Chapter 5
WS Security in GlassFish ESB

Michael.Czapski@sun.com, Revision 0.4.2, January, 2010

In this document I explore the effects of selected web services security policies on SOAP message exchange in the GlassFish ESB v2.1 (and v2.2 as of December 2009 – rev 0.4)

To provide early access I intend to release revisions of this document as significant new sections become available.

This is a work-in-progress document.

Rev 0.1: Content
- Assumptions and Notes
- Person Service XML Schema and WSDL Interface
- Common XML Project
- PersonSvc BPEL Module
- PersonCli BPEL Module
- JBI-based Person Service – Plain End-to-End
- JBI-based Person Service – SSL with Server-side Authentication

Rev 0.2: Additional Content
- JBI-based Person Service – SSL with Mutual Authentication (broken)
- EJB-based Person Service – No security
- EJB-based Person Service – SSL with Server-side Authentication

Rev 0.3: Additional Content
- EJB-based Person Service – SSL with Mutual Authentication
- JBI-based Person Service - Exploring WS-Addressing

Rev 0.4.1: Additional and Changed Content
- Modified sections 5.8 and 5.9 (SSL Server side and mutual authentication)
- Using WS-Addressing for Explicit Dynamic Routing
- Pre-requisite Cryptographic Objects [TBC]
- Upgrading Metro to version 1.5 [TBC]
- Username Token Profile 1.0 (2004) Policy [TBC]

Rev 0.4.2: Added and Changed Content
-

Table of Content

5.1 Chapter Content

GlassFish ESB v2.x uses the Metro stack for web services standards support.

This chapter explores selected methods of applying security to the channel over which SOAP messages are exchanged and the SOAP messages themselves, using a basic BPEL 2.0-based invoker and provider set.

A pair of projects, an invoker and a provider, are used to provide the logic. Composite Applications are used to apply different variants of security policies. There will be one pair of Composite Applications for each security policy to demonstrate that security is a non-functional requirement and to show how security policy and application logic can be separated, most of the time, such that change in one does not require change to the other.

The following aspects of security policies are explored:

- None
- HTP BC Channel Security - SSL / TLS with Server-side Authentication
- HTTP BC Channel Security - SSL / TLS with Mutual Authentication
- EJB Channel Security - SSL / TLS with Server-side Authentication
- EJB Channel Security - SSL / TLS with Mutual Authentication
- JBI-based Service – Exploring WS-Addressing
- Pre-requisite Cryptographic Objects
- Message Encryption
-

For each variant an end-to-end solution will be built and exercised. Server.log traces from both sides will be inspected and discussed as necessary to clarify what is happening during the process.

5.2 Assumptions and Notes

To explore different options for securing web services in GlassFish ESB v2.x it is necessary to obtain and install the GlassFish ESB v2.x software. Distribution, as at September 2009, can be downloaded from https://open-esb.dev.java.net/Downloads.html (as of December 2009 GlassFish ESB v2.2 is available). Since installation of GlassFish ESB is adequately documents, see http://wiki.open-esb.java.net/Wiki.jsp?page=UsingTheGlassFishESBInstallationGUI, installation instructions are not repeated here. It is assumed that the GlassFish ESB v2.x installation exists and is functional. This also assumes that the NeBeans 6.x IDE, distributed as part of GlassFish ESB, is installed and operational. Issues have been reported with different version of the JDK 6. GlassFish ESB installation used for examples developed in this chapter uses JDK 1.6.0_16.

Exploration of channel security, while possible with a single installation of GlassFish ESB, will be easier if two instances of GlassFish ESB, on two different hosts, are available. If not, it will be hard for the reader to follow SSL Handshake log messages and figure out which are produced by the invoker and which are produced by the provider. Examples in this chapter will use two separate hosts for these projects. Typically, the server-side implementation will be deployed to a host whose fully qualified domain name (FQDN) is orad1.ssc and client-side implementation will be deployed to a host whose FQDN is mcz02.aus.sun.com.

> **Note**
>
> In January 2010 I switched to using a virtual host for the “remote” side of the two-host configuration. My Blog entry “GlassFish ESB v2.2 Field Notes - Installig GlassFish ESB on the Basic JeOS Appliance for LB and HA Testing”, at http://blogs.sun.com/javacapsfieldtech/entry/glassfish_esb_v2_2_field, discusses the process of building a VMware appliance with GlassFish ESB v2.2 runtime. This appliance can be used to substitute for a physical second host.

It is assumed that the NetBeans IDE and one instance of the GlassFish Application Server are co-hosted on the same machine. Each time I use the expression “the local instance of the GlassFish” I mean the instance of the GlassFish which is resident on the same host as the NetBeans IDE used for development. If this is not the environment you use adjust as required.

5.3 Person Service XML Schema and WSDL Interface

A basic web service provider, which we will develop and use to explore web services security, will accept a request with a person identifier and will return a small set of person details for the selected person. This is a request/reply service. Since data returned by the service is not of importance we will not bother with details such as searching a database for person details. We will simply hardcode the response.

The request and response messages will conform to the XML Schema shown in Listing 5.3.1.

Listing 5.3.1 ***Person XML Schema***

```
<?xml version="1.0" encoding="UTF-8"?>

<xsd:schema
    xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    targetNamespace="http://xml.netbeans.org/schema/Person"
    xmlns:tns="http://xml.netbeans.org/schema/Person"
    elementFormDefault="qualified"
    >

    <xsd:element name="PersonReq">
        <xsd:complexType>
            <xsd:sequence>
                <xsd:element name="PersonID" type="xsd:string"/>
            </xsd:sequence>
        </xsd:complexType>
    </xsd:element>

    <xsd:element name="PersonRes">
        <xsd:complexType>
            <xsd:sequence>
                <xsd:element name="PersonID" type="xsd:string"/>
                <xsd:element name="FamilyName" type="xsd:string"/>
                <xsd:element name="MiddleInitials"
                             type="xsd:string" minOccurs="0"/>
                <xsd:element name="GivenName" type="xsd:string"/>
                <xsd:element name="Gender" type="xsd:string" minOccurs="0"/>
                <xsd:element name="AddressDetails" minOccurs="0">
                    <xsd:complexType>
                        <xsd:sequence>
                            <xsd:element name="StreetAddress"
                                         type="xsd:string" minOccurs="0"/>
                            <xsd:element name="CityTown"
                                         type="xsd:string" minOccurs="0"/>
                            <xsd:element name="PostCode"
                                         type="xsd:string" minOccurs="0"/>
                            <xsd:element name="StateProvince"
                                         type="xsd:string" minOccurs="0"/>
                            <xsd:element name="Country"
                                         type="xsd:string" minOccurs="0"/>
                        </xsd:sequence>
                    </xsd:complexType>
                </xsd:element>
                <xsd:element name="CreditCardDetails" minOccurs="0">
                    <xsd:complexType>
                        <xsd:sequence>
                            <xsd:element name="CardType"
                                         type="xsd:string" minOccurs="0"/>
```

```
                            <xsd:element name="CardNumber"
                                         type="xsd:string" minOccurs="0"/>
                            <xsd:element name="ExpiryDate"
                                         type="xsd:string" minOccurs="0"/>
                            <xsd:element name="SecurityCode"
                                         type="xsd:string" minOccurs="0"/>
                        </xsd:sequence>
                    </xsd:complexType>
                </xsd:element>

            </xsd:sequence>
        </xsd:complexType>
    </xsd:element>

    <xsd:element name="PersonFlt">
        <xsd:complexType>
            <xsd:sequence>
                <xsd:element name="PersonID" type="xsd:string"/>
                <xsd:element name="FaultDetail" type="xsd:string"/>
            </xsd:sequence>
        </xsd:complexType>
    </xsd:element>

</xsd:schema>
```

The service interface will conform to the WSDL interface document shown in Listing 5.3.2. This service uses messages defined in the Person XML Schema shown in Listing 5.3.1.

Listing 5.3.2 ***PersonAbsSvc WSDL Interface Document***

```
<?xml version="1.0" encoding="UTF-8"?>
<definitions
    name="PersonAbsSvc"
    targetNamespace="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc"
    xmlns="http://schemas.xmlsoap.org/wsdl/"
    xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns:tns="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc"
    xmlns:ns="http://xml.netbeans.org/schema/Person"
    xmlns:plnk="http://docs.oasis-open.org/wsbpel/2.0/plnktype">
    <types>
        <xsd:schema
            targetNamespace="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc">
            <xsd:import
                namespace="http://xml.netbeans.org/schema/Person"
                schemaLocation="Person.xsd"/>
        </xsd:schema>
    </types>
    <message name="getPersonDetailsRequest">
        <part name="msgPersonDetailsReq" element="ns:PersonReq"/>
    </message>
    <message name="getPersonDetailsResponse">
        <part name="msgPersonDetailsRes" element="ns:PersonRes"/>
    </message>
    <message name="getPersonDetailsFault">
        <part name="msgPersonDetailsFlt" element="ns:PersonFlt"/>
    </message>
    <portType name="PersonAbsSvcPortType">
        <operation name="getPersonDetails">
            <input name="input1" message="tns:getPersonDetailsRequest"/>
            <output name="output1" message="tns:getPersonDetailsResponse"/>
            <fault name="fault1" message="tns:getPersonDetailsFault"/>
        </operation>
```

```
    </portType>
    <plnk:partnerLinkType name="PersonAbsSvc">
        <plnk:role name="PersonAbsSvcPortTypeRole"
                   portType="tns:PersonAbsSvcPortType"/>
    </plnk:partnerLinkType>
</definitions>
```

Note that this WSDL document only defines the Abstract part of the interface. We will in most cases add concrete part for each project variant we will explore. This WSDL definition will be named PersonAbsSvc.

To save the effort the client implementation will be exposed as a web service and will be triggered using a SoapUI web service testing project. The interface definition, TriggerCon, is shown in Listing 5.3.3.

Listing 5.3.3 ***TriggerCon WSDL Interface Document***

```
<?xml version="1.0" encoding="UTF-8"?>
<definitions
    name="TriggerCon"
    targetNamespace="http://j2ee.netbeans.org/wsdl/CommonXML/TriggerCon"
    xmlns="http://schemas.xmlsoap.org/wsdl/"
    xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns:tns="http://j2ee.netbeans.org/wsdl/CommonXML/TriggerCon"
    xmlns:ns="http://xml.netbeans.org/schema/Person"
    xmlns:plnk="http://docs.oasis-open.org/wsbpel/2.0/plnktype"
    xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/">
    <types>
        <xsd:schema
            targetNamespace="http://j2ee.netbeans.org/wsdl/CommonXML/TriggerCon">
            <xsd:import
                namespace="http://xml.netbeans.org/schema/Person"
                schemaLocation="Person.xsd"/>
        </xsd:schema>
    </types>
    <message name="triggerPersonRequest">
        <part name="msgPersonDetailsReq" element="ns:PersonReq"/>
    </message>
    <message name="triggerPersonResponse">
        <part name="msgPersonDetailsRes" element="ns:PersonRes"/>
    </message>
    <message name="triggerPersonFault">
        <part name="msgPersonDetailsFlt" element="ns:PersonFlt"/>
    </message>
    <portType name="TriggerConPortType">
        <operation name="triggerPerson">
            <input name="input1" message="tns:triggerPersonRequest"/>
            <output name="output1" message="tns:triggerPersonResponse"/>
            <fault name="fault1" message="tns:triggerPersonFault"/>
        </operation>
    </portType>
    <binding name="TriggerConBinding" type="tns:TriggerConPortType">
        <soap:binding style="document"
            transport="http://schemas.xmlsoap.org/soap/http"/>
        <operation name="triggerPerson">
            <soap:operation/>
            <input name="input1">
                <soap:body use="literal"/>
            </input>
            <output name="output1">
                <soap:body use="literal"/>
```

```
            </output>
            <fault name="fault1">
                <soap:fault use="literal" name="fault1"/>
            </fault>
        </operation>
    </binding>
    <service name="TriggerConService">
        <port name="TriggerConPort" binding="tns:TriggerConBinding">
            <soap:address location=
            "http://localhost:${HttpDefaultPort}/TriggerConService/TriggerConPort"/>
        </port>
    </service>
    <plnk:partnerLinkType name="TriggerCon">
        <plnk:role name="TriggerConPortTypeRole" portType="tns:TriggerConPortType"/>
    </plnk:partnerLinkType>
</definitions>
```

This is a concrete interface. Remember to change the FQDN of the host in the WSDL to that of your host.

5.4 Common XML Project

Let's create a Project Group to contain projects developed in this chapter. This project group will be called WSPolicyExploration and will contain the common XML artifacts, the Person XML Schema, the PersonAbsSvc WSDL and the TriggerCon WSDL.

Let's create a New Project … -> SOA -> BPEL Module, named CommonXML. Figures 5.4.1 and 5.4.2 show important steps in the process. This BPEL project is just a convenient location for the XML documents we will be creating.

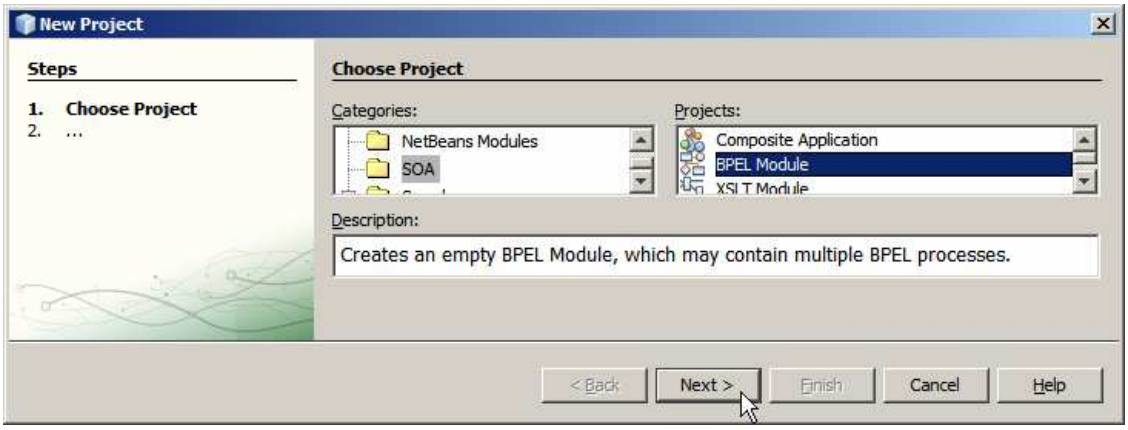


Figure 5.4.1 ***Create BPEL Module***

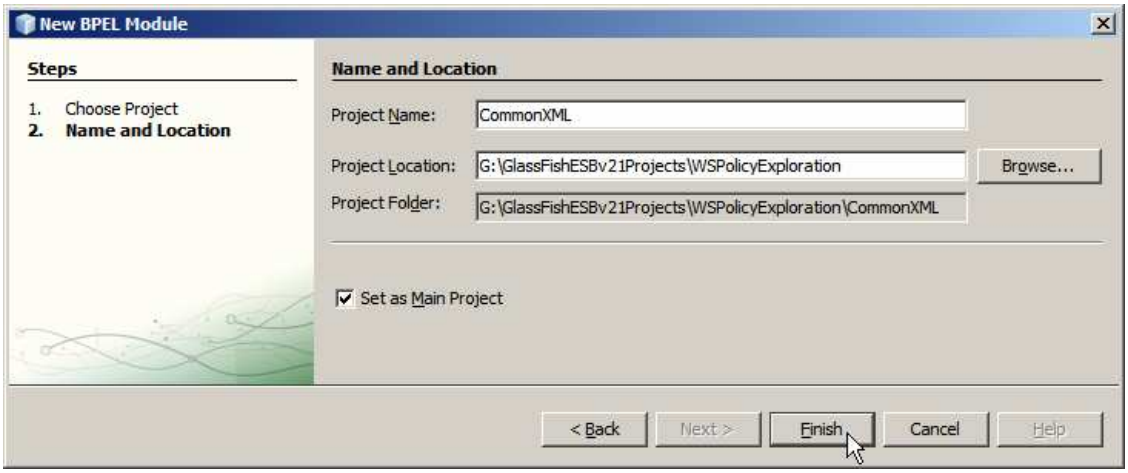


Figure 5.4.2 ***Naming the project and specifying location***

The skeleton BPEL process model, commonXML.bpel, can be deleted since it will not be used.

Right-click the project name and choose New … -> Other … -> XML -> XML Schema, Figure 5.4.3.

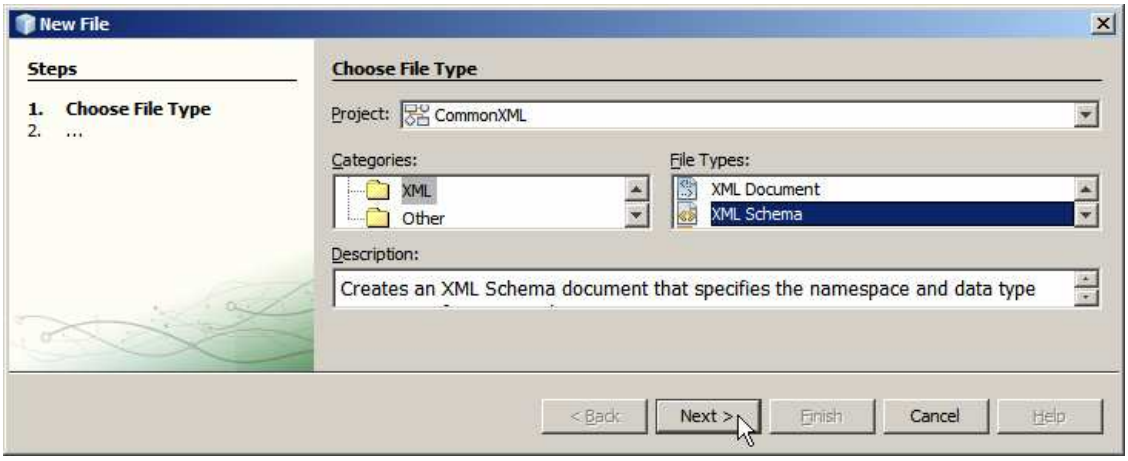


Figure 5.4.3 *Create a new XML Schema*

Name this schema Person and click Finish.

When the new XML Schema document opens in the editor window, switch to the Source view and select all the text. Figure 5.4.4 illustrates this.

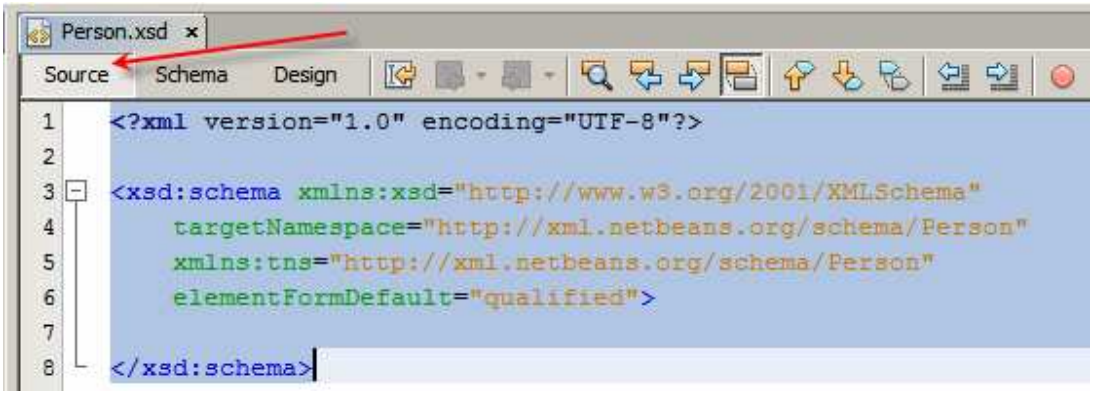


Figure 5.4.4 *Select the content of the new XML Schema document*

Paste XML Schema text from Listing 5.3.1 in place of the selected text. Check XML and Validate XML, illustrated in Figure 5.4.5, and resolve any issues that might have arisen.

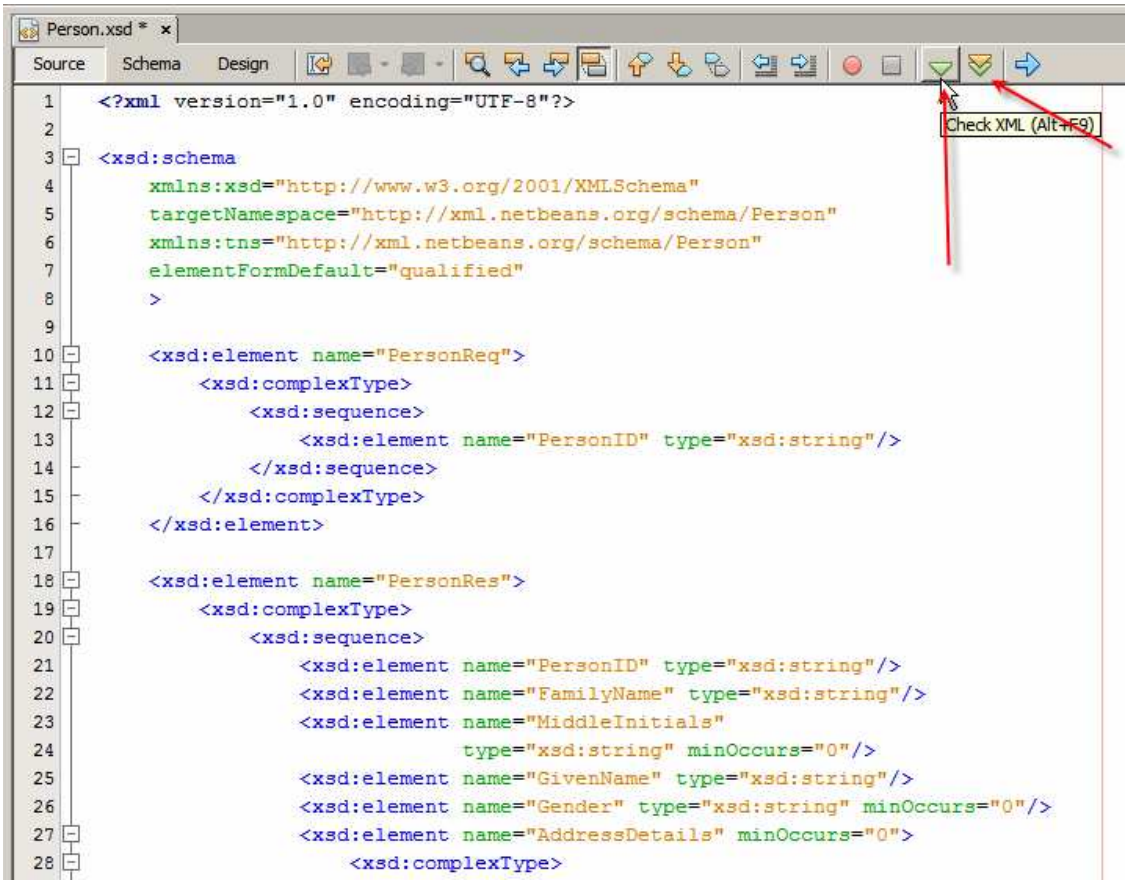


Figure 5.4.5 *Check and Validate*

Save the new schema.

Create a New … -> WSDL Document …, named PersonAbsSvc. This will be an Abstract WSDL Document. Figure 5.4.6 illustrates the first dialogue box involved in the process.

Click Next to advance to the next panel.

Change the name of the operation to getPersonDetails. Change names of Input and Output message parts to msgPersonDetailsReq and msgPersonDetaislRes respectively. Add a new Fault message part and name it msgPersonDetaislFlt. Figure 5.4.7 illustrated the dialogue box at this point in the process.

For each message part click the small ellipsis button and choose appropriate element from the Person XML Schema. For msgPersonDetailsReq it will be PersonReq, for msgPersonDetailsRes it will be PersonRes and for msgPersonDetailsFlt it will be PersonFlt. Figure 5.4.8 illustrates a step in this process. Figure 5.4.9 shows the dialogue box with all parts with correct elements.

Click Finish to complete the wizard. The resulting WSDL should look like that shown in Listing 5.3.2.

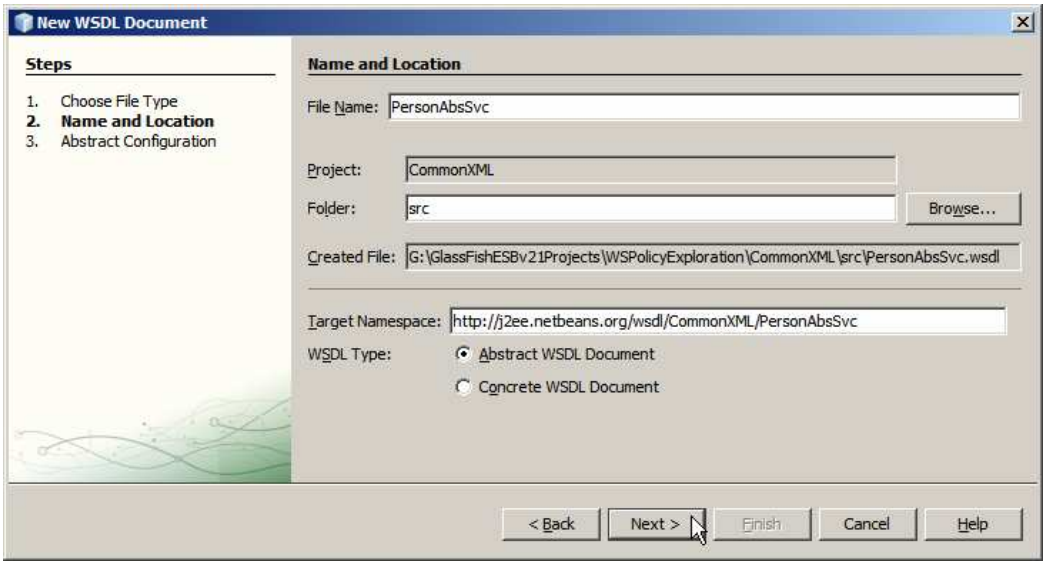


Figure 5.4.6 *Create a new Abstract WSDL, step 1*

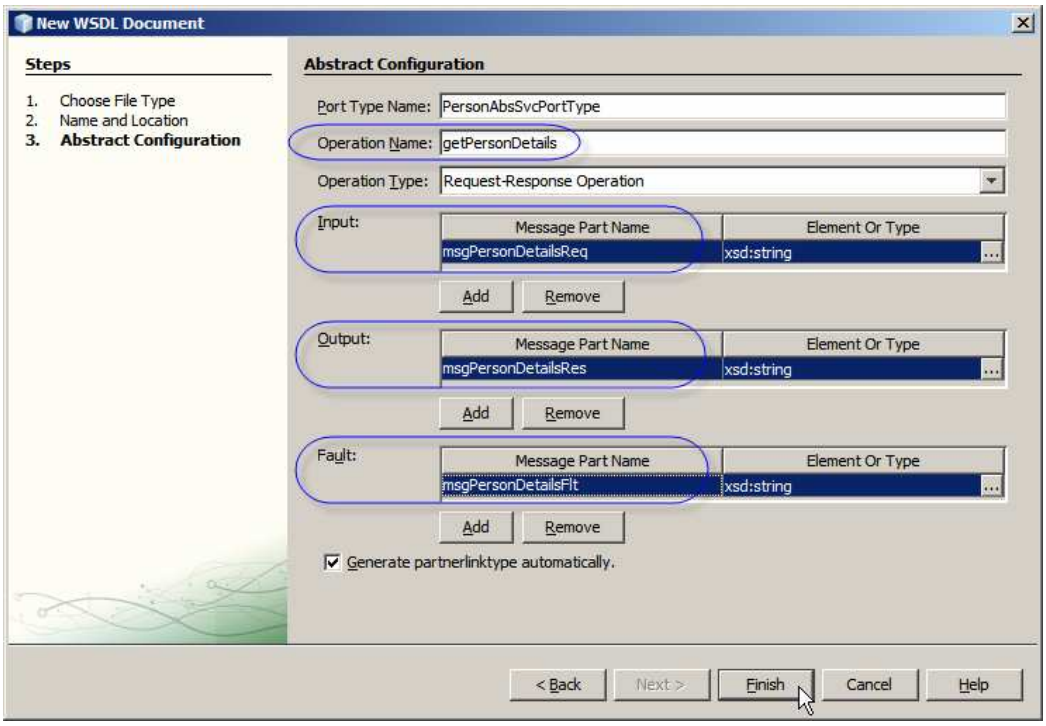


Figure 5.4.7 *Name operation and message parts*

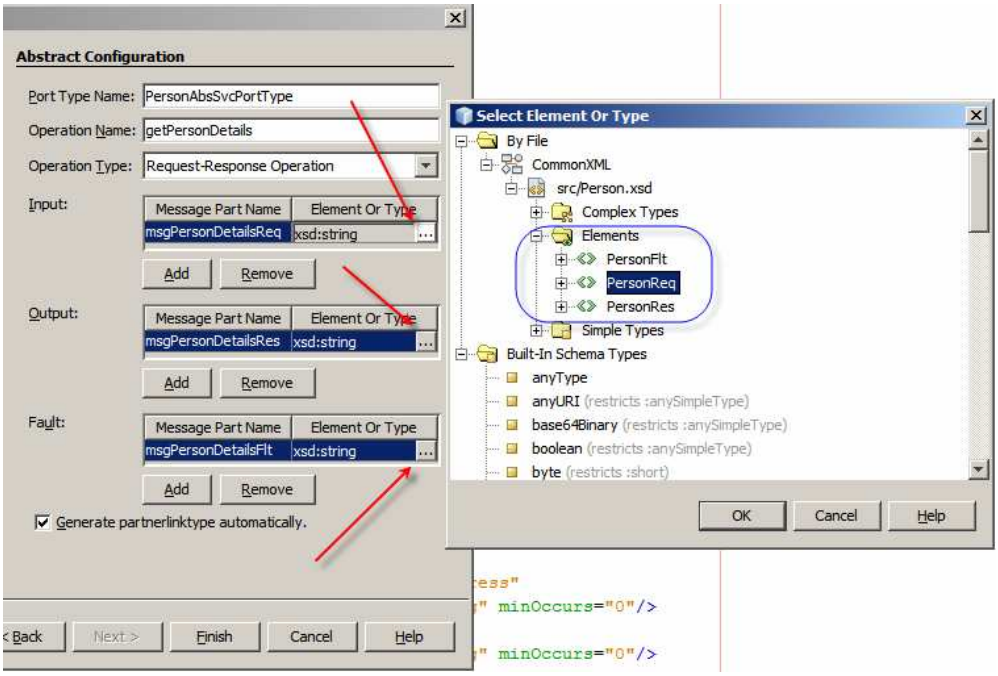


Figure 5.4.8 *Change message part types*

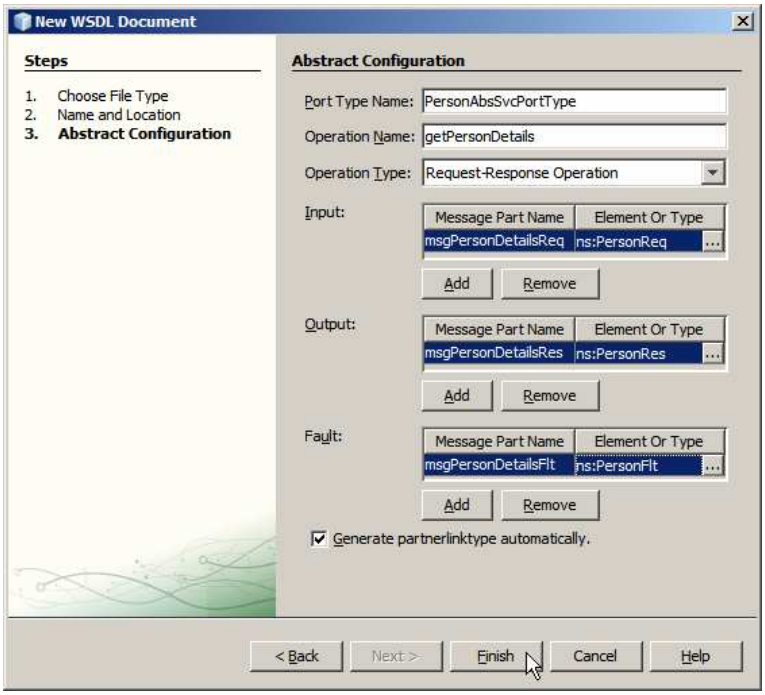


Figure 5.4.9 *Completed Abstract Configuration*

Finally, let's create the TriggerCon WSDL, which will be used to expose the client implementation as a web service so it can be triggered by a SopaUI web service testing project.

Create a New -> WSDL Document, names TriggerCon. It will be a Concrete WSDL, SOAP Binding, Document/Literal Type. Figure 5.4.10 shows the dialogue panel at this step in the process.

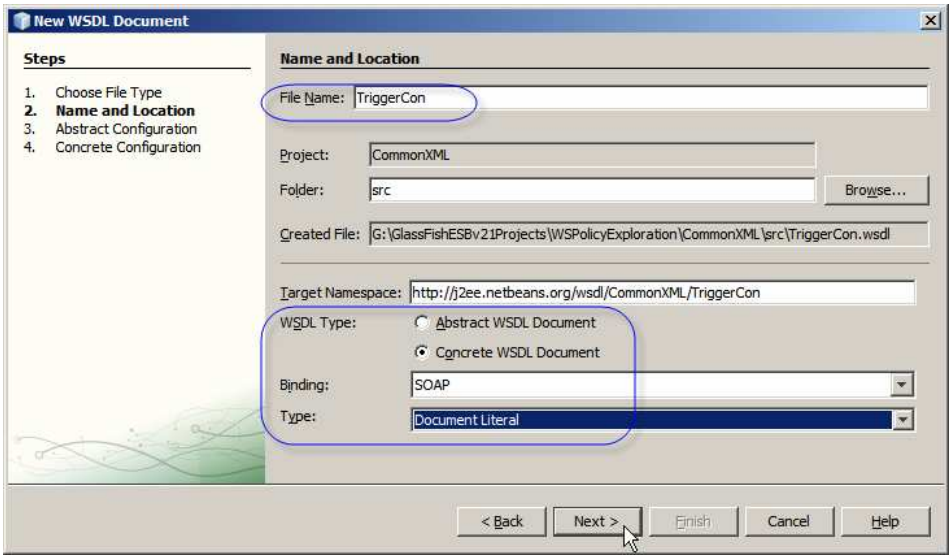


Figure 5.4.10 *Concrete WSDL, SOAP, Document/Literal*

Click Next to advance o the next panel. Change operation name to triggerPerson. Change message part names to msgPersonDetailsReq, msgPersonDetailsRes, add a Fault part and name it msgPersonDetailsFlt. Change “Element or Type” for the message parts to Personreq, PersonRes and PersonFlt, much the same way as was done for the PersonAbsSvc WSDL earlier. Figure 5.4.11 illustrates the final panel.

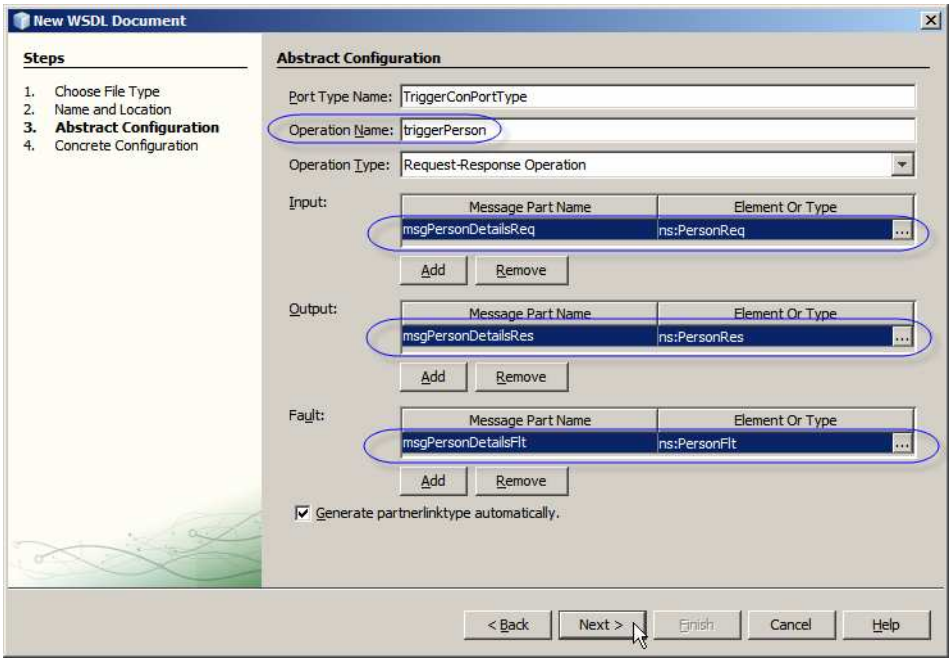


Figure 5.4.11 *TriggerCon WSDL abstract configuration*

Click Next, accept defaults and click Finish.

Our project, CommonXML, should look like that shown in Figure 5.4.12.

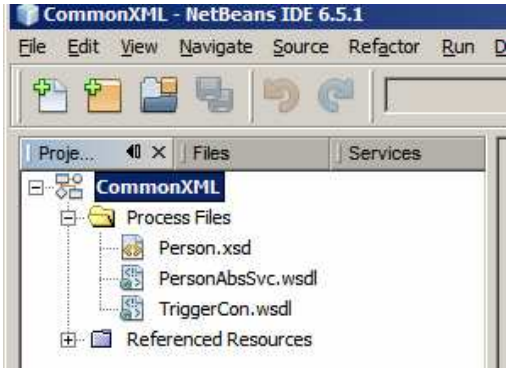


Figure 5.4.12 XML *Schema and WSDL in CommonXML*

5.5 PersonSvc BPEL Module

Let's create the BPEL Module project, PersonSvc, to implement, in BPEL 2.0, the service whose interface is defined by the PersonSvc WSDL, in CommonXML project.

Right-click in any blank area of the Project Explorer window and choose New Project … -> SOA -> BPEL Module. Name the project PersonSvc.

Expand the node tree to "Referenced Resources". Right-click "Referenced Resources" and choose Add -> Project Resource …, as illustrated in Figure 5.5.1.

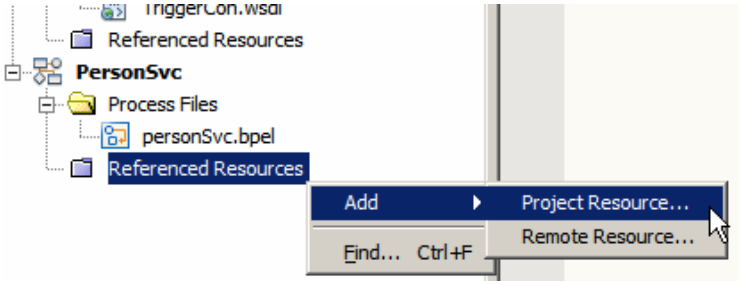


Figure 5.5.1 *Add Project Resource*

Locate the WSDL PersonAbsSvc and click Open, as illustrated in Figure 5.5.2.

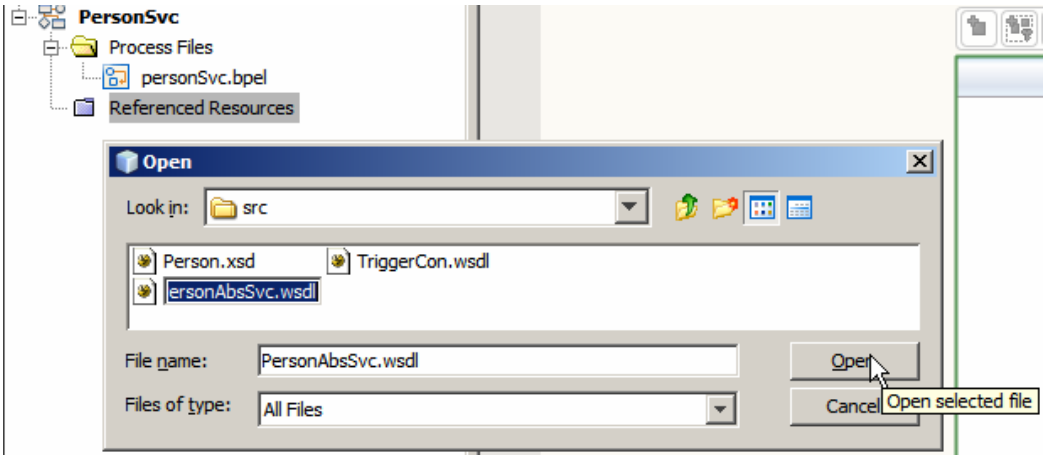


Figure 5.5.2 *Locate PersonAbsSvc WSDL*

Open the BPEL process, personSvc.bpel, if it is not already open, and drag the reference CommonXML/PersonAbsSvc onto the target marker in the left-hand swim line, as shown in Figure 5.5.3.

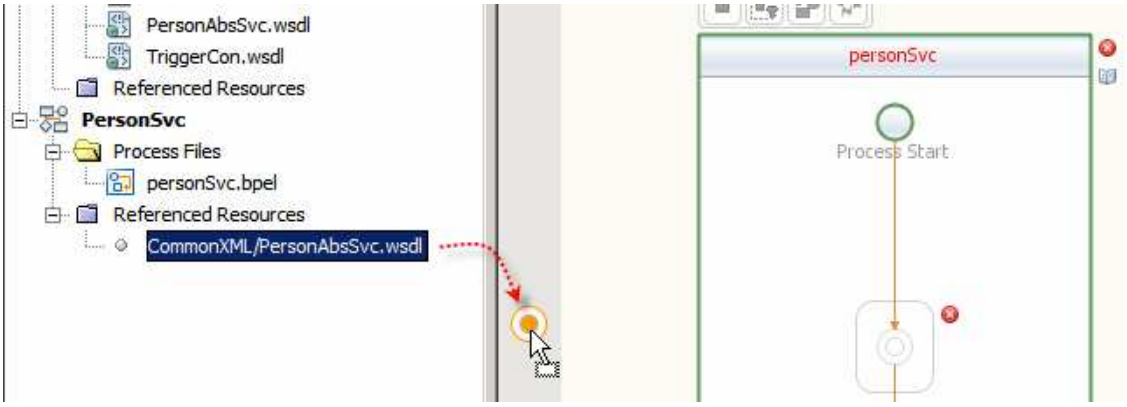


Figure 5.5.3 *Drag PersonAbsSvc WSDL reference onto the process canvas*

Name the partner link PersonRR.

From the Web Service Palette drag Receive, Assign and Reply activities onto the target markers inside the personSvc process scope, as shown in Figure 5.5.4.

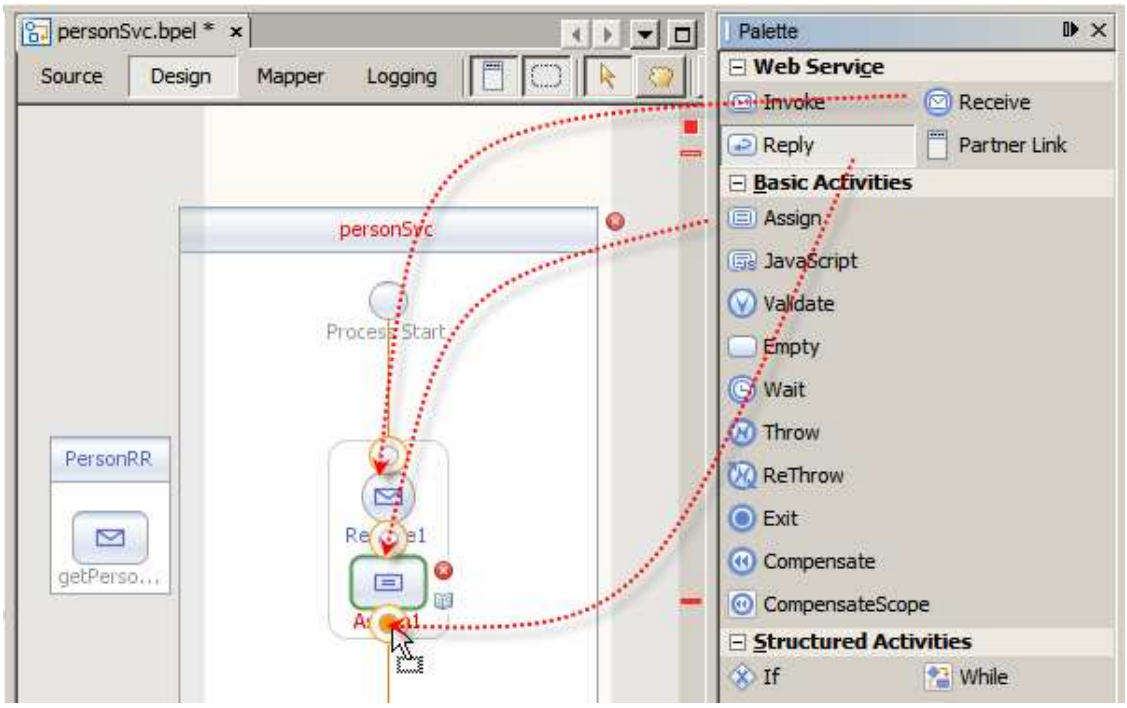
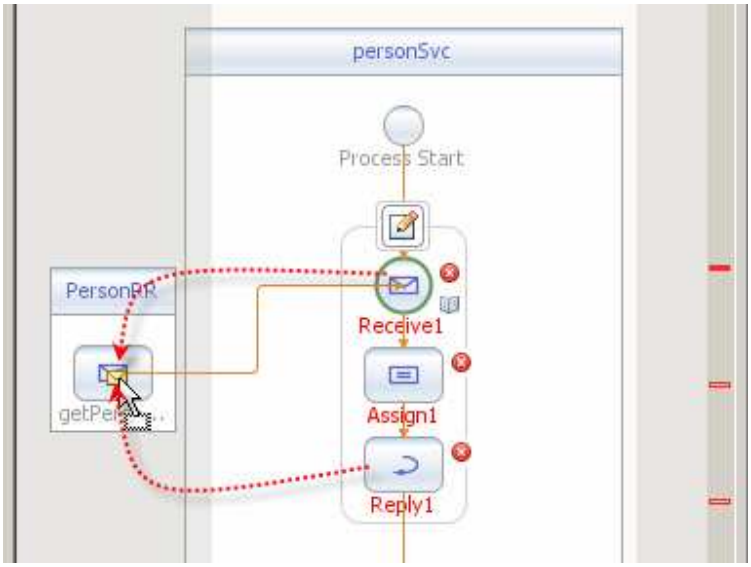


Figure 5.5.4 *Add Receive, Assign and Invoke activities*

Connect Receive and Reply activities to the PersonRR partner Link, as illustrated in Figure 5.5.5.



Fig**ure 5.5.5** *Connect Receive and Reply activities to the Partner Link*

Select the Receive activity, click the Edit icon, click the Create button alongside the “Input variable”, change the name of the variable to GetPersonReq, click OK. This will add a variable, GetPersonreq, which will contain the request message. Figure 5.5.6 illustrates the interesting points.

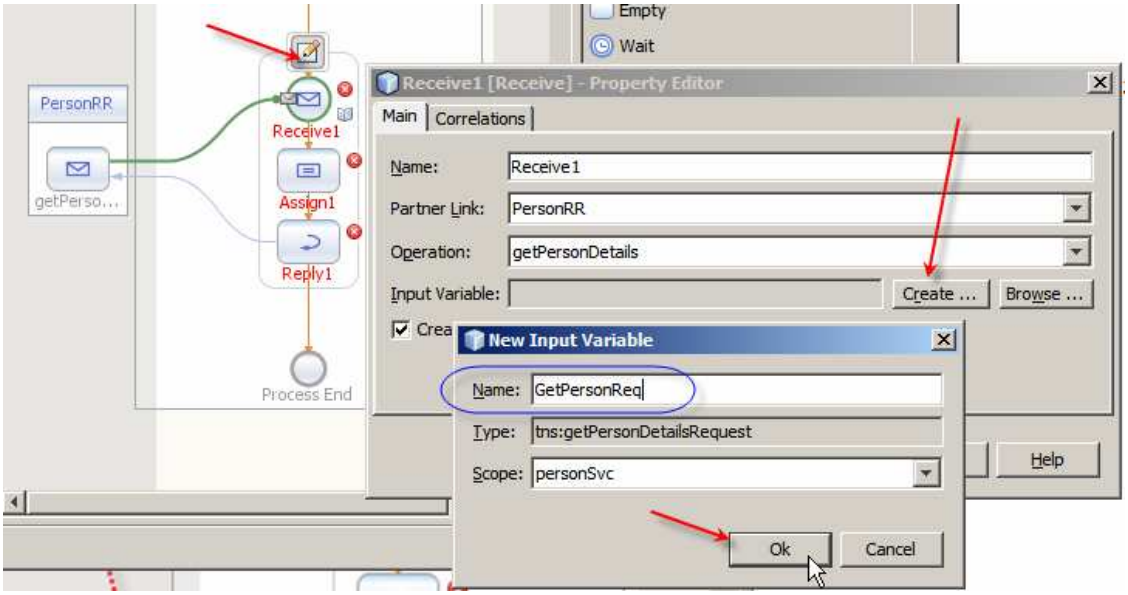


Figure 5.5.6 *Add variable to contain request message*

Repeat the process for the Reply activity, naming the variable GetPersonRes, as shown in Figure 5.5.7.

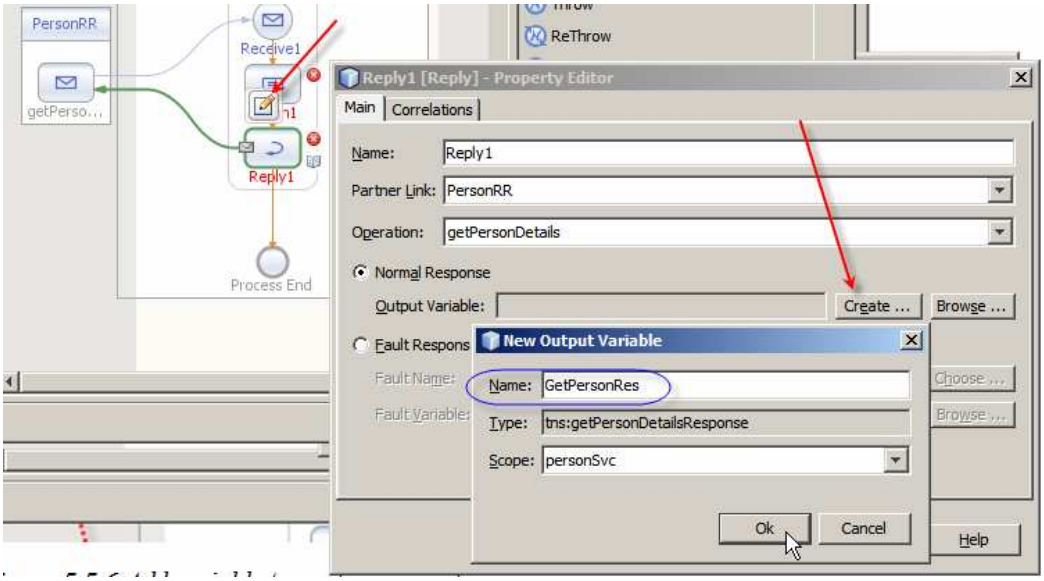


Figure 5.5.7 *Add variable GetPersonRes to the reply activity*

Double-click the Assign activity, or select the Assign activity and switch to Mapper mode. When in Mapper, map the request values and literal to the appropriate nodes of the response message. Figure 5.5.8 illustrates the mapping. Feel free to provide your own values for the literals.

