BEA WebLogic Integration™

Tutorial: Building Your First Business Process

Version 8.1 Service Pack 4
Document Date: December 2004

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Contents

CHAPTER 1

Tutorial: Building Your First Business Process

WebLogic Integration's business process management (BPM) functionality enables the integration of diverse applications and human participants, as well as the coordinated exchange of information between trading partners outside of the enterprise.

This tutorial provides a tour of the features available to design business processes in the WebLogic Workshop graphical design environment. It describes how to create a business process that orchestrates the processing of a *Request for Quote*.

Tutorial Goals

The goal of the tutorial is to provide the steps to create and test a business process using the graphical environment provided in WebLogic Workshop. It includes:

- Designing communication nodes in a business process—that is, creating the interface between your business process and its clients and resources. Clients of business processes can be any other resources or services that invoke business processes to perform one or more operations.
- Designing the interactions with clients, including creating the methods that expose your business process's functionality.
- Designing the interactions with resources using controls. WebLogic Platform controls make it easy to access enterprise resources, such as databases, Enterprise Java Beans (EJBs), Web services, and other business processes (including those that use RosettaNet and ebXML business processes) from within your application.

- Handling XML, non-XML, and Java data types in the business process—includes working with XML schemas and transforming data between disparate data types using the Transformation tool.
- Designing business processes to publish and subscribe to message broker channels.

Tutorial Overview

The business process in this scenario is started as a result of receiving a Request for Quote from clients. The business process checks the enterprise's inventory and pricing systems to determine whether the order can be filled. Based on the shipping address provided by the client, the process also determines whether sales tax should be added to the quote. Finally the business process compiles a single quote document from the sales tax, price, and availability data, logs the quote by writing it to your file system, and sends it to the client.

Designing the Request for Quote Business Process

The following sequence summarizes the steps in the request for quote process and describes how the business process is designed:

1. Receive a Request for Quote from a client.

   You design a **Client Request** node in your business process to handle the receipt of an XML document that contains the customer name, shipping address, and the identity and quantity of the items for which the quote is requested. You design the business process so that it starts when it receives a Request for Quote message from a client.

2. Evaluate a condition to determine whether sales tax should be included in the quote.

   In this case, you design a **Decision** node to create different paths of execution based on the evaluation of a condition. The **Decision** node includes, on one path, a call to a Web service that calculates sales tax. Business Processes communicate with other services via controls. You design a **Control Send** node to communicate with a Web service that calculates the sales tax for your quote.

3. Process the items sent in the Request for Quote message.

   The business process must calculate the price and determine the availability of the items and quantities requested in the incoming XML message. This involves the creation of the following nodes in your business process:

   – **For Each**: For Each nodes represent points in a business process at which a set of activities is performed repeatedly, once for each item in a list. **For Each** nodes include

an iterator node (on which a list of items is specified) and a loop (in which the activities to be performed for each item in the list are defined)

- **Parallel:** Parallel nodes represent points in a business process at which a number of activities are executed in parallel. In this case, you design a **Parallel** node containing two branches: one to execute the events that calculate the price for the quote, the second to execute the events that determine the availability of items for the quote.
- **Control** nodes: Control Send and Control Receive nodes on each path handle the asynchronous exchange of messages between a business process and Web service resources (via controls). A pricing Web service returns the price for the items in the Request Quote document. An availability Web service returns information about the availability of the requested items.

4. Compile price, availability, and tax information calculated by the business process into a quote document.

   Your business process calculates a price quote, availability information, and sales tax rate. You design your business process to use Transformation controls that map the various pieces of data to an XML document that is returned to the client as the quote.

5. Keep a record of the quote created by the business process.

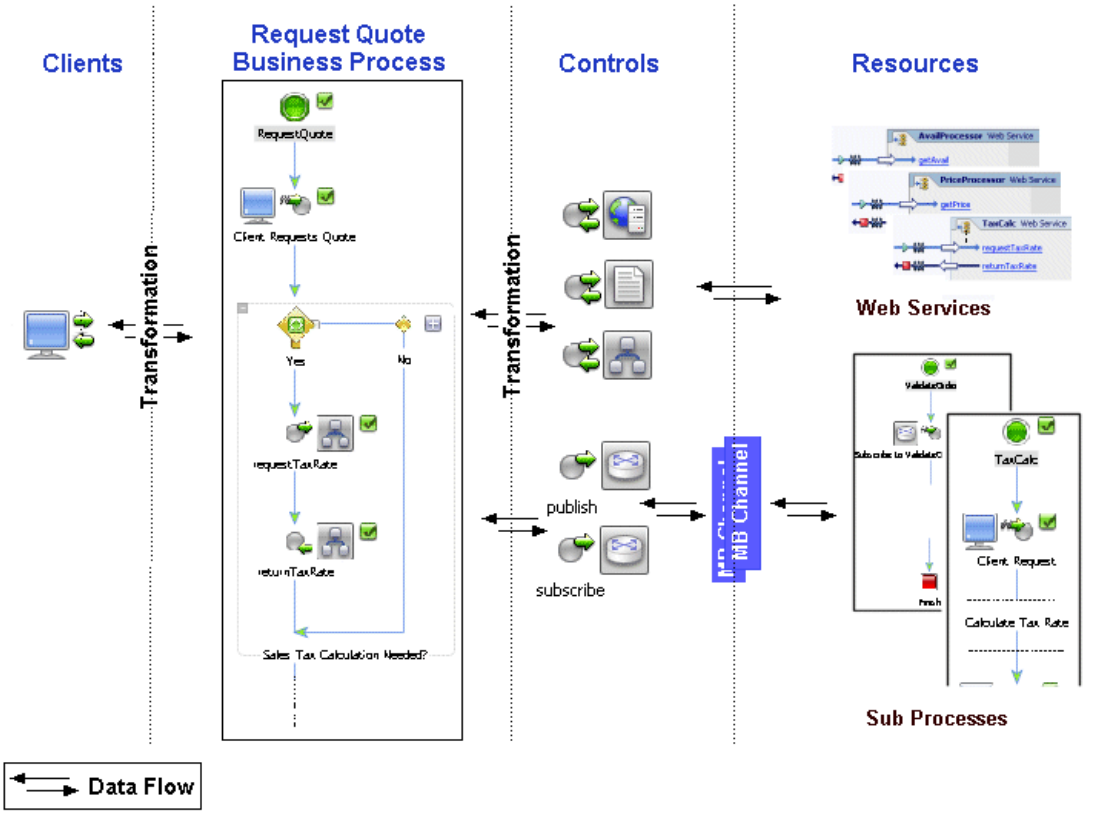
   Your business process uses a File control to write the quote to your file system.

6. Send a response, containing the quote, to the client.

   You design a **Client Response** node to send a response to the client. The response contains the data calculated by the business process.

Actors in the Tutorial Scenario

The actors in the tutorial scenario are represented in the following figure and described in the text that follows the figure:



The actors in the scenario include:

- The client of your RequestQuote service. Clients of `RequestQuote` are systems that create and send Request for Quote messages. A Request for Quote message provides the business process with a customer name, shipping address, and a list of items and quantity of those items required by the client. The business process computes and returns a price and availability quote for the items requested.
- Your `RequestQuote` business process. The process receives a Request for Quote for specific items and returns a price and availability quote for the items requested.
- A tax calculation Web service designed to calculate the sales tax to include in the quote, based on the shipping address provided by a client.

- A tax calculation business process designed to calculate the sales tax. The tax calculation business process serves the same purpose as the tax calculation Web service described in the preceding item. The `RequestQuote` business process can call either the Web service or the business process to request calculation of the sales tax for the quote.
- A pricing Web service designed to calculate the price of the items requested by a client.
- An availability Web service designed to determine the availability of the quantity of items requested by a client.
- Transformation controls: The business process in this case is started when it receives an XML document from a client. Data is shared and exchanged between resources in your application (clients, your business process, Web services and so on) in XML format. Transformation controls are designed to support the mapping of disparate data formats used in your application.
- A business process that validates the Request for Quote from clients (ValidateQuote.jpd). The RequestQuote business process communicates with this ValidateQuote process via Message Broker channels. In this way, the interaction between the business processes can be loosely coupled and anonymous.
- Message Broker channels: `ValidateOrder` and `StopQuote`. The RequestQuote business process communicates via these channels with the ValidateQuote process. In this tutorial, you design a single ValidateQuote service, but other services can be added and configured such that communication with the RequestQuote business process takes place by way of the `ValidateOrder` and `StopQuote` Message Broker channels.

Steps in This Tutorial

This tutorial creates a business process that meets the following requirements: receives Request for Quote messages from clients, starts the business process on receipt of the Request for Quote, validates and processes the request, and sends the status of the Request for Quote to the client.

The tutorial is organized into parts:

Part I

In Part I, you learn how to create a new business process, specify how the process is started at run time, and design a Decision node that includes asynchronous calls to a Web Service. Lastly, you can run and test the business process you created. To get started, proceed to Part I.

Part II

In Part II, you learn how to replace the asynchronous call to the Web service you designed in Part I with an asynchronous call to another business process. You learn how to create a process control and how the control's framework makes it easy to change the interactions your business process makes with various resources. To learn about the specific steps to complete this part, see Part II.

Part III

In Part III, you add more complex business logic to the business process you created in the preceding parts. You learn how to create looping logic, design parallel processing nodes, transform the price and availability data from untyped XML data to typed XML, use a File control to write your quote to a file system, and use a Client Response node to return the quote to the client invoking the business process. At the end of this part, you can run and test the business process you built. To learn about the specific steps to complete this part, see Part III.

Part IV

In Part IV, you build on the business process you created in Part III by adding logic that allows an external message to cause the business process to terminate. Your RequestQuote business process publishes the Request for Quote message it receives from a client to a Message Broker channel. A number of services that validate the Request for Quote in some way can be subscribed to that channel. If the request is determined to be invalid by one of these services, that service publishes a message on a second Message Broker channel, to which the RequestQuote process is subscribed. If the running RequestQuote process receives such a message, it is terminated and a message is sent to the client indicating why the quote was not processed. To learn about the specific steps to complete this part, see Part IV.

Part I Build and Run a Simple Business Process

Part I of the tutorial is comprised of Steps 1 through 5. In this part, you learn how to create a new business process, specify how the process is started at run time, design a Decision node that includes asynchronous calls to a Web Service, and run a nd test the business process you create in this first part.

Specifically, the steps in Part I include:

Chapter 1, "Step 1: Create Your Business Process Application"
Describes step-by-step instructions for creating a business process project in WebLogic Workshop.

Chapter 3, "Step 2: Specify How the Process is Started"
Describes how to design the start of your business process. In this case, provides a step-by-step procedure to create a Client Request node, and add a method that receives the Request for Quote message from the client, which in turn causes the business process to start.

Chapter 4, "Step 3: Define Conditions for Alternate Paths of Execution"
Describes how to design a decision node and its associated conditions in your business process. The path of execution through of a decision node is based on the evaluation of conditions you specify for the decision node.

Chapter 5, "Step 4: Invoke a Web Service"
Describes how to design your business process's interaction with a Web Service control.

Chapter 6, "Step 5: Run Your Business Process"

At this point, you have created a business process that you can run and test using the WebLogic Workshop Test Browser.

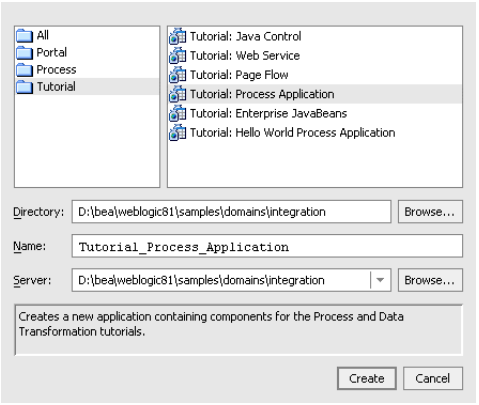
Step 1: Create Your Business Process Application

In this step, you use WebLogic Workshop to create the application, in which you build the tutorial business process (`RequestQuote.jpd`). The tasks in this step include:

- To Create a Business Process Tutorial Application
- To Begin the Design of Your Request for Quote Business Process

To Create a Business Process Tutorial Application

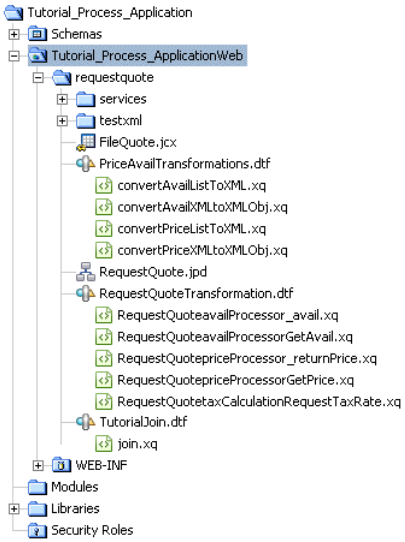
1. From the WebLogic Workshop menu, click **File→New→Application**. The **New Application** dialog box is displayed.
2. In the left pane of the **New Application** dialog box, select **Tutorial**, then in the right pane select **Tutorial: Process Application**.



3. In the **Directory** field, select the directory in which you want to create your application.
4. In the **Name** field, enter `Tutorial_Process_Application`.
5. Click the arrow beside the **Server** field to display a list of servers, then choose the sample **integration** server. For example, on a Windows system, the path to the integration server is:

   BEA_HOME`\weblogic81\samples\domains\integration`

   where *BEA_HOME* is the directory in which you installed WebLogic Platform.
6. Click **Create**.
7. The Tutorial Process Application is created and displayed in the **Application** pane. If the **Application** pane is not visible in WebLogic Workshop, choose **View→Application** from menu bar.



The **Application** pane displays a hierarchical representation of the files and resources available in your application. It includes the following components:

Tutorial_Process_Application—The application folder.

Schemas—A Schemas project that contains the XML Schemas and the Message Broker channel file used in the application.

Tutorial_Process_ApplicationWeb—A Web application project folder. Every application contains one or more projects. Projects represent WebLogic Server Web applications. In other words, when you create a project, you are creating a Web application. (The name of your project is included in the URL that clients use to access your application.)

Web Applications are J2EE deployment units that define a collection of Web resources such as business processes, Web services, JSPs, servlets, HTML pages, and can define references to external resources such as EJBs.

Note: The Web application project folder is named by appending **Web** to the name you gave your application.

requestquote—Contains your project files and folders:

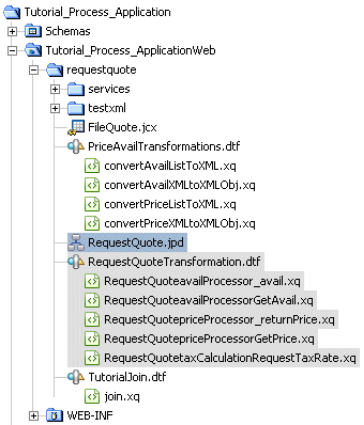
– **services** folder contains services with which your business process interacts. The **services** folder includes Web services, Web Service controls, business processes and Process controls.

- **testxml** folder contains XML files which you can use to test the completed business process.
- **FileQuote.jcx**—A File control used by your Request for Quote business process to write a file to the file system.
- **PriceAvailTransformations.dtf—**Contains data transformations used in `RequestQuote.jpd`.
- **RequestQuote.jpd**—The completed business process. (The tutorial walks you through rebuilding this business process. It is provided for reference, and allows you to run and test the business process before you start rebuilding it.)
- **RequestQuoteTransformation.dtf** and **TutorialJoin.dtf)**—Contains data transformations used in `RequestQuote.jpd`.
- **XQ files**—An XQ file for each transformation method on a DTF file. XQ files contain the queries (written in the XQuery language) called by the DTF files in your project.

Note: If you want to run and test the `RequestQuote.jpd` provided for you in the application folder, complete the steps in Step 12: Run the Request Quote Business Process.

8. In this tutorial, you build the `RequestQuote.jpd` from scratch. Therefore, to proceed, you must delete the following files from your **Tutorial_Process_ApplicationWeb** project:
   - `RequestQuote.jpd`
   - `RequestQuoteTransformation.dtf` including its XQ files:

     ```
     RequestQuoteavailProcessor_avail.xq
     RequestQuoteavailProcessorGetAvail.xq
     RequestQuotepriceProcessor_returnPrice.xq
     RequestQuotepriceProcessorGetPrice.xq
     RequestQuotetaxCalculationRequestTaxRate.xq
     ```

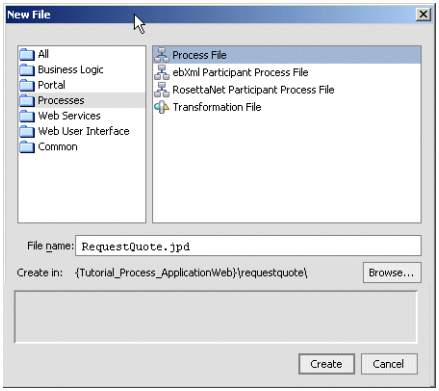


Note: To delete these files, put your mouse pointer in the **Application** tab, then press **Shift** and select the files you want to delete. Right-click and select **Delete 7 files**. Delete only the files listed in this step. You need all other files as you build the business process. Files are deleted from the **Application** pane (and from your application folder in the file system).

To Begin the Design of Your Request for Quote Business Process

In this step you start the process of recreating the `RequestQuote.jpd` business process in the **requestquote** folder.

1. In the **Application** pane, under the `Tutorial_Process_ApplicationWeb\requestquote` folder, right-click the **requestquote** folder to display a drop-down menu.
2. Choose **New—Process File**. The **New File** dialog box is displayed.
3. In the left pane, select **Processes**, then select **Process File** in the right pane.

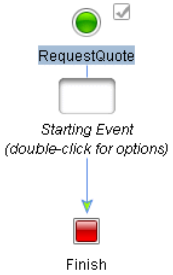


4. In the **File name** field, enter **RequestQuote.jpd**.

   Note: As indicated by the file extension in the **New File** dialog box, you create a new JPD (Process Definition for Java) file when you create a process file. A JPD file is a JAVA file; it contains code for a Java class. Specifically, it contains the implementation code for a business process class.

5. Click **Create**.

   The new `RequestQuote.jpd` file is created and displayed in the **Design View** (which for the moment consists only of a **Start** and a **Finish** node).



Related Topics

Components of Your Application

CHAPTER 2

Working in the Design View

This section describes the components and tools you use to design your business process in the WebLogic Workshop graphical design environment. Ensure that you are familiar with the following items—you will use them throughout the tutorial.

Application Pane

Provides a hierarchical representation of the source files in your project, and provides a place where you can save, open, add, and delete project files. *Projects* group source files as WebLogic Server *Web applications*.

If the Application pane is not visible in WebLogic Workshop, choose **View→Application** from the WebLogic Workshop menu

Design View

The Design View is your primary working canvas. It displays the business process as you design it. When you are working in the Design View, you can access the tools you need from the WebLogic Workshop menu bar.

You can also right-click a node or a group of nodes in the Design View to access options—different options are available depending on the process node you are designing. Options available from the right-click menu include the following: **Rename** to rename the node, **Add Exception Path** to add an exception path to a node or a group of nodes, **Add Message Path** to add a message path to a node or group of nodes, **Cut**, **Copy**, **Delete**, and so on.

To learn more about groups of nodes in the Design View, see Grouping Nodes in Your Business Process.

Source View

The Source View displays the source code for the current business process. As you design your business process, source code is written to the JPD file in keeping with the work you do in the Design View. You can also design and edit your JPD file in the Source View. To learn more about the Source View, see Business Process Source Code.

Palette

The Palette displays the nodes that you can add to your business process. Nodes represent different types of logic in your business process.

If the **Palette** is not visible in WebLogic Workshop, choose **View→Windows→Palette** from the WebLogic Workshop menu.

As you drag a node from the **Palette** onto the **Design View**, targets  appear on your business process. As you drag the node near a target location, the target is activated  . When this happens, you can release the mouse button and the node snaps to the business process at the location indicated by the active target. Note that if you create a node at an invalid location (that is, if you create invalid logic in your business process flow) that node is marked with the following icon in the Design View:  . Move your mouse pointer over the error icon to see a message that describes the error.

Data Palette

The Data Palette includes the following tabs: **Variables** and **Controls**. The **Variables** tab displays the variables created in your business process, and allows you to create new variables. The **Controls** tab displays the instances of controls in your business process and allows you to add new instances.

Use the **Add** command on the **Data Palette** to create instances of variables and controls in your project. You can also create variables and instances of controls in other ways as you work in the **Design View** to create your process logic. As you work through the tutorial, you will employ the various methods of designing controls and variables in your business processes.

If the **Data Palette** is not visible in WebLogic Workshop, choose **View→Windows→Data Palette** from the menu bar.

Property Editor

Provides read and write access to the properties of a node or group of nodes selected in the **Design View**.

If the **Property Editor** is not visible in WebLogic Workshop, choose **View—Property Editor** from the menu bar.

Functions and Shortcuts

You will use the following functions and shortcuts frequently throughout the tutorial:

 **Save**: Saves the file currently displayed in the Design or Source View.

 **Save All (Ctrl+S)**: Saves all the files in your application.

 **Start (Ctrl+F5)**: Build and run the business process currently open in the Design or Source View.

 **Stop (Shift+F5)**: Stop building and running the business process currently open in the Design or Source View and the Test Browser.

 **Build (F7)**: Build your application.

F2: To change the label (name) on a node in your business process, click **F2** when your mouse is active on the node in the **Design View**, enter the name you want to give the node, then click **Enter** on your keyboard.

 Use the up and down arrows on your keyboard to navigate up and down between the nodes in your business process.

 Use the right and left arrows on your keyboard to expand and collapse a *group* of nodes.

Related Topics

Using Keyboard Shortcuts

Step 2: Specify How the Process is Started

In this step, you specify how your business process is started.

As Web services, business processes expose their functionality through methods, which clients invoke to make requests. You can also create Process controls from business processes. In the case of Process controls, other resources can interact with your business process via the controls interface. You learn more about Process controls in Part II of this tutorial.

In this step, you design the **Start** node in your business process to receive a *Request for Quote* message from a client—the receipt of this message is the trigger that starts the business process.You also create a variable to hold the incoming Request for Quote message.

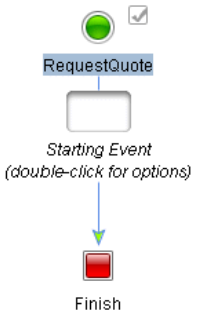
In the **Design View**, the interactions between a business process and a client application are represented by **Client Request** and **Client Response** nodes. In this case, you add a **Client Request** node to your business process and subsequently create the code on this node to handle the receipt of a message from a client.

Complete the following tasks to design the **Client Request** node that starts your business process:

- To Create a Start Node in Your Business Process
- To Design Your Client Request Node

To Create a Start Node in Your Business Process

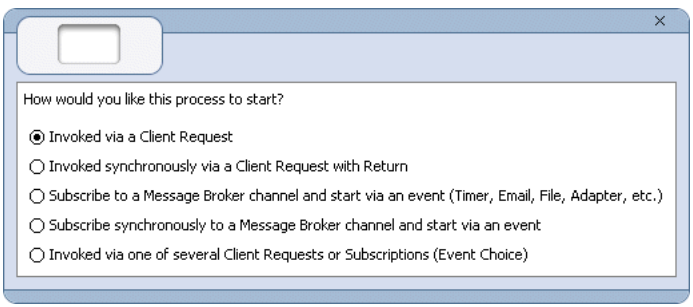
1. On the **Application** pane, double-click `RequestQuote.jpd`. Your **RequestQuote** business process is displayed in the **Design View**.



   You must add a node to this **Start** node to define the start method for your business process.

2. Double-click the empty **Starting Event** target on the **Start** node to display the Start node builder.

   The node builder displays with the possible start methods.



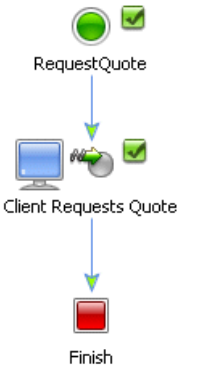
3. In the node builder, select **Invoked via a Client Request**.

4. Click the **X** in the top right-hand corner. The node builder closes and the empty node that was associated with the **Start** node is now populated with a **Client Request** node.

