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AquaLogic Service Bus is a market-leading enterprise service bus built from the ground up for Service Oriented Architecture (SOA) lifecycle management. It provides foundation capabilities for service discovery and intermediation, rapid service provisioning and deployment, and governance. This service-infrastructure software adheres to the SOA principles of building coarse grained, loosely coupled, and standards-based services, creating a neutral container in which business functions may connect service consumers and back-end business services, regardless of underlying infrastructure. Figure 1-1 illustrates the role of ALSB as a service intermediary in an enterprise IT SOA architecture.

**Figure 1-1  ALSB Intermediary**

ALSB Console enables you to:
configure a proxy service to suit your needs and to manage web services by controlling the service and policy configurations and by monitoring system and operations tasks. ALSB relies on WLS run-time features. For more information, see AquaLogic Service Bus Concepts and Architecture.

This topic consists of the following sections:

- ALSB Concepts
- Overview of the Tutorials
- How to Use the Tutorials

**ALSB Concepts**

ALSB allows you to manage web services and deliver authentic message brokering through the configuration of proxy services in ALSB Console. The underlying concepts of ALSB are briefly described in this section. For more information about ALSB, see AquaLogic Service Bus Concepts and Architecture. ALSB manages the routing and transformation of messages in an enterprise system to promote seamless application integration. Figure 1-2 illustrates the functional components of ALSB.
Proxy Services and Business Services

ALSB provides intelligent message brokering between business services (such as enterprise services and databases) and service clients (such as presentation applications or other business services) through proxy services that you can configure using ALSB Console. Proxy services are ALSB definitions of intermediary web services that ALSB implements locally on WebLogic Server. With ALSB message brokering, service clients exchange messages with an intermediary proxy service rather than working directly with a business service.

ALSB allows you to implement proxy services independently and configure them dynamically, as driven by your business needs without requiring costly infrastructure development efforts. The configuration functions are separated from the management functions in ALSB Console. A proxy service can route messages to multiple business services; you can choose to configure a proxy service with an interface that is independent of the business services with which the proxy service communicates. In such cases, you can configure a message flow definition to route a message to
the appropriate business service and map the message data into the format required by the business service’s interface.

For more information on proxy services, see Proxy Services in AquaLogic Service Bus Concepts and Architecture. For information about how to use the ALSB Console to configure proxy services and other resources, see Using the AquaLogic Service Bus Console.

Business services are ALSB definitions of the enterprise services that exchange messages during business processes. A business service and its interface can be defined and configured using the ALSB Console. To configure a business service you must specify its interface, type of transport it uses, its security requirements, and other characteristics. A business service definition is similar to that of a proxy service, but it does not have a pipeline. For more information on business services, see Business Services in AquaLogic Service Bus Concepts and Architecture. For information on how to configure a business service using the ALSB Console, see “Adding a Business Service” in Business Services in Using the AquaLogic Service Bus Console.

**Message Flows and Pipelines**

In ALSB, a message flow is the implementation of a proxy service. You configure the logic for the manipulation of messages using proxy service message flow definitions. This logic includes such activities as transformation, publishing, and reporting, which are implemented as individual actions within the stages of a pipeline.

Pipelines are one-way processing paths that include no branching. A pipeline is a named sequence of stages containing actions, representing a non-branching one-way processing path. It is used to specify the message flow for service requests and responses. A stage is a user-configured processing step. Messages fed into the pipelines are accompanied by a set of message context variables that contain the message contents. They can be accessed or modified by actions in the pipeline stages.

For more information on proxy services, see Message Flow Modeling in AquaLogic Service Bus Concepts and Architecture.

**Pipeline Pairs**

Pipeline pairs are request and response pipelines. The request pipeline definition specifies the actions that ALSB performs on request messages to the proxy service before invoking a business service or another proxy service. The response pipeline definition specifies the processing that ALSB performs on responses from the business or proxy service that the proxy service invokes before returning a response to a client.
Each pipeline consists of a sequence of stages, each stage containing actions. However, a single service-level request pipeline might optionally branch out into operational pipelines (you can configure one default operational pipeline at most one per operation). The determination of the operation is done through user-selected criteria. The response processing starts with the relevant operation pipeline which then joins into a single service-level response pipeline.

Figure 1-3 illustrates sample operation pipelines in a proxy service.

Figure 1-3  Example of Operation Pipelines in a Proxy Service

For more information, see Pipeline Pairs in AquaLogic Service Bus Concepts and Architecture.

Overview of the Tutorials

This tutorial shows how ALSB is used to route a loan application to appropriate business services based on the configurations set in the proxy service. ALSB Console comprises JSP-based portlets that support the configuration and design of the proxy service message flows and the associated resources.
Introduction to the ALSB Tutorials

In the tutorials, you will use the console to create the proxy service that will interact with the service client and business services. As you work through the tutorial, you will:

- Learn how to configure proxy services to process the input and output messages in a message flow.
- Create, read, and update configuration objects (such as proxy services and web services Development Language (WSDLs)).
- See how ALSB uses session management to allow configuration changes locally, and then instantiate the changes in the core environment.
- Configure resources such as WSDLs, Service Callouts, XQueries, and business services.
- Route messages according to XQuery-based policies or callouts to external web services.
- See how ALSB manages synchronous and asynchronous messages.
- Define a transformation on an XML message, based on XQuery, supporting a callout to a web service to gather additional data for the transformation.
- See how message processing by ALSB is driven by metadata specified as the message flow definition for a proxy service in the ALSB Console.
- Test proxy services and business services.

How to Use the Tutorials

The tutorials represent typical use case scenarios for ALSB. You will learn how to configure and use ALSB to resolve the business scenarios presented in the specified use cases. The tutorials will:

- Provide you an understanding of the concepts underlying ALSB.
- Show you how to navigate through the ALSB Console and demonstrate the capabilities of the console.
- Provide the basic tasks that will help you to configure specific scenarios.

Complete the first tutorial, Routing a loan application, to become familiar with ALSB, then proceed to the other tutorials in any order. The following tutorials are provided as part of the tutorial suite:

- Tutorial 1. Routing a Loan Application is based on scenarios that demonstrate how ALSB facilitates the routing of messages within an enterprise.
- **Tutorial 2. Transforming a Loan Application** describes how a proxy service is configured with a routing node, transformations, and a web service callout (Service Callout) to allow content-based routing and message enrichment through ALSB.

- **Tutorial 3. Validating a Loan Application** describes how an ALSB proxy service can be configured to validate a message passing from a client to a business service.

**Document Conventions**

The following conventions are used throughout this document:

- The instructions in the tutorial documentation are for Windows command shells. If you are using a UNIX-based shell, substitute `/` for `\` in path names.

- BEA_HOME represents the directory in which you installed your BEA product; for example, `C:\bea`.

**Related Documents**

- AquaLogic Service Bus Examples
- AquaLogic Service Bus Installation Guide
- AquaLogic Service Bus Concepts and Architecture
- Using the AquaLogic Service Bus Console
Introduction to the ALSB Tutorials
Getting Started with the ALSB Tutorials

The ALSB tutorials are based on a typical web services scenario that uses ALSB for configuring business services and adaptive message routing. This section describes the tasks required to configure the ALSB and Weblogic Server environment to deploy the business cases used in the tutorials. The ALSB example suite is used as a basis for instruction in the following tutorials. (See AquaLogic Service Bus Examples).

This topic consists of the following sections:

- Scenarios in the Tutorials
- Setting Up the Tutorials

After completing this section, you will know how to deploy a typical ALSB environment in which you can define resources and design web services. You must complete all the tasks in this section before you start the tutorials.

Scenarios in the Tutorials

The tutorials are based on a mortgage broker scenario describing a typical loan application process. A primary mortgage company uses ALSB to route loan applications to appropriate business services. The loan applications are routed to different business services depending on qualifying criteria, such as the requested interest rate and the requested principal amount. The applicant’s credit rating information is required to complete the loan application when the principal amount is greater than US $25 million.

In the first tutorial, you will become familiar with the basic functionality of ALSB that facilitates web service mediation, including message routing and web service resource creation. In
subsequent tutorials you will develop and customize web services for routing, transforming and validating a loan application.

**Setting Up the Tutorials**

Do the following to set up and run the tutorials:

1. Install ALSB
2. Create an ALSB Domain
3. Change Domain Configuration Settings
4. Start ALSB
5. Build and Deploy Business Services
6. Log into ALSB Consoles

The files (including pre-built business services) that support the building of the tutorial solutions are located in the following directory:

```
BEA_HOME\alsb_3.0\samples\servicebus\examples
```

The tutorial files contain properties that you must set to run the tutorials. In the tutorial, you can use four different business services. Each business service also has a set of files associated with it. The structure for each of the business services is the same. The directory structure for one of the business services—the NormalLoan business service, is described in Table 2-1. You can explore the other directories as an exercise.

**Table 2-1**  Sample Files Provided in Support of the Tutorials

<table>
<thead>
<tr>
<th>Filename/Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/src/setEnv.cmd</td>
<td>This file sets the environment properties.</td>
</tr>
<tr>
<td>/src/examples.properties</td>
<td>This file contains business service build and deployment properties.</td>
</tr>
</tbody>
</table>

For each business service:

```
BEA_HOME\alsb_3.0\samples\servicebus\examples\src\examples\webservices\jws_basic\normal
```

The files contained in this directory are those required by the NormalLoan business service. The same file structure exists for the other three business services used in this tutorial (ManagerLoanReview, LoanSaleProcessor, and CreditRating).
Install ALSB

Install ALSB. For installation instructions, see AquaLogic Service Bus Installation Guide.

Create an ALSB Domain

To develop and run the ALSB tutorials, you must create an ALSB domain using the Configuration Wizard. You can invoke the Configuration Wizard in the graphical mode or console mode. For this tutorial, you will start the Configuration Wizard in graphical mode.

1. To start the Configuration Wizard in graphical mode, choose the Configuration Wizard option in the BEA Products group from the Windows Start menu:
   
   **Start > All Programs > BEA Products > Tools > Configuration Wizard**

2. Using the Configuration Wizard, select the following product components:
   
   - WebLogic Server
   - AquaLogic Service Bus

   For more information, see Creating WebLogic Domains Using the Configuration Wizard.

3. In the Welcome page, the Create a new WebLogic domain radio button is selected by default. Accept the default selection and click Next.
b. In the Select Domain Source page, select AquaLogic Service Bus check box. Click Next.
c. In the **Configure Administrator Username and Password** page, configure a new administrator username and password. You can use the default weblogic username, but you must create a unique password. Click **Next** to proceed to the **Configure Server Start Mode and JDK** page.
d. In the **Configure Server Start Mode and JDK** page, Development Mode is selected as the default startup mode for the WebLogic domain. Accept the default settings and click **Next**.
e. In the **Customize Environment and Services Settings** page, the default customization option for the environment and services settings is No. Click **Yes** to change the **Listen Port** in **Configure the Administrator Server**.
Figure 2-5  Customize Environment and Service Settings

Do you want to customize any of the following options?

- The configuration of the Administration Server, including listen address and listen ports
- The number of Managed Servers and attributes, including listen ports
- The number of clusters and cluster attributes
- The number of machines and machine attributes
- The assignment of servers to clusters and machines
- JDBC data sources (if defined)
- JMS file store directories (if defined)

To keep the settings defined in the domain source and proceed directly to creating your domain, leave No selected.

- No

Set the value for **Listen Port** to 7001.
g. Click Next to proceed Configure Managed Servers page. Accept the default options for:
   - Configure Managed Server
   - Configure Machines
   - Configure JDBC Data Sources
   - Run Database Scripts
   - Configure JMS Stores
   
   Click Next on Review WebLogic Domain to go to Create WebLogic Domain page.

h. In the Create Weblogic Domain page specify the domain name as ServiceBusTutorial.  
   Click Create.
When the domain is created successfully, do not click **Start Admin Server**. Click **Done** to finish.

**Start ALSB**

You can start ALSB using one of the following methods:

- On Windows systems, from the Windows Start menu, select:
  
  **Start > All Programs > BEA Products > User Projects > domain_name > Start Server.**
  
  For example, to start the server for the Servicebustutorial domain select **Start > All Programs > BEA Products > User Projects > Servicebustutorial > Start Server**

- On Windows systems, invoke startWebLogic.cmd from the root of the ALSB domain.

- On UNIX systems, invoke startWebLogic.sh from the root of the ALSB domain.

When ALSB is started, a server command console window will display status information about WebLogic Server.
Note: A valid username and password is required to start the server, if a production mode domain is used. For more information about creating and configuring domains, see Creating WebLogic Domains Using the Configuration Wizard.

