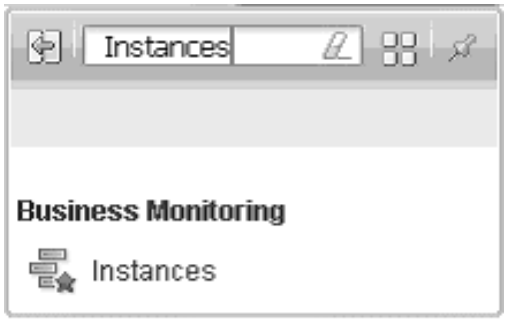
1. If not already logged in, log in to Business Space as userID `admin`.
2. Add a page named C & T Instances to the previously created ClipsAndTacks business space.

   a. Navigate to the Business Space Manager.
   b. Select the **ClipsAndTacks** business space.
   c. Click the **Create new page** icon  , name the page `C & T Instances`, and click **OK**.



The ClipsAndTacks business space is updated with the C & T Instances page.

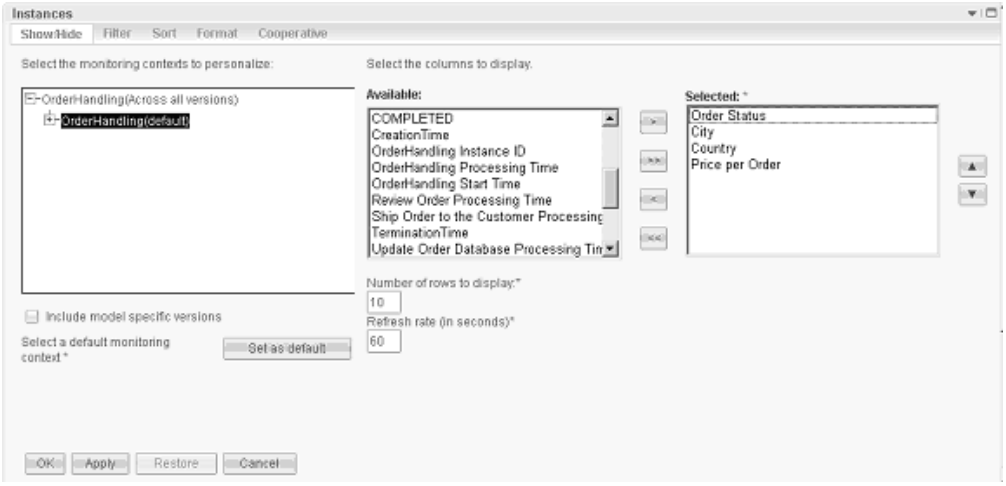
3. Add an instance widget to the C & T Instances page:
   a. Click the **C & T Instances** link to open the page. Click **Add Widgets**, which is in the center of the page, and type `Instances`. Drag the **Instances** item to the page.



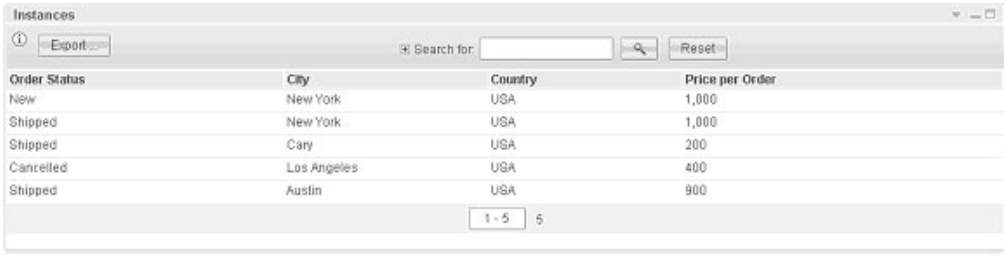
You could also click **Add Widgets** from the right corner of the page.

   b. Click the down arrow icon on the right side of the Instances toolbar and select **Configure**.

   c. In **Select the monitoring context to personalize**, expand **OrderHandling (Across all Versions)** and select **OrderHandling**. In **Select the columns to display**, select **City**, **Country**, **Order Status**, and **Price per order**. Use the right arrow > to move to these items into the **Selected** column. Then click **Set as default**.