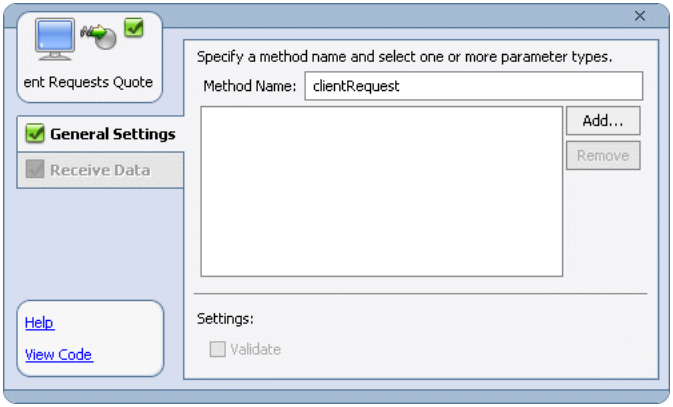
To Design Your Client Request Node

Designing your **Client Request** node includes creating a method and parameters that your client uses to trigger the start of your business process, and designing the logic for handling the receipt of a request from a client.

1. Rename the **Client Request** node. To do so, click the **Client Request** node and press **F2**. Enter `Client Requests Quote` as the name to replace **Client Request** for the node. Press **Enter**. Your business process should now resemble the following figure:



2. In **Design View**, double-click the **Client Requests Quote** node. The node builder is invoked.



Note: Node builders provide a task-driven user interface that helps you design the communication between a business process and its clients and other resources. To access the node builder for any node, double-click the node in the **Design View**—a node builder specific for the node you selected is displayed in-line in your business process.

As shown in the preceding figure, the node builder for a **Client Request** node displays the following tabs to guide your design of the communication between a client and the business process: **General Settings** and **Receive Data**.

- To Specify General Settings
- To Specify Receive Data

To Specify General Settings

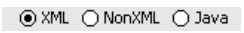
The following steps describe how to specify the method exposed by your business process to clients—clients invoke this method to start and make requests on your business process.

1. In the **Method Name** field on the **General Settings** tab, change the default method name from **clientRequest** to **quoteRequest**.

   Note: When you make your business process available as a service, the name you assign to a method on a **Client Request** node is the name of the method that is exposed via the Web Services Description Language (WSDL). In general, it is recommended that you define a name that is representative of the service offered by your business process.

2. Specify a data type for the parameter to your **quoteRequest** method:

   a. Click **Add** on the **General Settings** tab. A panel, which shows the data types you can use is displayed:

   The Request for Quote message from clients is an XML message. Therefore, we are concerned with **XML Types** at this node.

   b. If necessary, select **XML**. The panel is populated with a list of XML Schema files (*Typed XML*) and a list of *Untyped* XML objects available in your project.

   Note: The XML Schemas you need as you build the Quote Request business process in this tutorial are provided in the *myapplications*`\Tutorial_Process_Application\Schemas` folder, where *myapplications* represents the location where you created your tutorial application. The Schemas provided include `QuoteRequest.xsd`, `PriceQuote.xsd`, `AvailQuote.xsd`, `Quote.xsd` and a system Schema: `DynamicProperties.xsd`.

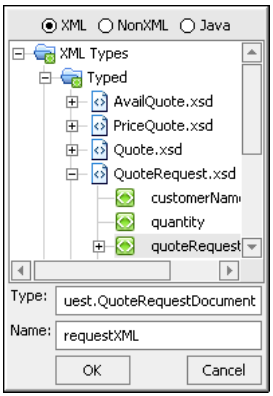
   For XML Schemas to be available to the services in your application, they must be located in a **Schemas** project. Schemas projects are represented the **Application** pane as folders in the Application folder. To learn about creating Schemas projects in your applications and importing XML Schemas, including system Schemas, into your application, see Importing Files into the Schemas Project.

In this step, we use an XML Schema, specifically **QuoteRequest.xsd**, to specify the structure of documents that clients can send to start your business process.

c. In the list of **XML Types**, click the + associated with **QuoteRequest.xsd**.

A graphical representation of the XML Schema defined by `QuoteRequest.xsd` is displayed in the node builder pane.

d. Click the **quoteRequest** node. (It represents the parent element in your XML document.) The **Type** field is populated with the XML type: `org.example.request.QuoteRequestDocument`.



e. In the **Name** field, replace the default parameter name (**x0**) with **requestXML**.

3. Click **OK**. The parameter specifications you made (parameter type is **QuoteRequestDocument**, parameter name is **requestXML**) is displayed in **General Settings** tab in the node builder.

This step completes the specification of the method exposed to clients by your business process. Messages from clients are expected to be *typed* XML. That is, the messages received from clients must contain XML that is valid against an XML Schema (in this case, `QuoteRequest.xsd`).

Note: Example XML messages (`QuoteRequest.xml` and `QuoteRequest_a.xml`) that can be received from a client are provided in the **testxml** folder in your project. You use them later in the tutorial to test your business process.

The General Settings tab is updated to indicate that you successfully completed the specification of a method name and parameters: ✅ indicates that a task is complete; ☑ indicates that a task is not complete.

To Specify Receive Data

1. Click the **Receive Data** tab, which allows you to specify a variable that receives a Request for Quote message from a client that is assigned at run time. By default, the **Receive Data** tab opens on the **Variable Assignment** panel.

   Note: **Receive Data** tabs have two modes:

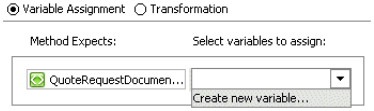
   – **Variable Assignment—**Use this mode when you want to assign the data received from the client to a variable of the same data type.

   – **Transformation—**Use this mode when you want to create a transformation between the data assigned to a variable and that expected by the method parameter.

   Note: Note that it is also possible to assign typed Non-XML (MFL) data directly to XML variables in the **Receive Data** tabs; no transformation is necessary. A discussion of Non-XML (MFL) data is outside the scope of this tutorial. To learn about MFL files and the assignment of the data to business process variables, see Business Process Variables and Data Types.

   In this case, we use the **Variable Assignment** mode because we want to assign the XML message received from the client directly to a variable of the same data type. In subsequent steps, you create a variable of typed XML (`QuoteRequestDocument`) to which your process assigns the incoming Request for Quote from clients.

2. Under **Select variables to assign**, click the arrow and select **Create new variable...**

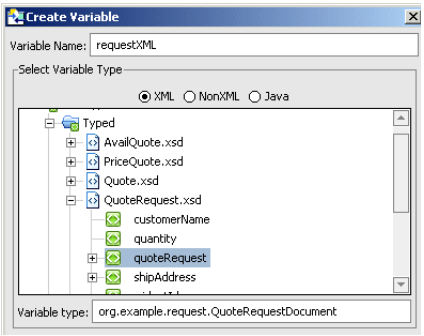


   The **Create Variable** dialog box is displayed.

3. In the **Create Variable** dialog box:

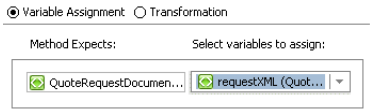
   a. In the **Variable Name** field, enter **requestXML**.

   b. In the **Select Variable Type** field, in the list of **XML Types**, select the **quoteRequest** element under **QuoteRequest.xsd**.

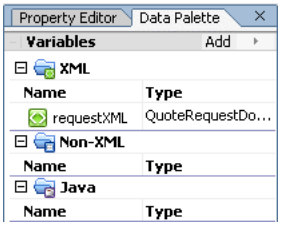


The **Variable Type** field is populated with **org.example.request.QuoteRequestDocument**.

c. Click **OK**. Your new variable is created and displayed in the **Receive Data** tab.



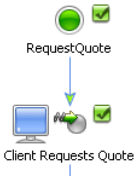
Note: The **requestXML** variable is also listed as an **XML** variable in the **Data Palette**.



Both tabs in the node builder (**General Settings** and **Receive Data**) are marked complete .

4. Click the **X** in the top right-hand corner. The **Client Requests Quote** node builder closes.

In **Design View**, note that the completeness icon associated with the **Client Requests Quote** node changed from to indicating that the design of the node is complete.



5. From the Workshop menu, select **File→Save All**.

Related Topics

Components of Your Application

Designing Start Nodes

Working With Data Types

Interacting With Resources Using Controls

Calling Business Processes

Step 3: Define Conditions for Alternate Paths of Execution

This step describes how you design a common pattern in business processes—one that selects one path of execution based on the evaluation of one or more conditions. You create this pattern by designing a **Decision** node in your business process.

In this part of the tutorial scenario, the business process is designed to make a decision based on a value that the business process extracts from the variable to which the XML message from the client is assigned. You design a single condition, which is evaluated at run time to determine whether the shipping address, specified in the incoming Request for Quote XML, requires that sales tax is calculated for the quote. If the condition evaluates to *true*, then sales tax must be calculated, and the flow of execution proceeds along a branch that calls a Web service to calculate the sales tax. If the condition evaluates to *false*, then no sales tax is required for the quote, and the flow of execution proceeds along the default branch. This step includes the following tasks:

- To Add A Decision Node To Your Business Process
- To Define a Condition in This Decision Node

To Add A Decision Node To Your Business Process

1. If the **Palette** is not visible in WebLogic Workshop, choose **View—Windows—Palette** from the WebLogic Workshop menu.

2. In **Design View**, click  **Decision** in the **Palette**, then drag and drop the **Decision** node onto the business process, positioning it directly below the **Client Requests Quote** node that you created in Step 2: Specify How the Process is Started.

Note: As you drag a node from the **Palette** onto the **Design View**, targets appear on your business process. As you drag the node near a target location, the target is activated and the cursor changes to an arrow. When this happens, you can release the mouse button and the node snaps to the business process at the location indicated by the active target.

The **Decision** node includes a node representing the condition (labeled **Condition**), and two paths of execution: one for events to be executed in the case the condition evaluates to *true*, and the other (the **Default** path) for events to be executed in the case the condition evaluates to *false*.

3. Relabel **Decision**, **Condition**, and **Default** to identify the business tasks for this node more clearly:

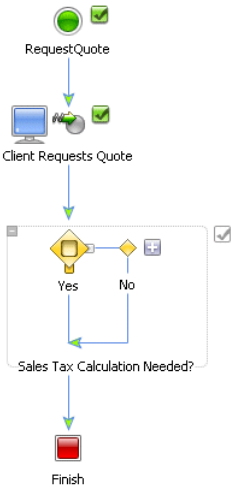
   a. In the node's **Name** box, replace **Decision**, with **Sales Tax Calculation Needed?**, then press **Enter**.

      Note: If the **Name** box is not open, double-click **Decision** to open it.

   b. To enter a label to replace **Condition** and identify the *true* path, double-click **Condition** and enter **Yes**, then press **Enter**.

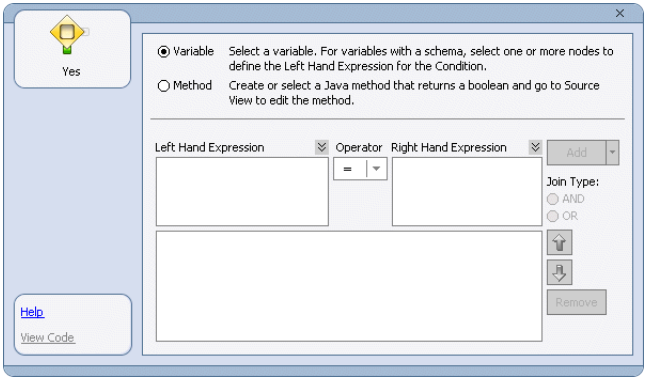
   c. To enter a label to replace **Default** and identify the *false* path, double-click **Default** and enter **No**, then press **Enter**.

The Decision node in your business process should now appear in the **Design View** as shown in the following figure.



To Define a Condition in This Decision Node

1. Double-click the condition node  to invoke the decision builder. It provides a task-driven user interface that helps you design the decision logic.



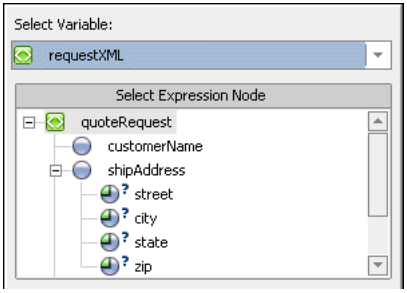
In the decision builder, **Variable** is selected by default. Do not change the selection because, in this case, you design the decision based on the value of an element in an XML document, which is valid against an XML Schema.

2. Select an XML element on which the decision is made. To do so, complete the following steps:

a. In the decision builder, select a variable by clicking the for the **Left Hand Expression**.

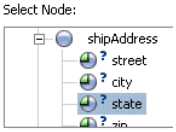
A drop-down list of variables in your project is displayed. In this case, the variable you created for the **Client Request** node at the start of your business process is displayed: **requestXML**.

A representation of the XML schema for the **QuoteRequest** is displayed in the **Select Expression Node** pane:



The elements and attributes of an XML document assigned to this variable are represented as nodes in a hierarchical representation, as shown in the preceding figure. The schema in our example (`QuoteRequest.xsd`) specifies a root element (`quoteRequest`), and child elements: `customerName`, `shipAddress`, and a repeating element (identified by): `widgetRequest`. The `shipAddress` element contains the following attributes: `street`, `city`, `state`, `zip`.

b. In the **Select Expression Node** panel, click the **state** attribute.



This selects the node in the XML document that represents the element for which you want to define the condition.

The **Selected Expression** field is populated with the following expression:

```
data($requestXML/ns0:shipAddress/@state)
```

c. Click **Select**.

The **Left Hand Expression** field is populated with expression.

d. If necessary, select the **=** operator from the **Operator** list.

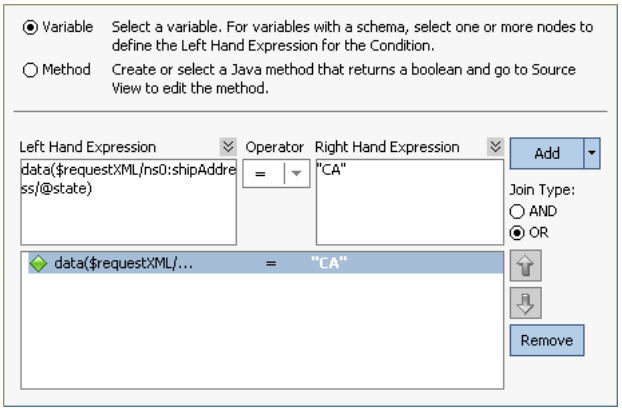
e. Enter `CA` in the **Right Hand Expression** field.

f. Click **Add** to add the condition you just created:

```
data($requestXML/ns0:shipAddress/@state) = "CA"
```

This completes the design of the first condition on this node.

g. Select the expression in the condition list pane, as shown in the following figure:



h. Change the **Join Type** option to **OR**.

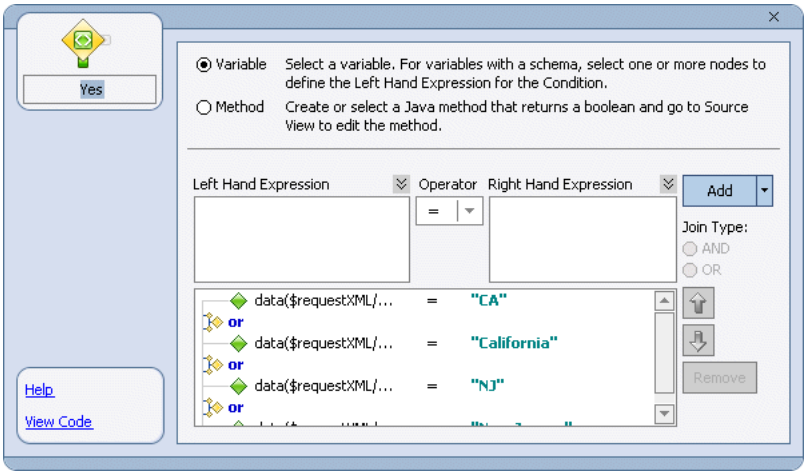
i. In the **Right Hand Expression** field, select `"CA"`, then change the entry to **California**.

j. The **Add** button changes to **Update**.

k. Select the arrow beside the **Update** button, then select **Add** from the menu.

l. Repeat the process of selecting the expression and then adding it to the condition list changing the entry in the **Right Hand Expression** field to **NJ** and **New Jersey** consecutively.

The conditions you specify are listed in the condition list pane, as shown in the following figure.



3. Click the **X** in the top right-hand corner. The decision builder closes.

   The icon for the **Condition** node in the **Design View** has changed from  to  . It is a visual reminder that the condition you defined on this node is based on the evaluation of XML.

   This step completes the design of the condition that is evaluated when the flow transitions to the Decision node at run time. Your condition logic is written in source code as an XQuery expression—see the following section: XML Conditions in the Source Code.

   You are ready to define the actions on the subsequent paths in the flow—proceed to Step 4: Invoke a Web Service.

XML Conditions in the Source Code

As you define your XML conditions in the decision builder, WebLogic Workshop writes an XQuery expression to the JPD file. Specifically, XQuery expressions are written in the `Process Language` region of the JPD file.

To view the XQuery expression written in keeping with your work in the preceding section, click the **Source View** tab, and expand the region of code indicated with ⊞ `Process Language`.

The condition defined by following the example in steps 2 through 9 in the preceding section creates the following XQuery expression in the source code:

```
* @jpd:xquery prologue::
*
* declare namespace ns0="http://www.example.org/request"
```

```
*
* define function exprFunction0(element $requestXML) returns xs:boolean {
*      (((data($requestXML/ns0:shipAddress/@state) = "CA") or
       (data($requestXML/ns0:shipAddress/@state) = "Calforinia")) or
       (data($requestXML/ns0:shipAddress/@state) = "NJ")) or
       (data($requestXML/ns0:shipAddress/@state) = "New Jersey")
}
*
* ::
```

Related Topics

Defining Conditions for Branching

Step 4: Invoke a Web Service

By default, a **Decision** node consists of one condition; a path below the condition node, which represents the path of execution followed when the condition, or set of conditions that evaluate to *true*; and a path to the right of the condition, which represents the path of execution followed when the condition evaluates to *false* (the default path).

Note: You can add additional condition nodes and paths to a **Decision** node, but in this scenario, we need only one set of conditions, and two paths.

In this step, you learn how to add logic to one path of execution for your **Decision** node (**Sales Tax Calculation Needed?**). Specifically, you learn how to design your business process to interact with resources via controls. Your business process invokes a Web service and handles the data returned from the Web service. This step describes the following topics:

- What is the Tax Calculation Control?
- Design the Interaction Between Your Business Process and a Web Service

What is the Tax Calculation Control?

Java Controls are server-side components managed by the Workshop framework. They encapsulate external resources and business logic for use in Workshop applications. In other words, controls represent the interfaces between your business process and other resources. The underlying control implementation takes care of most of the details of the interaction for you. Controls expose Java interfaces that may be invoked directly from your business process. You add an instance of a control to your project and then invoke its methods.

In this scenario, the business process calls a Web service, which calculates and returns a sales tax rate. Business Processes invoke Web services via Web Service controls. The Web service control (`TaxCalcControl.jcx`) is created for you and included in your application's project (specifically in the *`myapplications`*`\Tutorial_Process_Application\Tutorial_Process_ApplicationWeb\requestquote\services` folder, where *`myapplications`* represents the location in which you created your tutorial application).

A complete description of how to create the `TaxCalc.jws` Web service and its associated control (`TaxCalcControl.jcx`) is beyond the scope of this tutorial. The goal of Step 4 in this tutorial is to describe how to create the appropriate nodes in your business process, and design their communication with this Web Service control.

To learn about creating Web services, and creating a control from your Web service, see Tutorial: Web Services and Controls and Transactions.

Related Topics

Tutorial: Web Services

Buffering Methods and Callbacks

Transaction Boundaries

Design the Interaction Between Your Business Process and a Web Service

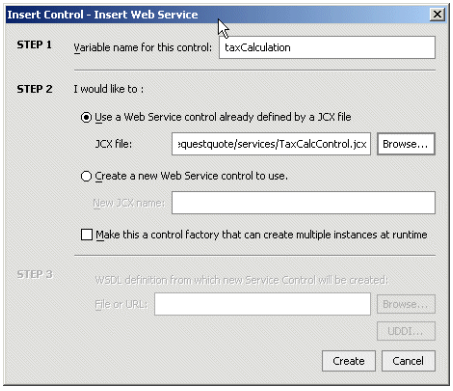
This section describes how to create the activities that are performed when the condition defined in your Decision node evaluates to true. The condition evaluates to true if the value of `shipAddress/state` in the XML document received from a client, equals any one of the following: CA, California, NJ, or New Jersey.

In this section, you learn how to invoke a Web service from your business process, and create a callback handler to receive the data returned by the Web service. It includes the following tasks:

- To Create an Instance of the Web Service Control in Your Project
- To Call the Tax Calculation Web Service From Your Business Process
- To Receive the Tax Rate Calculation From the Web Service

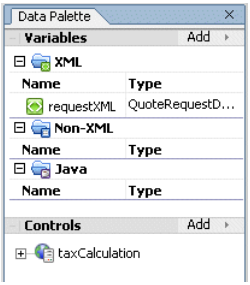
To Create an Instance of the Web Service Control in Your Project

1. If **Design View** is not visible, click the **Design View** tab.
2. If the **Controls** tab is not visible in WebLogic Workshop, choose **View→Windows→Data Palette** from the menu bar.
3. Click **Add** on the **Data Palette Controls** tab. A drop-down list of controls that represent the resources with which your business process can interact is displayed.
4. Choose **Web Service**. The **Insert Control** dialog box is displayed.



5. In the **Insert Control** dialog box:
   a. In **Step 1**, enter **taxCalculation** as the variable name for this control.
   b. In **Step 2**, ensure that the following option is selected: **Use a Web Service control already defined by a JCX file**.
   c. Click **Browse** beside the **JCX file** field, choose **TaxCalcControl.jcx** from the `\requestquote\services` folder in your application, then click **Select**. The file browser closes and `requestquote\services\taxCalcControl.jcx` is entered in the field.
6. Click **Create**. The **Insert Control** dialog box closes.

   An instance of a Web Service control, named **taxCalculation**, is created in your project and displayed on the **Data Palette Controls** tab.



7. From the Workshop menu, select **File—Save All**.

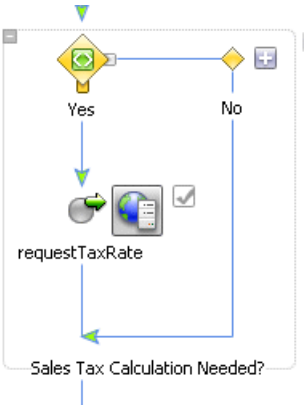
To Call the Tax Calculation Web Service From Your Business Process

In this step, you create the logic to call the tax calculation control from your business process.

1. In the **Data Palette**, click the + beside the **taxCalculation** control. The list of methods available on the **taxCalculation** control is displayed.
2. From the list of **taxCalculation** control methods, click the following method:

   ```
   void requestTaxRate(java.lang.String stateID)
   ```

3. Drag and drop the method onto the business process, placing it on the **Sales Tax Calculation Needed?** node immediately below the condition (Yes) node



A Control Send node is created representing the asynchronous call to your **taxCalculation** Web Service control. The node is named according to the name of the method you dragged onto the business process—in this case: **requestTaxRate**.

Note: This interaction is designed to be asynchronous, meaning that the business process can send a request to the **taxCalculation** control from this node, and does not block

waiting for a response from the control. In other words, the business process can continue processing and receive a response from the **taxCalculation** service when that service completes the request.

4. Double-click the **requestTaxRate** node. The node builder opens on the **General Settings** tab. The Control instance and target methods are already selected: **taxCalculation** and **void request TaxRate(String stateID)**, respectively.

5. Click the **Send Data** tab.

   By default, the **Send Data** tab opens on the **Variable Assignment** pane. The **Control Expects** field is populated with the data type expected by the `requestTaxRate`() method exposed by the **taxCalculation** Web services: **`String stateID`**.

   Note: As you learned in a previous step, **Send Data** tabs have two modes:

   – **Variable Assignment**—Use this mode when you want to assign the data received from the client to a variable of the same data type.

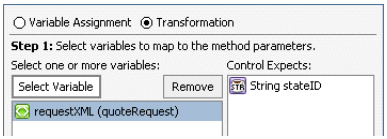
   – **Transformation—**Use this mode when you want to create a transformation between the data assigned to a variable and that expected by the method parameter.

   In this case, you must switch to the **Transformation** mode because the data type required as input to the **taxCalculation** control is a Java String type, and the variable in which the Request for Quote message (which includes the value of `shipAddress/state`) is stored, is of type XML (that is, `QuoteRequestDocument`, which is valid against an XML Schema).