Load the Client Application

To test the loan application using the test console, you must first deploy the client jars in the WLS console, which are available at \{BEA_HOME}\alsb_3.0\samples\servicebus\examples\build\webservices. The following client jars are available:

- creditLoan_jws_basic_ejb
- largeLoan_jws_basic_ejb
- manager_jws_basic_ejb
- normalLoan_jws_basic_ejb

To deploy creditLoan_jws_basic_ejb client jar:

1. Click **WLS Console** on the dashboard to go to the WLS Console.
   a. In left pane click **Lock and Edit** in the **Change Center**.
   b. Click on **Deployments in Domain Structure** to go to the **Summary of Deployments** page (see Figure 2-8).
c. Click **Install**. Use **Install Application Assistant** (see **Figure 2-9**) to install the client jar you want to deploy.
d. Use this to navigate to
BEA_HOME\alsb_3.0\samples\servicebus\examples\build\webservices

e. Click the radio button associated with creditLoan_jws_basic_ejb (see Figure 2-10). Click Next to choose the targeting style.

Figure 2-10 Choose Client Jar

f. In Choose Targeting Style page accept defaults. Click Next.
g. In Choose Targeting Style (see Figure 2-11) page accept defaults. Click Next to go to Optional Settings page.

h. In Optional Settings (see Figure 2-12) page accept defaults and click Finish. Click Activate the Session.
2. Click **Lock and Edit** to create a new session. In the **Summary of Deployments** page locate the client jar you have installed in Deployments table. Click on the radio button associated with the client jar and click **Start**. Choose Servicing all requests from the drop-down-list (see Figure 2-13).
3. In Start Deployments page click Yes (see Figure 2-14).

For more information on deploying and starting client jars in WLS console, see Enterprise Applications in Administration Console Online Help.

You must repeat step 1 to step 3 to deploy largeLoan_jws_basic_ejb, manager_jws_basic_ejb, and normalLoan_jws_basic_ejb in the WLS console.
Log in to ALSB Console

ALSB Console is a web services management dashboard, which allows you to monitor web services and servers, and perform service management tasks. The console enables you to perform operational tasks such as configuring proxy and business services, setting up security, managing resources, and capturing data for tracking or regulatory auditing. It provides views to monitor current state and health of the ALSB environment by displaying detailed statistics about servers, services, and alerts. The ALSB Console also enables you respond rapidly and effectively to changes in your service-oriented environment.

To log in to ALSB Console

1. Open a browser window and enter the following URL:
   
   http://host:port/sbconsole
   
   where host:port represents the name and port number of the machine on which WebLogic Server is running. The default port for WLS is 7001.
   
   Enter http://localhost:7001/sbconsole URL in your browser to open the ALSB console for the Servicebustutorial domain.

2. The ALSB Console login page is displayed. Enter the username and password that you specified when you created the ALSB tutorial domain.

Note: You can also open the ALSB Console from the Windows Start menu by selecting the following options:

   Start > All Programs > BEA Products > User Projects > Servicebustutorial > AquaLogic Service Bus Admin Console for ALSB Admin Console
Where to Go from Here

After you complete the tasks required to set up the tutorials, you can proceed to Tutorial 1. Routing a Loan Application, which describes how you can configure AquaLogic Service Bus with the resources required for the loan application routing scenario. Each of the tutorials include instructions to design and configure the ALSB resources, and procedures you can use to test the completed configurations.
Tutorial 1. Routing a Loan Application

ALSB enables adaptive message routing between business services in an enterprise environment. Messages can be routed from a client through the ALSB intermediary, to the appropriate business service. ALSB routes messages to one or more destinations, based on the actions configured in the message processing logic. These routing actions are configured using ALSB Console. Routing provides an efficient alternative to building a multitude of static point-to-point web service connections between pairs of systems.

This section includes the following topics:

- Prerequisites
- Tutorial Objectives
- Definition of the Scenario
- Tasks in This Tutorial

Prerequisites

You must complete Getting Started with the ALSB Tutorials before beginning this tutorial.

Tutorial Objectives

The objective of this tutorial is to create and test a routing scenario using the graphical environment provided in ALSB Console. It includes the following tasks:

- Importing Web Service Definition Language (WSDL) files
Tutorial 1. Routing a Loan Application

- Registering business services
- Creating a proxy service
- Configuring content-based routing

This tutorial introduces you to:

- Using ALSB Console
- Implementation details of proxy services: message flows and actions
- Editing XQuery expressions using the XQuery Expression Editor
- Working with context variables to manipulate the content of the message

Definition of the Scenario

A primary mortgage company uses ALSB to route loan applications to appropriate business services based on the interest rate requested. An application containing a request for a rate less than 5% requires management approval and is routed to an appropriate business service for processing. All other loan applications are routed to the appropriate business service for processing.

Figure 3-1 summarizes the logical architecture to support this scenario. It illustrates how ALSB mediates the messaging between the clients and the business services in your enterprise.

Figure 3-1 Expose a Loan Application Request Web Service via ALSB

Overview of the Run-Time Process in ALSB

A client sends a loan application to a proxy service named LoanGateway1. The default proxy service has a conditional routing stage that checks the value of the requested interest rate in the
loan application document. If the interest rate is less than 5%, the loan application is routed to the ManagerLoanReview business service; otherwise it is routed to the NormalLoan business service. The target business service returns a response similar to that shown in Figure 3-42.

**Note:** If the loan application is processed by the NormalLoan business service, MANAGER is replaced with NORMAL in the generated response.

### Required Resources

The following table lists the resources required to develop and run this tutorial.

**Table 3-1 Routing Loan Application Tutorial Resources**

<table>
<thead>
<tr>
<th>Resource Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>normalLoan</td>
<td>This is the WSDL resource.</td>
</tr>
<tr>
<td>NormalLoan</td>
<td>This is business service used by ALSB.</td>
</tr>
<tr>
<td>ManagerLoanReview</td>
<td>This is business service used by ALSB.</td>
</tr>
<tr>
<td>LoanGateway1</td>
<td>This is the ALSB proxy service.</td>
</tr>
</tbody>
</table>

### Tasks in This Tutorial

In this tutorial, ALSB is used to route a loan application within a mortgage company to a target a web service depending on the interest rate requested. Perform the following tasks to design and configure a proxy service and the associated resources in ALSB to implement this use case scenario.

### Prepare the Environment

Ensure that ALSB is running in the domain that you have created for the tutorial and that you have completed the tasks described in Setting Up the Tutorials.

### Create a Session and Set up a Project

Using ALSB Console, you can monitor resources and configurations in ALSB environment. You can perform system monitoring without initiating a session. However, you must first create an session in the ALSB Console to update or delete resources and modify their configuration properties.
The Change Center in the console allows you to create and manage sessions. All updates to the system configuration during the current session are saved as temporary files. These changes effective only when the current session is activated. Figure 3-2 illustrates the Change Center pane available on ALSB Console.

**Figure 3-2 Manage Sessions Using Change Center**

In addition to creating and activating sessions, the Change Center allows you to perform the functions summarized in the Table 3-2.

**Table 3-2 Change Center Options**

<table>
<thead>
<tr>
<th>Click…</th>
<th>To…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create</td>
<td>Create a new session. You must create a session to make changes to the configuration. You can exit this session using the Exit function, then re-enter it by clicking Edit. Once in the session, you can continue to modify the resources.</td>
</tr>
<tr>
<td>Edit</td>
<td>Enter a session that you previously created and exited. You must activate a session before you can use Edit.</td>
</tr>
<tr>
<td>Exit</td>
<td>Discontinue the session and save the session state. Click Edit to re-enter the discontinued session.</td>
</tr>
<tr>
<td>Discard</td>
<td>End the current session without saving the changes.</td>
</tr>
<tr>
<td>Activate</td>
<td>Save the current session’s configuration to the run time. When you click Activate, the Activate Session page is displayed. In this page, the user and session name of the session are displayed. If required, you can add a description. Click Submit to save the current session’s configuration to the run time.</td>
</tr>
</tbody>
</table>

**Note:** It is recommended that you click Create before modifying any system configuration settings on the console. It is a good practice to save your configuration changes.
incrementally. To save and activate configuration changes in the current session, you must click **Activate** after you have completed making a set of changes.

**To create the MortgageBroker Project and File Folders**

In the ALSB system environment, system configuration entities are grouped into user-defined projects. On ALSB Console, the Project Explorer page displays a default project and the various user defined projects under the Projects folder. This page allows you to perform all project configuration tasks. Each project is represented by a project folder on the console. You can add new project folders and navigate the project trees. You can collapse and expand folders as required by clicking them.

There are pre-defined resources types in the ALSB system environment. Each resource type is represented as a sub folder within the Project folder. You can create and configure resources of different types within the resource type folders.

This section describes the tasks to start a session and create a MortgageBroker project under the Projects folder. For this scenario, you will create three resource folders in the MortgageBroker project to hold each of the following pre-defined resource types:

- ProxyService
- BusinessService
- WSDL

**To Start a Session and Create a Project**

1. In the ALSB console Change Center click **Create** to create a new session.

2. In the ALSB Console navigation pane, select the **Project Explorer**.

   The project explorer opens in the navigation pane and a Project page is displayed on the console.

3. In the **Enter New Project Name** field in the Projects section, type **MortgageBroker** as shown in **Figure 3-3**.

**Figure 3-3  Create a Project**

4. Click **Add Project**.
The MortgageBroker project is created and listed in the Project Explorer under Projects. You must create a project folder WSDL first, and add a WSDL resource to it. The WSDLs are the basis on which you create the business services and the proxy service. You subsequently create other folders and resources for this scenario.

To Create a Project Folder

1. In the project explorer, click the MortgageBroker project to open the associated project page.

2. On the Project page, in Folders, enter the folder name in the field provided. In this case, enter WSDL as displayed in Figure 3-4.

3. Click Add Folder.

   The WSDL folder is displayed in the list of project folders for the MortgageBroker project.

4. Repeat step 2 and step 3 to create the following additional folders: ProxyService and BusinessService.

5. When all three folders are created, click Activate, then Submit to save the project directory structure. The Change Center environment setting options are listed in Table 3-2.

Create the WSDL Resources

AquaLogic resources are configured using configuration wizards. Each configuration wizard includes a sequence of pages that prompt you for information about the resource and provide property configuration options.

To Create the normalLoan WSDL Resource

A WSDL defines the public contract (interface specification) between a client and a service, whether the service is a proxy service or a business service. It is the formal description of a web service. A WSDL is used to describe what a web service's interface is, where it resides, and how to invoke it. You create the WSDL resource first since subsequent service registration tasks depend on it. The WSDL is subsequently used to register the business service with the proxy service.
To Import a WSDL

1. In the ALSB console Change Center click **Create** to create a new session.
2. In ALSB Console navigation pane, select the Project Explorer.
3. In the project explorer, click **MortgageBroker** to expand the folder, then click **WSDL** to open the WSDL folder.
4. In the Resources pane, from the Select Resource Type drop-down list, select WSDL.

**Figure 3-5 Select a Resource Type**

The Create a New WSDL Resource page is displayed.

5. Enter the following information in the Create a New WSDL Resource page (see Figure 3-6):
   a. Enter normalLoan as the resource name.
   b. Click **Browse**. Select the WSDL associated with the normal loan process:
      
      BEA_HOME\alsb_3.0\samples\servicebus\examples\src\examples\webservic es\jws_basic\normal\NormalLoanApprovalService.wsdl
   c. Optionally, enter information in the Resource Description field to describe the resource.
   d. The resource is now displayed in the resources pane. The displayed **Create a New WSDL Resource** page must be similar to the page shown in Figure 3-6.

   Click **Save** to create the WSDL resource.
Figure 3-6 Create a WSDL Resource

This step completes the creation of the normalLoan WSDL resource in the WSDL folder. Activate the session. For more information on how to activate a session, see Table 3-2.

Create the managerApproval WSDL Resource

Complete tasks in step 1 to step 5, to create a WSDL resource associated with the ManagerApproval Service, using the procedure in To Import a WSDL section. To import the ManagerApprovalService WSDL resource, you must use the configuration parameters listed in the following table.

<table>
<thead>
<tr>
<th>Configuration Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Name</td>
<td>managerApproval</td>
</tr>
<tr>
<td>ManagerApprovalService WSDL</td>
<td>BEA_HOME\alsb_3.0\samples\servicebus\examples\src\examples\webservices\jws_basic\manager\ManagerApprovalService.wsdl</td>
</tr>
</tbody>
</table>

Create a Proxy Service

In this section, you will create a proxy service. The proxy service is used to route the loan application to the appropriate business service.