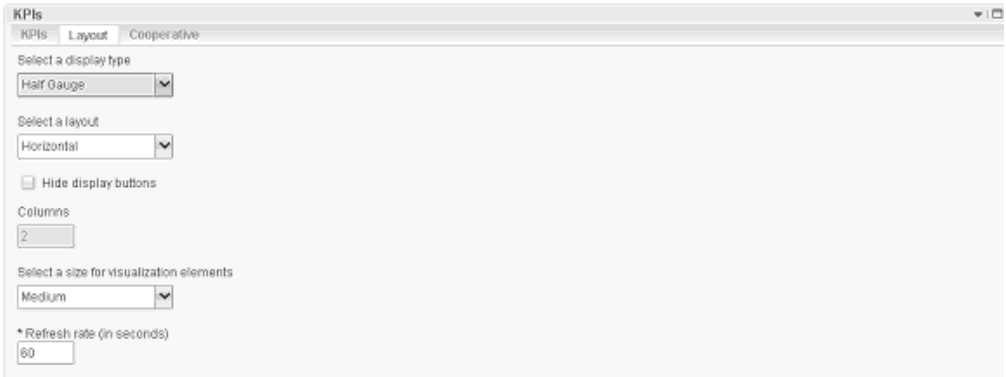


d. Click **OK**. The resulting Instances view is shown in the following screen capture.



4. Create a new page, add the KPI and Alerts widgets, and then configure the page:
   a. Click the **New Page** tab.
   b. Enter `C & T KPI and Alerts` as the page name, and then click **OK**.
   c. Click **Add Widgets** and enter `KPIs`. Drag the **KPIs** item to the page.
   d. Select **Configure**. Select the **Average Process Duration** and **Percentage of Orders Shipped** KPIs that you want to display on the widget.

   e. Click the **Layout** tab. Select **Half Gauge** as the display type. Click **OK**.

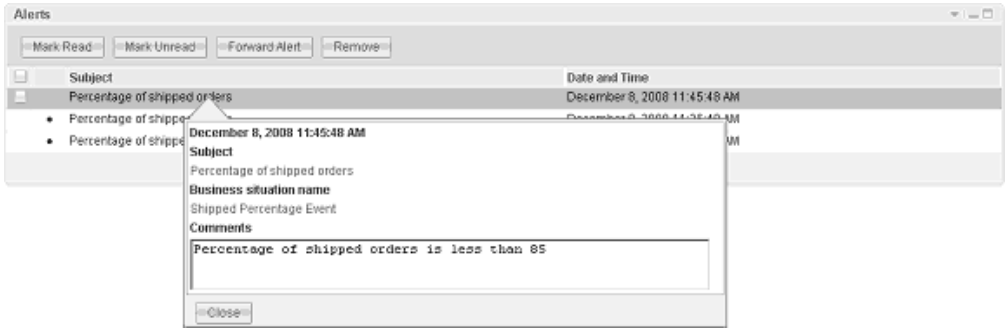


The KPI view opens.

5. Add the Alerts widget to the C & T KPI and Alerts page:
   a. Click **Add Widgets** and enter `Alerts`. Drag the **Alerts** item to the page, underneath the **KPIs** widget.

      There are two alerts defined in the model: one for shipped percentage and one for order processing time. The latter alert is based on a processing time greater than three days, so it is difficult to test here, unless you use the **KPI Manager widget** to reduce the target. The former alert can be tested easily by ensuring the number of shipped orders is less than 85 percent of the number of total orders.