   WebLogic Integration provides a data mapping tool to map between heterogeneous data types. The data transformations you create using the tool are stored in Data Transformation Format (DTF) files. You can think of DTF files as another resource with which your business process interacts via controls. That is, when DTF files containing your data transformations are built, they are built as controls. The controls expose transformation methods, which business processes invoke to map disparate data types.

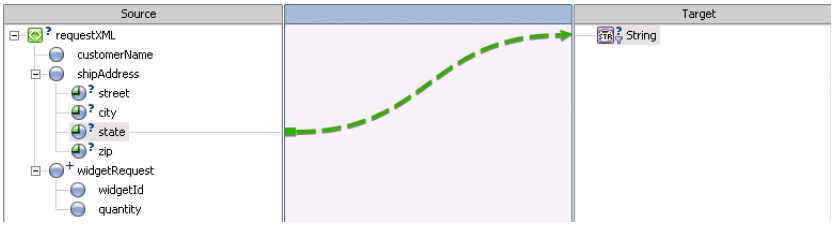
6. Click **Transformation**. A pane that allows you to define a transformation between your variable and the expected data type of the parameter on the control method.

7. In **Step 1**, click **Select Variable** to display the variables in your project, then choose `requestXML` (`QuoteRequestDocument`)—that is, the variable you created for the **Client Request** node at the start of your business process.



8. In **Step 2**, click **Create Transformation**. The Transformation tool opens, which displays a representation of the QuoteRequest XML document in the **Source** pane, and a **String** in the **Target** pane.

9. Click **state** in the **Source** pane and drag your mouse pointer over to **String** in the **Target** pane. A line is drawn between the **state** and **String** elements in the **XML Map** pane. It represents the transformation between the two data types.



10. To return to the process, in the **Application** pane, double-click the **RequestQuote.jpd**.

    Note: Creating the transformation in the preceding steps creates a Transformation control in your project: A DTF file, named `RequestQuoteTransformation.dtf` is created. An XQ file, which contains the query (written in the XQuery language) for the transformation method is also created. Both the DTF and XQ files are displayed in the **Application** tab. Also, an instance of the Transformation control was created and is represented as **transformations** in the **Data Palette** (**Controls** tab).

11. Click the **X** in top right-hand corner of the **Request Tax Rate** node builder to close it.

    This step completes the design of the **Request Tax Rate** node.

To Receive the Tax Rate Calculation From the Web Service

The interaction between the business process and the tax calculation control is asynchronous, which means that the business process can continue performing other work while the tax calculation service prepares its response. The tax calculation service notifies the business process when the response is ready.

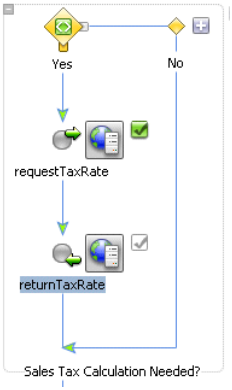
In the preceding section you designed a call to the tax calculation Web service (via a control). To add the logic in your business process that receives the tax rate returned by the tax calculation control, complete the following steps:

1. In the **Data Palette**, if needed, click the + beside the **taxCalculation** control to expand the list of methods available on the **taxCalculation** control.
2. From the list of **taxCalculation** control methods, click the following method:

   ```
   void returnTaxRate(float taxRate)
   ```

3. Drag and drop the method onto the business process placing it on the **Sales Tax Calculation Needed?** node immediately below the **requestTaxRate** node:

   A Control Receive node is created representing the asynchronous response from your Web Service control.

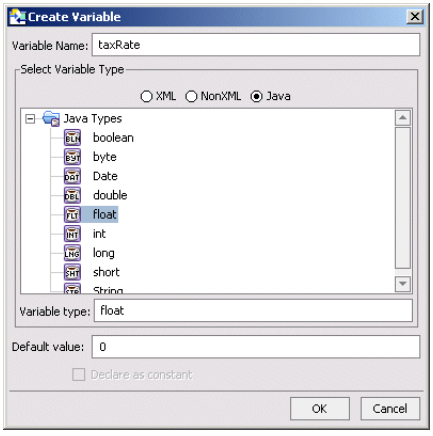
   The node is named according to the name of the method you dragged onto the business process—in this case: **returnTaxRate**.

4. Double-click the **returnTaxRate** node. The node builder opens on the **General Settings** tab. The Control instance and target methods are already selected: **taxCalculation** and **returnTaxRate(float taxRate)**, respectively.
5. Click the **Receive Data** tab. The tab opens with the **Variable Assignment** pane selected.

   The **Control Expects** field is populated with the data type and name of the parameter returned by the `returnTaxRate()` method on the **taxCalculation** control: `float taxRate`.

6. In the **Variable Assignment** pane, click the arrow in the field under **Select variables to assign**, then select **Create new variable...**. The **Create Variable** dialog box opens.
7. In the **Variable Name** field, enter **taxRate**.
8. In the **Select Variable Type** field, ensure that **Java** is selected, then select **float**.

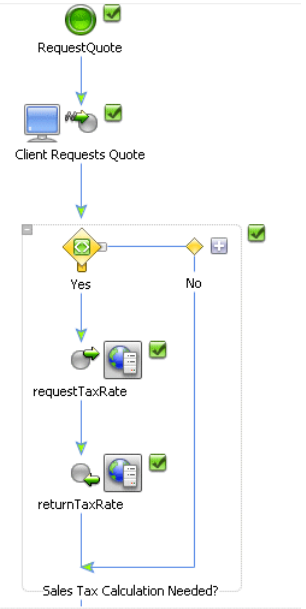
9. In the **Default value** field, enter **0**. This initializes the value of **taxRate** to zero.



10. Click **OK**. Your new variable, to which the sales tax rate is assigned at run time, is created and is listed as a **Java** variable in the **Variables** tab.

11. Click the **X** in the top right-hand corner of the node builder. The Control Receive node builder closes.

    This step completes the design of your **returnTaxRate** node and the design of the activities performed by your business process when the condition on the **Decision** node evaluates to true. In the **Design View**, your business process resembles that shown in the following figure:



Note that the Start node icon changed from to after you added the asynchronous call to the Web Service control. The former icon indicates that your business process is stateless, and the latter indicates that it is stateful.

The icons reflect the specification for the **stateless** property for your business process. To see whether the **stateless** property is defined as **true** or **false**, click the Start node icon and view the **Property Editor**. To learn about stateful and stateless business processes, see Building Stateless and Stateful Business Processes. To understand why the property changed from stateless to stateful, see Transaction Boundaries.

Note: If the **Property Editor** is not displayed in WebLogic Workshop, choose **View—Property Editor** from menu bar.

12. From the Workshop menu, select **File—Save All**.

Note: No further design is required for this Decision node. If the condition evaluates to true, the path of execution proceeds via the **Yes** path and the tax rate for the order is calculated. If the condition evaluates to false—no sales tax is required—the path of execution proceeds via the **No** path and a value of zero is assigned to the variable **taxRate**. Remember, you specified that **taxRate** is initialized to zero when you designed the **taxRate** variable in the preceding section.

Related Topics

Interacting With Resources Using Controls

Creating and Testing Maps

Guide to Data Transformation

Building Stateless and Stateful Business Processes

Step 5: Run Your Business Process

To run and test the business process that you have created, complete the following steps:

1. If WebLogic Server is not already running, from the WebLogic Workshop menu, choose **Tools→WebLogic Server→Start WebLogic Server**.

   When WebLogic Server is running, the following indicator is visible in the status bar at the bottom of the WebLogic Workshop visual development environment:

2. After the Server is running, from the WebLogic Workshop menu, click **Build→Build Application**. WebLogic Workshop builds your application.

3. After the build finishes, click the Start button  on the menu bar to run your business process. The **Workshop Test Browser** is launched. You can use it to test your business process using sample input values.

4. If the Test Form page is not already open, click the **Test Form** tab.

   You can enter data that your business process can receive as part of a client request directly on the **Test Form** page. Alternatively, you can browse your file system and upload a file which contains your test data. In this case, test XML data are provided in the tutorial application for you to use.

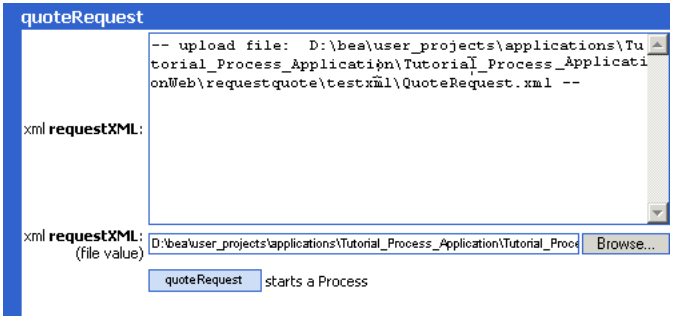
5. Open the file browser by clicking **Browse** beside the **xml requestXML (file value)** field.

6. Select **QuoteRequest.xml** from the **requestquote\testxml** folder in your project.

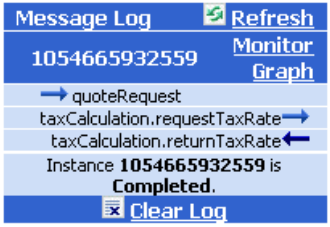
The **QuoteRequest.xml** file is available at the following location in your file system:
myapplications\Tutorial_Process_Application\
Tutorial_Process_ApplicationWeb\requestquote\testxml\QuoteRequest.xml

In the preceding line, *myapplications* represents the location in which you created your Tutorial_Process_Application application.

7. Click the button labeled with the method name on your business process (**quoteRequest**) to start the business process.



The **Test Form** page refreshes to display a summary of your request parameters and the responses from the Web service in the **Message Log**.



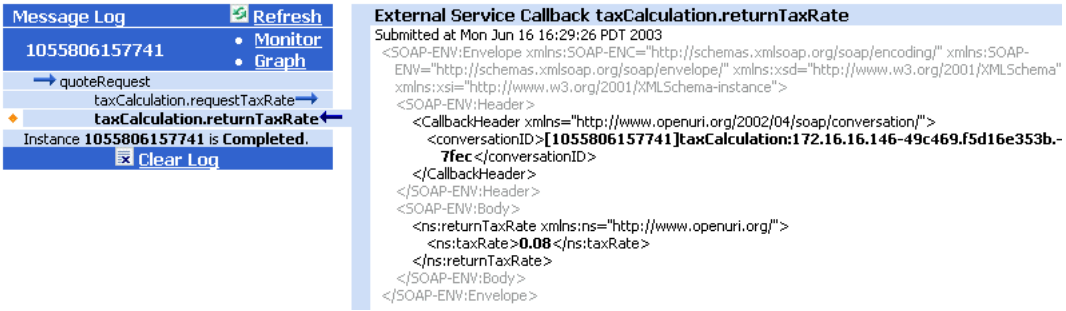
8. Click **Refresh** on the Message Log to refresh the entries in the log until this instance of the business process completes running. Entries in the Message Log correspond to the methods on your business process:
   - The **quoteRequest** method that starts the business process.
   - A call from your business process to the **taxCalculation** Web service: **taxCalculation.requestTaxRate**
   - A response from the service to your business process: **taxCalculation.returnTaxRate**
   - The **Instance ID**—When the business process finishes, a message similar to the following is displayed in the Message Log:

     `Instance instanceID is Completed.`

where *instanceID* represents the ID generated when the **quoteRequest** method in your business process was called.

You can click any of the methods in the Message Log to view the details of the call. For example, if you click **quoteRequest**, the **Service Request** panel displays the XML message sent by the client (you) when the method was called.

If you click **taxCalculation.returnTaxRate**, you can view the response from the **taxCalculation** service—in this case, the tax rate was calculated, based on the input value **(NJ)** for the **state** element in the test XML.



In the sample XML message you used, **`state="NJ"`**. That is, the state to which the order is shipped is **`NJ`**. This XML message is designed to cause the flow of execution through the **Yes** branch on your **Sales Tax Calculation Needed?** node. The preceding figure shows the rate of sales tax returned for this test XML message.

```
<returnTaxRate xmlns="http://www.openuri.org/">
<taxRate>0.08</taxRate>
</returnTaxRate>
```

By following these steps you ran and tested a simple business process, which contains a **Start** node and a **Decision** node, and includes an asynchronous call to a Web service, via a control.

9. To stop the **Test Browser**, you can simply close it, or return to WebLogic Workshop and click  on the tool bar.

Subsequent steps in this tutorial build on the business process you have created so far.

Note About Additional Functionality in the Test Browser

The following additional links are available from the Test Form page in the Test Browser:

Graph

Click **Graph** to open the **Process Graph** tab in the **Test Browser**. The interactive instance graph is a fully expanded version of the view provided in the Design View. The interactive process graph requires Adobe SVG Viewer Version 3.0. The first time you open the **Process Graph** tab, you will be asked if you would like to download the Viewer from the Adobe Web site. You can also download the viewer directly from the Adobe Web site at `http://www.adobe.com/svg/viewer/install/main.html`.

Note: This viewer is not available for some configurations that WebLogic Platform 8.1 supports. For details, please see "Browser Requirements for the Interactive Graph" in Process Instance Monitoring at `http://edocs.bea.com/wli/docs81/manage/processmonitoring.html` in *Managing WebLogic Integration Solutions*. For detailed information about the operating systems and browsers WebLogic Platform supports, see WebLogic Platform Supported Configurations at `http://edocs.bea.com/platform/suppconfigs/index.html`.

As previously mentioned, the Process Graph is a graphical representation of your business process and its execution path. The Process Graph highlights the node currently being executed. When the instance of the business process completes, the path of execution followed in your test is highlighted. In this scenario, the **Yes** path is executed—the **No** path is gray on the Process Graph to indicate that this path was not taken during the execution of this instance of the business process.

Note: Press **Alt** and drag the mouse pointer over the Process Graph to move and position it on the Test Browser page. To zoom in, press **Ctrl+click**; to zoom out, press **Ctrl+Shift+click**. Alternately, right-click on the Process Graph and select the **Zoom In** or **Zoom Out** command from the drop-down menu.

You will review your running business process in the **Process Graph** in a later step in the tutorial.

Note: Use the back and forward arrows  to navigate between the pages in the WebLogic Workshop Test Browser.

Monitor

Click **Monitor** to open the WebLogic Integration Administration Console in a Web Browser. Login using username = `weblogic` and password = `weblogic`. The WebLogic Integration Administration Console opens to the **Process Instance Details** page. The WebLogic Integration Administration Console allows you to administer and manage your WebLogic Integration applications. For example, if you click **View Statistics** on the Process Instances navigation pane, you access a **Process Instance Statistics** page. This

page displays a summary of business process instances grouped by the process type. To view the instances of a process type that ran or are running on your server, click the process name. Processes instances are identified by their *instanceID*. Note that the instanceID displayed for your **RequestQuote** business process matches the instanceID displayed on the Message Log pane (see the preceding figures in this topic).

Monitor all RequestQuote.jpd processes

Click **Monitor all RequestQuote.jpd processes** at the top of the **Test Form** to open the WebLogic Integration Administration Console. Login using username = `weblogic` and password = `weblogic`. When you use this link to open the Administration Console, it opens on the **Process Instance Summary** page, which displays a summary of all the instances of business processes that ran or are running.

Related Topics

Managing WebLogic Integration Solutions at
`http://edocs.bea.com/wli/docs81/manage/index.html`

Part II Call a Business Process Using a Process Control

Part II of the tutorial demonstrates how simple it is to interchange calls to different external resources in your business process.

You learn how to design a call to another business process from your Request for Quote process. Specifically, you create a new Process control and change the asynchronous call to the Web Service you designed in Part I, making it instead an asynchronous call to another business process, via the new Process control.

Proceed to Step 6: Invoke a Business Process Using a Process Control to complete Part II of the tutorial.

Step 6: Invoke a Business Process Using a Process Control

Process controls are used to send requests to and receive responses from other business processes in the same domain using Java/RMI. This scenario demonstrates a typical use case for a Process control—to call a subprocess from a parent business process.

For this part of the tutorial, we going to change the design of the business process you created in Part I to take advantage of a tax calculation service provided by a business process instead of using the tax calculation Web service you initially used. You can do so by first creating a Process control from the tax calculation business process. Then you simply change the Control nodes you designed in Part I in such a way that, instead of communicating with the tax calculation *Web service* via the Web Service control, they communicate with the tax calculation *business process*, via the new Process control.

The tasks in this step include:

- To Create a Process Control
- To Change the Control Send Node in the Request Quote Business Process to Interact With the Process Control
- To Change the Control Receive Node in the Request Quote Business Process to Interact With the Process Control
- To Test the Request Quote Process and its Call to the Tax Calculation Process

To Create a Process Control

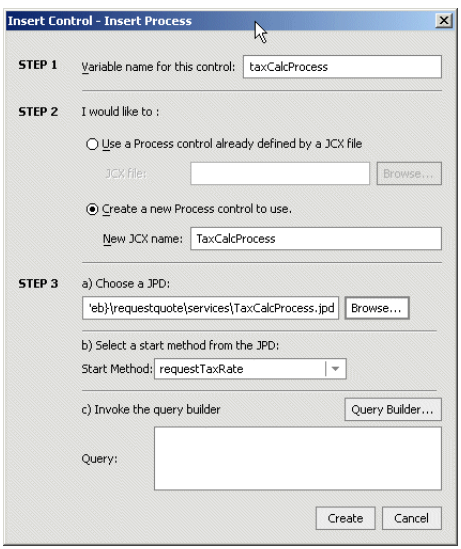
The tutorial application provides you with a simple business process (`TaxCalcProcess.jpd`) that calculates the sales tax for a Request for Quote. (See

`\Tutorial_Process_ApplicationWeb\requestquote\services\TaxCalcProcess.jpd` in the **Application** pane.) In this step, you learn how to create a Process control for the `TaxCalcProcess.jpd` business process.

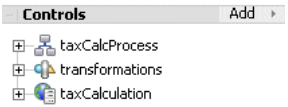
Note: If the **Data Palette** is not visible in WebLogic Workshop, choose **View→Windows→Data Palette** from the menu bar. Instances of controls already available in your project are displayed in the **Data Palette** tab under **Controls**.

1. Click **Add** on the **Data Palette Controls** tab to display a drop-down list of controls that represent the resources with which your business process can interact.
2. Point to **Integration Controls**, then select **Process** to invoke the **Insert Control** dialog box.
3. In **Step 1**, in the **Variable name for this control** field, enter **taxCalcProcess** as the name for the instance of the Process control you are about to create.
4. In **Step 2**, select **Create a new Process control to use**, then enter **TaxCalcProcess** in the **New JCX name** field.
5. In **Step 3**, click **Browse** beside the **Choose a JPD** field, then choose **TaxCalcProcess.jpd** from the `\Tutorial_Process_ApplicationWeb\requestquote\services` folder.

   The **Start Method** field is populated with **requestTaxRate**, which is the start method for **TaxCalcProcess.jpd**.



6. Click **Create**. The Process control (**TaxCalcProcess.jcx**) is created and displayed in the **Applications** tab. Also, an instance of the control (**taxCalcProcess**) is added to the **Data Palette**. The **Controls** tab on the **Data Palette** should now resemble the following figure:



To Change the Control Send Node in the Request Quote Business Process to Interact With the Process Control

1. In the **Data Palette**, click + beside **taxCalcProcess** to expand the list of methods on the control.
2. In **Design View**, select the following method:

   ```
   void requestTaxRate (QuoteRequestDocument quoteRequest)
   ```

3. Drag and drop the method onto the **requestTaxRate** node in your RequestQuote.jpd. The following message is displayed:

   ```
   The Control node is already associated with a control method. Do you
   wish to replace this control method?
   ```

4. Click **Yes**. The **requestTaxRate** node changes to reflect the change in the type of control with which it is associated. The node representation changes from

5. Double-click the **requestTaxRate** node to open its node builder on the **General Settings** pane.
6. Confirm that **taxCalcProcess** is selected in the **Control** field and that the following method is selected in the **Method** field:

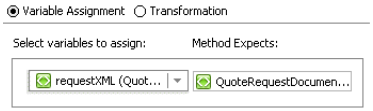
   ```
   void requestTaxRate(QuoteRequestDocument quoteRequest)
   ```

7. Click the **Send Data** tab to open the second pane in the node builder. The **Variable Assignment** option is selected by default, and the **Control Expects** field is populated with **QuoteRequestDocument** to indicate the format and type of the message expected by the tax calculation process.

   Note: The tax calculation process expects to receive a message of XML type **QuoteRequestDocument**—the same type as the **requestXML** variable to which the XML message sent from a client to the **RequestQuote.jpd** process is assigned.

Unlike the scenario for sending data to the tax calculation Web service in Step 4: Invoke a Web Service, no transformation is required on this node—you can create a direct variable assignment.

8. Click the arrow in the **Select variables to assign** field, and select **requestXML(QuoteRequest)**.



9. Click the **X** in the top right-hand corner to close the node builder.

   This step completes the procedure to remove the call from your Request for Quote business process to a tax calculation Web Service—changing it to a call to a tax calculation business process (via the Process control you created).

To Change the Control Receive Node in the Request Quote Business Process to Interact With the Process Control

1. In **Design View**, from the **Data Palette**, select the following method on the **taxCalcProcess**:

   ```
   void returnTaxRate(float salesTaxRate)
   ```

2. Drag and drop the method onto the **returnTaxRate** node in your RequestQuote.jpd.

   The following message is displayed:

   ```
   The Control node is already associated with a control method. Do you
   wish to replace this control method?
   ```

3. Click **Yes**. The **returnTaxRate** node changes to reflect the change in the type of control with which it is associated. The node representation changes from

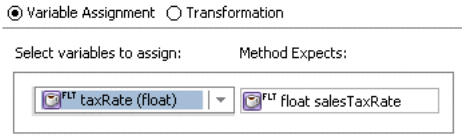
4. Double-click the **returnTaxRate** node to open its node builder on the **General Settings** pane.

5. Confirm that **taxCalcProcess** is selected in the **Control** field and that the following method is selected in the **Method** field:

   ```
   void returnTaxRate(float salesTaxRate)
   ```

6. Click the **Receive Data** tab to open the second panel in the node builder. The **Variable Assignment** option is selected by default, and the **Control Returns** field is populated with **float salesTaxRate** to indicate the type and name of the parameter expected to be returned by the tax calculation process.

7. Click the arrow in the **Select variables to assign** field, and select **taxRate (float)**.



8. Click the **X** in the top right-hand corner to close the node builder.

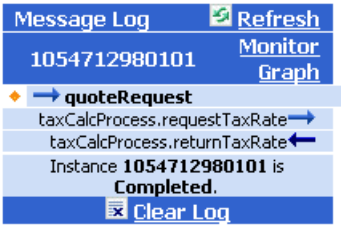
   This step completes the procedure to remove the callback handler that receives a message from a tax calculation Web Service—changing it to a callback handler that receives a message from a tax calculation business process (via the Process control you created).

9. From the Workshop menu, select **File→Save All**.

To Test the Request Quote Process and its Call to the Tax Calculation Process

You can run and test the business process, which now contains an asynchronous call to another business process (via the Process control) in the same way as you tested the business process you created in Part I. To do so, follow steps 1 through 7, as described in Step 5: Run Your Business Process.

When you start the operations in the **Test Form** page, the **Message Log** refreshes to display a summary of the calls to, and responses from, the tax calculation business process.



Entries in the Message Log correspond to the methods on your business process:

- The **quoteRequest** method that starts the business process.
- A call from your **RequestQuote** business process to the **taxCalcProcess** business process: **taxCalcProcess.requestTaxRate**. Note that in this case, the entire *Request for Quote* XML document (contained in the **requestXML** variable) is passed to the subprocess. This is different to the case in which your business process called the tax calculation Web service (Part I)—in that case, only the state field from the *Request for Quote* XML document was passed to the Web service.
- A response from the **taxCalcProcess** business process to your **RequestQuote** business process: **taxCalcProcess.returnTaxRate**. Note that instead of the tax rate being returned in a Web services SOAP envelope, as it was in the return from the Web service in the business process you created in Part I, the Process control returns the raw float value (0.08).
- The **Instance ID**—When the business process finishes, a message similar to the following is displayed in the Message Log:

  `Instance instanceID is Completed.`

  where `instanceID` represents the ID generated when the **quoteRequest** method in your business process was called.