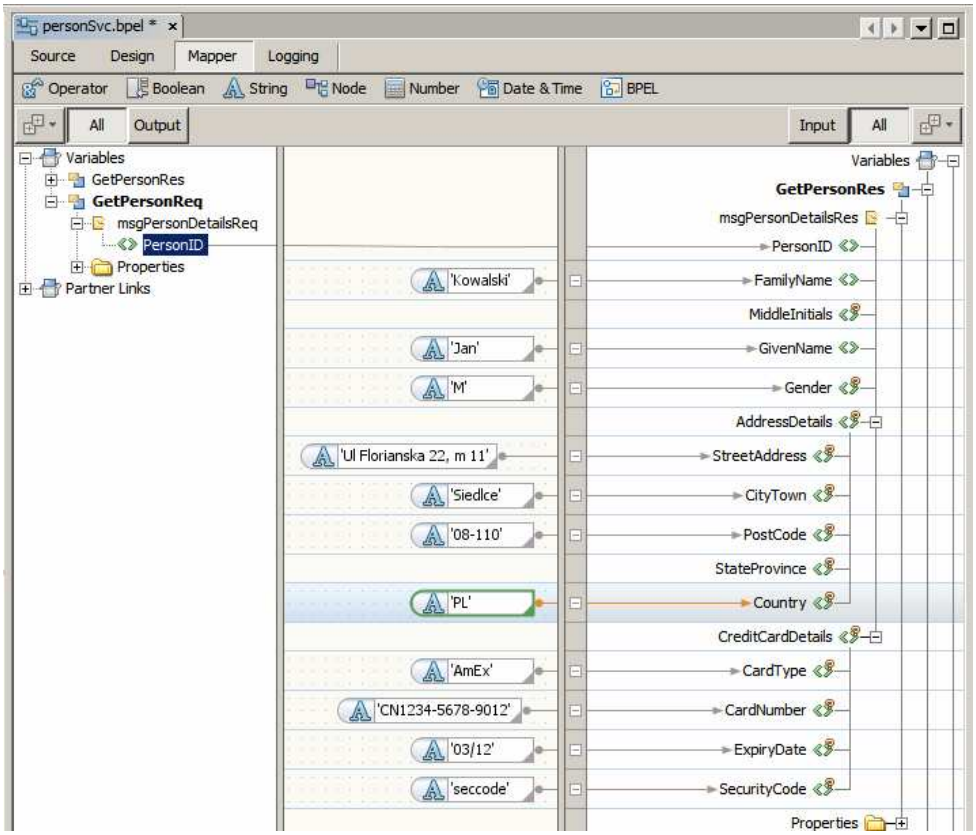


Figure 5.5.8 *Mapping response values*

Right-click the name of the project and choose Build. Figure 5.5.9 illustrates this.

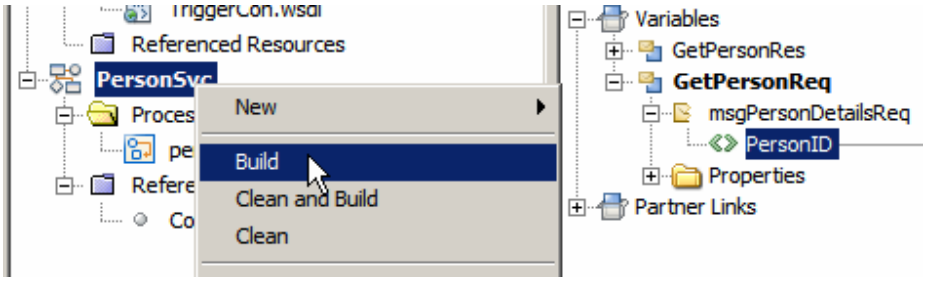


Figure 5.5.9 *Build the project*

The PersonSvc project, which implements service logic, is ready. We will develop the composite application that will encapsulate this logic and deploy it to runtime in subsequent sections.

5.6 PersonCli BPEL Module

Let's create the BPEL Module project, PersonCli, to implement, in BPEL 2.0, the invoker of the PersonSvc service. The BPEL process, implemented in this project, will be exposed as a web service using the TriggerCon WSDL, developed earlier. This process will, in turn, invoke the PersonSvc service using the Abstract WSDL interface defined in PersonAbsSvc.

In the new BPEL Module project add two project resource references, the PersdonAbsSvc WSDL and the TriggerCon WSDL. Figure 5.6.1 illustrates project hierarchy after these resources have been added.

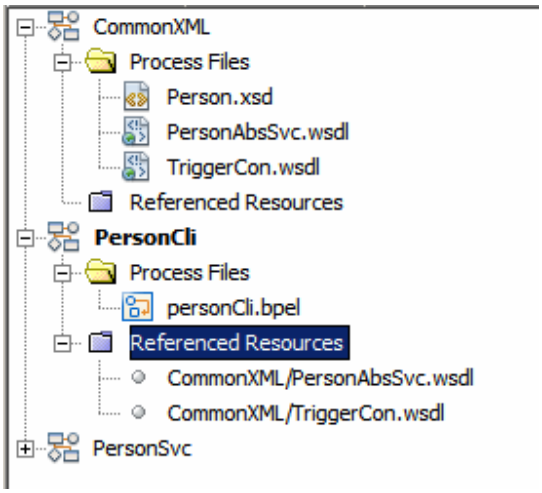


Figure 5.6.1 *PersonAbsSvc and TriggerCon WSDL References Resources*

Open the personCli business process, if it is not already open. Drag the TriggerCon WSDL reference to the left-hand (provide) swim line and the PersonAbsSvc WSDL reference to the right-hand (invoke) swim line. Name the partner links TriggerRR and PersonWS respectively, as shown in Figure 5.6.2.

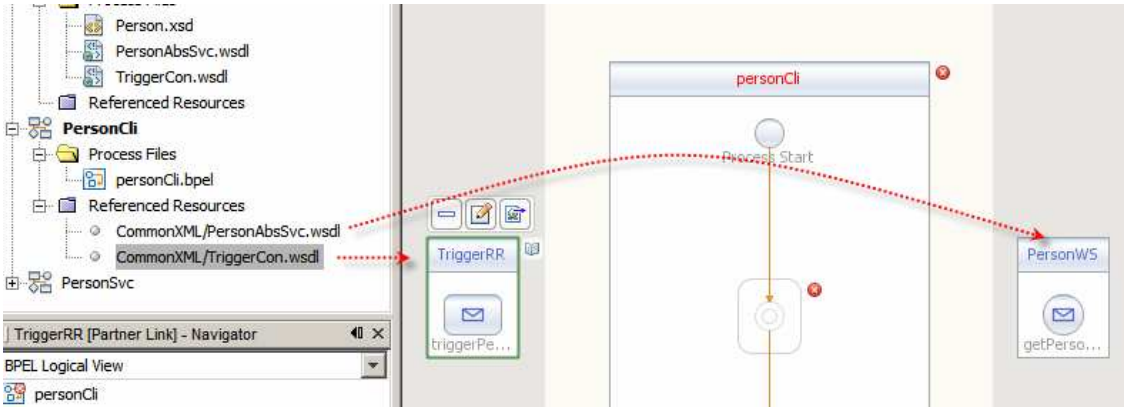


Figure 5.6.2 *Provide and Invoke Partner Links*

Recall that both TriggerCon and PersonAbsSvc use the same request and response structures. BPEL logic we are developing will consist of copying the request message from TriggerCon to PersonAbsSvc and the response message from PersonAbsSvc to TriggerCon. The TriggerCon interface will not be secured in any way so we can conveniently invoke the client service using SoapUI. Security policies, if any, will be applied to the PersonAbsSvc interaction.

Let's add Receive, Assign, Invoke, Assign and Reply activities to the process canvas, connect Request and Reply to the TriggerRR partner Link and Invoke activity to the PersonWS Partner Link. Figure 5.6.3 illustrates the process at this point in development.

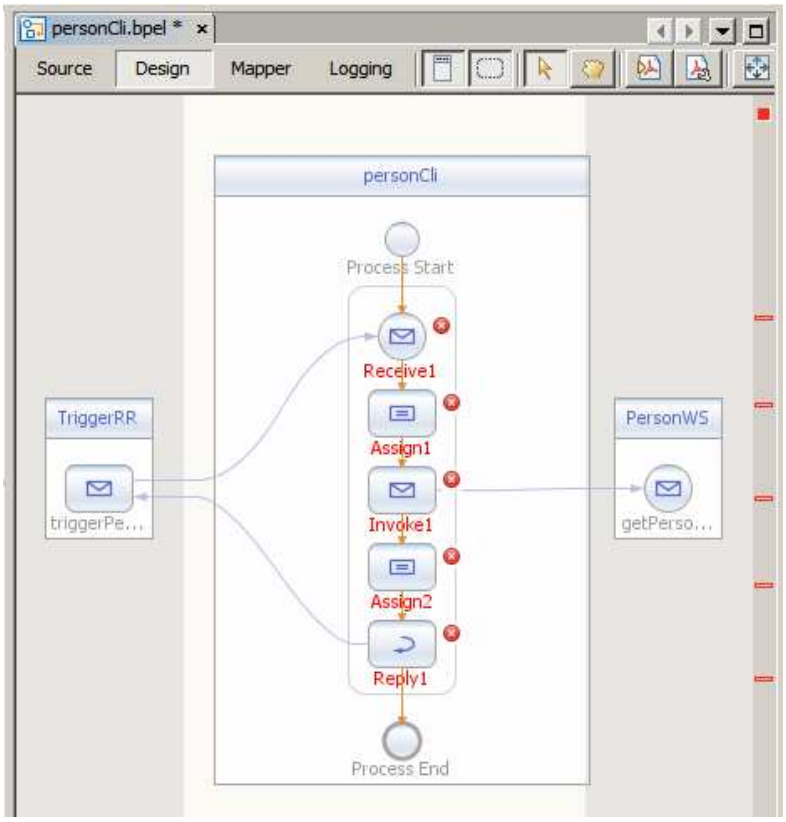


Figure 5.6.3 *Activities added and connected*

Note the "error indicators". These tell us that activities are not configured. Figures 5.6.4 and 5.6.5 show error messages for the Assign and the Reply activities.

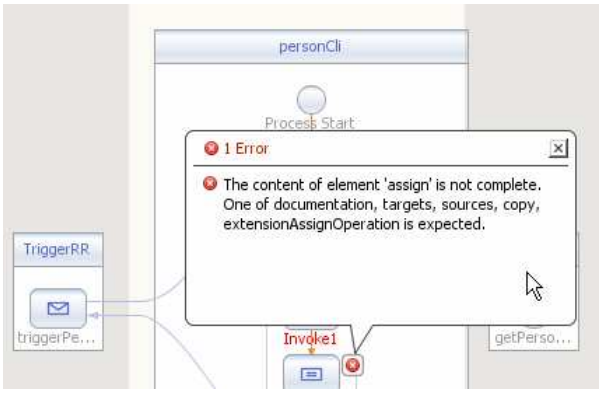


Figure 5.6.4 *Assign error – no mapping*

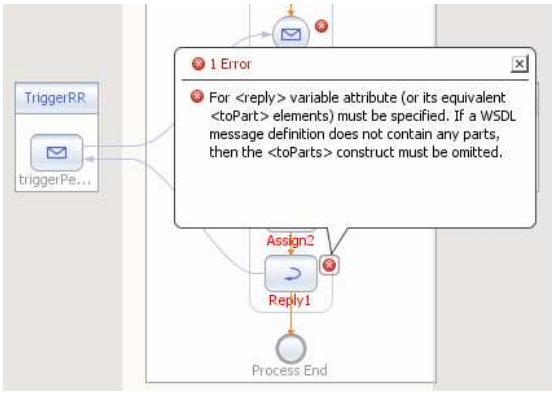


Figure 5.6.5 *Error on Reply activity*

BPEL Editor performs continuous background validation so it picks up the fact that we did not finish configuring activities. All these error will be resolved as we continue to work in the process.

Edit Receive, Reply and Invoke activities and add variables that will contain messages – vTriggerReq for Receive, vTriggerRes for the Reply and vPersonReq and vPersonRes for the Invoke. This is done the same way as has been done in the ProcessSvc so no pictures should be necessary. Figure 5.6.6 calls out variable names configured for the Invoke activity.

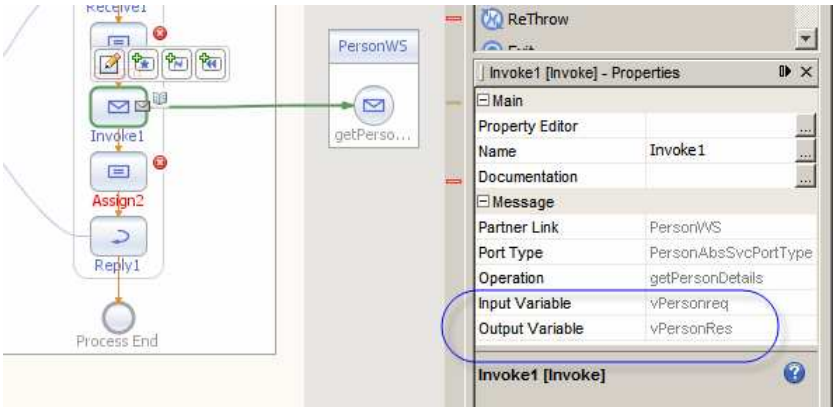


Figure 5.6.6 *Variable names for the Invoke activity*

We can now complete the Assign activities. Mapping in Assign1 are shown in Figure 5.6.7.

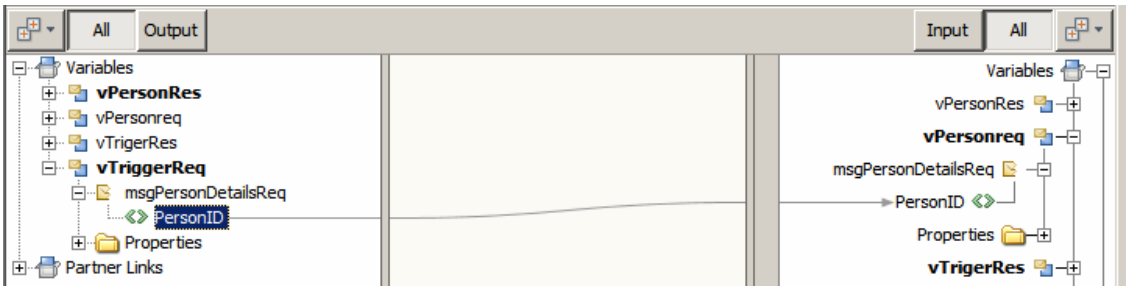


Figure 5.6.7 *Mapping in Assign1*

Mapping in Assign2 are shown in Figure 5.6.8.

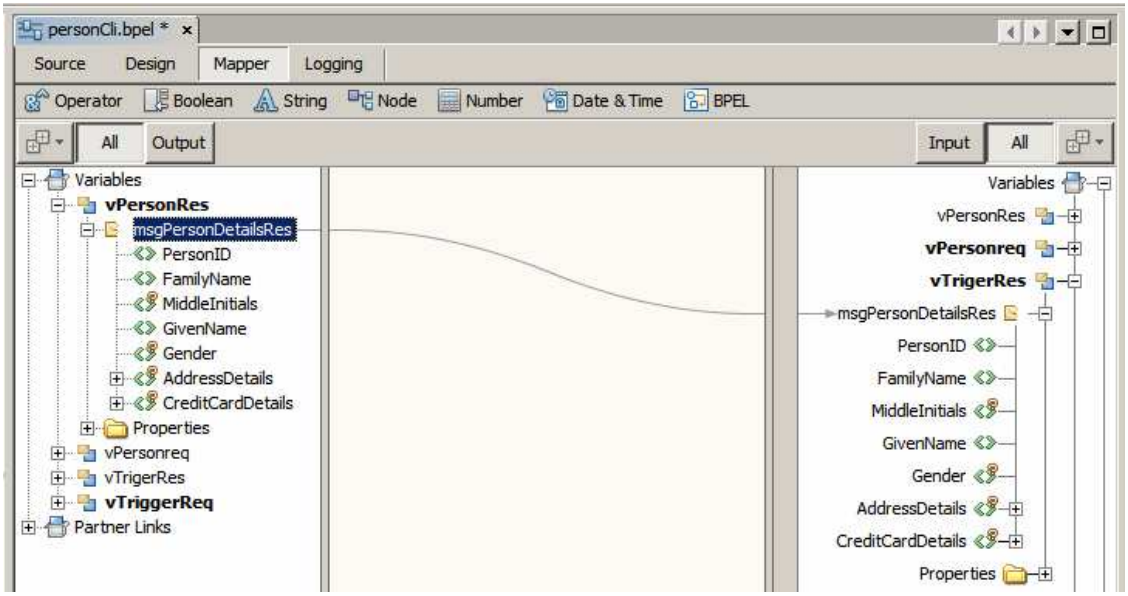


Figure 5.6.8 *Mapping in Assign2*

In Assign2 we map the root nodes, instead of mapping each individual field. We can do this because both the source and the destination messages are of the same structure.

Finally, let's configure the process so that it is lenient with respect to missing data. Switch to Design view, click the personCli process scope and choose "Yes" for the value of process property "Ignore Missing From Data". Figure 5.6.9 illustrates this.

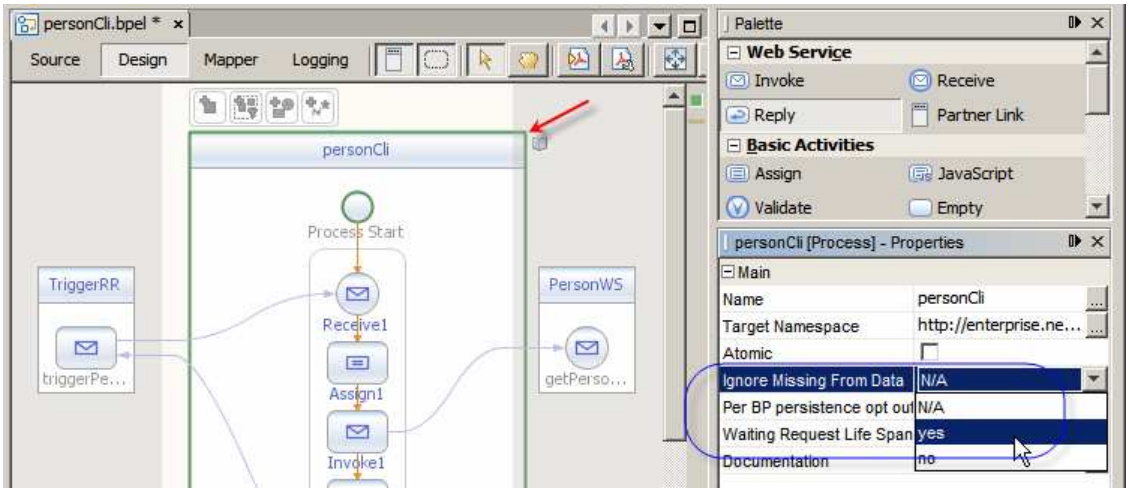


Figure 5.6.9 *Set "Ignore Missing From Data" to "Yes"*

The PersonCli project, which implements client-side logic, is ready. Build the project.

We will develop the composite application that will encapsulate this logic module and deploy it to runtime in the subsequent sections.

5.7 Person Service – Plain End-to-End

The service provider and service invoker BPEL Module are ready. We are now in a position to create Composite Applications for each and to exercise the solution end-to-end.

Let's start by creating the composite application, PersonSvc_CA_Plain, for the PersonSvc BPEL module, a web service testing project, PersonSvc_WSTP, to exercise this application, then perform the service implementation test.

Create a New Project -> SOA -> Composite Application, named PersonSvc_CA_Plain. Once created, drag the BPEL Module PersonSvc onto the Composite Application Service Assembly canvas and click Build. Figure 5.7.1 illustrates this.

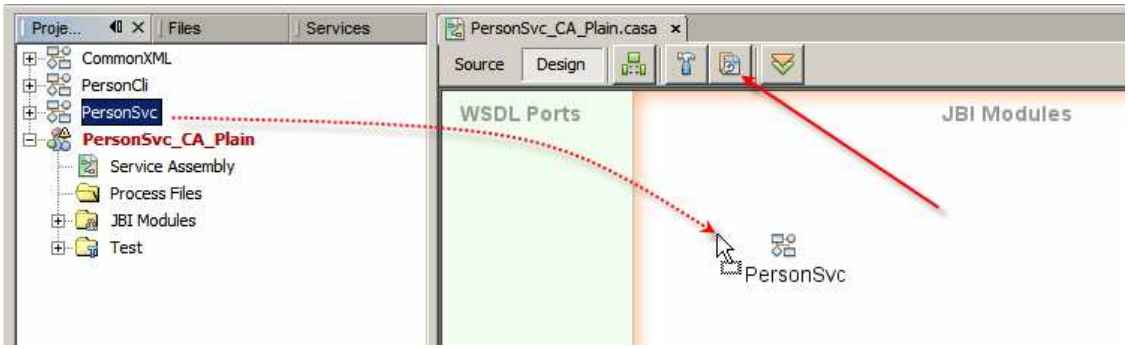


Figure 5.7.1 *Add BPLE Module to the CASA canvas and Build*

Because the service interface WSDL is an Abstract WSDL we don't see a Binding Component on the CASA canvas once the build is finished. We need to provide a concrete binding. AT this point we could use any available binding. Since we are building a web service implementation we will drag the soap binding to the canvas. Figure 5.7.2 illustrates this.

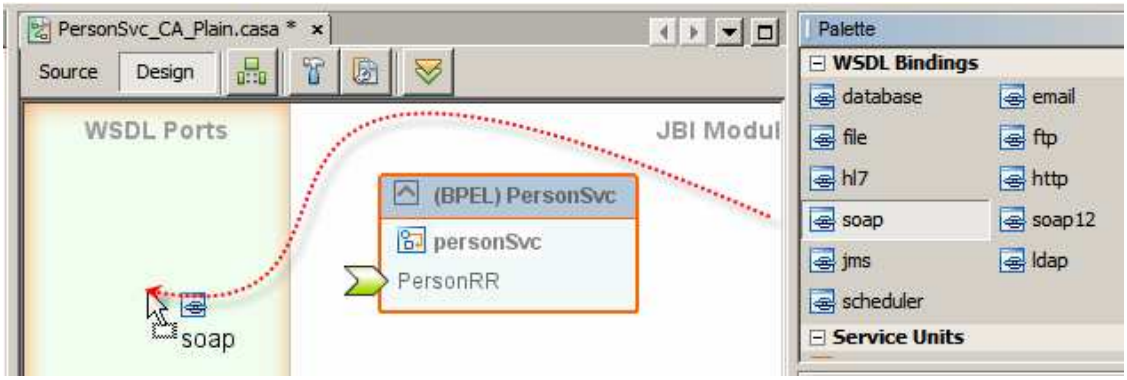


Figure 5.7.2 *Add soap binding to the CASA canvas*

Connect Consume connector of the SOAP BC to the Provide connector of the BPEL Module then build the process again. Figure 5.7.3 illustrates the final CASA map.

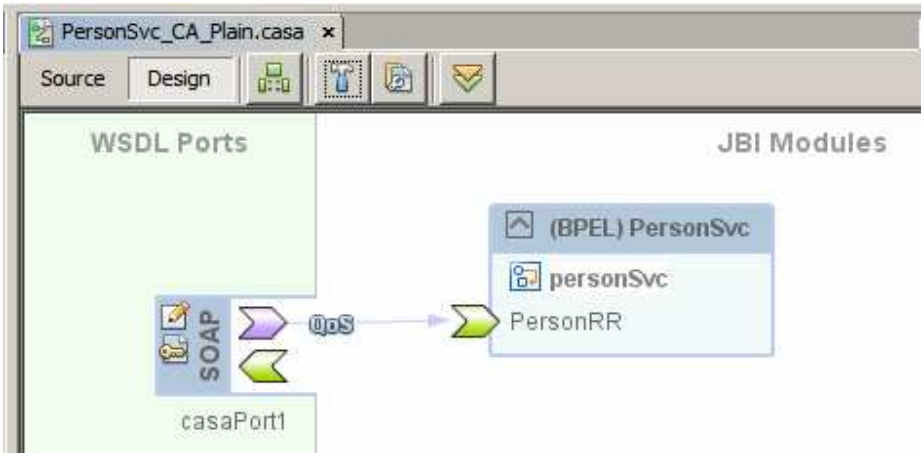


Figure 5.7.3 *Completed CASA map*

Click the “pencil and paper” icon to open SOAP BC properties and note the endpoint address in the Location property, shown in Figure 5.7.4.

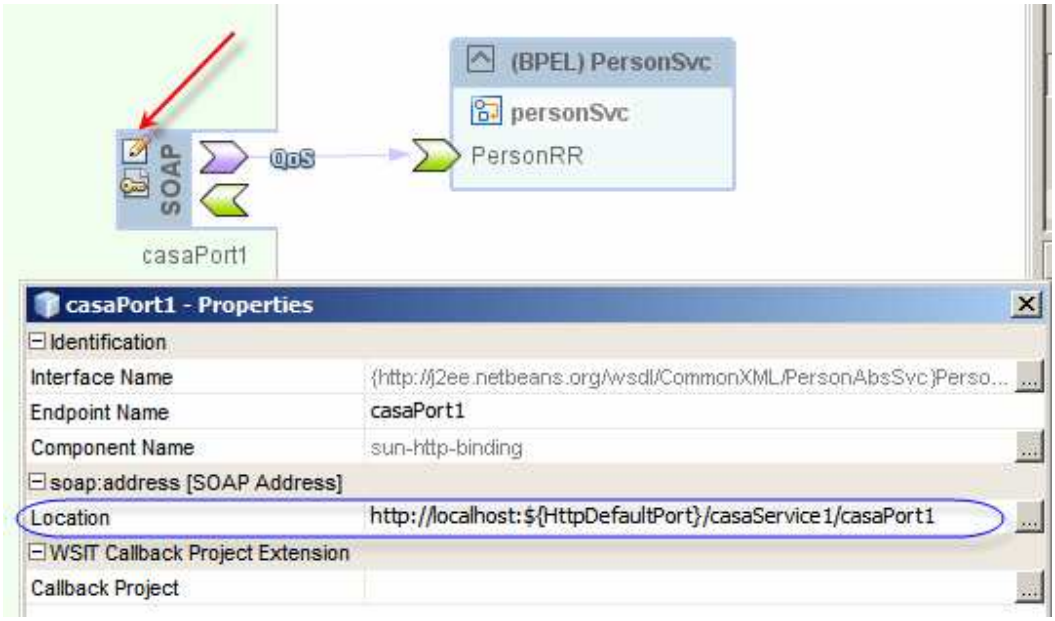


Figure 5.7.4 *Location property*

Note the construction “${HttpDefaultPort}”. The HttpDefaultPort is the name of the environment variable that gets replaced, at build time, with the value configured for the default HTTP port used by the JBI container. By default this will be 9080. For me this will be 29080. You can find out what it is by looking at properties of Services -> Servers -> GlassFish v2 -> JBI -> Binding Components -> sun-http-binding, specifically property named “Default HTTP Port Number”. While at it, also note the value of the “Default HTTPS Port Number”. This is the port for the SSL/TLS protocol. More on that later.

Deploy the project to the local GlassFish instance. For me this will be the “GlassFish v2” running on host mcz02.aus.sun.com.

Let's now create a New Project … -> Java EE -> Web Service Testing Project and name it PersonSvc_WSTP. We will use this project to submit a SOAP request to the PersonSvc_CA_Plain service, which we just built and deployed, to verify that it works. Enter, or paste, the endpoint URL from the Location property, discussed above, with host and port configured as required, into the property "Initial WSDL (URL)". For me this will be:

```
http://mcz02.aus.sun.com:29080/casaService1/casaPort1?WSDL
```

For you the FQDN of the host will be different and the port number will be 9080 if you have a default GlassFish installation.

Once the project is created, expand the nodes all the way to getPersonDetails, right-click and choose New Request. Figure 5.7.5 illustrates this.

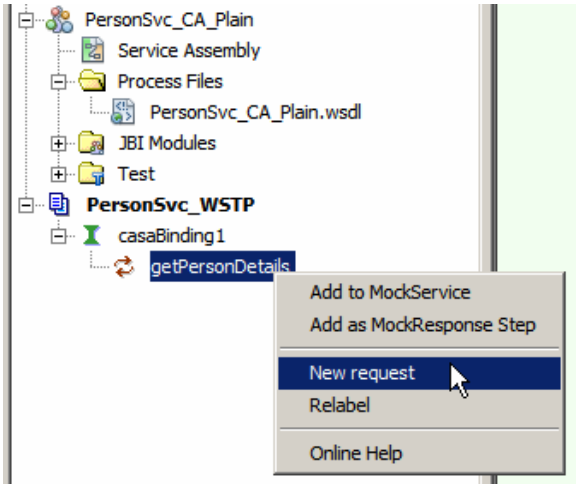


Figure 5.7.5 *Create new Soap Request*

Modify the request by replacing "gero et" with "q2345", or whatever value you find attractive, and submit the request as shown in Figure 5.7.6.

Figure 5.7.6 *Submit SOAP Request with the PersonID of 12345*

With mapping in the PersonSvc BPEL Module as shown in Figure 5.5.8 the SOAP Response will look like that in Figure 5.7.7.

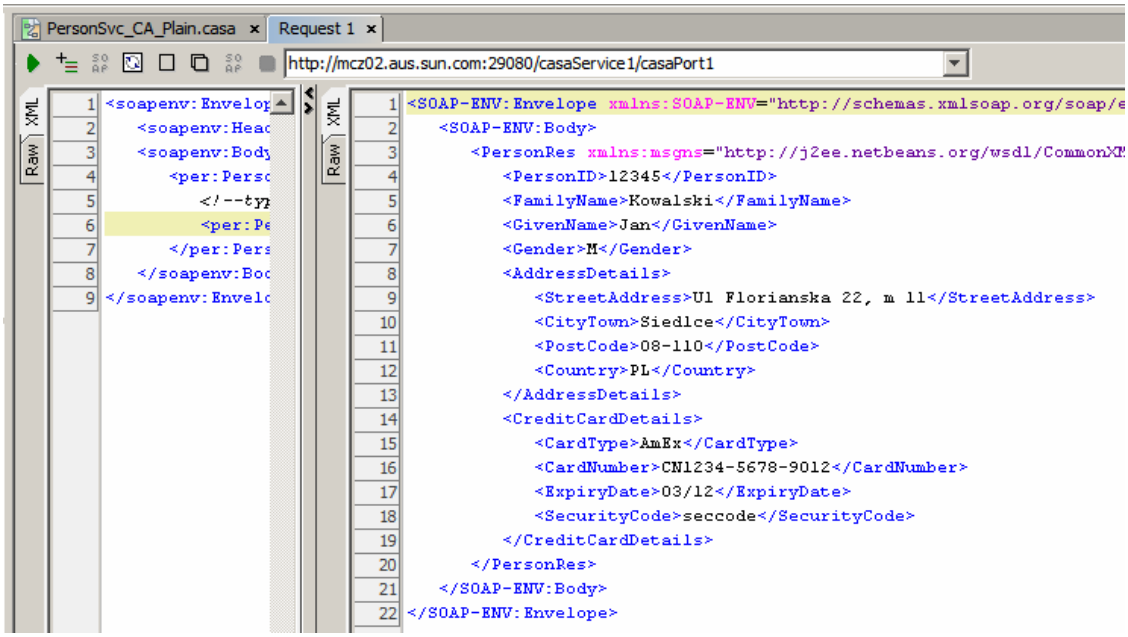


Figure 5.7.7 *SOAP Response*

The service PersonSvc works as expected. We will not use the testing project PersonSvc_WSTP again. We will create t6he composite application for the PersonCli BPEL Module and will use it to exercise the end-to-end solution.

Create a New Project -> SOA -> Composite Application, named PersonCli_CA_Plain. Drag the PersonCli BPEL Module onto the CASA canvas and Build. Figure 5.7.8 illustrates the key points.

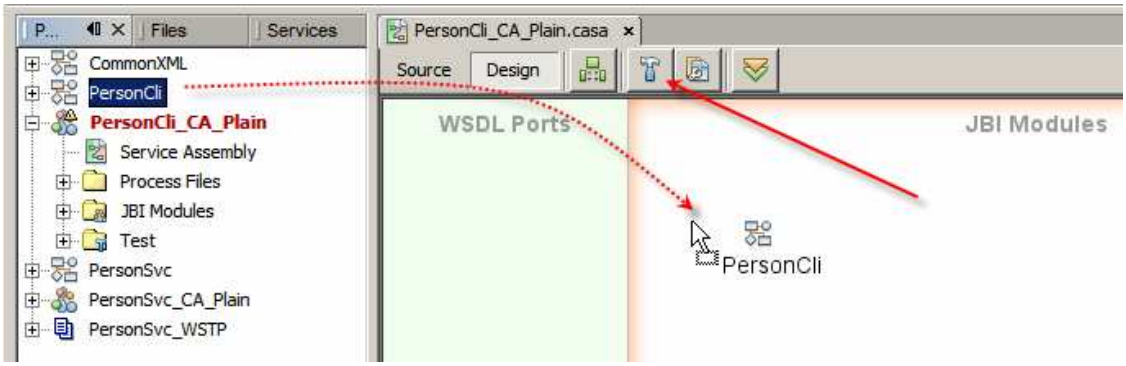


Figure 5.7.8 *Create PersonCli_CA_Plain Composite Application*

Note that the Consume connector of the PersonCli BPEL Module is not connected to a binding component. This is because the PersonAbsSvc WSDL, which we used in the BPEL process, is an Abstract WSDL. Figure 5.7.9 illustrates the CASA canvas at this point.

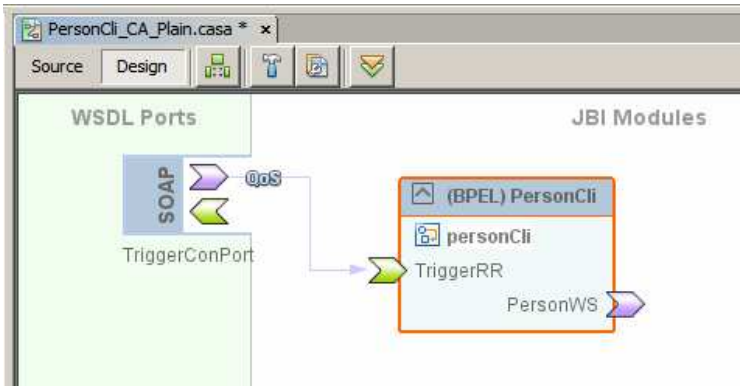


Figure 5.7.9 *CASA canvas with unconnected PersonWS Partner Link*

We will add a concrete WSDL to this composite application project to provide concrete binding for the PersonWS partner link.

Copy the WSDL URL of the PersonSvc_CA_Plain service to the clipboard. For me this will be:

```
http://mcz02.aus.sun.com:29080/casaService1/casaPort1?WSDL
```

For you the FQDN of the host will be different and the port number will be 9080 if you have a default GlassFish installation.

Right-click on the name of the project, PersonCli_CA_Pain, choose New -> Other -> XML -> "External WSDL Document(s)" and paste the WSDL URL into the "From URL" text box. Figure 5.7.10 illustrates the dialogue box.

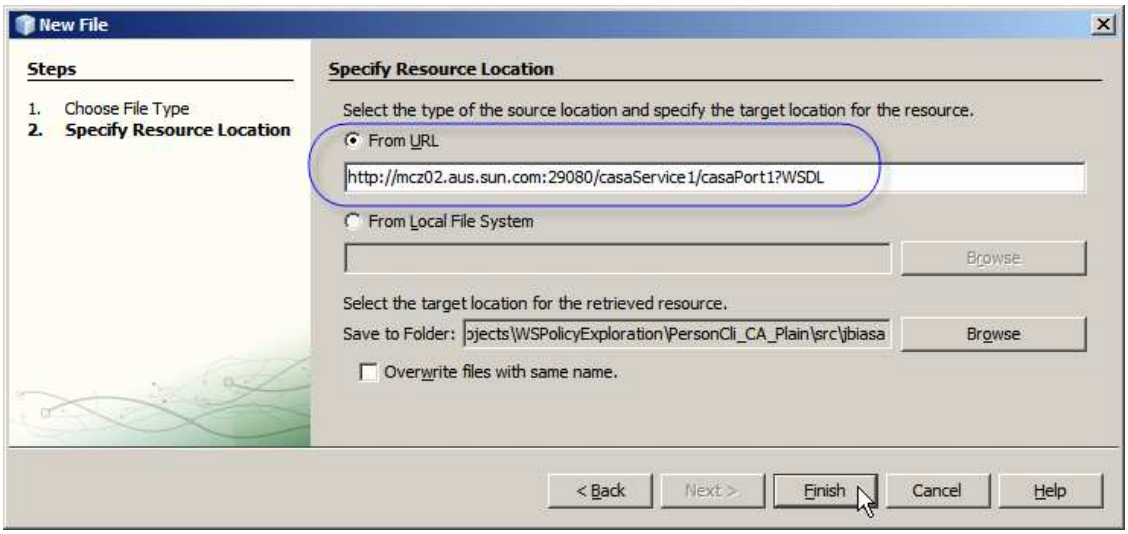


Figure 5.7.10 *New External WSDL document being created*

New WSDL and XSD objects will be added under the Process File node in the project hierarch. Figure 5.7.11 illustrates this.

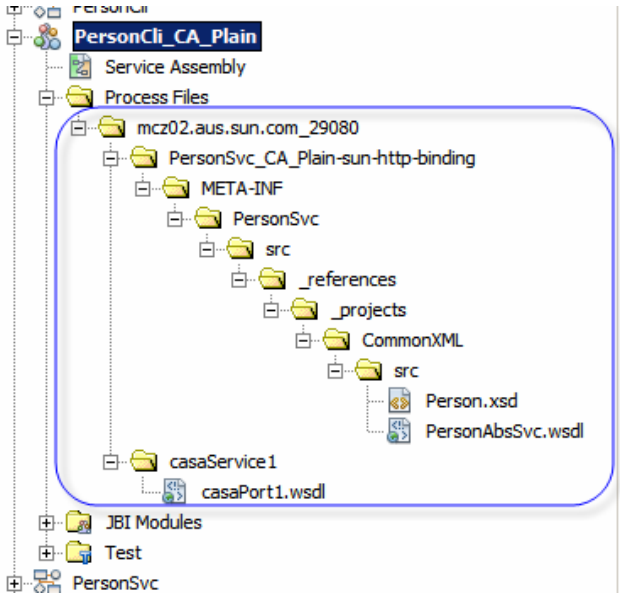


Figure 5.7.11 *WSDLs and XSD added to the Composite Application project*

Right-click on the CASA canvas inside the "WSDL Ports" swim line and choose "Load WSDL Port…", as shown in Figure 5.7.12, to add the SOAP BC, configured to communicate with the PersonSVc service, to the CASA canvas.

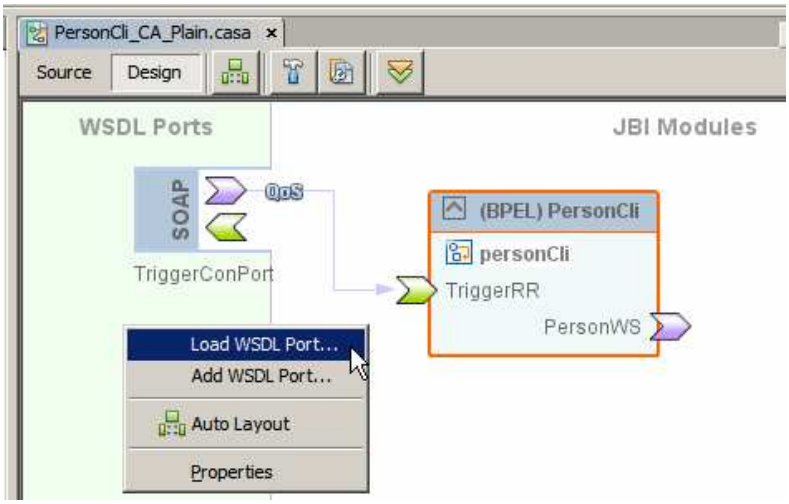


Figure 5.7.12 *Load WSDL Port, part 1*

In the dialogue box that appears select the one and only WSDL Port, as shown in Figure 5.7.13, and click OK. Build the CA project.

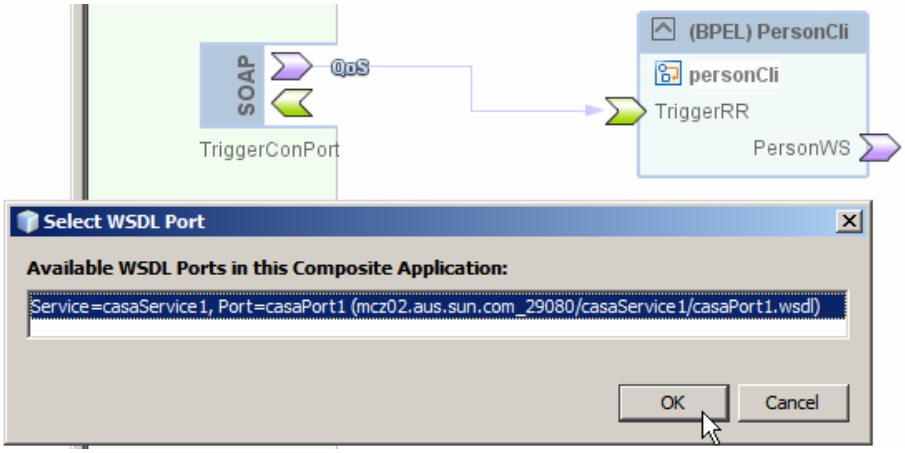


Figure 5.7.13 *Select WSDL Port to add*

The CASA canvas should now look like that shown in Figure 5.7.14.

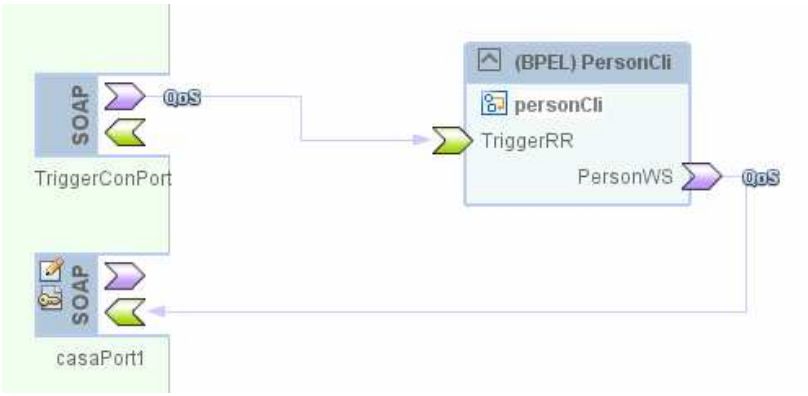


Figure 5.7.14 *CASA canvas with both binding components added and connected*

Deploy the project to the local instance of the GlassFish Application Server. For me this will be "GlassFish v2" running on mcz02.aus.sun.com.

Locate and copy to the clipboard the endpoint URL for the TriggerCon connector. The WSDL associated with that endpoint, TriggerCon.wsdl in project CommonXML, will have that value. For me this is:

```
http://localhost:${HttpDefaultPort}/TriggerConService/TriggerConPort
```

Replace ${HttpDefaultPort} with the correct value. For me this will be 29080, and append "?WSDL? to the end of the URL. For me the final value will be:

```
http://localhost:29080/TriggerConService/TriggerConPort?WSDL
```

This is the URL to which the web service testing project, created next, will submit SOAP requests. Create a New -> Java EE -> Web Service testing Project, names PersonCli_WSTP. Use the URL shown above as the "Initial WSDL (URL/file)".

Expand the nodes, right-click on triggerPerson binding, choose “New Request” and create a request. Modify PersonID value to 54321, or whatever value you find attractive, ans submit the request. Figure 5.7.15 illustrates the request.

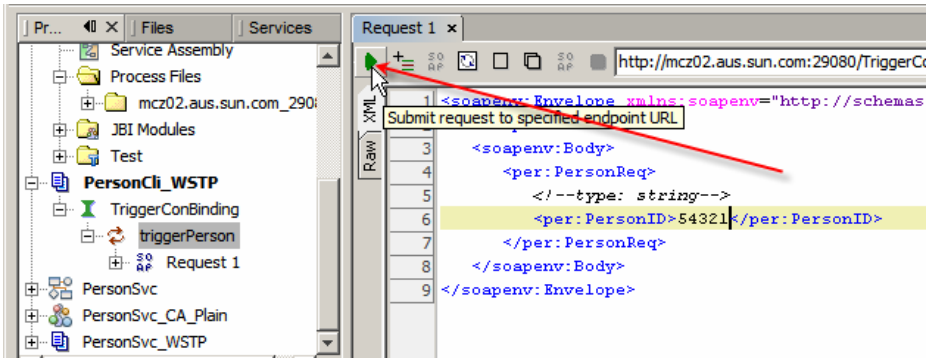


Figure 5.7.15 *SOAP Request to be submitted to the PersonCli service*

Observe the response – it should be like that shown in Figure 5.7.16.

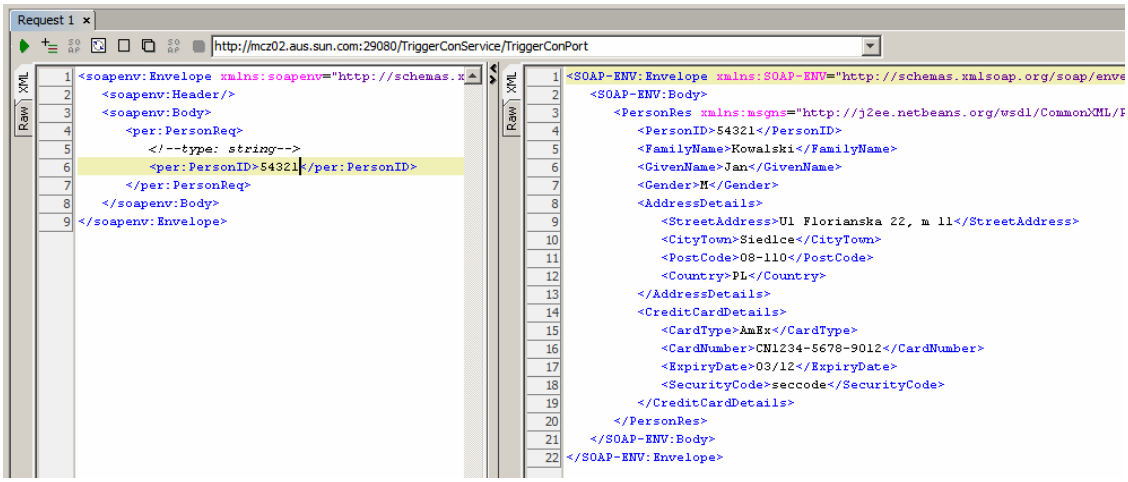


Figure 5.7.16 *SOAP Response*

We have the client / invoker (PersonCli) invoking the service / provider, PersonSvc. The end-to-end project works, as does the BPEL logic in the client and the service implementations.

Note that we did not do anything about security policies, nor did we even mention them until now. SOAP requests and SOAP responses are exchanged “in the clear”, in plain text. Anybody eavesdropping on the wire can see the content of the messages.

Before proceeding to the next section undeploy both the invoker and the provider projects.

5.8 Person Service - SSL Server-side Authentication

One way to prevent eavesdropping on messages being exchange between the invoker and the provider is to encrypt the channel between the two. Since web services use the HTTP protocol one can use the Secure Sockets Layer (SSL) / Transport Layer Security (TLS) to encrypt the channel. This is a common mechanism used for securing message exchange with electronic commerce sites in order to prevent intercept of credit card details and other sensitive commercial information submitted by purchasers.

There is a great deal to SSL /TLS. More then I am prepared to discuss in this section. I assume that the reader is either sufficiently familiar with the protocol's operation to not require elaboration, or that the reader does not care for the theory and will be satisfied with the practice as discussed here. All others are referred to the excellent book by Eric Rescorla, "SSL and TLS: Designing and Building Secure Systems", ISBN-10: 0201615983, for elaboration.

SSL with Server-side Authentication adds security to the message exchange in two ways.

By requiring the server to provide the X.509 Certificate, expected to be issued by a trusted Certification Authority (CA) for a specific Host, the client is able to assure itself that the FQDN of the server is the same as the FQDN of the host in the certificate, therefore no substitution of hosts took place. The client is also able to validate the server certificate by verifying the digital signature of the CA, if the certificate was issued by a well know CA. Signature verification ensures that the certificate was not tampered with and the FQDN of the host was not altered. If the certificate signature is not valid, the certificate FQDN host name is not the same as the server host name, the certificate is a self-signed certificate or the CA is not a well know CA, then client would typically reject the certificate and abort the SSL Handshake. It is possible that the FQDN of the server will not be the same as the FQDN in the certificate. This may be legitimate inside an enterprise. To prevent rejection of the certificate a custom Hostname Verifier class can be provided that resolves this discrepancy. This is beyond the scope of this text. To prevent rejection of a certificate issued by a non-well know CA one can add the CA's certificate to the Client's truststore and mark it as trusted. This will make all certificates issued by the CA trusted by extension. This can also be legitimate inside an enterprise or between enterprises that explicitly trust each other. A self-signed certificate can be made trusted, therefore acceptable, the same way as an unknown CA can be made trusted – by being added to the Client's truststore and marked as trusted.

By encrypting the channel over which messages travel both the Client and the Server ensure that message exchange can not be profitably eavesdropped upon.

These two ways are typically used together. It is possible, though not common, to use channel encryption without certificate exchange. An internal enterprise application concerned with channel security, but not with endpoint authentication, might do that. Endpoint authentication in such an application might be provided in some other way, for example by embedding credentials in messages themselves. Channel encryption will protect these credentials.

Before proceeding with development let's do some groundwork.

SSL Handshake can be logged to the server.log by adding "-Djavax.net.debug=ssl:handshake" to the GlassFish Application Server's JVM Options. Figure 5.8.1 illustrates this in the GlassFish Application Server Admin Console.

Figure 5.8.1 ***JVM Options***

If you don't have this incantation in the JVM Options at both end of the SSL Handshake you will not be able to see the log of the handshake. Please add the JVM Option to both instances of the GlassFish Application Server, if you are using two as I am doing. My local instance runs on mcz02.aus.sun.com and my remote instance runs on orad1.ssc (as of January 2010 I am using a an OpenSolaris VM virtual host gfesbv22 [1]).

When looking at the JVM Options also note the names and locations of the keystore.jks and cacerts.jks, see Figure 5.8.2. These are the cryptographic stores GlassFish uses at runtime. We will work with both in the not too distant future.

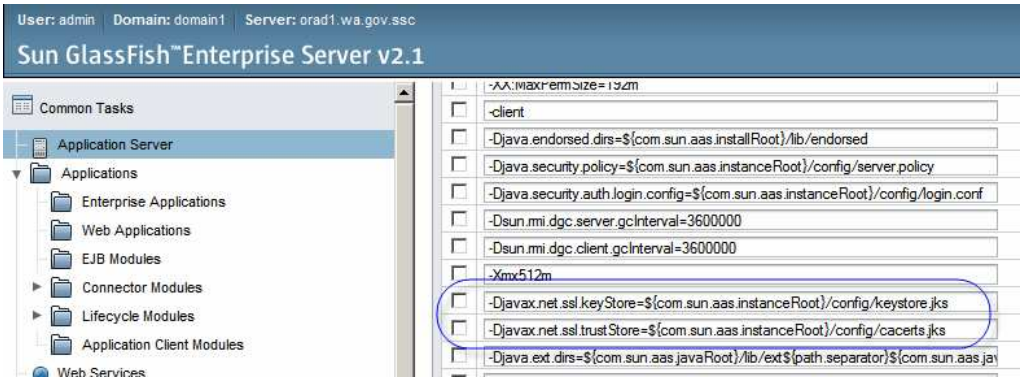


Figure 5.8.2 ***Cryptographic objects stores***

Recall, or note, that at installation time the GlassFish installer generates the cryptographic key pair and the server certificate, which embeds the FQDN of the host on which it is being installed. This private key gets added to the keystore.jks, which by default resides in *<glassfishinstallroot >/domains/domain1/config*, under the alias *a1as*. When requested to provide a certificate, as is the case when SSL with Server-side Authentication is configured, the server will return its X.509 certificate as part of the SSL Handshake. The client/invoker is expected to use that certificate to verify whether it "trusts" the server enough to allow the SSL Handshake to succeed. The client verifies that the certificate is "trusted", that is it is either signed by a trusted certification

authority (CA) or it is explicitly trusted, if it is a self-signed certificate, by there being a copy of it in the client's trust store, typically *<glassfishinstallroot>/domains/domain1/config/cacerts.jks*.