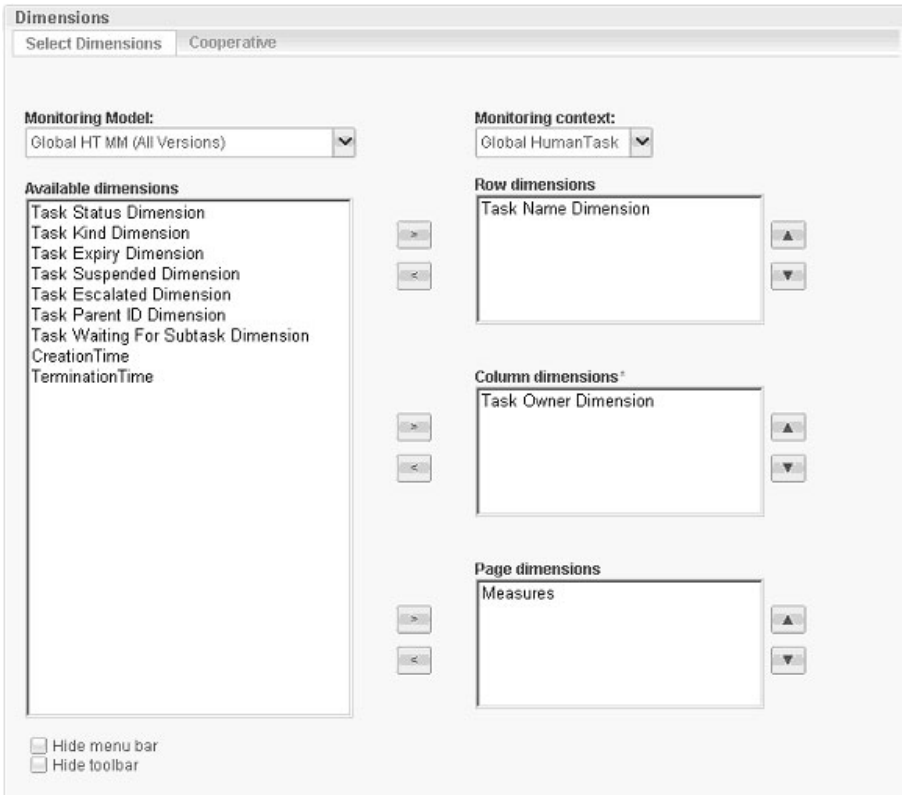
      Note: WebSphere Business Monitor may ship with a default BAM showcase model. The alert view may display alerts from this showcase model.
   b. Click the alert to see details.



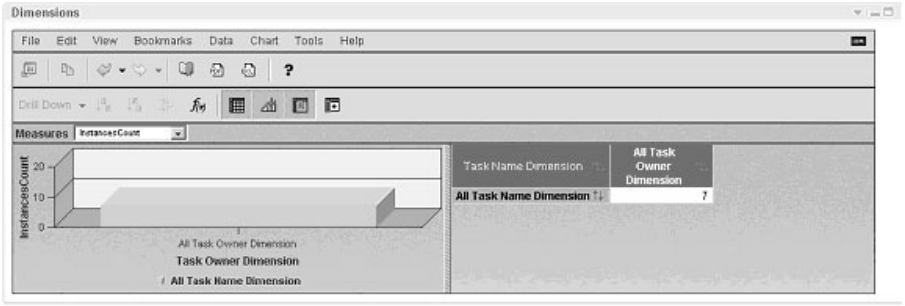
6. Create a new page to add the Human Tasks widget and Dimensions view:
   a. Click the **New Page** tab .
   b. Enter `C & T Human Tasks and Dimensions` as the page name and click **OK**.
   c. Click **Add Widgets** and enter `Human Tasks`. Drag the **Human Tasks** item to the page.
   d. Select **Configure**.
   e. Select **Creation Time**, **Owner**, and **Status** and use the right arrow  to move them to the **Selected** column.

f. Click **OK**. The Human Tasks view displays.

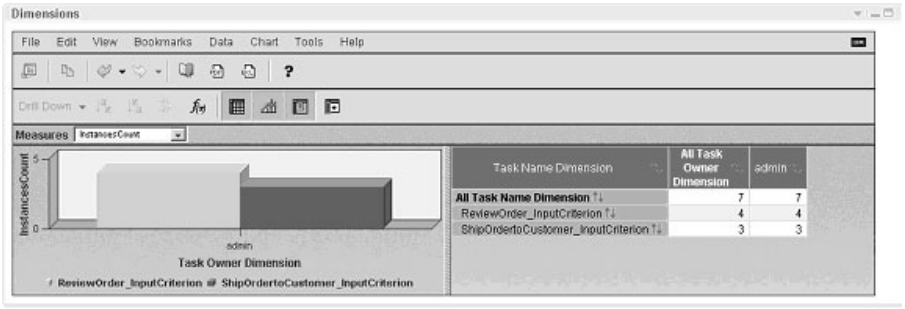
7. Add the Dimension widget to C & T Human Tasks and Dimensions page:
   a. Click the **Add Widgets** and enter `Dimensions`. Drag the **Dimensions** item to the page, underneath the **Human Tasks** widget.
   b. Click **Configure**.
   c. In the **Monitoring Model** field, select **Global HT MM (All Versions)**.
   d. Add **Task Name Dimension** to the Row dimensions box.
   e. Add **Task Owner Dimension** to the Column dimensions box.
   f. Add **Measures Dimension** to the Page dimensions box.



   g. Click **OK**. The Dimensions view displays the instances count based on the task name and task owner.