Note About Additional Functionality in the Test Browser

The following additional links are available from the Test Form page in the Test Browser:

Graph

Click **Graph** to open the **Process Graph** tab in the **Test Browser**. The interactive instance graph is a fully expanded version of the view provided in the Design View. The interactive process graph requires Adobe SVG Viewer Version 3.0. The first time you open the **Process Graph** tab, you will be asked if you would like to download the Viewer from the Adobe Web site. You can also download the viewer directly from the Adobe Web site at `http://www.adobe.com/svg/viewer/install/main.html`.

Note: This viewer is not available for some configurations that WebLogic Platform 8.1 supports. For details, please see "Requirements for the Interactive Graph" in Process Instance Monitoring at `http://edocs.bea.com/wli/docs81/manage/processmonitoring.html` in *Managing WebLogic Integration Solutions*. For detailed information about the operating systems and browsers WebLogic Platform supports, see BEA WebLogic Platform Supported Configurations at `http://e-docs.bea.com/platform/suppconfigs/index.html`.

As previously mentioned, the Process Graph is a graphical representation of your business process and its execution path. The Process Graph highlights the node currently being executed. When the instance of the business process completes, the path of execution followed in your test is highlighted. In this scenario, the **Yes** path is executed—the **No** path is gray on the Process Graph to indicate that this path was not taken during the execution of this instance of the business process.

Note: Press **Alt** and drag the mouse pointer over the Process Graph to move and position it on the Test Browser page. To zoom in, press **Ctrl+click**; to zoom out, press **Ctrl+Shift+click**. Alternately, right-click on the Process Graph and select the **Zoom In** or **Zoom Out** command from the drop-down menu.

You will review your running business process in the **Process Graph** in a later step in the tutorial.

Note: Use the back and forward arrows  to navigate between the pages in the WebLogic Workshop Test Browser.

Monitor

Click **Monitor** to open the WebLogic Integration Administration Console in a Web Browser. Login using username = `weblogic` and password = `weblogic`. The WebLogic Integration Administration Console opens to the **Process Instance Details** page. The WebLogic Integration Administration Console allows you to administer and manage your WebLogic Integration applications. For example, if you click **View Statistics** on the Process Instances navigation pane, you access a **Process Instance Statistics** page. This page displays a summary of business process instances grouped by the process type. To

view the instances of a process type that ran or are running on your server, click the process name. Processes instances are identified by their *instanceID*. Note that the instanceID displayed for your **RequestQuote** business process matches the instanceID displayed on the Message Log pane (see the preceding figures in this topic).

Monitor all RequestQuote.jpd processes

Click **Monitor all RequestQuote.jpd processes** at the top of the **Test Form** to open the WebLogic Integration Administration Console. (Login using username = `weblogic` and password = `weblogic`.) When you use this link to open the Administration Console, it opens on the **Process Instance Summary** page, which displays a summary of all the instances of business processes that ran or are running.

To stop the **Test Browser**, you can simply close it, or return to WebLogic Workshop and click  on the tool bar.

This step completes Part II of the tutorial.

Related Topics

Process Control

Managing WebLogic Integration Solutions at
`http://edocs.bea.com/wli/docs81/manage/index.html`

Part III Adding Looping Logic, Parallel Paths . . .

Part III is comprised of Steps 7 through 12. You add more complex business logic to the business process you created in Parts I and Part II. You learn how to create looping logic, design parallel processing nodes, transform the price and availability data from untyped XML data to typed XML, use a File control to write your quote to a file system, and use a Client Response node to return the quote to the client that invoked the business process. The final step in Part III is to run and test the business process you built.

The steps in Part III include:

Chapter 1, "Step 7: Looping Through Items in a List"
: Describes how to create the logic to extract a list of items from the Request for Quote document received from a client and performs a set of activities repeatedly, once for each item in the list.

Chapter 2, "Step 8: Design Parallel Paths of Execution"
: Describes how to design your business process to execute tasks in parallel. This step also includes instructions about how to design your business process to interact with resources via controls and transform the data exchanged with those controls, as required.

Chapter 3, "Step 9: Create Quote Document"
: Describes how to transform the price and availability data from untyped XML data to typed XML, and then combine the price and availability data, which is returned to the Request Quote business process by a number of external services, to produce a single Quote document.

Chapter 4, "Step 10: Write Quote to File System"
: Describes how to write business process data to a log using a File control.

Chapter 5, “Step 11: Send Quote From Business Process to Client”
: Describes how to send the final *quote* message from the business process to a client.

Chapter 6, “Step 12: Run the Request Quote Business Process”
: Describes how to compile and test the business process you created by following the steps in Part III.

CHAPTER 1

Step 7: Looping Through Items in a List

In this step, you create the logic to extract a list of items from the Request for Quote document received from a client, and begin the work of designing the business process to determine the price and availability of the items requested by the client.

A **For Each** node represents a point in a business process where a set of activities is performed repeatedly, once for each item in a list. A **For Each** node includes an iterator node (on which a list of items is specified) and a loop (in which the activities to be performed for each item in the list are defined). An *iteration* variable holds the current element being processed in the **For Each** loop, for the life of the loop.

This section includes the following topics:

Understanding XML Schemas and For Each Nodes

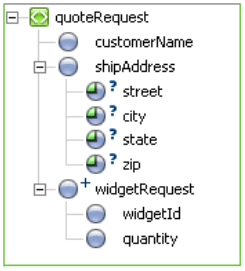
The business process you build in this tutorial is designed to start when it receives a Request for Quote XML document from a client. The Request for Quote document must contain valid XML, that is, XML valid against an XML Schema, specifically `QuoteRequest.xsd`. The `QuoteRequest.xsd` Schema is located in your application at the following location: *`myapplications`*`\Tutorial_Process_Application\Tutorial_Process_ApplicationWeb\Schemas`.

In the preceding line, *`myapplications`* represents the location of your tutorial application.

Note: To make the Schemas in your project available in your business process, you must place them in a **Schemas** project. A Schemas project is one of the types of projects that Workshop applications can contain. The Schemas projects added to your WebLogic Workshop applications are represented in the WebLogic Workshop file hierarchy as child folders of your application folder. To learn about creating and populating Schemas projects in your WebLogic Integration applications, see Related Topics.

XML Schemas in your application's **Schemas** folder are compiled to generate XML Beans. In this way, WebLogic Workshop generates a set of interfaces that represent different aspects of your XML Schemas. XML Bean types correspond to types in the XML Schema itself. XML Beans provides Java counterparts for all built-in Schema types, and generates Java counterparts for any derived types in your Schema.

In Step 2: Specify How the Process is Started, you created a variable (`requestXML`) to which the Request for Quote document (which your business process receives from a client) is assigned. When you work with such variables in the **Design View**, you work with a graphical representation of the XML Schema that is associated with the variable. The following figure is a graphical representation of the `quoteRequest` element in the `QuoteRequest.xsd` schema, against which the Request for Quote document from clients is valid:



Note the following characteristics of the `QuoteRequest.xsd` Schema:

- The elements and attributes of the XML schema are represented as nodes. Note that `quoteRequest` is a root element.
- The `quoteRequest` element specifies the following child elements: `customerName`, `shipAddress`, and `widgetRequest`.
- The `shipAddress` element specifies the following attributes: `street`, `city`, `state`, and `zip`.
- The `widgetRequest` element is a repeating element (represented graphically by). In other words, there can be one or more occurrences of the `widgetRequest` element

in an associated XML document. The `widgetRequest` element, in turn, contains two elements: `widgetId` and `quantity`.

The business process in this scenario dictates that each pair of `widgetId` and `quantity` elements received in the Request for Quote documents from clients is processed. This processing begins with a **For Each** node—each iteration through the **For Each** loop processes one of a set of `widgetRequest` items.

In this section, you design the **For Each** node to first extract a list of items (the `widgetRequest` items) from the `requestXML` variable, and then to perform an activity (or set of activities) repeatedly, once for each item in the list.

Related Topics

How Do I: Create a Schemas Project Folder?

How Do I: Import Files into a Schemas Project Folder?

Design a For Each Loop in Your Business Process

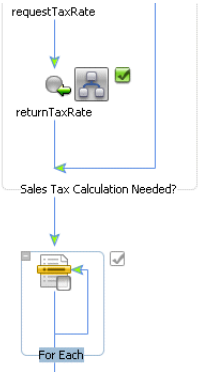
Complete the following steps to create the logic that causes your business process to iterate over the sequence of nodes in the Request for Quote XML document:

- To Add a For Each Node to Your Business Process
- To Select a Repeating XML Element Over Which to Iterate
- To Design the Activities in Your For Each Loop

To Add a For Each Node to Your Business Process

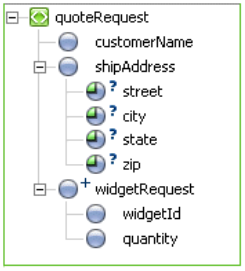
1. Click **For Each** in the **Palette**.
2. In **Design View**, drag and drop the **For Each** node onto the RequestQuote business process placing it immediately after the **Sales Tax Calculation Needed?** (**Decision**) node.
3. Press **Enter** to name the node **For Each**.

   The **Design View** is updated to contain the **For Each** node:



To Select a Repeating XML Element Over Which to Iterate

1. In the **Design View**, double-click the **For Each** node to invoke its node builder.
2. In the node builder, click **Select Variable**. A drop-down list of variables (of typed XML) in your project is displayed.
3. Select **requestXML (QuoteRequestDocument)**. The **requestXML** variable contains the repeating XML element over which you want to design the iteration logic. A representation of the XML in the `requestXML` variable is displayed in the **Select Node** pane. The repeating element is identified by .



4. In the **Select Node** pane, if not already selected, click **widgetRequest**.

   The **Repeating Element** and **Iteration Variable** fields are populated with the following data:

   – **Repeating element**—Contains the following XPath expression, which when applied against the incoming XML document, returns the set of repeating XML elements:

   ```
   $requestXML/ns0:widgetRequest
   ```

– **Iteration Variable**—Contains the name of an iteration variable: `iter_forEach1`. At run time, the current element being processed in the **For Each** loop is assigned to the iteration variable.

5. Click the **X** in the top right-hand corner to close the node builder.

   The iteration variable, `iter_forEach1`, is created and added to the list of variables in the **Data Palette**. This variable is of XML type **WidgetRequestDocument**.

   To learn how the iteration variable is used in the **For Each** loop, see To Design the Create PriceList Node.

   This step completes the design of the iteration logic for your **For Each** node. Note that in the **Design View**, the node is updated graphically to reflect the work you did to define the condition:

   indicates that the design of the task on the node is complete, as compared to , which indicates that the design is not complete. indicates that an XML query is defined on the node.

To Design the Activities in Your For Each Loop

After you create the iteration logic in your **For Each** node, you must define the activity or set of activities performed during each iteration over the items in the list you created.

You add activities to the **For Each** loop by creating nodes within it that support your business logic. In the next step in this tutorial, you create a **Parallel** node, and design it so that the business process executes two sets of activities in parallel: the request for price, and the determination of availability for the items requested by the client. To learn how to design a Parallel node, see Step 8: Design Parallel Paths of Execution.

Related Topics

Business Process Variables and Data Types

Looping Through Items in a List

Grouping Nodes in Your Business Process

Step 8: Design Parallel Paths of Execution

In the preceding step, you created a **For Each** loop to iterate over a set of repeating elements in a Request for Quote document. In this step, you design the activities within the **For Each** loop. That is, you design the activities that are performed for each iteration your business process makes through the loop.

When your business process interacts with multiple different systems, as is the case during the price and availability processing in this scenario, you can increase throughput in the business process by executing tasks in parallel. You add **Parallel** nodes to your business process when you want to create two or more such *parallel* branches of execution.

In our example scenario, the business process must determine both price and availability information so that a quote can be prepared and returned to the client. This business process can benefit from parallelism because it communicates with two external systems: one for the price calculation; one for the availability calculation. The business process expects a response from each of the external systems.

The external systems can be any resource (other business processes, Web services, EJBs, databases, file systems, and so on) that returns the information your business process requires. Your business process interacts with the resources via controls. The tutorial uses two Web services: one returns the price for each `widgetID` specified in the client's request document; a second service returns availability information, based on the `widgetID` and the `quantity` specified in the request document. The controls with which your `RequestQuote` business process interacts are provided for you in your project folder: `\Tutorial_Process_ApplicationWeb\requestquote\services`. The controls are `PriceProcessorControl.jcx` and `AvailProcessorControl.jcx`.

Related Topics

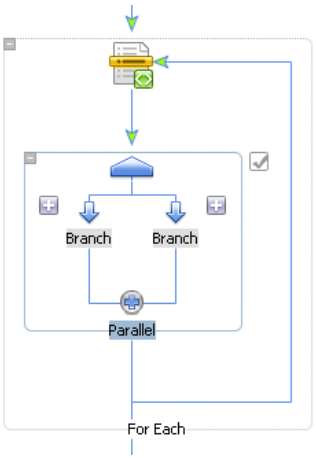
Understanding Parallel Execution in Your Business Process

Create a Parallel Node

To Add A Parallel Node to Your Business Process

1. Make sure that your business process (**RequestQuote.jpd**) is displayed in Design View.
2. In **Design View**, select **Parallel** in the **Palette**, then drag and drop the **Parallel** node onto the business process, placing it inside the **For Each** loop.
3. Press **Enter** to name the node **Parallel**.

   The **Design View** is updated to contain a representation of the **Parallel** node as shown in the following figure:



4. Change the names of the branches contained within the **Parallel** node to identify the activities that your business process executes in parallel:
   - Double-click the label on the left **Branch** and enter **Get Price**, then press **Enter**.
   - Double-click the label on the right **Branch** and enter **Get Availability**, then press **Enter**.

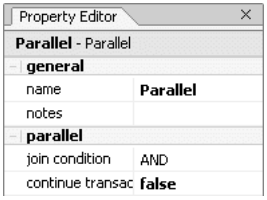
Note About Join Conditions

By default, **Parallel** nodes specify an **AND** *join condition*, represented by on the Parallel branch lines. In this case, the activities on all branches must complete before the flow of execution proceeds to the node following the parallel node.

In the case of your RequestQuote business process, because you want both branches of the **Parallel** node to complete, do not change the default **AND** join condition.

If an **OR** join condition is specified, when the activities on one branch complete the execution of activities on all other branches terminates, and the flow of execution proceeds to the node following the **Parallel** node. (The **OR** join condition is represented as in the **Design View**.)

In **Design View**, you can view and edit the **join condition** property in the **Property Editor**. Click or (at the top of the **Parallel** node) to display the properties of the **Parallel** node in the **Property Editor**. The **Property Editor** for your **Parallel** node should resemble that shown in the following figure:



Create Logic to Assemble Price and Availability Data

In this section, you learn how to:

- Invoke the price and availability services (via controls) from the parallel branches you created.
- Design callbacks on your branches to wait for and handle the responses from the controls.
- Construct an XML document, to which the response data from controls is appended for each iteration through the **For Each** loop. (Review your business process in **Design View**: your Parallel node is within the **For Each** loop, meaning that the flow of execution is through the **Parallel** node for each iteration through the loop.)

To design the **Parallel** node to interact with the price and availability Web services, complete the following tasks:

- To Create Instances of the PriceProcessor and AvailProcessor Controls in Your Project

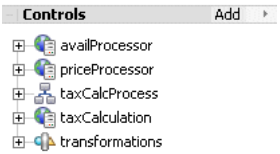
To Create Instances of the PriceProcessor and AvailProcessor Controls in Your Project

The Web service controls (`PriceProcessorControl.jcx` and `AvailProcessorControl.jcx`) are provided for you in your application's project (specifically in *`myapplications`*`\Tutorial_Process_Application\Tutorial_Process_ApplicationWeb\requestquote\services` folder, where *`myapplications`* represents the location at which you created your tutorial application). The goal of this section is to describe how to create the appropriate controls in your application, and then design the communication between your business process and these controls.

1. Click **Add** on the **Data Palette Controls** tab to display a list of controls that represent the resources with which your business process can interact.
2. Choose **Web Service**. The **Insert Control** dialog box is displayed.
3. In **Step 1**, enter **priceProcessor** as the variable name for this control.
4. In **Step 2**, ensure that the following option is selected: **Use a Web Service control already defined by a JCX file**.
5. Click **Browse** beside the **JCX file** field, browse to the `\Tutorial_Process_ApplicationWeb\requestquote\services` folder, choose **PriceProcessorControl.jcx**, then click **Select**. The file browser closes.
6. Click **Create**.

   The **Insert Control** dialog box closes and an instance of the Web Service control is created in your project and displayed in the **Data Palette**.
7. Repeat steps 1 through 6, but enter **availProcessor** as the variable name for the control, and choose the **AvailProcessorControl.jcx** control, which is already defined in the following folder, as the control file on which to base your instance: `\Tutorial_Process_ApplicationWeb\requestquote\services` folder.

   The **availProcessor** Web Service control instance is added to the **Data Palette**:



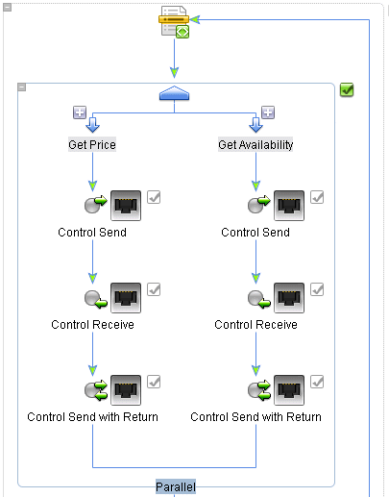
To Add Control Nodes to Your Business Process

You learned in Parts I and II that you can create Control nodes in your business process by dragging the methods from the appropriate control on the **Data Palette** onto the business process in the **Design View**. You can also create Control nodes by selecting **Control Send**, **Control Receive**, or **Control Send with Return** from the **Palette** and dragging them onto the business process. You subsequently bind the appropriate methods to the control node you created. In this section you will use the latter approach.

Add the following nodes from the **Palette** to each branch on your **Parallel** node:

- **Control Send**
- **Control Receive**
- **Control Send with Return**

In **Design View**, select each of the listed nodes, then drag and drop the node onto the business process, placing the nodes on the **Parallel** branches until you create a **Parallel** group as shown in the following figure:



In this way, each branch is designed for the following flow of execution:

1. Call a resource (via a control) from the **Control Send** node.
2. Wait for a response from the control at the **Control Receive** node.
3. Make a synchronous call to a control at the **Control Send with Return** node. At this node you call a Transformation that constructs an XML document. The response data from controls is appended to this XML document for each iteration through the **For Each** loop.

To Design the Activities on the Get Price Branch

1. Rename the nodes on the **Get Price** Branch (in the order in which they are executed) as follows: **Request Price**, **Receive Price**, **Create PriceList**.
2. Complete the following tasks:

- To Design the Request Price Node
- To Design the Receive Price Node
- To Design the Create PriceList Node

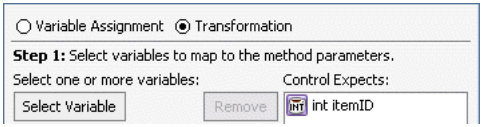
To Design the Request Price Node

1. Double-click the **Request Price** node to open its node builder. The node builder opens on the **General Settings** tab.
2. Click the arrow beside the **Control** field to display a drop down list of the instances of the controls in your project and select **priceProcessor**.

   The **Method** panel is populated with a list of the *asynchronous send methods* you can invoke on the **priceProcessor** control.
3. Select the following method: `void getPrice(int itemID)`
4. Click **Send Data** to open the second tab in the node builder.

   By default, the **Send Data** tab opens on the **Variable Assignment** pane. (The **Control Expects** field is populated with the data type expected by the `getPrice`() method exposed by the **priceProcessor** Web service: `int itemID`.)

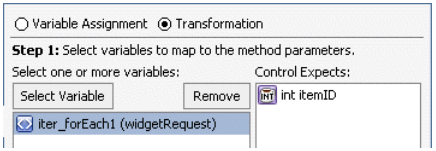
   Note: The **priceProcessor** service takes the ID of the item requested as input, and returns the price of the widget.
5. Select **Transformation** to switch modes in the **Send Data** tab.



Note: In this case, you must switch modes because the data type required as input to the **priceProcessor** control is `int`, and the **iter_forEach1** variable, which holds the value of `widgetId` in the **For Each** loop, is of type XML (`WidgetRequestDocument` valid against an XML Schema).

The iteration variable was created for you when you specified the repeating element over which the **For Each** loop iterates. At run time, it holds the current `widgetRequest` element—that is, the one currently being processed in the **For Each** loop. (See Design a For Each Loop in Your Business Process.)

6. In **Step 1**, click **Select Variable** to display the variables in your project, then choose **iter_forEach1 (widgetRequest)**.



7. In **Step 2**, click **Create Transformation**.

   The Transformation tool opens and displays a representation of the **iter_forEach1 (widgetRequest)** variable in the **Source** pane, and an **int** in the **Target** pane.

8. Click **widgetID** in the **Source** pane and drag your mouse over to **int** in the **Target** pane. A line is drawn between the **widgetID** and **int** elements in the map pane. It represents the transformation between the two data types.

As you draw the line in the map pane, WebLogic Workshop will display the following warning:

```
The datatype of the source node: [widgetId] and target node: [int] do not
match, a type conversion will be applied.
```

Note: Creating this transformation creates a new method under the `RequestQuoteTransformation.dtf` already created in your project and prebuilt for you in the tutorial application. It is available in the

`Tutorial_Process_ApplicationWeb\requestquote` folder. A new XQ file, which contains the query for this transformation method, is also created. See Note About Transformations.

9. In the **Application** pane, double-click **RequestQuote.jpd** to return to your process.
10. To close the **Request Price** node builder, click the **X** in the top right-hand corner of the node builder.

    This step completes the design of the **Request Price** node.

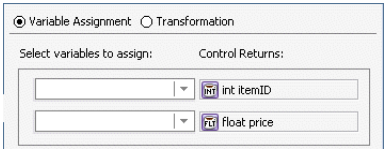
To Design the Receive Price Node

1. Double-click the **Receive Price** node to open its node builder. The node builder opens on the **General Settings** tab.
2. Click the arrow beside the **Control** field to display a list of the instances of controls in your project and select **priceProcessor**.

    The **Method** panel is populated with a list of the *asynchronous receive methods* on the **priceProcessor** control.
3. Select the following method from the list:

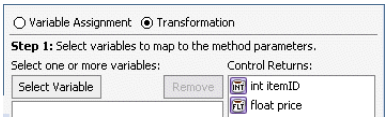
    ```
    void returnPrice(int itemID,float price)
    ```
4. Click **Receive Data** to open the second tab in the node builder.

    The **Control Returns** field is populated with the data types returned by the `returnPrice(int itemID, float price)` method on the **priceProcessor** Web service.



    The **PriceProcessor** service takes the itemID (an `int`) as input and returns an `int` and a `float`—containing values for the itemID and the price, respectively.

    In this case, you must switch from the **Variable Assignment** mode displayed in the preceding figure to the **Transformation** mode because you want to assign the data returned by the **priceProcessor** service to a variable of type XML. To do so, your business process must transform the Java data types returned from the priceProcessor service to typed XML.
5. Click **Transformation**. The **Receive Data** tab is displayed as shown in the following figure:

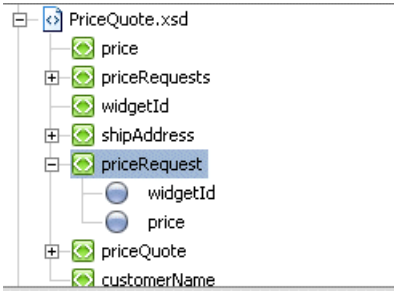


6. In **Step 1**, click **Select Variable**, then **Create new variable...**. The **Create Variable** dialog box is displayed.

7. In the **Variable Name** field, enter **price**.

8. In the **Select variable Type** pane, ensure that **XML** is selected.

9. Click the + beside `priceQuote.xsd` in **XML Types** to expand the list, then select **priceRequest** from the list. The **Variable Type** field is populated with `org.example.price.PriceRequestDocument`.

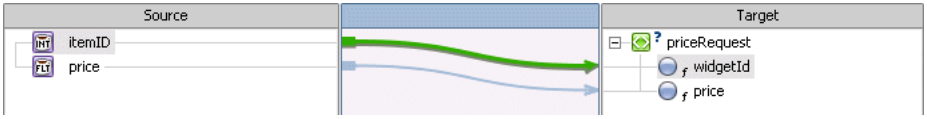


10. Click **OK**. The **Create Variable** dialog box closes and the new variable is displayed in the **Receive Data** tab. It is also listed as an **XML Type** variable in the **Data Palette**.