To Create the Proxy Service

1. In the ALSB console Change Center click Create to create a new session.
2. In the Project Explorer, select the MortgageBroker project. The project folder is expanded to show the directory structure of the project.

3. Select the ProxyService folder. The MortgageBroker/ProxyService page is displayed.

4. In the Select Resource Type drop-down list, select Proxy Service.

   The Create a Proxy Service - General Configuration page is displayed as shown in Figure 3-7.

   **Figure 3-7  Create a Proxy Service**

   ![Create a Proxy Service](image)

   5. Name the proxy service, LoanGateway1.

   6. In Service Type, select WSDL web service, then click **Browse**.

      The Select a WSDL page is displayed. The proxy service is based on the WSDL resource that you originally created, hence you must reference the resource here.
7. Select the normalLoan WSDL. The Select WSDL Definitions pane is populated with the content categories of the WSDL.

**Figure 3-8  Select WSDL Definition**

![Select WSDL Definitions](image)

<table>
<thead>
<tr>
<th>Name</th>
<th>Path</th>
<th>WSDL Namespace</th>
</tr>
</thead>
<tbody>
<tr>
<td>normalLoan</td>
<td>MortgageBroker/WSDL</td>
<td><a href="http://example.org">http://example.org</a></td>
</tr>
</tbody>
</table>

- a. In Select WSDL Definitions pane, from the Ports category, Click helloPort, which is the WSDL port for the normalLoan WSDL (helloPort).

- b. Click **Submit**. The port name is displayed in the WSDL port text field as shown in **Figure 3-9**.
8. Click **Next** to continue configuring the proxy service.


   **Note:** The protocol you select on this page determines the format for the endpoint URI that you will specify in the next step. The assumed default protocol is http since it is used by most services.

10. Set the Endpoint URI to /loan/gateway1. This is the URI to which the client will send its messages.

11. Accept the default for the **Get All Headers** option (No). The **Create a Proxy Service-HTTP Transport Configuration** page is displayed as shown in Figure 3-10.

12. Click **Next**.
13. Accept the default settings for the HTTP transport configuration in **HTTP Transport Configuration** page (see **Figure 3-11**).

The Create a Proxy Service - Operation Selection Configuration page is displayed as shown in **Figure 3-12**. On this page you will select the metadata accompanying the message, which identifies the web service operation to be invoked.
14. Accept the default selection algorithm (SOAP Body Type). Click Next. The Create a Proxy Service–Summary page is displayed as shown in the Figure 3-13. This page shows a summary of configuration settings for the proxy service.

**Note:** The default service is an RPC web service. As a result, the SOAP body contains the service operation selection information. An operation in a Java web service WSDL corresponds to a public method in the Java web service. If there are multiple public methods accessible to a client, each public method type will have an operation definition in the WSDL. For a SOAP based RPC service, the SOAP body indicates the operation (method) selected by the client. The SOAP header can also specify the operation. However, by convention, the SOAP body defines this.
Before registering the proxy service, you can review the configuration settings and change them if necessary, by clicking Edit icon.

15. After reviewing the proxy service configuration settings, click **Save** to register the service.

**Note:** You must always select Save before activating a session configuration in the Change Center.

The LoanGateway1 proxy service is displayed in the **Resources** pane in the ProxyService folder of the MortgageBroker project. Click the LoanGateway1 link in the Resources pane of MortgageBroker/ProxyServices to go the View a Proxy Service page.
16. The View a Proxy Service page is displayed as shown in Figure 3-15. The Operational Settings tab on this page has options to enable monitoring for the proxy service.

To enable monitoring:

a. Click the Operational Settings tab.

b. Select the Enabled check box for the Monitoring setting.
c. Choose an aggregation interval for the service. The aggregation interval is the period over which aggregated statistics related to the service are computed for display in the ALSB Console dashboard. You can also accept the default value for the Aggregation Interval, which is set to five minutes.

For more information about using the ALSB Dashboard and monitoring services, see: Monitoring in Using the AquaLogic Service Bus Console and AquaLogic Service Bus Operations Guide.

d. Click Update.

e. Click the Back button at the bottom of the View a Proxy Service page, to return to the MortgageBroker/ProxyService folder page.

This step completes the configuration of the LoanGateway1 proxy service in ALSB Console. Activate the session. For more information, see Table 3-2.

Create the Business Services

In the routing a loan scenario, when the interest rate requested on a loan application is greater than or equal to 5%, then the loan application is routed to the normal loan processing service for approval. If the interest rate requested on a loan application is less than 5%, then the loan application must be approved by a manager, therefore it is routed to a manager approval service.

Complete this step to:

- Create the NormalLoan Business Service
- Create the ManagerLoanReview Business Service

Create the NormalLoan Business Service

1. In the ALSB console Change Center click Create to create a new session

2. In the Project Explorer, select the BusinessService folder from the MortgageBroker project tree.

3. In the Select Resource Type drop-down list, select Business Service.
   The Create a Business Service - General Configuration page is displayed as shown in Figure 3-16.
4. Enter a name for the service. In this case, enter NormalLoan.

5. For Service Type, select WSDL web service, then click Browse… . Select the WSDL and port on which to base the business service:
   a. In the WSDL Browser, select the normalLoan WSDL
   b. Select the port (helloPort) for the WSDL.
   c. Click Submit.

The text field for the WSDL port service type is populated with the value selected on the Create a Business Service - General Configuration page.

6. Click Next.

The Create a Business Service - Transport Configuration page is displayed as shown in Figure 3-17.
Tutorial 1. Routing a Loan Application

Figure 3-17 Transport Configuration of a Business Service

7. Accept the default protocol, http.

8. Select none for the Load Balancing Algorithm, since load balancing is relevant only when a service specifies multiple end points.

   When you specify multiple end points and a load balancing algorithm, if one end point is overloaded or not available at run time, the message can be sent to the next service in the list of end point URIs. In this case, there is only one service, therefore accepting the default behavior or selecting none does not effect the behavior of the proxy service at run time.

9. The End Point URI of the business service is the endpoint URI on the server on which the service is deployed. Ensure that the pre-populated value for the End point URI in the Existing URIs field is http://<host:port>/njws_basic_ejb/NormalSimpleBean.

   The host and port values specified for <host:port> represent the machine and port on which your ALSB server is running.

   Note: Delete any invalid endpoint URI in the existing URI list.

10. Accept the default settings for the remaining options on the page and click Next.

   The Create a Business Service-HTTP Transport Configuration page is displayed as shown in Figure 3-18.
11. Accept the default settings on this page, then click Next.

The Create a Business Service-SOAP Binding Configuration page is displayed as shown in Figure 3-19.

12. Accept the default settings on this page, then click Next.

The Create a Business Service-Summary page is displayed as shown in Figure 3-20. You can now check if all the settings of the business service have been implemented correctly.
13. Click **Save** to accept the configuration settings.

To turn on monitoring for the NormalLoan business service, click NormalLoan business service in the **Resources** pane. The View a Business Service page is displayed as shown in **Figure 3-21**. The Operational Settings tab on this page has options to enable monitoring for the business service.
To enable monitoring:

a. Click the **Operational Settings** tab.

b. Select the **Enable Monitoring** check box.

c. Choose an aggregation interval for the service. The aggregation interval is the period over which aggregated statistics related to the service are computed for display in the ALSB Console dashboard. You can also accept the default value for the Aggregation Interval, which is set to five minutes.

For more information about using the ALSB Dashboard and monitoring services, see **Monitoring** in Using the AquaLogic Service Bus Console and **Monitoring ALSB at Runtime** AquaLogic Service Bus Operations Guide.

Click **Update**.
d. Click **Back** in the **View a Business Service** page to return your browser to the MortgageBroker project, BusinessService folder page.

You have completed the configuration of the NormalLoan business service on ALSB Console. Activate the session. For more information, see Table 3-2.

**Create the ManagerLoanReview Business Service**

To create the business service to which a loan application is routed when the interest rate requested in that loan application is less than 5%.

Follow the same tasks as described in the preceding section: **Create the NormalLoan Business Service**, but use the configuration parameters in the following table.

**Table 3-4 ManagerLoanReview Business Service**

<table>
<thead>
<tr>
<th>Configuration Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Service Name</td>
<td>ManagerLoanReview</td>
</tr>
<tr>
<td>ManagerApprovalService WSDL</td>
<td>Select the manager Approval WSDL you created based on:</td>
</tr>
<tr>
<td></td>
<td>BEA_HOME\alsb_3.0\samples\servicebus\examples\src\examples\webservices\jws_basic\manager\ManagerApprovalService.wsdl</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Select the helloPort port.</td>
</tr>
<tr>
<td>EndpointURI</td>
<td>http://<a href="">host:port</a>/mjws_basic_ejb/ManagerSimpleBean</td>
</tr>
<tr>
<td>Load Balancing Algorithm</td>
<td>none</td>
</tr>
</tbody>
</table>

**Summary**

When you complete all the tasks from **Prepare the Environment to Create the Business Services**, you have created two business services (NormalLoan and ManagerLoanReview), a proxy service (LoanGateway1) and two WSDLs (normalLoan and ManagerApprovalService) that are the resources required for this tutorial.

Once you have configured the proxy service with a base configuration you can proceed to the next task (**Configure the LoanGateway1 Proxy Service**) to complete the configuration of the proxy service by adding the routing behavior for the loan application.
Configure the LoanGateway1 Proxy Service

ALSB Message Flows define the implementation of proxy services. Message flows can include zero or more pipeline pairs: request and response pipelines for the proxy service (or for the operations on the service) and error handler pipelines that can be defined for stages, pipelines, and proxy services. Pipelines can include one or more stages, which in turn include actions.

Configure the Routing Behavior of the Message Flow

1. In the ALSB console Change Center click Create to create a new session.

2. In the Project Explorer, select the ProxyService folder from the MortgageBroker project tree.
   
   **Note:** You must be in a session to edit resources. If you have not already done so, click Create in the change center to begin a session to configure the proxy service and edit the message flow.

3. In the Actions column associated with the LoanGateway1 proxy service, double click the Edit Message Flow icon. The **Edit Message Flow** page for the proxy service LoanGateway1 is displayed as shown in **Figure 3-22**.

**Figure 3-22  Edit Message Flow for LoanGateway1 Proxy Service**

4. Click LoanGateway1, and select Add Route from the short-cut menu options.
Routing a Loan Application

**Figure 3-23** Configure Message Flow for LoanGateway1 Proxy Service

RouteNode1 is added in the configuration page as shown in Figure 3-24.

**Figure 3-24** Add a Route Node

5. Click RouteNode1 and select **Edit > Route** from the short-cut menu options.

The Edit Stage Configuration: Route Node page is displayed as shown in Figure 3-25. This page contains a single Add an Action link.

**Note:** A stage is an element of a pipeline and also a container for actions defined in a pipeline. Actions are the elements of a pipeline stage that define the handling of messages as they flow through a proxy service at run time.
6. Click the **Add an Action** link, and select the **Communication > Routing Table** from the short-cut menu options.

The Edit Stage Configuration page changes to display routing table configuration page.
You must configure the routing table to route messages to business services based on the value of the interest rate element in the incoming message. You can configure content-based routing by creating an XQuery expression, using the XQuery Expression Editor.

7. In the Routing table, click <Expression>. The XQuery Expression Editor is displayed.

Figure 3-28 XQuery Expression Editor

8. In the left pane, click Variable Structures.

Figure 3-29 Namespace Definitions Pane

9. The Variable Structures pane is displayed. Select body from the Select Structure drop-down list in the Variable Structures pane.

Figure 3-30 Variable Structures Pane
10. A structural representation of the body element is displayed in the Variable Structures pane.

11. Click + to expand the processLoanApp element, within the $body - processLoanApp (request) element.

**Figure 3-31 processLoanApp Element**

12. Click + to expand the loanRequest element. A graphical representation of the structure of the loanRequest document is displayed. At run time, the proxy service makes its routing decision based on the value in the Rate element of the message.

**Figure 3-32 loanRequest Element**

13. Drag-and-drop the circle associated with the rate element in the XQuery Expression text box. The following XQuery expression is written in the text box:

```
$body/exam:processLoanApp/loanRequest/java:Rate
```

**Note:** The drag-and-drop functionality works only in Internet Explorer (IE) browsers. If you are using a browser other than IE, select the Rate element in the Variable Structures pane. The expression is displayed in the Property Inspector palette. Place the cursor in the XQuery expression text box and click **Copy Property**. The expression is copied to the text box. You can also copy the expression in the palette and paste it in the XQuery Expression text box.
14. Click **Validate** to validate the XQuery. It is a good practice to do this before you submit the expression. The expression is validated for syntax. If there are errors in the expression, they are displayed directly above the Validate button.
15. Click **Save**. The routing table is displayed on the Edit Stage Configuration page. 