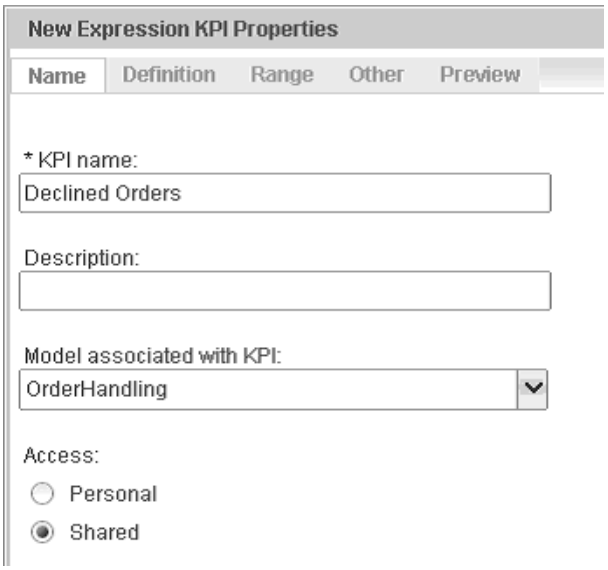


h. You can double-click **All Task Name Dimension** and select **All Task Owner Dimension** to drill down for more detailed data.

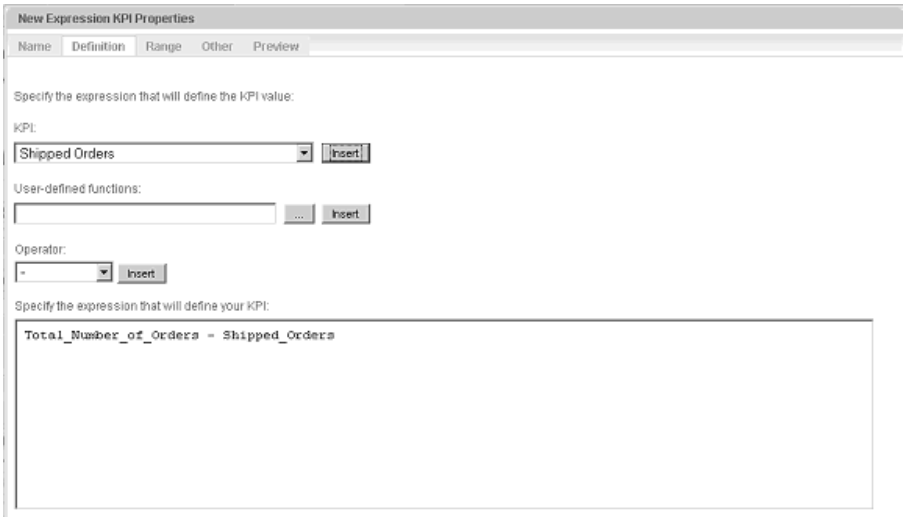


8. Add a dynamic KPI to the business space:
   a. Click the **C & T KPI and Alerts** link to open the page.
   b. Click **Add Widgets** and enter `KPI Manager`. Drag the **KPI Manager** item to the page, underneath the **Alerts** widget.
   c. For the model, select **OrderHandling**.

   d. Click **Actions** and select the **New Expression KPI**.
   e. For the name of the KPI, enter `Declined Orders`.
   f. For the model associated with the KPI, select **OrderHandling**.
   g. For the type of access, select **Shared** so that other users can see the new KPI.

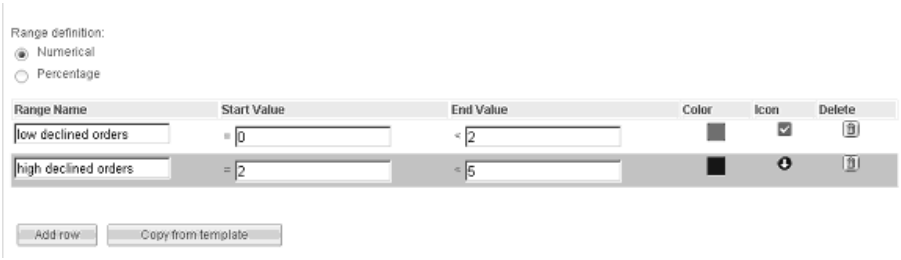


9. Create the expression for the new Declined Orders KPI:
   a. Select the **Definition** tab.
   b. Use the **KPI** drop-down list to select **Total Number of Orders** and click **Insert**.
   c. Use the **Operator** drop-down list to select the minus symbol (-) and click **Insert**.
   d. Use the **KPI** drop-own list again to select **Shipped Orders** and click **Insert**.