Using a tool like "Portecle Key Manager" [2], inspect the keystore.jks. Note the presence of the one and only private key, with the alias of s1as. Note, too, that its corresponding certificate is associated with the host mcz02.aus.sun.com - for you it will be the fully qualified name of the host on which you installed the GlassFish Application Server whose keystore,jks you are inspecting. Figure 5.8.3 illustrates this.

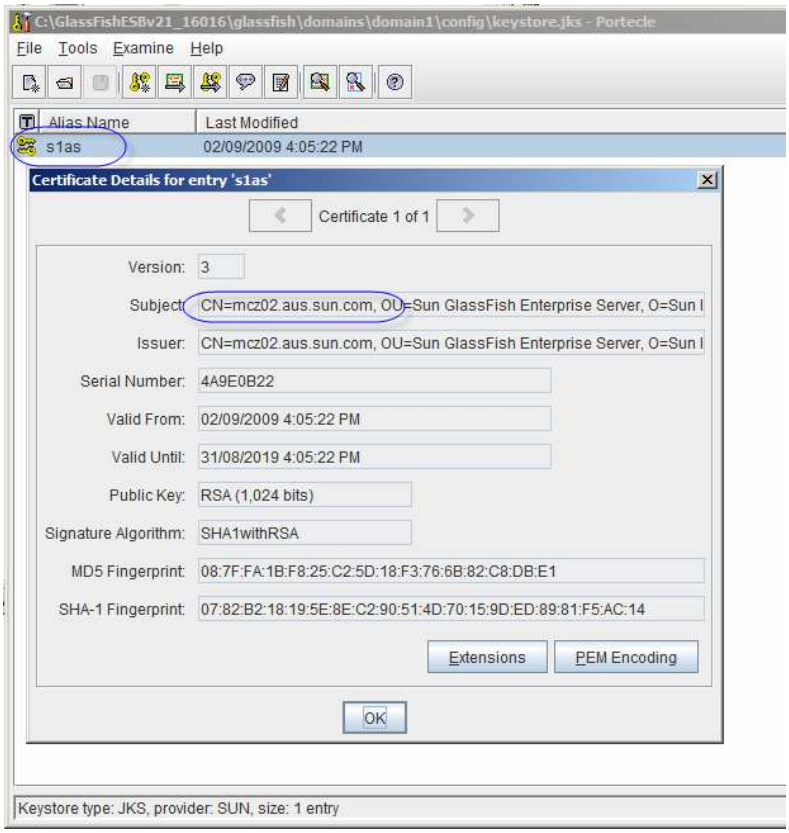


Figure 5.8.3 ***Private key, s1as, and its certificate***

You can surmise form this that if mcz02.aus.sun.com is the server hosting the PersonSvc web service, and it is required to provide the client with a certificate, the certificate associated with the alias a1as will be provided to the client.

Note, also, that the Issuer of the certificate is the same as the Subject of the certificate in Figure 5.8.3. That makes this certificate a self-signed certificate. There is no separate Certification Authority which issued the certificate so it is unlikely that this certificate will be trusted by any other host unless explicitly told to do so.

Let's interrupt the certificate discussion at this point. We will resume it later.

Create the PersonSvc_CA_SSLServerAuth Composite Application, drag the PersonSvc BPEL Module onto the CASA canvas, add and connect a SOAP binding and Build, much as was illustrated in Figures 5.7.1, 5.7.2 and 5.7.3.

Click on the “pencil and paper” icon to open properties of the SOAP BC and modify Location URL to a) use the https scheme instead of the http scheme, b) use the FQDN of the remote host (for me this will be orad1.ssc) and c) modify port number variable name from HttpDefaultPort to HttpsDefaultPort. For me, the modified URL will be:

```
https://gfesbv22.ssc:${HttpsDefaultPort}/casaService1/casaPort1
```

Figure 5.8.4 illustrates the key points.

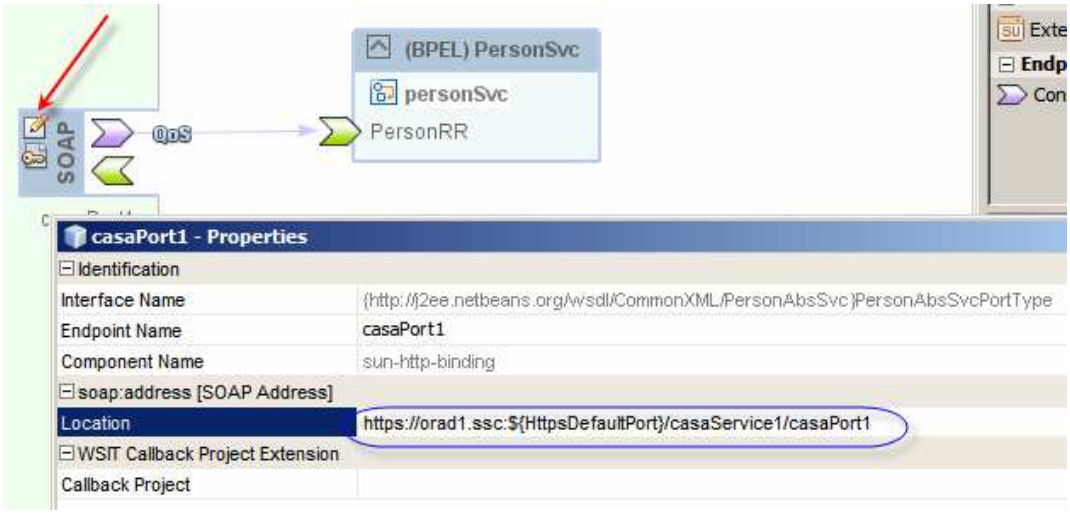


Figure 5.8.4 *Modified Location property*

Here comes a twist. The original WSDL does not use any security policies at all. In fact it can not because most security policies are applied to the concrete part of he WSDL and our original WSDL does not have a concrete part. By dragging the SOAP BC onto the CASA canvas and connecting it to the BPEL Module we created a WSDL which imports our original WSDL and adds the concrete part. Explore the PersonSvc_CA_SSLServerAuth -> Process Files, Figure 5.8.5, and note the WSDL PersonSvc_CA_SSLServerAuth. Open this WSDL and look at the concrete part, Figure 5.8.5.

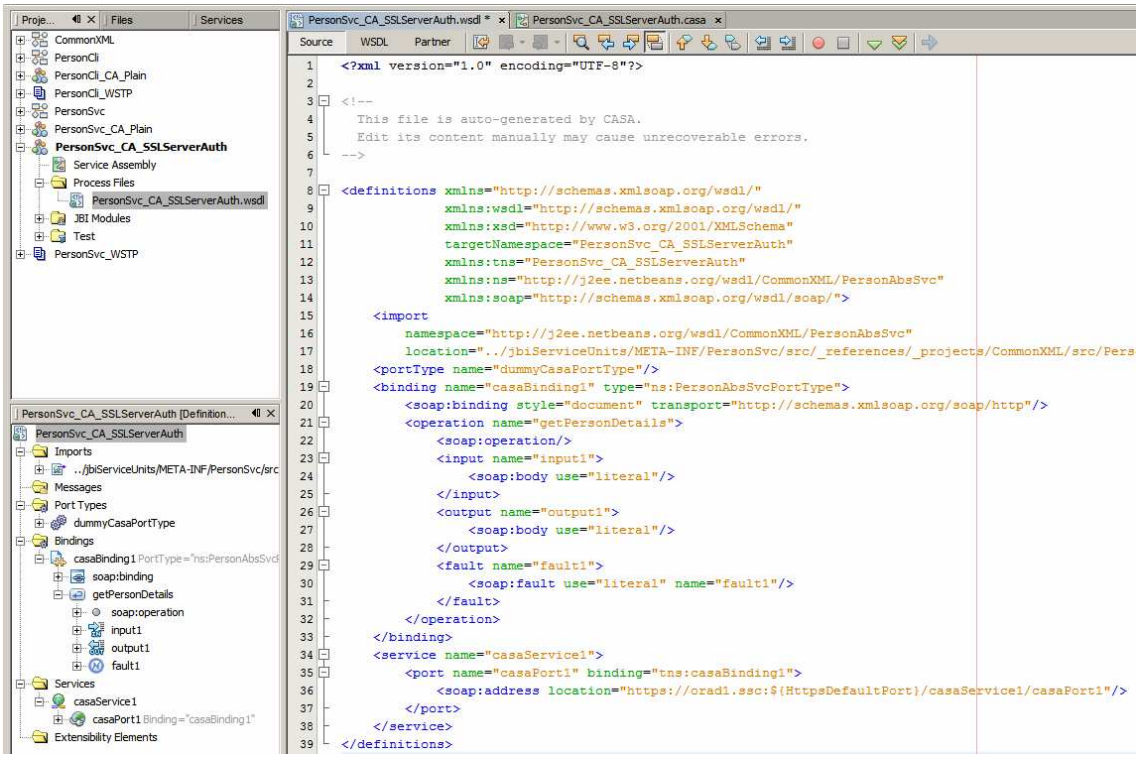


Figure 5.8.5 *Concrete WSDL*

Note that the imported WSDL location is relative to the location of this WSDL. At build time NetBeans will be able to resolve this but at runtime it will not. To make sure the project can deploy successfully we need to “import” the abstract WSDL from the CommonXML Project to this project’s “Process Files” folder. Right-click on the “process File” folder, choose “New” -> “External WSDL Document(s)”, locate the WSDL in the CommoXML/src folder, select it and import it into the CASA project. This should not be required but … Figure 5.8.9 shows the project structure after this activity.

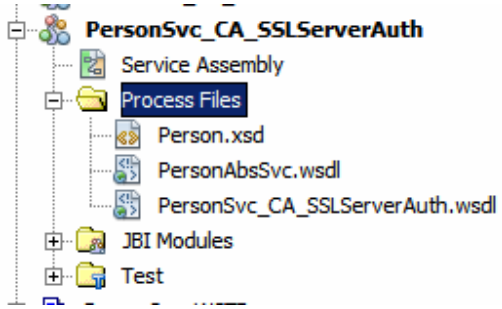


Figure 5.8.9 *Project structure with abstract WSDL and XSD “imported”*

Switch back to the CASA canvas, click the “paper with a key” icon and choose “Server Configuration”. Figure 5.8.10 illustrates this step.

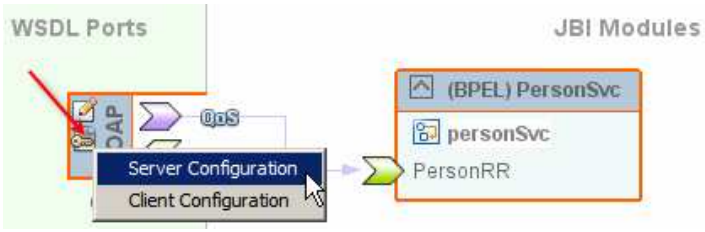


Figure 5.8.10 *Edit Server Configuration*

Check the “Secure Service” checkbox, choose “Transport Security (SSL)” from the Security Mechanism drop-down and click “Configure”, as shown in Figure 5.8.11.

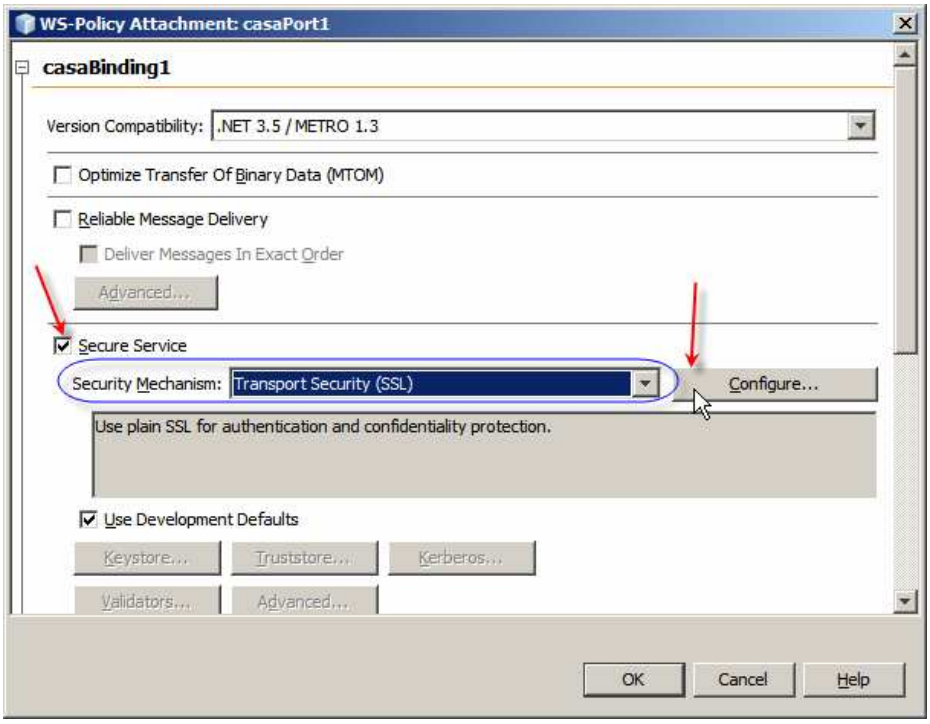


Figure 5.8.11 *Enable and configure SSL / TLS channel security*

In GlassFish ESB v2.2 the only thing that happens when the Configure button is clicked is that a dialog box appears, asking whether to require client certificate.

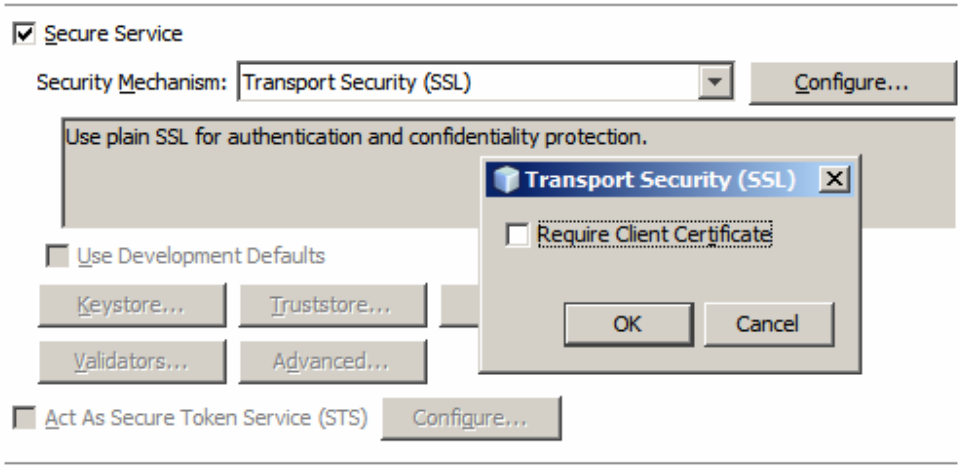


Figure 5.8.12 *Require Client Certificate – ineffective directive*

As it happens, the HTTP BC ignores this setting even if provided.

In GlassFish ESB v2.1 there were plenty of other options, related to algorithm suites and similar things, but since all were ignored by the HTTP BC perhaps it is just as well they were removed. It would have been better if the configuration was passed by the HTTP BC to the Metro infrastructure and actually invoked the implied functionality but …

Dismiss the dialog and look again at the PersonSvc_CA_SSLServerAuth WSDL. Switch to the Source view and inspect the policy formulation.

Note, on line 16, that a policy reference attribute, shown in Figure 5.8.13, was added to the Biding.

```
8  <definitions xmlns="http://schemas.xmlsoap.org/wsdl/"
9               xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
10              xmlns:xsd="http://www.w3.org/2001/XMLSchema"
11              targetNamespace="PersonSvc_CA_SSLServerAuth"
12              xmlns:tns="PersonSvc_CA_SSLServerAuth" xmlns:ns="http://j2ee.netbeans.org/wsd
13     <import namespace="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc" location="../
14     <portType name="dummyCasaPortType"/>
15     <binding name="casaBinding1" type="ns:PersonAbsSvcPortType">
16        <wsp:PolicyReference URI="#casaBinding1Policy"/>
17        <soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
18        <operation name="getPersonDetails">
19            <soap:operation/>
```

Figure 5.8.13 *Policy Reference in the Binding*

Were we to remove this attribute and its value no policy would be applied to the binding, even if one was there in the WSDL.

> **Note**
>
> This discussion relates to the WSDL generated by the tooling. The line number references and crypto algorithm changed between GlassFish ESB v2.1 and GlassFish ESB v2.2. The illustrations apply to GlassFish ESB v2.1. In v2.2 line numbers and algorithm will be different. Overall the discussion still applies.

Scroll down and note the following, called out in Figure 5.8.14:

Figure 5.8.14 *Policy elements of special interest*

- Line 43: <wsam:Addressing wsp:Optional="false"/>
  One would expect this to mean “WS-Addressing is mandatory”. The presence of the wsp:Optional=”false” attribute make the implementation ignore WS-Addressing altogether. **WS-Addressing is not required for SSL and is unrelated to SSL so let’s get rid of this element**.

- Line 48: <sp:HttpsToken RequireClientCertificate="false"/>
  This attribute indicates that Server-side authentication is used – no client certificate is required.

- Line 56: <sp:IncludeTimestamp/>
  This element requires addition of a timestamp token**. Timestamp token is not related to or required by SSL so delete this element.**

- Line 59: <sp:Basic256Rsa15/>
  This specified the preferred algorithm suite

The final policy, after removal of addressing and timestamp elements, is shown in Figure 5.8.15.

```
40  <wsp:Policy wsu:Id="casaBinding1Policy">
41      <wsp:ExactlyOne>
42          <wsp:All>
43              <sp:TransportBinding>
44                  <wsp:Policy>
45                      <sp:TransportToken>
46                          <wsp:Policy>
47                              <sp:HttpsToken RequireClientCertificate="false"/>
48                          </wsp:Policy>
49                      </sp:TransportToken>
50                      <sp:Layout>
51                          <wsp:Policy>
52                              <sp:Lax/>
53                          </wsp:Policy>
54                      </sp:Layout>
55                      <sp:AlgorithmSuite>
56                          <wsp:Policy>
57                              <sp:Basic256Rsa15/>
58                          </wsp:Policy>
59                      </sp:AlgorithmSuite>
60                  </wsp:Policy>
61              </sp:TransportBinding>
62              <sp:Wss10/>
63          </wsp:All>
64      </wsp:ExactlyOne>
65  </wsp:Policy>
```

Figure 5.8.15 *Final policy*

Save and close the modified WSDL and Build, but do not Deploy the project.

This project will be deployed to the remote instance of the GlassFish Application Server – for me orad1.ssc. Before we can deploy the project we need to add the GlassFish instance to the NetBeans IDE so it can address it at deployment time. Switch to the Services Tab in the project explorer, right-click on the Servers node and choose Add Server. Figure 5.8.16 illustrates this. If you already have the remote server in the list, skip this.

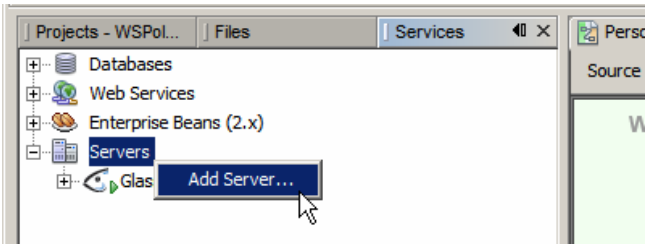


Figure 5.8.16 *Add Server …*

Choose GlassFish v2, modify the name to reflect host name and click Next, as shown in Figure 5.8.17.

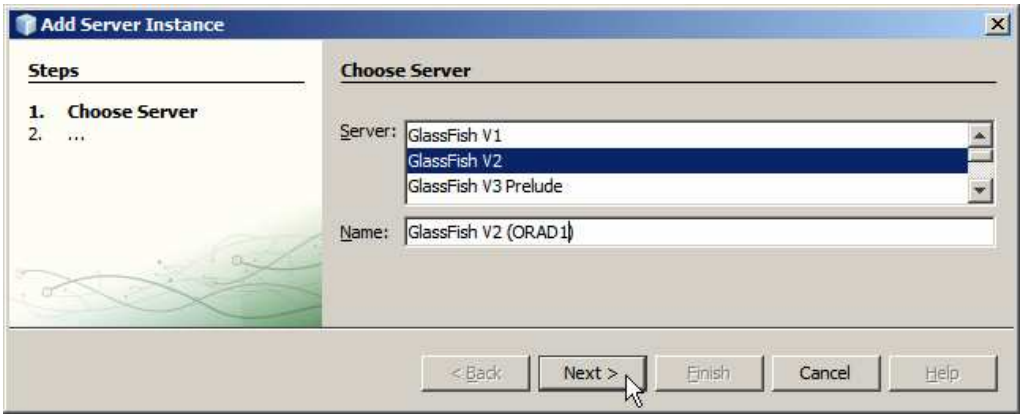


Figure 5.8.17 *Choose server type and name it*

Choose “Register Remote Domain” and click Next. Figure 5.8.18 illustrates key points.

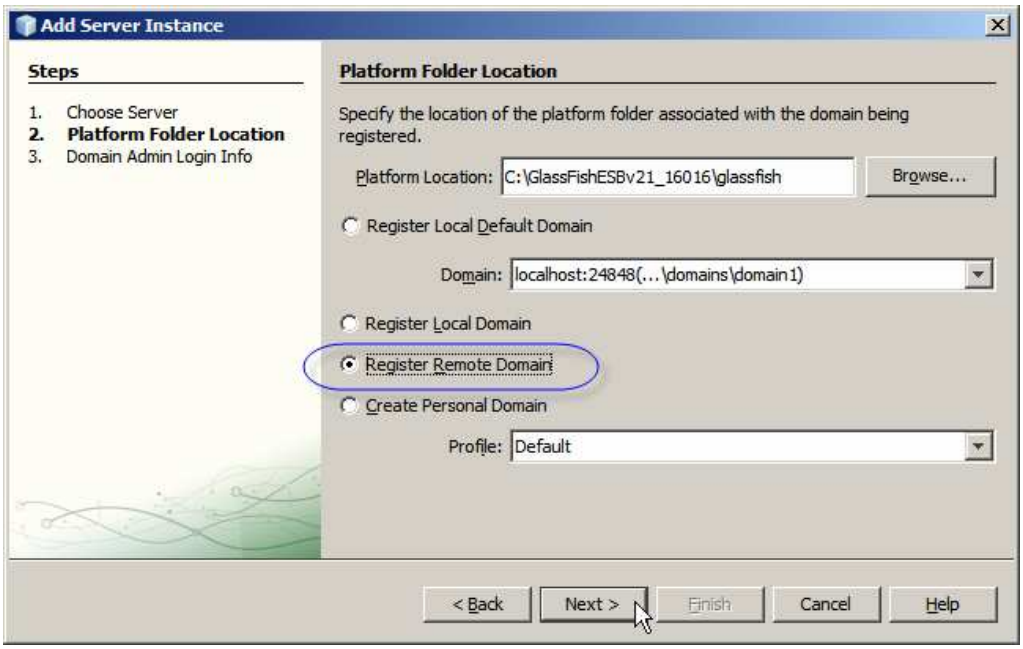


Figure 5.8.18 *Choose to Register Remote Domain*

Enter FQDN of the remote host, as specified for the server certificate when the remote GlassFish instance was installed, specify the appropriate administrative port number, if different from default, and click Next. Figure 5.8.19 illustrates this.

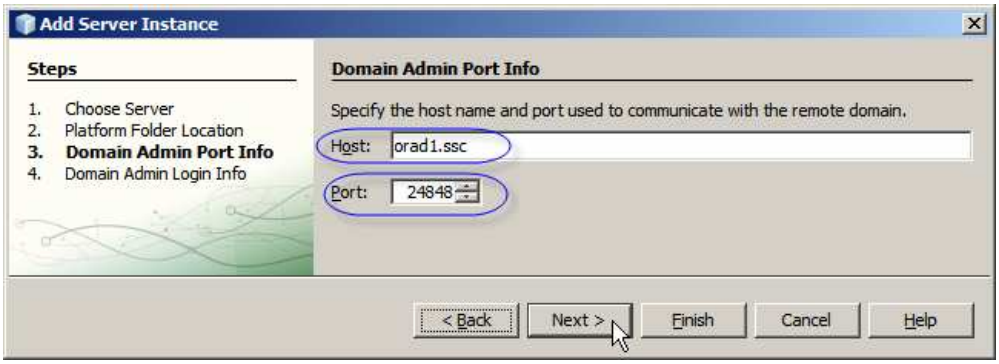


Figure 5.8.19 *Specify host and port*

Provide credentials and Finish.

If the remote GlassFish instance is running and correct configuration information was provided to NetBeans, the GlassFish instance will appear in the list of servers, as shown in Figure 5.8.20.

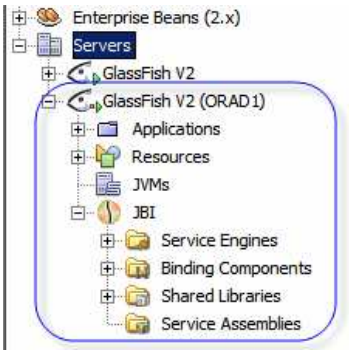


Figure 5.8.20 *Remote GlassFish instance in NetBeans*

> **Note**
>
> As I reviewed this document I switched GlassFish ESB from version 2.1 to version 2.2 and remote host from orad1.ssc to gfesbv22. Where it matters I will make a comment to that effect. In the meantime, wherever I make a reference to orad1.ssc I mean a remote host. In the reviewed text that would be gfesb22.

Switch back to the Project Explorer's Project tab, right-click on the name PersonSvc_CA_SSLServerAuth, choose Properties, click the "Running Project" property and select the remote GlassFish instance as the deployment target. Figure 5.8.21 illustrates key points.

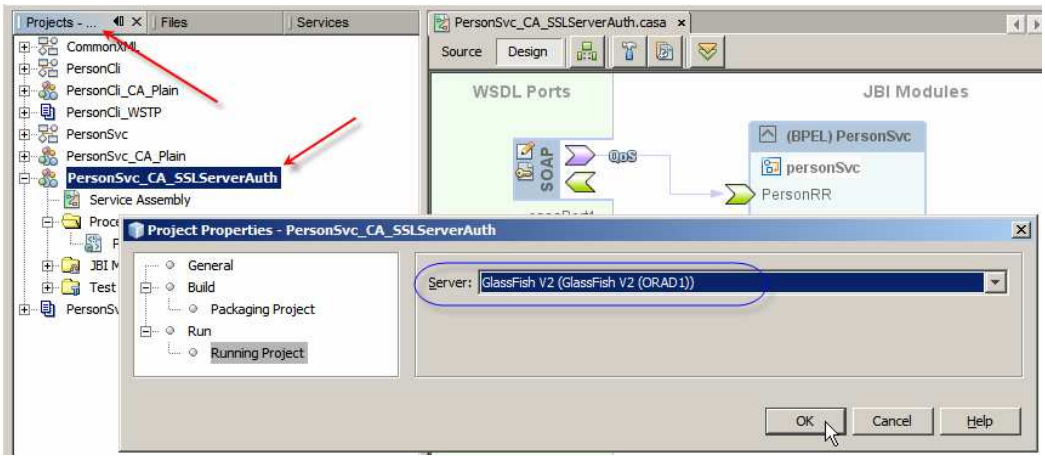


Figure 5.8.21 *Choose the remote GlassFish instance as the deployment target*

Build the project and Deploy it.

> **Note**
>
> In GlassFish ESB v2.2 a change was made which prevents deployment of a service if the host name in the URL is not a FQDN of the host to which the service is being deployed and is not localhost. I had a lengthy discussion with the HTTP BC developer and finally gave up trying to get this unwarranted, unjustified and illogical restriction lifted. In the meantime, unless the host name in the URL is one of the two "acceptable" ones, deployment in v2.2 will fail with a message similar to the following:
>
> ```
> [#|2010-01-24T17:59:38.944+0000|SEVERE|sun-
> appserver2.1|com.sun.jbi.httpsoapbc.HttpSoapBindingDeployer|_Thread
> ID=24;_ThreadName=PersonSvc_CA_SSLServerAuth-sun-http-
> binding;_RequestID=4dd3becb-74cf-4946-9015-5d36f549bda2;|HTTPBC-
> E00203: Initialization failed. java.lang.Exception: HTTPBC-E00298:
> Found an invalid host name 'gfesbv22.aus.sun.com' in the
> soap:address URI
> 'https://gfesbv22.aus.sun.com:9181/casaService1/casaPort1' for WSDL
> 'PersonSvc_CA_SSLServerAuth.wsdl' - only localhost or the
> equivalent FQDN is valid in the HTTP URL for web services provided
> by HTTP BC.
> javax.jbi.JBIException: java.lang.Exception: HTTPBC-E00298: Found
> an invalid host name 'gfesbv22.aus.sun.com' in the soap:address URI
> 'https://gfesbv22.aus.sun.com:9181/casaService1/casaPort1' for WSDL
> 'PersonSvc_CA_SSLServerAuth.wsdl' - only localhost or the
> equivalent FQDN is valid in the HTTP URL for web services provided
> by HTTP BC.
> ```
>
> Modify the concrete WSDL and change the host name to localhost. Deploy again.

Because this is a project that requires SSL with Server-side Authentication we can use the SoapUI plugin to test the service and observe SSL Handshake at the server side. We will implement and exercise the PersonCli SSL with Server-side Authentication project a little later.

Let's create a "New Project" -> "Java EE" -> "Web Service Testing Project", named PersonSvc_SSLServerAuth_WSDP, using the WSDL location from the CASA SOAP BC's Location Property, replacing the ${HttpsDefaultPort} with the appropriate port number, For me this will be:

```
https://orad1.ssc:29181/casaService1/casaPort1?WSDL
```

As the project is created, a dialogue box my pop up asking you to accept remote GlassFish instance's certificate, similar to what I saw for orad1, Figure 5.8.22.

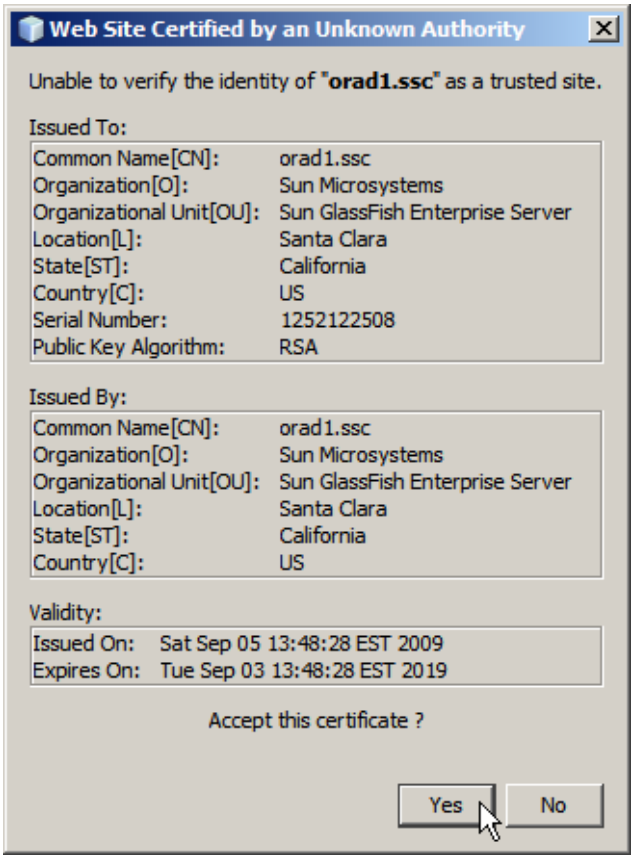


Figure 5.8.22 *Accept remote GlassFish instance's certificate*

This will happen once, the first time a reference is made to the remote host. Thereafter NetBeans will trust the certificate and will not ask for confirmation.

Once the project is created add a New Request to the getPersonDetai;ls interface, modify PersonID to 342312 and submit the request. Figure 5.8.23 illustrates the request.

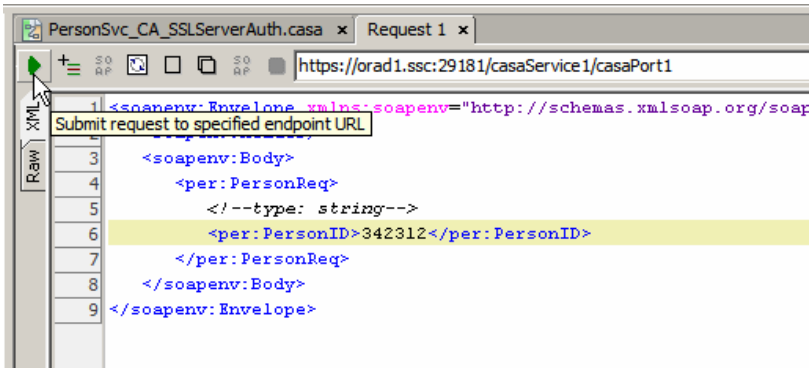


Figure 5.8.23 *SOAP Request*

Note

If you received a SOAP Fault with an error similar to this:

```
<S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/">
   <S:Body>
      <S:Fault xmlns:ns3="http://www.w3.org/2003/05/soap-envelope">
         <faultcode xmlns:wsse="http://docs.oasis-
open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-
1.0.xsd">wsse:InvalidSecurity</faultcode>
         <faultstring>Security Requirements not met - No Security
header in message</faultstring>
      </S:Fault>
   </S:Body>
</S:Envelope>
```

It means you did not delete the addressing or timestamp parts from the WSDL. Go back to the earlier discussion and follow the steps.

Observe a SOAP Response. Click on the “SSL Info” tab and observe the orad1.ssc’s certificate, figure 5.8.24.

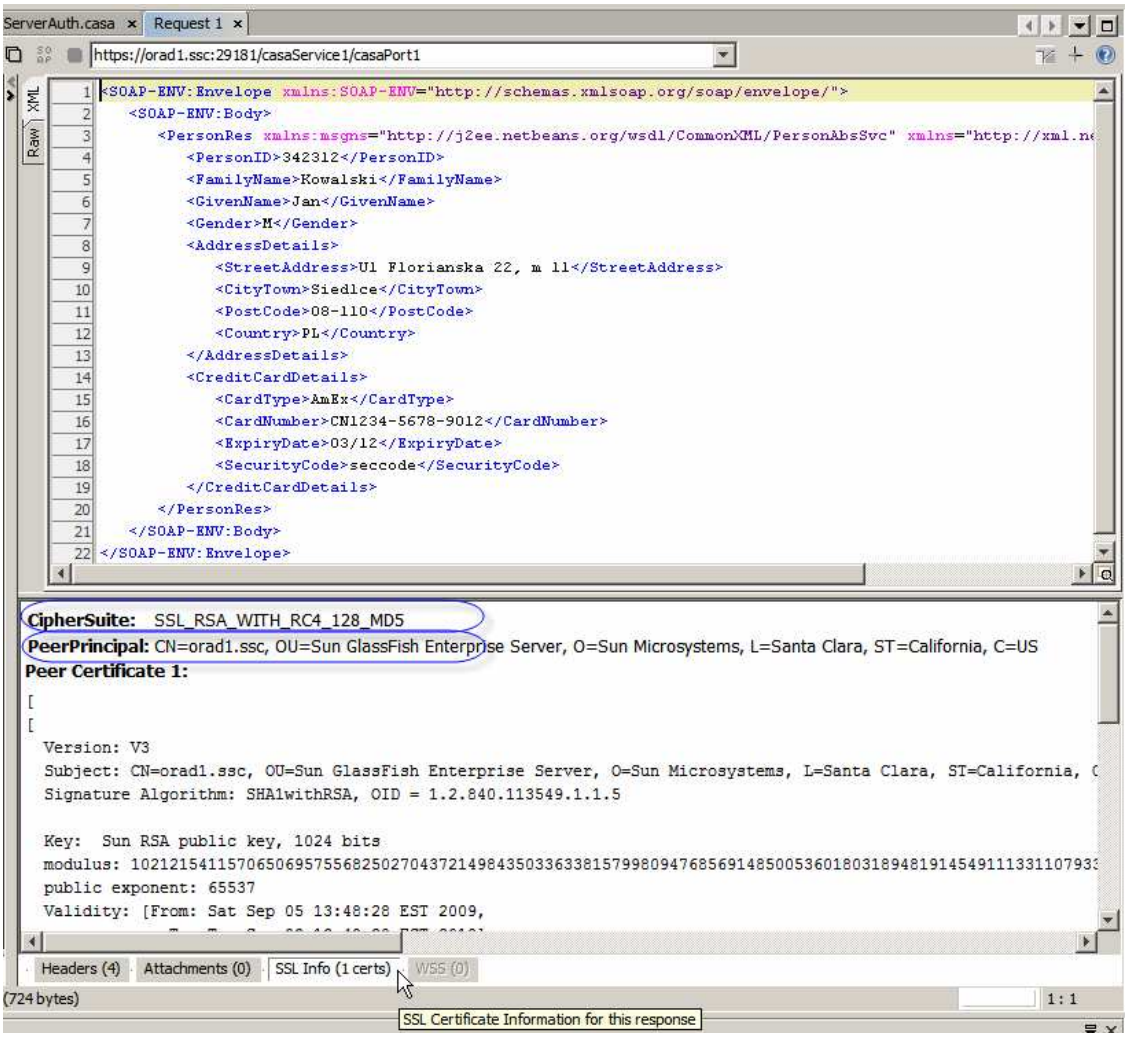
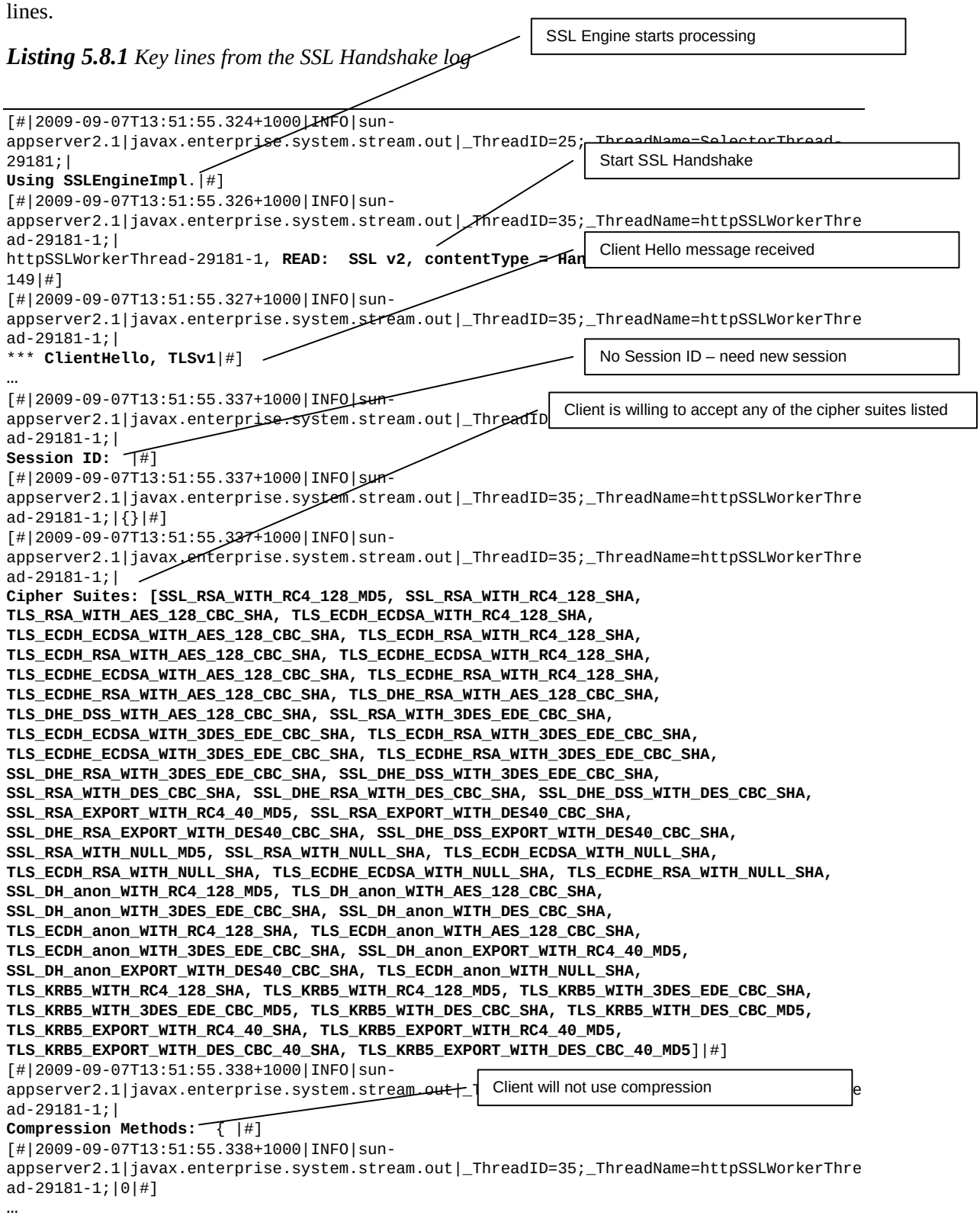


Figure 5.8.24 *SOAP Response and orad1.ssc’s certificate*

The SSL Handshake was successful. Let's look at selected lines from the server.log of the remote GlassFish instance to see how the SSL Handshake looked like there. Listing 5.8.1 shows just key lines.

Listing 5.8.1 *Key lines from the SSL Handshake log*




```
[#|2009-09-07T13:51:55.324+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=25;_ThreadName=SelectorThread-
29181;|
Using SSLEngineImpl.|#]
[#|2009-09-07T13:51:55.326+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
httpSSLWorkerThread-29181-1, READ:  SSL v2, contentType = Han
149|#]
[#|2009-09-07T13:51:55.327+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
*** ClientHello, TLSv1|#]
…
[#|2009-09-07T13:51:55.337+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID
ad-29181-1;|
Session ID:  |#]
[#|2009-09-07T13:51:55.337+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|{}|#]
[#|2009-09-07T13:51:55.337+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_ECDH_ECDSA_WITH_RC4_128_SHA,
TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA, TLS_ECDH_RSA_WITH_RC4_128_SHA,
TLS_ECDH_RSA_WITH_AES_128_CBC_SHA, TLS_ECDHE_ECDSA_WITH_RC4_128_SHA,
TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA, TLS_ECDHE_RSA_WITH_RC4_128_SHA,
TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
TLS_ECDH_ECDSA_WITH_3DES_EDE_CBC_SHA, TLS_ECDH_RSA_WITH_3DES_EDE_CBC_SHA,
TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA, TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA,
SSL_RSA_WITH_NULL_MD5, SSL_RSA_WITH_NULL_SHA, TLS_ECDH_ECDSA_WITH_NULL_SHA,
TLS_ECDH_RSA_WITH_NULL_SHA, TLS_ECDHE_ECDSA_WITH_NULL_SHA, TLS_ECDHE_RSA_WITH_NULL_SHA,
SSL_DH_anon_WITH_RC4_128_MD5, TLS_DH_anon_WITH_AES_128_CBC_SHA,
SSL_DH_anon_WITH_3DES_EDE_CBC_SHA, SSL_DH_anon_WITH_DES_CBC_SHA,
TLS_ECDH_anon_WITH_RC4_128_SHA, TLS_ECDH_anon_WITH_AES_128_CBC_SHA,
TLS_ECDH_anon_WITH_3DES_EDE_CBC_SHA, SSL_DH_anon_EXPORT_WITH_RC4_40_MD5,
SSL_DH_anon_EXPORT_WITH_DES40_CBC_SHA, TLS_ECDH_anon_WITH_NULL_SHA,
TLS_KRB5_WITH_RC4_128_SHA, TLS_KRB5_WITH_RC4_128_MD5, TLS_KRB5_WITH_3DES_EDE_CBC_SHA,
TLS_KRB5_WITH_3DES_EDE_CBC_MD5, TLS_KRB5_WITH_DES_CBC_SHA, TLS_KRB5_WITH_DES_CBC_MD5,
TLS_KRB5_EXPORT_WITH_RC4_40_SHA, TLS_KRB5_EXPORT_WITH_RC4_40_MD5,
TLS_KRB5_EXPORT_WITH_DES_CBC_40_SHA, TLS_KRB5_EXPORT_WITH_DES_CBC_40_MD5]|#]
[#|2009-09-07T13:51:55.338+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_T                                    e
ad-29181-1;|
Compression Methods:  { |#]
[#|2009-09-07T13:51:55.338+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|0|#]
…
```


```
[#|2009-09-07T13:51:55.338+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
%% Created:  [Session-19, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-07T13:51:55.339+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
*** ServerHello, TLSv1|#]
…
[#|2009-09-07T13:51:55.349+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
Session ID:  |#]
[#|2009-09-07T13:51:55.349+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|{74, 164, 131, 91, 63, 222, 251, 80, 243, 87, 244, 51, 122, 138, 49, 114, 24,
244, 67, 8, 250, 124, 74, 146, 191, 69, 3, 249, 26, 3, 159, 81}|#]
[#|2009-09-07T13:51:55.350+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-07T13:51:55.350+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
Compression Method: 0|#]
[#|2009-09-07T13:51:55.350+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
***|#]
[#|2009-09-07T13:51:55.350+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
Cipher suite:  SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-07T13:51:55.350+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
*** Certificate chain|#]
[#|2009-09-07T13:51:55.351+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
chain [0] = [
[
  Version: V3
  Subject: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
102121541157065069575568250270437214984350336338157998094768569148500536018031894819145491
113311079336949399472032140208618356816163637202618727298710465300230334324506184949208474
446933178623253726110968175800084405517043740120715529443624373833850530287673442674333181
408072531272948503339758724948550982873
  public exponent: 65537
  Validity: [From: Sat Sep 05 13:48:28 EST 2009,
              To: Tue Sep 03 13:48:28 EST 2019]
  Issuer: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4aa1df8c]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
```

```
0000: 9E 79 9C E9 59 86 34 8F   FD 75 09 F7 82 D0 82 CE  .y..Y.4..u......
0010: BE 9A 44 EE                                       ..D.
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 23 A7 FD 51 1F 81 9E 8C   34 3A 58 01 EF 5A 04 CD  #..Q....4:X..Z..
0010: AD 35 2C 67 17 40 3A B8   EA 19 37 DB B2 B3 C8 EA  .5,g.@:...7.....
0020: 5B 4F 0E 30 4E 9D 42 23   52 FE E8 53 44 8B 64 21  [O.0N.B#R..SD.d!
0030: CF 5F EE 07 D5 60 1E F2   1B EA 68 99 E4 BB 6C 89  ._...`....h...l.
0040: 02 21 1D A5 AE 6C 26 14   8C 92 02 92 E3 C1 74 56  .!...l&.......tV
0050: 6A 69 96 8E 2D 1E 7D 6C   52 5E 99 38 20 8B 19 C4  ji..-..lR^.8 ...
0060: 52 11 89 B3 73 D0 6C 61   B2 DB BF CA 58 C
0070: 40 81 97 CC 3F 60 A6 1E   B5 D6 60 8A C6 6B B6 F6  @...?`....`..k..

]|#]
 [#|2009-09-07T13:51:55.352+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
*** ServerHelloDone|#]
[#|2009-09-07T13:51:55.352+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
httpSSLWorkerThread-29181-1, WRITE: TLSv1 Handshake, length = 794|#]
[#|2009-09-07T13:51:55.524+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
httpSSLWorkerThread-29181-1, READ: TLSv1 Handshake, length = 134|#]
[#|2009-09-07T13:51:55.527+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
*** ClientKeyExchange, RSA PreMasterSecret, TLSv1|#]
[#|2009-09-07T13:51:55.528+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
SESSION KEYGEN:|#]
[#|2009-09-07T13:51:55.528+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
PreMaster Secret:|#]
[#|2009-09-07T13:51:55.528+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
0000: |#]
[#|2009-09-07T13:51:55.528+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|03 |#]
…
[#|2009-09-07T13:51:55.543+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
CONNECTION KEYGEN:|#]
[#|2009-09-07T13:51:55.543+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
Client Nonce:|#]
[#|2009-09-07T13:51:55.544+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
0000: |#]
…
```

Hello exchange done, perform secrets exchange

[#|2009-09-07T13:51:55.554+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
Server Nonce:|#]
[#|2009-09-07T13:51:55.554+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
0000: |#]
[#|2009-09-07T13:51:55.554+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|4A |#]
…
[#|2009-09-07T13:51:55.564+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
Master Secret:|#]
[#|2009-09-07T13:51:55.564+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
0000: |#]
[#|2009-09-07T13:51:55.564+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|6F |#]
…
[#|2009-09-07T13:51:55.577+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|**Client MAC write Secret:**|#]
[#|2009-09-07T13:51:55.577+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
0000: |#]
[#|2009-09-07T13:51:55.577+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|C3 |#]
…
[#|2009-09-07T13:51:55.582+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
Server MAC write Secret:|#]
[#|2009-09-07T13:51:55.582+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
0000: |#]
[#|2009-09-07T13:51:55.583+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|6F |#]
…
[#|2009-09-07T13:51:55.587+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|**Client write key:**|#]
[#|2009-09-07T13:51:55.587+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
0000: |#]
[#|2009-09-07T13:51:55.587+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|C2 |#]
…
[#|2009-09-07T13:51:55.592+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|**Server write key:**|#]
[#|2009-09-07T13:51:55.592+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|

```
0000: |#]
[#|2009-09-07T13:51:55.593+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|BF |#]
…
[#|2009-09-07T13:51:55.598+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|... no IV used for this cipher|#]
[#|2009-09-07T13:51:55.598+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
httpSSLWorkerThread-29181-1, READ: TLSv1 Change Cipher Spec, length = 1|#]
[#|2009-09-07T13:51:55.599+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
httpSSLWorkerThread-29181-1, READ: TLSv1 Handshake, length = 32|#]
[#|2009-09-07T13:51:55.599+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
*** Finished|#]
[#|2009-09-07T13:51:55.599+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
verify_data:  { |#]
[#|2009-09-07T13:51:55.599+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|58|#]
…
[#|2009-09-07T13:51:55.603+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
httpSSLWorkerThread-29181-1, WRITE: TLSv1 Change Cipher Spec, length = 1|#]
[#|2009-09-07T13:51:55.604+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
*** Finished|#]
[#|2009-09-07T13:51:55.604+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
verify_data:  { |#]
[#|2009-09-07T13:51:55.604+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|220|#]
…
[#|2009-09-07T13:51:55.609+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
httpSSLWorkerThread-29181-1, WRITE: TLSv1 Handshake, length = 32|#]
[#|2009-09-07T13:51:55.609+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=35;_ThreadName=httpSSLWorkerThre
ad-29181-1;|
%% Cached server session: [Session-19, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-07T13:51:55.662+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=36;_ThreadName=httpSSLWorkerThre
ad-29181-0;|
---[HTTP request]---|#]
…
```

Successful SSL Handshake begin data transfer

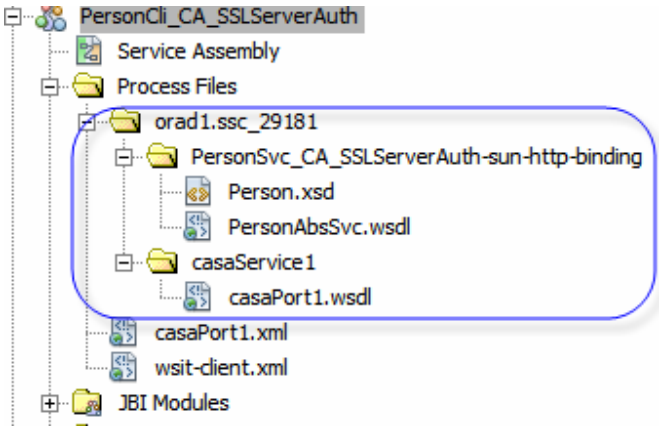
The listing shows key points in the SSL Handshake, as seem at the server. The client view will be looked at shortly. The SoapUI plugin does not produce a log I can see, however it received the server certificate as can be seen in Figure 5.8. **SoapUI plugin did not object to the certificate**

as not being trusted. It seems that SoapUI will accept any certificate. It is a testing tool, after all, not an application used to exchange real data.