11. In **Step 2** on the **Receive Data** tab, click **Create Transformation**. The Transformation tool opens and displays a representation of the **int (itemID)** and **float (price)** in the **Source** pane, and the **price** variable in the **Target** pane.

12. Map the elements in the **Source** pane to the elements in the **Target** pane, as shown in the following figure:

    itemID to **widgetId**
    price to **price**



Note: Creating this transformation creates a new method under the `RequestQuoteTransformation.dtf` already created in your project and prebuilt in the tutorial application. It is available in the

`Tutorial_Process_Application\Webrequestquote` folder. A new XQ file, which contains the query for this transformation method, is also created.

13. To return to your business process, double-click **RequestQuote.jpd** in the **Application** pane.
14. To close the **Receive Price** node builder, click the **X** in the top right-hand corner of the node builder.

    This step completes the design of the **Receive Price** node.

To Design the Create PriceList Node

In this step, you use a Transformation control (**PriceAvailTransformations**) provided in your project to append the price data returned from the **priceProcessor** control (on each iteration through the **For Each** loop) to a single variable.

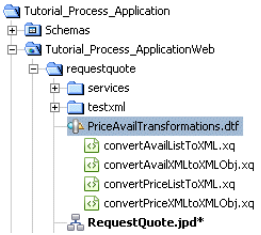
Previously, when you designed nodes in the business process, you created transformation methods on a Transformation as necessary to map the data your business process sent to or received from clients and controls. In this case, you also use a Transformation, but in a different way. In the case of the **Create PriceList** node, the data is not sent to a client or control. Instead, the Transformation takes, as input from your business process, *typed* XML data and returns *untyped* XML (`XmlObject`). The business process must append the data returned on every iteration of the **For Each** loop to a single variable, thus creating a repeating sequence of XML data. A variable that can hold this type of repeating sequence of XML data in a **For Each** loops is of type **XmlObjectList**. Both typed and **XmlObject** variables can be appended to variables of type **XmlObjectList**. (See Note About Using the XmlObjectList Data Type.)

Note: This transformation is prebuilt for you in the tutorial application. It is available in the `Tutorial_Process_Application\Webrequestquote` folder.

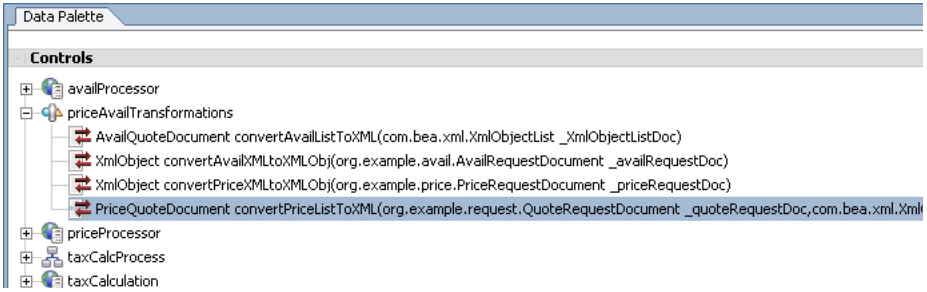
A description of how to create the `PriceAvailTransform.dtf` file is beyond the scope of this tutorial. To learn more about Transformations, see Note About Transformations.

To Create an Instance of the PriceAvailTransformations Control in Your Project

1. If the **Data Palette** pane is not visible in WebLogic Workshop, choose **View→Windows→Data Palette** from the menu bar.
2. On the **Applications** pane, click the **priceAvailTransformations.dtf** file.



3. Drag the **PriceAvailTransformations.dtf** file from the **Applications** pane onto the **Controls** pane of the **Data Palette**. The instance of your control (**priceAvailTransformations**) is created and displayed in the **Data Palette** as shown in the following figure:



To Design the Interaction of the Create PriceList Node With the Transformation

1. In the **Data Palette**, expand the **priceAvailTransformations** instance, as shown in the preceding figure, then click the following method:

   ```
   XmlObject
   convertPriceXMLtoXMLObj(org.example.price.PriceRequestDocument
   _priceRequestDoc)
   ```

2. Drag the method from the **Data Palette** and drop it on the **Create PriceList** node in the **Design View**. The **Create Price List** node changes to reflect the binding of the method, as shown in the following figure:

3. Double-click the **Create PriceList** node to open its node builder. The node builder opens on the **General Settings** tab.

4. Confirm that the method you dragged onto the node is selected:

```
XmlObject
convertPriceXMLtoXMLObj(org.example.price.PriceRequestDocument
_priceRequestDoc)
```

5. Click **Send Data** to open the second tab in the node builder.

   The **Control Expects** field is populated with the data type and name of the parameter expected by the `convertPriceXMLtoXMLObj`() method on the **priceAvailTransformations** control: `PriceRequestDocument _priceRequestDoc`.

6. Click the arrow on the field under **Select variable to assign** to display a list of variables, then select **price (PriceRequestDocument)**.

   In this case, note that the data type of your **price** variable (**PriceRequestDocument**) matches that of the data expected by the **priceAvailTransformations**.

7. Click **Receive Data** to open the third tab in the node builder.

   The **Control Returns** field is populated with the data type of the parameter returned by the `convertPriceXMLtoXMLObj`() method on the **priceAvailTransformations** control: `XmlObject`.

   An `XmlObject` is a Java data type that specifies data in untyped XML format. In other words, this data type represents XML data that is *not* valid against an XML Schema.

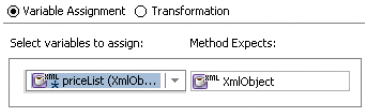
8. Click the arrow on the field under **Select variable to assign** and select **Create new variable ...**. The **Create Variable** dialog box opens.

9. In the **Variable Name** field, enter **priceList**.

10. If necessary, in the **Select Variable Type** pane, select **XML** to display a representation of the XML data types in your application. (**XmlObject** is selected by default. You must change this selection in the following step).

11. Select **XmlObjectList** and click **OK**.

    The **priceList** variable is created and assigned to receive the **XmlObject** data returned by the priceProcessor service.



12. To close the **Create PriceList** node builder, click the **X** in the top right-hand corner.

    This step completes the design of the **Get Price** branch on the **Parallel** node. At run time, by executing this branch, your business process appends the XmlObject, which contains

the data returned by the **priceProcessor** control (during the current iteration through the **For Each** loop), to the **priceList** variable.

13. From the Workshop menu, select **File—Save All**.

To Design the Activities on the Get Availability Branch

1. Rename the nodes on the **Get Availability** Branch (in the order in which they are executed) as follows: **Request Availability**, **Receive Availability**, **Create AvailList**.
2. Complete the following tasks:

- To Design the Request Availability Node
- To Design the Receive Availability Node
- To Design the Create AvailList Node

To Design the Request Availability Node

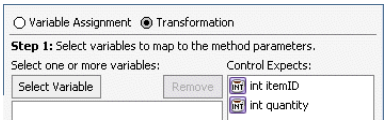
1. Double-click the **Request Availability** node. The node builder opens on the **General Settings** tab.
2. Click the arrow beside the **Control** field to display a list of the instances of controls available in your project and select **availProcessor**.

   The **Method** panel is populated with a list of the *asynchronous send methods* you can invoke on the **availProcessor** control.
3. Select the following method from the list:

   ```
   void getAvail(int itemID, int quantity)
   ```
4. Click **Send Data** to open the second tab in the node builder.

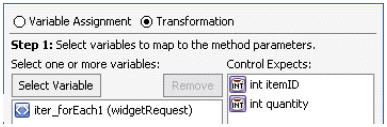
   By default, the **Send Data** tab opens on the **Variable Assignment** pane. The **Control Expects** field is populated with the data types and names of the parameters expected by the `getAvail()` method exposed by the **availProcessor** Web service: `int itemID` and `int quantity`.

   Note: The **availProcessor** service takes, as input, the itemID (int) and the quantity (int) requested by the client. It returns the itemID (int), the quantity available (int), a boolean to indicate whether the widgets are in stock, and a ship date (String).
5. Select **Transformation** to switch modes in the **Send Data** tab.



Note: In this case, you must switch modes because you must transform the data you input to **availProcessor**. The **availProcessor** control requires its input as `int` data types, and the **iter_forEach1** variable, which holds the value of `widgetId` and `quantity` in the **For Each** loop, is of type XML (`WidgetRequestDocument` valid against an XML Schema).

6. In **Step 1**, click **Select Variable** to display the variables in your project, then choose **iter_forEach1 (WidgetRequest)**.



7. In **Step 2**, click **Create Transformation**.

   The Transformation tool opens and displays a representation of the **iter_forEach1** variable in the **Source** pane, and the integer arguments to the **availProcessor** transformation method in the **Target** pane.

8. Map the elements in the **Source** pane to the elements in the **Target** pane, as shown in the following figure:

   widgetID to **itemID**
   quantity to **quantity**

   A line is drawn between the elements in the map pane. It represents the transformation between the data types.

   Note: Creating this transformation creates a new method under the `RequestQuoteTransformation.dtf` already created in your project and prebuilt in the tutorial application. It is available in the `Tutorial_Process_ApplicationWeb/requestquote` folder. A new XQ file, which contains the query for this transformation method, is also created.

9. Double-click **RequestQuote.jpd** in the **Application** pane to return to your process.

10. To close the **Request Price** node builder, click the **X** in the top right-hand corner of the node builder.

    This step completes the design of the **Request Availability** node.

To Design the Receive Availability Node

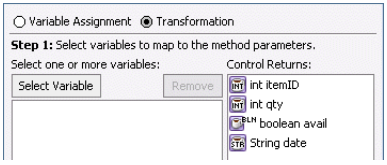
1. Double-click the **Receive Availability** node. The node builder opens on the **General Settings** tab.
2. Click the arrow beside the **Control** field to display a list of the instances of controls available in your project and select **availProcessor**.

   The **Method** panel is populated with a list of the *asynchronous receive methods* on the **availProcessor** control.
3. Select the following method from the list:

   ```
   void avail(int itemID, int qty, boolean avail, String date)
   ```
4. Click **Receive Data** to open the second tab in the node builder.

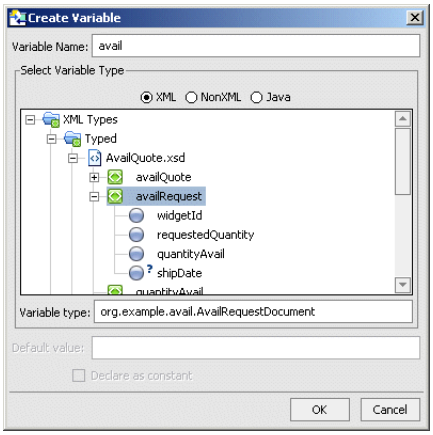
   The **Control Returns** fields are populated with the data types and names of the parameters returned by the `avail(int itemID, int qty, boolean avail, String date)` method on the **availProcessor** Web service.

   Note: In this case, you must switch from the **Variable Assignment** mode to the **Transformation** mode on the **Receive Data** tab because you want to assign the data returned by the **availProcessor** service to a variable of type XML. To do so, your process must transform the Java data types returned to typed-XML.
5. Click **Transformation**. The **Receive Data** tab is displayed as shown in the following figure:



6. Click **Select Variable**, then **Create new variable...**. The **Create Variable** dialog box is displayed.
7. In the **Variable Name** field, enter **avail**.
8. In the **Select variable Type** pane, ensure that **XML** is selected.

9. In **XML Types**, click the + beside `availQuote.xsd` to expand the list, then select **availRequest** from the list. The **Variable Type** field is populated with **org.example.avail.AvailRequestDocument**.

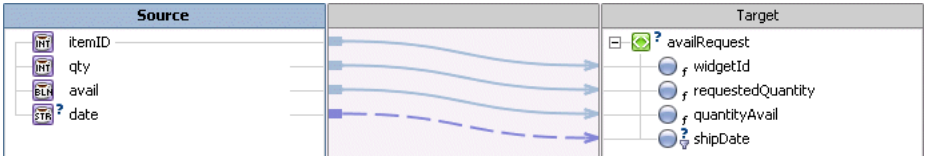


10. Click **OK**. The **Create Variable** dialog box is closed and your new variable is created and is listed as an **XML Type** variable in the **Data Palette**.

11. In **Step 2**, click **Create Transformation** to open the Transformation tool, which displays a representation of the data types returned by the **availProcessor** control in the **Source** pane, and the **avail** variable in the **Target** pane.

12. Map the **Source** values to the **Target** elements as shown in the following:

    itemID to **widgetId**
    qty to **requestedQuantity**
    avail to **quantityAvail**
    date to **shipDate**)



Note: Creating this transformation creates a new method under the `RequestQuoteTransformation.dtf` already created in your project and prebuilt in the tutorial application. It is available in the `requestquote\Tutorial_Process_ApplicationWeb` folder. A new XQ file, which contains the query for this transformation method, is also created.

13. Double-click **RequestQuote.jpd** in the **Application** pane to return to your business process.
14. To close the **Receive Availability** node builder, click the **X** in the top right-hand corner of the node builder.

    This step completes the design of the **Receive Availability** node.

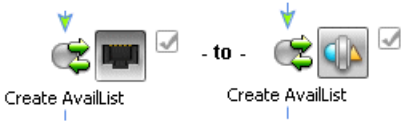
To Design the Create AvailList Node

In the same way as you designed the business process to append the price data to a single variable when you designed the **Get Price** branch of the **Parallel** node, in this step, you call a method on the **priceAvailTransformations** control to append the availability data returned to a single variable, of type **XmlObjectList**. (See Note About Using the XmlObjectList Data Type.)

1. If necessary, expand the **priceAvailTransformations** control instance in the **Data Palette**, then click the following method:

   ```
   XmlObject
   convertAvailXMLtoXMLObj(org.example.avail.AvailRequestDocument
   _availRequestDoc)
   ```

2. Drag the method from the **Data Palette** and drop it on the **Create AvailList** node in the **Design View**. The **Create AvailList** node changes to reflect the binding of the method, as shown in the following figure:

3. Double-click the **Create AvailList** node. The node builder opens on the **General Settings** tab.
4. Confirm that the **priceAvailTransformations** control is selected in the **Control** field, and that the method you dragged onto the node is selected in the **Method** field:

   ```
   XmlObject convertAvailXMLtoXMLObj(org.example.AvailRequestDocument
   _availRequestDoc)
   ```

5. Click **Send Data** to open the second tab in the node builder.

   The **Control Expects** field is populated with `AvailRequestDocument`, which is the data type expected by the `convertAvailXMLtoXMLObj(org.example.avail.AvailRequestDocument _availRequestDoc)` method on the **priceAvailTransformations** control.

6. Click the arrow on the field under **Select variable to assign** to display a list of variables. Select **avail (AvailRequest)**.

   In this case, note that the data type of your **avail** variable (**AvailRequest**) matches that of the data expected by the **priceAvailTransformations** control.

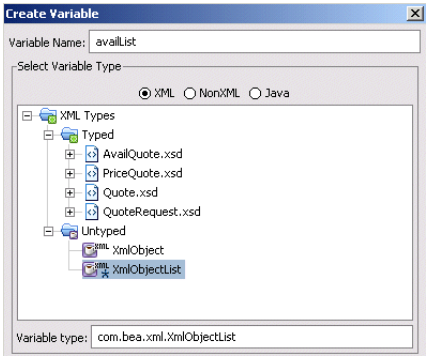
7. Click **Receive Data** to open the third tab in the node builder.

   The **Control Returns** field is populated with `XmlObject`, which is the data type returned by the `convertAvailXMLtoXMLObj`() method on the **priceAvailTransformations** control.

   An `XmlObject` is a Java data type that specifies data in untyped XML format. In other words, this data type represents XML data that is not valid against an XML Schema.

8. Click the arrow on the field under **Select variable to assign** and select **Create new variable ...**. The **Create Variable** dialog box is displayed.

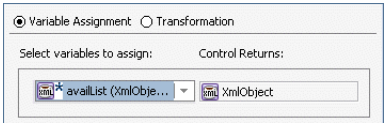
9. In the **Variable Name** field, enter **availList**.



10. In the **Select Variable Type** pane, if necessary, select **XML** to display a representation of the XML data types in your application.

11. Select **XmlObjectList**, then click **OK**.

    The **availList** variable is created and assigned to receive the **XmlObject** data returned by the availProcessor service.



12. To close the **Create AvailList** node builder, click the **X** in the top right-hand corner of the node builder.

This step completes the design of the **Get Availability** branch on the **Parallel** node. At run time, by executing this branch, your business process appends the XmlObject, which contains the data returned by the **availProcessor** control (during the current iteration through the **For Each** loop), to the **availList** variable.

13. From the Workshop menu, select **File—Save All**.

Note About Using the XmlObjectList Data Type

On each iteration through the **For Each** loop, the priceProcessor service returns price data, which is assigned to the `price` variable; and the availProcessor service returns availability data, which is assigned to the `avail` variable. Your business process must collect the price data returned on each iteration and create a list of price data; one item is assigned to the list for each iteration through the loop. Similarly, a list of availability data is created on the **Get Availability** branch of the **Parallel** node for each iteration through the loop.

An `XmlObjectList` is a Java data type that specifies a sequence of untyped XML format data. In other words, this data type represents a sequence of XML elements (a set of repeating elements). As the final step of each iteration through the **Get Price** branch in your **Parallel** node, your business process assigns the data from the `price` variable to the `priceList` variable (of type `XmlObjectList`). In this way, a single variable holds the price data for each of the widgets in the Request for Quote over which the **For Each** loop iterates. In the same way, a single variable holds the availability data for each widget.

To learn how the **XmlObjectList** variable is used, see To Design the Create PriceList Node and To Design the Create AvailList Node.

Related Topics

Note About Transformations

Creating Maps

Testing Maps in the Test View

Guide to Data Transformation

Understanding Parallel Execution in Your Business Process

Step 9: Create Quote Document

As a result of the work you did when you designed the **Parallel** node, at the point at which the business process exits the **For Each** node, the price quote data are assigned to the `priceList` variable, and the availability quote data are assigned to the `availList` variable. Both the `priceList` and the `availList` variables are of data type XmlObjectList (a untyped sequences of XML data).

In this step, you first transform the data in the `priceList` and `availList` variables from untyped XML data (`XmlObjectList`) to typed XML (that is, to XML that is valid against the XML Schemas provided in your project). Subsequently, you combine the XML-typed price and availability data to produce a single *quote* document, which comprises the response your business process sends to the client that invoked it.

Note About Transformations

WebLogic Integration allows you to create Transformations in the following ways:

- Using the node builders in your business process. You are already familiar with creating a Transformation control and transformation methods in this way. `RequestQuoteTransformation.dtf` was created for you the first time you created a transformation from a node builder, that is, when you needed to map the data types from the Request for Quote message to the input of the `taxCalculation` control. (To review, see "To Call the Tax Calculation Web Service From Your Business Process" in Step 4: Invoke a Web Service) You subsequently created several additional transformation methods on `RequestQuoteTransformation.dtf` (and associated XQ files) on Control nodes within the Parallel node you designed.

- By choosing **File→New→Transformation File** from the WebLogic Workshop menu. Transformation files you create in this way can be called from your business process via Control nodes.

  The following Transformation files were created using this method, and are provided for you in the tutorial application: `PriceAvailTransformations.dtf` and `TutorialJoin.dtf`. You used `PriceAvailTransformations.dtf` in the previous step (Step 8: Design Parallel Paths of Execution) and you will use it again in this step, as well as `TutorialJoin.dtf` in this step.

In this step, you design the logic in your business process that creates a single quote document from the price and availability data already calculated. This involves designing **Control** nodes that call the `PriceAvailTransformations.dtf` and `TutorialJoin.dtf` Transformation files.

Note: A description of how to create these Transformation files is outside the scope of this tutorial. However, to learn how to create `TutorialJoin.dtf`, see *Tutorial: Building Your First Data Transformation*.

In this step, in which you create a single quote document for a client, you must complete the following tasks:

- Convert Price List to XML Quote Document
- Convert Availability List to XML Quote Document
- Combine Price and Availability Quotes

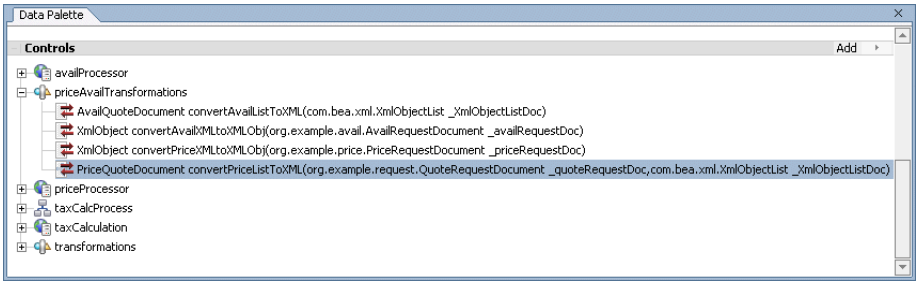
Convert Price List to XML Quote Document

Complete the following steps to design a node to transform the price list (created as a result of iteration through the **For Each** loop) to a variable whose data type is typed-XML. To do so, you use methods on the **priceAvailTransformations** control.

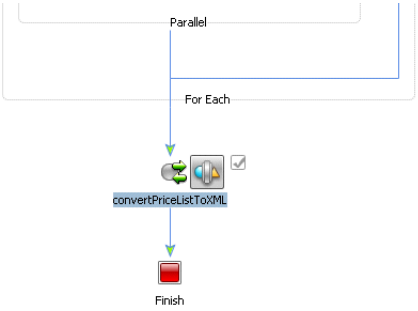
To Design the Interaction With the Transformation Control

1. With the **priceAvailTransformations** control instance expanded in the **Data Palette**, click the following method:

   ```
   PriceQuoteDocument convertPriceListToXML
   (QuoteRequestDocument _quoteRequestDoc, XmlObjectList _XmlObjectListDoc)
   ```



2. Drag the method from the **Data Palette** and drop it on your **RequestQuote** business process in the **Design View**, placing it immediately after, and outside, the **For Each** block.



3. Rename the node from **convertPriceListToXML** to **Convert PriceList To PriceQuote XML**.

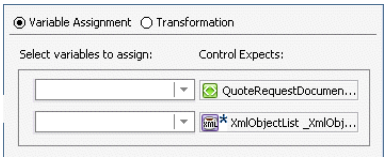
4. Double-click the **Convert PriceList To PriceQuote XML** node to open its node builder.

5. Verify that the **priceAvailTransformations** control and the following method are selected on the **General Settings** tab:

   ```
   PriceQuoteDocument convertPriceListToXML
   (org.example.request.QuoteRequestDocument _quoteRequestDoc,
   com.bae.xml.XmlObjectList _XmlObjectListDoc)
   ```

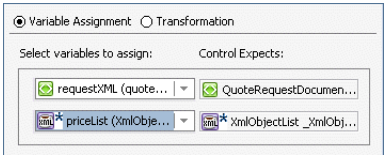
6. Click **Send Data** to open the second tab in the node builder.

The **Control Expects** field is populated with the data type expected by the `convertPriceListToXML`() method on the **priceAvailTransformations** control:



Note: The `convertPriceListToXML()` method on the **priceAvailTransformations** control is designed to achieve two goals: First, to transform the `XmlObjectList` price data to typed XML, and then to combine the customer name, the shipping address, and the price quote data (the price list) in a single variable. The `convertPriceListToXML()` method receives the price list in a parameter of type `XmlObjectList`, and the customer name and shipping address in a parameter of type `QuoteRequestDocument`. To learn more about the **priceAvailTransformations** control, see Note About the Transformation on This Node.

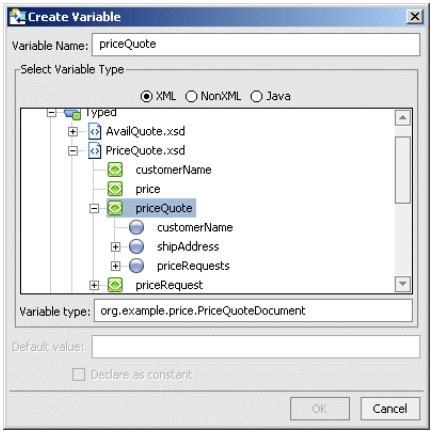
7. On the **Send Data** tab, under **Select variables to assign**, assign the variables that hold the data required by the **priceAvailTransformations** control as follows:
   - Click the arrow in the variable assignment field associated with **QuoteRequestDocument**, and select **requestXML (QuoteRequestDocument)**. (The **requestXML** variable holds the customer name and shipping address).
   - Click the arrow in the variable assignment field associated with **XmlObjectList**, and select **priceList (XmlObjectList)**.