\(<\text{Expression}>\) is replaced by the expression that returns the value of the Rate element in the message.

**Figure 3-35 Routing Table View - Expression**

16. In the Operator drop-down list, select `<`. In the associated text field enter the number 5.

The routing table now contains an expression that determines the routing behavior. If the value in the rate element is less than 5, you must route according to the routing table configuration.

**Figure 3-36 Routing Table View - Routing Condition**

17. Click the **Service** link to define the service to which you want to route messages when the rate is less than five. The Select Service page is displayed.

a. Select the ManagerLoanReview business service.

b. Click **Submit**.
18. In the Routing Table Operation drop-down list, select the processLoanApp operation. This is the operation on the ManagerLoanReview business service that is invoked at run-time if the rate requested in the loan application is less than 5.

You have now defined the case to route the loan application to the ManagerLoanReview business service. If the rate specified in the loan application is equal to or greater than five percent, then the message is routed to the NormalLoan business service. The next section describes how you can add a condition to the routing table to account for this case (which is the default case).

**Add a Default (Else) Condition to the Routing Table**

19. Click the **Case** icon, then select Insert Default Case. The else condition (default case) is added to the routing table.

**Figure 3-37 Routing Table Default Condition**

20. In the Default (else) condition, click the **Service** link. The Select Service page is displayed.
   a. Select the NormalLoan business service.
   b. Click **Submit**.

21. In the Default operation drop-down list, select the processLoanApp operation for the service.

   This step completes the configuration of the message flow in the route node: RouteNode1.

After you have completed these tasks, the Edit Stage Configuration page is displayed as shown in **Figure 3-38**.
22. Click **Validate** to validate the RouteNode1 routing configuration.

   **Note:** It is a good practice to validate any updates to the routing behavior before you save the configuration.

23. Click **Save** on the **Edit Stage Configuration** page to save the configuration and return to the **Edit Message Flow** page.

**Figure 3-39 LoanGateway1 Proxy Service Message Flow Map**

24. Click **Save** on the **Edit Message Flow** page and return to the **MortgageBroker/ProxyServices** page.

25. In the Change Center, click **Activate** the session. For more information, see **Table 3-2**.
Summary

Configure the LoanGateway1 Proxy Service completes the configuration of the run-time message routing behavior in the LoanGateway1 Routing Table. A message is routed to the ManagerLoanReview business service if the rate specified in the loan application is less than 5. Otherwise the message is routed to the NormalLoan business service.

Test Your Loan Application Routing Configuration Using the Test Console

After you have configured ALSB to work with the client and the target business services, you can test the configuration. The routing behavior for the proxy service LoanGateway1 in this scenario is based on the interest rate requested in the loan application message. A change in the value of the interest rate results in a change in the routing behavior as follows:

- A value of 4.9 or less causes the message to be routed to the ManagerLoanReview business service.
- A value of 5.0 or greater causes the message to be routed to the NormalLoan business service.

To test the Routing of the Loan Application ManagerLoanReviewService

1. Start WLS Server in ServiceBusTutorial Domain
2. In ALSB Console activate the current session.
3. Click on Resource Browser in the left panel to navigate to Summary of Proxy Services page.
4. Click on Launch Test Console icon in Actions column for LoanGateway1 to launch the test console (see Figure 3-40).
5. Replace the default payload in loanRequest field with the following code:

```xml
<loanRequest xmlns:java="java:normal.client">
  <!--Optional:-->
  <java:Name>Smith</java:Name>
  <!--Optional:-->
  <java:SSN>1234567</java:SSN>
  <!--Optional:-->
  <java:Rate>4.1</java:Rate>
  <!--Optional:-->
  <java:Amount>9000000</java:Amount>
  <!--Optional:-->
  <java:NumOfYear>10</java:NumOfYear>
</loanRequest>
```
6. Accept other default settings and click **Execute**. The response as in **Figure 3-41** is obtained.

**Figure 3-41  Response from the ManagerLoanApplicationReview Service**

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Header/>
  <soap:Body>
    <managerLoanApplicationReview xmlns="http://example.org">
      <return>
        <java:Name xmlns="java:client">Smith</java:Name>
        <java:SSN xmlns="java:client">1234567</java:SSN>
        <java:Rate xmlns="java:client">4.1</java:Rate>
        <java:Amount xmlns="java:client">900000</java:Amount>
        <java:NumOfYear xmlns="java:client">10</java:NumOfYear>
        APPROVED BY THE &lt;b&gt;MANAGER&lt;/b&gt; &lt;b&gt; LOAN APPLICATION REVIEW SERVICE
      </return>
    </managerLoanApplicationReview>
  </soap:Body>
</soap:Envelope>
```

The response message indicates that the proxy service LoanGateway1 routes the request to ManagerLoanReview business service because the interest rate requested is 4 (less than 5).

**To test the Routing of the Loan Application Through normalLoanProcessor**

1. Start WLS Server in ServiceBusTutorial Domain
2. In ALSB Console activate the current session.
3. Click on **Resource Browser** in the left panel to navigate to **Summary of Proxy Services** page.
4. Click on **Launch Test Console** icon in **Actions** column for LoanGateway1 to launch the test console (see **Figure 3-40**)
5. Replace the default payload in loanRequest field with the following code:

```
<loanRequest xmlns:java="java:client">
  <!--Optional:-->
</loanRequest>
```
Accept other default settings and click **Execute**. The response as in Figure 3-42 is obtained.

**Figure 3-42 Response From NormalLoanProcessor**

The response message indicates that the proxy service LoanGateway1 routes the request to NormalLoanProcessor business service because the interest rate requested is 5.3 (greater than 5).
Where to go From Here

Tutorial 2. Transforming a Loan Application

Data transformation is the mapping of data from one format to another, to make information compatible in heterogeneous system environments. ALSB can be configured to route and transforms messages when necessary, based on specific proxy service configurations.

This section includes the following topics:

- Prerequisites
- Tutorial Objectives
- Definition of the Scenario

Prerequisites

You must complete Tutorial 1. Routing a Loan Application before beginning this tutorial.

Tutorial Objectives

This tutorial provides the tasks to create and test a routing and transformation scenario developed using the graphical environment provided in ALSB Console. Using the ALSB Console you will build on what you learned in Tutorial 1. Routing a Loan Application to perform the following tasks:

- Configure content-based routing.
- Use an XPath expression to change the content in the message body.
**Definition of the Scenario**

A primary mortgage company uses ALSB to identify and re-route loan applications that can be sold to secondary loan companies. Loan applications with a principal request of greater than US $25 million are candidates for sale to a secondary loan company. When ALSB receives a loan application meeting these criteria, the applicant’s credit rating information is retrieved (by making a callout to a web service). The credit rating information is added to the loan application. The application is then forwarded to the secondary mortgage company web service to be processed. Loan applications with a principal request equal to or less than US $25 million are routed to a different business service for processing. The target business services respond indicating whether the loan application is approved or rejected.

Figure 4-1 illustrates where ALSB fits in your enterprise to mediate the messaging between the enterprise services and the business services.

**Figure 4-1  Expose a Loan Application Processing Web Service via ALSB**

---

**Overview of the Run-time Process in ALSB**

A primary mortgage company receives a loan application. It is routed through the ALSB proxy service, LoanGateway2, to determine the target business service to process the application. If the loan amount is greater than US $25 million, the application is routed to the LoanSaleProcessor business service. If the amount is less than or equal to US $25 million, the application is routed to the NormalLoan business service. When the loan amount is more than US $25 million, the request pipeline makes a service callout to the CreditRating business service and receives the credit rating of the applicant using the $creditRating variable. To fulfill the interface requirements of the secondary loan company service, the message body is transformed by adding the credit rating details. The transformed message ($body) is routed to a business service that handles applications for large loan amounts. The service returns a response similar to the following:
Loan Application Response: CREDIT RATING: AA: LOAN PURCHASED BY THE LARGE LOANS SERVICE

Required Resources
You will use the MortgageBroker project folder and the directory structure you created in the previous tutorial to hold the project artifacts. The resources required for this scenario are described in the following table.

<table>
<thead>
<tr>
<th>Resource Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>creditRating, loanSale</td>
<td>These are the WSDL resources.</td>
</tr>
<tr>
<td>NormalLoan, LoanSaleProcessor, CreditRating</td>
<td>These are the external business services used by ALSB.</td>
</tr>
<tr>
<td>LoanGateway2</td>
<td>This is the ALSB proxy service.</td>
</tr>
</tbody>
</table>

Tasks in This Tutorial
In this tutorial, you will perform the following tasks:

- Import additional WSDL resources
- Register new business services and proxy services
- Configure the routing behavior for the proxy service, by executing the following tasks:
  - Adding a Service Callout to get a credit rating
  - Changing the namespace and inserting a new <CreditRating> element in the outbound (request) message
  - Reverting the namespace change and removing the <CreditRating> element on the response message.

Prepare the Environment
Ensure that ALSB is running in the domain that you created for the tutorial and that you have completed the tasks described in Tutorial 1. Routing a Loan Application.
Create a Session

For this tutorial, you need to use the MortgageBroker project folder, and the directory structure that you created in Tutorial 1. Routing a Loan Application to hold the project artifacts.

1. In the ALSB console Change Center click Create to create a new session.

2. In the ALSB Console navigation pane, select the Project Explorer.
   
   The project explorer pane is opened in the navigation pane and a project page is displayed in the console.

3. In the project explorer, expand the MortgageBroker project tree to expose the subfolders containing the project artifacts:
   
   – ProxyService
   – BusinessService
   – WSDL

Create the Resources

In this section, you will learn how to import the WSDL resource, and create the proxy service and the business services required for the tutorial.

Create the WSDL Resources

You must create the WSDL resources (loanSale and creditRating) before creating the other resources required for this scenario. WSDL resources are the building blocks for creating the business and proxy services. To import the appropriate WSDLs and create the WSDL resources, follow the tasks described in To Create the normalLoan WSDL Resource section in Tutorial 1.
Routing a Loan Application. However, for this instance, name your resources and base them on the WSDLs listed in the following table.

**Table 4-2 WSDL Configuration Settings**

<table>
<thead>
<tr>
<th>Resource Name</th>
<th>Location of the WSDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>loanSale</td>
<td>BEA_HOME\alsb_3.0\samples\servicebus\examples\src\examples\webservices\jws_basic\large\LargeLoanPurchasingService.wsdl</td>
</tr>
<tr>
<td>creditRating</td>
<td>BEA_HOME\alsb_3.0\samples\servicebus\examples\src\examples\webservices\jws_basic\credit\CreditLoanApprovalService.wsdl</td>
</tr>
</tbody>
</table>

When you complete this task, the MortgageBroker/WSDL folder contains the WSDL resources created in this tutorial and in Chapter 3, “Tutorial 1. Routing a Loan Application” as shown in Figure 4-2.

**Figure 4-2 WSDL Resources**

<table>
<thead>
<tr>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create Resource: Select Resource Type</td>
</tr>
</tbody>
</table>

Create a Proxy Service

In this task, you will create a proxy service. The proxy service is used to route the loan application to the appropriate business service. It also calls a look up service to obtain the credit rating of the requestor if the loan amount requested is greater than US $25 million.

**Note:** No units are assigned to the loan amount, but units can be any currency such as US dollars.
To create a new proxy service, follow the tasks described in *To Create the Proxy Service*. For this instance, use the proxy service name and the endpoint URI listed in the following table.

### Table 4-3  LoanGateway2 Proxy Service Configuration Settings

<table>
<thead>
<tr>
<th>Proxy Service Name</th>
<th>LoanGateway2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service Type</strong></td>
<td>Select the WSDL web service (port or binding) option. Select the normalLoan WSDL in the <strong>Select a WSDL</strong> page. Select the helloPort port in the <strong>Select a WSDL Definition</strong> page.</td>
</tr>
<tr>
<td><strong>Endpoint URI</strong></td>
<td>Click Next to proceed to the <strong>Create a Proxy Service - Transport Configuration</strong> page. Enter /loan/gateway2 as the endpoint URI.</td>
</tr>
</tbody>
</table>

After you complete this task, a summary of the configuration settings for the proxy service is displayed as shown in Figure 4-3. You must review the configuration settings before to registering the proxy service.
When you complete this task, the MortgageBroker/ProxyService folder contains the proxy services that you created in this tutorial and in Tutorial 1. Routing a Loan Application as shown in Figure 4-4.

**Figure 4-4 Proxy Service Resources**

<table>
<thead>
<tr>
<th>Name</th>
<th>Resource Type</th>
<th>Actions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>LoanGateway1</td>
<td>Proxy Service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LoanGateway2</td>
<td>Proxy Service</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Create a Business Service

In this scenario, the proxy service is configured to route to one of several different business services, depending on the business requirements as follows:

- **CreditRatingService**—returns the customer's credit rating when a loan application meeting specified criteria is received. This is implemented using a web service callout (Service Callout).

- **NormalLoan**—is the secondary mortgage company's business service. This service is invoked when a loan application is submitted for an amount of US $25 million or less.

- **LoanSaleProcessor**—is the secondary mortgage company's business service. This service is invoked when a loan application is submitted for amounts greater than US $25 million.

You created the NormalLoan service in Tutorial 1. Routing a Loan Application. To create the LoanSaleProcessor and CreditRatingService business services for this scenario, follow the tasks described in Create the NormalLoan Business Service. You must configure your services using the names, service types, and endpoint URIs listed in the following two tables.

| Table 4-4 Configuration Settings for the LoanSaleProcessor Business Service |
|-----------------------------|-----------------------------|
| **Business Service Name**   | **LoanSaleProcessor**       |
| Service Type                | Select the WSDL web service as the Service Type option. |
|                            | Select the LoanSale WSDL in the Select a WSDL page. |
|                            | Select the helloPort port in the Select a WSDL Definition page. |
| Endpoint URI                | Ensure that the pre-populated value for the Endpoint URI in the Existing URIs field is http://<host:port>/ljws_basic_ejb/LargeSimpleBean where <host:port> represents the machine and port on which the ALSB server is running. |
| Load Balancing Algorithm    | none                        |
When you complete this task, the MortgageBroker/BusinessService folder contains the business services that you created in this tutorial and in Tutorial 1. Routing a Loan Application as shown in Figure 4-5.

### Table 4-5  Configuration Settings for the CreditRating Business Service

<table>
<thead>
<tr>
<th>Business Service Name</th>
<th>CreditRating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Type</td>
<td>Select the WSDL port option. Select the creditRating WSDL in the Select a WSDL page. Select the helloPort port in the Select a WSDL Definition page.</td>
</tr>
<tr>
<td>Endpoint URI</td>
<td>Ensure that the pre-populated value for the endpoint URI in the Existing URIs field is http://<a href="">host:port</a>/crejws_basic_ejb/CreditSimpleBean where <a href="">host:port</a> represents the machine and port on which your ALSB server is running.</td>
</tr>
<tr>
<td>Load Balancing Algorithm</td>
<td>none</td>
</tr>
</tbody>
</table>

When you complete this task, the MortgageBroker/BusinessService folder contains the business services that you created in this tutorial and in Tutorial 1. Routing a Loan Application as shown in Figure 4-5.

### Summary

Upon completing all the tasks from Prepare the Environment to Create the Resources you have created the resources required for this scenario. You have also configured the proxy service with a base configuration. In the following three tasks you will configure the proxy service by adding the routing, transformation, and Service Callout behavior for the loan application messages.
Configure Routing for LoanGateway2 Proxy Service

A proxy service is implemented in ALSB as a message flow, which includes request and response pipelines. This task includes the following tasks:

- Create a Routing Table
- Configure the Routing Expression

Create a Routing Table

1. In the ALSB Console navigation pane, select **Resource Browser**.
   
The **Resource Browser** pane is opened in the navigation pane and the **Summary of Proxy Services** page is displayed in the console.
   
   **Note:** You must be in an session to edit resources.

2. In the Actions column associated with the LoanGateway2 proxy service, click the **Edit Message Flow** icon.

![Edit Message Flow - LoanGateway2](image)

3. Click LoanGateway2, then select **Add Route** from the short-cut menu. In the configuration dialog, **RouteNode1** is added.
Figure 4-7  Edit Message Flow - LoanGateway2 RouteNode1

4. Click RouteNode1 and select Edit Route from the short-cut menu. The Edit Stage Configuration page is displayed and contains a single link, Add an Action.

Figure 4-8  Add an Action Link

5. Click Add an Action, then select Communication > Routing Table from the short-cut menu.

Figure 4-9  Add a Routing Table Element

The Edit Stage Configuration page changes to display the routing table configuration information.
Figure 4-10 Routing Table Configuration Page

To configure the routing table to route messages to business services based on the amount element of the incoming message, you must create an XQuery expression using the XQuery Expression Editor.

Configure the Routing Expression

1. In the Routing Table, click the `<Expression>` link. The XQuery Expression Editor is displayed.

Figure 4-11 XQuery Expression Editor

2. Accept the default selection of XQuery Text in the editor.

3. In the Namespace Definitions pane, click Variable Structures.
4. Click **Variable Structures** to display the Variable Structures pane. Select body from the **Select Structure** drop-down list in the Variable Structures pane.

5. A structural representation of the body element is displayed in the **Variable Structures** pane. Click + to expand the processLoanApp element, within the $body - processLoanApp (request) element.

6. Click + to expand the loanRequest application element. A graphical representation of the structure of the loan application document is displayed. At run time, the proxy service makes its routing decision based on the value in the amount element of the message.
7. Click the Node icon associated with the Amount node element, drag-and-drop it in the XQuery Expression text box. The following XQuery expression is written in the text box.

$\text{body/exam/processLoanApp/loanRequest/java:Amount}

**Note:** The drag-and-drop functionality works only in Internet Explorer (IE) browsers. If you are using a browser other than IE, select the Amount element in the Variable Structures pane. The expression is displayed in the **Property Inspector** palette. Place the cursor in the XQuery expression text box and click **Copy Property**. The expression is copied to the text box. You can also copy the expression in the palette and paste it in the XQuery Expression text box.

8. Click **Validate** to validate the XQuery.

It is good practice to do this before you submit the expression. The expression is validated for syntax. If there are errors in the expression, they are displayed directly above the Validate button. In this case, the expression is valid as shown in Figure 4-15.
Tasks in This Tutorial

9. Click **Save**.

   The routing table is displayed on the **Edit Stage Configuration** page. `<Expression>` is now replaced by the expression that returns the value of the amount element in the message.

10. In the Operator drop-down list, select `>` and in the associated text field, enter the number 25000000 (without commas).

    The routing table now contains an expression that determines the routing behavior. If the value in the Amount field is greater than US $25 million, then messages are routed according to the routing table configuration.

11. Click the **Service** link to define the service to which you want to route when the amount is greater than US $25 million. The **Select Service** page is displayed.

   a. Select the LoanSaleProcessor business service

   b. Click **Submit**.

12. In the **Operation** drop-down list, select the `processLoanApp` operation.

    This is the operation on the LoanSaleProcessor business service that is invoked at run-time if the amount of the loan requested in the loan application is greater than US $25 million.

You have now defined the case for routing the loan application to the LoanSaleProcessor business service as shown in **Figure 4-16**.

---

**Figure 4-15 Validate Routing Expression**

![Routing Expression Validation](image)

9. Click **Save**.

   The routing table is displayed on the **Edit Stage Configuration** page. `<Expression>` is now replaced by the expression that returns the value of the amount element in the message.

10. In the Operator drop-down list, select `>` and in the associated text field, enter the number 25000000 (without commas).

    The routing table now contains an expression that determines the routing behavior. If the value in the Amount field is greater than US $25 million, then messages are routed according to the routing table configuration.

11. Click the **Service** link to define the service to which you want to route when the amount is greater than US $25 million. The **Select Service** page is displayed.

   a. Select the LoanSaleProcessor business service

   b. Click **Submit**.

12. In the **Operation** drop-down list, select the `processLoanApp` operation.

    This is the operation on the LoanSaleProcessor business service that is invoked at run-time if the amount of the loan requested in the loan application is greater than US $25 million.

You have now defined the case for routing the loan application to the LoanSaleProcessor business service as shown in **Figure 4-16**.

---

**Figure 4-16 Routing the Loan Application to LoanSaleProcessor**

![Routing Table](image)
When a loan application with a loan amount greater than US $25 million is identified, a web service callout (Service Callout) is performed to retrieve the customer's credit rating. The credit rating information is added to the loan application. The application is then forwarded to the secondary mortgage company's business service to be processed.

**Configure Routing Request Actions for LoanGateway2 Proxy Service**

This section describes how to configure the proxy service to do the Service Callout and transform the message appropriately for the target service.

**Configure the Service Callout Input Parameter**

A Service Callout is used to send the loan application to the CreditRating business service, which returns the credit rating of an applicant. Before adding the Service Callout action, you must configure the Service Callout input parameter by performing the following tasks:

- Delete the “xsi:type” attribute from the message
- Assign an input parameter for the Service Callout action
- Rename the namespace for the Service Callout input parameter

**Add a Delete Action**

You must delete the “xsi:type” attribute from the message by adding and configuring a Delete action as follows:

1. In the Routing Table Request Actions pane, select **Add an Action** > **Message Processing** > Delete.
The Delete action is added to the Routing Table Request Action pipeline.

2. Select the `<XPath>` in variable option, then click `<XPath>`. The XPath Expression editor is displayed.
   a. In the XPath Expression text box, enter the following expression:
      
      ./exam:processLoanApp/loanRequest/@xsi:type
   b. Click Validate, then Save. You will return to the Edit Stage Configuration page.

3. Enter body in the variable text field of the `<XPath>` in variable option in the Delete action.
   The configuration for the Delete action is therefore:
   
   Delete ./exam:processLoanApp/loanRequest/@xsi:type in variable body as shown in Figure 4-19.
Assign a Service Callout Input Parameter

You must now assign an input parameter for the service callout action as follows:

1. Click on the Delete icon in the Request Actions pane of the Routing Table.
2. Select Add an Action. Then select Message Processing > Assign.
   The Assign action is added to the Request Action pipeline in the Routing Table.

3. Click the <Expression> link. The XQuery Expression editor is displayed.
4. Accept the default selection of XQuery Text in the editor.
5. Navigate to the **Variables Structures** pane. Select body from the Variables Structures drop-down list.

6. Expand the element list. Drag-and-drop the loanRequest element into the XQuery expression text box. The following XQuery expression is written in the text box:

   ```xml
   $body/exam:processLoanApp/loanRequest
   ```

7. Click Validate to validate the XQuery, then Save. The routing table is displayed on the **Edit Stage Configuration** page. `<Expression>` is now replaced by the expression that returns the content of the message to be sent to the **Service Callout** service.

8. Enter `loanRequestVariable` in the variable text box as shown in **Figure 4-21**.

**Figure 4-21  LoanGateway2 Routing Request Assign Action**

This task completes the assignment of value returned by the XQuery expression ($body/exam:processLoanApp/loanRequest) to the `loanRequestVariable` variable.

**Rename Input Variable Namespace**

You must now rename the namespace of the input parameter you have assigned for the Service Callout using the tasks below:

1. Click the **Assign** icon in the Request Actions pane of the Routing Table.

2. Select **Add an Action > Message Processing > Rename**. The Rename action configuration fields are added to the Request Actions pane.
3. In the Rename statement, click the `<XPath>` link. The XPath Expression Editor is displayed.

4. In the XPath Expression text box, enter the following XPath expression:

   ```xpath
   ./java:*
   ```

   This expression identifies every instance of a namespace with a prefix of java.

5. Click Save to save the XPath expression and return to the Edit Stage Configuration page.

6. In the variable text box, enter `loanRequestVariable`.

   You have completed creating a condition in which the XPath expression finds all the namespaces with the java prefix in the `loanRequestVariable` context variable. The next task specifies the namespace to replace the namespaces identified by the XPath expression.

7. Select the namespace option and enter the fully qualified new namespace to be substituted in the message. The new namespace is `java:credit.client`.

   **Note:** The default namespace that you are replacing in this case is `java:normal.client`.

   The Rename action is displayed as shown in Figure 4-23.
Figure 4-23 LoanGateway2 Routing Request Rename Action

Add a Service Callout Action

This section describes how you can configure the Service Callout action to send the loan application to the CreditRating business service, that returns the credit rating of an applicant.

1. In the Request Actions pane of the Routing Table, click the Rename icon.
2. Select Add an Action > Communication > Service Callout.

The Service Callout action is added to the Request Action pipeline in the Routing Table.
3. Click the **Service Callout to <Service>** link. The **Select Service** page is displayed.
   a. In the **Select Service** page, select **CreditRating**.
   b. Click **Submit**.

   The service callout action will be displayed as shown in **Figure 4-25**.

**Figure 4-25  Service Callout Action with Configured Service**

4. From the **Operation** drop-down list, select **processLoanApp**. The fields that allow you to configure the request and response parameters for the service callout are displayed as shown in **Figure 4-26**.

**Figure 4-24  Initial Service Callout Action**
a. In the service callout **Request Parameters** section, set the `loanRequest` parameter to `loanRequestVariable` (the message context variable you defined in the preceding section).

b. In the service callout **Response Parameters** section, set the **return** parameter name to `creditRating` as shown in Figure 4-27.

This task completes the service callout configuration to invoke the creditRating web service. The credit rating returned by this web service is assigned to the `$creditRating` context variable.
Configure Message Transformation

In this section, you will configure the message transformation to match the public contract (interface requirements) of the LoanSaleProcessor business service. You will configure the proxy service to:

- Rename the namespace for the message to the namespace required by the target service using XPath expressions as described in Rename the Message Namespace.
- Insert an new element into the message by adding an element action in the configuration as described in Insert a New Element in the Message.

Rename the Message Namespace

1. Click the Service Callout icon and select Add an Action > Message Processing > Rename. The Rename action configuration fields are added to the Request Actions pane.
2. In the Rename statement, click the <XPath> link. The XPath Expression Editor is displayed.
3. In the XPath Expression text box, enter the following XPath expression:
   \[//java:*\]
   This expression identifies every instance of a namespace with a prefix of java.
4. Click Save to save the XPath expression and return to the Edit Stage Configuration page.
5. In the variable text box, enter body. The body context variable contains the body of the message.
   You have completed creating a condition in which the XPath expression finds all the namespaces with the java prefix in the body context variable. The next task specifies the namespace to replace the namespaces identified by the XPath expression.
6. Select the namespace option and enter the fully qualified new namespace to be substituted in the message. The new namespace you must enter is java:large.client.
   
   **Note:** The default namespace that you are replacing in this case is java:normal.client.
   The Rename action is displayed as shown in Figure 4-28.
Insert a New Element in the Message

1. Click the Rename icon and select Add an Action > Message Processing > Insert.

   The Insert action configuration fields are added to the Request Actions pane.

2. In the Insert action, click Expression. The XQuery Expression editor is displayed. You will add a new namespace on this page in the subsequent tasks.

3. In the Namespace Definitions palette, navigate to the User Defined Namespaces area.
   a. Click Add Namespace.
   b. In the Prefix field, enter lg.
   c. In the URI field, enter java:large.client
   d. Click Add.

   The new namespace is displayed in the User Defined Namespaces area in the Namespace Definitions palette as shown in Figure 4-29.

4. In the XQuery Expression text box, enter the following expression to specify how the new element is constructed:

   `<lg:CreditRating>{data($creditRating)}</lg:CreditRating>

   where:
Tutorial 2. Transforming a Loan Application

- lg: is the namespace of the element that you add to the message that should be associated with the java:large.client namespace.
- {} indicates to the XQuery engine that the content between the {} is not XML and must be interpreted.

At run time, the ScreditRating variable is assigned a credit rating value by the CreditRating business service. (This is the business service to which we configured a Service Callout action in section Add a Service Callout Action).

5. Click Validate, then Save.
   
   Note: It is good practice is to validate the expression before you submit it.

6. In the Insert action, select after from the drop-down list.

7. Click the <XPath> link. The page is displayed.
   
   a. Click Variable Structures. The Variable Structures pane is displayed.
   
   b. In the Select Structure drop-down list in the Variables Structures pane, select body.
   
   c. Expand the element list and drag the Notes element and drop it into the XPath Expression text box.

The following XPath expression is written to the text box