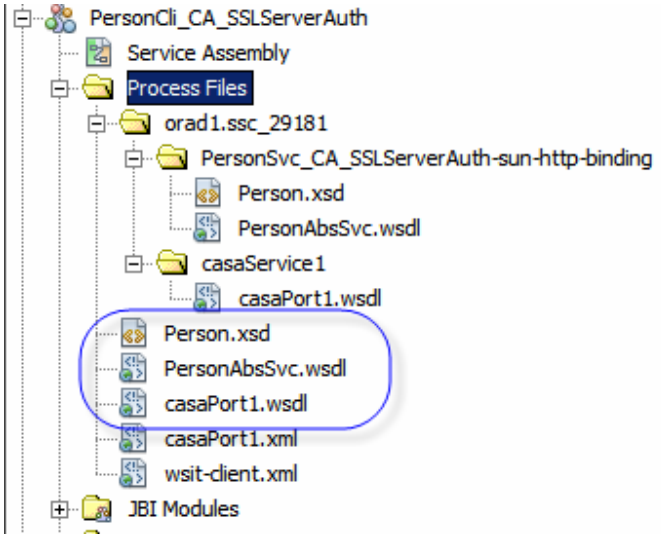
> **Note**
>
> The fact that SoapUI accepts any certificate frequently trips young players. They expect that a non-SoapUI application, for example a GlassFish ESB HTTPS client, will also accept any certificate. This is not the case at all. For GlassFish ESB HTTPS client to accept a server certificate the server certificate must be added to the client-side truststore if self-signed, or the certificate of the signer of the server certificate has to be added to the client-side truststore.

Let's now create a composite application, PersonCli_CA_SSLServerAuth, for the client side. Drag the PersonCli BPEL module onto the CASA canvas and click Build. Right-click on the name of the project and create a "New" -> "External WSDL Document(s)", providing the endpoint URL exposed by the PersonSvc_CA_SSLServerAuth composite application, with the suffix "?WSDL". Accept the certificate if the dialog box, like that shown in Figure 5.8.22 pops up.

> **Note**
>
> Here comes the rub.
>
> In GlassFish ESB v2.2, as in GlassFish ESB v2.1 before it, the **name** of the host specified in the URL matters. One may get different artifacts generated when specifying "localhost" as the host name, different when specifying FQDN of the host and different when specifying an alias host name (alternative name to FQDN, perhaps specified in the "hosts" file. If the alias refers to 127.0.0.1 artifacts are not generated correctly.
>
> The best policy is to use the FQDN of the host to which the service is deployed. This generates correct artifacts.
>
> Here comes another rub.
>
> Artifacts generated using the FQDN of the service host embed URL references that include that FQDN. This makes it impossible to deploy the client to a host which does not have connectivity to the original service host. Why does it matter? Picture a situation where the service is developed and deployed to a development machine. The consumer is then developed using the service deployed to the development machine. The service is then deployed to a test or production machine. The consumer will likewise need to be deployed to the test or production machine. There is no connectivity between development machine and production machine. The consumer will try to obtain artifacts form the development machine at deploy and start time and will fail. The consumer which uses artifacts with embedded inaccessible host URLs will fail to deploy.
>
> The best policy is to copy the artifacts that appear in a hierarchy of directories under the "Process Files" directory directly to the "Process Files" directory then manually modify them, replacing all URL references with the reference to the file name of the artifact.
>
> Here is the "before" picture.



Here is the “after” picture.



The URL references look like:

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <definitions targetNamespace="PersonSvc_CA_SSLServerAuth" xmlns="http://schemas.xmlsoap.org/wsdl/" xmln
3    <import namespace="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc"
4      location="https://gfesbv22:9181/PersonSvc_CA_SSLServerAuth-sun-http-binding/PersonAbsSvc.wsdl">
5      </import>
6    <portType name="dummyCasaPortType">
7    </portType>
8    <binding name="casaBinding1" type="ns:PersonAbsSvcPortType">
```

They need to be changed to retain just the name of the artifact file:

```
<?xml version="1.0" encoding="UTF-8"?>
<definitions targetNamespace="PersonSvc_CA_SSLServerAuth" xmlns="http://sch
  <import namespace="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc"
    location="PersonAbsSvc.wsdl">
    </import>
  <portType name="dummyCasaPortType">
  </portType>
  <binding name="casaBinding1" type="ns:PersonAbsSvcPortType">
    <wsp:PolicyReference URI="#casaBinding1Policy" />
```

Repeat the process for all other artifacts which were generated and copied to the “root” folder to make sure none use URL-based references to WSDLs and XSDs.

If you modified artifact references the discussion below, all the way to Listing 5.8.40, will not apply at deployment time, but will apply at runtime, the first time the client is invoked. The first invocation will fail if the server certificate is not trusted at the client side.

Right-click on the WSDL Ports swim line and choose “Load WSDL Port”. Accept the one and only port and click Build to build the project. These steps are illustrated in Figures 5.7.8 through 5.7.14.

Click on the “paper and key” icon on the SOAP BC and choose Client Configuration, as shown in Figure 5.8.25.

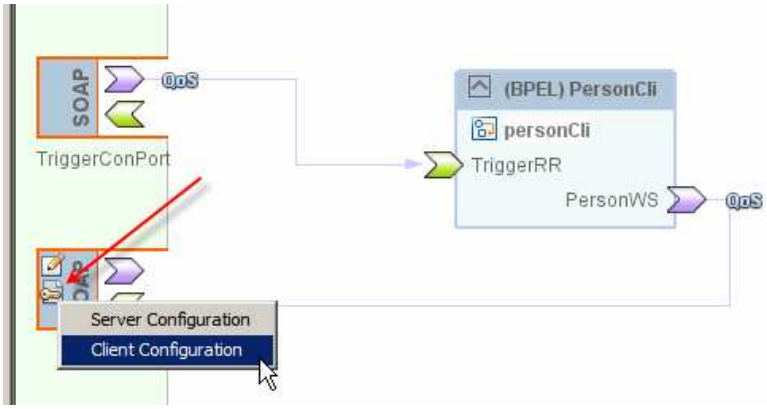


Figure 5.8.25 *Client policy configuration*

Note, as shown in Figure 5.8.26, that there are no specific configuration options for SSL with Server-side Authentication.

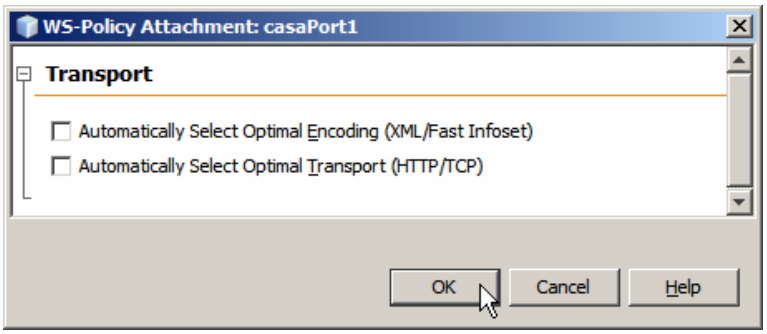


Figure 5.8.26 *No SSL configuration options at the client side*

Build the project.

Attempt to deploy the project to the local GlassFish instance. The expectation is that deployment may fail with an unenlightening message like that shown in Listing 5.8.2.

Listing 5.8.2 Deployment error messages

```
ERROR: Successful execution of Deploy:
G:\GlassFishESBv21Projects\WSPolicyExploration\PersonCli_CA_SSLServerAuth/dist/P
ersonCli_CA_SSLServerAuth.zip
WARNING: (JBIMA0404) Deployment of service assembly PersonCli_CA_SSLServerAuth
succeeded partially; some service units failed to deploy.
    * Component: sun-http-binding
      ERROR: (SOAPBC_DEPLOY_2) HTTPBC-E00201: Deployment failed.
javax.wsdl.WSDLException: WSDLException (at /definitions/import):
faultCode=OTHER_ERROR: Unable to resolve imported document at
''https://orad1.ssc:29181/PersonSvc_CA_SSLServerAuth-sun-http-
binding/PersonAbsSvc.wsdl'', relative to
''file:/C:/GlassFishESBv21_16016/glassfish/domains/domain1/jbi/service-
assemblies/PersonCli_CA_SSLServerAuth.1/PersonCli_CA_SSLServerAuth-sun-http-
binding/sun-http-binding/orad1.ssc_29181/casaService1/casaPort1.wsdl'':
javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested target
G:\GlassFishESBv21Projects\WSPolicyExploration\PersonCli_CA_SSLServerAuth\nbproj
ect\build-impl.xml:201: Deployment failure.
BUILD FAILED (total time: 2 seconds)
```

What happened? The deployer attempted to start the composite application and the SOAP Binding Component in the PersonCli_CA_SSLServerAuth on mcz02.aus.sun.com attempted to connect to the SOAP BC in the PersonSvc_CA_SSLServerAuth on orad1.ssc. Since the GalssFish instance on mcz02.aus.sun.com does not know about the certificate returned by the GlassFish instance on orad1.ssc it rejected it with a rude message.

Listing 5.8.3 shows selected messages from the mcz02.aus.sun.com's server.log, relating to the SSL Handshake failure.

Listing 5.8.3 Client-side SSL Handshake

```
[#|2009-09-07T18:18:18.343+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
%% No cached client session|#]
[#|2009-09-07T18:18:18.343+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
*** ClientHello, TLSv1|#]
...
[#|2009-09-07T18:18:18.343+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
Session ID:  |#]
[#|2009-09-07T18:18:18.343+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|{}|#]
[#|2009-09-07T18:18:18.343+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]
```

[#|2009-09-07T18:18:18.343+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
Compression Methods: { |#]
...
[#|2009-09-07T18:18:18.343+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
PersonCli_CA_SSLServerAuth-sun-http-binding, **WRITE: TLSv1 Handshake**, length = 73|#]
[#|2009-09-07T18:18:18.343+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
PersonCli_CA_SSLServerAuth-sun-http-binding, **WRITE: SSLv2 client hello message**, length =
98|#]
[#|2009-09-07T18:18:18.640+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
PersonCli_CA_SSLServerAuth-sun-http-binding, **READ: TLSv1 Handshake**, length = 794|#]
[#|2009-09-07T18:18:18.640+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
***** ServerHello, TLSv1|#]**
...
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
Session ID: |#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|{74, 164, 193, 203, 245, 191, 123, 38, 91, 15, 20, 255, 117,
203, 207, 130, 17, 102, 76, 59, 54, 207, 0, 9, 12, 125, 143, 33, 189, 59, 111, 26}|#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
Compression Method: 0|#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
***|#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
%% Created: [Session-3, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
**** SSL_RSA_WITH_RC4_128_MD5|#]**
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
***** Certificate chain|#]**
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
chain [0] = [
[
  Version: V3
  Subject: CN=**orad1.ssc**, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

```
  Key:  Sun RSA public key, 1024 bits
  modulus:
102121541157065069575568250270437214984350336338157998094768569148500536018031894819145491
113311079336949399472032140208618356816163637202618727298710465300230334324506184949208474
446933178623253726110968175800084405517043740120715529443624373833850530287673442674333181
408072531272948503339758724948550982873
  public exponent: 65537
  Validity: [From: Sat Sep 05 13:48:28 EST 2009,
              To: Tue Sep 03 13:48:28 EST 2019]
  Issuer: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4aa1df8c]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 9E 79 9C E9 59 86 34 8F   FD 75 09 F7 82 D0 82 CE  .y..Y.4..u......
0010: BE 9A 44 EE                                        ..D.
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 23 A7 FD 51 1F 81 9E 8C   34 3A 58 01 EF 5A 04 CD  #..Q....4:X..Z..
0010: AD 35 2C 67 17 40 3A B8   EA 19 37 DB B2 B3 C8 EA  .5,g.@:...7.....
0020: 5B 4F 0E 30 4E 9D 42 23   52 FE E8 53 44 8B 64 21  [O.0N.B#R..SD.d!
0030: CF 5F EE 07 D5 60 1E F2   1B EA 68 99 E4 BB 6C 89  ._...`....h...l.
0040: 02 21 1D A5 AE 6C 26 14   8C 92 02 92 E3 C1 74 56  .!...l&.......tV
0050: 6A 69 96 8E 2D 1E 7D 6C   52 5E 99 38 20 8B 19 C4  ji..-..lR^.8 ...
0060: 52 11 89 B3 73 D0 6C 61   B2 DB BF CA 58 0A 3A 5D  R...s.la....X.:]
0070: 40 81 97 CC 3F 60 A6 1E   B5 D6 60 8A C6 6B B6 F6  @...?`....`..k..

]|#]
...
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|, SEND TLSv1 ALERT:  |#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|fatal, |#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|description = certificate_unknown|#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
PersonCli_CA_SSLServerAuth-sun-http-binding, WRITE: TLSv1 Alert, length = 2|#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
PersonCli_CA_SSLServerAuth-sun-http-binding, called closeSocket()|#]
[#|2009-09-07T18:18:18.656+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=81;_ThreadName=PersonCli_CA_SSLS
erverAuth-sun-http-binding;|
PersonCli_CA_SSLServerAuth-sun-http-binding, handling exception:
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested target|#]
[#|2009-09-07T18:18:18.671+1000|SEVERE|sun-
appserver2.1|com.sun.jbi.httpsoapbc.HttpSoapBindingDeployer|_ThreadID=81;_ThreadName=Perso
nCli_CA_SSLServerAuth-sun-http-binding;_RequestID=c5817253-ec00-4d70-9d29-
```

```
218bfc560ba3;|HTTPBC-E00201: Deployment failed. javax.wsdl.WSDLException: WSDLException
(at /definitions/import): faultCode=OTHER_ERROR: Unable to resolve imported document at
'https://orad1.ssc:29181/PersonSvc_CA_SSLServerAuth-sun-http-binding/PersonAbsSvc.wsdl',
relative to 'file:/C:/GlassFishESBv21_16016/glassfish/domains/domain1/jbi/service-
assemblies/PersonCli_CA_SSLServerAuth.1/PersonCli_CA_SSLServerAuth-sun-http-binding/sun-
http-binding/orad1.ssc_29181/casaService1/casaPort1.wsdl':
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested target
javax.jbi.JBIException: javax.wsdl.WSDLException: WSDLException (at /definitions/import):
faultCode=OTHER_ERROR: Unable to resolve imported document at
'https://orad1.ssc:29181/PersonSvc_CA_SSLServerAuth-sun-http-binding/PersonAbsSvc.wsdl',
relative to 'file:/C:/GlassFishESBv21_16016/glassfish/domains/domain1/jbi/service-
assemblies/PersonCli_CA_SSLServerAuth.1/PersonCli_CA_SSLServerAuth-sun-http-binding/sun-
http-binding/orad1.ssc_29181/casaService1/casaPort1.wsdl':
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested target
        at
com.sun.jbi.httpsoapbc.ServiceUnitImpl.createEndpoints(ServiceUnitImpl.java:601)
        at com.sun.jbi.httpsoapbc.ServiceUnitImpl.deploy(ServiceUnitImpl.java:201)
        at
com.sun.jbi.httpsoapbc.HttpSoapBindingDeployer.deploy(HttpSoapBindingDeployer.java:146)
        at
com.sun.jbi.framework.ServiceUnitOperation.process(ServiceUnitOperation.java:177)
        at com.sun.jbi.framework.Operation.run(Operation.java:104)
        at java.lang.Thread.run(Thread.java:619)
Caused by: javax.wsdl.WSDLException: WSDLException (at /definitions/import):
faultCode=OTHER_ERROR: Unable to resolve imported document at
'https://orad1.ssc:29181/PersonSvc_CA_SSLServerAuth-sun-http-binding/PersonAbsSvc.wsdl',
relative to 'file:/C:/GlassFishESBv21_16016/glassfish/domains/domain1/jbi/service-
assemblies/PersonCli_CA_SSLServerAuth.1/PersonCli_CA_SSLServerAuth-sun-http-binding/sun-
http-binding/orad1.ssc_29181/casaService1/casaPort1.wsdl':
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested target
        at com.ibm.wsdl.xml.WSDLReaderImpl.parseImport(WSDLReaderImpl.java:561)
        at com.ibm.wsdl.xml.WSDLReaderImpl.parseDefinitions(WSDLReaderImpl.java:331)
        at com.ibm.wsdl.xml.WSDLReaderImpl.readWSDL(WSDLReaderImpl.java:2324)
        at com.ibm.wsdl.xml.WSDLReaderImpl.readWSDL(WSDLReaderImpl.java:2288)
        at com.ibm.wsdl.xml.WSDLReaderImpl.readWSDL(WSDLReaderImpl.java:2341)
        at com.ibm.wsdl.xml.WSDLReaderImpl.readWSDL(WSDLReaderImpl.java:2249)
        at com.ibm.wsdl.xml.WSDLReaderImpl.readWSDL(WSDLReaderImpl.java:2211)
        at
com.sun.jbi.wsdlvalidator.impl.ValidatingWSDLReaderImpl.readWSDL(ValidatingWSDLReaderImpl.
java:88)
        at
com.sun.jbi.wsdlvalidator.impl.ValidatingWSDLReaderImpl.readWSDL(ValidatingWSDLReaderImpl.
java:95)
        at
com.sun.jbi.wsdlvalidator.impl.ValidatingWSDLReaderImpl.readWSDL(ValidatingWSDLReaderImpl.
java:95)
        at
com.sun.jbi.wsdlvalidator.impl.ValidatingWSDLReaderImpl.readWSDL(ValidatingWSDLReaderImpl.
java:95)
        at
com.sun.jbi.httpsoapbc.ServiceUnitImpl.createEndpoints(ServiceUnitImpl.java:486)
        ... 5 more
Caused by: javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException:
PKIX path building failed: sun.security.provider.certpath.SunCertPathBuilderException:
unable to find valid certification path to requested target
        at com.sun.net.ssl.internal.ssl.Alerts.getSSLException(Alerts.java:174)
        at com.sun.net.ssl.internal.ssl.SSLSocketImpl.fatal(SSLSocketImpl.java:1611)
        at com.sun.net.ssl.internal.ssl.Handshaker.fatalSE(Handshaker.java:187)
        at com.sun.net.ssl.internal.ssl.Handshaker.fatalSE(Handshaker.java:181)
```

```
        at
com.sun.net.ssl.internal.ssl.ClientHandshaker.serverCertificate(ClientHandshaker.java:1035
)
        at
com.sun.net.ssl.internal.ssl.ClientHandshaker.processMessage(ClientHandshaker.java:124)
        at com.sun.net.ssl.internal.ssl.Handshaker.processLoop(Handshaker.java:516)
        at com.sun.net.ssl.internal.ssl.Handshaker.process_record(Handshaker.java:454)
        at com.sun.net.ssl.internal.ssl.SSLSocketImpl.readRecord(SSLSocketImpl.java:884)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.performInitialHandshake(SSLSocketImpl.java:1112
)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.startHandshake(SSLSocketImpl.java:1139)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.startHandshake(SSLSocketImpl.java:1123)
        at sun.net.www.protocol.https.HttpsClient.afterConnect(HttpsClient.java:434)
        at
sun.net.www.protocol.https.AbstractDelegateHttpsURLConnection.connect(AbstractDelegateHttp
sURLConnection.java:166)
        at
sun.net.www.protocol.http.HttpURLConnection.getInputStream(HttpURLConnection.java:1049)
        at
sun.net.www.protocol.https.HttpsURLConnectionImpl.getInputStream(HttpsURLConnectionImpl.ja
va:234)
        at java.net.URL.openStream(URL.java:1010)
        at com.ibm.wsdl.util.StringUtils.getContentAsInputStream(StringUtils.java:184)
        at com.ibm.wsdl.xml.WSDLReaderImpl.parseImport(WSDLReaderImpl.java:442)
        ... 16 more
Caused by: sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
        at sun.security.validator.PKIXValidator.doBuild(PKIXValidator.java:285)
        at sun.security.validator.PKIXValidator.engineValidate(PKIXValidator.java:191)
        at sun.security.validator.Validator.validate(Validator.java:218)
        at
com.sun.net.ssl.internal.ssl.X509TrustManagerImpl.validate(X509TrustManagerImpl.java:126)
        at
com.sun.net.ssl.internal.ssl.X509TrustManagerImpl.checkServerTrusted(X509TrustManagerImpl.
java:209)
        at
com.sun.net.ssl.internal.ssl.X509TrustManagerImpl.checkServerTrusted(X509TrustManagerImpl.
java:249)
        at
com.sun.net.ssl.internal.ssl.ClientHandshaker.serverCertificate(ClientHandshaker.java:1014
)
        ... 30 more
Caused by: sun.security.provider.certpath.SunCertPathBuilderException: unable to find
valid certification path to requested target
        at
sun.security.provider.certpath.SunCertPathBuilder.engineBuild(SunCertPathBuilder.java:174)
        at java.security.cert.CertPathBuilder.build(CertPathBuilder.java:238)
        at sun.security.validator.PKIXValidator.doBuild(PKIXValidator.java:280)
        ... 36 more
|#]
```

The client commenced SSL Handshake by sending the Client Hello message nominating cryptographic algorithms and compression method it is willing to use, the server responded with the Server Hello message, nominating the selected cryptographic algorithm, session id and its server certificate. The client looked at the certificate, did not found the CA that issued it in its truststore and aborted the SSL Handshake.

Recall from earlier discussion that for a self-signed certificate, which the one returned by orad1.ssc is, it must be explicitly imported into the client's GlassFish instance's cecerts.jks truststore. When I look at the client's (mcz02) GlassFish instance's cacert.jks I don't see the certificate that corresponds to orad1.ssc. Figure 5.8.27.

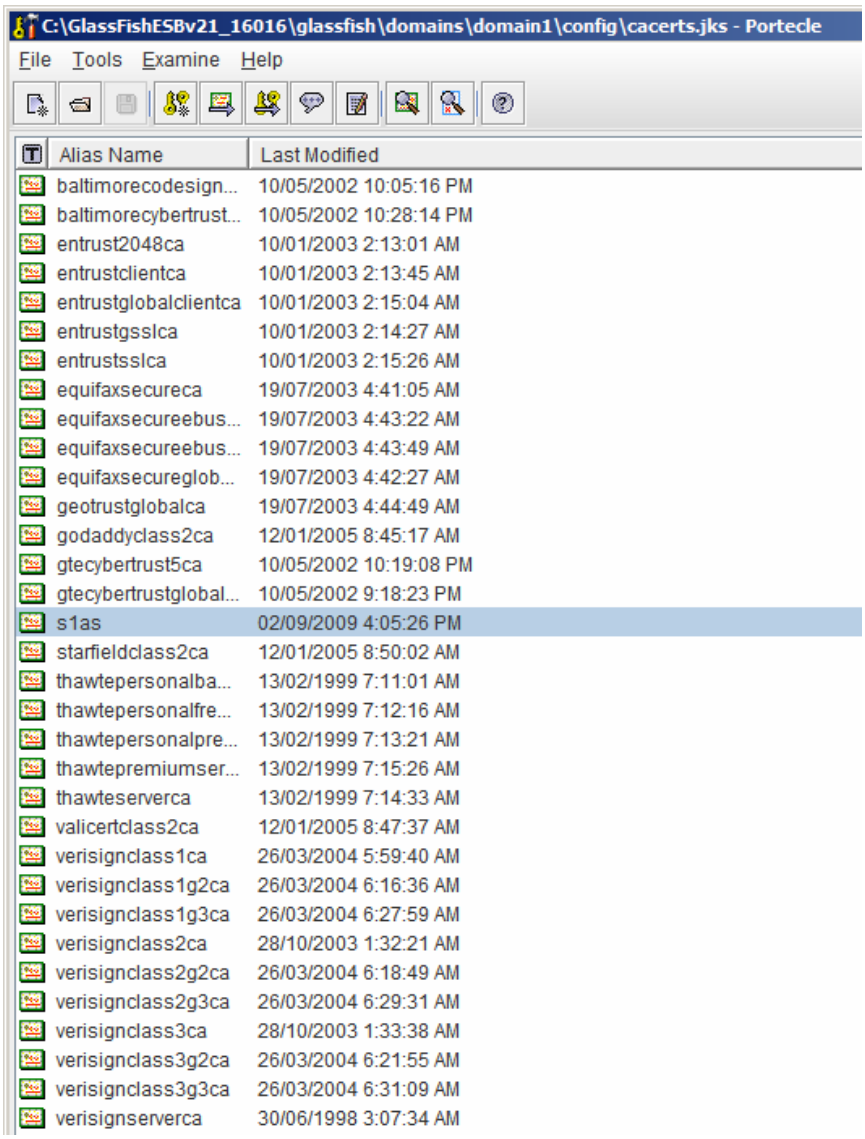


Figure 5.8.27 *Default GlassFish list of trusted certificates*

We need to extract the orad1.ssc's certificate from its keystore.jks and import it into the mcz02's cacerts.jks.

The steps to extract a certificate from a keystore using the Portacle tool [2] are discussed in the next few paragraphs. If you have the certificate of the remote host, as you might, or use another tool to work with keystores, skip past this section.

I transferred the truststore.jks and the cacerts.jsk from orad1.ssc to the machine on which I have Portacle installed so I can easily manipulate them.

Open the remote host's (orad1 for me) truststore.jsk with Prtacle. Password, by default, is changeit. Figure 5.8.28 shows the keystore content and the content of the s1as certificate.

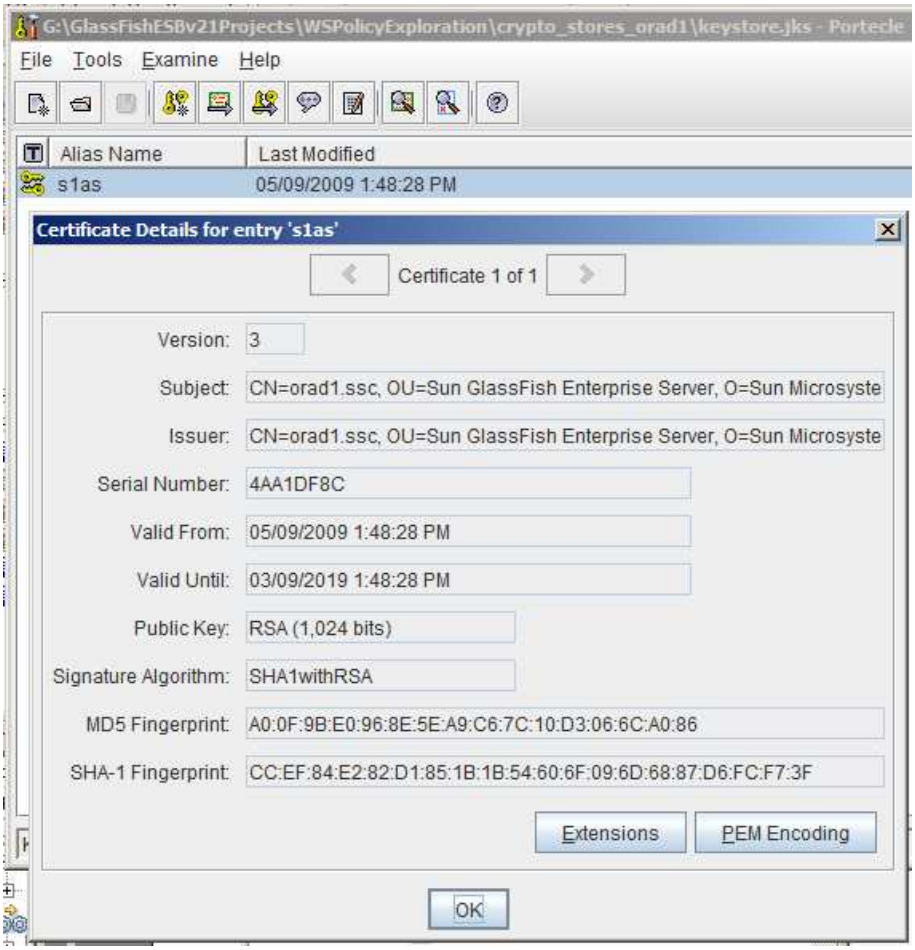


Figure 5.8.28 *orad1's keystore with s1as private key and certificate*

Right-click s1as key and choose "Export", as shown in Figure 5.8.29.

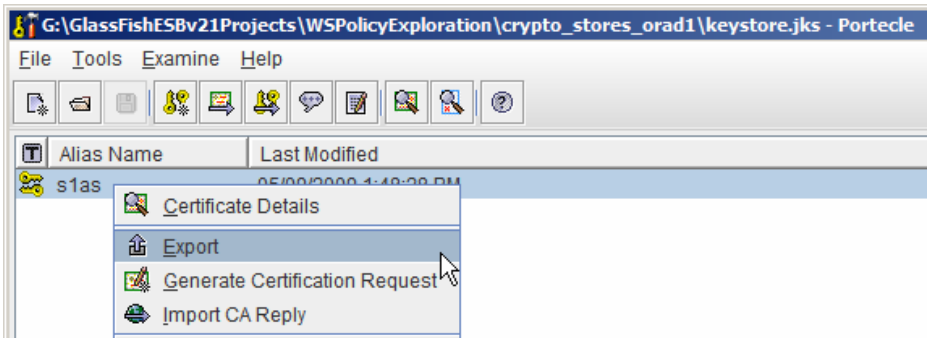


Figure 5.8.29 *Trigger export of s1as certificate*

Choose to export just the "head certificate" and store it in PEM Encode form – Figure 5.8.30. Since the certificate is a self-signed certificate it does not matter whether we export the head

certificate (just the certificate itself) or the Certificate Chanin (including all related CA certificates). The PEM Encoded, for Privacy Enhanced Mail (PEM) is basically a Base64 encoded binary certificate.

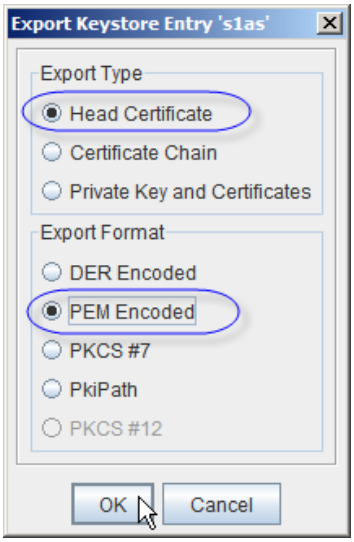


Figure 5.8.30 *Choose export options*

Complete the wizard by nominating the folder to which to save the certificate. By default the name of the file will be derived from the CN (Common Name) value in the certificate. Figure 5.8.31 illustrates this for my environment.

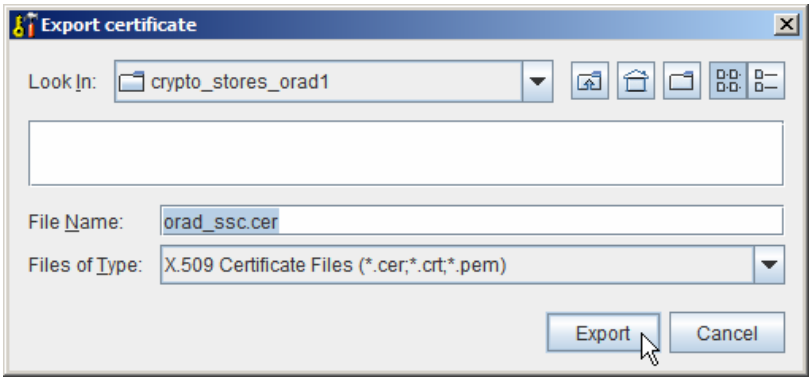


Figure 5.8.31 *Save certificate to a file*

If you happen to be on a Windows machine, as I am for the client-side development, you can inspect the certificate with windows tools. Merely double-click the certificate file and see what you see. What I see is shown in Figure 5.8.32.

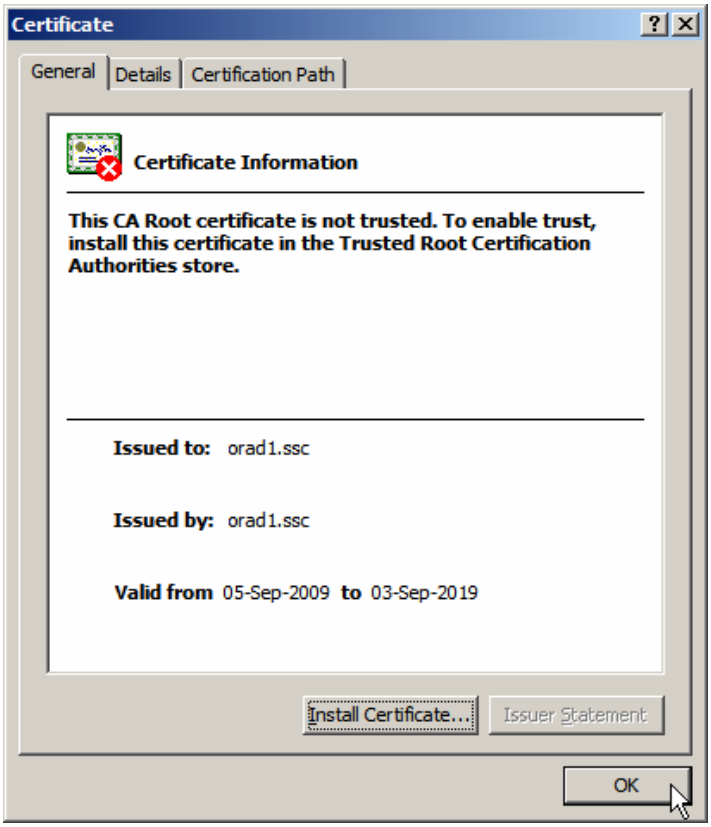


Figure 5.8.32 *orad1_ssc.cer shown in Windows*

Now let's import the certificate to the local GlassFish instance's, mcz02 for me, cacerts.jsk truststore. Figure 5.8.33 illustrates the first step in this process.

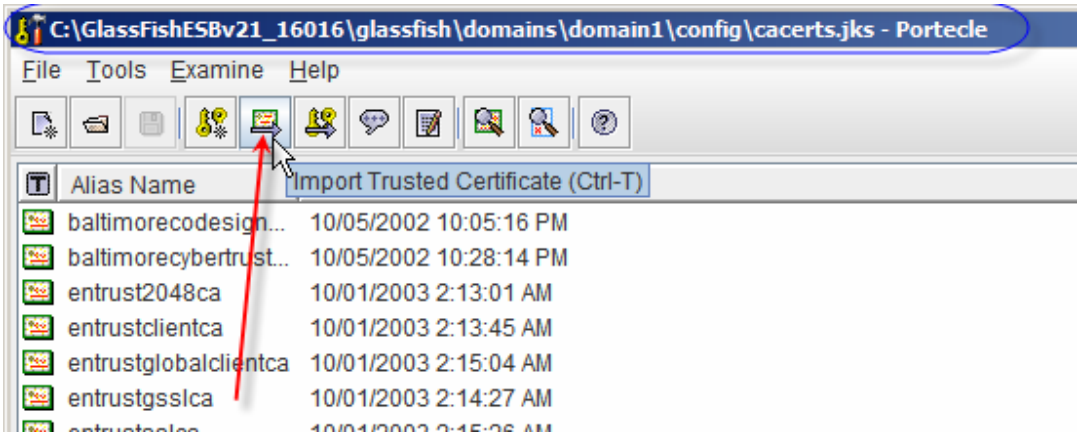


Figure 5.8.33 *Start the certificate import process*

Locate the certificate and select it for import, as is shown in Figure 5.8.34.

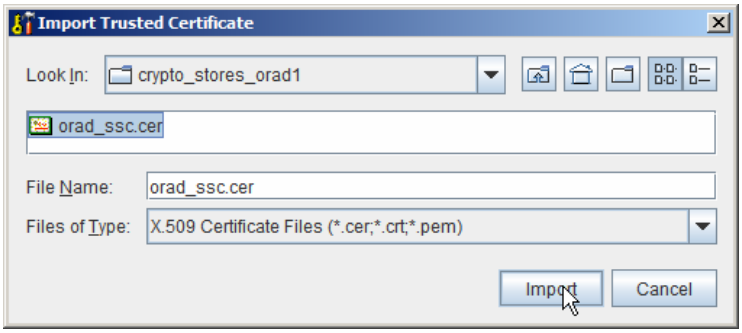


Figure 5.8.34 *Select and import the certificate*

This is a self-signed certificate so the tool will advise that it can not establish trust for the certificate, as shown in Figure 5.8.35. Acknowledge the message.

Figure 5.8.35 *Trust path can not be established message*

Then the certificate details will be shown, as can be seen in Figure 5.8.36. Acknowledge this by clicking OK.

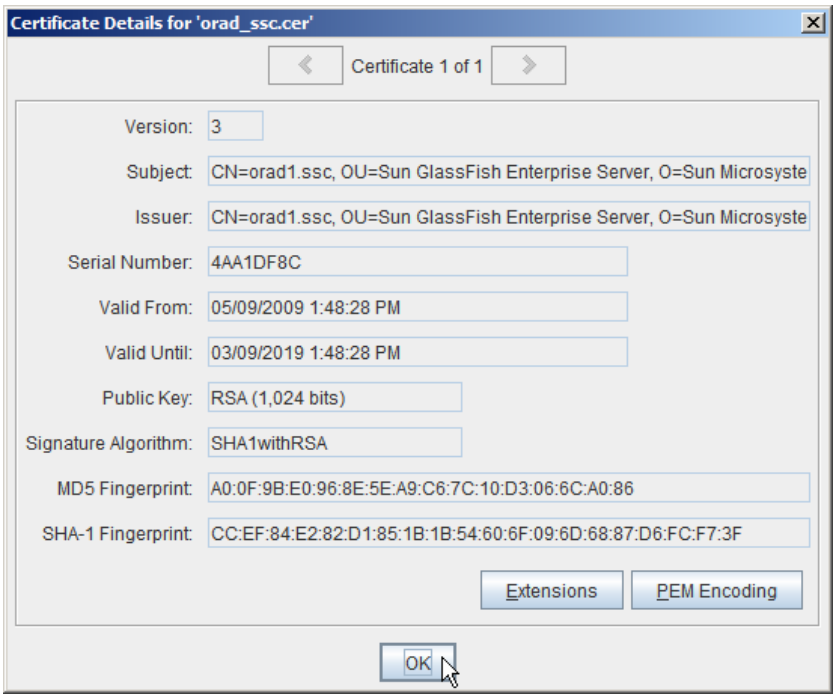


Figure 5.8.36 *Certificate details*

Finally, click the Yes button to accept the certificate as trusted, Figure 5.8.37, and accept the provided or modified certificate alias, Figure 5.8.38.

Figure 5.8.37 *Accept certificate as trusted*

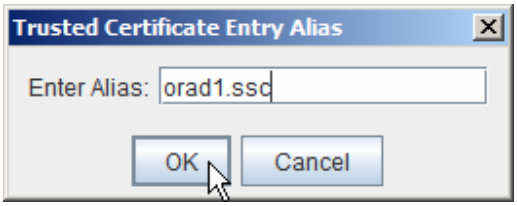


Figure 5.8.38 *Accept certificate alias*

Once this is done the certificate will be imported into the cacerts.jsk truststore, as trusted certificate with alias of orad1.ssc. Figure 5.8.39 shows the final feedback.

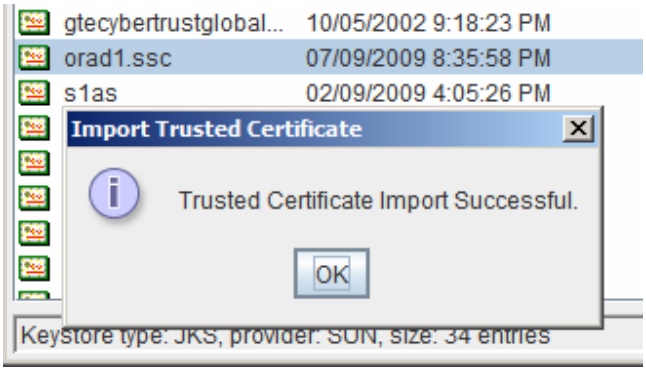


Figure 5.8.39 *Certificate was imported*

Exit from Portacle Key Manager, saving the modified cacerts.jsk keystore on the way.

The GlassFish Application Server appears to be caching the truststore content. It is necessary to re-start GlassFish after corticated is imported.

We are ready to attempt to deploy the client application again. This time, since the remote GlassFish instance's certificate is in the cacerts.jsk truststore, and is trusted, we should succeed. Listing 5.8.40 shows the feedback fro the NetBeans IDE.

Listing 5.8.40 *Deployment successful*

```
run-jbi-deploy:
[undeploy-service-assembly]
    Undeploying a service assembly...
        host=localhost
        port=24848
```

```
        name=PersonCli_CA_SSLServerAuth
[deploy-service-assembly]
    Deploying a service assembly...
        host=localhost
        port=24848

file=G:\GlassFishESBv21Projects\WSPolicyExploration\PersonCli_CA_SSLServerAuth/dist/Person
Cli_CA_SSLServerAuth.zip
[start-service-assembly]
    Starting a service assembly...
        host=localhost
        port=24848
        name=PersonCli_CA_SSLServerAuth
run:
BUILD SUCCESSFUL (total time: 8 seconds)
```

The service implementation composite application, PersonSvc_CA_SSLServerAusth, is deployed to host orad1.wa.gov.ssc. The client implementation composite application, PersonCli_CA_SSLServerAuth, is deployed to mcz02.aus.sun.com.

Let's exercise the solution using the PersonCli_WSTP web service testing project by submitting the SoapUI request, as we did before. Listing 5.8.41 shows abbreviated trace of the SSL Handshake as seen on the client side when the server certificate is know and trusted. Listings 5.8.42 and 5.8.43 show extracts from the server.log from the client and the server side when the server certificate is not known/trusted by the client side.

Listing 5.8.41 ***Client-side SSL Handshake trace***

```
[#|2009-09-07T20:52:16.500+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% Client cached [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-07T20:52:16.500+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% Try resuming [Session-1, SSL_RSA_WITH_RC4_128_MD5] from port 4707|#]
[#|2009-09-07T20:52:16.500+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** ClientHello, TLSv1|#]
...
[#|2009-09-07T20:52:16.515+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Session ID:  |#]
[#|2009-09-07T20:52:16.515+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|{74, 164, 228,
147, 242, 12, 228, 182, 189, 239, 197, 106, 83, 181, 198, 176, 62, 55, 7, 142, 242, 27,
58, 223, 237, 12, 12, 62, 224, 73, 109, 208}|#]
[#|2009-09-07T20:52:16.515+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
```

```
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]
[#|2009-09-07T20:52:16.515+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Compression Methods:  { |#]
...
[#|2009-09-07T20:52:16.515+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-2, WRITE: TLSv1 Handshake, length = 105|#]
[#|2009-09-07T20:52:16.843+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-2, READ: TLSv1 Handshake, length = 74|#]
[#|2009-09-07T20:52:16.843+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** ServerHello, TLSv1|#]
...
[#|2009-09-07T20:52:16.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Session ID:  |#]
[#|2009-09-07T20:52:16.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|{74, 164, 228,
147, 242, 12, 228, 182, 189, 239, 197, 106, 83, 181, 198, 176, 62, 55, 7, 142, 242, 27,
58, 223, 237, 12, 12, 62, 224, 73, 109, 208}|#]
[#|2009-09-07T20:52:16.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-07T20:52:16.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Compression Method: 0|#]
[#|2009-09-07T20:52:16.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
***|#]
[#|2009-09-07T20:52:16.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
CONNECTION KEYGEN:|#]
[#|2009-09-07T20:52:16.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Client Nonce:|#]
...
Server Nonce:|#]
```

```
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
0000: |#]
...
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Master Secret:|#]
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
0000: |#]
...
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Client MAC write Secret:|#]
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
0000: |#]
...
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|Server MAC write
Secret:|#]
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
0000: |#]
...
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Client write key:|#]
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
0000: |#]
...
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|Server write
key:|#]
[#|2009-09-07T20:52:16.906+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
0000: |#]
...
...
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
```

OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
... no IV used for this cipher|#]
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% Server resumed [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-2, READ: TLSv1 Change Cipher Spec, length = 1|#]
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-2, READ: TLSv1 Handshake, length = 32|#]
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
***** Finished|#]**
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
verify_data: { |#]
...
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-2, WRITE: TLSv1 Change Cipher Spec, length = 1|#]
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
***** Finished|#]**
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
verify_data: { |#]
...
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-2, WRITE: TLSv1 Handshake, length = 32|#]
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-2, WRITE: TLSv1 Application Data, length = 323|#]
[#|2009-09-07T20:52:16.921+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-2, WRITE: TLSv1 Application Data, length = 549|#]
[#|2009-09-07T20:52:17.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-2, READ: TLSv1 Application Data, length = 856|#]

```
[#|2009-09-07T20:52:17.187+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=58;_ThreadName=HTTPBC-
OutboundReceiver-2;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
---[HTTP response 200]---|#]
...
*** a lot of stuff here - messages exchanged and so on ****
...
[#|2009-09-07T20:52:27.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=61;_ThreadName=Keep-Alive-
Timer;|
Keep-Alive-Timer, called close()|#]
[#|2009-09-07T20:52:27.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=61;_ThreadName=Keep-Alive-
Timer;|
Keep-Alive-Timer, called closeInternal(true)|#]
[#|2009-09-07T20:52:27.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=61;_ThreadName=Keep-Alive-
Timer;|
Keep-Alive-Timer|#]
[#|2009-09-07T20:52:27.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=61;_ThreadName=Keep-Alive-
Timer;|, SEND TLSv1 ALERT:  |#]
[#|2009-09-07T20:52:27.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=61;_ThreadName=Keep-Alive-
Timer;|warning, |#]
[#|2009-09-07T20:52:27.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=61;_ThreadName=Keep-Alive-
Timer;|description = close_notify|#]
[#|2009-09-07T20:52:27.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=61;_ThreadName=Keep-Alive-
Timer;|
Keep-Alive-Timer, WRITE: TLSv1 Alert, length = 18|#]
```

Note, in Listing 5.8.41, that rather than establishing a new session, the two parties resumed an earlier SSL session. The client requested session resumption and the server agreed to resume the session. No certificate was sent from the server to the client.

If the server certificate is not know/trusted, execution will fail showing trace similar to that shown in Listing 5.8.42. If this happens one needs to add the server certificate to the clisnt side truststore, as discussed a several paragraphs before, starting around Figure 5.8.27.

Listing 5.8.42 SSL Handshake failure – client side

```
[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% No cached client session|#]

[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** ClientHello, TLSv1|#]

[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
RandomCookie:  |#]
```

```
[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|GMT: 1264303446
|#]

...
[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Session ID:  |#]

[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|{}|#]

[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]

[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Compression Methods:  { |#]
...
[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-1, WRITE: TLSv1 Handshake, length = 73|#]

[#|2010-01-25T08:36:22.343+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-1, WRITE: SSLv2 client hello message, length = 98|#]

[#|2010-01-25T08:36:22.437+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-1, READ: TLSv1 Handshake, length = 792|#]

[#|2010-01-25T08:36:22.437+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** ServerHello, TLSv1|#]

[#|2010-01-25T08:36:22.437+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
RandomCookie:  |#]
```

```
[#|2010-01-25T08:36:22.437+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|GMT: 1264408582
|#]
...
[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Session ID:  |#]

[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|{75, 93, 88, 6,
138, 134, 239, 186, 237, 138, 95, 94, 181, 248, 150, 37, 82, 154, 43, 109, 57, 180, 168,
190, 108, 246, 96, 128, 61, 42, 86, 16}|#]

[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]

[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Compression Method: 0|#]

[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
***|#]

[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% Created:  [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]

[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
** SSL_RSA_WITH_RC4_128_MD5|#]

[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** Certificate chain|#]

[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
chain [0] = [
[
  Version: V3
  Subject: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
```

```
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
162019218549153832437846806265131912188716502010853225371772234756127209194813917271519933
308936626560088970134028685595103985234837519163387923444045924454296696087850075632676103
985057493298783684614765757279216594655237962857291655184931289671432133385295735524558107
521801179091614740871192538934917535511
  public exponent: 65537
  Validity: [From: Fri Dec 25 21:59:20 EST 2009,
              To: Mon Dec 23 21:59:20 EST 2019]
  Issuer: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4b349b08]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 6B F8 6E B9 01 5B 5C 92   4D 22 6D 01 B3 DF 3C B0  k.n..[\.M"m...<.
0010: AC 68 97 D2                                        .h..
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 71 88 A3 15 54 06 F8 4E   DF 85 A0 5D 0D 13 E8 43  q...T..N...]...C
0010: 8D 67 D6 79 6A 87 12 99   E6 0D 0F 48 A0 9E 41 90  .g.yj......H..A.
0020: 28 33 87 89 57 C8 B2 55   04 EA 29 5D 45 6E 43 8D  (3..W..U..)]EnC.
0030: 7D 08 A1 2C 0E 3C CE D9   FB 33 ED 5D CB AC 36 E5  ...,.<...3.]..6.
0040: 66 D3 79 15 7D 9D E8 06   BF 08 03 32 62 2A 70 78  f.y........2b*px
0050: 6D C5 66 FF 08 A8 CA 1B   8E FC 41 59 97 20 29 C7  m.f.......AY. ).
0060: A3 F9 9F 80 F2 52 5B B4   36 03 1B 90 81 35 39 F5  .....R[.6....59.
0070: 51 D7 31 5B 6C 69 BA 44   C3 A8 38 BA E3 0D E7 DC  Q.1[li.D..8.....