8. Click **Receive Data** to open the third tab in the node builder.

   The **Control Returns** field is populated with `PriceQuoteDocument`, which is the data type returned by the `convertPriceListToXML`() method on the **priceAvailTransformations** control.

9. Click the arrow associated with the **Select variables to assign** field, and click **Create new variable ...**. The **Create Variable** dialog box is displayed.



10. In the **Variable Name** field, enter **priceQuote**.
11. In the **Select Variable Type** field, select **priceQuote** in the **XML Types** list. The **Variable Type** field is populated with `org.example.price.PriceQuoteDocument`.
12. Click **OK** to close the **Create Variable** dialog box.
13. To close the node builder, click the **X** in the top right-hand corner.

    This step completes the design of the **Convert PriceList to PriceQuote XML** node. At run time, the price quote data (in typed-XML format), and the customer name and shipping address are assigned to the **priceQuote** variable.

Note About the Transformation on This Node

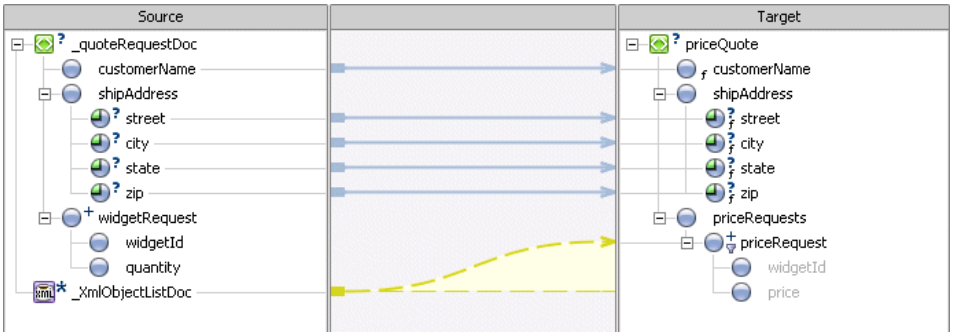
The `convertPriceListToXML`() method on the **priceAvailTransformations** control does the work of creating the price quote XML data in the preceding step.

In brief, the input to the Transformation method includes the original data sent by the client (in the **requestXML** variable), and the price data returned by the **priceProcessor** control (in the **priceList** variable) after the iterations in the **For Each** node complete.

The `convertPriceListToXML`() method extracts the customer name and shipping address from the **requestXML** variable, and a list of widget IDs and prices from the **priceList** variable, and maps the data to the new variable (**priceQuote**).

It is left as an exercise to the reader to view this and other transformation methods on the **priceAvailTransformations** control. For example, you can double-click **PriceAvailTransformations.dtf** in the **Application** pane to display the Transformation control in the **Design View**. Right-click on the **convertPriceListToXML** method, and select **Goto**

XQuery Document to open the Transformation tool. Use the **Design View** and **Source View** tabs in the transformation tool to see the data map that represents the transformation and the corresponding XQuery. Use the **Test View** tab to test the XQuery. For example the following figure shows the map for the `convertPriceListToXML()` method:



Related Topics

Guide to Data Transformation

Tutorial: Building Your First Data Transformation

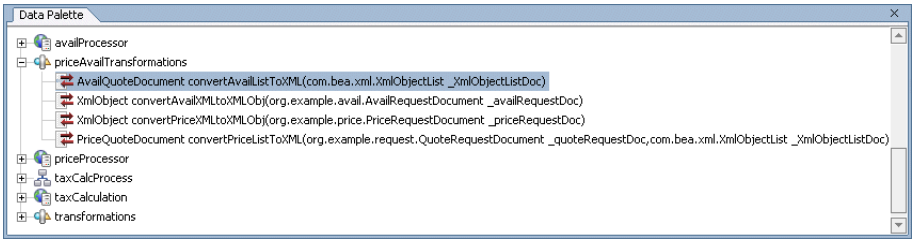
Convert Availability List to XML Quote Document

Complete the following steps to design a node to transform the availability list (created as a result of iteration through the **For Each** loop) to a variable whose data type is typed-XML. To do so, you use methods on the **priceAvailTransformations** control.

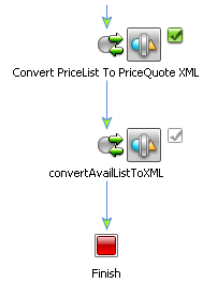
To Design the Interaction With the Transformation Control

1. Expand the **priceAvailTransformations** control instance in the **Data Palette**, then click the following method:

   ```
   AvailQuoteDocument convertAvailListToXML(com.bea.xml.XmlObjectList
   _XmlObjectListDoc)
   ```



2. Drag the method from the **Data Palette** and drop it on your **RequestQuote** business process in the **Design View**, placing it immediately after the **Convert PriceList to PriceQuote XML** node.



3. Rename the node from **convertAvailListToXML** to **Convert AvailList to AvailQuote XML**.
4. Double-click the **Convert AvailList to AvailQuote XML** node to open its node builder.
5. Verify that the **priceAvailTransformations** control and the following method are selected on the **General Settings** tab:

   ```
   AvailQuoteDocument convertAvailListToXML(com.bea.xml.XmlObjectList
   _XmlObjectListDoc)
   ```

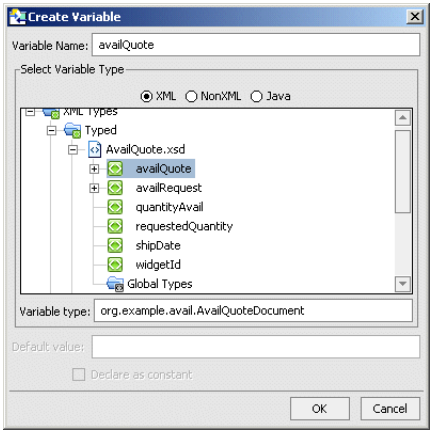
6. Click **Send Data** to open the second tab in the node builder.

   The **Control Expects** field is populated with `XmlObjectList`, which is the data type expected by the `convertAvailListToXML`() method on the **priceAvailTransformations** control.

7. On the **Send Data** tab, under **Select variables to assign**, click the arrow in the variable assignment field, and select **availList (XmlObjectList)**.
8. Click **Receive Data** to open the third tab in the node builder.

   The **Control Returns** field is populated with `AvailQuoteDocument`, which is the data type returned by the `convertAvailListToXML`() method on the **priceAvailTransformations** control.

9. Click the arrow associated with the **Select variables to assign** field, and click **Create new variable ...**. The **Create Variable** dialog box is displayed.
10. In the **Variable Name** field, enter **availQuote**.



11. In the **Select Variable Type** field, click the + beside **AvailQuote.xsd** in the **XML Types** list, then select **availQuote** from the list. The **Variable Type** field is populated with `org.example.avail.AvailQuoteDocument`.

12. Click **OK** to close the **Create Variable** dialog box.

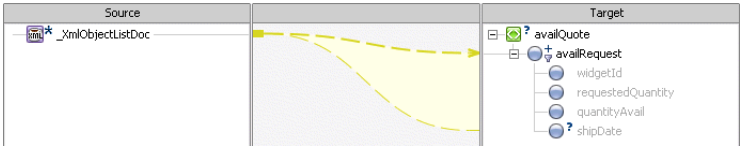
13. To close the node builder, click the **X** in the top right-hand corner.

    This step completes the design of the **Convert AvailList to AvailQuote XML** node. At run time, the availability quote data in XML format are assigned to the **availQuote** variable.

Note About the Transformation on This Node

The `convertAvailListToXML`() method on the **priceAvailTransformations** control does the work of creating the availability quote XML data. The input to `convertAvailListToXML`() is the availability data returned by the **availProcessor** control after the iterations in the **For Each** node complete.

You can double-click **PriceAvailTransformations.dtf** in the **Application** pane to display the Transformation control in **Design View**. Right click on `convertAvailListToXML` method, and select **Go to XQuery Document** to open the Transformation tool. The following figure shows the map for the `convertAvailListToXML`() method:



The preceding figure shows the transformation of the data in a variable of type `XmlObjectList`, which contains a repeating set of untyped XML data, to the repeating element in an XML-typed variable. Note that to achieve this transformation, the repeating element in the target schema *must* be the single child of a root element. In this case, `availRequest` is the repeating element, and it is the single child of the `availQuote` element. Click the **Source View** tab in the Transformation tool to see the corresponding XQuery.

Combine Price and Availability Quotes

Complete the following tasks:

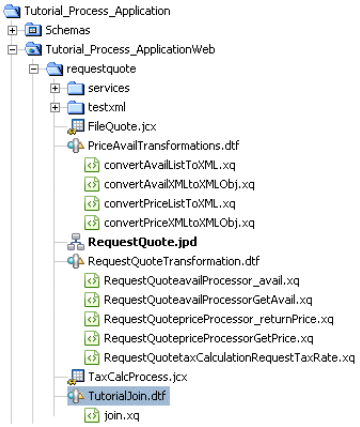
- To Create an Instance of the TutorialJoin Control in Your Project
- To Design the Process Interaction With the TutorialJoin Control

To Create an Instance of the TutorialJoin Control in Your Project

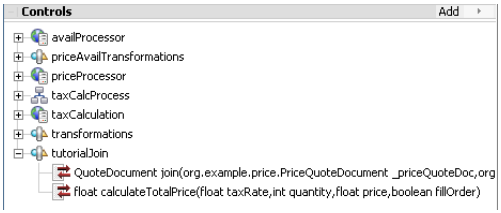
The `TutorialJoin.dtf` control is provided in your tutorial application. It is available in the **requestquote** folder in your **Tutorial_Process_ApplicationWeb** project folder. To learn how to build the `TutorialJoin.dtf` control, see *Tutorial: Building Your First Data Tansformation*.

Complete the following steps to add an instance of this control to your business process.

1. If the **Data Palette** is not visible in WebLogic Workshop, choose **View—Windows—Data Palette** from the menu bar.
2. On the **Applications** pane, click the **TutorialJoin.dtf** file.



3. Drag the **TutorialJoin.dtf** file from the **Applications** pane onto the **Data Palette**. The instance of your control (**tutorialJoin**) is created and displayed in the **Data Palette** as shown in the following figure:



To Design the Process Interaction With the TutorialJoin Control

In this step, you design the business process to call the following method on the **tutorialJoin** control:

```
join(PriceQuoteDocument _priceQuoteDoc,
AvailQuoteDocument _availQuoteDoc, float taxRate)
```

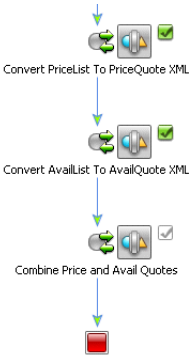
This `join` method does the work of combining the data returned to your business process from different systems and creating a single XML response document (quote), which is subsequently returned to the business process' client.

1. Expand the **tutorialJoin** control instance in the **Data Palette**, then click the following method:

   ```
   QuoteDocument join(org.example.price.PriceQuoteDocument _priceQuoteDoc,
   org.example.avail.AvailQuoteDocument _availQuoteDoc,float taxRate)
   ```

2. In the **Design View**, drag the method from the **Data Palette** and drop it on your **RequestQuote** business process placing it immediately after the **Convert AvailList to AvailQuote XML** node.

3. Rename the node from **join** to **Combine Price and Avail Quotes**.



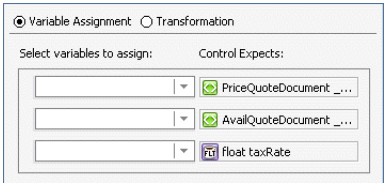
4. Double-click the **Combine Price and Avail Quotes** node. The node builder opens on the **General Settings** tab.

5. Confirm that **tutorialJoin** is displayed in the **Control** field, and that the following method, which you dragged onto the node from the **Data Palette**, is selected in the **Method** field:

   ```
   QuoteDocument join(org.exampel.price.PriceQuoteDocument _priceQuoteDoc,
   org.example.avail.AvailQuoteDocument _availQuoteDoc,float taxRate
   ```

6. Click **Send Data** to open the second tab in the node builder.

   The **Control Expects** field is populated with the data type expected by the `join` method on the **tutorialJoin** control, as shown in the following figure:



7. Under **Select variables to assign**, select the variables such that their data types match the data type expected (Control Expects) in the input parameters to the `join`() method, as follows:

   – For **PriceQuoteDocument** select **priceQuote (PriceQuote)**.

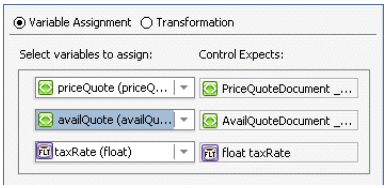
     priceQuote holds the price quote data, which is returned from the priceProcessor service in the **For Each** loop in your business process.

   – For **AvailQuoteDocument**, select **availQuote (AvailQuote)**.

     availQuote holds the availability quote data, which is returned from the availProcessor service in the **For Each** loop in your business process.

– For **float taxRate**, select **taxRate (float)**.

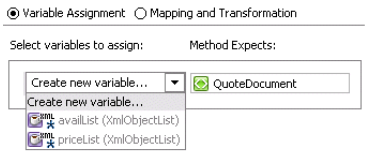
taxRate holds the rate of sales tax applied to the quote, based on the shipping address, which is returned to your business process from the taxCalculation service.



8. Click **Receive Data** to open the third tab in the node builder.

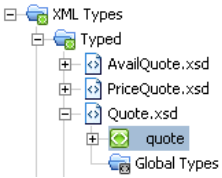
   On the **Receive Data** tab, the **Control Returns** field is populated with `QuoteDocument`, which is the data type returned by the `join`() method.

9. Click the arrow in **Select variable to assign**, then choose **Create new variable...**. The **Create Variable** dialog box is displayed.



10. In the **Variable Name** field, enter **Quote**.

11. In the **Select Variable Type** field, select **quote** from the list of **XML** types, as shown in the following figure:



    The **Variable Type** field is populated with `org.example.quote.QuoteDocument`.

12. Click **OK** to create the new variable. The **Quote** variable is displayed in the **Receive Data** tab, and also in the **XML** list in the **Data Palette**.

13. To close the node builder, click the **X** in top right-hand corner.

    This step completes the design of the **Combine Price and Avail Quotes** node. At run time, the availability quote data in XML format is assigned to the **Quote** variable.

14. From the Workshop menu, select **File—Save All**.

    To complete Part III of the tutorial, it only remains to write the quote to your file system (an optional step), and to create the **Client Response** node in your business process. The business process returns the quote you created to the client via the **Client Response** node.

    Step 10: Write Quote to File System

    Step 11: Send Quote From Business Process to Client

Related Topics

To learn how to create Transformation controls, and specifically to learn how to design the **TutorialJoin.dtf** control used in this section, see *Tutorial: Building Your First Data Tansformation*.

Step 10: Write Quote to File System

Complete this step to create a node, at which your business process writes the quote created in the preceding step to your file system. A File control makes it easy to read, write, or append to a file in a file system.

Complete the following tasks to design your business process to write the combined price and availability quote to your file system:

- To Create an Instance of a File Control in Your Project
- To Design a Control Send Node in Your Business Process to Interact With Your File Control

The following tasks are optional. They are provided to deepen your understanding of File controls but are not required for the completion of the tutorial.

- To Assign File Control Properties to a Variable in Your Business Process
- To Use the File Control Properties in Your Business Process

To Create an Instance of a File Control in Your Project

In this scenario, you add one instance of the File control to your business process.

1. Click **Add** on the **Data Palette Controls** tab to display a list of controls that represent the resources with which your business process can interact.
2. Select **Integration Controls—File**. The **Insert Control** dialog box is displayed.
3. In the **Insert Control** dialog box:

a. In **Step 1**, enter **myFileQuote** as the variable name for this control.

b. In **Step 2**, select **Create a new File control to use**, then enter **MyFileQuote** in the **New JCX name** field.

c. In **Step 3**, enter values in the following fields:

directory-name—Enter the location in which you want the File control to write the file. You can use any location on your file system.

file-mask—Enter a name for the file. For example, enter `quote.xml`.

file-type—Select **XmlObject** from the drop-down list.

d. Click **Create** to close the **Insert Control** dialog box.

An instance of a File control, named **myFileQuote**, is created in your project and displayed in the **Controls** tab.

4. From the Workshop menu, select **File→Save**.

Note: In the simple case, each instance of the File control allows you to manipulate a separate file. To learn about how your File control can operate on multiple files, see File Control.

To Design a Control Send Node in Your Business Process to Interact With Your File Control

1. Expand the **myFileQuote** control instance in the **Data Palette**, then click the following method:

```
FileControlPropertiesDocument write(com.bea.xml.XmlObject someData)
```

2. From the **Data Palette**, drag the method and drop it on your **RequestQuote** business process, placing it immediately after the **Combine Price and Avail Quotes** node (and immediately before the **Finish** node). The node is named **write** by default.

3. Rename the node from **write** to **Write Quote to File**.

4. Double-click the **Write Quote to File** node. Its node builder opens on the **General Settings** tab.

5. Confirm that **myFileQuote** is displayed in the **Control** field and that the following method is selected in the **Method** field:

```
FileControlPropertiesDocument write(XmlObject someData)
```

6. Click **Send Data** to open the second tab in the node builder. The **Control Expects** field is populated with `XmlObject someData`, which is the data type expected by the `write`() method.

7. In the **Select variables to assign** field, click the arrow to display the list of variables in your project, then choose **Quote (quote)**. (Recall that you created the `Quote` variable to hold the quote in Step 9: Create Quote Document.)

   Note: The node builder for this node contains a **Receive Data** tab. You can use this tab to specify a variable to which the data returned by the File control is assigned. For the purposes of this tutorial scenario, it is *not* required that you specify this variable; you can ignore the **Receive Data** tab. However, to learn how to specify a variable on the **Receive Data** tab, and a scenario in which you might subsequently use the variable, proceed to Note About File Control Properties.

8. To continue with the tutorial without specifying a variable on the **Receive Data** tab, close the node builder by clicking the **X** in the top right-hand corner.

9. From the Workshop menu, select **File→Save**.

   This step completes the design of your File control node. At run time, the quote document you created in Step 9: Create Quote Document is written to your file system in the location specified by you.

10. Proceed to Step 10: Write Quote to File System.

Note About File Control Properties

This optional section provides additional steps you can use to further define the **Write Quote to File** node you created in the preceding section. You are ***not*** required to complete the steps in this section to complete the tutorial. The steps are provided to help you understand and use the *File Control Properties* returned to your business process by the File control's `FileControlPropertiesDocument write(XmlObject someData)` method.

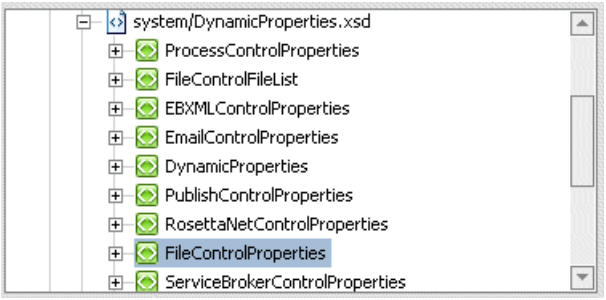
When you use a File control to write a file to the file system as you do in this step, the control returns information about the file you wrote. The information is returned in a document of type XML: `FileControlPropertiesDocument`. The `FileControlPropertiesDocument` is valid against an XML Schema: `DynamicProperties.xsd`. The Schema is provided for you in the **Schemas** project in your tutorial application. (See the **Schemas** project in the **Application** tab.)

To Assign File Control Properties to a Variable in Your Business Process

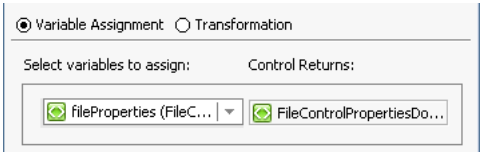
The following steps describe how to design the **Write Quote to File** node in your business process to include assigning a variable to which the File Control Properties are assigned:

Note: Before starting this section, you should have completed steps 1 through 7 as described in To Design a Control Send Node in Your Business Process to Interact With Your File Control.

1. If the **Write Quote to File** node builder is not open, double-click the node.
2. Click **Receive Data** to open the third tab in the node builder. The **Control Returns** field is populated with `FileControlPropertiesDocument`, which is the data type returned by the `write`() method.
3. In the **Select variables to assign** field, click the arrow to display the list of variables in your project, then choose **create new variable...**. The **Create Variable** dialog box is displayed.



4. In the **Variable Name** field, enter **fileProperties**.
5. In the **Select Variable Type** pane, expand **system/DynamicProperties.xsd**, then select **FileControlProperties**. The Variable type field populated with `com.bea.wli.control.dynamicProperties.FileControlPropertiesDocument`.
6. Click **OK**. The new variable is displayed in the node builder.



7. To close the node builder, click the **X** in the top right-hand corner.
8. From the Workshop menu, select **File—Save**.

   This step completes the design of your File control node. At run time, the quote document you create in Step 9: Create Quote Document is written to your file system in the location specified by you. Information about the file you wrote is returned to the RequestQuote business process, and assigned to the **fileProperties** variable you created.

   Note: The `Dynamic Properties.xsd` XML Schema must be available in a **Schemas** project in your application before you can create a variable to hold the file control properties that are returned to your business process from the File control. `Dynamic Properties.xsd` is one of the system schemas available to you when you create

WebLogic Integration applications in WebLogic Workshop. To create a project that contains system schemas in your application, choose **File→New→Project** from the WebLogic Workshop menu to open the **New Project** dialog box. Select **Schema** in the left pane, then **WLI System Schemas** in the right pane. Enter a name for your project in the **Project name** field and click **Create**.

To Use the File Control Properties in Your Business Process

In the preceding steps, you assigned the data returned from the File control to a variable named **fileProperties**. You can derive information about the file you wrote from **fileProperties**.

Click the **Source View** tab to view your **RequestQuote.jpd** file in **Source View**. By completing the steps described in the preceding section, the following code is written in your JPD file in keeping with the work you did in the Design View.

The **fileProperties** variable declaration is shown in the following listing:

```
public com.bea.wli.control.dynamicProperties.FileControlPropertiesDocument
fileProperties;
```

The `write()` method on the **myFileQuote** control is shown in the following listing:

```
public void myFileQuoteWrite() throws Exception
    {
        //#START: CODE GENERATED - PROTECTED SECTION - you can safely add code
above this comment in this method. #//

        // input transform
        // return method call
        this.fileProperties = myFileQuote.write(this.Quote);
        // output transform
        // output assignments
       //#END: CODE GENERATED - PROTECTED SECTION - you can safely add code below
this comment in this method. #//
    }
```

You can edit this method (outside the `PROTECTED SECTION` of code) to write code that derives information from the **fileProperties** variable. For example, the following line of code returns the FileMask:

```
this.fileProperties.getFileControlProperties().getFileMask()
```

To illustrate this example further, edit the `public void fileQuoteWrite()` method in **Source View** to include the line of code shown in bold in the following listing:

```
//#END: CODE GENERATED - PROTECTED SECTION - you can safely add code below
this comment in this method. #//
```

```
System.out.println ("The RequestQuote Process logged the quote in the following
file  "
 + this.fileProperties.getFileControlProperties().getFileMask());
}
```

Note that you must add the code *after* the `PROTECTED SECTION` comment. Code completion in the **Source View** helps you write the code. When you switch back to the **Design View**, note that the **Write Quote to File** node changes to include the following icon:  . This is a visual reminder that you edited the code associated with this node in the **Source View**.

When you run the business process, the name you gave the file (the FileMask) is printed to the console.

Related Topics

File Control

Using Integration Controls

How Do I: Create a Schemas Project Folder?

How Do I: Import Files into a Schemas Project Folder?

Step 11: Send Quote From Business Process to Client

A business process must be able to send and receive messages to and from its clients. You designed your business process to receive messages from a client in Step 2: Specify How the Process is Started. This section describes how to add operations that send messages from your business process to a client. That is, in this section you learn how to design **Client Response** nodes.

This step describes the following tasks:

- To Add a Client Response Node to Your Business Process
- To Design Your Send Quote Node

To Add a Client Response Node to Your Business Process

1. On the **Application** pane, double-click **RequestQuote.jpd** to ensure that your business process is displayed in **Design View**.
2. In **Design View**, select **Client Response** in the **Palette**, then drag and drop the node onto the business process immediately before the **Finish** node. The **Design View** is updated to contain the **Client Response** node.
3. Change the name of the node from **Client Response** to **Send Quote**.