   e. Click **Apply**.
   f. Select the **Range** tab.
   g. For Range definition, select **Numerical**.
   h. Add two rows by clicking **Add row** and entering the following values:
      - In the first row, enter `low declined orders` for the range name, `0` for the start value, `2` for the end value, green for the color, and the check mark in the green square for the icon.
      - In the second row, enter `high declined orders` for the range name, `2` for the start value, `5` for the end value, red for the color, and the down arrow in the red circle for the icon.

      Click **OK**.



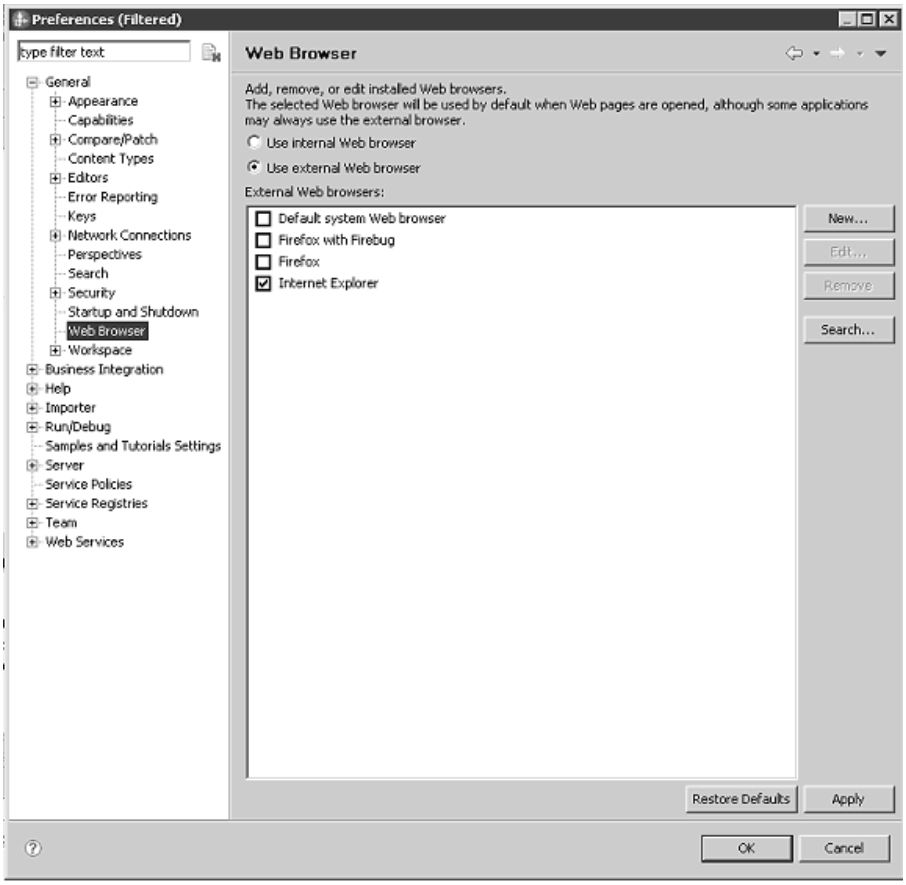
i. Click **Configure** on the **KPIs** widget.

j. Expand **OrderHandling** and select **Declined Orders** and then click **OK**. The newly created KPI is added to the KPIs widget.