]|#]

[#|2010-01-25T08:36:22.453+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
***|#]

[#|2010-01-25T08:36:22.531+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-1|#]

[#|2010-01-25T08:36:22.531+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|, SEND TLSv1
ALERT:  |#]

[#|2010-01-25T08:36:22.531+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|fatal, |#]

[#|2010-01-25T08:36:22.546+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
```

```
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|description =
certificate_unknown|#]

[#|2010-01-25T08:36:22.546+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-1, WRITE: TLSv1 Alert, length = 2|#]

[#|2010-01-25T08:36:22.562+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-1, called closeSocket()|#]

[#|2010-01-25T08:36:22.562+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-1, handling exception: javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target|#]

[#|2010-01-25T08:36:22.562+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-1, called close()|#]

[#|2010-01-25T08:36:22.562+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=HTTPBC-
OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-1, called closeInternal(true)|#]

[#|2010-01-25T08:36:22.578+1100|WARNING|sun-
appserver2.1|com.sun.jbi.httpsoapbc.OutboundMessageProcessor|_ThreadID=46;_ThreadName=HTTP
BC-OutboundReceiver-1;Context=PersonCli_CA_SSLServerAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;_RequestID=5a357e98
-7d3a-42e7-aaa0-3c8babfaf337;|HTTPBC-E00759: An exception occured while processing a reply
message. HTTP transport error: javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
com.sun.xml.ws.client.ClientTransportException: HTTP transport error:
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested target
        at
com.sun.xml.ws.transport.http.client.HttpClientTransport.getOutput(HttpClientTransport.jav
a:134)
        at
com.sun.xml.ws.transport.http.client.HttpTransportPipe.process(HttpTransportPipe.java:138)
        at
com.sun.xml.wss.jaxws.impl.SecurityClientPipe.process(SecurityClientPipe.java:208)
        at com.sun.xml.ws.api.pipe.helper.PipeAdapter.processRequest(PipeAdapter.java:115)
        at com.sun.xml.ws.api.pipe.Fiber.__doRun(Fiber.java:595)
        at com.sun.xml.ws.api.pipe.Fiber._doRun(Fiber.java:554)
        at com.sun.xml.ws.api.pipe.Fiber.doRun(Fiber.java:539)
        at com.sun.xml.ws.api.pipe.Fiber.runSync(Fiber.java:436)
        at com.sun.xml.ws.client.Stub.process(Stub.java:248)
        at com.sun.xml.ws.client.dispatch.DispatchImpl.doInvoke(DispatchImpl.java:180)
        at com.sun.xml.ws.client.dispatch.DispatchImpl.invoke(DispatchImpl.java:206)
```

```
	at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.outboundCall(OutboundMessageProcessor.java
:1256)
	at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.dispatch(OutboundMessageProcessor.java:129
6)
	at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.processRequestReplyOutbound(OutboundMessag
eProcessor.java:747)
	at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.processMessage(OutboundMessageProcessor.ja
va:257)
	at com.sun.jbi.httpsoapbc.OutboundAction.run(OutboundAction.java:63)
	at
java.util.concurrent.ThreadPoolExecutor$Worker.runTask(ThreadPoolExecutor.java:886)
	at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:908)
	at java.lang.Thread.run(Thread.java:619)
Caused by: javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException:
PKIX path building failed: sun.security.provider.certpath.SunCertPathBuilderException:
unable to find valid certification path to requested target
	at com.sun.net.ssl.internal.ssl.Alerts.getSSLException(Alerts.java:174)
	at com.sun.net.ssl.internal.ssl.SSLSocketImpl.fatal(SSLSocketImpl.java:1611)
	at com.sun.net.ssl.internal.ssl.Handshaker.fatalSE(Handshaker.java:187)
	at com.sun.net.ssl.internal.ssl.Handshaker.fatalSE(Handshaker.java:181)
	at
com.sun.net.ssl.internal.ssl.ClientHandshaker.serverCertificate(ClientHandshaker.java:1035
)
	at
com.sun.net.ssl.internal.ssl.ClientHandshaker.processMessage(ClientHandshaker.java:124)
	at com.sun.net.ssl.internal.ssl.Handshaker.processLoop(Handshaker.java:516)
	at com.sun.net.ssl.internal.ssl.Handshaker.process_record(Handshaker.java:454)
	at com.sun.net.ssl.internal.ssl.SSLSocketImpl.readRecord(SSLSocketImpl.java:884)
	at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.performInitialHandshake(SSLSocketImpl.java:1112
)
	at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.startHandshake(SSLSocketImpl.java:1139)
	at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.startHandshake(SSLSocketImpl.java:1123)
	at sun.net.www.protocol.https.HttpsClient.afterConnect(HttpsClient.java:434)
	at
sun.net.www.protocol.https.AbstractDelegateHttpsURLConnection.connect(AbstractDelegateHttp
sURLConnection.java:166)
	at
sun.net.www.protocol.http.HttpURLConnection.getOutputStream(HttpURLConnection.java:904)
	at
sun.net.www.protocol.https.HttpsURLConnectionImpl.getOutputStream(HttpsURLConnectionImpl.j
ava:230)
	at
com.sun.xml.ws.transport.http.client.HttpClientTransport.getOutput(HttpClientTransport.jav
a:122)
	... 18 more
Caused by: sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
	at sun.security.validator.PKIXValidator.doBuild(PKIXValidator.java:285)
	at sun.security.validator.PKIXValidator.engineValidate(PKIXValidator.java:191)
	at sun.security.validator.Validator.validate(Validator.java:218)
	at
com.sun.net.ssl.internal.ssl.X509TrustManagerImpl.validate(X509TrustManagerImpl.java:126)
	at
com.sun.net.ssl.internal.ssl.X509TrustManagerImpl.checkServerTrusted(X509TrustManagerImpl.
java:209)
```

```
	at
com.sun.net.ssl.internal.ssl.X509TrustManagerImpl.checkServerTrusted(X509TrustManagerImpl.
java:249)
	at
com.sun.net.ssl.internal.ssl.ClientHandshaker.serverCertificate(ClientHandshaker.java:1014
)
	... 30 more
Caused by: sun.security.provider.certpath.SunCertPathBuilderException: unable to find
valid certification path to requested target
	at
sun.security.provider.certpath.SunCertPathBuilder.engineBuild(SunCertPathBuilder.java:174)
	at java.security.cert.CertPathBuilder.build(CertPathBuilder.java:238)
	at sun.security.validator.PKIXValidator.doBuild(PKIXValidator.java:280)
	... 36 more
|#]

[#|2010-01-25T08:36:22.656+1100|WARNING|sun-
appserver2.1|com.sun.jbi.engine.bpel.BPELSEHelper|_ThreadID=47;_ThreadName=sun-bpel-
engine-thread-0;Process Instance Id=192.168.60.2:c49d553:1266209ef32:-7ee9;Service
Assembly Name=PersonCli_CA_SSLServerAuth;BPEL Process Name=personCli;_RequestID=abdbcfab-
946a-43f8-905e-62ebea9622a9;|BPJBI-6001: Sending ERROR status (Service Name =
{http://enterprise.netbeans.org/bpel/PersonCli/personCli}TriggerRR, Endpoint Name =
TriggerConPortTypeRole_myRole, Operation Name =
{http://j2ee.netbeans.org/wsdl/CommonXML/TriggerCon}triggerPerson, Message Exchange Id =
23233266708452-64336-134836617802340114)
 Error properties
  com.sun.jbi.crl.faultcode = Server
  com.sun.jbi.crl.faultstring = BPCOR-6135: A fault was not handled in the process scope;
Fault Name is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is <?xml version="1.0" encoding="UTF-8"?><jbi:message
xmlns:sxeh="http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling"
type="sxeh:faultMessage" version="1.0" xmlns:jbi="http://java.sun.com/xml/ns/jbi/wsdl-11-
wrapper"><jbi:part>HTTP transport error: javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target</jbi:part></jbi:message>. Sending errors for the
pending requests in the process scope before terminating the process instance
  com.sun.jbi.crl.faultactor = sun-bpel-engine
  com.sun.jbi.crl.faultdetail =
   BPCOR-6135: A fault was not handled in the process scope; Fault Name is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is <?xml version="1.0" encoding="UTF-8"?><jbi:message
xmlns:sxeh="http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling"
type="sxeh:faultMessage" version="1.0" xmlns:jbi="http://java.sun.com/xml/ns/jbi/wsdl-11-
wrapper"><jbi:part>HTTP transport error: javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target</jbi:part></jbi:message>. Sending errors for the
pending requests in the process scope before terminating the process instance
   Caused by: BPCOR-6131: An Error status was received while doing an invoke
(partnerLink=PersonWS,
portType={http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}PersonAbsSvcPortType,
operation=getPersonDetails)
BPCOR-6129: Line Number is 39
BPCOR-6130: Activity Name is Invoke1
   Caused by: HTTP transport error: javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
   Caused by: sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
```

```
   Caused by: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
   Caused by: unable to find valid certification path to requested target|#]

[#|2010-01-25T08:36:22.671+1100|SEVERE|sun-
appserver2.1|com.sun.jbi.httpsoapbc.OutboundMessageProcessor|_ThreadID=48;_ThreadName=HTTP
BC-InboundReply-2;_RequestID=ea2bfb74-de38-4554-ab13-2ef608d64ff0;|HTTPBC-E00720: Provider
for service [{http://j2ee.netbeans.org/wsdl/CommonXML/TriggerCon}TriggerConService]
endpoint [TriggerConPort] responded with an error status. Error detail is: BPCOR-6135: A
fault was not handled in the process scope; Fault Name is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is <?xml version="1.0" encoding="UTF-8"?><jbi:message
xmlns:sxeh="http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling"
type="sxeh:faultMessage" version="1.0" xmlns:jbi="http://java.sun.com/xml/ns/jbi/wsdl-11-
wrapper"><jbi:part>HTTP transport error: javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target</jbi:part></jbi:message>. Sending errors for the
pending requests in the process scope before terminating the process instance|#]

[#|2010-01-25T08:36:22.687+1100|WARNING|sun-
appserver2.1|com.sun.jbi.engine.bpel.core.bpel.model.runtime.impl.BPELProcessInstanceImpl|
_ThreadID=47;_ThreadName=sun-bpel-engine-thread-0;Process Instance
Id=192.168.60.2:c49d553:1266209ef32:-7ee9;Service Assembly
Name=PersonCli_CA_SSLServerAuth;BPEL Process Name=personCli;_RequestID=abdbcfab-946a-43f8-
905e-62ebea9622a9;|BPCOR-6151: The process instance has been terminated because a fault
was not handled; Fault Name is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is <?xml version="1.0" encoding="UTF-8"?><jbi:message
xmlns:sxeh="http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling"
type="sxeh:faultMessage" version="1.0" xmlns:jbi="http://java.sun.com/xml/ns/jbi/wsdl-11-
wrapper"><jbi:part>HTTP transport error: javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target</jbi:part></jbi:message>
com.sun.jbi.engine.bpel.core.bpel.exception.SystemException: BPCOR-6131: An Error status
was received while doing an invoke (partnerLink=PersonWS,
portType={http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}PersonAbsSvcPortType,
operation=getPersonDetails)
BPCOR-6129: Line Number is 39
BPCOR-6130: Activity Name is Invoke1
       at
com.sun.jbi.engine.bpel.core.bpel.model.runtime.impl.InvokeUnitImpl.processStatus(InvokeUn
itImpl.java:974)
       at
com.sun.jbi.engine.bpel.core.bpel.model.runtime.impl.InvokeUnitImpl.process(InvokeUnitImpl
.java:547)
       at
com.sun.jbi.engine.bpel.core.bpel.model.runtime.impl.InvokeUnitImpl.doAction(InvokeUnitImp
l.java:183)
       at
com.sun.jbi.engine.bpel.core.bpel.engine.impl.BPELInterpreter.execute(BPELInterpreter.java
:163)
       at
com.sun.jbi.engine.bpel.core.bpel.engine.BusinessProcessInstanceThread.execute(BusinessPro
cessInstanceThread.java:98)
       at
com.sun.jbi.engine.bpel.core.bpel.engine.impl.BPELProcessManagerImpl.process(BPELProcessMa
nagerImpl.java:1133)
       at
com.sun.jbi.engine.bpel.core.bpel.engine.impl.EngineImpl.process(EngineImpl.java:280)
       at
com.sun.jbi.engine.bpel.core.bpel.engine.impl.EngineImpl.process(EngineImpl.java:1336)
```

```
        at
com.sun.jbi.engine.bpel.BPELSEInOutThread.processStatus(BPELSEInOutThread.java:384)
        at
com.sun.jbi.engine.bpel.BPELSEInOutThread.processMsgEx(BPELSEInOutThread.java:241)
        at com.sun.jbi.engine.bpel.BPELSEInOutThread.run(BPELSEInOutThread.java:193)
Caused by: com.sun.xml.ws.client.ClientTransportException: HTTP transport error:
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested target
        at
com.sun.xml.ws.transport.http.client.HttpClientTransport.getOutput(HttpClientTransport.jav
a:134)
        at
com.sun.xml.ws.transport.http.client.HttpTransportPipe.process(HttpTransportPipe.java:138)
        at
com.sun.xml.wss.jaxws.impl.SecurityClientPipe.process(SecurityClientPipe.java:208)
        at com.sun.xml.ws.api.pipe.helper.PipeAdapter.processRequest(PipeAdapter.java:115)
        at com.sun.xml.ws.api.pipe.Fiber.__doRun(Fiber.java:595)
        at com.sun.xml.ws.api.pipe.Fiber._doRun(Fiber.java:554)
        at com.sun.xml.ws.api.pipe.Fiber.doRun(Fiber.java:539)
        at com.sun.xml.ws.api.pipe.Fiber.runSync(Fiber.java:436)
        at com.sun.xml.ws.client.Stub.process(Stub.java:248)
        at com.sun.xml.ws.client.dispatch.DispatchImpl.doInvoke(DispatchImpl.java:180)
        at com.sun.xml.ws.client.dispatch.DispatchImpl.invoke(DispatchImpl.java:206)
        at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.outboundCall(OutboundMessageProcessor.java
:1256)
        at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.dispatch(OutboundMessageProcessor.java:129
6)
        at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.processRequestReplyOutbound(OutboundMessag
eProcessor.java:747)
        at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.processMessage(OutboundMessageProcessor.ja
va:257)
        at com.sun.jbi.httpsoapbc.OutboundAction.run(OutboundAction.java:63)
        at
java.util.concurrent.ThreadPoolExecutor$Worker.runTask(ThreadPoolExecutor.java:886)
        at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:908)
        at java.lang.Thread.run(Thread.java:619)
Caused by: javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException:
PKIX path building failed: sun.security.provider.certpath.SunCertPathBuilderException:
unable to find valid certification path to requested target
        at com.sun.net.ssl.internal.ssl.Alerts.getSSLException(Alerts.java:174)
        at com.sun.net.ssl.internal.ssl.SSLSocketImpl.fatal(SSLSocketImpl.java:1611)
        at com.sun.net.ssl.internal.ssl.Handshaker.fatalSE(Handshaker.java:187)
        at com.sun.net.ssl.internal.ssl.Handshaker.fatalSE(Handshaker.java:181)
        at
com.sun.net.ssl.internal.ssl.ClientHandshaker.serverCertificate(ClientHandshaker.java:1035
)
        at
com.sun.net.ssl.internal.ssl.ClientHandshaker.processMessage(ClientHandshaker.java:124)
        at com.sun.net.ssl.internal.ssl.Handshaker.processLoop(Handshaker.java:516)
        at com.sun.net.ssl.internal.ssl.Handshaker.process_record(Handshaker.java:454)
        at com.sun.net.ssl.internal.ssl.SSLSocketImpl.readRecord(SSLSocketImpl.java:884)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.performInitialHandshake(SSLSocketImpl.java:1112
)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.startHandshake(SSLSocketImpl.java:1139)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.startHandshake(SSLSocketImpl.java:1123)
        at sun.net.www.protocol.https.HttpsClient.afterConnect(HttpsClient.java:434)
```

```
        at
sun.net.www.protocol.https.AbstractDelegateHttpsURLConnection.connect(AbstractDelegateHttp
sURLConnection.java:166)
        at
sun.net.www.protocol.http.HttpURLConnection.getOutputStream(HttpURLConnection.java:904)
        at
sun.net.www.protocol.https.HttpsURLConnectionImpl.getOutputStream(HttpsURLConnectionImpl.j
ava:230)
        at
com.sun.xml.ws.transport.http.client.HttpClientTransport.getOutput(HttpClientTransport.jav
a:122)
        ... 18 more
Caused by: sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
        at sun.security.validator.PKIXValidator.doBuild(PKIXValidator.java:285)
        at sun.security.validator.PKIXValidator.engineValidate(PKIXValidator.java:191)
        at sun.security.validator.Validator.validate(Validator.java:218)
        at
com.sun.net.ssl.internal.ssl.X509TrustManagerImpl.validate(X509TrustManagerImpl.java:126)
        at
com.sun.net.ssl.internal.ssl.X509TrustManagerImpl.checkServerTrusted(X509TrustManagerImpl.
java:209)
        at
com.sun.net.ssl.internal.ssl.X509TrustManagerImpl.checkServerTrusted(X509TrustManagerImpl.
java:249)
        at
com.sun.net.ssl.internal.ssl.ClientHandshaker.serverCertificate(ClientHandshaker.java:1014
)
        ... 30 more
Caused by: sun.security.provider.certpath.SunCertPathBuilderException: unable to find
valid certification path to requested target
        at
sun.security.provider.certpath.SunCertPathBuilder.engineBuild(SunCertPathBuilder.java:174)
        at java.security.cert.CertPathBuilder.build(CertPathBuilder.java:238)
        at sun.security.validator.PKIXValidator.doBuild(PKIXValidator.java:280)
        ... 36 more
|#]

[#|2010-01-25T08:36:22.750+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-JAXWS-
Engine-2;|
---[HTTP response 500]---|#]

[#|2010-01-25T08:36:22.750+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-JAXWS-
Engine-2;|
<?xml version="1.0" ?><SOAP-ENV:Envelope xmlns:SOAP-
ENV="http://schemas.xmlsoap.org/soap/envelope/"><SOAP-ENV:Body><SOAP-ENV:Fault><faultcode
xmlns="">SOAP-ENV:Server</faultcode><faultstring xmlns="">BPCOR-6135: A fault was not
handled in the process scope; Fault Name is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is &amp;lt;?xml version=&amp;quot;1.0&amp;quot; encoding=&amp;quot;UTF-
8&amp;quot;?&amp;gt;&amp;lt;jbi:message
xmlns:sxeh=&amp;quot;http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHa
ndling&amp;quot; type=&amp;quot;sxeh:faultMessage&amp;quot;
version=&amp;quot;1.0&amp;quot; xmlns:jbi=&amp;quot;http://java.sun.com/xml/ns/jbi/wsdl-
11-wrapper&amp;quot;&amp;gt;&amp;lt;jbi:part&amp;gt;HTTP transport error:
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested
target&amp;lt;/jbi:part&amp;gt;&amp;lt;/jbi:message&amp;gt;. Sending errors for the
pending requests in the process scope before terminating the process
instance</faultstring><faultactor xmlns="">sun-bpel-engine</faultactor><detail
xmlns=""><detailText>BPCOR-6135: A fault was not handled in the process scope; Fault Name
```

```
is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is &amp;lt;?xml version=&amp;quot;1.0&amp;quot; encoding=&amp;quot;UTF-
8&amp;quot;?&amp;gt;&amp;lt;jbi:message
xmlns:sxeh=&amp;quot;http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHa
ndling&amp;quot; type=&amp;quot;sxeh:faultMessage&amp;quot;
version=&amp;quot;1.0&amp;quot; xmlns:jbi=&amp;quot;http://java.sun.com/xml/ns/jbi/wsdl-
11-wrapper&amp;quot;&amp;gt;&amp;lt;jbi:part&amp;gt;HTTP transport error:
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested
target&amp;lt;/jbi:part&amp;gt;&amp;lt;/jbi:message&amp;gt;. Sending errors for the
pending requests in the process scope before terminating the process instance
   Caused by: BPCOR-6131: An Error status was received while doing an invoke
(partnerLink=PersonWS,
portType={http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}PersonAbsSvcPortType,
operation=getPersonDetails)
BPCOR-6129: Line Number is 39
BPCOR-6130: Activity Name is Invoke1
   Caused by: HTTP transport error: javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
   Caused by: sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
   Caused by: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
   Caused by: unable to find valid certification path to requested
target</detailText></detail></SOAP-ENV:Fault></SOAP-ENV:Body></SOAP-ENV:Envelope>|#]

[#|2010-01-25T08:36:22.750+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-JAXWS-
Engine-2;|--------------------|#]
```

The server will also show an aborted SSL Handshake, Listing 5.8.43.

Listing 5.8.43 SSL Handshake failure – server side

```
[#|2010-01-25T08:36:22.328+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=31;_ThreadName=SelectorThread-
9181;|
Using SSLEngineImpl.|#]

[#|2010-01-25T08:36:22.330+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2, READ:  SSL v2, contentType = Handshake, translated length =
73|#]

[#|2010-01-25T08:36:22.330+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** ClientHello, TLSv1|#]

[#|2010-01-25T08:36:22.331+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
RandomCookie:  |#]
```

```
[#|2010-01-25T08:36:22.331+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|GMT: 1264303446 |#]

...
[#|2010-01-25T08:36:22.398+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Session ID:  |#]

[#|2010-01-25T08:36:22.398+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|{}|#]

[#|2010-01-25T08:36:22.399+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]

[#|2010-01-25T08:36:22.399+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Compression Methods:  { |#]

[#|2010-01-25T08:36:22.399+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|0|#]

[#|2010-01-25T08:36:22.399+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;| }|#]

[#|2010-01-25T08:36:22.399+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
***|#]

[#|2010-01-25T08:36:22.400+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
%% Created:  [Session-51, SSL_RSA_WITH_RC4_128_MD5]|#]

[#|2010-01-25T08:36:22.400+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** ServerHello, TLSv1|#]

[#|2010-01-25T08:36:22.400+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
RandomCookie:  |#]

[#|2010-01-25T08:36:22.400+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|GMT: 1264408582 |#]

[#|2010-01-25T08:36:22.401+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|bytes = { |#]
```

```
...
[#|2010-01-25T08:36:22.410+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Session ID:  |#]

[#|2010-01-25T08:36:22.410+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|{75, 93, 88, 6, 138, 134, 239, 186, 237, 138, 95, 94, 181, 248, 150, 37, 82,
154, 43, 109, 57, 180, 168, 190, 108, 246, 96, 128, 61, 42, 86, 16}|#]

[#|2010-01-25T08:36:22.410+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]

[#|2010-01-25T08:36:22.410+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Compression Method: 0|#]

[#|2010-01-25T08:36:22.410+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
***|#]

[#|2010-01-25T08:36:22.410+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Cipher suite:  SSL_RSA_WITH_RC4_128_MD5|#]

[#|2010-01-25T08:36:22.410+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** Certificate chain|#]

[#|2010-01-25T08:36:22.413+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
chain [0] = [
[
  Version: V3
  Subject: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  SunPKCS11-Solaris RSA public key, 1024 bits (id 141319576, session object)
  modulus:
162019218549153832437846806265131912188716502010853225371772234756127209194813917271519933
308936626560088970134028685595103985234837519163387923444045924454296696087850075632676103
985057493298783684614765757279216594655237962857291655184931289671432133385295735524558107
521801179091614740871192538934917535511
  public exponent: 65537
  Validity: [From: Fri Dec 25 10:59:20 UTC 2009,
              To: Mon Dec 23 10:59:20 UTC 2019]
  Issuer: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4b349b08]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 6B F8 6E B9 01 5B 5C 92   4D 22 6D 01 B3 DF 3C B0  k.n..[\.M"m...<.
0010: AC 68 97 D2                                        .h..
```

```
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 71 88 A3 15 54 06 F8 4E   DF 85 A0 5D 0D 13 E8 43  q...T..N...]...C
0010: 8D 67 D6 79 6A 87 12 99   E6 0D 0F 48 A0 9E 41 90  .g.yj......H..A.
0020: 28 33 87 89 57 C8 B2 55   04 EA 29 5D 45 6E 43 8D  (3..W..U..)]EnC.
0030: 7D 08 A1 2C 0E 3C CE D9   FB 33 ED 5D CB AC 36 E5  ...,.<...3.]..6.
0040: 66 D3 79 15 7D 9D E8 06   BF 08 03 32 62 2A 70 78  f.y........2b*px
0050: 6D C5 66 FF 08 A8 CA 1B   8E FC 41 59 97 20 29 C7  m.f.......AY. ).
0060: A3 F9 9F 80 F2 52 5B B4   36 03 1B 90 81 35 39 F5  .....R[.6....59.
0070: 51 D7 31 5B 6C 69 BA 44   C3 A8 38 BA E3 0D E7 DC  Q.1[li.D..8.....

]|#]

[#|2010-01-25T08:36:22.413+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
***|#]

[#|2010-01-25T08:36:22.413+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** ServerHelloDone|#]

[#|2010-01-25T08:36:22.414+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2, WRITE: TLSv1 Handshake, length = 792|#]

[#|2010-01-25T08:36:22.535+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2, READ: TLSv1 Alert, length = 2|#]

[#|2010-01-25T08:36:22.536+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2|#]

[#|2010-01-25T08:36:22.536+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|, RECV TLSv1 ALERT:  |#]

[#|2010-01-25T08:36:22.536+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|fatal, |#]

[#|2010-01-25T08:36:22.536+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|certificate_unknown|#]

[#|2010-01-25T08:36:22.539+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2, fatal: engine already closed.  Rethrowing
javax.net.ssl.SSLException: Received fatal alert: certificate_unknown|#]

[#|2010-01-25T08:36:22.539+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=32;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
```

```
httpSSLWorkerThread-9181-2, fatal: engine already closed.  Rethrowing
javax.net.ssl.SSLException: Received fatal alert: certificate_unknown|#]
```

A SOAP Fault will be returned to SoapUI. The fault will indicate, more or less clearly, that the certificate the server provided was not trusted by the service invoker.

Listing 5.8.44 SOAP Fault

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
   <SOAP-ENV:Body>
      <SOAP-ENV:Fault>
         <faultcode>SOAP-ENV:Server</faultcode>
         <faultstring><![CDATA[BPCOR-6135: A fault was not handled in the process scope;
Fault Name is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is &lt;?xml version=&quot;1.0&quot; encoding=&quot;UTF-
8&quot;?&gt;&lt;jbi:message
xmlns:sxeh=&quot;http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandli
ng&quot; type=&quot;sxeh:faultMessage&quot; version=&quot;1.0&quot;
xmlns:jbi=&quot;http://java.sun.com/xml/ns/jbi/wsdl-11-
wrapper&quot;&gt;&lt;jbi:part&gt;HTTP transport error:
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested target&lt;/jbi:part&gt;&lt;/jbi:message&gt;.
Sending errors for the pending requests in the process scope before terminating the
process instance]]></faultstring>
         <faultactor>sun-bpel-engine</faultactor>
         <detail>
            <detailText><![CDATA[BPCOR-6135: A fault was not handled in the process scope;
Fault Name is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is &lt;?xml version=&quot;1.0&quot; encoding=&quot;UTF-
8&quot;?&gt;&lt;jbi:message
xmlns:sxeh=&quot;http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandli
ng&quot; type=&quot;sxeh:faultMessage&quot; version=&quot;1.0&quot;
xmlns:jbi=&quot;http://java.sun.com/xml/ns/jbi/wsdl-11-
wrapper&quot;&gt;&lt;jbi:part&gt;HTTP transport error:
javax.net.ssl.SSLHandshakeException: sun.security.validator.ValidatorException: PKIX path
building failed: sun.security.provider.certpath.SunCertPathBuilderException: unable to
find valid certification path to requested target&lt;/jbi:part&gt;&lt;/jbi:message&gt;.
Sending errors for the pending requests in the process scope before terminating the
process instance
   Caused by: BPCOR-6131: An Error status was received while doing an invoke
(partnerLink=PersonWS,
portType={http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}PersonAbsSvcPortType,
operation=getPersonDetails)
BPCOR-6129: Line Number is 39
BPCOR-6130: Activity Name is Invoke1
   Caused by: HTTP transport error: javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
   Caused by: sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
   Caused by: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid
certification path to requested target
   Caused by: unable to find valid certification path to requested target]]></detailText>
         </detail>
      </SOAP-ENV:Fault>
   </SOAP-ENV:Body>
```

```
</SOAP-ENV:Envelope>
```

When the session expires a complete SSL Handshake will be performed again, including supply of the server certificate to the client. Host validation and certificate trust path validation.

The end-to-end solution using SSL with Server-side Authentication works. Let’s undeploy both composite applications in preparation for the next section – channel security using SSL with Mutual Authentication.

5.9 Person Service - SSL Mutual Authentication (Revised)

Note

Since the original rev 0.3 appeared more information came to light. This scenario is now doable, though the way this has to be done is not what I would consider appropriate or acceptable. The HTTP BC developers have undoubtedly their reasons for implementing this functionality the way they did. I think they should strive to do better.

SSL with Server-side Authentication is a good choice for enforcing message privacy as it travels between two end points. It is also a good choice if the client cares about authenticity of the server but the server does not use SSL to establish authenticity of the client. This is common in electronic commerce application where the client needs to make sure it is communicating with the expected server before providing credit card and similar information to it. Channel security takes care of privacy for the credit card details and server certificate allows the client to validate the server. The commerce site uses credit card information to obtain the payment, activity which is completely unrelated to the message exchange between two endpoints. All that the commerce site cares about is that credit card information is valid and the payment can be exacted. It does not need to authenticate the client machine because it is not relevant to the transaction.

Still, there are situations where both the server and the client, in addition to maintaining message privacy through channel encryption, need to authenticate one another. SSL with Mutual Authentication can be used for this purpose. The SSL Handshake is modified in such a way that as well as server sending its certificate to the client for verification the client sends its certificate to the server for validation. Either side can abort the handshake if it is not happy with the other's certificate. Once the handshake completes successfully the channel is encrypted as normal and the same protocol operating applies (periodic change of keys, etc.).

It is important to remember that SSL with Mutual Authentication can be used to confirm identity of the owners of certificates which the infrastructure components are configured to send on request. The identity of the owner of the certificate is not the same as identity of the piece of infrastructure (any number of SSL servers and clients can be configured to use the same certificate). The identity of the owner of the certificate is "extended" to the infrastructure component by configuration. One can, and frequently does, assume that identity of the certificate owner and identity of the infrastructure component are the same. This is not strictly true but is good enough most of the time, so long as the people are aware of the distinction and its implication on security. The purpose of certificate exchange is to allow both parties to determine each other's identity to, in turn, determine if each party is prepared to trust that the other party is "who it claims to be" (certificate conveys the vouched-for association between the party's identity and its certificate). Once parties determine each other's identity they can then determine whether they are prepared to pass messages to each other. It is critical to remember that while one party my be happy to send message to another party because it concluded that it "knows" and "trusts:" that party, this "knowledge" and "trust" only extend to the end points that exchange messages. This "knowledge" and "trust" emphatically does not extend to the messages themselves. The best that can be said about messages that come out of a "trusted" endpoint is that they, well, come out of a "trusted" endpoint. The messages themselves could have originated anywhere, could be bogus and fraudulent. The identity the endpoint represents can not possibly

be associated with the messages unless the messages themselves are digitally signed and the signature is associated with the same identity as that of the endpoint. This departs from the endpoint/channel security, which SSL provides, and moves into message security, which SSL does not provide.

About the greatest mistake one can make is to assume that SSL with Mutual Authentication somehow conveys authenticity of a "user", as in a human being logged into some application from which messages come. There is no relationship between a "logged in user", whatever he or she may be logged into, and the identity in the certificate associated with the SSL-secured endpoint through which application messages travel - none whatsoever.

This is the reason I am belaboring this point, because some people don't understand the distinctions and confuse channel security with message security, and SSL with Mutual Authentication (endpoints authenticating to one another) and conveyance of identity of an application user to, say, a back end database that requires user credentials.

In this section the end-to-end solution which uses secures the channel using SSL with Mutual Authentication will be developed and exercised.

As, hopefully, is clear by now, security policies, if any, can be applied to a service endpoint in a composite application without having to disturb or redevelop application logic. PersonSvc BPEL Module and PersonCli BPEL Module implement business logic. PersonSvc_CA_xxx and PersonCli_CA_xxx are used to configure varying policies.

To save ourselves the trouble of creating a composite application from scratch, not that it is a big deal, let's copy the PersonSvc_CA_SSLServerAuth composite application as PersonSvc_CA_SSLMutualAuth. Figure 5.9.1 provides an illustration of this.

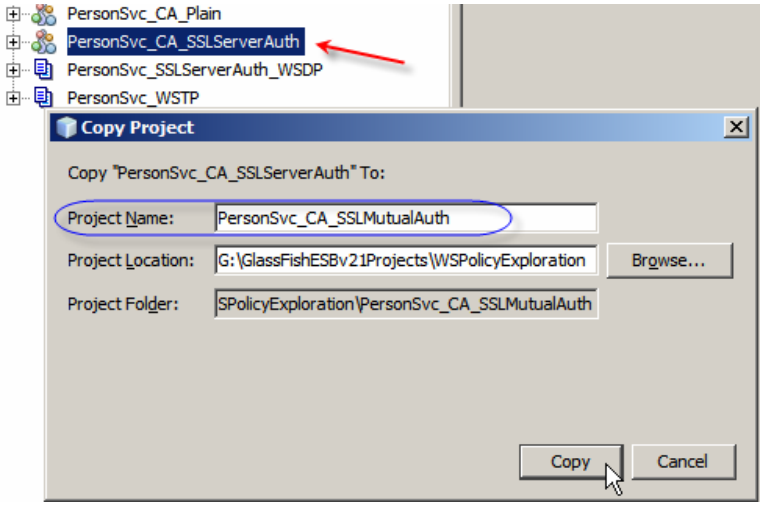


Figure 5.9.1 *Clone PersonSvc_CA_SSLServerAuth as PersonSvc_CA_SSLMutualAuth*

Open "Server Configuration" properties pane as illustrated in Figure 5.9 2.

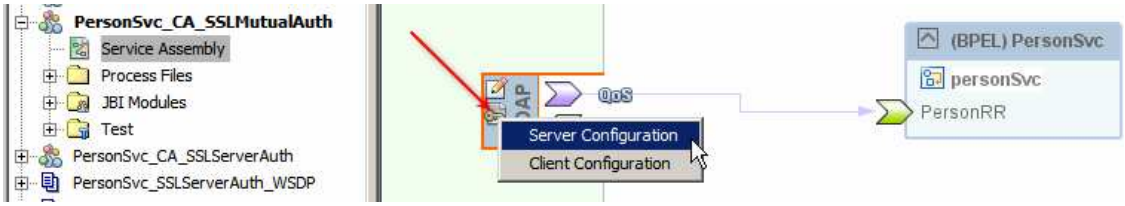


Figure 5.9.2 *Open Server Configuration Properties Pane*

Click the Configure button, check the "Require Client Certificate" checkbox and dismiss both dialogue boxes by clicking OK. Figure 5.9.3 illustrates key points.

> **Note**
>
> The dialogue box is different in GlassFish ESB v2.2 but since neither the options in v2.1 nor the on;y surviving option in v2.2 have any apparent effect, it does not seem to matter. Perhaps GlassFish ESB v2.3 will get rid of it or get the security options implemented?

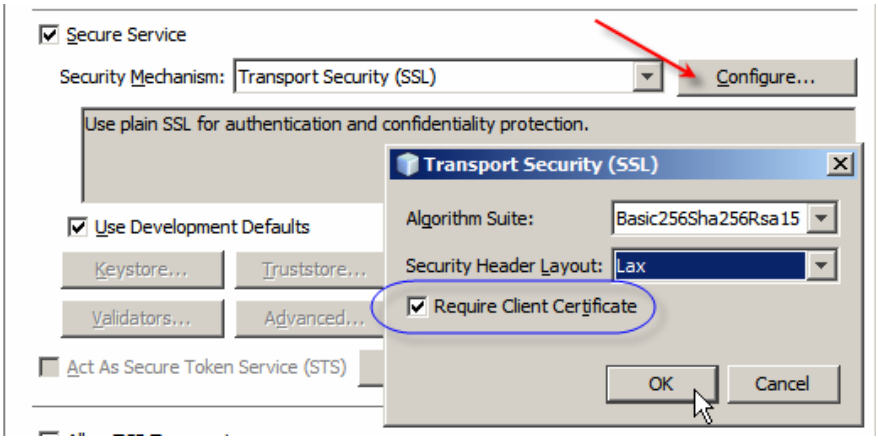


Figure 5.9.3 *Require Client Certificate*

Edit the modified WSDL and remove references to timestamp and addressing from the policy. If you do not, the service will expect the appropriate header tgo be sent by the client. The client will not send them and you will get a SOAP Fault response saying: "Security Requirements not met - No Security header in message".

Build and Deploy the application to the remote GlassFish instance.

Since the service WSDL has changed we can not re-use the PersonCli_CA_SSLServerAuth and trivially modify configuration before re-deploying, as we have done with the PersonSvc_CA_SSLServerAuth. This is because the composite application has a copy of the server WSDL, provided when we create a "New -> External WSDL Document(s)". This copy of the WSDL is a copy of the old WSDL and there is no way to refresh it short of deleting and re-creating it from scratch. By the time we do that we might as well create a new PersonCli_CA_SSLMutualAuth project form scratch. This is what we will do.

Create a "New Project" -> SOA -> "Composite Application", named PersonCli_CA_SSLMutualAuth.

Determine the WSDL URL for the PersonSvc_CA_SSLMutualAuth service. For me this will be:

```
https://orad1.ssc:29181/casaService1/casaPort1?WSDL
```

Using this WSDL URL create a “New” -> “External WSDL Document(s)” in the new composite application project. Figure 5.9.3 illustrates the outcome of this process.

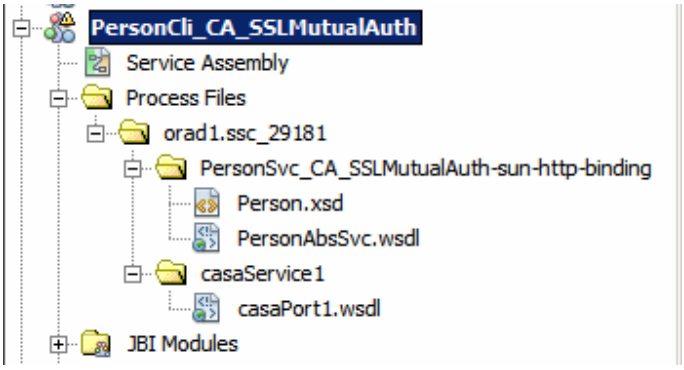


Figure 5.9.3 *External WSDL in the composite application project*

The references in the generated client stub are URL references to the service on specific host. To avoid issues with that, copy all WSDLs and XSDs to the “Project Files” folder, and modify URL references, deleting all thest startinh with “http://” all the way to and including the last slash, but leaving the name of the WSDL or the XSD.

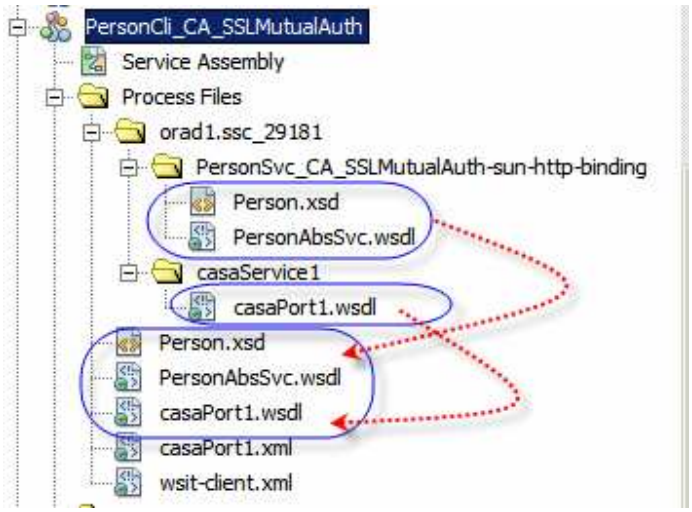


Figure 5.9.4 *Copy artifacts to the “Process Files” folder*

By copyig the artifacts to the “Process Files Folder, as illustrated in Figure 5.9.4, we are avoiding the problem of having to specify relative folder references in modified references inside WSDL and XSDs. The issue is that while local copies are being made when client artifacts are generated, the artifacts themselves are generated with URL references, instead of references to the local copies in the project. This causes the URL references to be followed at deployment and start time and negates the benefit of having local copies in the first place. Ughhhh …

Modify casaPort1.wsdl to leave just file names in import directive’s location attribute, as shown in Figures 5.9.5 and 5.9.6.

```
<definitions targetNamespace="PersonSvc_CA_SSLServerAuth" xmlns="http://schemas.xmlsoap.org/wsdl/" xm
  <import namespace="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc"
    location="https://oradi.ssc:29101/PersonSvc_CA_SSLMutualAuth-sun-http-binding/PersonAbsSvc.wsdl"
    >
    </import>
  <portType name="dummyCasaPortType">
  </portType>
  <binding name="casaBinding1" type="ns:PersonAbsSvcPortType">
    <wsp:PolicyReference URI="#casaBinding1Policy"/>
    <soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
```

Figure 5.9.5 *Eliminate URL reference*

```
<definitions targetNamespace="PersonSvc_CA_SSLServerAu
  <import namespace="http://j2ee.netbeans.org/wsdl/Con
    location="PersonAbsSvc.wsdl"
    >
    </import>
  <portType name="dummyCasaPortType">
  </portType>
```

Figure 5.9.6 *Leave just the name of the file*

As we have done twice before, drag the PersonCli BPEL module onto the CASA and build the project. Notice two SOAP BCs on the canvas, connected to the BPEL Module. The Provider (TriggerCon) and the consumer (PersonSvc).

Open and inspect “Client Configuration” properties of the Consume SOAP BC, illustrated in figure 5.9.7. Notice that, as before, there are no SSL-related properties to configure.

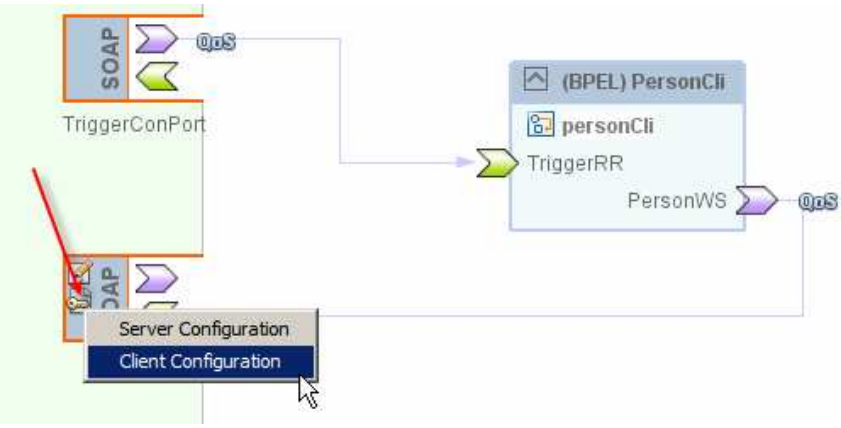


Figure 5.9.7 *Open Client Configuration of the service consumer endpoint*

We are expecting the SSL Handshake to call for client’s certificate. The only certificate the client’s (local) GlassFish instance know about is the one with the alias of s1as in the GlassFish instance’s keystore.jsk (<glassfish_root>/domains//domain1/config/keystore.jks).

Build and deploy the project to the local GlassFish instance.Use the SOAP request in PersonCli_WSTP web service testing project to trigger this solution.

Inspecting the server.log at the client and the service sides, notice that the client certificate has not been requested and has not been sent. The reason for this is that GlassFish ESB v2.x, and

OpenESB, from which it is derived, ignore the WS Policy stanza, generated when the “Require Client Certificate” checkbox is checked. The HTTP BC does not have a way of passing this requirement to the underlying Metro stack so it does not. Instead, the HTTP BC, certainly in GlassFish ESB v2.1, and GlassFish ESB v2.1 (hence in Java CAPS 6.2), provides a “(SSL) Client authentication enabled” checkbox, illustrated in Figure 5.9.8.

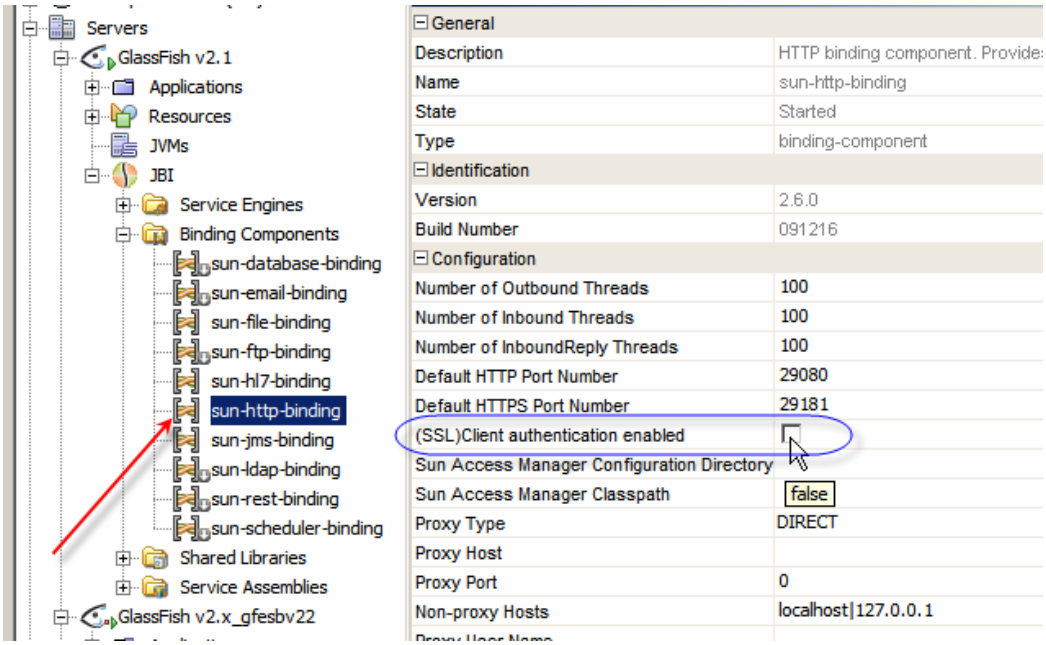


Figure 5.9.8 *(SSL) Client authentication enabled*

Note that this checkbox enables SSL with mutual authentication for all services which use the https scheme, deployed to this application server instance. Since each service is part-built at deploy and start time there is no way to enable this funcitonality, deploy a service, then disable it for the next service. When the application server restarts whatever setting is configured here will be applied to all services that use SSL and are deployed to this application server instance.

Let’s check the checkbox and deploy the service.

A dialogue box naming all services that may be affected by the change is displayed, as illustrated in Figure 5.9.9.

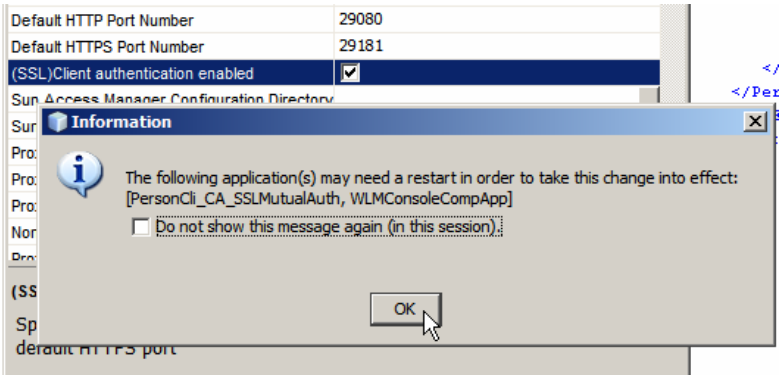


Figure 5.9.9 *Dialogue box listing affected services*

A further dialogue box, advising tha the JBI component may need to be restarted, appears. This is illustrated in Figure 6.9.10.

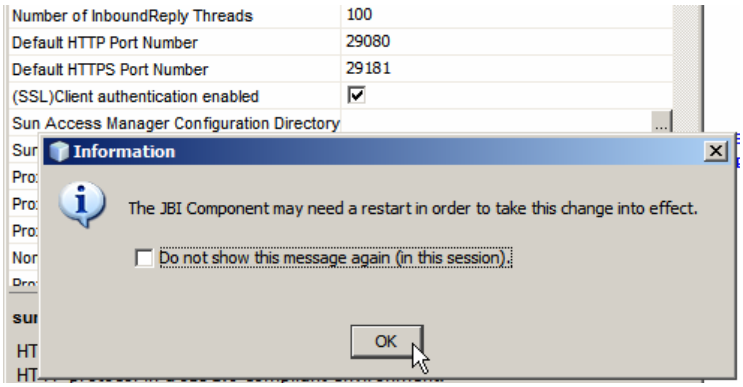


Figure 5.9.10 *sun-http-binding may need to be re-started*

Right-click on the sun-htt-binding, choose stop. When the component is stopped, right-clik it again and choose start. The server.log will show a message similar to that shown in Figure 5.9.11.

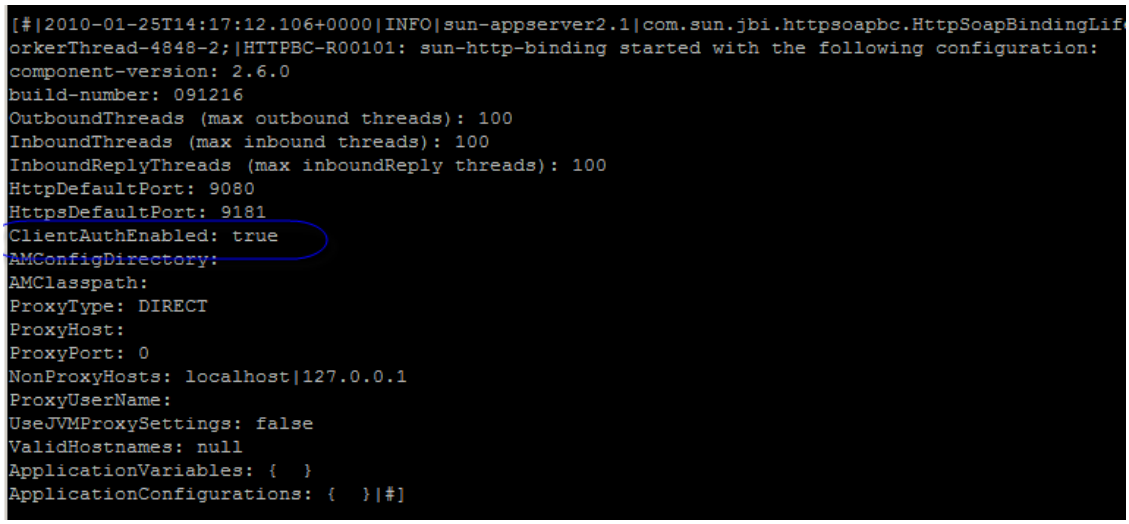


Figure 5.9.11 *SSL Client authentication enabled for the http bc.*

This, by itself, is not enough. The client sinde infrastructure hangs onto the SSL session and tries to reuse it. This prevents the SSL Handshake from being retried, rather, an existing session is reused without the handshake.

Submit the request to test the solution and review server.log trace of the SSL Handshake at the client and the server side.

Undeploy the client and the server projects. Deploy the server project. Deploy the client project.

Submit the request to test the solution and review server.log trace of the SSL Handshake at the client and the server side.

Even that is not good enough. The client still tries to use the cached session, see Figure 5.9.12.

```
[#|2010-01-25T14:45:16.421+1100|INFO|sun-appserver2.1|javax.enterprise.system.stream.out|
tp-binding-{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% Client cached [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]

[#|2010-01-25T14:45:16.421+1100|INFO|sun-appserver2.1|javax.enterprise.system.stream.out|
tp-binding-{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% Try resuming [Session-1, SSL_RSA_WITH_RC4_128_MD5] from port 4049|#]
```

Figure 5.9.12 *Client tries to re-use SSL session despite client SA being redeployed*

The server side, likewise, is happy to resume the session even though binding component condifuraitn has changed, the binding component has been restarted and the service assembly has been re-deployed, Figure 5.9.13. What does it take … ☹

```
[#|2010-01-25T14:45:15.908+0000|INFO|sun-appserver2.1|javax.enterprise.system
d-9181-4;|
%% Resuming [Session-52, SSL_RSA_WITH_RC4_128_MD5]|#]

[#|2010-01-25T14:45:15.909+0000|INFO|sun-appserver2.1|javax.enterprise.system
d-9181-4;|
*** ServerHello, TLSv1|#]
```

Figure 5.9.13 *Server is happy to resume the session even if I am not*

Re-start the client-side domain, to force it to kill off all SSL sessions, and re-submit the request.

Still no SSL with mutual authentication. The server is not asking the client for its certificate.

Re-start the server side domain and resubmit the request.

Now we get some action. The server requested the client certificate. The client provided its certificate. The server looked at the certificate, decided it does not trust it, and aborted the handshake. Listing 5.9.1 shows keey events from the server side.