To Design Your Send Quote Node

This section describes how to complete the design of the interaction with clients for this business process. Specifically, at this point in the process, the business process sends a quote containing price and availability information to clients.

In this step, you specify the structure of documents that your business process sends to clients from this node.

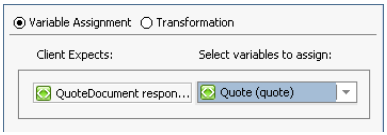
1. Double-click the **Send Quote** node in your business process. The node builder is displayed.
2. In the **General Settings** tab, change the name in the **Method Name** field from **clientResponse** to **quoteResponse**.
3. Click **Add** to display the panel of data types.

   Note: In the **Combine Price and Avail Quotes** node, you created an XML variable to hold the quote. This data assigned to this variable is valid against the `Quote.xsd` Schema. Therefore we are concerned with **XML Types** at this node.

4. If it is not already selected, select **XML**.
   a. If necessary, click the + beside **XML Types** to see a list of XML Schemas in your project.
   b. Expand **Quote.xsd**, then click the **quote** node. The **Type** field is populated with `org.example.quote.QuoteDocument`.
   c. In the **Name** field, replace **x0** with **responseXML**. In this way, you name the parameter that returns the **QuoteDocument**.
5. Click **OK**. The **QuoteDocument responseXML** parameter is added to the **General Settings** tab in the node builder and the **General Settings** tab is marked complete:
6. Click the **Send Data** tab. A tab that allows you to define one or more variables to hold the data your business process sends to clients is displayed.

The **Client Expects** field is populated with the data type and the name of the parameter you specified on the **General Settings** tab: **QuoteDocument responseXML**

7. Under **Select variables to assign**, select the **Quote (quote)** variable.



8. To close the **Client Response** node builder, click the **X** in the top right-hand corner of the node builder.

9. From the Workshop menu, select **File**—**Save**.

   This step completes the design of your RequestQuote business process. To run it, proceed to Step 12: Run the Request Quote Business Process.

Step 12: Run the Request Quote Business Process

You can run and test the functionality of the business process you created using WebLogic Workshop's browser-based interface. Using the Workshop Test Browser, you play the role of the client, invoking the methods on the business process and viewing the responses.

To Launch the Test Browser

1. In the **Application** pane, select **RequestQuote.jpd**—the business process you want to test.
2. If it not already selected, click the **Design View** tab. The business process you selected in the **Application** pane is displayed in the **Design View**.
3. If it is not already running, start WebLogic Server. To do so, from the WebLogic Workshop menu, choose **Tools→WebLogic Server→Start WebLogic Server**.

   If WebLogic Server is running, the following indicator is visible in the status bar at the bottom of the WebLogic Workshop visual development environment:

4. From the WebLogic Workshop menu, click **Build→Build Application**. WebLogic Workshop builds your application.
5. When the build is complete, click the Start button  on the menu bar to run your business process. If the build is successful, the **Workshop Test Browser** is launched, through which you can test your business process using sample input values.

   Note: If you completed Step 6 in the tutorial to replace the tax calculation Web Service with a Process control, you may get a build warning about the taxCalculation Web service when you run your process. You can ignore this warning. It occurs because you have

an unused Web Service control (`taxCalculation`) in the `RequestQuote.jpd`. If you remove or comment out the declaration of `taxCalculation` in the `RequestQuote.jpd`, the business process builds without warnings. The following lines show the control declaration in your JPD file:

```
/**
* @common:control
*/
private requestquote.services.TaxCalcControl taxCalculation;
```

6. If the browser is not already open on the **Test Form** page, click the **Test Form** tab to open the Test Form page.

   You can enter data that your business process can receive as part of a client request directly on the **Test Form** page. Alternatively, you can browse your file system and upload a file which contains your test data. In this case, test XML data are provided in the tutorial application for you to use.

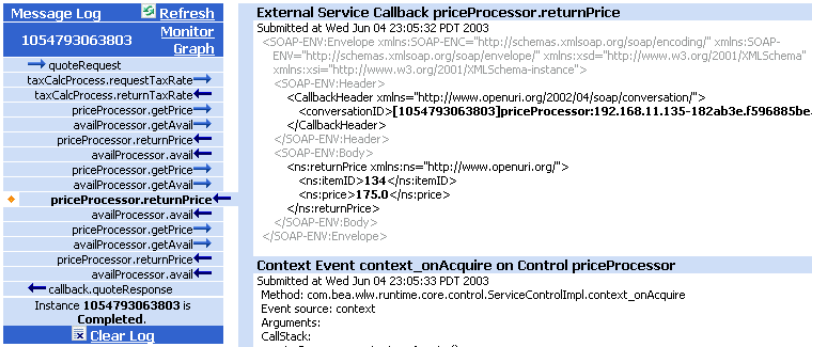
7. Click **Browse** beside the **xml requestXML (file value)** field to open the file browser.

8. Select **QuoteRequest.xml** from the **testxml** folder, which is available at the following location in your file system:

   myapplications`\Tutorial_Process_Application\Tutorial_Process_ApplicationWeb\requestquote\testxml\QuoteRequest.xml`.

   In the preceding line, *`myapplications`* represents the location in which you created your `Tutorial_Process_Application` application.

9. Click the button labeled with the method name on your business process (**quoteRequest**) to invoke the method and start the business process. The **Test Form** page refreshes to display a summary of your request parameters and the response from the external services in the **Message Log**:



For business processes that involve multiple communications with clients (as is the case in this scenario), or communications with resources such as other Web services, the **Message Log** at the left of the **Test Form** page displays an entry for each call to a method or a response from the service so that you can view the data for each.

Note that the sequence of calls displayed in the **Message Log** when you run your business process may be different from the sequence shown in the preceding figure. In your **Message Log**, you should see the following calls:

a. The **quoteRequest** call you made to invoke the business process.

b. A call to and a response from the tax calculation service.

c. Three sets of price request and responses and three sets of availability request and responses—a total of 12 messages. Because the requests to the price and availability services are made in parallel, the requests and responses can be in a different order each time you run your process. However, the **For Each** loop ensures that the processing for a given line item (in this case, for each **widgetID**) is completed before the next line item is processed.

d. The **quoteResponse** call from the business process to the client that invoked.

10. Click any log entry to see the details of that interaction. For example, if you click **priceProcessor.returnPrice**, the browser displays the message returned from the **priceProcessor** during one iteration through the **For Each** loop.

11. When the business process finishes, a message similar to the following is displayed in the Message Log:

    `Instance instanceID is Completed.`

    where *`instanceID`* represents the ID generated when the **quoteRequest** method in your business process was called.

12. If you included a call to a File control in your business process, as described in Step 10: Write Quote to File System, a file containing the quote document is created in the location in your file system that you specified when you designed the interaction between your business process and the File control.

    Note: If you are running the **RequestQuote.jpd** business process provided for you when you created your **Tutorial_Process_Application** application for the first time, the File control writes a file named `quote.xml` to your working directory. In this case, the working directory is the directory in which the integration server is running: *`BEA_HOME`*`\weblogic81\samples\domains\integration`.

13. To display a graphical representation of your running process, click **Graph** on the Message Log panel.
14. To stop the **Test Browser**, you can simply close it, or return to WebLogic Workshop and then click on the menu.

To Monitor Instances of Your Business Process

You can use the WebLogic Integration Administration Console to monitor running processes or view statistics for processes that already ran.

- Click **Monitor** to open the WebLogic Integration Administration Console in a Web Browser. Login using username = `weblogic` and password = `weblogic`. The WebLogic Integration Administration Console opens to the **Process Instance Details** page. The WebLogic Integration Administration Console allows you to administer and manage your WebLogic Integration applications. For example, if you click **View Statistics** on the Process Instances navigation pane, you access a **Process Instance Statistics** page. This page displays a summary of business process instances grouped by the process type. To view the instances of a process type that ran or are running on your server, click the process name. Processes instances are identified by their *instanceID*. Note that the instanceID displayed for your **RequestQuote** business process matches the instanceID displayed on the Message Log pane (see the preceding figures in this topic).
- Click **Monitor all RequestQuote.jpd processes** at the top of the **Test Form** to open the WebLogic Integration Administration Console. Login using the default username: `weblogic` and password: `weblogic`. When you use this link to open the Administration Console, it opens on the **Process Instance Summary** page, which displays a summary of all the instances of business processes that ran or are running. It allows you to:
  - View process instance statistics, including the number of instances in each state (running, suspended, aborted, and completed).
  - View the summary or detailed status for selected instances.
  - Suspend, resume, or terminate, selected instances.
- Other ways to invoke the WebLogic Integration Administration Console include the following:
  - From the WebLogic Workshop **Tools** menu, select **Tools→WebLogic Integration→WebLogic Integration Administration Console**
  - Entering the following URL in a Web browser: `http://localhost:7001/wliconsole`

The default username is `weblogic` and password is `weblogic` for the sample integration server.

To learn about using the WebLogic Integration Administration Console, see the console's online help and *Managing WebLogic Integration Solutions* at the following URL:

```
http://edocs.bea.com/wli/docs81/manage/index.html
```

Related Topics

Managing WebLogic Integration Solutions at
`http://edocs.bea.com/wli/docs81/manage/index.html`

Understanding the Service URL

Testing Your Application with Test View

Part IV Using the Message Broker

Part IV of this tutorial is comprised of Steps 13 through 15. You build on the business process you created in Part III.

The Message Broker provides a publish and subscribe message-based communication model for WebLogic Integration business processes, and includes a message filtering capability. In this scenario, your RequestQuote business process publishes the Request for Quote message it receives from a client to a Message Broker channel. A number of services, which validate the Request for Quote in some way, can subscribe to that channel. If the request is determined to be invalid by one of these services, that service publishes a message on a second Message Broker channel, to which the RequestQuote process is subscribed. If the running RequestQuote process receives such a message, it is terminated and a message is sent to the client indicating why the quote is not processed.

One external service that validates the Request for Quote as well as a Channel file that specifies two Message Broker channels are provided for you to support the tutorial scenario. You learn about creating Message Broker channels, publishing and subscribing to those channels, and designing your business process to handle the receipt of an out-of-bound message that causes it to terminate.

To learn about the WebLogic Integration Message Broker, see Introducing the Message Broker. For a description of the scenario modeled in this part of the tutorial, see Understanding the Validation Service Scenario.

The steps in Part IV include:

Step 13: Publish and Subscribe to Message Broker Channels
Build on the business process you created in Parts I through III of the tutorial by designing nodes in your RequestQuote business process that specify how the business process publishes the Request for Quote to a Message Broker channel and how it subscribes to a Message Broker channel.

Step 14: Designing a Message Path for Your Business Process
Add a message path to handle the callback from the Message Broker channel to which your business process is subscribed, and specify the actions taken by the RequestQuote process when such a callback is received.

Step 15: Run and Test the Request Quote Business Process With the Quote Validation Service
Run and test your expanded Request for Quote business process.

Introducing the Message Broker

The Message Broker provides typed channels, to which messages can be published, and to which services can subscribe to receive messages. You can design your system for subject-based or content-based routing of messages:

- The Message Broker provides typed channels, which you can use to design subject-based routing of messages. Messages can be published to these typed channels, and business processes can subscribe to the channels that receive those messages.
- The Message Broker includes a message filtering capability that allows you to design content-based routing. Using XQuery filters, subscribers to Message Broker channels can filter messages on the channels based on content and process rules.WebLogic Integration provides a mapping tool that allows you to create the XQuery filters.

Two Message Broker controls are available when you build WebLogic Integration applications: **Message Broker (MB) Publish** and **Message Broker (MB) Subscription**. Business processes use MB Publish controls to publish messages to channels and MB Subscription controls to dynamically subscribe to channels and receive messages:

- You bind the Message Broker channel to the MB Publish control when you declare the control, but it can be overridden dynamically.
- When you create an instance of a MB Subscription control for your business process, you bind the channel and optionally, an XQuery expression for filtering messages. However, in the case of a MB Subscription control, the bindings cannot be overridden dynamically.

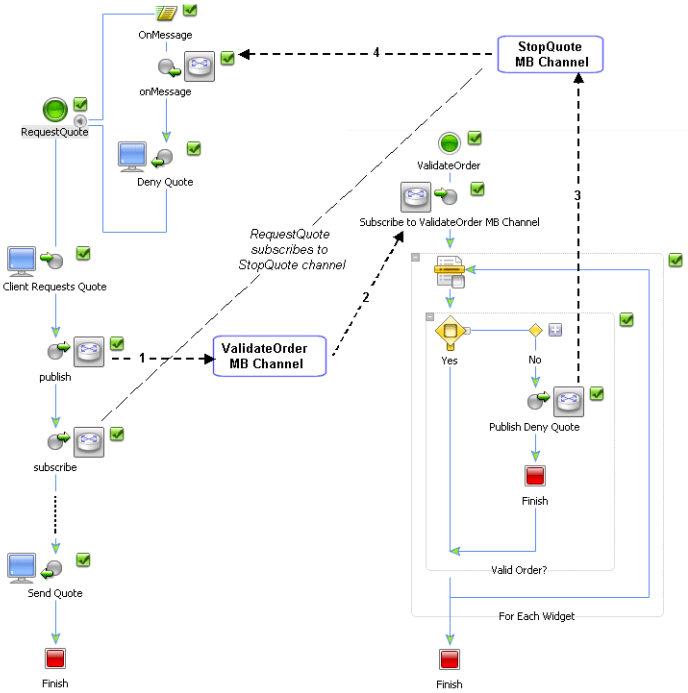
In addition to the dynamic subscriptions you design at the **Control** nodes in your business process, you can design static subscriptions at **Start** nodes. A business process that is subscribed to a Message Broker channel at its Start node starts when a message is received on the channel to which it is subscribed.

To learn more about using the Message Broker controls in WebLogic Integration applications, see Message Broker Controls.

Understanding the Validation Service Scenario

A service that validates a *Request for Quote* and a channel file that defines two Message Broker channels are provided for you in the tutorial application. The validation service is a process (`ValidateOrder.jpd`) that subscribes to a Message Broker channel named **ValidateOrder**. It validates the client's *Request for Quote* based on the number of widgets requested. `ValidateOrder.jpd` starts when a *Request for Quote* message is published to the **ValidateOrder** Message Broker channel. In this part of the tutorial scenario, if the number of widgets requested is greater than 400, the *Request for Quote* is determined to be invalid and the `ValidateOrder.jpd` process publishes a message to a second Message Broker channel (named **StopQuote**). Your **RequestQuote** business process subscribes to the **StopQuote** Message Broker channel—when it receives the message from that channel, the **RequestQuote** business process is terminated.

The following figure outlines the flow of execution at run time for the **RequestQuote** business process you build in Part IV and the interaction with the **ValidateOrder** business process:



The interactions between the business processes via the Message Broker channels is indicated by the numbers in the figure. The following steps describe the flow:

1. Your **RequestQuote** business process publishes the Request for Quote message to the **ValidateOrder** Message Broker channel.
2. The **ValidateOrder** business process starts when it receives a message on the **ValidateOrder** channel to which it is subscribed.
3. If the **ValidateOrder** business process determines that the order in the Request for Quote message is invalid, it publishes a message to the **StopQuote** Message Broker channel.
4. The **RequestQuote** business process subscribes to the **StopQuote** Message Broker channel and receives the message from the channel on the **onMessage** path. A response is sent to the client from the **Deny Quote** node on the **onMessage** path, and the **RequestQuote** business process is terminated.

Proceed to the next topic to start the steps included in Part IV of the tutorial.

CHAPTER 1

Step 13: Publish and Subscribe to Message Broker Channels

To design the Message Broker functionality described in Understanding the Validation Service Scenario, you create nodes in your **RequestQuote** business process: one that publishes to the **ValidateOrder** Message Broker channel and one that subscribes to the **StopQuote** Message Broker channel. Subsequently, you create a message path on your business process. On the message path, you create the logic to handle the callback from the channel (**StopQuote**) to which the **ValidateOrder** service posts a message. That logic specifies that the **RequestQuote** business process terminates after it receives a callback from the channel to which it is subscribed.

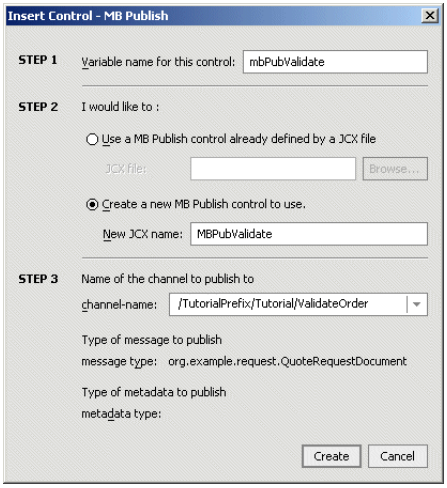
This step includes the following tasks:

- To Publish the Request for Quote Message to a Message Broker Channel
- To Subscribe to a Message Broker Channel to Receive Messages from a Validation Service

To Publish the Request for Quote Message to a Message Broker Channel

You must first create a Message Broker Publish control in your project, then bind a method from the control to a node in your business process. To do so, complete the following steps:

1. In the **Application** pane, double-click **RequestQuote.jpd** to ensure that it is displayed in the **Design View**.
2. If the **Data Palette** is not visible in WebLogic Workshop, click **View—Windows—Data Palette** from the menu bar.
3. In the **Data Palette Controls** tab, select **Add—Integration Controls—MB Publish**. The **Insert Control** dialog box is displayed.



4. In **Step 1**, enter **mbPubValidate** as the variable name for this control.

5. In **Step 2**, select **Create a new MB Publish control to use**, then in the **New JCX name** field, enter **MBPubValidate**.

6. In **Step 3**, click the arrow associated with the **channel-name** field to display the channels available in your application:

   `/TutorialPrefix/Tutorial/ValidateOrder`

   `/TutorialPrefix/Tutorial/StopQuote`

   Note: The following channels are also available: `/deadletter/xml`, `/deadletter/string`, `/deadletter/rawData`. To learn about using dead letter channels in your applications, see "Dead Letter Channels" in How Do I: Create Message Broker Channels.

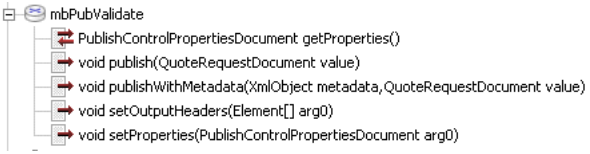
7. Select /**TutorialPrefix/Tutorial/ValidateOrder**. This specifies the channel to which your business process publishes the *Request for Quote* messages it receives from clients.

   The message type field is populated with the data type of the message that is published to the **ValidateOrder** channel: `org.example.request.QuoteRequestDocument`.

   Note: If the channels are not available for you to select in the **channel-name** field, you must build your **Schemas** project. To do so, first click **Cancel** in the **Insert Control** dialog box to close it. Then right-click on the **Schemas** folder in the **Application** tab and choose **Build Schemas** from the drop-down menu. When the **Schemas** project finishes building, click **Add→Integration Controls→MB Publish** on the **Data Palette Controls** tab to open the **Insert Control** dialog box. Repeat steps 4 through

6, as described above. The channels are now available in the **channel-name** field. (The channel files that define Message Broker channels in your application are located in a **Schemas** project, and must be built in that project for them to be available in your application. To learn how the **ValidateOrder** channel is defined, see Understanding the Message Broker Channels in Your Tutorial Application.

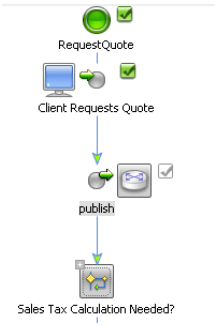
8. Click **Create**. An instance of the MB Publish control in your project is created, the **Insert Control** dialog box is closed, and the **MBPubValidate.jcx** file is created and is visible in the **Application** pane. The instance of the **mbPubValidate** control you created is displayed in the **Data Palette**:



9. In the **Data Palette**, click the following method in the **mbPubValidate** control:

   ```
   void publish(QuoteRequestDocument value)
   ```

10. Drag and drop the method onto the RequestQuote business process placing it immediately after the **Client Requests Quote** Start node.



    A **Control Send** node is created. By default, the node is named **publish**.

11. Double-click the **publish** node. The node builder opens on the **General Settings** tab. The **mbPubValidate** control and the `void publish (QuoteRequestDocument value)` method are already selected.

12. Click **Send Data** to open the second tab in the node builder, in which you can specify the message to be published to the **ValidateOrder** Message Broker channel.

    The **Control Expects** field is populated with the data type of the parameter expected by the control: `QuoteRequestDocument`.

13. In the **Select variables to assign** field, click the arrow to display the variables in your project, then select **requestXML (QuoteRequest)**.

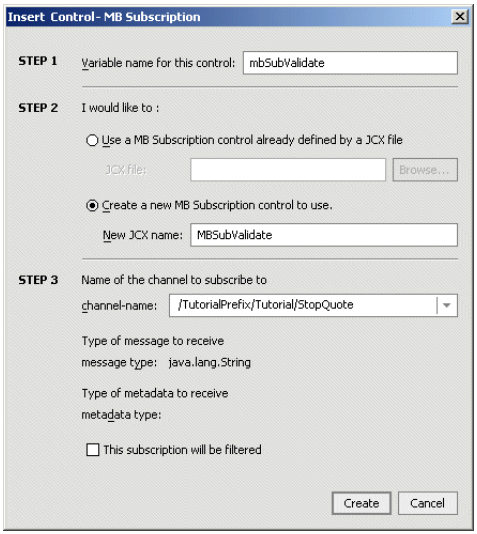
    Note: Recall that when you designed the Start node for your business process at the beginning of the tutorial, you assigned the *Request for Quote* messages from clients to the **requestXML** variable.

14. To close the node builder, click **X** in the top right-hand corner.

To Subscribe to a Message Broker Channel to Receive Messages from a Validation Service

You must create a Message Broker Subscription control in your project, then bind a method from the control to a node in your business process. Using the Message Broker Subscription control, your process subscribes to a channel on which Validation services can publish messages if the *Request for Quote* from the client is invalid. In the tutorial scenario, a **ValidateOrder** service determines that a *Request for Quote* is invalid if the number of widgets requested by a client is greater than 400. Complete the following steps:

1. Ensure that the **RequestQuote** business process is displayed in the **Design View**.
2. On the **Data Palette Controls** tab, click **Add—Integration Controls—MB Subscription**. The **Insert Control** dialog box is displayed.



3. In **Step 1**, enter **mbSubValidate** as the variable name for this control.
4. In **Step 2**, select **Create a new MB Subscription control to use**. In the **New JCX name** field, enter **MBSubValidate**.

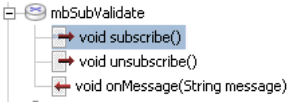
5. In **Step 3**, select **/TutorialPrefix/Tutorial/StopQuote**.

   This specifies the channel to which your business process subscribes. It is also the channel to which the **ValidateOrder** service publishes messages when it determines that a Request for Quote is invalid.

   Note: The message type field is populated with the data type of the message that is published to the **StopQuote** channel: `java.lang.String`. To learn how the **StopQuote** channel is defined, see Understanding the Message Broker Channels in Your Tutorial Application.

6. Click **Create** to create an instance of the MB Subscription control in your project.

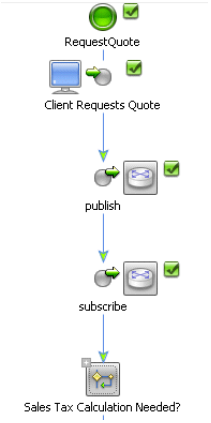
   The **Insert Control** dialog box is closed and the **MBSubValidate.jcx** file is created and is visible in the **Application** pane. The instance of the **mbSubValidate** control you created is displayed in the **Data Palette**:



7. In the **Data Palette**, click the following method in the **mbSubValidate** control:

   ```
   void subscribe()
   ```

8. Drag and drop the method onto the RequestQuote business process in the **Design View**, placing it immediately after the **publish** node.



   A **Control Send** node is created. By default, the node is named **subscribe**. Note that the ✅ indicates that the specifications on this node are complete—no further work is required to design this node.

Note: Message Broker Subscription controls do not define callback methods for you. You must define a custom callback to specify how the business process expects to receive the event messages. To define the callback for your business process, proceed to Step 14: Designing a Message Path for Your Business Process.

This step completes the design of the nodes that specify how your RequestQuote process publishes and subscribes to Message Broker channels.

Related Topics

Understanding the Message Broker Channels in Your Tutorial Application

Message Broker Controls

How Do I: Create Message Broker Channels?