```
./exam:processLoanApp/loanRequest/java:Notes
```

Note: The drag-and-drop functionality works only in Internet Explorer (IE) browsers. If you are using a browser other than IE, select the Notes element in the Variable Structures pane. The XPath expression is displayed in the Property Inspector palette. Place the cursor in the XPath expression text box and click Copy Property. The expression is copied to the text box. You can also copy the expression in the palette and paste it in the XPath Expression text box.

8. In this statement, replace the namespace java with the namespace lg

```
./exam:processLoanApp/loanRequest/lg:Notes
```
9. Click **Validate**, then Save to return to the **Edit Stage Configuration** page.

10. Enter **body** in the Variable text field (the last field in the expression). This is the context variable into which the new `<CreditRating>` element is inserted at run time.

    The Insert action will be displayed as shown in Figure 4-31.

**Figure 4-31 Insert New Element into Message**

![Insert New Element into Message](image)

This task completes the configuration of the outbound message. You have added a credit rating element to the message and changed the message namespace so that the message complies with the public contract (interface) of the target service.

The configuration of the outbound message will be displayed as shown in the following figures.
The next task describes how you can configure the response actions for the LoanGateway2 proxy service.
Configure Routing Response Actions for LoanGateway2 Proxy Service

This section describes how you can configure the response actions in the Routing Table so that the message that is returned by the proxy service to the client complies with the client’s public contract (WSDL). You can configure the proxy service to:

- Remove the <CreditRating> element from the response message as described in **Delete an Element**.
- Revert the namespace to the namespace in the original message: java:normal.client as described in **Add a Rename Action**.

**Delete an Element**

1. Ensure that the **Edit Stage Configuration** page for the routing table that you created and configured in the preceding tasks is open in the ALSB Console.

2. In the routing table **Response Actions** pane, select **Add an Action > Message Processing > Delete**.
   
The Delete action configuration fields are added to the Routing Table Response Actions.

3. Select the **<XPath> in variable option**, then click **<XPath>**. The **XPath Expression Editor** page is displayed.
   
a. In the XPath Expression text box, enter the following expression:
      
      ./exam:processLoanAppResponse/return/lg:CreditRating
      
      where <processLoanAppResponse> is the WSDL operation that was invoked with the string Response appended to it, and return is the WSDL part name.

   b. Click **Validate**, then **Save**. The **Edit Stage Configuration** page is displayed.

4. Enter **body** in the variable text field of the **<XPath> in variable option** in the Delete action.
   
The configuration for the Delete action is therefore:

   Delete ./exam:processLoanAppResponse/return/lg:CreditRating in variable body as shown in **Figure 4-33**.
Figure 4-33  Response Delete Action

You have configured ALSB to remove the <CreditRating> element from the response message, when the message is processed in the response pipeline.

Add a Rename Action

This section describes how you can rename the namespace to the namespace that the client requires, that is java:normal.client.

Note: Recall that you configured the request message to the LoanSaleProcessor business service to change the namespace to that required by that service. (See Rename the Message Namespace).

1. Click the Delete icon, then Add an Action > Message Processing > Rename.
   The Rename action configuration fields are added to the Response Actions pipeline.
2. In the Rename statement, click <XPath>. The XPath Expression Editor is displayed.
   a. In the XPath Expression text box, enter the following expression:
      
      .//lg:*

      This XPath expression finds every namespace with a prefix of lg:
   b. Click Save. The Edit Stage Configuration page is displayed.
3. In the Rename action’s variable text field enter body.
4. Select the namespace option, and in the text field associated with the namespace, enter java:normal.client
   When these tasks are completed, you have specified that ALSB replaces all namespaces with the prefix lg: in the response message with java:normal.client as shown in Figure 4-34.
Tasks in This Tutorial

Figure 4-34  Add Rename Action

After these tasks are complete, the response action configuration of the proxy service will be displayed as shown in Figure 4-35.

Figure 4-35  Configuration of Response Actions of Proxy Service

The last task in the configuration of the routing table for the LoanGateway2 proxy service is to add a default routing case (an else condition) to the case expression.

Add a Default Routing Case

This section describes how you can configure a default routing case for the routing table of the LoanGateway2 proxy service. At run time, if none of the conditions configured in the Routing Table are met, ALSB routes messages according to the configuration of this default case.

1. Click the Case icon, then select Insert Default Case.

   The default case is added after the routing table on the Edit Stage Configuration page.

2. Click <Service> in the default case to display the Select Services page.
a. Select the NormalLoan business service.

b. Click **Submit**.

3. In the default case configuration operation drop-down list, select the operation `processLoanApp` as shown in Figure 4-36.

**Figure 4-36 Add Default Routing Case**

4. Click **Save** to save the route node configuration and return to the **Edit Message Flow** page for the LoanGateway2 proxy service.

5. Click **Save** on each configuration page until you return to the **Edit Message Flow** page.

6. Click **Activate**, and then **Submit** to save the session configuration information.

The message flow map of the proxy service will be displayed as shown in Figure 4-37.

**Figure 4-37 Map of Message Flow of the LoanGateway2 Proxy Service**

**Figure 4-38** shows the complete route node for LoanGateway2.
Figure 4-38  Configuration of the Route Node for LoanGateway2
Test the Loan Application Routing Configuration Using the Test Console

This section describes how to test the loan application using the test console. To test the loan, you must first deploy the client jars in the WLS console. For more information see, Load the Client Application.

To test the Routing of the Loan Application Using LoanSaleProcessor Service

1. Start WLS Server in ServiceBusTutorial Domain
2. In ALSB Console activate the current session.
3. Click on Resource Browser in the left panel to navigate to Summary of Proxy Services page. Click on Launch Test Console icon in Actions column for LoanGateway2 to launch the test console (see Figure 3-40).
4. Replace the default payload in loanRequest field with the following code:

   ```xml
   <loanRequest xmlns:java="java:normal.client">
     <!--Optional:-->
     <java:Name>Smith</java:Name>
     <!--Optional:-->
     <java:SSN>1234567</java:SSN>
     <!--Optional:-->
     <java:Rate>5</java:Rate>
     <!--Optional:-->
     <java:Amount>900000000</java:Amount>
     <!--Optional:-->
     <java:NumOfYear>10</java:NumOfYear>
     <!--Optional:-->
     <java:Notes>Large Loan Processing</java:Notes>
   </loanRequest>
   
   Accept other default settings and click Execute. The response as in Figure 4-39.
The response message indicates that the proxy service LoanGateway2 routes the application to LoanSale Processor processed the request because the amount of the loan requested is greater than US $25 million.

**Test the NormalLoan Business Service**

1. Start WLS Server in ServiceBusTutorial Domain
2. In ALSB Console activate the current session.
3. Click on Resource Browser in the left panel to navigate to Summary of Proxy Services page. Click on Launch Test Console icon in Actions column for LoanGateway2 to launch the test console (see Figure 3-40).
4. Replace the default payload in loanRequest field with the following code:

```xml
<loanRequest xmlns:java="java:normal.client">
    <!--Optional:-->
    <java:Name>Smith</java:Name>
    <!--Optional:-->
    <java:SSN>1234567</java:SSN>
</loanRequest>
```
Tutorial 2. Transforming a Loan Application

Accept other default settings and click **Execute**. The response as in **Figure 4-40**.

**Figure 4-40  Response from NormalLoanProcessor**

The response message indicates that the proxy service LoanGateway2 routes the application to NormalLoanApproval business service processed the request because the amount of the loan requested was less than US $25 million.

**Best Practices**

In this tutorial, you configured the transformation and replaced the namespaces in the Route node. Alternatively, it is possible to configure the same logic in the request pipeline in a pipeline pair.
The work you must do to accomplish the transformation and namespace replacement is the same regardless of the model that you choose.

In the case of the tutorial scenario, it is easier to add the actions to the request and response actions of the existing route node rather than create a separate pipeline pair, add a stage, and then add the transformation actions to that stage.

The following scenario describes a situation in which the choice of the implementation is important:
A route node routes messages to five different services. Each service requires the same transformation. In this scenario, it is a good practice to add a single transformation to a request pipeline rather than configure five identical sets of transformations for each routing configuration of every route node. The run-time execution cost is the same, but the cost of maintaining, configuring, and understanding the latter implementation is higher and requires greater effort.
Chapter 5

Tutorial 3. Validating a Loan Application

ALSB proxy services can be configured to validate messages passed between clients and business services. Validation actions can be configured at any stage in the message handling pipeline. However these actions are usually configured in the early stages to eliminate erroneous messages. XQuery conditional expressions can be used to perform explicit validation during message processing.

You can configure message validation logic in the following ways:

- By validating elements selected by an XPath expression against a top level XML schema element or WSDL resource. For more information about the Validate action, see “Adding an Action” in Proxy Services: Actions in Using the AquaLogic Service Bus Console.