Listing 5.9.1 Key messages at the server side

```
[#|2010-01-25T15:06:38.232+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=26;_ThreadName=SelectorThread-
9181;|
Using SSLEngineImpl.|#]

[#|2010-01-25T15:06:38.255+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2, READ: TLSv1 Handshake, length = 105|#]

[#|2010-01-25T15:06:38.261+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** ClientHello, TLSv1|#]

[#|2010-01-25T15:06:38.261+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
RandomCookie:  |#]
```

```
[#|2010-01-25T15:06:38.262+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|GMT: 1264392143 |#]

...
[#|2010-01-25T15:06:38.275+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Session ID:  |#]

[#|2010-01-25T15:06:38.275+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|{75, 93, 178, 78, 143, 66, 182, 7, 58, 143, 65, 153, 136, 215, 205, 162, 45,
120, 117, 211, 115, 157, 182, 74, 178, 141, 169, 122, 170, 68, 132, 249}|#]

[#|2010-01-25T15:06:38.276+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]
...
[#|2010-01-25T15:06:38.283+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
%% Created:  [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]

[#|2010-01-25T15:06:38.283+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** ServerHello, TLSv1|#]
...
[#|2010-01-25T15:06:38.301+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Session ID:  |#]

[#|2010-01-25T15:06:38.302+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|{75, 93, 179, 126, 196, 96, 165, 66, 38, 186, 183, 99, 174, 168, 184, 156, 254,
127, 110, 228, 65, 94, 149, 179, 150, 209, 108, 138, 60, 156, 249, 211}|#]

[#|2010-01-25T15:06:38.302+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
...
[#|2010-01-25T15:06:38.303+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Cipher suite:  SSL_RSA_WITH_RC4_128_MD5|#]

[#|2010-01-25T15:06:38.305+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** Certificate chain|#]

[#|2010-01-25T15:06:38.311+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
chain [0] = [
```

```
[
  Version: V3
  Subject: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  SunPKCS11-Solaris RSA public key, 1024 bits (id 136424744, session object)
  modulus:
162019218549153832437846806265131912188716502010853225371772234756127209194813917271519933
308936626560088970134028685595103985234837519163387923444045924454296696087850075632676103
985057493298783684614765757279216594655237962857291655184931289671432133385295735524558107
521801179091614740871192538934917535511
  public exponent: 65537
  Validity: [From: Fri Dec 25 10:59:20 UTC 2009,
              To: Mon Dec 23 10:59:20 UTC 2019]
  Issuer: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4b349b08]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 6B F8 6E B9 01 5B 5C 92   4D 22 6D 01 B3 DF 3C B0  k.n..[\.M"m...<.
0010: AC 68 97 D2                                        .h..
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 71 88 A3 15 54 06 F8 4E   DF 85 A0 5D 0D 13 E8 43  q...T..N...]...C
0010: 8D 67 D6 79 6A 87 12 99   E6 0D 0F 48 A0 9E 41 90  .g.yj......H..A.
0020: 28 33 87 89 57 C8 B2 55   04 EA 29 5D 45 6E 43 8D  (3..W..U..)]EnC.
0030: 7D 08 A1 2C 0E 3C CE D9   FB 33 ED 5D CB AC 36 E5  ...,.<...3.]..6.
0040: 66 D3 79 15 7D 9D E8 06   BF 08 03 32 62 2A 70 78  f.y........2b*px
0050: 6D C5 66 FF 08 A8 CA 1B   8E FC 41 59 97 20 29 C7  m.f.......AY. ).
0060: A3 F9 9F 80 F2 52 5B B4   36 03 1B 90 81 35 39 F5  .....R[.6....59.
0070: 51 D7 31 5B 6C 69 BA 44   C3 A8 38 BA E3 0D E7 DC  Q.1[li.D..8.....

]|#]
...
[#|2010-01-25T15:06:38.318+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** CertificateRequest|#] <<<<<<<================

[#|2010-01-25T15:06:38.318+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Cert Types: |#]

[#|2010-01-25T15:06:38.319+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|RSA|#]

[#|2010-01-25T15:06:38.320+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|, |#]

[#|2010-01-25T15:06:38.321+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|DSS|#]
```

```
[#|2010-01-25T15:06:38.321+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|, |#]

[#|2010-01-25T15:06:38.321+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|ECDSA|#]

[#|2010-01-25T15:06:38.321+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
Cert Authorities:|#]

[#|2010-01-25T15:06:38.322+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
<OU=Equifax Secure Certificate Authority, O=Equifax, C=US>|#]

[#|2010-01-25T15:06:38.322+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
<OU=Starfield Class 2 Certification Authority, O="Starfield Technologies, Inc.", C=US>|#]

...
[#|2010-01-25T15:06:38.336+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
<CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa Clara,
ST=California, C=US>|#]

[#|2010-01-25T15:06:38.336+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
<EMAILADDRESS=info@valicert.com, CN=http://www.valicert.com/, OU=ValiCert Class 2 Policy
Validation Authority, O="ValiCert, Inc.", L=ValiCert Validation Network>|#]

[#|2010-01-25T15:06:38.337+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** ServerHelloDone|#]
...
[#|2010-01-25T15:06:40.109+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
*** Certificate chain|#]

[#|2010-01-25T15:06:40.109+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
***|#]

[#|2010-01-25T15:06:40.111+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2, fatal error: 42: null cert chain
javax.net.ssl.SSLHandshakeException: null cert chain|#]

[#|2010-01-25T15:06:40.112+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2|#]

[#|2010-01-25T15:06:40.112+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|, SEND TLSv1 ALERT:  |#] <<<<<<<<<<==============
```

```
[#|2010-01-25T15:06:40.115+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|fatal, |#]

[#|2010-01-25T15:06:40.115+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|description = bad_certificate|#] <<<<<<<<<<==============

[#|2010-01-25T15:06:40.116+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2, WRITE: TLSv1 Alert, length = 2|#]

[#|2010-01-25T15:06:40.116+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-9181-2;|
httpSSLWorkerThread-9181-2, fatal: engine already closed.  Rethrowing
javax.net.ssl.SSLHandshakeException: null cert chain|#] <<<<<<<<<<==============
```

Listing 5.9.2 shows key messages at the client side.

Listing 5.9.2 Key messages at the client side

```
[#|2010-01-25T15:06:39.000+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% Client cached [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]

[#|2010-01-25T15:06:39.000+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% Try resuming [Session-1, SSL_RSA_WITH_RC4_128_MD5] from port 4271|#]

[#|2010-01-25T15:06:39.000+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** ClientHello, TLSv1|#]
...
[#|2010-01-25T15:06:39.000+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Session ID:  |#]

[#|2010-01-25T15:06:39.015+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|{75, 93, 178, 78,
143, 66, 182, 7, 58, 143, 65, 153, 136, 215, 205, 162, 45, 120, 117, 211, 115, 157, 182,
74, 178, 141, 169, 122, 170, 68, 132, 249}|#]

[#|2010-01-25T15:06:39.015+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
```

```
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]
...
[#|2010-01-25T15:06:40.828+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** ServerHello, TLSv1|#]
...
[#|2010-01-25T15:06:40.828+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Session ID:  |#]

[#|2010-01-25T15:06:40.828+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|{75, 93, 179, 126,
196, 96, 165, 66, 38, 186, 183, 99, 174, 168, 184, 156, 254, 127, 110, 228, 65, 94, 149,
179, 150, 209, 108, 138, 60, 156, 249, 211}|#]

[#|2010-01-25T15:06:40.828+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
...
[#|2010-01-25T15:06:40.828+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
%% Created:  [Session-2, SSL_RSA_WITH_RC4_128_MD5]|#]

[#|2010-01-25T15:06:40.828+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
** SSL_RSA_WITH_RC4_128_MD5|#]

[#|2010-01-25T15:06:40.828+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** Certificate chain|#]

[#|2010-01-25T15:06:40.843+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
chain [0] = [
[
  Version: V3
  Subject: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
162019218549153832437846806265131912188716502010853225371772234756127209194813917271519933
308936626560088970134028685595103985234837519163387923444045924454296696087850075632676103
985057493298783684614765757279216594655237962857291655184931289671432133385295735524558107
521801179091614740871192538934917535511
  public exponent: 65537
```

```
  Validity: [From: Fri Dec 25 21:59:20 EST 2009,
              To: Mon Dec 23 21:59:20 EST 2019]
  Issuer: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4b349b08]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 6B F8 6E B9 01 5B 5C 92   4D 22 6D 01 B3 DF 3C B0  k.n..[\.M"m...<.
0010: AC 68 97 D2                                        .h..
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 71 88 A3 15 54 06 F8 4E   DF 85 A0 5D 0D 13 E8 43  q...T..N...]...C
0010: 8D 67 D6 79 6A 87 12 99   E6 0D 0F 48 A0 9E 41 90  .g.yj......H..A.
0020: 28 33 87 89 57 C8 B2 55   04 EA 29 5D 45 6E 43 8D  (3..W..U..)]EnC.
0030: 7D 08 A1 2C 0E 3C CE D9   FB 33 ED 5D CB AC 36 E5  ...,.<...3.]..6.
0040: 66 D3 79 15 7D 9D E8 06   BF 08 03 32 62 2A 70 78  f.y........2b*px
0050: 6D C5 66 FF 08 A8 CA 1B   8E FC 41 59 97 20 29 C7  m.f.......AY. ).
0060: A3 F9 9F 80 F2 52 5B B4   36 03 1B 90 81 35 39 F5  .....R[.6....59.
0070: 51 D7 31 5B 6C 69 BA 44   C3 A8 38 BA E3 0D E7 DC  Q.1[li.D..8.....

]|#]

[#|2010-01-25T15:06:40.843+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
***|#]

[#|2010-01-25T15:06:40.843+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Found trusted certificate:|#]

[#|2010-01-25T15:06:40.843+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
[
[
  Version: V3
  Subject: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
162019218549153832437846806265131912188716502010853225371772234756127209194813917271519933
308936626560088970134028685595103985234837519163387923444045924454296696087850075632676103
985057493298783684614765757279216594655237962857291655184931289671432133385295735524558107
521801179091614740871192538934917535511
  public exponent: 65537
  Validity: [From: Fri Dec 25 21:59:20 EST 2009,
              To: Mon Dec 23 21:59:20 EST 2019]
  Issuer: CN=gfesbv22, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4b349b08]
```

```
Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 6B F8 6E B9 01 5B 5C 92   4D 22 6D 01 B3 DF 3C B0  k.n..[\.M"m...<.
0010: AC 68 97 D2                                        .h..
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 71 88 A3 15 54 06 F8 4E   DF 85 A0 5D 0D 13 E8 43  q...T..N...]...C
0010: 8D 67 D6 79 6A 87 12 99   E6 0D 0F 48 A0 9E 41 90  .g.yj......H..A.
0020: 28 33 87 89 57 C8 B2 55   04 EA 29 5D 45 6E 43 8D  (3..W..U..)]EnC.
0030: 7D 08 A1 2C 0E 3C CE D9   FB 33 ED 5D CB AC 36 E5  ...,.<...3.]..6.
0040: 66 D3 79 15 7D 9D E8 06   BF 08 03 32 62 2A 70 78  f.y........2b*px
0050: 6D C5 66 FF 08 A8 CA 1B   8E FC 41 59 97 20 29 C7  m.f.......AY. ).
0060: A3 F9 9F 80 F2 52 5B B4   36 03 1B 90 81 35 39 F5  .....R[.6....59.
0070: 51 D7 31 5B 6C 69 BA 44   C3 A8 38 BA E3 0D E7 DC  Q.1[li.D..8.....

]|#]

[#|2010-01-25T15:06:40.859+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** CertificateRequest|#] <<<<<<<<<<<<<<=====================

[#|2010-01-25T15:06:40.859+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Cert Types: |#]

[#|2010-01-25T15:06:40.859+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|RSA|#]

[#|2010-01-25T15:06:40.859+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|, |#]

[#|2010-01-25T15:06:40.859+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|DSS|#]

[#|2010-01-25T15:06:40.859+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|, |#]

[#|2010-01-25T15:06:40.859+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|ECDSA|#]

[#|2010-01-25T15:06:40.859+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
Cert Authorities:|#]
```

```
[#|2010-01-25T15:06:40.859+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
<OU=Equifax Secure Certificate Authority, O=Equifax, C=US>|#]
...
[#|2010-01-25T15:06:40.875+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
<EMAILADDRESS=info@valicert.com, CN=http://www.valicert.com/, OU=ValiCert Class 2 Policy
Validation Authority, O="ValiCert, Inc.", L=ValiCert Validation Network>|#]

[#|2010-01-25T15:06:40.875+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** ServerHelloDone|#]

[#|2010-01-25T15:06:40.875+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** Certificate chain|#]

[#|2010-01-25T15:06:40.875+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
***|#]

[#|2010-01-25T15:06:40.890+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** ClientKeyExchange, RSA PreMasterSecret, TLSv1|#]

[#|2010-01-25T15:06:40.890+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, WRITE: TLSv1 Handshake, length = 141|#]

[#|2010-01-25T15:06:40.890+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
SESSION KEYGEN:|#]

[#|2010-01-25T15:06:40.890+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
PreMaster Secret:|#]
...
[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
*** Finished|#]
...
[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
```

```
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, WRITE: TLSv1 Handshake, length = 32|#]

[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, waiting for close_notify or alert: state 1|#]

[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, Exception while waiting for close java.net.SocketException:
Software caused connection abort: recv failed|#]

[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, handling exception: java.net.SocketException: Software caused
connection abort: recv failed|#]
...
[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|, SEND TLSv1
ALERT:  |#]

[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|fatal, |#]

[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|description =
unexpected_message|#]

[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, WRITE: TLSv1 Alert, length = 18|#]

[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, Exception sending alert: java.net.SocketException: Software
caused connection abort: socket write error|#]

[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, called closeSocket()|#]

[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, called close()|#]
```

```
[#|2010-01-25T15:06:40.984+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=49;_ThreadName=HTTPBC-
OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
HTTPBC-OutboundReceiver-5, called closeInternal(true)|#]

[#|2010-01-25T15:06:41.046+1100|WARNING|sun-
appserver2.1|com.sun.jbi.httpsoapbc.OutboundMessageProcessor|_ThreadID=49;_ThreadName=HTTP
BC-OutboundReceiver-5;Context=PersonCli_CA_SSLMutualAuth-sun-http-binding-
{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;_RequestID=a111c6f9
-7975-4937-ba83-1bfcb75e9671;|HTTPBC-E00759: An exception occured while processing a reply
message. HTTP transport error: java.net.SocketException: Software caused connection abort:
recv failed
com.sun.xml.ws.client.ClientTransportException: HTTP transport error:
java.net.SocketException: Software caused connection abort: recv failed
        at
com.sun.xml.ws.transport.http.client.HttpClientTransport.getOutput(HttpClientTransport.jav
a:134)
        at
com.sun.xml.ws.transport.http.client.HttpTransportPipe.process(HttpTransportPipe.java:138)
        at
com.sun.xml.wss.jaxws.impl.SecurityClientPipe.process(SecurityClientPipe.java:208)
        at com.sun.xml.ws.api.pipe.helper.PipeAdapter.processRequest(PipeAdapter.java:115)
        at com.sun.xml.ws.api.pipe.Fiber.__doRun(Fiber.java:595)
        at com.sun.xml.ws.api.pipe.Fiber._doRun(Fiber.java:554)
        at com.sun.xml.ws.api.pipe.Fiber.doRun(Fiber.java:539)
        at com.sun.xml.ws.api.pipe.Fiber.runSync(Fiber.java:436)
        at com.sun.xml.ws.client.Stub.process(Stub.java:248)
        at com.sun.xml.ws.client.dispatch.DispatchImpl.doInvoke(DispatchImpl.java:180)
        at com.sun.xml.ws.client.dispatch.DispatchImpl.invoke(DispatchImpl.java:206)
        at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.outboundCall(OutboundMessageProcessor.java
:1256)
        at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.dispatch(OutboundMessageProcessor.java:129
6)
        at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.processRequestReplyOutbound(OutboundMessag
eProcessor.java:747)
        at
com.sun.jbi.httpsoapbc.OutboundMessageProcessor.processMessage(OutboundMessageProcessor.ja
va:257)
        at com.sun.jbi.httpsoapbc.OutboundAction.run(OutboundAction.java:63)
        at
java.util.concurrent.ThreadPoolExecutor$Worker.runTask(ThreadPoolExecutor.java:886)
        at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:908)
        at java.lang.Thread.run(Thread.java:619)
Caused by: java.net.SocketException: Software caused connection abort: recv failed
        at java.net.SocketInputStream.socketRead0(Native Method)
        at java.net.SocketInputStream.read(SocketInputStream.java:129)
        at com.sun.net.ssl.internal.ssl.InputRecord.readFully(InputRecord.java:293)
        at com.sun.net.ssl.internal.ssl.InputRecord.read(InputRecord.java:331)
        at com.sun.net.ssl.internal.ssl.SSLSocketImpl.readRecord(SSLSocketImpl.java:789)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.waitForClose(SSLSocketImpl.java:1455)
        at
com.sun.net.ssl.internal.ssl.HandshakeOutStream.flush(HandshakeOutStream.java:103)
        at
com.sun.net.ssl.internal.ssl.Handshaker.sendChangeCipherSpec(Handshaker.java:612)
        at
com.sun.net.ssl.internal.ssl.ClientHandshaker.sendChangeCipherAndFinish(ClientHandshaker.j
ava:868)
        at
com.sun.net.ssl.internal.ssl.ClientHandshaker.serverHelloDone(ClientHandshaker.java:794)
```

```
        at
com.sun.net.ssl.internal.ssl.ClientHandshaker.processMessage(ClientHandshaker.java:226)
        at com.sun.net.ssl.internal.ssl.Handshaker.processLoop(Handshaker.java:516)
        at com.sun.net.ssl.internal.ssl.Handshaker.process_record(Handshaker.java:454)
        at com.sun.net.ssl.internal.ssl.SSLSocketImpl.readRecord(SSLSocketImpl.java:884)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.performInitialHandshake(SSLSocketImpl.java:1112
)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.startHandshake(SSLSocketImpl.java:1139)
        at
com.sun.net.ssl.internal.ssl.SSLSocketImpl.startHandshake(SSLSocketImpl.java:1123)
        at sun.net.www.protocol.https.HttpsClient.afterConnect(HttpsClient.java:434)
        at
sun.net.www.protocol.https.AbstractDelegateHttpsURLConnection.connect(AbstractDelegateHttp
sURLConnection.java:166)
        at
sun.net.www.protocol.http.HttpURLConnection.getOutputStream(HttpURLConnection.java:904)
        at
sun.net.www.protocol.https.HttpsURLConnectionImpl.getOutputStream(HttpsURLConnectionImpl.j
ava:230)
        at
com.sun.xml.ws.transport.http.client.HttpClientTransport.getOutput(HttpClientTransport.jav
a:122)
        ... 18 more
|#]
...
[#|2010-01-25T15:06:41.265+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=53;_ThreadName=HTTPBC-JAXWS-
Engine-4;|
---[HTTP response 500]---|#]

[#|2010-01-25T15:06:41.265+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=53;_ThreadName=HTTPBC-JAXWS-
Engine-4;|
<?xml version="1.0" ?><SOAP-ENV:Envelope xmlns:SOAP-
ENV="http://schemas.xmlsoap.org/soap/envelope/"><SOAP-ENV:Body><SOAP-ENV:Fault><faultcode
xmlns="">SOAP-ENV:Server</faultcode><faultstring xmlns="">BPCOR-6135: A fault was not
handled in the process scope; Fault Name is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is &amp;lt;?xml version=&amp;quot;1.0&amp;quot; encoding=&amp;quot;UTF-
8&amp;quot;?&amp;gt;&amp;lt;jbi:message
xmlns:sxeh=&amp;quot;http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHa
ndling&amp;quot; type=&amp;quot;sxeh:faultMessage&amp;quot;
version=&amp;quot;1.0&amp;quot; xmlns:jbi=&amp;quot;http://java.sun.com/xml/ns/jbi/wsdl-
11-wrapper&amp;quot;&amp;gt;&amp;lt;jbi:part&amp;gt;HTTP transport error:
java.net.SocketException: Software caused connection abort: recv
failed&amp;lt;/jbi:part&amp;gt;&amp;lt;/jbi:message&amp;gt;. Sending errors for the
pending requests in the process scope before terminating the process
instance</faultstring><faultactor xmlns="">sun-bpel-engine</faultactor><detail
xmlns=""><detailText>BPCOR-6135: A fault was not handled in the process scope; Fault Name
is
{http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHandling}systemFault;
Fault Data is &amp;lt;?xml version=&amp;quot;1.0&amp;quot; encoding=&amp;quot;UTF-
8&amp;quot;?&amp;gt;&amp;lt;jbi:message
xmlns:sxeh=&amp;quot;http://www.sun.com/wsbpel/2.0/process/executable/SUNExtension/ErrorHa
ndling&amp;quot; type=&amp;quot;sxeh:faultMessage&amp;quot;
version=&amp;quot;1.0&amp;quot; xmlns:jbi=&amp;quot;http://java.sun.com/xml/ns/jbi/wsdl-
11-wrapper&amp;quot;&amp;gt;&amp;lt;jbi:part&amp;gt;HTTP transport error:
java.net.SocketException: Software caused connection abort: recv
failed&amp;lt;/jbi:part&amp;gt;&amp;lt;/jbi:message&amp;gt;. Sending errors for the
pending requests in the process scope before terminating the process instance
   Caused by: BPCOR-6131: An Error status was received while doing an invoke
(partnerLink=PersonWS,
```

```
portType={http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}PersonAbsSvcPortType,
operation=getPersonDetails)
BPCOR-6129: Line Number is 39
BPCOR-6130: Activity Name is Invoke1
   Caused by: HTTP transport error: java.net.SocketException: Software caused connection
abort: recv failed
   Caused by: Software caused connection abort: recv failed</detailText></detail></SOAP-
ENV:Fault></SOAP-ENV:Body></SOAP-ENV:Envelope>|#]

[#|2010-01-25T15:06:41.265+1100|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=53;_ThreadName=HTTPBC-JAXWS-
Engine-4;|--------------------|#]

[#|2010-01-25T15:13:34.453+1100|FINE|sun-
appserver2.1|javax.enterprise.resource.jta|_ThreadID=54;_ThreadName=p: thread-pool-1; w:
5;ClassName=com.sun.enterprise.distributedtx.J2EETransactionManagerImpl;MethodName=ejbDest
royed;_RequestID=76263d13-28ca-481f-8114-bef7978f2cbd;| ejbDestroyed:
com.sun.ejb.containers.EntityContextImpl@1a50bea|#]
```

Using the method discussed in section 5.8, starting before Figure 5.8.28, extract the server certificate from the local host's application server and add it to the cacerts.jks truststore of the remote application server. This will require the remote application server to be restarted.

Submit the request again and inspect the server.log trace of the SSL andshake at both ends of the connection.

Finally, we have a successful SSL handshake. Listing 5.9.3 shows key traces from the server side.

Listing 5.9.3 Key traces at the server side

```
...
[#|2010-01-25T16:10:38.426+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
*** CertificateRequest|#]
[#|2010-01-25T16:10:38.427+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
Cert Types: |#]
[#|2010-01-25T16:10:38.427+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|RSA|#]
[#|2010-01-25T16:10:38.427+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|, |#]
[#|2010-01-25T16:10:38.427+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|DSS|#]
[#|2010-01-25T16:10:38.427+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|, |#]
[#|2010-01-25T16:10:38.428+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|ECDSA|#]
[#|2010-01-25T16:10:38.428+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
Cert Authorities:|#]
```

```
[#|2010-01-25T16:10:38.428+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
<OU=Equifax Secure Certificate Authority, O=Equifax, C=US>|#]
...
...[#|2010-01-25T16:10:38.440+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
<CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US>|#]
..

[#|2010-01-25T16:10:38.442+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
<EMAILADDRESS=info@valicert.com, CN=http://www.valicert.com/, OU=ValiCert Class 2 Policy
Validation Authority, O="ValiCert, Inc.", L=ValiCert Validation Network>|#]
[#|2010-01-25T16:10:38.443+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
*** ServerHelloDone|#]
[#|2010-01-25T16:10:38.447+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
httpSSLWorkerThread-9181-4, WRITE: TLSv1 Handshake, length = 5989|#]
[#|2010-01-25T16:10:38.518+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
httpSSLWorkerThread-9181-4, READ: TLSv1 Handshake, length = 866|#]
[#|2010-01-25T16:10:38.521+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
*** Certificate chain|#]
[#|2010-01-25T16:10:38.523+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
chain [0] = [
[
  Version: V3
  Subject: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  SunPKCS11-Solaris RSA public key, 1024 bits (id 135191280, session object)
  modulus:
119015729011601992066437627694175597302274488523936435943788428425927290506073513787302643
017960861607237521305422120418909115354894571170784283556475403430369950778357285764306166
648491798878209927016239722200800248859806528655579306309537174834576238534116325674324337
749349373878258250083698752057654968931
  public exponent: 65537
  Validity: [From: Thu Dec 24 01:01:19 UTC 2009,
              To: Sun Dec 22 01:01:19 UTC 2019]
  Issuer: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  SerialNumber: [    4b32bd5f]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 77 33 BB 8D 4C 50 31 41   6C 26 E0 99 51 F8 EE F8  w3..LP1Al&..Q...
0010: E6 DA 00 45                                        ...E
]
]
```

```
]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 38 91 BF 72 69 3F A9 B4   2A AB A0 AA 9E 5E AA E3  8..ri?..*....^..
0010: 90 95 42 B3 D7 63 02 82   2D 86 10 BE BB C7 ED E9  ..B..c..-.......
0020: BE BE 50 8E 2A 0E 7F 29   AC 0F 97 8E 6A 27 4B 46  ..P.*..)....j'KF
0030: 1A 34 CE 5B 33 EF B6 6C   02 53 20 A1 0C BF 6E 1A  .4.[3..l.S ...n.
0040: 78 A8 06 AA 38 EF F6 31   2F A3 E5 F6 03 B1 F2 8D  x...8..1/.......
0050: E9 8E 02 F7 6F D2 6D F1   20 91 6C EB E9 A2 6C F5  ....o.m. .l...l.
0060: 22 18 CD 5A 35 06 95 E1   BD 5D 83 1A A5 47 24 D9  "..Z5....]...G$.
0070: 41 44 42 C9 E9 74 15 84   3A DA 95 C4 EC E8 8C D6  ADB..t..:.......

]|#]
...
[#|2010-01-25T16:10:38.536+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
Found trusted certificate:|#] <<<<<<<<<<<<<<<<===========================
[#|2010-01-25T16:10:38.538+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
[
[
  Version: V3
  Subject: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  SunPKCS11-Solaris RSA public key, 1024 bits (id 135191280, session object)
  modulus:
1190157290116019920664376276941755973022744885239364359437884284259272905060735137873026430
1796086160723752130542212041890911535489457117078428355647540343036995077835728576430616664
8491798878209927016239722200800248859806528655579306309537174834576238534116325674324337
74934937387825825008369875205765496893
  public exponent: 65537
  Validity: [From: Thu Dec 24 01:01:19 UTC 2009,
               To: Sun Dec 22 01:01:19 UTC 2019]
  Issuer: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  SerialNumber: [    4b32bd5f]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 77 33 BB 8D 4C 50 31 41   6C 26 E0 99 51 F8 EE F8  w3..LP1Al&..Q...
0010: E6 DA 00 45                                        ...E
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 38 91 BF 72 69 3F A9 B4   2A AB A0 AA 9E 5E AA E3  8..ri?..*....^..
0010: 90 95 42 B3 D7 63 02 82   2D 86 10 BE BB C7 ED E9  ..B..c..-.......
0020: BE BE 50 8E 2A 0E 7F 29   AC 0F 97 8E 6A 27 4B 46  ..P.*..)....j'KF
0030: 1A 34 CE 5B 33 EF B6 6C   02 53 20 A1 0C BF 6E 1A  .4.[3..l.S ...n.
0040: 78 A8 06 AA 38 EF F6 31   2F A3 E5 F6 03 B1 F2 8D  x...8..1/.......
0050: E9 8E 02 F7 6F D2 6D F1   20 91 6C EB E9 A2 6C F5  ....o.m. .l...l.
0060: 22 18 CD 5A 35 06 95 E1   BD 5D 83 1A A5 47 24 D9  "..Z5....]...G$.
0070: 41 44 42 C9 E9 74 15 84   3A DA 95 C4 EC E8 8C D6  ADB..t..:.......

]|#]
```

```
[#|2010-01-25T16:10:38.564+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
*** ClientKeyExchange, RSA PreMasterSecret, TLSv1|#]
...
[#|2010-01-25T16:10:38.755+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
*** Finished|#]
[#|2010-01-25T16:10:38.755+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
verify_data:  { |#]
...
[#|2010-01-25T16:10:38.779+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
*** Finished|#]
...
[#|2010-01-25T16:10:38.784+0000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=28;_ThreadName=httpSSLWorkerThre
ad-9181-4;|
%% Cached server session: [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]
...
```

SSL with mutual authentication works in GlassFisj ESB v2.1 and 2.2. Not quite the way I would expect and desire, but it works. By having to globally configure the sun-http-binding to “require client authentication” we are forced to have all SSL services on that applicaitn server instance require SSL with mutual authentication. This is not the way I expect these kinds of things to work. I expect this feature to be enabled on per HTTP BC-baseis, not globally.

So it does not get in the way of future proects, uncheck the “require client authentication” checkbox at the remote server. Undeploy the client and the server projects so we can get on with the next part of the discussion and next lot of projects.

5.10 EJB-based Person Svc with No Channel Security

In this section the EJB-based web service provider and consumer will be built and exercised, in preparation for configuration of security policies in subsequent sections.

Listing 5.3.2 shows the Abstract WSDL that describes the interface to our service. In this section we will implement this service in Java as an EJB-based web service.

Create “New Project” -> “Java EE” -> “EJB Module”, choosing the remote GlassFish instance as the deployment target. Name this module EJBPersonNoSecSvc.

In the new project create “New” -> “Web Service From WSDL”, naming the service EJBPersonNoSecSvc, placing it in the package pkg.EJBPersonNoSecSvc and using the CommonXML/PersonAbsSvc “Local WSDL File”.

Figure 5.10.1 shows the source of the service implementation, at this point in time, reformatted for better readability.

```
1  /*
2   * To change this template, choose Tools | Templates
3   * and open the template in the editor.
4   */
5
6  package pkg.EJBPersonNoSecSvc;
7
8  import javax.ejb.Stateless;
9  import javax.jws.WebService;
10 import org.netbeans.j2ee.wsdl.commonxml.personabssvc.GetPersonDetailsFault;
11 import org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType;
12
13 /**
14  *
15  * @author mczapski
16  */
17 @WebService
18     (serviceName = "PersonAbsSvcService",
19     portName = "PersonAbsSvcPort",
20     endpointInterface = "org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType",
21     targetNamespace = "http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc",
22     wsdlLocation = "META-INF/wsdl/EJBPersonNoSecSvc/PersonAbsSvcWrapper.wsdl")
23 @Stateless
24 public class EJBPersonNoSecSvc implements PersonAbsSvcPortType {
25
26     public org.netbeans.xml.schema.person.PersonRes getPersonDetails
27             (org.netbeans.xml.schema.person.PersonReq msgPersonDetailsReq)
28                 throws GetPersonDetailsFault {
29         //TODO implement this method
30         throw new UnsupportedOperationException("Not implemented yet.");
31     }
32
33 }
34
```

Figure 5.10.1 *Skeleton service implementation*

Replace lines 29-30 (in my source) with the java code shown in Listing 5.10.1.

Listing 5.10.1 Service implementation

```
        System.out.println("\n%%%%%%% PersonID: " + msgPersonDetailsReq.getPersonID());

        org.netbeans.xml.schema.person.PersonRes sRes
                = new org.netbeans.xml.schema.person.PersonRes();
        sRes.setPersonID(msgPersonDetailsReq.getPersonID());
        sRes.setFamilyName("Doe");
        sRes.setGivenName("John");
        sRes.setGender("M");

        org.netbeans.xml.schema.person.PersonRes.AddressDetails addr
                = new org.netbeans.xml.schema.person.PersonRes.AddressDetails();

        addr.setStreetAddress("33 Berry Street");
        addr.setCityTown("North Sydney");
        addr.setStateProvince("NSW");
        addr.setPostCode("2160");
        addr.setCountry("Australia");
        sRes.setAddressDetails(addr);

        org.netbeans.xml.schema.person.PersonRes.CreditCardDetails card
                = new org.netbeans.xml.schema.person.PersonRes.CreditCardDetails();
        card.setCardNumber("123-456-7689-0123");
        card.setCardType("Passport");
        card.setExpiryDate("01/21");
        card.setSecurityCode((new java.util.Date()).toString());
        sRes.setCreditCardDetails(card);

        if (msgPersonDetailsReq.getPersonID().equalsIgnoreCase("FAULT")) {
            PersonFlt pFlt = new PersonFlt();
            pFlt.setPersonID(msgPersonDetailsReq.getPersonID());
            pFlt.setFaultDetail("Induced GetPersonDetailsFault");
            GetPersonDetailsFault sFlt
                    = new GetPersonDetailsFault
                        ("Induced GetpersonDetailsFault"
                        ,pFlt);
            throw sFlt;
        }
        return sRes;
```

Right-click inside the source window and choose “Fix Imports” to resolve import-related issues.

Build and Deploy the project.

Create “New Project” -> “Java EE” -> “EJB Module”, named EJBPersonNoSecCli, to be deployed to the local GlassFish instance.

Create “New” -> “Web Service From WSDL”, named EJBPersonNoSecCli, in package pkg.EJBPersonNoSecCli, using WSDL from the CommonXML/TriggerCon.wsdl.

Create “New” -> “Web Service Client”. Click “Project”, browse to the EJBPersonNoSecSvc project and choose the web service implementation. Figure 5.10.2 illustrates this step.

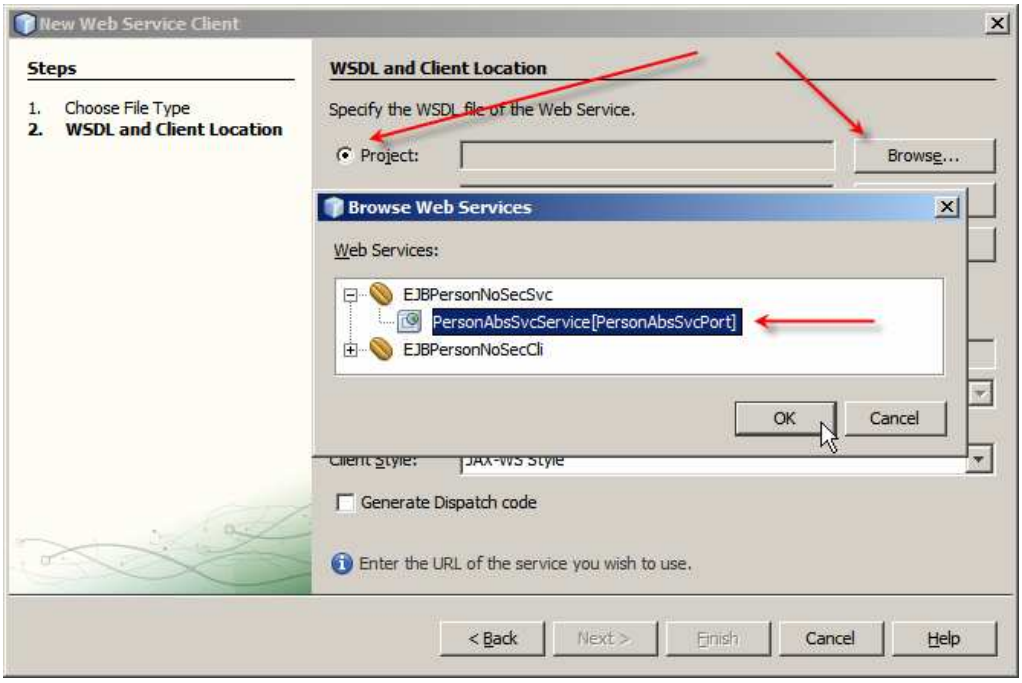


Figure 5.10.2 *Choose web service implementation for the client to invoke*

Replace the two lines of code, "//TODO …" and "throw new Unsupported…" with the code shown in Listing 5.10.2.

Listing 5.10.2 Replacement code

```
        org.netbeans.xml.schema.person.PersonReq cReq
                = new org.netbeans.xml.schema.person.PersonReq();
        cReq.setPersonID(msgPersonDetailsReq.getPersonID());

        org.netbeans.xml.schema.person.PersonRes cRes
                = new org.netbeans.xml.schema.person.PersonRes();
        cRes.setPersonID(msgPersonDetailsReq.getPersonID());

       // invoke service here

        return cRes;
```

The source, reformatted for better readability, is shown in Figure 5.10.3.

```
17  @WebService
18      (serviceName = "TriggerConService",
19      portName = "TriggerConPort",
20      endpointInterface = "org.netbeans.j2ee.wsdl.commonxml.triggercon.TriggerConPortType",
21      targetNamespace = "http://j2ee.netbeans.org/wsdl/CommonXML/TriggerCon",
22      wsdlLocation = "META-INF/wsdl/EJBPersonNoSecCli/TriggerCon.wsdl")
23  @Stateless
24  public class EJBPersonNoSecCli implements TriggerConPortType {
25
26      public org.netbeans.xml.schema.person.PersonRes triggerPerson
27              (org.netbeans.xml.schema.person.PersonReq msgPersonDetailsReq)
28                  throws TriggerPersonFault {
29          org.netbeans.xml.schema.person.PersonReq cReq
30                  = new org.netbeans.xml.schema.person.PersonReq();
31          cReq.setPersonID(msgPersonDetailsReq.getPersonID());
32
33          org.netbeans.xml.schema.person.PersonRes cRes
34                  = new org.netbeans.xml.schema.person.PersonRes();
35          cRes.setPersonID(msgPersonDetailsReq.getPersonID());
36
37      // invoke service here
38
39          return cRes;
40      }
```

Figure 5.10.3 *Client implementation code before service invocation is added*

Variables cReq and cRes will contain request to the service and response from the service respectively.

Expand Web Service References node all the way to the service operation and drag the service operation onto the source window following the comment "// invoke service here", as shown in Figure 5.10.4.

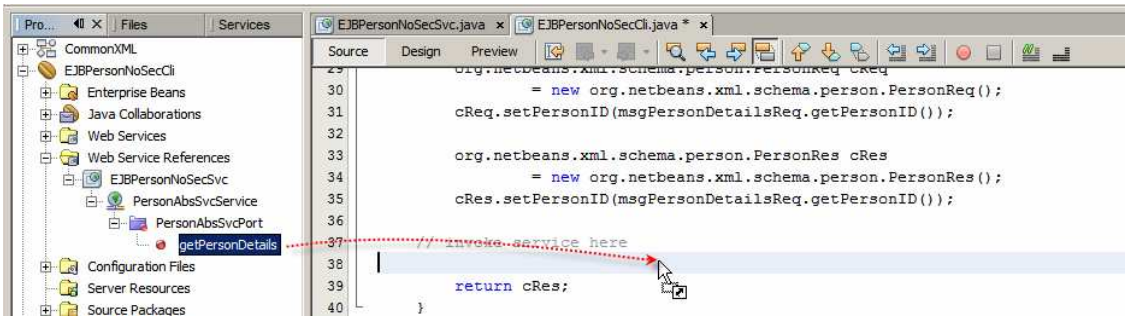
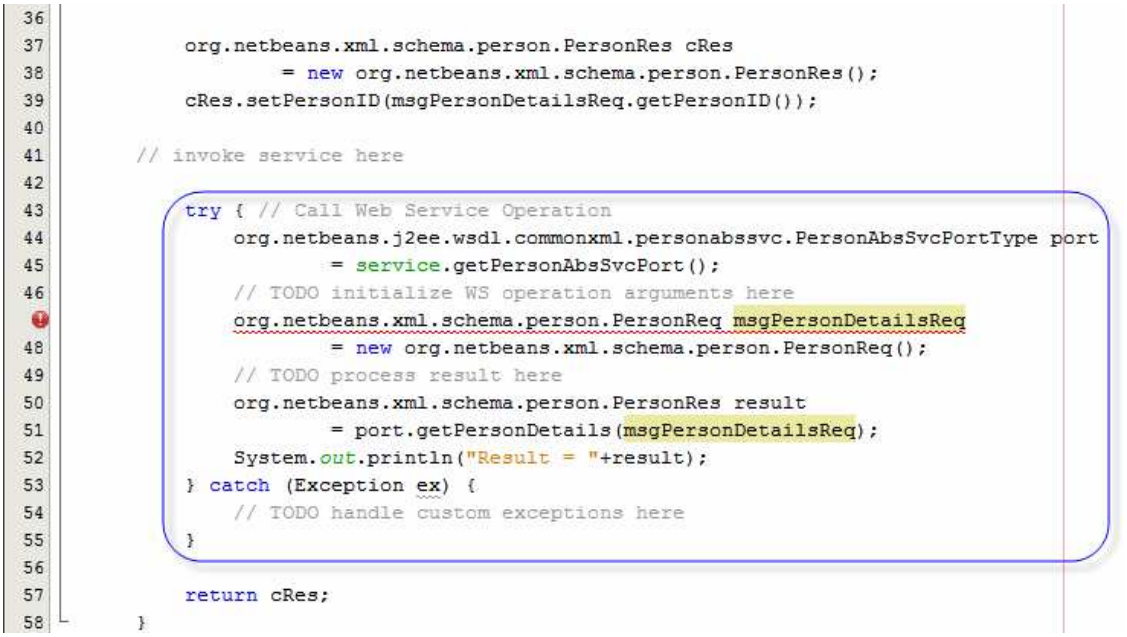


Figure 5.10.4 *Drag the service operation onto the source window*

The code fragment, which was generated by the NetBeans tooling, reformatted for better readability, is shown in Figure 5.10.5.



```
36
37          org.netbeans.xml.schema.person.PersonRes cRes
38                  = new org.netbeans.xml.schema.person.PersonRes();
39          cRes.setPersonID(msgPersonDetailsReq.getPersonID());
40
41      // invoke service here
42
43          try { // Call Web Service Operation
44              org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType port
45                      = service.getPersonAbsSvcPort();
46              // TODO initialize WS operation arguments here
                org.netbeans.xml.schema.person.PersonReq msgPersonDetailsReq
48                      = new org.netbeans.xml.schema.person.PersonReq();
49              // TODO process result here
50              org.netbeans.xml.schema.person.PersonRes result
51                      = port.getPersonDetails(msgPersonDetailsReq);
52              System.out.println("Result = "+result);
53          } catch (Exception ex) {
54              // TODO handle custom exceptions here
55          }
56
57          return cRes;
58      }
```

Figure 5.10.5 *Service invocation skeleton code*

Replace the lines inside the try { … } catch block with the code in Listing 5.10.3.

Listing 5.10.3 Code to invoke the service and process the reply

```
org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType port
        = service.getPersonAbsSvcPort();
org.netbeans.xml.schema.person.PersonRes result = port.getPersonDetails(cReq);

System.out.println("\n===>>> " + result.getFamilyName());

cRes.setFamilyName(result.getFamilyName());
cRes.setMiddleInitials(result.getMiddleInitials());
cRes.setGivenName(result.getGivenName());
cRes.setGender(result.getGender());

org.netbeans.xml.schema.person.PersonRes.AddressDetails cAddr
        = new org.netbeans.xml.schema.person.PersonRes.AddressDetails();
cAddr.setStreetAddress(result.getAddressDetails().getStreetAddress());
cAddr.setCityTown(result.getAddressDetails().getCityTown());
cAddr.setStateProvince(result.getAddressDetails().getStateProvince());
cAddr.setPostCode(result.getAddressDetails().getPostCode());
cAddr.setCountry(result.getAddressDetails().getCountry());
cRes.setAddressDetails(cAddr);

org.netbeans.xml.schema.person.PersonRes.CreditCardDetails cCard =
        new org.netbeans.xml.schema.person.PersonRes.CreditCardDetails();
cCard.setCardNumber(result.getCreditCardDetails().getCardNumber());
cCard.setCardType(result.getCreditCardDetails().getCardType());
cCard.setExpiryDate(result.getCreditCardDetails().getExpiryDate());
cCard.setSecurityCode(result.getCreditCardDetails().getSecurityCode());
cRes.setCreditCardDetails(cCard);
```

I will leave analysis of what this slab of code does to the reader. Suffices it to say that the new request, cReq, populated with the PersonID from the client, is submitted to the service and the response, cRes, is sued to populate the response of the client.

The resulting source is illustrated in Figure 5.10.6.

```
41      // invoke service here
42
43          try { // Call Web Service Operation
44              org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType port
45                      = service.getPersonAbsSvcPort();
46              org.netbeans.xml.schema.person.PersonRes result = port.getPersonDetails(cReq);
47
48              System.out.println("\n===>>> " + result.getFamilyName());
49
50              cRes.setFamilyName(result.getFamilyName());
51              cRes.setMiddleInitials(result.getMiddleInitials());
52              cRes.setGivenName(result.getGivenName());
53              cRes.setGender(result.getGender());
54
55              org.netbeans.xml.schema.person.PersonRes.AddressDetails cAddr
56                      = new org.netbeans.xml.schema.person.PersonRes.AddressDetails();
57              cAddr.setStreetAddress(result.getAddressDetails().getStreetAddress());
58              cAddr.setCityTown(result.getAddressDetails().getCityTown());
59              cAddr.setStateProvince(result.getAddressDetails().getStateProvince());
60              cAddr.setPostCode(result.getAddressDetails().getPostCode());
61              cAddr.setCountry(result.getAddressDetails().getCountry());
62              cRes.setAddressDetails(cAddr);
63
64              org.netbeans.xml.schema.person.PersonRes.CreditCardDetails cCard =
65                      new org.netbeans.xml.schema.person.PersonRes.CreditCardDetails();
66              cCard.setCardNumber(result.getCreditCardDetails().getCardNumber());
67              cCard.setCardType(result.getCreditCardDetails().getCardType());
68              cCard.setExpiryDate(result.getCreditCardDetails().getExpiryDate());
69              cCard.setSecurityCode(result.getCreditCardDetails().getSecurityCode());
70              cRes.setCreditCardDetails(cCard);
71          } catch (Exception ex) {
72              // TODO handle custom exceptions here
73          }
```

Figure 5.10.6 *Submit request and process response*

To complete client implementation let's replace the one line comment "// TODO handle …" with the slab of code shown in Listing 5.10.4, then right-click inside the source window and choose "Fix Imports".

Listing 5.10.4 Convert exception into a Fault

```
ex.printStackTrace();
String sFltMsg = ex.getMessage();
PersonFlt pFlt = new PersonFlt();
pFlt.setPersonID(msgPersonDetailsReq.getPersonID());
pFlt.setFaultDetail(sFltMsg);
org.netbeans.j2ee.wsdl.commonxml.triggercon.TriggerPersonFault sFlt
        = new org.netbeans.j2ee.wsdl.commonxml.triggercon.TriggerPersonFault
            (sFltMsg, pFlt);
throw sFlt;
```

Figure 5.10.7 shows the completed implementation code.

```
42      // invoke service here
43
44          try { // Call Web Service Operation
45              org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType port
46                      = service.getPersonAbsSvcPort();
47              org.netbeans.xml.schema.person.PersonRes result = port.getPersonDetails(cReq);
48
49              System.out.println("\n===>>> " + result.getFamilyName());
50
51              cRes.setFamilyName(result.getFamilyName());
52              cRes.setMiddleInitials(result.getMiddleInitials());
53              cRes.setGivenName(result.getGivenName());
54              cRes.setGender(result.getGender());
55
56              org.netbeans.xml.schema.person.PersonRes.AddressDetails cAddr
57                      = new org.netbeans.xml.schema.person.PersonRes.AddressDetails();
58              cAddr.setStreetAddress(result.getAddressDetails().getStreetAddress());
59              cAddr.setCityTown(result.getAddressDetails().getCityTown());
60              cAddr.setStateProvince(result.getAddressDetails().getStateProvince());
61              cAddr.setPostCode(result.getAddressDetails().getPostCode());
62              cAddr.setCountry(result.getAddressDetails().getCountry());
63              cRes.setAddressDetails(cAddr);
64
65              org.netbeans.xml.schema.person.PersonRes.CreditCardDetails cCard =
66                      new org.netbeans.xml.schema.person.PersonRes.CreditCardDetails();
67              cCard.setCardNumber(result.getCreditCardDetails().getCardNumber());
68              cCard.setCardType(result.getCreditCardDetails().getCardType());
69              cCard.setExpiryDate(result.getCreditCardDetails().getExpiryDate());
70              cCard.setSecurityCode(result.getCreditCardDetails().getSecurityCode());
71              cRes.setCreditCardDetails(cCard);
72          } catch (Exception ex) {
73              ex.printStackTrace();
74              String sFltMsg = ex.getMessage();
75              PersonFlt pFlt = new PersonFlt();
76              pFlt.setPersonID(msgPersonDetailsReq.getPersonID());
77              pFlt.setFaultDetail(sFltMsg);
78              org.netbeans.j2ee.wsdl.commonxml.triggercon.TriggerPersonFault sFlt
79                      = new org.netbeans.j2ee.wsdl.commonxml.triggercon.TriggerPersonFault
80                          (sFltMsg, pFlt);
81              throw sFlt;
82          }
83
84          return cRes;
```

Figure 5.10.7 *Client implementation*

Build and Deploy the project.

The web service client we just built is itself a web service. We designed this client in this way so that we can use the SoapUI plugin to invoke the client, rather then go to the trouble of working out how else to invoke it and to build the appropriate implementation.

To create a SopUI project we need a WSDL URL. Expand the Web Service node in the client project, right-click the web service name and choose Test Web Service, as illustrated in Figure 5.10.8.

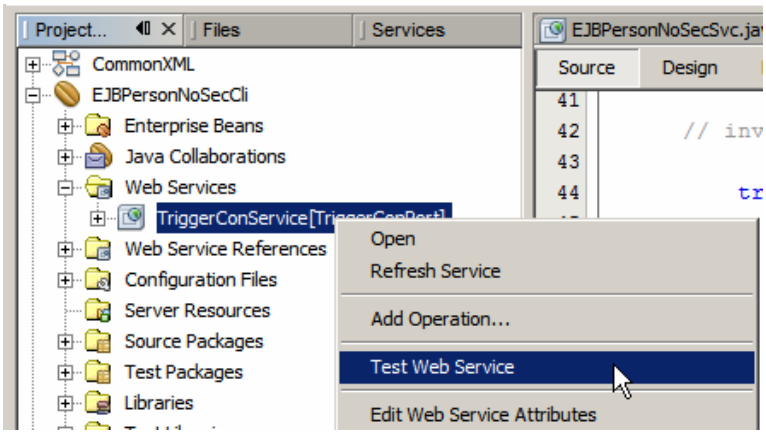


Figure 5.10.8 *Choose to test Web Service*

Once the web browser window opens with the test page, right-click the WSDL link and choose Copy Link Location, or equivalent. Figure 5.10.9 shows this in the Firefox web browser.

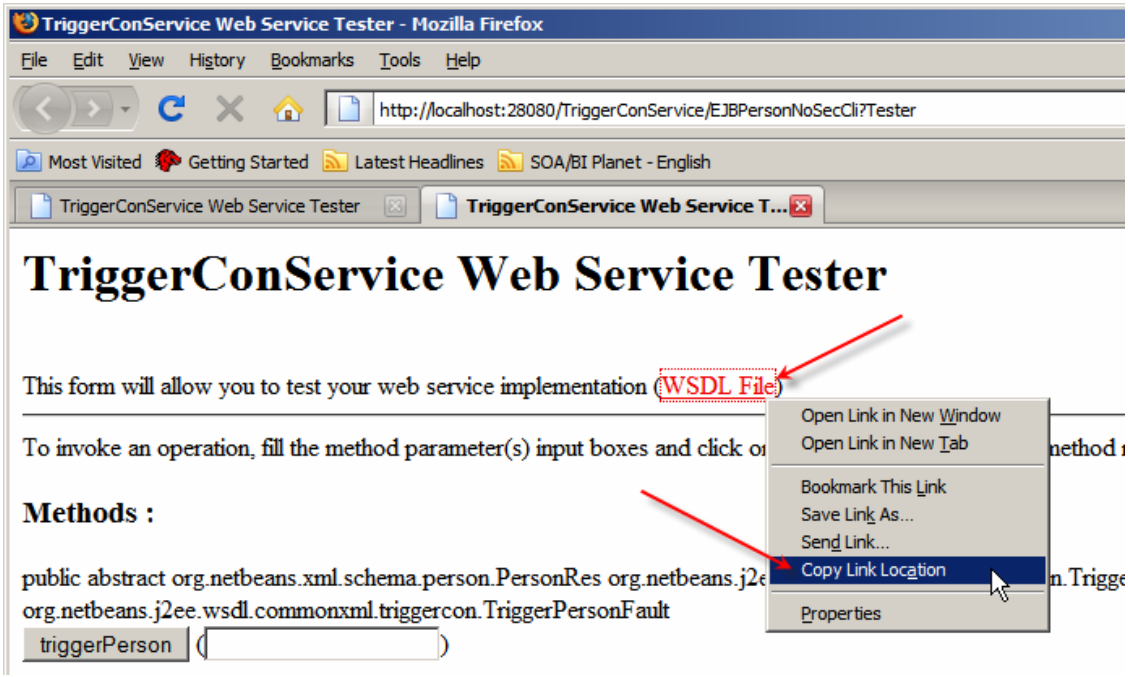


Figure 5.10.9 *Copy WSDL link location*

For me the URL will be:

```
http://localhost:28080/TriggerConService/EJBPersonNoSecCli?WSDL
```

Default port number is 8080. I changed mine to 28080.