Chapter 4. Running the sample

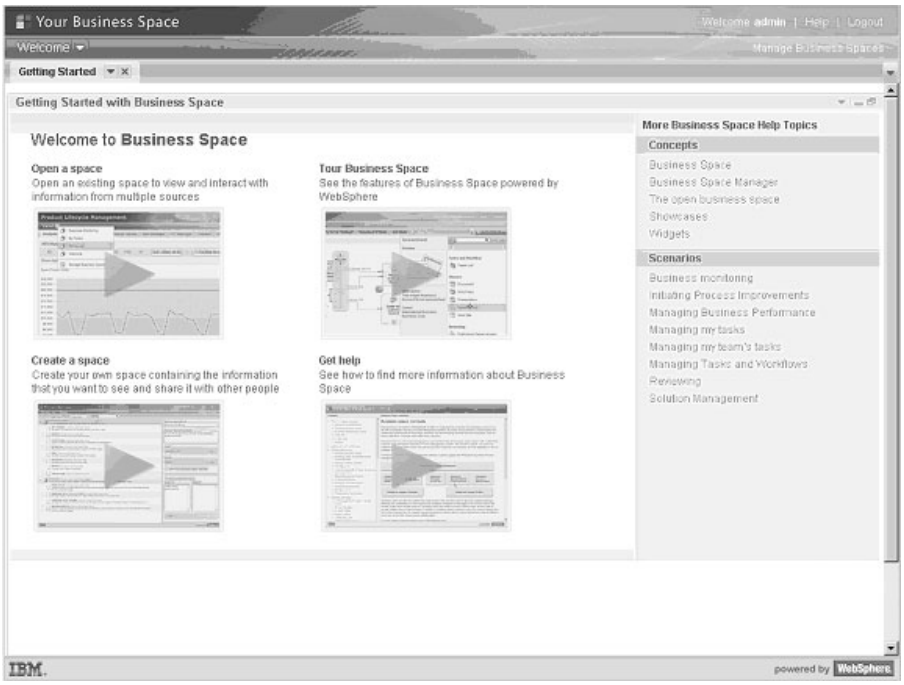
You can run the sample from the provided artifacts if you did not build the sample from the tutorial.

1. Import the provided project interchange file. There are two options for completing this step, choose the method that best suits you.
   a. Start WebSphere Integration Developer V6.2 and create a new workspace for this sample, for example `C:\Documents and Settings\Administrator\IBM\wid6.2\ClipsAndTacks`. Do not select **Use this as the default and do not ask again** because it is easier to come back to this window if it is not selected. Click **OK**.
   b. If you accessed this documentation through the Samples and Tutorials Gallery, return to the gallery now and use the button to import the complete application, then continue on to step 2.
   c. If you accessed this document through a web browser, follow the steps in Chapter 5, "Download and import samples," on page 141
2. Follow the steps described in "Setting up the Lotus Forms Server API workspace" on page 57.
3. Follow the steps described in "Identifying WebSphere Monitor Server on WebSphere Process Server ports" on page 70
4. Follow the steps in "Creating a WebSphere Business Services Fabric project" on page 70.
5. Follow the steps described in "Updating the web services endpoint URLs" on page 85, and be sure to complete the governance step at the end.
6. Deploy the monitor model J2EE projects. Follow the steps described in the "Generating executable artifacts for the monitor model and deploying to the server" on page 122. Note that when generating the J2EE artifacts, you will have to overwrite existing artifacts so be sure to select the checkbox.
7. Follow the steps in "Configuring WebSphere Business Monitor for business situation events" on page 123.
8. Follow the steps in "Setting up access to the OrderHandling monitor model" on page 126.
9. Import the provided clipsandtacks.data file into Business Space powered by WebSphere.
   a. In WebSphere Integration Developer, click **Windows → Preferences → General → Web Browser**. The default browser might be **Internal Web Browser**, but this one does not have all of the functions that you require. Select **Default system Web browser** or another listed browser other than the internal browser and select **Use external Web browser**. Click **OK**.

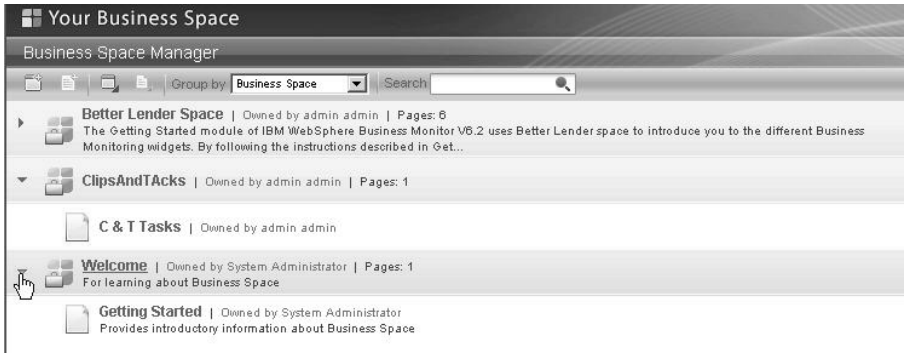


b. In WebSphere Integration Developer, in the Servers view, right-click the **WebSphere Business Monitor Server V6.2** server and select **Launch → Business Space**. (If a Security page displays, select the option to continue to the Web site or add this connection as an exception, depending on the browser being used.)

c. When prompted, enter `admin` for the user ID and enter `admin` for the password (or the administrator ID and password if you have changed it). A Business Space Manager window opens.