- By validating the message and reporting errors. For more information, see “Adding an Action” in Proxy Services: Error Handlers in Using the AquaLogic Service Bus Console.

This tutorial includes the following topics:

- Prerequisites
- Tutorial Objectives
- Definition of the Scenario
- Tasks in This Tutorial
Prerequisites
You must complete Tutorial 1. Routing a Loan Application and Tutorial 2. Transforming a Loan Application before beginning this tutorial:

Tutorial Objectives
The objective of this tutorial is to provide tasks to configure ALSB resources that implement message validation and error handling, in ALSB Console. This tutorial includes the following:

- Demonstrates a common message validation and error handling pattern using an ALSB proxy service.
- Validates a request pipeline message against a schema type definition in a WSDL.

Features Highlighted
This tutorial exposes you to the following features of ALSB:

- Configuration of a request-response pipeline
- Use of the validate action to raise a validation exception
- Illustration of how a stage error handler can trap an error and return a customized error message

Definition of the Scenario
A primary mortgage company routes every loan application through an ALSB proxy service that validates the message. If the application is:

- Incomplete, it is written to an error directory and an error message is returned to the client.
- Complete, it is routed to a business service for review.
- Approved, the service returns a message indicating whether the loan is accepted or rejected.

Figure 5-1 summarizes the logical architecture to support this scenario and illustrates how ALSB is positioned in the enterprise system environment to mediate the messaging between the client and the business services.
Definition of the Scenario

Overview of the Run-Time Process in ALSB

In this scenario, you can configure ALSB to validate an incoming message in the message flow against a schema definition in a WSDL resource. Every field is checked for valid content. All elements must be populated for the application to be valid. When the value of the loan duration field is not an integer, the validate action raises an error. The context variable, $fault, is populated with the error details. The error is trapped by a stage error handler which replaces the body context variable <Notes> field value with the text of the $fault <reason> element. A Report action then saves the error code and the message body, for later viewing and searching in the console. The Reply action returns the body context variable to the client.

In this scenario, the message routing is as follows:

- Returned by the response pipeline to the client along with the validation error message
- Or
- Forwarded to the NormalLoan business service, which returns the following reply:
  The loan application was accepted.
Required Resources

Use the MortgageBroker project folder and the directory structure that you created in the previous tutorial to hold the project artifacts. The resources required for this scenario are described in the following table.

<table>
<thead>
<tr>
<th>Resource Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>normalLoan</td>
<td>The WSDL resource.</td>
</tr>
<tr>
<td>NormalLoan</td>
<td>The external business service used by ALSB.</td>
</tr>
<tr>
<td>LoanGateway3</td>
<td>The ALSB proxy service.</td>
</tr>
</tbody>
</table>

Tasks in This Tutorial

In this tutorial, ALSB is used to route a loan application within a mortgage company to a target web service. The loan application has to be completed correctly for the application to be processed. If there is an error in the application, ALSB raises a validation exception, and returns an error message to the client.

You will create a proxy service, LoanGateway3, and configure it to route a message to the NormalLoan business service. You will configure the behavior of the proxy service by performing the following tasks:

- Creating a proxy service and edit the request pipeline to include a validate action
- Using the context variable, $fault, to hold the error
- Trapping the error using a stage error handler to write the context variable element $fault<reason> to the value of the body context variable <Notes> field.

Prepare Your Environment

Ensure that ALSB is running in the domain you created for the tutorial and that you have completed the tasks described in Chapter 3, “Tutorial 1. Routing a Loan Application”.
Create a Session

For this tutorial, use the MortgageBroker project folder and the directory structure you created in Chapter 3, “Tutorial 1. Routing a Loan Application” to hold the project artifacts.

1. Click Create in the Change Center to create a new session.
2. In the ALSB Console navigation pane, select the Project Explorer.
   - The Project Explorer pane is opened in the navigation pane and a project page is displayed in the console.
3. In the Project Explorer expand the MortgageBroker project tree to expose the subfolders containing the project artifacts:
   - ProxyService
   - BusinessService
   - WSDL

Create the Resources

In this section, you will create the proxy service, LoanGateway3. You will use the existing normalLoan WSDL resource to validate the content of the message. If the loan application is valid and meets the expected criteria it is routed to the existing NormalLoan business service. The normalLoan WSDL resource and the NormalLoan business service were created in To Create the normalLoan WSDL Resource section in Chapter 3, “Tutorial 1. Routing a Loan Application”.

Create a Proxy Service

In this task, you create a proxy service that is used to route the loan application to the appropriate business service. For creating this proxy service instance, follow the tasks described in To Create the Proxy Service, and use the proxy service name and the endpoint URI specified in Table 5-2.

<table>
<thead>
<tr>
<th>Proxy Service Name</th>
<th>LoanGateway3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Type</td>
<td>Select normalLoan WSDL</td>
</tr>
<tr>
<td>Endpoint URI</td>
<td>/loan/LoanGateway3</td>
</tr>
</tbody>
</table>
While configuring the proxy service, accept the default settings for the HTTP transport configuration, message level security configuration, and default SOAP Body Type operation selection algorithm. When the Create a Proxy Service - Summary page is displayed, you must review the summary of configuration settings before registering the proxy service.
When you complete this task, the **MortgageBroker/ProxyService** folder must contain the following proxy services you created in this tutorial and the previous tutorials:

- LoanGateway1
- LoanGateway2
- LoanGateway3

**Configure the LoanGateway3 Proxy Service**

The proxy service is implemented in ALSB as a message flow. ALSB message flows define the implementation of proxy services using request and response pipelines. Message flows can include zero or more of the following pipeline pairs:

- Request and response pipelines for the operations on the proxy service
- Error handler pipelines defined for stages, pipelines, and proxy services

Each pipeline can include one or more stages, which in turn include actions.
To configure the behavior of the LoanGateway3 proxy service, you must complete the following tasks:

- Create a Pipeline Pair
- Configure the Request Actions for the LoanGateway3 Proxy Service

Create a Pipeline Pair

1. In the ALSB Console navigation pane, select the Project Explorer.
   - The Project Explorer pane is opened in the navigation pane.
   - **Note:** You must be in a session to edit resources. If you have not already done so, begin a session (click **Create** in the Change Center) so that you can configure the proxy service and edit the message flow.

2. In the Actions column associated with the LoanGateway3 proxy service, click the **Edit Message Flow** icon.
   - The **Edit Message Flow** page for the proxy service LoanGateway3 is displayed.

3. Click the LoanGateway3 node, then select **Add Pipeline Pair**.

   *Figure 5-4  Add Pipeline Pair Node*

   ![Add Pipeline Pair Node](image)

The PipelinePairNode1 is created and placed in the message flow. Request and response pipelines are displayed for this node as shown in *Figure 5-5.*
Configure the Request Actions for the LoanGateway3 Proxy Service

You must now configure the Request actions for the proxy service.

1. Click the Request icon, then select Add Stage.
2. Click Stage1, then select Edit Name and Comments.
3. Enter validate loan application and click Save.

The page is displayed as shown in Figure 5-6.

Configure an Action to Perform Message Validation

1. To edit the stage, click validate loan application, then select Edit Stage. The Edit Stage Configuration page is displayed.
2. Select **Add an Action**, then select **Message Processing > Validate** from the drop-down list. The Validate action is added to the stage.

![Figure 5-7 Add Validate Action](image)

3. In the **Validate** statement, click the `<XPath>` link to edit the XPath expression. The XPath Expression Editor is displayed.

![Figure 5-8 XPath Expression Editor](image)

4. Click **Variable Structures**. The **Variable Structures** pane is displayed.

5. In the variables structure pane, from the Select Structure drop-down list, select **body**.
   A structural representation of the body element is displayed in the Variables Structure pane.
   a. Click + beside the `processLoanApp` element to expand the element.
      The `processLoanApp` element is within the `$body - processLoanApp (request)` element.
   b. Click + to expand the `loanRequest` element.
      A graphical representation of the structure of the loan application document is displayed.
c. Drag-and-drop icon associated with the loanRequest element, in the XQuery Expression text box. The XQuery expression is written in the text box.

```
./exam:processLoanApp/loanRequest
```

Figure 5-10  XQuery Expression Editor

![XQuery Expression Editor](image)

**Note:** The drag-and-drop functionality works only in Internet Explorer (IE) browsers. If you are using a browser other than IE, select the loanRequest element in the Variable Structures pane. The expression is displayed in the Property Inspector palette. Place the cursor in the XQuery expression text box and click **Copy Property**. The expression is copied to the text box. You can also copy the expression in the palette and paste it in the XQuery Expression text box.

6. Click **Validate** to validate the XQuery.

It is good practice to do this before you submit the expression. The expression is validated for syntax. If there are errors in the expression, they are displayed directly above the Validate button. In this case, the expression is valid.

7. Click **Save**.
The **Edit Stage Configuration** page displays `<XPath>` which is replaced by the XQuery expression.

8. In the **Variable** text field, enter `body`.

9. Click `<resource>` and select WSDL from the list. The **Select a WSDL** page is displayed.

   You must validate the message against the resource since the proxy service is based on the WSDL resource that you originally created.

**Figure 5-11 WSDL Resource Selection**

10. In the **Select a WSDL** page, select the normalLoan WSDL resource.

   The Select WSDL Definitions pane is populated with the content categories of the WSDL.

   a. In the Select WSDL Definitions pane, from the Types category, select the WSDL type for this WSDL as `loanStruct`.

   **Figure 5-12 WSDL Definitions Pane**

   b. Click **Submit** to complete the selection.

11. Select the Raise Error on validation failure option. The Validate action will be displayed as shown in **Figure 5-13**.
12. Click **Save** to save the configuration.

**Figure 5-13  Configured Message Validate Action**

![Validate](image)
- Validate `/exampleprocess...` on variable `body` against `normalUser` (Type = `toString`)
- Save result of validation in variable
- Raise Error on validation failure

**Note:** Message validation must be done as early as possible in a message flow. This prevents unnecessary processing of invalid message content. By raising an exception, further message processing is stopped and an error response is immediately returned to the client.

Messages can be validated at the route node or using a separate Validate action (as in this case). When you create a Validation stage, message processing is more modular since the configured validate actions logically break down the message flow. If multiple validations are performed on a message, the validate action is logically expanded.

**To Configure the Stage Error Handler**

You must perform the following tasks to configure the Stage Error Handler:

1. Configure error code checking using an **If...Then** action and **Else** actions (Add an **If...Then... action to the Stage Error Handler**).

2. Add a **Replace** action within the If clause of the **If...Then...** action of the stage. This action replaces the Notes element value with the fault context variable reason text. The fault description is returned to the client (Add a **Replace Action to the Stage Error Handler**).

3. Add a **Report** action within the If portion of the **If...Then...** action of the stage (Add a **Report Action to Report the Error**).

4. Add a **Replace** action within the **Then...** section of the stage (as in step 2).

5. Add a **Log** action within the **Then...** action of the stage (Add a **Log Action Within the Else Action**).

6. Add a **Reply** with Failure for both conditions of the stage (Add a **Reply Action to Reply with a Failure Code**).
Add Stage Error Handler Element

1. Click validate loan application, then select Add Stage Error Handler. The Edit Error Handler page is displayed.

2. Click Error Handler, then select Add Stage. The stage1 node is displayed.

Figure 5-14 Add Stage Error Handler

3. Click stage1 and select Edit Name and Comments as shown in Figure 5-15.

Figure 5-15 Edit Stage Error Handler
4. Change the stage name to Reply, then click Save.

**Figure 5-16  Edit Name and Comments of Stage**

The **Edit Stage Configuration** page is displayed as shown in **Figure 5-17**.

**Figure 5-17  Edit Error Handler**

5. To edit the stage, click Reply, then select Edit Stage.

**Add an If...Then… action to the Stage Error Handler**

1. Select Add an Action, then select Flow Control > If...Then…
Figure 5-18  Add Flow Control Action

The If...Then action is added to the Reply stage.

2. Click the If...Then… action <Condition> link to specify the expression that needs to be validated. The Xquery Condition Editor page is displayed.
   a. Select the Builder pane.
   b. In the Comparison Expression pane within the Expression Builder pane, enter $fault/ctx:errorCode in the Operand textbox.

   c. Select the = Operator from the drop-down list.
   d. Enter "BEA-382505" (including double quotes) in the Value pane.
   e. Select the radio button for the And conjunction.

   The Expression Builder pane is displayed as in Figure 5-20:
Tasks in This Tutorial

Figure 5-20 Conditions in the Expression Builder

![Expression Builder](image)

f. Click **Add** to add expression to the **Expressions** textbox.