We can not actually test this service through the web browser. The service expects a structured message, conforming to Person XML Schema. We would have to construct a XML instance document and paste it into the text box. Even if we did go to that trouble the XML text would

have gotten “escaped” by the form processor and the resulting message would have been garbled anyway.

As mentioned, we will use the SoapUI to trigger the client.

Create “New Project” -> “Java EE” -> “Web Service Testing Project”, named EJBPersonNoSecCli_WSTP (this assumes that the SoapUI plugin has been installed – if it has not then now is the time to obtain and install it). Use the WSDL URL just copied to the clipboard as the service URL. Figure 5.10.10 illustrates this step.

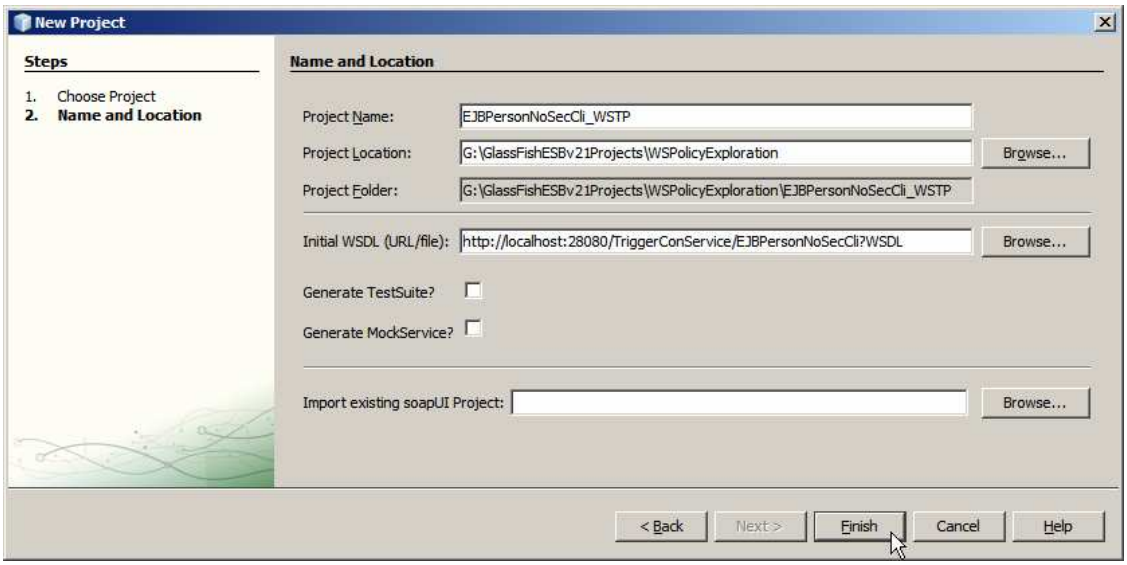


Figure 5.10.10 *Create new web service testing project*

Once the project is created expand the nodes, right-click the service operation and choose “New request”, as illustrated in Figure 5.10.11.

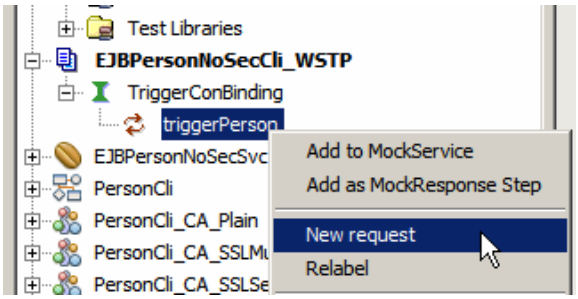


Figure 5.10.11 *Add new request*

Set PersonID to some favourite value and click the Submitt request “button”. This is illustrated in Figure 5.10.12.

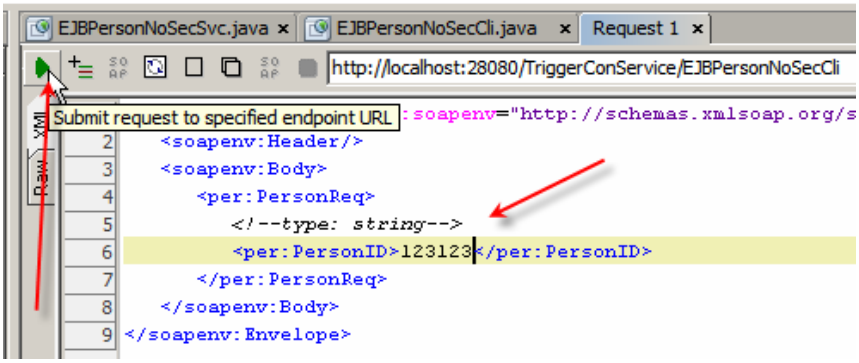


Figure 5.10.12 *Submit SOAP Request*

If all goes well, the service response will look similar to that shown in Figure 5.10.13.

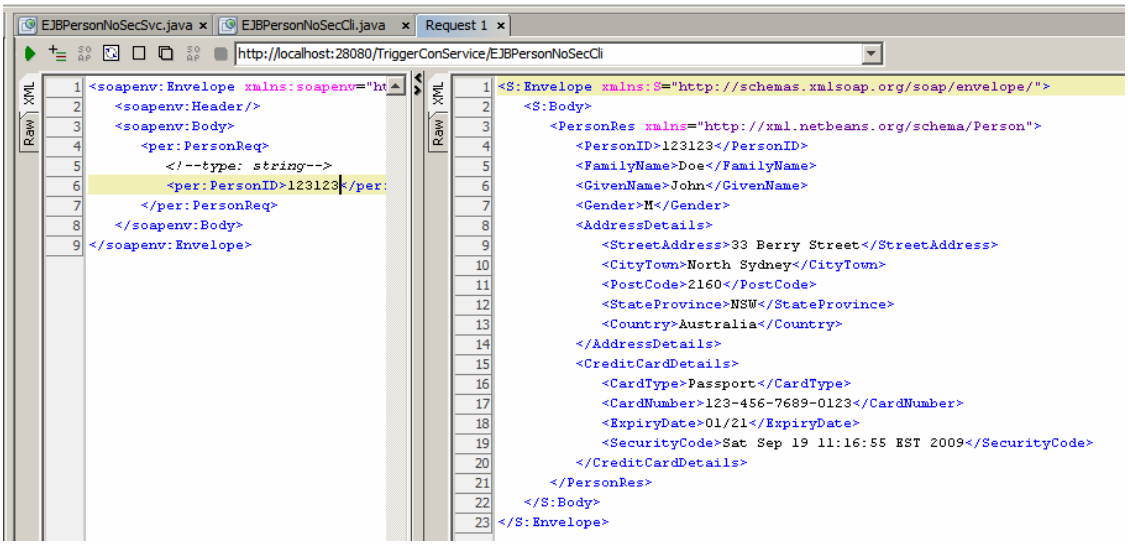


Figure 5.10.13 *Service Response*

To test exception processing in the client, undeploy the service and submit the request again. Figure 5.10.14 shows the Fault response.

Figure 5.10.14 *Fault response*

The service provider and the service consumer were implemented and exercised. This will help with the next section. Before going on let’s undeploy the client as well so that neuither the client nor the service are deployed.

5.11 EJB-based Person Svc with Server-side Authentication

In this section I will discuss how to configure SSL with Server-side Authentication for an EJB-based Web Service, using the "Interface First" programming model, though this equally applies to "Implementation First" programming model for EJB Web Services.

WS-Security Policy and Metro / WSIT are not used for this. A far as I can tell the EJB-based web service implementation, and the infrastructure that supports it, completely ignores the WS-Security Policy and Metro / WSIT policies relating to channel security – SSL / TLS, whether with Server-side or Mutual Authentication. This section is not, then, an exploration of security policy but an exploration of a practical implementation of SSL- / TLS-based channel security.

The security parameters, port, certificate alias, cryptographic suites, are configured in the GlassFish Application Server. Figures 5.11.1 and 5.11.2 show the areas of particular interest.

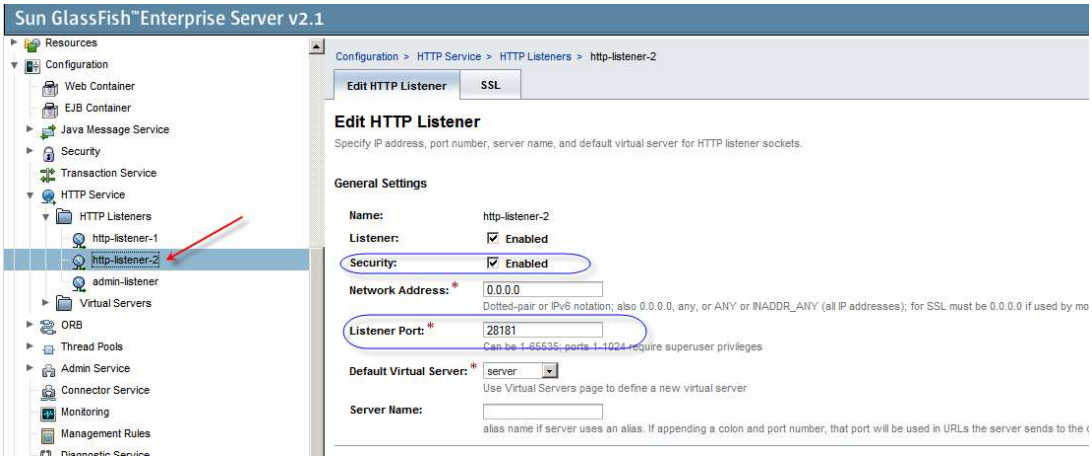


Figure 5.11.1 *http-listener-2 port configuration*

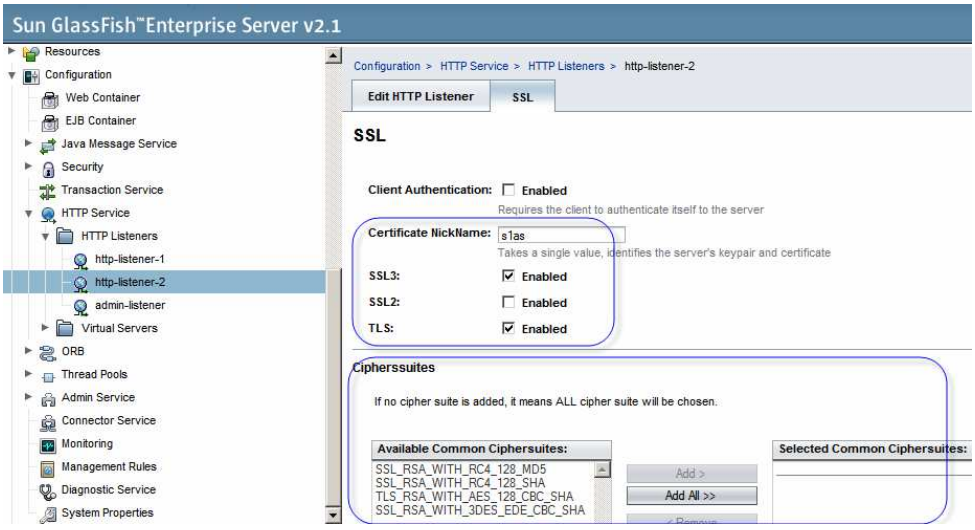


Figure 5.11.2 *SSL / TLS Configuration*

Unlike in the JBI world, where logic and policy can be separated into a BPLE Module and a Composite Application projects, with EJB-based Web Services a single project will implement both.

5.11.1 EJB-based Web Service Provider with Server-side Authentication

Click anywhere in the empty area of the Project Explorer and create “New Project” -> “Java EE” -> “EJB Module”. Name this module EJBPersonSSLServerAuthSvc and have it deploy to the remote GlassFish instance.

Right-click on the name of the new project. Choose “New” -> “Other” -> “Web Services” -> “Web Service From WSDL”. Name the service EJBPersonSSLServerAuthSvc, name the package pkg.EJBPersonSSLServerAuthSvc, browse to the CommonXML/PersonAbsSvc WSDL, select it and click Finish.

As the wizard completes a skeleton Java Source of the implementation class will appear in a window.

Replace the line containing the comment “// TO DO …” and the following line with the java statements shown in Listing 5.11.1.

Listing 5.10.1 *Method body*

```
PersonRes res = new PersonRes();
res.setPersonID(msgPersonDetailsReq.getPersonID());
res.setFamilyName("Doe");
res.setGivenName("John");
res.setGender("M");

PersonRes.AddressDetails addr = new PersonRes.AddressDetails();

addr.setStreetAddress("33 Berry Street");
addr.setCityTown("North Sydney");
addr.setStateProvince("NSW");
addr.setPostCode("2160");
addr.setCountry("Australia");
res.setAddressDetails(addr);

PersonRes.CreditCardDetails card = new PersonRes.CreditCardDetails();
card.setCardNumber("123-456-7689-0123");
card.setCardType("Passport");
card.setExpiryDate("01/21");
card.setSecurityCode("SecurityCode");
res.setCreditCardDetails(card);

return res;
```

The class implementation should look like that shown in Figure 5.11.3.

```
18  @WebService
19      (serviceName = "PersonAbsSvcService",
20      portName = "PersonAbsSvcPort",
21      endpointInterface = "org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType",
22      targetNamespace = "http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc",
23      wsdlLocation = "META-INF/wsdl/EJBPersonSSLServerAuthSvc/PersonAbsSvcWrapper.wsdl")
24  @Stateless
25  public class EJBPersonSSLServerAuthSvc implements PersonAbsSvcPortType {
26
27      public org.netbeans.xml.schema.person.PersonRes getPersonDetails
28              (org.netbeans.xml.schema.person.PersonReq msgPersonDetailsReq)
29                  throws GetPersonDetailsFault {
30          PersonRes res = new PersonRes();
31          res.setPersonID(msgPersonDetailsReq.getPersonID());
32          res.setFamilyName("Doe");
33          res.setGivenName("John");
34          res.setGender("M");
35
36          PersonRes.AddressDetails addr = new PersonRes.AddressDetails();
37
38          addr.setStreetAddress("33 Berry Street");
39          addr.setCityTown("North Sydney");
40          addr.setStateProvince("NSW");
41          addr.setPostCode("2160");
42          addr.setCountry("Australia");
43          res.setAddressDetails(addr);
44
45          PersonRes.CreditCardDetails card = new PersonRes.CreditCardDetails();
46          card.setCardNumber("123-456-7689-0123");
47          card.setCardType("Passport");
48          card.setExpiryDate("01/21");
49          card.setSecurityCode("SecurityCode");
50          res.setCreditCardDetails(card);
51
52          return res;
53      }
```

Figure 5.11.3 *Implementation code*

Move the "@Stateless" annotation from its location on line 23 to just before the "@WebService annotation". Figures 5.11.4 and 5.11.5 illustrate the "before" and "after" state.

```
17  */
18  @WebService
19      (serviceName = "PersonAbsSvcService",
20      portName = "PersonAbsSvcPort",
21      endpointInterface = "org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType",
22      targetNamespace = "http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc",
23      wsdlLocation = "META-INF/wsdl/EJBPersonSSLServerAuthSvc/PersonAbsSvcWrapper.wsdl")
24  @Stateless
25  public class EJBPersonSSLServerAuthSvc implements PersonAbsSvcPortType {
```

Figure 5.11.4 *"Before" state*

```
17  */
18  @Stateless
19  @WebService
20      (serviceName = "PersonAbsSvcService",
21      portName = "PersonAbsSvcPort",
22      endpointInterface = "org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType",
23      targetNamespace = "http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc",
24      wsdlLocation = "META-INF/wsdl/EJBPersonSSLServerAuthSvc/PersonAbsSvcWrapper.wsdl")
25  public class EJBPersonSSLServerAuthSvc implements PersonAbsSvcPortType {
26
```

Figure 5.11.5 *"After" state*

The empirical reason for this is that processing of the @WebService annotation before the @Stateless annotation generates code that ignores channel security.

Build the project.

Click on the "Configuration Files" folder to select it. Click on the drop down "File" NetBeans menu. Choose "New File" -> "Other" -> "Empty File". Figure 5.11.6 illustrates a step in this process.

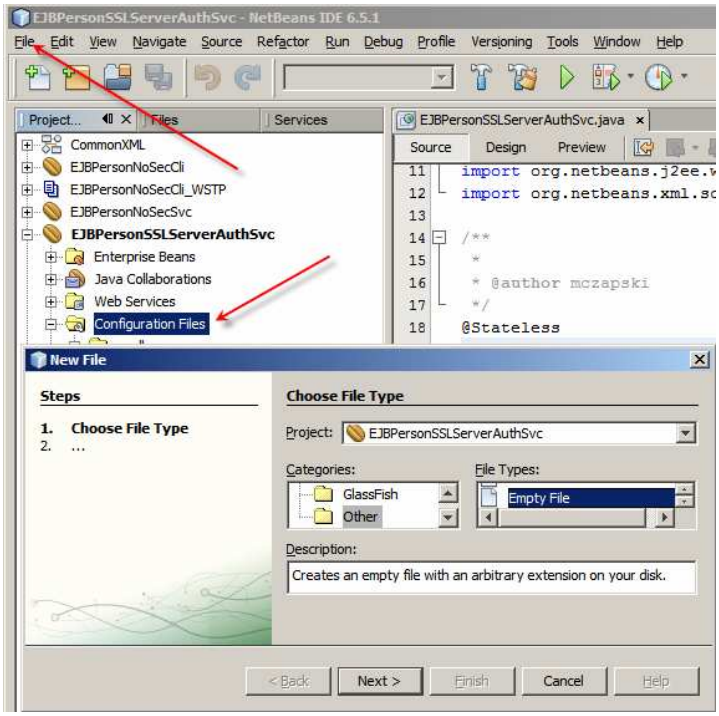


Figure 5.11.6 *Create Empty File in the Configuration Files folder*

Name the new file "sun-ejb-jar.xml".

Paste the XML content shown in Listing 5.10.2 into the sun-ejb-jar.xml.

Listing 5.11.2 *Content of the sun-ejb-jar.xml*

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE sun-ejb-jar PUBLIC '-//Sun Microsystems, Inc.//DTD
Application Server 9.0 EJB 3.0//EN'
'http://www.sun.com/software/appserver/dtds/sun-ejb-jar_3_0-0.dtd'>
<sun-ejb-jar>
    <enterprise-beans>
        <ejb>
            <ejb-name>EJBPersonSSLServerAuthSvc</ejb-name>
            <webservice-endpoint>
                <port-component-name>EJBPersonSSLServerAuthSvc</port-component-name>
                <transport-guarantee>CONFIDENTIAL</transport-guarantee>
            </webservice-endpoint>
        </ejb>
    </enterprise-beans>
```

```
</sun-ejb-jar>
```

This seems to be the standard way of requiring SSL-based channel security for EJB-based web endpoints deployed to the GlassFish Application Server. See http://java.sun.com/developer/EJTechTips/2006/tt0527.html for discussion. The ejb-name and port-component-name values are the name of the implementation class, EJBPersonSSLServerAuthSvc.

Save the project, Build and Deploy.

Expand the “Web Service” node, right click on the port name and choose “Test Web Service”.

When the Web Browser opens, with the web service tester URL, there will be an error message in the content windows. Figure 5.17.7 shows the error message in the Firefox browser.

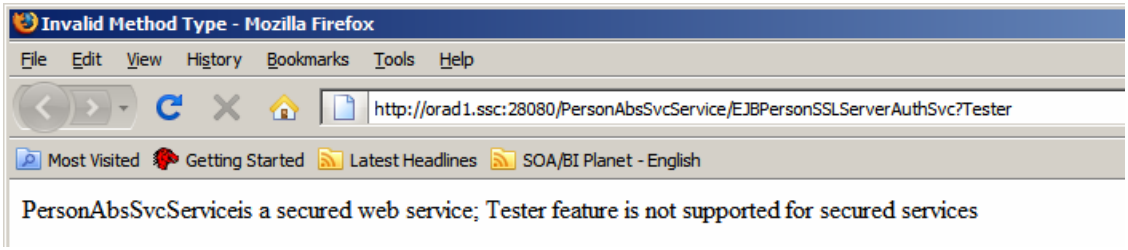


Figure 5.11.7 *Error invoking web service test functionality*

Clearly, there is no way to access the service over non-secure channel.

For me, because I don’t use default port numbers, the secure channel URL will be:

`https://orad1.ssc:28181/PersonAbsSvcService/EJBPersonSSLServerAuthSvc`

The default port number of the SSL-enabled listener will be 8181.

Let’s attempt to access the WSDL for this service using the following URL:

`https://orad1.ssc:28181/PersonAbsSvcService/EJBPersonSSLServerAuthSvc?WSDL`

Access succeeds. Figure 5.11.8 shows the WSDL in Firefox.

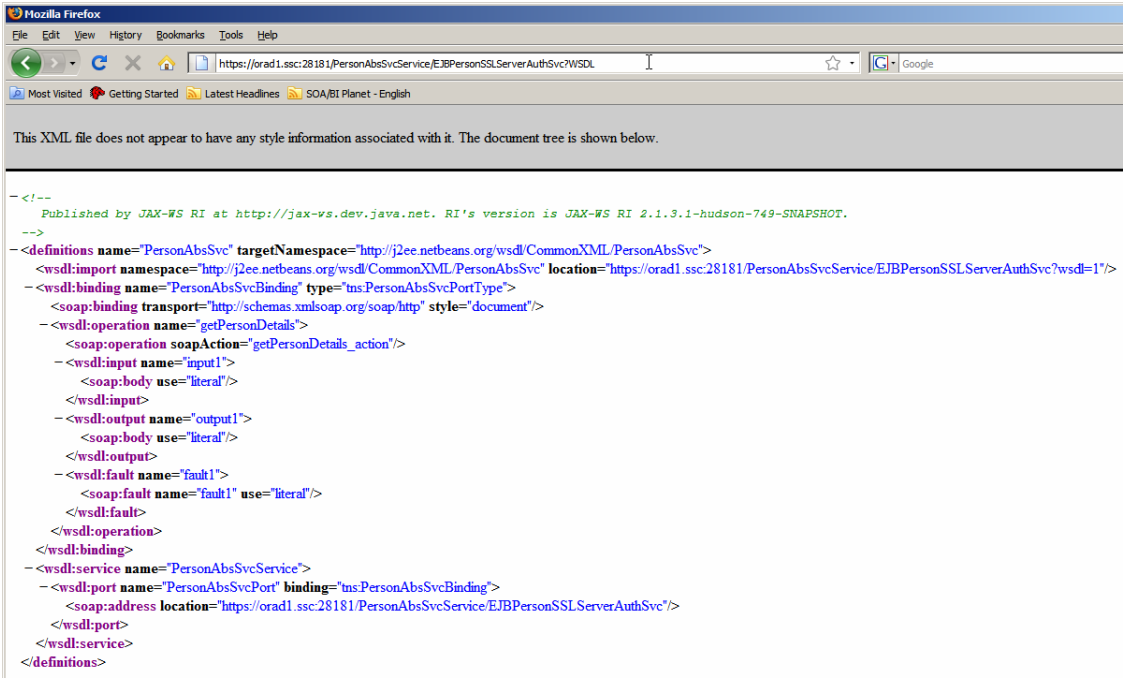


Figure 5.11.8 *WSDL obtained over the secure channel*

Let's now try to use the non-secure channel to get the WSDL. For me, the URL will be:

```
http://orad1.ssc:28080/PersonAbsSvcService/EJBPersonSSLServerAuthSvc?WSDL
```

Access will fail. The browser will show a blank page and the server.log will have a WARNING-level message:

```
[#|2009-09-19T11:46:16.556+1000|WARNING|sun-
appserver2.1|javax.enterprise.system.container.ejb|_ThreadID=30;_ThreadName=http
SSLWorkerThread-28080-2;_RequestID=b4cbae17-fdd9-4051-991b-71482e166246;|Invalid
request scheme for Endpoint EJBPersonSSLServerAuthSvc. Expected https . Received
http|#]
```

Let's now create a "New Project" -> "Java EE" -> "Web Service Testing Project", named EJBPersonSSLServerAuthSvc_WSTP. Use the secure WSDL URL, which for me will be:

```
https://orad1.ssc:28181/PersonAbsSvcService/EJBPersonSSLServerAuthSvc?WSDL
```

Create, populate and submit a SOAP request. Figure 5.11.9 illustrates the project and the request.

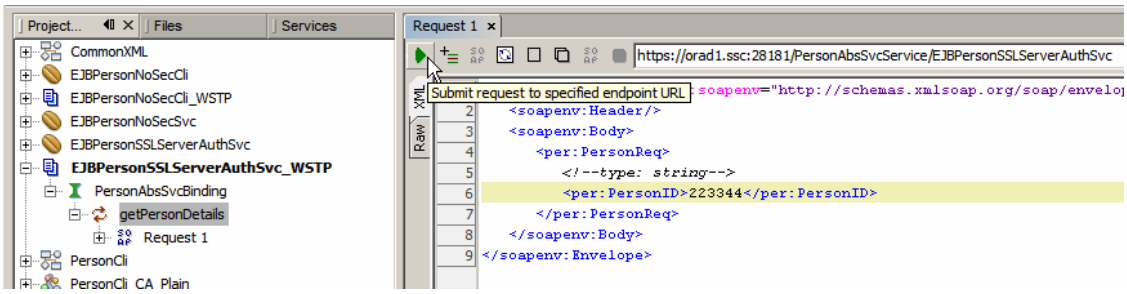


Figure 5.11.9 *Submit SOAP request*

Figure 5.11.10 shows the SOAP Response, the X.509 Certificate and the Crypto Suite, which was provided and negotiated by the GlassFish Application Server to the SoapUI client during the SSL Handshake.

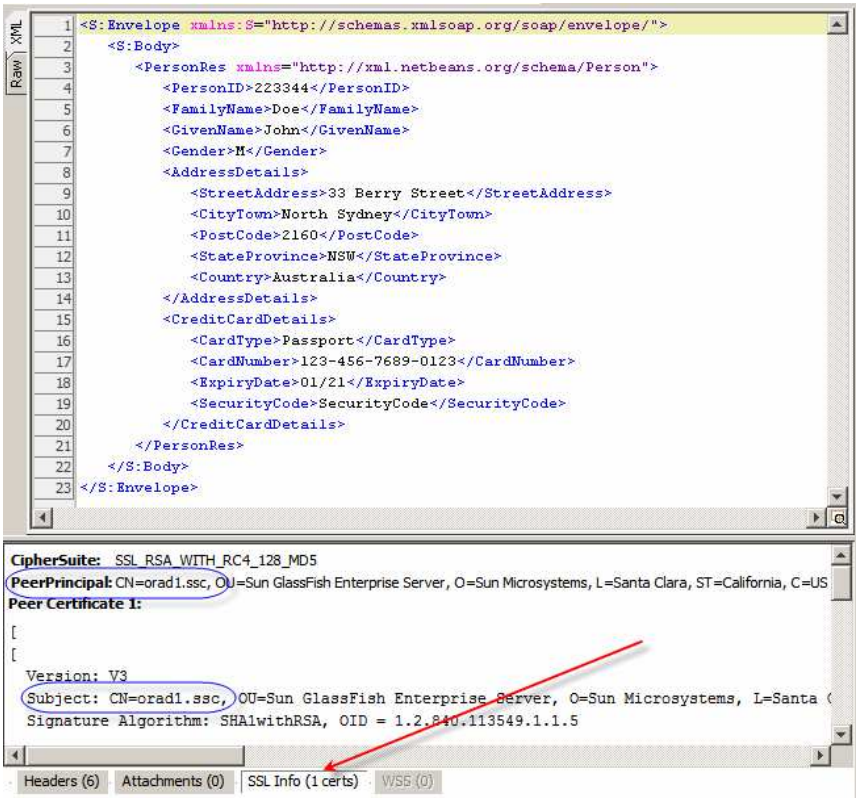


Figure 5.11.10 *SOAP Response and SSL information*

SSL Handshake can be logged to the server.log by adding "-Djavax.net.debug=ssl:handshake" to the GlassFish Application Server's JVM Options. Figure 5.8.1 illustrates this in the GlassFish Application Server Admin Console.

The web service, secured using SSL with Server-side Authentication, is operational. Let's see if we can access it using a non-secure URL, which for me would be:

`http://orad1.ssc:28080/PersonAbsSvcService/EJBPersonSSLServerAuthSvc`

Create a new SOAP Request in the EJBPersonSSLServerAuthSvc_WSTP project and change the endpoint URL to the non-secure one, as shown in Figure 5.11.11.

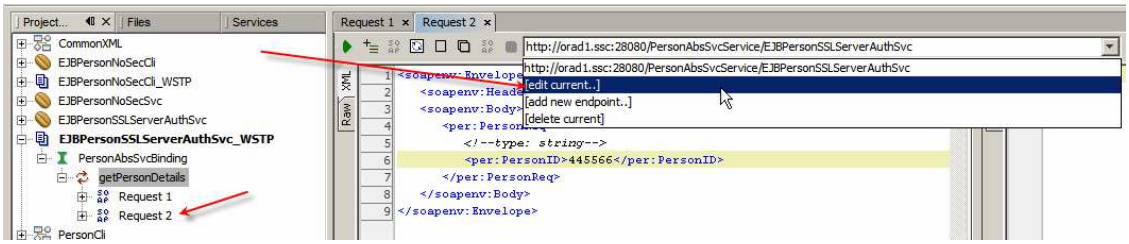


Figure 5.11.11 *Create a new request and "[edit current …]" endpoint URL*

Submit the request.

The SoapUI will give a blank response, which is perhaps misleading, and the server.log will show the, familiar by now, WARNING-level message:

```
[#|2009-09-19T11:55:18.389+1000|WARNING|sun-
appserver2.1|javax.enterprise.system.container.ejb|_ThreadID=31;_ThreadName=http
SSLWorkerThread-28080-3;_RequestID=92f0cc01-3b4e-4e89-8776-1ee02f2b5fac;|Invalid
request scheme for Endpoint EJBPersonSSLServerAuthSvc. Expected https . Received
http|#]
```

The web service endpoint is secured, using SSL with Server-side Authentication.

5.11.2 EJB-based Web Service Client with Server-side Authentication

Let's create an EJB-based web service client to exercise the service we just implemented.

Create a "New Project" -> "Java EE" -> "EJB Module", named EJBPersonSSLServerAuthCli, with the local GlassFish instance as the deployment target.

Create "New" -> "Web Service From WSDL", named EJBPersonSSLServerAuthCli, in package pkg.EJBPersonSSLServerAuthCli i, using WSDL from the CommonXML/TriggerCon.wsdl.

Create "New" -> "External WSDL Document(s)", using the service WSDL URL. For me this will be:

```
https://orad1.ssc:28181/PersonAbsSvcService/EJBPersonSSLServerAuthSvc?WSDL
```

Figure 5.11.12 shows the new WSDL in the project structure.

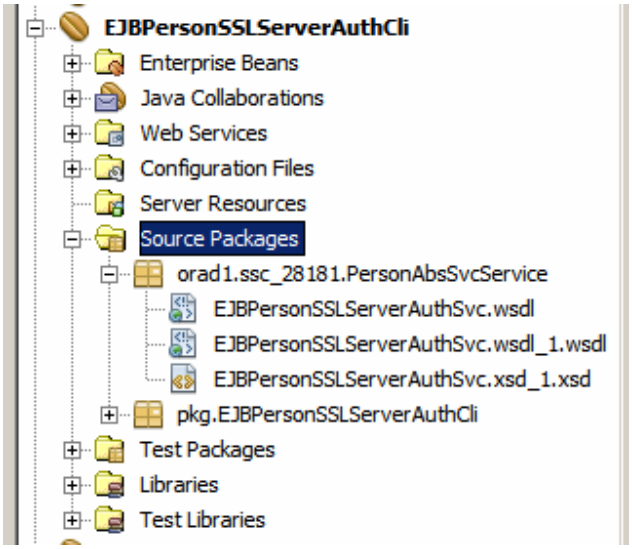


Figure 5.11.12 *WSDL I the project structure*

Create "New" -> "Web Service Client", click "Local File", Browse to the location of the WSDL EJBPersonSSLServerAuthSvc.wsdl and select it. Figure 5.11.13 illustrates this step.

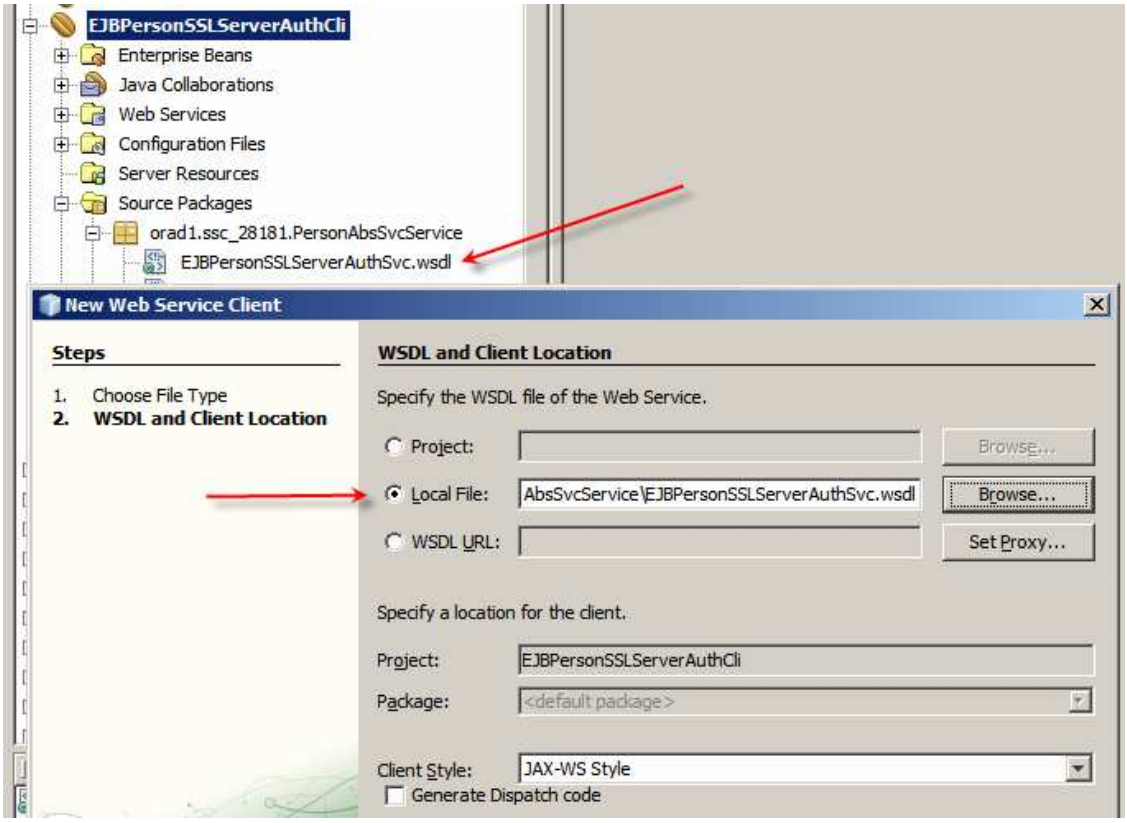


Figure 5.11.13 *Use WSDL in the local file*

Open the Java source of the client implementation, if not already open.

Replace the two lines of code, "//TODO …" and "throw new Unsupported…" with the code shown in Listing 5.11.3.

Listing 5.11.3 Replacement code

```
        org.netbeans.xml.schema.person.PersonReq cReq
                = new org.netbeans.xml.schema.person.PersonReq();
        cReq.setPersonID(msgPersonDetailsReq.getPersonID());

        org.netbeans.xml.schema.person.PersonRes cRes
                = new org.netbeans.xml.schema.person.PersonRes();
        cRes.setPersonID(msgPersonDetailsReq.getPersonID());

       // invoke service here

        return cRes;
```

The source, reformatted for better readability, is shown in Figure 5.11.14.

```
17  @WebService
18      (serviceName = "TriggerConService",
19      portName = "TriggerConPort",
20      endpointInterface = "org.netbeans.j2ee.wsdl.commonxml.triggercon.TriggerConPortType",
21      targetNamespace = "http://j2ee.netbeans.org/wsdl/CommonXML/TriggerCon",
22      wsdlLocation = "META-INF/wsdl/EJBPersonSSLServerAuthCli/TriggerCon.wsdl")
23  @Stateless
24  public class EJBPersonSSLServerAuthCli implements TriggerConPortType {
25
26      public org.netbeans.xml.schema.person.PersonRes triggerPerson
27              (org.netbeans.xml.schema.person.PersonReq msgPersonDetailsReq)
28                  throws TriggerPersonFault {
29          org.netbeans.xml.schema.person.PersonReq cReq
30                  = new org.netbeans.xml.schema.person.PersonReq();
31          cReq.setPersonID(msgPersonDetailsReq.getPersonID());
32
33          org.netbeans.xml.schema.person.PersonRes cRes
34                  = new org.netbeans.xml.schema.person.PersonRes();
35          cRes.setPersonID(msgPersonDetailsReq.getPersonID());
36
37      // invoke service here
38
39          return cRes;
40      }
```

Figure 5.11.14 *Client implementation code before service invocation is added*

Variables cReq and cRes will contain request to the service and response from the service respectively.

Expand Web Service References node all the way to the service operation and drag the service operation onto the source window following the comment "// invoke service here", as shown in Figure 5.11.15.

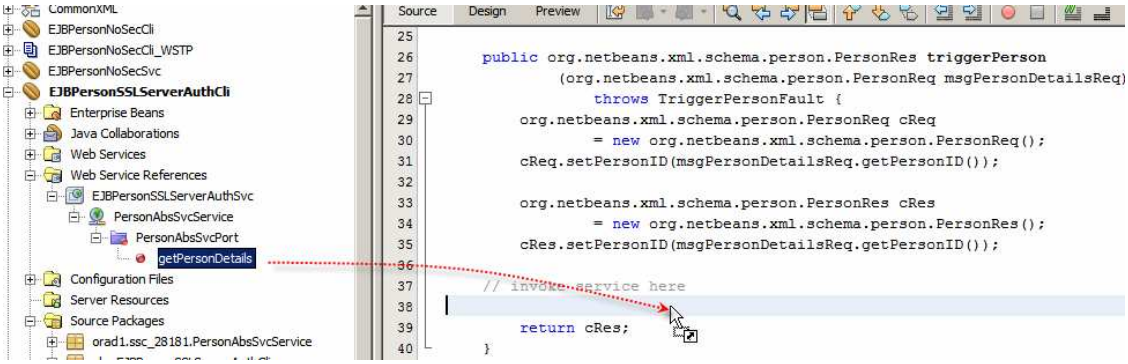


Figure 5.11.15 *Drag the service operation onto the source window*

The code fragment, which was generated by the NetBeans tooling, reformatted for better readability, is shown in Figure 5.11.16.

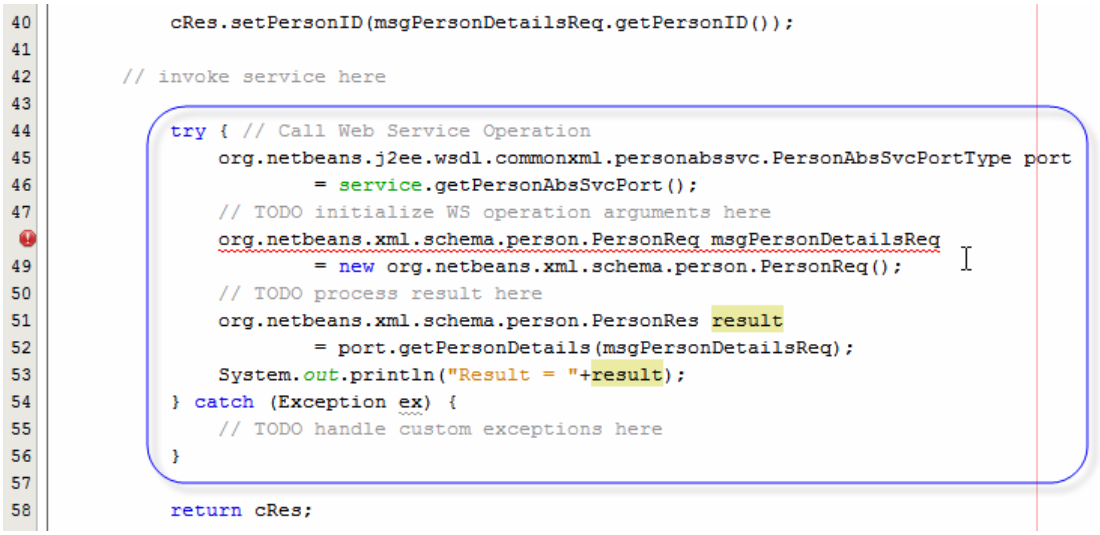


Figure 5.11.16 *Service invocation skeleton code*

Replace the lines inside the try { … } catch block with the code in Listing 5.11.4.

Listing 5.11.4 Code to invoke the service and process the reply

```
org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType port
        = service.getPersonAbsSvcPort();
org.netbeans.xml.schema.person.PersonRes result = port.getPersonDetails(cReq);

System.out.println("\n===>>> " + result.getFamilyName());

cRes.setFamilyName(result.getFamilyName());
cRes.setMiddleInitials(result.getMiddleInitials());
cRes.setGivenName(result.getGivenName());
cRes.setGender(result.getGender());

org.netbeans.xml.schema.person.PersonRes.AddressDetails cAddr
        = new org.netbeans.xml.schema.person.PersonRes.AddressDetails();
cAddr.setStreetAddress(result.getAddressDetails().getStreetAddress());
cAddr.setCityTown(result.getAddressDetails().getCityTown());
cAddr.setStateProvince(result.getAddressDetails().getStateProvince());
cAddr.setPostCode(result.getAddressDetails().getPostCode());
cAddr.setCountry(result.getAddressDetails().getCountry());
cRes.setAddressDetails(cAddr);

org.netbeans.xml.schema.person.PersonRes.CreditCardDetails cCard =
        new org.netbeans.xml.schema.person.PersonRes.CreditCardDetails();
cCard.setCardNumber(result.getCreditCardDetails().getCardNumber());
cCard.setCardType(result.getCreditCardDetails().getCardType());
cCard.setExpiryDate(result.getCreditCardDetails().getExpiryDate());
cCard.setSecurityCode(result.getCreditCardDetails().getSecurityCode());
cRes.setCreditCardDetails(cCard);
```

The new request, cReq, populated with the PersonID from the client, is submitted to the service and the response, cRes, is sued to populate the response of the client.

To complete client implementation let's replace the one line comment "// TODO handle …" with the slab of code shown in Listing 5.11.5, then right-click inside the source window and choose "Fix Imports".

Listing 5.11.5 Convert exception into a Fault

```
ex.printStackTrace();
String sFltMsg = ex.getMessage();
PersonFlt pFlt = new PersonFlt();
pFlt.setPersonID(msgPersonDetailsReq.getPersonID());
pFlt.setFaultDetail(sFltMsg);
org.netbeans.j2ee.wsdl.commonxml.triggercon.TriggerPersonFault sFlt =
null;
sFlt = new TriggerPersonFault(sFltMsg, pFlt);
throw sFlt;
```

Figure 5.11.17 shows the completed implementation code.

```
43      // invoke service here
44
45          try { // Call Web Service Operation
46              org.netbeans.j2ee.wsdl.commonxml.personabssvc.PersonAbsSvcPortType port
47                      = service.getPersonAbsSvcPort();
48              org.netbeans.xml.schema.person.PersonRes result = port.getPersonDetails(cReq);
49
50              System.out.println("\n===>>> " + result.getFamilyName());
51
52              cRes.setFamilyName(result.getFamilyName());
53              cRes.setMiddleInitials(result.getMiddleInitials());
54              cRes.setGivenName(result.getGivenName());
55              cRes.setGender(result.getGender());
56
57              org.netbeans.xml.schema.person.PersonRes.AddressDetails cAddr
58                      = new org.netbeans.xml.schema.person.PersonRes.AddressDetails();
59              cAddr.setStreetAddress(result.getAddressDetails().getStreetAddress());
60              cAddr.setCityTown(result.getAddressDetails().getCityTown());
61              cAddr.setStateProvince(result.getAddressDetails().getStateProvince());
62              cAddr.setPostCode(result.getAddressDetails().getPostCode());
63              cAddr.setCountry(result.getAddressDetails().getCountry());
64              cRes.setAddressDetails(cAddr);
65
66              org.netbeans.xml.schema.person.PersonRes.CreditCardDetails cCard =
67                      new org.netbeans.xml.schema.person.PersonRes.CreditCardDetails();
68              cCard.setCardNumber(result.getCreditCardDetails().getCardNumber());
69              cCard.setCardType(result.getCreditCardDetails().getCardType());
70              cCard.setExpiryDate(result.getCreditCardDetails().getExpiryDate());
71              cCard.setSecurityCode(result.getCreditCardDetails().getSecurityCode());
72              cRes.setCreditCardDetails(cCard);
73          } catch (Exception ex) {
74              ex.printStackTrace();
75              String sFltMsg = ex.getMessage();
76              PersonFlt pFlt = new PersonFlt();
77              pFlt.setPersonID(msgPersonDetailsReq.getPersonID());
78              pFlt.setFaultDetail(sFltMsg);
79              org.netbeans.j2ee.wsdl.commonxml.triggercon.TriggerPersonFault sFlt = null;
80              sFlt = new TriggerPersonFault(sFltMsg, pFlt);
81              throw sFlt;
82          }
```

Figure 5.11.17 *Client implementation*

Build and Deploy the project.

The web service client we just built is itself a web service. We designed this client in this way so that we can use the SoapUI plugin to invoke the client, rather then go to the trouble of working out how else to invoke it and to build the appropriate implementation.

To create a SopUI project we need a WSDL URL. Expand the Web Service node in the client project, right-click the web service name and choose Test Web Service.

Once the web browser window opens with the test page, right-click the WSDL link and choose Copy Link Location, or equivalent, to copy WSDL URL to the clipboard.

For me the URL will be:

`http://localhost:28080/TriggerConService/EJBPersonSSLServerAuthCli?WSDL`

Default port number is 8080. I changed mine to 28080.

We can not actually test this service through the web browser. The service expects a structured message, conforming to Person XML Schema. We would have to construct a XML instance document and paste it into the text box. Even if we did go to that trouble the XML text would have gotten “escaped” by the form processor and the resulting message would have been garbled anyway.

As mentioned, we will use the SoapUI to trigger the client.

Create “New Project” -> “Java EE” -> “Web Service Testing Project”, named EJBPersonSSLServerAuthCli_WSTP (this assumes that the SoapUI plugin has been installed – if it has not then now is the time to obtain and install it). Use the WSDL URL just copied to the clipboard as the service URL.

Once the project is created expand the nodes, right-click the service operation and choose “New request”.

Set PersonID to some favorite value and click the Submit request “button”.

If all goes well, the service response will look similar to that shown in Figure 5.11.18.

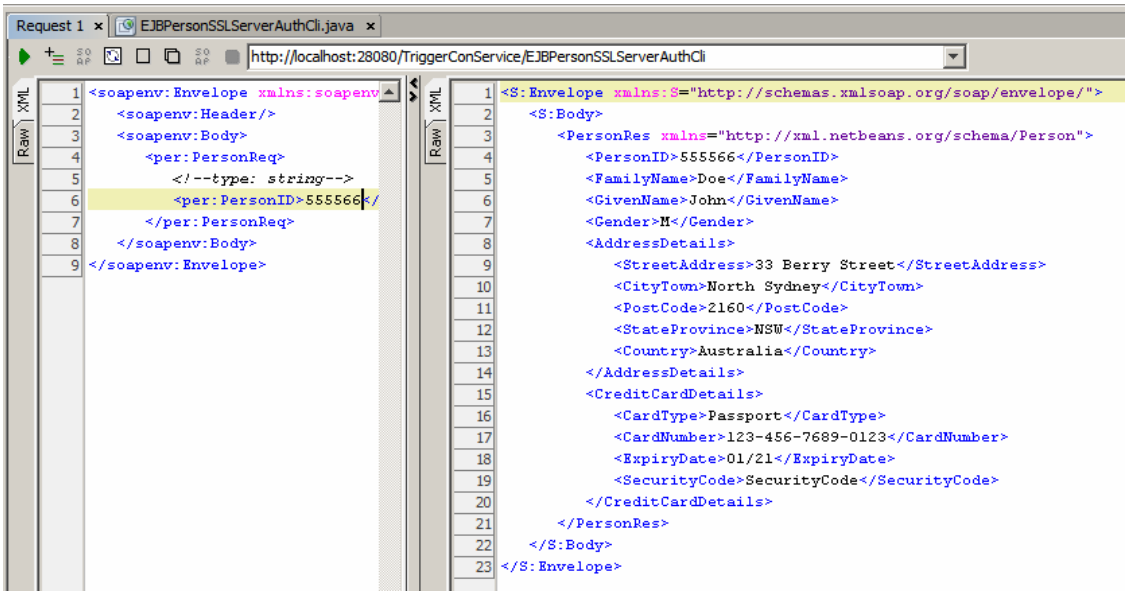


Figure 5.11.18 *Service Response*

The service provider and the service consumer, communicating over secure channel using SSL with Server-side Authentication, were implemented and exercised. We can no undeploy both the client and the server.

Inspection of server.log of the local GlassFish instance will show the client-side of the SSL Handshake. Inspection of the server.log of the remote GlassFish instance will show the server-side of the SSL Handshake. The traces are worth studying at leas once to see what a normal handshake looks like. Whenever there are issues with handshake, as might be the case when server certificate is not trusted or the partner can not agree on the appropriate cipher suite to use, the SSL handshake trace will be the first place to look to figure out who is objecting and to what they are objecting.

5.12 EJB-based Person Svc with Mutual Authentication

Implement the Web Services Provider, following the steps in Section 5.11.1. As you do, name the service EJBPersonSSLMututalAuthSvc, instead of EJBPersonSSSServerAuthSvc.

When you get to Listing 5.11.2, instead of pasting the XML markup from that listing paste the XML markup from Listing 5.12.1.

Listing 5.12.1 sun-ejb-jar.xml with Mutual Authentication requirement

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE sun-ejb-jar PUBLIC '-//Sun Microsystems, Inc.//DTD
Application Server 9.0 EJB 3.0//EN'
'http://www.sun.com/software/appserver/dtds/sun-ejb-jar_3_0-0.dtd'>
<sun-ejb-jar>
    <enterprise-beans>
        <ejb>
            <ejb-name>EJBPersonSSLMutualAuthSvc</ejb-name>
            <webservice-endpoint>
                <port-component-name>EJBPersonSSLMutualAuthSvc</port-component-name>
                 <login-config>
                   <auth-method>CLIENT-CERT</auth-method>
                   <realm>certificate</realm>
                 </login-config>
                <transport-guarantee>CONFIDENTIAL</transport-guarantee>
            </webservice-endpoint>
        </ejb>
    </enterprise-beans>
</sun-ejb-jar>
```

Stop once you have the project built and deployed.