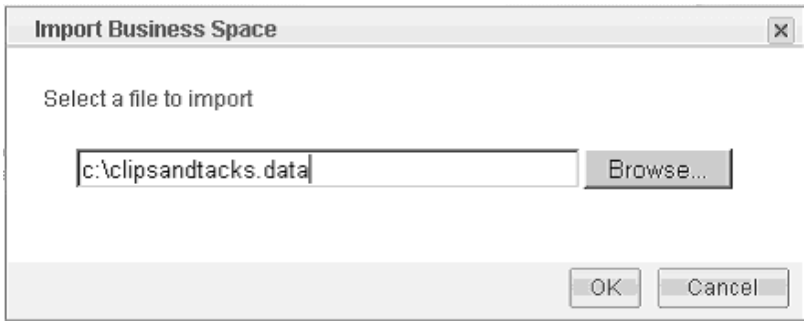


10. Click **Manage Business Spaces**. The new page contains two default business spaces: **Solution Management** and **Welcome** (which has a few sample pages).



11. Import the provided clipsandtacks.data file.

    a. Click the **Import Business Space** icon  . Click **Browse** and navigate to the directory where the clipsandtacks.data file is located.



    b. Click **OK**.

12. To run the sample, complete the following steps:

    a. Follow the steps described in "Testing the initial shipping policies" on page 89.

b. Follow the steps described in "Testing the Order Handling business process" on page 128 and select the **C & T Instances and Diagrams**, **C & T KPI and Alerts** and **C & T Human Tasks and Dimensions** pages to monitor the deployed process.

13. View the business dashboard.
    - On the C & T Instances page you can see a record of each test you ran.
    - On the C & T KPI and Alerts page you can see gauges representing the average process duration and the percentage of orders shipped, as well as an alert for the percentage of orders shipped below the threshold of 85%.
    - On the C & T Human Tasks and Dimensions page you can see each human task with its current status and in the dimensions widget a graphical representation of the tasks that you can drill down to view additional details.

Chapter 5. Download and import samples

This section provides links to artifact files needed to complete the tutorial and build the sample application, and also guidance on the three different starting points.

This sample uses the WebSphere Business Process Management Products in the following order

1. WebSphere Business Modeler
2. WebSphere Integration Developer
3. WebSphere Business Services Fabric
4. WebSphere Business Monitor
5. Business Space Powered by WebSphere

There are three paths through the tutorial. The required files and the starting points in the documentation are as follows:

1. Start in WebSphere Business Modeler
   a. Download the file Download/BIY_StartInModeler.zip. This contains the following artifact files:

      Order.xsd
      The XML schema to be used in WebSphere Business Modeler.

      Order.xfdl
      The Lotus® form used in this tutorial. It is imported in WebSphere Business Modeler.

      ClipsAndTacksEndpoints.zip
      Web service endpoints to be called by WebSphere Business Services Fabric. These are not really Business Process Management artifacts, but rather external artifacts necessary to run the application.

      CancelOrderandSendNotificationImpl.java
      The Java file used to generate notifications. It is the implementation for one of the components in the WebSphere Integration Developer.

      CreditRating.java
      The Java file used to check the customer account status. It is the implementation for one of the components in the WebSphere Integration Developer.

      ContextExtractorImpl.java
      A file used by the Dynamic Assembler component in Websphere Integration Developer to extract data from the incoming request and pass it to Websphere Business Services Fabric.

      ClipsAndTacks-Core_ontology.fca
      Custom ontology (vocabulary) required for Websphere Business Services Fabric.

      ClipsTacks_initial_scenario-owl.zip
      WebSphere Business Services Fabric repository project.

      DeclinedOrderEvent.xsd
      An XML schema for the Declined Order event that is monitored in Websphere Business Monitor.

      LateAverageOrderShippedEvent.xsd
      An XML schema for the Order Fulfillment event that is monitored in Websphere Business Monitor.

      ClipsAndTacksF1.mar
      The completed process model in WebSphere Business Modeler.

b. Extract the files into a convenient local directory.
c. Proceed to Chapter 3, “Build it yourself,” on page 11 of the documentation.

2. Start in WebSphere Integration Developer
   a. Download the file Download/BIY_StartInWID.zip. This contains the following artifact files:

      ClipsAndTacksF1.mar
      The completed process model in WebSphere Business Modeler.