CHAPTER 2

Step 14: Designing a Message Path for Your Business Process

In this step, you create a message path on your business process that specifies the logic to handle a callback from the channel to which the **ValidateOrder** service posts a message.

In this case, you associate the Message path you create with the Start node in your business process. It is also possible to associate Message paths with individual nodes or groups of nodes. For the case in which a Message path is associated with the Start node, the logic defined within the path applies to the entire business process in the event a message is received on this path. (The same is true for Exception paths and Timeout paths created on business process Start nodes.) The logic defined for paths associated with individual nodes or groups of nodes applies to those individual or groups of nodes. To learn more about Message, Exception, and Timeout paths for business processes, see Related Topics.

This step includes the following tasks:

- To Create a Message Path on Your Business Process That Handles Messages Routed via a Channel to Which Your Process is Subscribed
- To Design a Node to Receive the Message Event From the StopQuote Channel
- To Specify the Behavior of Your Business Process in the Event that the Message Path is Triggered
- To Design a Node to Send a Message to Clients in the Event the Business Process Receives a StopQuote Message From the StopQuote Channel

To Create a Message Path on Your Business Process That Handles Messages Routed via a Channel to Which Your Process is Subscribed

In this step, you learn how to create a message path on your business process that handles the following tasks:

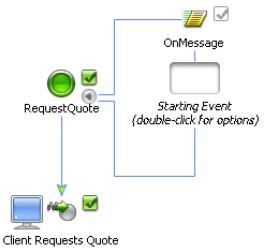
- Receives the message event from the **StopQuote** Message Broker channel to which your process is subscribed.
- Specifies the run-time behavior of the process in the event the message path is executed: if a message is received from the **StopQuote** channel, the process sends a message to the client from which the Request for Quote originated, and terminates the Request for Quote business process.

Message paths can be associated with individual nodes or groups of nodes that contain a blocking element, or with the business process (global). In this case, you design a global message path for the business process by specifying the message path at the Start node.

To Design a Node to Receive the Message Event From the StopQuote Channel

1. Ensure that the **RequestQuote** business process is displayed in the **Design View**.
2. Right-click the **Start** node, then choose **Add Message Path** from the drop-down menu.

   A path, which contains a placeholder for the event that invokes the path at run time, is created to the right of the Start node in the **Design View**:



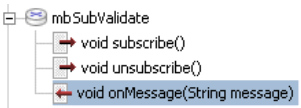
   Note: The Message Broker Subscription control you created in Step 13 does not define callback methods for you. You design a **Control Receive** node on this message path to define a custom callback that specifies how the business process expects to receive the event messages from the **StopQuote** channel to which it is subscribed.

3. Double-click the **Starting Event** node on the message path to display the types of nodes you can choose for this path.
4. Choose **A Control Receive**, then click the **X** in the top right-hand corner of the node builder.

A **Control Receive** node is added to the **OnMessage** path. This node specifies that this path waits to receive a message from a control.

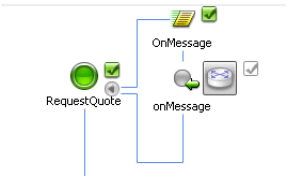
5. On the **Data Palette**, click the following method in the **mbSubValidate** control:

   ```
   void onMessage(String message)
   ```

6. Drag and drop the method onto the message path (**OnMessage**), placing it on the **Control Receive** node.

   The **Control Receive** node in the **OnMessage** path changes to reflect the binding of the Subscription control method: the node is named **onMessage** and the Start node icon reflects a Message Broker Subscription control. Your message path should resemble that displayed in the following figure:

7. Double-click the **onMessage** node. The node builder opens on the **General Settings** tab. The **mbSubValidate** control and its **void onMessage (String message)** method are already selected.

8. Click **Receive Data** to open the second tab in the node builder, in which you can assign a variable to which the message that is received from the **StopQuote** channel is stored.

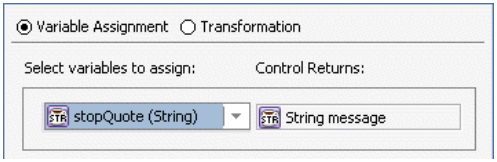
   The **Control Returns** field is populated with the data type and the name of the parameter expected by the control: `String message`.

9. In the **Select variables to assign** field, click the arrow to display the variables in your project, then select **Create new variable...**. The **Create Variable** dialog box is displayed.

10. In the **Variable Name** field, enter **stopQuote**.

11. In the **Select Variable Type** pane, select **String** in the list of **Java Types**. The **Variable type** field is populated with `java.lang.String`.

12. Click **OK**. The **stopQuote** variable is created and is displayed in the **Receive Data** tab (and on the **Data Palette Variables** tab).



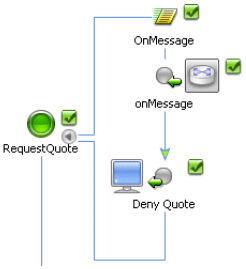
This completes the assignment of the message from the **StopQuote** Message Broker channel to the **stopQuote** variable.

13. To close the **onMessage** node builder, click the **X** in the top right-hand corner.

    This step completes the design of the callback handler that handles a message event on the **StopQuote** channel to which your **RequestQuote** business process is subscribed.

To Design a Node to Send a Message to Clients in the Event the Business Process Receives a StopQuote Message From the StopQuote Channel

1. Ensure that your **RequestQuote** business process open in the **Design View**.
2. Click **Client Response** in the **Palette**, then drag and drop the node onto the business process, placing it on the message path, immediately after the **onMessage** subscription node. The **Design View** is updated to contain the **Client Response** node.

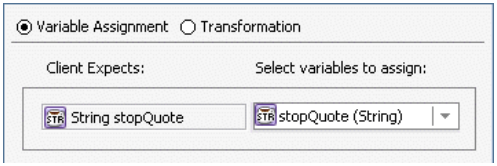


3. Change the name of the node from **Client Response** to **Deny Quote**.
4. Double-click the **Deny Quote** node to open its node builder.
5. In the **General Settings** tab, change the default name in the **Method Name** field to **denyQuote**.
6. Click **Add** to display the panel of data types.

   Note: In a preceding step, you created a variable of type **String** to hold the message received from the **ValidateOrder** service, via the **StopQuote** channel. This is the message your **RequestQuote** business process sends to clients in the event that the *Request for Quote* is invalid. Therefore we are concerned with **String** Java Types at this node.

7. Select **Java** on the panel of data types, then in the list of **Java Types**, select **String**. The Type field is populated with `java.lang.String`.
8. In the **Name** field, replace the default **x0** by entering **stopQuote** and click **OK**.
9. Click the **Send Data** tab to open the tab that allows you to assign the variable that holds the data your business process sends to clients.

   The **Client Expects** field is populated with the data type and parameter name you specified on the **General Settings** tab: **String stopQuote**.
10. Under **Select variables to assign**, select **stopQuote (String)**.



11. To close the **Client Response** node builder, click the **X** in the top right-hand corner.

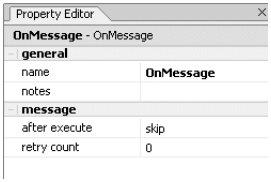
    In the **Design View**, note that by completing the tasks in the node builder, the completeness icon associated with the **Send Quote** node changed from to indicating that the design of the node is complete.
12. From the Workshop menu, select **File—Save**.

To Specify the Behavior of Your Business Process in the Event that the Message Path is Triggered

In this step you learn how to specify the run-time behavior of your business process in the event this message path is triggered. To do so, you use the **Property Editor** to set the **after execute** property for your message path.

1. In **Design View**, click the **OnMessage** path icon. The **Property Editor** displays properties for the **OnMessage** path.

   Note: If the **Property Editor** is not visible in WebLogic Workshop, select **View—Property Editor** from the menu bar.



2. Verify the following properties for the **OnMessage** path:
   - **name**—Displays the name of the message path: **OnMessage**. Click on this property if you want to enter a new name for the path.
   - **notes**—You can click **...** in the notes field 

to invoke a text editor in which you can add text. For example, you can use it to document something about this node.
   - **after execute**—Specifies the behavior of the business process when this message node is activated at run time. **skip** is specified by default.

     Valid options for this property include **skip** and **resume**, described here for heuristic purposes. In our scenario, you should not change the default specification.

     skip—Specifies that after execution of the message path, the process engine skips the node or group with which the message path is associated. That is, the process engine resumes execution of the process at the node following the node or group for which the message path is defined. In the special case of a global message path—one defined for the business process on the Start node—the process is terminated after execution of the message path.

     resume—Specifies that after execution of the message path, the process engine resumes execution of the business process at the node that was executing when the message was received. That is, the process state returns to what it was before the message path executed and the On Message port is still active.
   - **retry count**—Specifies how many times the process engine retries to execute the nodes contained in the Message path after the first attempt to execute them and before the **after execute** path is taken. Zero is specified by default.

This step completes the design of the message path on your RequestQuote business process.

By completing this section, you created the logic that allows your **RequestQuote** business process to publish the *Request for Quote* message it receives from clients to a Message Broker channel. (A validation service is subscribed to that channel). You also created a dynamic subscription to another Message Broker channel to allow your **RequestQuote** business process to receive messages published by the validation service.

To run the business process you created by following the steps in Part IV of this tutorial, proceed to Step 15: Run and Test the Request Quote Business Process With the Quote Validation Service.

Related Topics

To learn about designing Message paths, Exception paths, and Timeout paths for your business process, see the following topics in the *Guide to Building Business Processes*:

Handling Exceptions

Adding Message Paths

Adding Timeout Paths

Step 15: Run and Test the Request Quote Business Process With the Quote Validation Service

In the same way you ran and tested the business process you created when you finished Part III of the tutorial, you can run and test the functionality of the business process you created in Part IV using WebLogic Workshop's browser-based interface.

To Launch the Test Browser

1. Ensure that the **RequestQuote** business process is displayed in the **Design View**.
2. If the WebLogic Server is not already running, from the WebLogic Workshop menu, choose **Tools→WebLogic Server→Start WebLogic Server**.

   If WebLogic Server is running, the following indicator is visible in the status bar at the bottom of the WebLogic Workshop visual development environment:

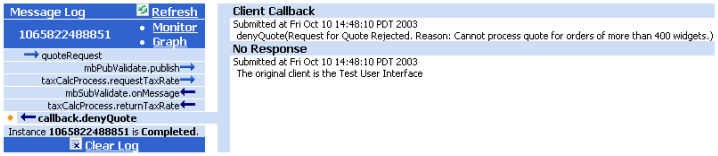
3. From the WebLogic Workshop menu, click **Build→Build Application**. WebLogic Workshop builds your application.
4. Click the Start button  on the menu bar to run your business process. The **Workshop Test Browser** is launched, through which you can test your business process using sample input values.
5. If necessary, open the Test Form page.

   You can enter data that your business process can receive as part of a client request directly on the **Test Form** page. Alternatively, you can browse your file system and upload a file which contains your test data. In this case, test XML data are provided in the tutorial application for you to use.

6. Click **Browse** beside the **xml requestXML (file value)** field to open the file browser.
7. Select **QuoteRequest_a.xml** from the **testxml** folder in your project (`Tutorial_Process_ApplicationWeb\requestquote\testxml\QuoteRequest_a.xml`).

   Note: `QuoteRequest_a.xml` contains data that specify an order for a quantity of widgets of 400 or more. This data is designed to fail the validation check carried out by the **ValidateOrder** business process.

8. Click the button labeled with the method name on your business process (**quoteRequest**) to invoke the method. The **Test Form** page refreshes to display a summary of your request parameters and the response from the external services in the **Message Log**:



   The message log reflects the order of execution of methods in your **RequestQuote** business process and the services it calls. For the scenario logged in the preceding figure, note the following entries in the message log:

   – **quoteRequest**—Was called by the client (you in this test instance) to start the **RequestQuote** business process.

   – **mbPubValidate.publish**—The **publish** node in your business process published the Request for Quote to the **ValidateOrder** Message Broker channel.

   – **taxCalcProcess.requestTaxRate**—The **RequestQuote** business process continues to execute. In this case, it calls the `requestTaxRate()` method on the tax calculation business process before it is interrupted by the **mbSubValidate.onMessage** message.

   – **mbSubValidate.onMessage**—In this scenario, when the **ValidateOrder** process determines that the Request for Quote is invalid, it publishes a message to the **StopQuote** Message Broker channel. Your **RequestQuote** business process subscribes to the **StopQuote** channel—when **RequestQuote** receives the message, it executes the logic in the **OnMessage** path, sends a response to the client that sent the Request for Quote (see **callback.denyQuote** in the Message Log in the preceding figure), and terminates the business process.

   – **taxCalcProcess.returnTaxRate**—The business process receives a response from the tax calculation service (`returnTaxRate()`) before it executes the logic in the OnMessage path. (Remember that the **after execute** property on the OnMessage path specifies that the process engine terminates the business process *after* execution of the

message path. In other words, in this case, the **returnTaxRate** call is received as part the normal flow of execution because the logic in the OnMessage path is not yet executed.)

- **callback.denyQuote**—Your **RequestQuote** business process sends a denyQuote message to the client that sent the Request for Quote.
- **Instance *instanceID* is finished**—The quote is determined to be invalid by the **ValidateOrder** service. Therefore, further processing of the quote via the **RequestQuote** business process is not required. After the **callback.denyQuote** message is sent to the client from the message path, the business process is terminated.

  instanceID represents the ID generated when the first method in your business process was called.

Note: For this business process, the first and second messages in your **Message Log** are **quoteRequest** and **mbPubValidate.publish**. However, the order of subsequent messages can vary depending on your system. For the case shown in the preceding figure, the asynchronous message (**taxCalcProcess.requestTaxRate**) was sent to the tax calculation service before the interrupt message (**mbSubValidate.onMessage**) was received from the **Stop Quote** Message Broker channel. In addition, a response message (**taxCalcProcess.returnTaxRate**) was received from the tax calculation service before the business process was terminated as a result of receiving the **mbSubValidate.onMessage** message.

You can click any log entry to see the details of that interaction in the right panel of the **Test Form**.

To Monitor Instances of Your Business Process

You can use the WebLogic Integration Administration Console to monitor your processes.

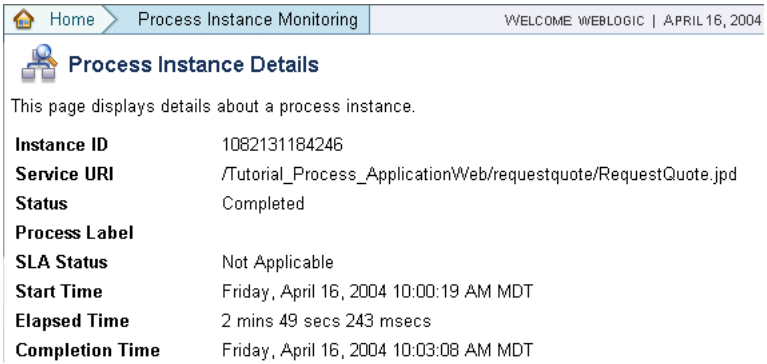
1. Invoke the Administration Console in one of the following ways:
   - Click **Monitor** on the **Message Log** in the Test Browser's **Test Form** page.
   - From your WebLogic Workshop **Tools** menu:

     Tools→WebLogic Integration→WebLogic Integration Administration Console
   - By entering the following URL in a Web browser:

     `http://localhost:7001/wliconsole`

   The default username is `weblogic` and the password for the sample integration server is also `weblogic`.

2. The WebLogic Integration Administration Console opens on the Process Instance Details page.



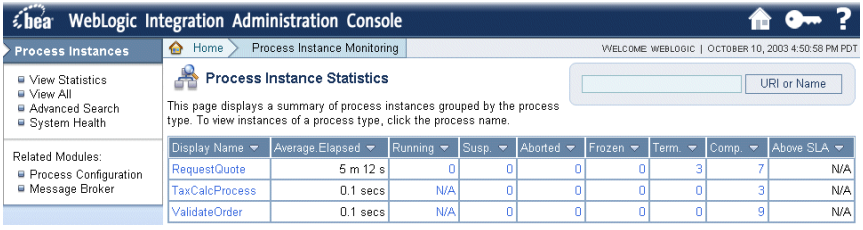
3. Click **Process Instance Monitoring** to open a page that allows you to:

   – View process instance statistics, including the number of instances in each state (running, suspended, aborted, and completed).

   – View the summary or detailed status for selected instances.

   – Suspend, resume, or terminate, selected instances.

   If you invoked the **Process Instance Monitoring** page after running the **RequestQuote** business process, as described in this step, three business processes are listed in the Process Instance Statistics page: **RequestQuote**, **TaxCalcProcess**, and **Validate Order**.



4. Click the name of any business process in the **Display Name** column to go to a page that displays more information about that process. For example, to learn more about the instance of the **ValidateOrder** business process that ran in your test:

5. Click **ValidateOrder** in the **Display Name** column on the **Process Instance Statistics** page displayed in the preceding figure.

6. A **Process Instance Summary** page is displayed. This page lists all the instances of the **ValidateOrder** business process that ran or are running.

7. To display a page which contains more details about any instance, click the ***Instance ID*** in the **ID** column on the **Process Instance Summary** page.

8. On the **Process Instance Details** page, click **Graphical View** to display a graphical representation of this instance of the **ValidateOrder** business process.

9. To display information about the nodes, click each node of the **ValidateOrder** business process. Note that if you started your RequestQuote business process in the WebLogic Workshop Test Browser with the **QuoteRequest_a.xml** test data, the **ValidateOrder** process determines that the order is not valid. In that case, the **No** path on the **Valid Order?** Decision node is executed and highlighted in the Process Graph; the **Yes** path is gray, indicating that this path was not executed for this instance.

To learn more about Process Instance Monitoring in the WebLogic Integration Administration Console, see the **Process Instance Monitoring** topic in the Administration Console online help.

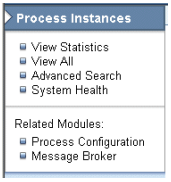
To Monitor the Message Broker Channels

You can use the WebLogic Integration Administration Console to monitor the Message Broker channels in your system, specifically the name, status, and the number of subscribers for each channel.

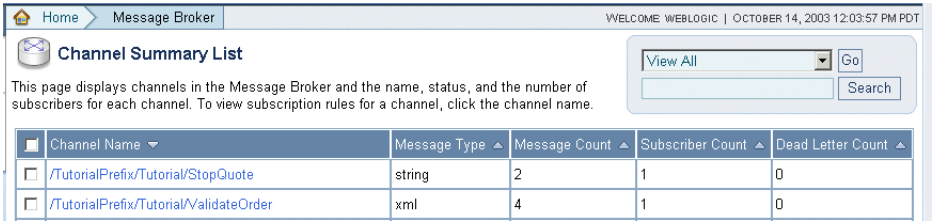
Open the **Channel Summary List** page in one of the following ways:

- From the Administration Console's Home page, click **Message Broker**:

- In the left pane of any **Process Instance Monitoring** page, click **Message Broker**:



The **Channel Summary List** page is displayed. The list displays all the channels in your system (in the samples integration domain in this case). Note that the **TutorialPrefix/Tutorial/StopQuote** and **TutorialPrefix/Tutorial/ValidateOrder** channels used by your business process in Part IV of the tutorial are displayed:



Note the following information about the Message Broker channels:

- The **Message Type** for each channel is displayed: **String** for the **StopQuote** channel and **XML** for the **ValidateOrder** channel.
- The **Message Count** records the number of messages routed through the channels. These numbers reflect the number of times you ran the business process from the Test Browser.
- The **Subscriber Count** displays the number of subscribers to a particular channel that are deployed on your system. If you have one tutorial application deployed on your system, you should see a **Subscriber Count** of 1 for each of the **StopQuote** and **ValidateOrder** Message Broker channels.
- The **Dead Letter Count** reflects the number of messages sent to the dead letter queue since the count was last reset. When the Message Broker is unable to determine the URI to send a message to (that is, no subscribers are found), the message is sent to the dead letter channel that corresponds to the channel type. To learn about the deadletter channels in your WebLogic Integration applications, see *Dead Letter Channels* in How Do I: Create Message Broker Channels?

To learn more about the Message Broker module in the WebLogic Integration Administration Console, see the **Message Broker** topic in the Administration Console online help.

Related Topics

Managing WebLogic Integration Solutions at
`http://edocs.bea.com/wli/docs81/manage/index.html`

Running and Testing Your Business Process

CHAPTER 4

Understanding the Message Broker Channels in Your Tutorial Application

This topic provides information about the Message Broker channels used in Part IV of the tutorial. You are not need to perform any of the steps described in this topic to complete the tutorial.

Channel files define the Message Broker channels available in a WebLogic Integration application. Channel files must be placed in a **Schemas** project in your application. Otherwise, they are not visible to your application components. A channel file, named **Validate.channel**, is provided for you in the **Schemas** project in your tutorial application. **Validate.channel** specifies two Message Broker channels: **ValidateOrder** and **StopQuote**.

This topic includes the following sections:

Creating Channel Files in Your Application

1. Locate a Schemas project in the **Application** pane.
2. Right-click the Schemas project and choose **New—Channel File** from the drop-down menu. The **New File** dialog box is displayed.
3. Ensure that **Processes** is selected in the left pane, and **Channel File** is selected in the right pane.
4. Enter a name for the file in the **File name** field.

Note: As indicated by the file extension in the **New File** dialog box, the Channel File is automatically appended with **channel** as its suffix.

5. Click **Create**.

   Your new channel file is created and displayed in your Schemas folder on the **Application** tab. This file is a template file that you edit to define the Message Broker channels for your application.

6. To view the contents of the template file, go to the **Application** pane, then double-click the file you created in the Schemas folder. The file is displayed in the **Source View**.

   Channel files are XML files that are valid against an XML Schema. The Schema is available at the following location in your WebLogic Platform installation:

   BEA_HOME\weblogic81\integration\lib\xmlschema\config\ChannelFile.xsd

   In the preceding line, *BEA_HOME* represents the directory in which you installed WebLogic Platform.

Understanding the Channels Specified for the Tutorial

Click the **Validate.channel** file provided for you in your **Schemas** project. The file is displayed in the **Source View**. The following listing displays the channel definitions in `Validate.channel`:

```
<?xml version="1.0"?>

:

<channels channelPrefix="/TutorialPrefix"
          xmlns="http://www.bea.com/wli/broker/channelfile"
                xmlns:et="http://www.example.org/request">

    <channel name ="Tutorial" messageType="none">

      <channel messageType="xml" name="ValidateOrder"
                  qualifiedMessageType="et:quoteRequest"/>

      <channel messageType="string" name="StopQuote"/>

    </channel>

</channels>
```

Note the following characteristics of the `Validate.channel` file:

- `channelPrefix=”/TutorialPrefix”`

Helps define the URI for the Message Broker channel. The `channelPrefix` is used to scope the use of the Message Broker channels across a domain. To ensure that you do not unintentionally send or receive messages to and from other applications in your domain, it is recommended that you create a unique **channelPrefix** for an application (for example, you can use the same name as your application name). However, if you want to use the Message Broker for communication among two or more applications, these applications should use the same prefix for the channels.

- `xmlns="http://www.bea.com/wli/broker/channelfile"`

  A namespace that references the names used in the channel file Schema.

- `xmlns:et="http://www.example.org/request"`

  A namespace that references the names used in the RequestQuote.xsd Schema, against which the messages sent from clients to the RequestQuote business process is validated.

- Two channels are defined in this file: **ValidateOrder** and **StopQuote:**
  - For the **ValidateOrder** channel:
    - `name="ValidateOrder"` specifies the name of the channel.
    - `messageType="xml"` specifies the data type of the messages routed by that channel.
    - `qualifiedMessageType="et:quoteRequest"` specifies the **quoteRequest** element in the Schema referenced by the following namespace: `http://www.example.org/request`. The **et:** prefix is associated with an XML Schema namespace through the following declaration, which appears in the channels element: `xmlns:et="http://www.example.org/request"`. In other words, the `qualifiedMessageType` specifies that the XML is *Typed XML*—valid against the `QuoteRequest.xsd` Schema referenced by the `http://www.example.org/request` namespace. The `QuoteRequest.xsd` Schema file is located in the **Schemas** project in your application.

    Warning: Make sure that the namespaces you reference in your channel files exist in your application. If they do not, although you do not get an error at compile time, you will get an error when you try to run your application.
  - For the **StopQuote** channel:
    - `name="StopQuote"` specifies the name of the channel
    - `messageType="string"` specifies the data type of the messages routed by the **StopQuote** channel: `java.lang.String`

Related Topics

Message Broker Controls