The following expression is displayed in the textbox:

Figure 5-21 Expressions Textbox

![Expressions Textbox](image)

3. Click **Save** to save the expression and return to the **Edit Stage Configuration** page.

Add a Replace Action to the Stage Error Handler

1. To add a **Replace** select **Add an Action** within the **Then...** portion of the **If...Then** action.

   **Note:** When adding multiple actions on a page, click the action preceding the placement of the new action and select the action to be added from there. actions are added in sequence.

2. Click **to view available options** icon, select **Message Processing > Replace**.
3. In the Replace statement, click the <XPath> link to edit the XPath expression. The XPath Expression Editor page is displayed.

4. In the Variable Structures pane, select body from the Select Structure drop-down list.

   A structural representation of the body element is displayed in the Variable Structures pane.

   a. Click + beside the processLoanApp element to expand the element.

      The processLoanApp element is within the $body - processLoanApp (request) element.

   b. Click + to expand the loanRequest element.

   c. Select the Node icon associated with the Notes element of $body, drag-and-drop it on the XPath expression text box. The following XPath expression is written in the text box.

      
      ..exam:processLoanApp/loanRequest/java:Notes
5. Click **Validate** to validate the expression, then click **Save**.

6. In the **Variable** text field, enter `body`.

7. Click the `<Expression>` link to display the **XQuery Expression Editor** page.

8. In the XQuery Text pane, enter:
   
   \[
   $\text{fault/ctx:reason/text()}
   \]

   **Figure 5-25 Replace Statement XQuery Expression**

9. Click **Validate**, then **Save**.

10. Select **Replace node contents** option. You need not replace the entire node.

    The Replace action is displayed as shown in Figure 5-26.

   **Figure 5-26 Add Error Handler Using Replace Action**
Add a Report Action to Report the Error

Next, you must add a Report action and configure it to report the body context variable as detailed context, and set a key name of errorCode and the key value to the actual error code found in the fault context variable.

1. Click the Replace icon and select Add an Action > Reporting > Report. The report action is added to the page.

**Figure 5-27 Adding a Report Action**

```plaintext
If ($faultErrorText) {
    Replace $javascript:document.body.innerHTML = $faultBodyText;
}
```

The Stage Error Handler is displayed as shown in **Figure 5-28**.

**Figure 5-28 Stage Error Handler with Report Action**

```plaintext
If ($faultErrorText) {
    Replace $javascript:document.body.innerHTML = $faultBodyText;
}
```
2. In the **Report** statement, click the `<Expression>` link. The **XQuery Expression Editor** page is displayed.

3. Accept the default selection of **XQuery Text** in the page.

4. In the Variables Structures pane, select `body - processLoanApp` from the Select Structure drop-down list.
   a. Select the icon associated with the $body element and drag-and-drop it on the XQuery Expression text box.
   
   The $body XQuery expression is typed in the text box.
   
   **Note:** The drag-and-drop functionality works only in Internet Explorer (IE) browsers. If you are using a browser other than IE, select the body element in the Variable Structures pane. The expression is displayed in the Property Inspector palette. Place the cursor in the XQuery expression text box and click **Copy Property**. The expression is copied to the text box. You can also copy the expression in the palette and paste it in the XQuery Expression text box.

   b. Click **Validate**, then Save.
   
   The **Edit Stage Configuration** page is displayed.

5. In the key-value pair table, select the Add a key link.
   a. Enter a name for the key. In this case, enter `errorCode`.

   ![Figure 5-29 Report Action Expression Key](image)

   b. In the key value field, click `<XPath>` link. The **XPath Expression Editor** is displayed.

6. In the **Variable Structures** pane, select `fault` from the Select Structure drop-down list.
Figure 5-30  Fault Variable Structure

a. Drag-and-drop the Node icon associated with the errorCode in the XPath Expression text box.

Type ./ctx:errorCode expression in the text box.

Figure 5-31  Report Action ErrorCode Expression

Note: The drag-and-drop functionality works only in Internet Explorer (IE) browsers. If you are using a browser other than IE, select the errorCode element in the Variable Structures pane. The expression is displayed in the Property Inspector palette. Place the cursor in the XPath expression text box and click Copy Property. The expression is copied to the text box. You can also copy the expression in the palette and paste it into the XPath Expression text box.

This step enables you to index the reporting data by error code. The keys are a convenient way to identify a message. You can use the error code to search for reporting entries in the reporting module.

7. Click Validate to validate the XQuery, then click Save.

8. In the Variable text field, enter fault.

The Report action must be displayed as shown in Figure 5-32.

Figure 5-32  Configured Report Action

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The Edit Stage Configuration page is displayed as shown in Figure 5-33.

Figure 5-33  Request Actions for LoanGateway3 Proxy Service

Add an Else Action to the Stage Error Handler
1. Click the If...Then… icon.
2. Select Add else Condition to add an Else action to the stage error handler.

Add a Replace Action Within the Else Action
1. Select Add an Action > Message Processing > Replace.
2. Execute step 3 to step 10 in the Add a Replace Action to the Stage Error Handler section.

The Edit Stage Configuration page is displayed as shown in Figure 5-34.

Figure 5-34  Edit Stage Configuration Page - Else Replace Action

Add a Log Action Within the Else Action
1. Click the Replace icon within the Else action.
2. Select Add an Action > Reporting > Log.

Figure 5-35 Reporting Log Action

The reply error handler Else action is displayed as shown in Figure 5-35. Add the Log action

Figure 5-36 Reporting Log Action

3. Click the <Expression> link to display the XQuery Expression Editor page. Enter $fault/ctx:reason/text() in the XQuery Text page.

4. Click Validate and Save to validate and save the expression and return to the Edit Stage Configuration page.

5. Enter Other than validation error, in the With Annotation text box.

6. Select Error from the At Severity Level drop-down list.

The completed Else condition must be displayed as shown in Figure 5-37.
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Figure 5-37 LoanGateway3 Proxy Service Request Else Actions

Add a Reply Action to Reply with a Failure Code

1. Click the Report icon under the If...Then action.

2. Select Add an Action > Flow Control > Reply. The reply action is added to the page.

3. Select With Failure option. The Report Reply action is displayed as shown in Figure 5-38.

Figure 5-38 Report Reply Action with Failure Code
4. Click **Save** to save the stage configuration and return to the **Edit Error Handler** page.

5. Click **Save** to save the error handler configuration.

### Add a Default Routing Case

You must now add a **Route Node** to the Pipeline pair and configure it to enable default routing to the NormalLoan business service.

#### Configure the Route Node

1. Click **PipelinePairNode1**, then select **Add Route**.

**Figure 5-39 Pipeline Route Node**

The **Edit Message Flow** page is displayed as shown in **Figure 5-40**.
2. Click RouteNode1, then select Edit Route. The Edit Stage Configuration page is displayed.

3. Click Add an Action, then select Communication > Routing.

The Route to action is displayed in the Edit Stage Configuration page as shown Figure 5-42.
4. In the route statement, click the <Service> link to define the service to which you want to route messages. The Select Service page is displayed as shown in Figure 5-43.

Figure 5-43 Route to Statement Service

<table>
<thead>
<tr>
<th>Name</th>
<th>Path</th>
<th>Resource Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>CreditRating</td>
<td>MortgageBroker/BusinessService</td>
<td>Business Service</td>
</tr>
<tr>
<td>LoanGateway1</td>
<td>MortgageBroker/ProxyService</td>
<td>Proxy Service</td>
</tr>
<tr>
<td>LoanGateway2</td>
<td>MortgageBroker/ProxyService</td>
<td>Proxy Service</td>
</tr>
<tr>
<td>LoanGateway3</td>
<td>MortgageBroker/ProxyService</td>
<td>Proxy Service</td>
</tr>
<tr>
<td>LoanSalesProcessor</td>
<td>MortgageBroker/BusinessService</td>
<td>Business Service</td>
</tr>
<tr>
<td>ManagerLoanReview</td>
<td>MortgageBroker/BusinessService</td>
<td>Business Service</td>
</tr>
<tr>
<td>NormalLoan</td>
<td>MortgageBroker/BusinessService</td>
<td>Business Service</td>
</tr>
</tbody>
</table>

a. Select the NormalLoan business service.
b. Click Submit and return to the Edit Stage Configuration page.

5. In the Operation drop-down list, select processLoanApp. Click Save.

This is the operation on the NormalLoan business service that is invoked at run time. You have now defined the case for routing the loan application to the NormalLoan business service. The Edit Message Flow page is displayed as shown in Figure 5-44.
6. Click **Save** to save the configuration and return to the **MortgageBroker/ProxyService** page.

7. Click **Activate**, then Submit.

You can view the map of the message flow of the proxy service as shown in Figure 5-45.

**To Test the Loan Application Routing Configuration Using Test Console**

Now that you have configured ALSB to work with the client and the target business services, you must test the configuration. To test the routing configuration, you must change the value of the Loan duration (in years) field in the build.xml file. Then you must test the routing logic by
verifying whether the proxy service behavior changes for different loan values. If the loan value entered is a non integer, an exception must be triggered and an error message displayed in the Notes field of the message. If the loan value entered is an integer, the message must be routed to the NormalLoan business service. The message returned in the command window indicates whether a validation exception occurred or the message was routed to the appropriate business service.

To test the loan application using the test console, you must first deploy the client jars in the WLS console. For more information see, Load the Client Application.

**To test the Validation of the Loan Application by LoanGateway3**

**Scenario One**

1. Start WLS Server in ServiceBusTutorial Domain
2. In ALSB Console activate the current session.
3. Click on Resource Browser in the left panel to navigate to Summary of Proxy Services page. Click on Launch Test Console icon in Actions column for LoanGateway3 to launch the test console (see Figure 3-40).
4. Replace the default payload in loanRequest field with the following code:

```xml
<loanRequest xmlns:java="java:normal.client">
  <!--Optional:-->
  <java:Name>Smith</java:Name>
  <!--Optional:-->
  <java:SSN>1234567</java:SSN>
  <!--Optional:-->
  <java:Rate>5</java:Rate>
  <!--Optional:-->
  <java:Amount>900000000</java:Amount>
  <!--Optional:-->
  <java:NumOfYear>10.1</java:NumOfYear>
  <!--Optional:-->
  <java:Notes>Large Loan Processing</java:Notes>
</loanRequest>
```
Accept other default settings and click **Execute**. The response as in **Figure 5-46**.

**Figure 5-46 Response from Error Handler**

![Response Document](image)

This response message indicates that a validation exception occurred because the loan duration specified was not an integer.

**Scenario Two**

1. Start WLS Server in ServiceBusTutorial Domain
2. In ALSB Console activate the current session.
3. Click on **Resource Browser** in the left panel to navigate to **Summary of Proxy Services** page. Click on **Launch Test Console** icon in **Actions** column for LoanGateway1 to launch the test console (see **Figure 3-40**).
4. Replace the default payload in loanRequest field with the following code:

```xml
<loanRequest xmlns:java="java: normal.client">
  <!--Optional:-->
</loanRequest>
```
Accept other default settings and click **Execute**. The response as in

**Figure 5-47 Response From Normal Loan Processor**

The response message indicates that the NormalLoan business service processed the loan application because the loan duration value was an integer.
Step 7: Using Reporting and Monitoring

Now that you have tested the proxy service, you can explore the reporting and monitoring features of the ALSB Console.

Note: You must have run the tests in To Test the Loan Application Routing Configuration Using Test Console multiple times (at least five times) to generate data to enable you to explore the reporting and monitoring features.

Reporting

ALSB includes a JMS Reporting Provider for message reporting. The Reporting module in the ALSB Console displays the information captured from this reporting provider. You can create your own reporting provider using the Reporting Service Provider Interface (SPI) if you do not wish to use the out-of-the-box reporting provider.

The dashboard of ALSB Console contains reporting features that are presented in a drill-down format. When you explore the links presented, the information is made available to you.

For more information, see:

- Reporting in AquaLogic Service Bus Operations Guide
- Reporting in Using the AquaLogic Service Bus Console

Monitoring

ALSB can monitor and collect run-time information for both systems operations and business auditing purposes. ALSB aggregates run-time statistics that you can view on a customizable Dashboard. The Dashboard allows you to monitor the health of the system and alerts you to problems in your messaging services. With this information, you can quickly and easily isolate and diagnose problems as they occur.

For more information, see:

- Monitoring in AquaLogic Service Bus Operations Guide
- Monitoring in Using the AquaLogic Service Bus Console