      ClipsAndTacksF1.zip
      The modeler model formatted for import into WebSphere Integration Developer.

      ClipsAndTacksEndpoints.zip
      Web service endpoints to be called by WebSphere Business Services Fabric. These are not really Business Process Management artifacts, but rather external artifacts necessary to run the application.

      CancelOrderandSendNotificationImpl.java
      The Java file used to generate notifications. It is the implementation for one of the components in the WebSphere Integration Developer.

      CreditRating.java
      The Java file used to check the customer account status. It is the implementation for one of the components in the WebSphere Integration Developer.

      ContextExtractorImpl.java
      A file used by the Dynamic Assembler component in Websphere Integration Developer to extract data from the incoming request and pass it to Websphere Business Services Fabric.

      ClipsAndTacks-Core_ontology.fca
      Custom ontology (vocabulary) required for Websphere Business Services Fabric.

      ClipsTacks_initial_scenario-owl.zip
      WebSphere Business Services Fabric repository project.

      DeclinedOrderEvent.xsd
      An XML schema for the Declined Order event that is monitored in Websphere Business Monitor.

      LateAverageOrderShippedEvent.xsd
      An XML schema for the Order Fulfillment event that is monitored in Websphere Business Monitor.

      ClipsAndTacksF1_Completed.zip
      The completed process model and monitor projects, to be imported into WebSphere Integration Developer
   b. Extract the files into a convenient local directory.
   c. Proceed to “Integration development” on page 55 of the Build It Yourself documentation.
3. Start with the complete WebSphere Integration Developer process, modeler model, and business space
   a. Download the file RunTheSample.zip. This contains the following artifact files:

      ClipsAndTacksF1_Completed.zip
      The completed process model and monitor projects, to be imported into WebSphere Integration Developer

      ClipsAndTacksF1_Monitor.zip
      The monitor model to be imported into WebSphere Integration Developer for further development

ClipsAndTacksEndpoints.zip
Web service endpoints to be called by WebSphere Business Services Fabric. These are not really Business Process Management artifacts, but rather external artifacts necessary to run the application.

ClipsAndTacks-Core_ontology.fca
Custom ontology (vocabulary) required for Websphere Business Services Fabric.

ClipsTacks_initial_scenario-owl.zip
WebSphere Business Services Fabric repository project.

clipsandtacks.data
A pre-built business space for the ClipsAndTacks scenario

b. Extract the files into a convenient local directory.
c. Complete the steps in "Importing the completed model into WebSphere Integration Developer"
d. Proceed to Chapter 4, "Running the sample," on page 137 of the documentation.

There are three additional files available for individual download as follows:

ClipsAndTacks.pdf
The documentation for running the sample in a book format that you can print

ClipsAndTacksF1.mar
The completed process model to be imported into WebSphere Business Modeler

Use the instructions in "Importing the completed process model into WebSphere Business Modeler" to import the model into WebSphere Business Modeler.

ClipsAndTacksF1_Completed.zip
The completed process model and monitor projects, to be imported into WebSphere Integration Developer

Use the instructions in "Importing the completed model into WebSphere Integration Developer" to import the model into WebSphere Business Modeler.

Importing the completed process model into WebSphere Business Modeler

The completed process model is in the ClipsAndTacksF1.mar file.

To import the ClipsAndTacksF1.mar file, complete the following steps:
1. Start WebSphere Business Modeler with a new workspace.
2. Right-click the white background of the **Project Tree** panel and select **Import**.
3. Select **WebSphere Business Modeler project (.mar, .zip)** and click **Next**.
4. Click **Browse** and select the directory where the ClipsAndTacksF1.mar is saved.
5. Select **ClipsAndTacksF1.mar** and click **Finish**.

Importing the completed model into WebSphere Integration Developer

The completed process model, monitor model, and WebSphere Business Services Fabric endpoints for importing into WebSphere Integration Developer are included in the ClipsAndTacksF1Completed.zip file.

To import the ClipsAndTacksF1Completed.zip file, complete the following steps:
1. Start WebSphere Integration Developer with a new workspace.
2. Click **File** → **Import** → **Other** → **Project Interchange** and click **Next**.
3. For **From zip file**, click **Browse** and select the directory where the ClipsAndTacksF1Completed.zip is saved.

4. To import everything, click **Select All** and then **Finish**.