Skip to Section 5.11.2 and follow the steps there to build the client for this service, making sure to name the client EJBPersonSSLMutualAuthCli

Once the SAOP Request is submitted and the response is received inspect the server.log on the client side to see the client view of the SSL Handshake. The handshake trace from my client, somewhat abbreviated, is shown in Listing 5.12.2. It can be seen that several handshakes were exchanged between the request being sent and the response being returned. This could be NetBeans being chatty about something or another.

Listing 5.12.2 Client-side SSL Handshake trace

```
[#|2009-09-19T17:02:23.968+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|============|#]
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% No cached client session|#]
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
```

***** ClientHello, TLSv1|#]**
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
RandomCookie: |#]
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|GMT: 1236500992 |#]
...
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Session ID: |#]
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|{}|#]
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
**Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]**
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Compression Methods: { |#]
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|0|#]
...
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Handshake, length = 73|#]
[#|2009-09-19T17:02:24.093+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: SSLv2 client hello message, length = 98|#]
[#|2009-09-19T17:02:24.375+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Handshake, length = 794|#]
[#|2009-09-19T17:02:24.375+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** ServerHello, TLSv1|#]
[#|2009-09-19T17:02:24.375+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
RandomCookie: |#]
[#|2009-09-19T17:02:24.375+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|GMT: 1236500992 |#]
[#|2009-09-19T17:02:24.375+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|bytes = { |#]
...
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Session ID: |#]

```
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|{74, 180, 130, 0, 143, 164, 242, 159, 60, 221, 46, 129, 114, 200, 246, 71, 14,
33, 39, 208, 85, 216, 218, 234, 12, 96, 86, 28, 68, 40, 236, 150}|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Compression Method: 0|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
***|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% Created:  [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
** SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** Certificate chain|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
chain [0] = [
[
  Version: V3
  Subject: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
102121541157065069575568250270437214984350336338157998094768569148500536018031894819145491
113311079336949399472032140208618356816163637202618727298710465300230334324506184949208474
446933178623253726110968175800084405517043740120715529443624373833850530287673442674333181
408072531272948503339758724948550982873
  public exponent: 65537
  Validity: [From: Sat Sep 05 13:48:28 EST 2009,
              To: Tue Sep 03 13:48:28 EST 2019]
  Issuer: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4aa1df8c]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 9E 79 9C E9 59 86 34 8F   FD 75 09 F7 82 D0 82 CE  .y..Y.4..u......
0010: BE 9A 44 EE                                        ..D.
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 23 A7 FD 51 1F 81 9E 8C   34 3A 58 01 EF 5A 04 CD  #..Q....4:X..Z..
0010: AD 35 2C 67 17 40 3A B8   EA 19 37 DB B2 B3 C8 EA  .5,g.@:...7.....
```

```
0020: 5B 4F 0E 30 4E 9D 42 23   52 FE E8 53 44 8B 64 21  [O.0N.B#R..SD.d!
0030: CF 5F EE 07 D5 60 1E F2   1B EA 68 99 E4 BB 6C 89  ._...`....h...l.
0040: 02 21 1D A5 AE 6C 26 14   8C 92 02 92 E3 C1 74 56  .!...l&.......tV
0050: 6A 69 96 8E 2D 1E 7D 6C   52 5E 99 38 20 8B 19 C4  ji..-..lR^.8 ...
0060: 52 11 89 B3 73 D0 6C 61   B2 DB BF CA 58 0A 3A 5D  R...s.la....X.:]
0070: 40 81 97 CC 3F 60 A6 1E   B5 D6 60 8A C6 6B B6 F6  @...?`....`..k..

]|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
***|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Found trusted certificate:|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
[
[
  Version: V3
  Subject: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
102121541157065069575568250270437214984350336338157998094768569148500536018031894819145491
113311079336949399472032140208618356816163637202618727298710465300230334324506184949208474
446933178623253726110968175800084405517043740120715529443624373833850530287673442674333181
408072531272948503339758724948550982873
  public exponent: 65537
  Validity: [From: Sat Sep 05 13:48:28 EST 2009,
              To: Tue Sep 03 13:48:28 EST 2019]
  Issuer: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4aa1df8c]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 9E 79 9C E9 59 86 34 8F   FD 75 09 F7 82 D0 82 CE  .y..Y.4..u......
0010: BE 9A 44 EE                                        ..D.
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 23 A7 FD 51 1F 81 9E 8C   34 3A 58 01 EF 5A 04 CD  #..Q....4:X..Z..
0010: AD 35 2C 67 17 40 3A B8   EA 19 37 DB B2 B3 C8 EA  .5,g.@:...7.....
0020: 5B 4F 0E 30 4E 9D 42 23   52 FE E8 53 44 8B 64 21  [O.0N.B#R..SD.d!
0030: CF 5F EE 07 D5 60 1E F2   1B EA 68 99 E4 BB 6C 89  ._...`....h...l.
0040: 02 21 1D A5 AE 6C 26 14   8C 92 02 92 E3 C1 74 56  .!...l&.......tV
0050: 6A 69 96 8E 2D 1E 7D 6C   52 5E 99 38 20 8B 19 C4  ji..-..lR^.8 ...
0060: 52 11 89 B3 73 D0 6C 61   B2 DB BF CA 58 0A 3A 5D  R...s.la....X.:]
0070: 40 81 97 CC 3F 60 A6 1E   B5 D6 60 8A C6 6B B6 F6  @...?`....`..k..

]|#]
[#|2009-09-19T17:02:24.390+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** ServerHelloDone|#]
```

```
[#|2009-09-19T17:02:24.406+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** ClientKeyExchange, RSA PreMasterSecret, TLSv1|#]
[#|2009-09-19T17:02:24.406+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Handshake, length = 134|#]
[#|2009-09-19T17:02:24.406+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
SESSION KEYGEN:|#]
[#|2009-09-19T17:02:24.406+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
PreMaster Secret:|#]
...
...
[#|2009-09-19T17:02:24.421+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|CONNECTION KEYGEN:|#]
[#|2009-09-19T17:02:24.421+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Client Nonce:|#]
[#|2009-09-19T17:02:24.421+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:24.421+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Server Nonce:|#]
[#|2009-09-19T17:02:24.421+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:24.421+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Master Secret:|#]
[#|2009-09-19T17:02:24.421+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Client MAC write Secret:|#]
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Server MAC write Secret:|#]
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
```

```
...
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Client write key:|#]
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Server write key:|#]
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
... no IV used for this cipher|#]
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Change Cipher Spec, length = 1|#]
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** Finished|#]
[#|2009-09-19T17:02:24.437+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
verify_data:  { |#]
...
[#|2009-09-19T17:02:24.453+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Handshake, length = 32|#]
[#|2009-09-19T17:02:24.703+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Change Cipher Spec, length = 1|#]
[#|2009-09-19T17:02:24.703+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Handshake, length = 32|#]
[#|2009-09-19T17:02:24.703+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** Finished|#]
[#|2009-09-19T17:02:24.703+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
verify_data:  { |#]
...
[#|2009-09-19T17:02:24.703+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% Cached client session: [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T17:02:24.718+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Application Data, length = 222|#]
```

```
[#|2009-09-19T17:02:24.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Application Data, length = 2056|#]
[#|2009-09-19T17:02:24.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, called close()|#]
[#|2009-09-19T17:02:24.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, called closeInternal(true)|#]
[#|2009-09-19T17:02:24.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3|#]
[#|2009-09-19T17:02:24.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|, SEND TLSv1 ALERT:  |#]
[#|2009-09-19T17:02:24.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|warning, |#]
[#|2009-09-19T17:02:24.828+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|description = close_notify|#]
[#|2009-09-19T17:02:24.828+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Alert, length = 18|#]
...
XML Request sent
...
[#|2009-09-19T17:02:24.984+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% Client cached [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T17:02:24.984+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% Try resuming [Session-1, SSL_RSA_WITH_RC4_128_MD5] from port 1481|#]
[#|2009-09-19T17:02:24.984+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** ClientHello, TLSv1|#]
[#|2009-09-19T17:02:24.984+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
RandomCookie:  |#]
[#|2009-09-19T17:02:24.984+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|GMT: 1236500992 |#]
[#|2009-09-19T17:02:24.984+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|bytes = { |#]
...
[#|2009-09-19T17:02:25.000+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Session ID:  |#]
[#|2009-09-19T17:02:25.000+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|{74, 180, 130, 0, 143, 164, 242, 159, 60, 221, 46, 129, 114, 200, 246, 71, 14,
33, 39, 208, 85, 216, 218, 234, 12, 96, 86, 28, 68, 40, 236, 150}|#]
```

```
[#|2009-09-19T17:02:25.000+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]
[#|2009-09-19T17:02:25.000+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Compression Methods:  { |#]
[#|2009-09-19T17:02:25.000+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|0|#]
...
[#|2009-09-19T17:02:25.000+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Handshake, length = 105|#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Handshake, length = 74|#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** ServerHello, TLSv1|#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
RandomCookie:  |#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|GMT: 1236500993 |#]
...
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Session ID:  |#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|{74, 180, 130, 0, 143, 164, 242, 159, 60, 221, 46, 129, 114, 200, 246, 71, 14,
33, 39, 208, 85, 216, 218, 234, 12, 96, 86, 28, 68, 40, 236, 150}|#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Compression Method: 0|#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
***|#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
CONNECTION KEYGEN:|#]
[#|2009-09-19T17:02:25.250+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
```

```
Client Nonce:|#]
...
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Server Nonce:|#]
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Master Secret:|#]
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Client MAC write Secret:|#]
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|Server MAC write Secret:|#]
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Client write key:|#]
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Server write key:|#]
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
... no IV used for this cipher|#]
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% Server resumed [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]
```

```
[#|2009-09-19T17:02:25.265+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Change Cipher Spec, length = 1|#]
[#|2009-09-19T17:02:25.281+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Handshake, length = 32|#]
[#|2009-09-19T17:02:25.281+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** Finished|#]
[#|2009-09-19T17:02:25.281+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
verify_data:  { |#]
...
[#|2009-09-19T17:02:25.281+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Change Cipher Spec, length = 1|#]
[#|2009-09-19T17:02:25.281+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** Finished|#]
[#|2009-09-19T17:02:25.281+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
verify_data:  { |#]
...
[#|2009-09-19T17:02:25.281+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Handshake, length = 32|#]
[#|2009-09-19T17:02:25.281+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Application Data, length = 369|#]
[#|2009-09-19T17:02:25.281+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Application Data, length = 227|#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Handshake, length = 20|#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** HelloRequest (empty)|#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% Client cached [Session-1, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% Try resuming [Session-1, SSL_RSA_WITH_RC4_128_MD5] from port 1481|#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** ClientHello, TLSv1|#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
```

```
RandomCookie:  |#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|GMT: 1236500993 |#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|bytes = { |#]
...
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Session ID:  |#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|{74, 180, 130, 0, 143, 164, 242, 159, 60, 221, 46, 129, 114, 200, 246, 71, 14,
33, 39, 208, 85, 216, 218, 234, 12, 96, 86, 28, 68, 40, 236, 150}|#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Compression Methods:  { |#]
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|0|#]
...
[#|2009-09-19T17:02:25.578+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Handshake, length = 121|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Handshake, length = 6007|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** ServerHello, TLSv1|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
RandomCookie:  |#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|GMT: 1236500993 |#]
...
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Session ID:  |#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|{74, 180, 130, 1, 45, 141, 239, 238, 97, 61, 122, 55, 157, 168, 211, 13, 52,
40, 234, 35, 145, 230, 94, 127, 56, 108, 221, 85, 144, 175, 198, 155}|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
```

```
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Compression Method: 0|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
***|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% Created:  [Session-2, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
** SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** Certificate chain|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
chain [0] = [
[
  Version: V3
  Subject: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
102121541157065069575568250270437214984350336338157998094768569148500536018031894819145491
113311079336949399472032140208618356816163637202618727298710465300230334324506184949208474
446933178623253726110968175800084405517043740120715529443624373833850530287673442674333181
408072531272948503339758724948550982873
  public exponent: 65537
  Validity: [From: Sat Sep 05 13:48:28 EST 2009,
              To: Tue Sep 03 13:48:28 EST 2019]
  Issuer: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4aa1df8c]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 9E 79 9C E9 59 86 34 8F   FD 75 09 F7 82 D0 82 CE  .y..Y.4..u......
0010: BE 9A 44 EE                                        ..D.
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 23 A7 FD 51 1F 81 9E 8C   34 3A 58 01 EF 5A 04 CD  #..Q....4:X..Z..
0010: AD 35 2C 67 17 40 3A B8   EA 19 37 DB B2 B3 C8 EA  .5,g.@:...7.....
0020: 5B 4F 0E 30 4E 9D 42 23   52 FE E8 53 44 8B 64 21  [O.0N.B#R..SD.d!
0030: CF 5F EE 07 D5 60 1E F2   1B EA 68 99 E4 BB 6C 89  ._...`....h...l.
0040: 02 21 1D A5 AE 6C 26 14   8C 92 02 92 E3 C1 74 56  .!...l&.......tV
0050: 6A 69 96 8E 2D 1E 7D 6C   52 5E 99 38 20 8B 19 C4  ji..-..lR^.8 ...
0060: 52 11 89 B3 73 D0 6C 61   B2 DB BF CA 58 0A 3A 5D  R...s.la....X.:]
0070: 40 81 97 CC 3F 60 A6 1E   B5 D6 60 8A C6 6B B6 F6  @...?`....`..k..
```

```
]|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
***|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID                    hre
ad-28080-3;|
Found trusted certificate:|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
[
[
  Version: V3
  Subject: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
102121541157065069575568250270437214984350336338157998094768569148500536018031894819145491
113311079336949399472032140208618356816163637202618727298710465300230334324506184949208474
446933178623253726110968175800084405517043740120715529443624373833850530287673442674333181
408072531272948503339758724948550982873
  public exponent: 65537
  Validity: [From: Sat Sep 05 13:48:28 EST 2009,
              To: Tue Sep 03 13:48:28 EST 2019]
  Issuer: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4aa1df8c]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 9E 79 9C E9 59 86 34 8F   FD 75 09 F7 82 D0 82 CE  .y..Y.4..u......
0010: BE 9A 44 EE                                        ..D.
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 23 A7 FD 51 1F 81 9E 8C   34 3A 58 01 EF 5A 04 CD  #..Q....4:X..Z..
0010: AD 35 2C 67 17 40 3A B8   EA 19 37 DB B2 B3 C8 EA  .5,g.@:...7.....
0020: 5B 4F 0E 30 4E 9D 42 23   52 FE E8 53 44 8B 64 21  [O.0N.B#R..SD.d!
0030: CF 5F EE 07 D5 60 1E F2   1B EA 68 99 E4 BB 6C 89  ._...`....h...l.
0040: 02 21 1D A5 AE 6C 26 14   8C 92 02 92 E3 C1 74 56  .!...l&.......tV
0050: 6A 69 96 8E 2D 1E 7D 6C   52 5E 99 38 20 8B 19 C4  ji..-..lR^.8 ...
0060: 52 11 89 B3 73 D0 6C 61   B2 DB BF CA 58 0A 3A 5D  R...s.la....X.:]
0070: 40 81 97 CC 3F 60 A6 1E   B5 D6 60 8A C6 6B B6 F6  @...?`....`..k..

]|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** CertificateRequest|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Cert Types: |#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|RSA|#]
```

Server Certificate
Remote GlassFish Instance

```
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|, |#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|DSS|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Cert Authorities:|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
<OU=Equifax Secure Certificate Authority, O=Equifax, C=US|#]
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_Threa                    orkerThre
ad-28080-3;|
<OU=Starfield Class 2 Certification Authority, O="Starfield Technologies, Inc.", C=US>|#]
...
[#|2009-09-19T17:02:25.781+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
<CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US>|#]
...
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
<EMAILADDRESS=info@valicert.com, CN=http://www.valicert.com/, OU=ValiCert Class 2 Policy
Validation Authority, O="ValiCert, Inc.", L=ValiCert Validation Network>|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** ServerHelloDone|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
matching alias: s1as|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** Certificate chain|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
chain [0] = [
[
  Version: V3
  Subject: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
174610285967130076929433670401931369979056104274821726926658341672478078515143944746448169
889789628870976561651451419582037703705467095772563333561120698881935934497528631786042457
419154290859213666928038322102378930220861799398920406847727491559386649134967663405597793
770279369602066470786819069250405750121
  public exponent: 65537
  Validity: [From: Wed Sep 02 16:05:22 EST 2009,
              To: Sat Aug 31 16:05:22 EST 2019]
  Issuer: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  SerialNumber: [    4a9e0b22]
```

Client Certificate
Local GlassFish Instance

```
Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: F1 9E 66 16 11 83 58 9B   B7 1F 3E 8B BE 44 43 4D  ..f...X...>..DCM
0010: A8 BA 92 12                                        ....
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: DA 7B E3 80 06 24 01 A1   59 7D 97 BB 26 C7 3D BF  .....$..Y...&.=.
0010: B2 17 97 83 71 38 95 FA   DD 0E D8 A7 B7 E4 03 66  ....q8.........f
0020: 17 A7 69 89 5F 54 FD 96   22 BE 92 DE D0 C3 98 90  ..i._T.."....... 
0030: 22 B1 6A FE CE 38 9C 00   AD A7 3A 28 21 10 62 BE  ".j..8....:(!.b.
0040: 1D A9 58 B3 DA CE 3C 30   D0 7C 67 F3 CE 98 21 8A  ..X...<0..g...!.
0050: 62 A8 3B 88 ED 5C 6F 0F   C6 11 A0 0C 64 2E F1 13  b.;..\o.....d...
0060: 06 D1 A6 74 9B 63 81 56   DB 60 EE 22 92 A8 38 09  ...t.c.V.`."..8.
0070: B8 76 17 59 C0 5E 01 17   D3 AE AC 8F A2 61 48 4C  .v.Y.^.......aHL

]|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
***|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** ClientKeyExchange, RSA PreMasterSecret, TLSv1|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Handshake, length = 882|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
SESSION KEYGEN:|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
PreMaster Secret:|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
CONNECTION KEYGEN:|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Client Nonce:|#]
[#|2009-09-19T17:02:25.796+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|Server Nonce:|#]
```

```
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Master Secret:|#]
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Client MAC write Secret:|#]
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
..
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Server MAC write Secret:|#]
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
..
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Client write key:|#]
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
..
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
Server write key:|#]
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
0000: |#]
...
[#|2009-09-19T17:02:25.812+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
... no IV used for this cipher|#]
[#|2009-09-19T17:02:25.843+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** CertificateVerify|#]
[#|2009-09-19T17:02:25.843+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Handshake, length = 150|#]
[#|2009-09-19T17:02:25.843+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
```

```
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Change Cipher Spec, length = 17|#]
[#|2009-09-19T17:02:25.843+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** Finished|#]
[#|2009-09-19T17:02:25.843+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
verify_data:  { |#]
...
[#|2009-09-19T17:02:25.843+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, WRITE: TLSv1 Handshake, length = 32|#]
[#|2009-09-19T17:02:26.062+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Change Cipher Spec, length = 17|#]
[#|2009-09-19T17:02:26.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Handshake, length = 32|#]
[#|2009-09-19T17:02:26.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
*** Finished|#]
[#|2009-09-19T17:02:26.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
verify_data:  { |#]
...
[#|2009-09-19T17:02:26.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
%% Cached client session: [Session-2, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T17:02:26.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
httpSSLWorkerThread-28080-3, READ: TLSv1 Application Data, length = 870|#]
[#|2009-09-19T17:02:26.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
---[HTTP response 200]---|#]
[#|2009-09-19T17:02:26.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=71;_ThreadName=httpSSLWorkerThre
ad-28080-3;|
null: HTTP/1.1 200 OK|#]
```

...

XML Response from the server

...

```
[#|2009-09-19T17:02:36.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=72;_ThreadName=Keep-Alive-
Timer;|
Keep-Alive-Timer, called close()|#]
[#|2009-09-19T17:02:36.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=72;_ThreadName=Keep-Alive-
Timer;|
Keep-Alive-Timer, called closeInternal(true)|#]
[#|2009-09-19T17:02:36.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=72;_ThreadName=Keep-Alive-
Timer;|
Keep-Alive-Timer|#]
```

```
[#|2009-09-19T17:02:36.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=72;_ThreadName=Keep-Alive-
Timer;|, SEND TLSv1 ALERT:  |#]
[#|2009-09-19T17:02:36.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=72;_ThreadName=Keep-Alive-
Timer;|warning, |#]
[#|2009-09-19T17:02:36.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=72;_ThreadName=Keep-Alive-
Timer;|description = close_notify|#]
[#|2009-09-19T17:02:36.078+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=72;_ThreadName=Keep-Alive-
Timer;|
Keep-Alive-Timer, WRITE: TLSv1 Alert, length = 18|#]
```

Looking at the server-side, remote GlassFish instance's server.log we an exchange involving both the server and the client certificates. Listing 5.12.3 is the abbreviated server.log transcript.

Listing 5.12.3 Transcript of server.log with server-side SSL Handshake

```
[#|2009-09-19T17:02:25.431+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
***|#]
[#|2009-09-19T17:02:25.435+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
%% Invalidated:  [Session-20, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T17:02:25.435+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
*** HelloRequest (empty)|#]
[#|2009-09-19T17:02:25.435+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, WRITE: TLSv1 Handshake, length = 20|#]
[#|2009-09-19T17:02:25.704+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, READ: TLSv1 Handshake, length = 121|#]
[#|2009-09-19T17:02:25.704+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
*** ClientHello, TLSv1|#]
[#|2009-09-19T17:02:25.704+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
RandomCookie:  |#]
[#|2009-09-19T17:02:25.704+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|GMT: 1236500993 |#]
...
[#|2009-09-19T17:02:25.708+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Session ID:  |#]
[#|2009-09-19T17:02:25.708+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|{74, 180, 130, 0, 143, 164, 242, 159, 60, 221, 46, 129, 114, 200, 246, 71, 14,
33, 39, 208, 85, 216, 218, 234, 12, 96, 86, 28, 68, 40, 236, 150}|#]
[#|2009-09-19T17:02:25.708+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
```

Cipher Suites: [SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA,
TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,
SSL_RSA_WITH_DES_CBC_SHA, SSL_DHE_RSA_WITH_DES_CBC_SHA, SSL_DHE_DSS_WITH_DES_CBC_SHA,
SSL_RSA_EXPORT_WITH_RC4_40_MD5, SSL_RSA_EXPORT_WITH_DES40_CBC_SHA,
SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA, SSL_DHE_DSS_EXPORT_WITH_DES40_CBC_SHA]|#]
[#|2009-09-19T17:02:25.708+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Compression Methods: { |#]
[#|2009-09-19T17:02:25.708+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|0|#]
[#|2009-09-19T17:02:25.708+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;| }|#]
[#|2009-09-19T17:02:25.708+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
***|#]
[#|2009-09-19T17:02:25.709+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
%% Created: [Session-21, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T17:02:25.709+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
**** ServerHello, TLSv1|#]**
[#|2009-09-19T17:02:25.709+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
RandomCookie: |#]
...
[#|2009-09-19T17:02:25.712+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Session ID: |#]
[#|2009-09-19T17:02:25.712+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|{74, 180, 130, 1, 45, 141, 239, 238, 97, 61, 122, 55, 157, 168, 211, 13, 52,
40, 234, 35, 145, 230, 94, 127, 56, 108, 221, 85, 144, 175, 198, 155}|#]
[#|2009-09-19T17:02:25.712+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-19T17:02:25.712+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Compression Method: 0|#]
[#|2009-09-19T17:02:25.712+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
***|#]
[#|2009-09-19T17:02:25.713+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Cipher suite: SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-19T17:02:25.713+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
**** Certificate chain|#]**
[#|2009-09-19T17:02:25.714+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|

```
chain [0] = [
[
  Version: V3
  Subject: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
102121541157065069575568250270437214984350336338157998094768569148500536018031894819145491
113311079336949399472032140208618356816163637202618727298710465300230334324506184949208474
446933178623253726110968175800084405517043740120715529443624373833850530287673442674333181
408072531272948503339758724948550982873
  public exponent: 65537
  Validity: [From: Sat Sep 05 13:48:28 EST 2009,
              To: Tue Sep 03 13:48:28 EST 2019]
  Issuer: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4aa1df8c]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 9E 79 9C E9 59 86 34 8F   FD 75 09 F7 82 D0 82 CE  .y..Y.4..u......
0010: BE 9A 44 EE                                        ..D.
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 23 A7 FD 51 1F 81 9E 8C   34 3A 58 01 EF 5A 04 CD  #..Q....4:X..Z..
0010: AD 35 2C 67 17 40 3A B8   EA 19 37 DB B2 B3 C8 EA  .5,g.@:...7.....
0020: 5B 4F 0E 30 4E 9D 42 23   52 FE E8 53 44 8B 64 21  [O.0N.B#R..SD.d!
0030: CF 5F EE 07 D5 60 1E F2   1B EA 68 99 E4 BB 6C 89  ._...`....h...l.
0040: 02 21 1D A5 AE 6C 26 14   8C 92 02 92 E3 C1 74 56  .!...l&.......tV
0050: 6A 69 96 8E 2D 1E 7D 6C   52 5E 99 38 20 8B 19 C4  ji..-..lR^.8 ...
0060: 52 11 89 B3 73 D0 6C 61   B2 DB BF CA 58 0A 3A 5D  R...s.la....X.:]
0070: 40 81 97 CC 3F 60 A6 1E   B5 D6 60 8A C6 6B B6 F6  @...?`....`..k..

]|#]
[#|2009-09-19T17:02:25.714+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
***|#]
[#|2009-09-19T17:02:25.717+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
*** CertificateRequest|#]
[#|2009-09-19T17:02:25.717+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Cert Types: |#]
[#|2009-09-19T17:02:25.717+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|RSA|#]
[#|2009-09-19T17:02:25.717+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|, |#]
[#|2009-09-19T17:02:25.717+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|DSS|#]
```

Ask for client certificate

```
[#|2009-09-19T17:02:25.718+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Cert Authorities:|#]
[#|2009-09-19T17:02:25.718+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
<OU=Equifax Secure Certificate Authority, O=Equifax, C=US>|#]
...
[#|2009-09-19T17:02:25.723+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
<CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US>|#]
...
[#|2009-09-19T17:02:25.726+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
<CN=VeriSign Class 3 Public Primary Certification Authority - G3, OU="(c) 1999 VeriSign,
Inc. - For authorized use only", OU=VeriSign Trust Network, O="VeriSign, Inc.", C=US>|#]
[#|2009-09-19T17:02:25.760+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
<EMAILADDRESS=info@valicert.com, CN=http://www.valicert.com/, OU=ValiCert Class 2 Policy
Validation Authority, O="ValiCert, Inc.", L=ValiCert Validation Network>|#]
[#|2009-09-19T17:02:25.761+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
*** ServerHelloDone|#]
[#|2009-09-19T17:02:25.762+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, WRITE: TLSv1 Handshake, length = 6007|#]
[#|2009-09-19T17:02:25.971+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, READ: TLSv1 Handshake, length = 882|#]
[#|2009-09-19T17:02:25.971+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
*** Certificate chain|#]
[#|2009-09-19T17:02:26.007+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
chain [0] = [
[
  Version: V3
  Subject: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
174610285967130076929433670401931369979056104274821726926658341672478078515143944746448169
889789628870976561651451419582037703705467095772563333561120698881935934497528631786042457
419154290859213666928038322102378930220861799398920406847727491559386649134967663405597793
770279369602066470786819069250405750121
  public exponent: 65537
  Validity: [From: Wed Sep 02 16:05:22 EST 2009,
              To: Sat Aug 31 16:05:22 EST 2019]
  Issuer: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  SerialNumber: [    4a9e0b22]

Certificate Extensions: 1
```

Receive and validate client certificate

```
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: F1 9E 66 16 11 83 58 9B   B7 1F 3E 8B BE 44 43 4D  ..f...X...>..DCM
0010: A8 BA 92 12                                        ....
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: DA 7B E3 80 06 24 01 A1   59 7D 97 BB 26 C7 3D BF  .....$..Y...&.=.
0010: B2 17 97 83 71 38 95 FA   DD 0E D8 A7 B7 E4 03 66  ....q8.........f
0020: 17 A7 69 89 5F 54 FD 96   22 BE 92 DE D0 C3 98 90  ..i._T..".......
0030: 22 B1 6A FE CE 38 9C 00   AD A7 3A 28 21 10 62 BE  ".j..8....:(!.b.
0040: 1D A9 58 B3 DA CE 3C 30   D0 7C 67 F3 CE 98 21 8A  ..X...<0..g...!.
0050: 62 A8 3B 88 ED 5C 6F 0F   C6 11 A0 0C 64 2E F1 13  b.;..\o.....d...
0060: 06 D1 A6 74 9B 63 81 56   DB 60 EE 22 92 A8 38 09  ...t.c.V.`."..8.
0070: B8 76 17 59 C0 5E 01 17   D3 AE AC 8F A2 61 48 4C  .v.Y.^.......aHL

]|#]
[#|2009-09-19T17:02:26.007+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
***|#]
[#|2009-09-19T17:02:26.029+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Found trusted certificate:|#]
[#|2009-09-19T17:02:26.030+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
[
[
  Version: V3
  Subject: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
174610285967130076929433670401931369979056104274821726926658341672478078515143944746448169
889789628870976561651451419582037703705467095772563333561120698881935934497528631786042457
419154290859213666928038322102378930220861799398920406847727491559386649134967663405597793
770279369602066470786819069250405750121
  public exponent: 65537
  Validity: [From: Wed Sep 02 16:05:22 EST 2009,
              To: Sat Aug 31 16:05:22 EST 2019]
  Issuer: CN=mcz02.aus.sun.com, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems,
L=Santa Clara, ST=California, C=US
  SerialNumber: [    4a9e0b22]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: F1 9E 66 16 11 83 58 9B   B7 1F 3E 8B BE 44 43 4D  ..f...X...>..DCM
0010: A8 BA 92 12                                        ....
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: DA 7B E3 80 06 24 01 A1   59 7D 97 BB 26 C7 3D BF  .....$..Y...&.=.
```

I am happy with the client certificate

```
0010: B2 17 97 83 71 38 95 FA   DD 0E D8 A7 B7 E4 03 66  ....q8.........f
0020: 17 A7 69 89 5F 54 FD 96   22 BE 92 DE D0 C3 98 90  ..i._T..".......
0030: 22 B1 6A FE CE 38 9C 00   AD A7 3A 28 21 10 62 BE  ".j..8....:(!.b.
0040: 1D A9 58 B3 DA CE 3C 30   D0 7C 67 F3 CE 98 21 8A  ..X...<0..g...!.
0050: 62 A8 3B 88 ED 5C 6F 0F   C6 11 A0 0C 64 2E F1 13  b.;..\o.....d...
0060: 06 D1 A6 74 9B 63 81 56   DB 60 EE 22 92 A8 38 09  ...t.c.V.`."..8.
0070: B8 76 17 59 C0 5E 01 17   D3 AE AC 8F A2 61 48 4C  .v.Y.^.......aHL

]|#]
[#|2009-09-19T17:02:26.033+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
*** ClientKeyExchange, RSA PreMasterSecret, TLSv1|#]
[#|2009-09-19T17:02:26.033+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
SESSION KEYGEN:|#]
[#|2009-09-19T17:02:26.033+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
PreMaster Secret:|#]
...
[#|2009-09-19T17:02:26.040+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
CONNECTION KEYGEN:|#]
[#|2009-09-19T17:02:26.040+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Client Nonce:|#]
...
[#|2009-09-19T17:02:26.043+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|Server Nonce:|#]
...
[#|2009-09-19T17:02:26.047+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Master Secret:|#]
...
[#|2009-09-19T17:02:26.052+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Client MAC write Secret:|#]
...
[#|2009-09-19T17:02:26.054+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Server MAC write Secret:|#]
...
[#|2009-09-19T17:02:26.056+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Client write key:|#]
...
[#|2009-09-19T17:02:26.058+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
Server write key:|#]
...
[#|2009-09-19T17:02:26.059+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
... no IV used for this cipher|#]
```

```
[#|2009-09-19T17:02:26.060+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, READ: TLSv1 Handshake, length = 150|#]
[#|2009-09-19T17:02:26.061+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
*** CertificateVerify|#]
[#|2009-09-19T17:02:26.062+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, READ: TLSv1 Change Cipher Spec, length = 17|#]
[#|2009-09-19T17:02:26.062+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, READ: TLSv1 Handshake, length = 32|#]
[#|2009-09-19T17:02:26.062+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
*** Finished|#]
[#|2009-09-19T17:02:26.062+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
verify_data:  { |#]
...
[#|2009-09-19T17:02:26.064+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, WRITE: TLSv1 Change Cipher Spec, length = 17|#]
[#|2009-09-19T17:02:26.064+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
*** Finished|#]
[#|2009-09-19T17:02:26.064+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
verify_data:  { |#]
...
[#|2009-09-19T17:02:26.066+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, WRITE: TLSv1 Handshake, length = 32|#]
[#|2009-09-19T17:02:26.066+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
%% Cached server session: [Session-21, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T17:02:26.090+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
---[HTTP request]---|#]
...
produce response
...
[#|2009-09-19T17:02:26.117+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
---[HTTP response 200]---|#]
[#|2009-09-19T17:02:26.117+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
<?xml version="1.0" ?><S:Envelope
xmlns:S="http://schemas.xmlsoap.org/soap/envelope/"><S:Body><PersonRes
xmlns="http://xml.netbeans.org/schema/Person"><PersonID>67876</PersonID><FamilyName>Doe</F
amilyName><GivenName>John</GivenName><Gender>M</Gender><AddressDetails><StreetAddress>33
Berry Street</StreetAddress><CityTown>North
```

```
Sydney</CityTown><PostCode>2160</PostCode><StateProvince>NSW</StateProvince><Country>Austr
alia</Country></AddressDetails><CreditCardDetails><CardType>Passport</CardType><CardNumber
>123-456-7689-
0123</CardNumber><ExpiryDate>01/21</ExpiryDate><SecurityCode>SecurityCode</SecurityCode></
CreditCardDetails></PersonRes></S:Body></S:Envelope>|#]
...
[#|2009-09-19T17:02:26.118+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=46;_ThreadName=httpSSLWorkerThre
ad-28181-2;|
httpSSLWorkerThread-28181-2, WRITE: TLSv1 Application Data, length = 854|#]
[#|2009-09-19T17:02:36.193+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|
httpSSLWorkerThread-28181-0, READ: TLSv1 Alert, length = 18|#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|
httpSSLWorkerThread-28181-0|#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|, RECV TLSv1 ALERT:  |#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|warning, |#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|close_notify|#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|
httpSSLWorkerThread-28181-0, closeInboundInternal()|#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|
httpSSLWorkerThread-28181-0, closeOutboundInternal()|#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|
httpSSLWorkerThread-28181-0|#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|, SEND TLSv1 ALERT:  |#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|warning, |#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|description = close_notify|#]
[#|2009-09-19T17:02:36.194+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=43;_ThreadName=httpSSLWorkerThre
ad-28181-0;|
httpSSLWorkerThread-28181-0, WRITE: TLSv1 Alert, length = 18|#]
```

The Client and Server communicated over a secure channel using SSL with Mutual Authentication. The server provided its X.509 Certificate to the client and requested the client to provide its X.509 Certificate back. Server and client validated each other's certificates.

Let's remove the client's certificate from the server's cacerts.jks truststore and submit the request. The SSL Handshake fails. The client receives a Fault, shown in Figure 5.12.1.

Figure 5.12.1 *SOAP Fault on SSL Handshake failure – not particularly enlightening*

Listing 5.12.4 shows the fragment of the server.log at the client side – as far as the client is concerned the server simply dropped the connection – this is deliberately not very enlightening to the client since any indication of what might have gone wrong might help a potential attacker.

Listing 5.12.4 Client-side failed handshake log

```
[#|2009-09-19T23:48:57.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|... no IV used for this cipher|#]
[#|2009-09-19T23:48:57.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2, WRITE: TLSv1 Change Cipher Spec, length = 17|#]
[#|2009-09-19T23:48:57.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
*** Finished|#]
[#|2009-09-19T23:48:57.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
verify_data:  { |#]
…
[#|2009-09-19T23:48:57.890+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2, WRITE: TLSv1 Handshake, length = 32|#]
 [#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2, received EOFException: ignored|#]
 [#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2, called closeInternal(false)|#]
[#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2|#]
[#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|, SEND TLSv1 ALERT:  |#]
[#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|warning, |#]
```

```
[#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|description = close_notify|#]
[#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2, WRITE: TLSv1 Alert, length = 18|#]
[#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2, called close()|#]
[#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2, called closeInternal(true)|#]
[#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2, called close()|#]
[#|2009-09-19T23:48:58.171+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;|
httpSSLWorkerThread-28080-2, called closeInternal(true)|#]
[#|2009-09-19T23:48:58.171+1000|WARNING|sun-
appserver2.1|javax.enterprise.system.stream.err|_ThreadID=73;_ThreadName=httpSSLWorkerThre
ad-28080-2;_RequestID=062f4dfb-54ab-4465-bec9-2d56a3a58bfd;|
javax.xml.ws.WebServiceException: java.net.SocketException: Unexpected end of file from
server
        at
com.sun.xml.ws.transport.http.client.HttpClientTransport.checkResponseCode(HttpClientTrans
port.java:238)
        at
com.sun.xml.ws.transport.http.client.HttpTransportPipe.process(HttpTransportPipe.java:151)
        at
com.sun.xml.ws.transport.http.client.HttpTransportPipe.processRequest(HttpTransportPipe.ja
va:88)
        at com.sun.xml.ws.api.pipe.Fiber.__doRun(Fiber.java:595)
        at com.sun.xml.ws.api.pipe.Fiber._doRun(Fiber.java:554)
        at com.sun.xml.ws.api.pipe.Fiber.doRun(Fiber.java:539)
```

Listing 5.12.5 shows the SSL Handshake failure at the server side. The handshake proceeds as normal until the server requests client's certificate. It does not get one. It tries to validate the certificate and fails. On failure it abort SSL Handshake.

Listing 5.12.5 Handshake failure at the server side

```
…
[#|2009-09-19T23:48:58.008+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
Session ID:  |#]
[#|2009-09-19T23:48:58.009+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|{74, 180, 225, 74, 185, 10, 114, 127, 188, 253, 132, 18, 240, 40, 62, 214,
109, 234, 13, 198, 51, 207, 105, 149, 16, 97, 123, 117, 240, 157, 161, 240}|#]
[#|2009-09-19T23:48:58.009+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
Cipher Suite: SSL_RSA_WITH_RC4_128_MD5|#]
```

```
[#|2009-09-19T23:48:58.009+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
Compression Method: 0|#]
[#|2009-09-19T23:48:58.009+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
***|#]
[#|2009-09-19T23:48:58.009+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
Cipher suite:  SSL_RSA_WITH_RC4_128_MD5|#]
[#|2009-09-19T23:48:58.009+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
*** Certificate chain|#]
[#|2009-09-19T23:48:58.011+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
chain [0] = [
[
  Version: V3
  Subject: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  Signature Algorithm: SHA1withRSA, OID = 1.2.840.113549.1.1.5

  Key:  Sun RSA public key, 1024 bits
  modulus:
102121541157065069575568250270437214984350336338157998094768569148500536018031894819145491
113311079336949399472032140208618356816163637202618727298710465300230334324506184949208474
446933178623253726110968175800084405517043740120715529443624373833850530287673442674333181
408072531272948503339758724948550982873
  public exponent: 65537
  Validity: [From: Sat Sep 05 13:48:28 EST 2009,
              To: Tue Sep 03 13:48:28 EST 2019]
  Issuer: CN=orad1.ssc, OU=Sun GlassFish Enterprise Server, O=Sun Microsystems, L=Santa
Clara, ST=California, C=US
  SerialNumber: [    4aa1df8c]

Certificate Extensions: 1
[1]: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 9E 79 9C E9 59 86 34 8F   FD 75 09 F7 82 D0 82 CE  .y..Y.4..u......
0010: BE 9A 44 EE                                        ..D.
]
]

]
  Algorithm: [SHA1withRSA]
  Signature:
0000: 23 A7 FD 51 1F 81 9E 8C   34 3A 58 01 EF 5A 04 CD  #..Q....4:X..Z..
0010: AD 35 2C 67 17 40 3A B8   EA 19 37 DB B2 B3 C8 EA  .5,g.@:...7.....
0020: 5B 4F 0E 30 4E 9D 42 23   52 FE E8 53 44 8B 64 21  [O.0N.B#R..SD.d!
0030: CF 5F EE 07 D5 60 1E F2   1B EA 68 99 E4 BB 6C 89  ._...`....h...l.
0040: 02 21 1D A5 AE 6C 26 14   8C 92 02 92 E3 C1 74 56  .!...l&.......tV
0050: 6A 69 96 8E 2D 1E 7D 6C   52 5E 99 38 20 8B 19 C4  ji..-..lR^.8 ...
0060: 52 11 89 B3 73 D0 6C 61   B2 DB BF CA 58 0A 3A 5D  R...s.la....X.:]
0070: 40 81 97 CC 3F 60 A6 1E   B5 D6 60 8A C6 6B B6 F6  @...?`....`..k..

]|#]
[#|2009-09-19T23:48:58.011+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
***|#]
```

```
[#|2009-09-19T23:48:58.011+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
*** CertificateRequest|#]
[#|2009-09-19T23:48:58.011+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
Cert Types: |#]
[#|2009-09-19T23:48:58.012+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|RSA|#]
[#|2009-09-19T23:48:58.012+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|, |#]
[#|2009-09-19T23:48:58.012+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|DSS|#]
[#|2009-09-19T23:48:58.012+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
Cert Authorities:|#]
[#|2009-09-19T23:48:58.047+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
<OU=Equifax Secure Certificate Authority, O=Equifax, C=US>|#]
...
[#|2009-09-19T23:48:58.102+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
<EMAILADDRESS=info@valicert.com, CN=http://www.valicert.com/, OU=ValiCert Class 2 Policy
Validation Authority, O="ValiCert, Inc.", L=ValiCert Validation Network>|#]
[#|2009-09-19T23:48:58.102+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
*** ServerHelloDone|#]
[#|2009-09-19T23:48:58.106+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
httpSSLWorkerThread-28181-1, WRITE: TLSv1 Handshake, length = 5849|#]
[#|2009-09-19T23:48:58.298+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
httpSSLWorkerThread-28181-1, READ: TLSv1 Handshake, length = 157|#]
[#|2009-09-19T23:48:58.309+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
*** Certificate chain|#]
[#|2009-09-19T23:48:58.309+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
***|#]
[#|2009-09-19T23:48:58.309+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
httpSSLWorkerThread-28181-1, fatal error: 42: null cert chain
javax.net.ssl.SSLHandshakeException: null cert chain|#]
[#|2009-09-19T23:48:58.309+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
%% Invalidated:  [Session-3, SSL_RSA_WITH_RC4_128_MD5]|#]
[#|2009-09-19T23:48:58.309+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
httpSSLWorkerThread-28181-1|#]
```

```
[#|2009-09-19T23:48:58.309+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|, SEND TLSv1 ALERT:  |#]
[#|2009-09-19T23:48:58.309+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|fatal, |#]
[#|2009-09-19T23:48:58.309+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|description = bad_certificate|#]
[#|2009-09-19T23:48:58.309+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
httpSSLWorkerThread-28181-1, WRITE: TLSv1 Alert, length = 18|#]
[#|2009-09-19T23:48:58.310+1000|INFO|sun-
appserver2.1|javax.enterprise.system.stream.out|_ThreadID=27;_ThreadName=httpSSLWorkerThre
ad-28181-1;|
httpSSLWorkerThread-28181-1, fatal: engine already closed.  Rethrowing
javax.net.ssl.SSLHandshakeException: null cert chain|#]
[#|2009-09-19T23:48:58.310+1000|WARNING|sun-
appserver2.1|javax.enterprise.system.container.ejb|_ThreadID=27;_ThreadName=httpSSLWorkerT
hread-28181-1;_RequestID=a74d12d5-b6e4-4326-9fff-efd3253d61a8;|CLIENT CERT authentication
error for EJBPersonSSLMutualAuthSvc|#]
```

We created and exercised a pair of cooperating EJB-based web services. The client invoked the provider over a secure channel using SSL with Mutual Authentication. We saw the client and server SSL Handshake traces both when the handshake succeeded and when it failed.

Undeploy both the client and the service so they don't get in the way as we explore further.

5.13 Snooping on SOAP Message Processing

By default very little feedback is provided to the developer of web services. As various policies are applied to services a great deal of processing is going on. The Metro project-provided infrastructure takes care of adding policy markup, processing policy markup, exception generation and the like. To better understand what is happening, it will be good to configure the infrastructure to log messages and processing steps at various stages of processing.

To log WS-* processing for various policy variants, add directives listed in Listing 5.13.1 to the GlassFish Application Server's "JVM Settings" -> "JVM Options".

Listing 5.13.1 Metro processing and other logging directives

```
-Dcm.sun.enterprise.web.connection.grizzly.enableSnoop=true
-Dcom.sun.xml.ws.assembler.client.action=true
-Dcom.sun.xml.ws.assembler.client.transport=true
-Dcom.sun.xml.ws.assembler.client.wsa.after=true
-Dcom.sun.xml.ws.assembler.client.wsa.before=true
-Dcom.sun.xml.ws.assembler.client.wsrm.after=true
-Dcom.sun.xml.ws.assembler.client.wsrm.before=true
-Dcom.sun.xml.ws.assembler.client.wss.after=true
-Dcom.sun.xml.ws.assembler.client.wss.before=true
-Dcom.sun.xml.ws.assembler.client.wstx.after=true
-Dcom.sun.xml.ws.assembler.client.wstx.before=true
-Dcom.sun.xml.ws.assembler.client=true
-Dcom.sun.xml.ws.assembler.server.action=true
-Dcom.sun.xml.ws.assembler.server.transport=true
-Dcom.sun.xml.ws.assembler.server.transport=true
-Dcom.sun.xml.ws.assembler.server.wsa.after=true
-Dcom.sun.xml.ws.assembler.server.wsa.before=true
-Dcom.sun.xml.ws.assembler.server.wsmex.after=true
-Dcom.sun.xml.ws.assembler.server.wsmex.before=true
-Dcom.sun.xml.ws.assembler.server.wsrm.after=true
-Dcom.sun.xml.ws.assembler.server.wsrm.before=true
-Dcom.sun.xml.ws.assembler.server.wss.after=true
-Dcom.sun.xml.ws.assembler.server.wss.before=true
-Dcom.sun.xml.ws.assembler.server.wstx.after=true
-Dcom.sun.xml.ws.assembler.server.wstx.before=true
-Dcom.sun.xml.ws.assembler.server=true
-Dcom.sun.xml.ws.transport.http.HttpAdapter.dump=true
-Dcom.sun.xml.ws.transport.http.client.HttpTransportPipe.dump=true
-Dcom.sun.xml.ws.transport.local.LocalTransportPipe.dump=true
```

Here the "was" will log processing related to addressing, "wstx" will log processing related to transactionality, "wss" will log processing related to security, "wsrm" will log processing related to reliable messaging, "wsmex" will log processing related to message exchange and transport will log the wire messages. "server" and "client" have obvious meanings. Other directives log wire messages at different places in the processing stack.

Enabling all these logging facilities requires application server restart and will result in multiple log entries for the same message exchange. Figure 5.13.2 illustrates the GlassFish Application Server Console Restart warning.

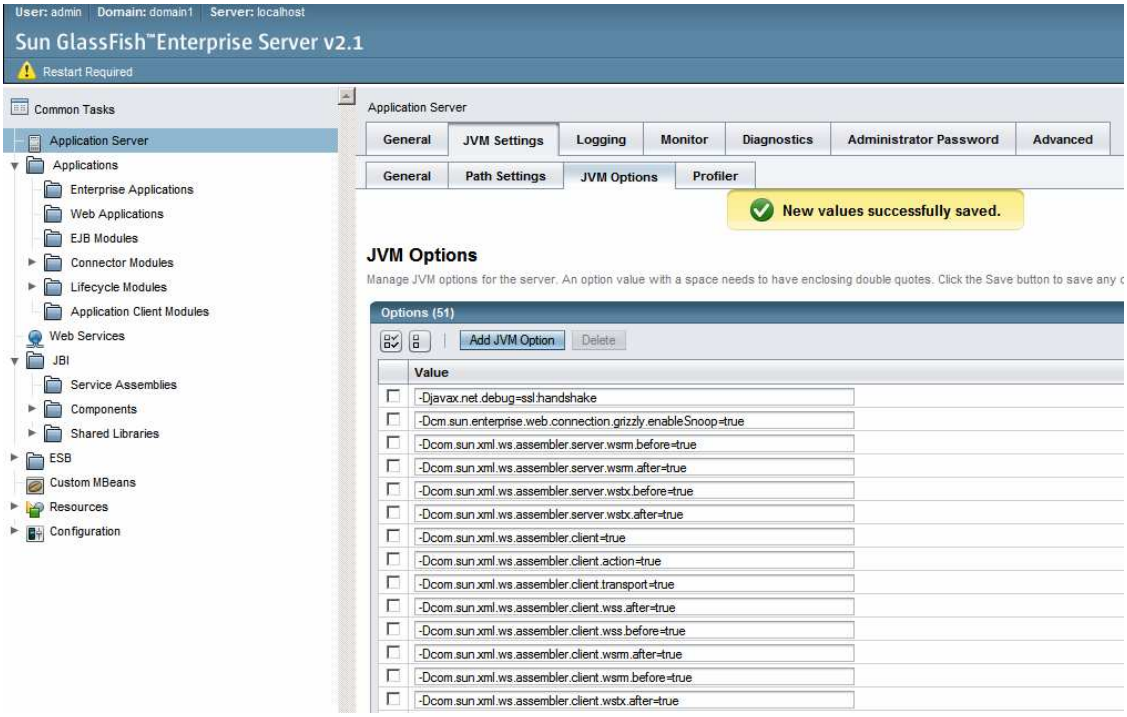


Figure 5.13.2 *Restart Required*

To log other events of interest consider adding the logging categories in Table 5.13.1.

Table 5.13.1 *Logging other processing*

Logging Category	Level
com.sun.org.apache.xml	FINEST
com.sun.xml	FINEST
com.sun.xml.bind.v2.runtime.reflect	INFO
com.sun.xml.bind.v2.runtime.reflect.opt	INFO
com.sun.xml.bind.v2.runtime.reflect.opt.Injector	INFO
com.sun.xml.messaging	FINER
com.sun.xml.rpc	FINEST
com.sun.xml.ws	FINEST
com.sun.xml.ws.api.pipe.Fiber	INFO
com.sun.xml.ws.assembler	FINEST
com.sun.xml.wss	FINEST
com.sun.xml.wss.impl	FINEST
com.sun.xml.wss.logging	FINEST
com.sun.xml.wss.logging.impl.opt	FINEST
com.sun.xml.wss.logging.impl.opt.crypto.level	FINEST
com.sun.xml.wss.logging.impl.opt.level	FINEST
com.sun.xml.wss.logging.impl.opt.signature.level	FINEST
com.sun.xml.wss.logging.impl.opt.token.level	FINEST
java.security.cert	FINEST

javax.enterprise.resource.webservices.jaxws	FINEST
javax.xml.messaging	FINEST
javax.xml.ws	FINEST
org.apache.xerces.dom	FINEST
org.jcp.xml	FINEST
org.jcp.xml.dsig.internal.dom.level	FINEST
sun.security.provider	FINEST
sun.security.provider.certpath	FINEST
sun.security.validator	FINEST

Some of these may be redundant or not triggered for specific scenarios.

Adding these logging categories and changing their values does not require restart of the Application Server.

5.14 Adding WS-Addressing to HTTP BC-based service

WS-Addressing "… provides transport-neutral mechanisms to address Web Services and messages".

For reference, WS-Addressing Specifications, applicable to the Metro implementation, are:

1. Web Services Addressing 1.0 - Core, W3C Recommendation 9 May 2006, Available: http://www.w3.org/TR/2006/REC-ws-addr-core-20060509/, Accessed: September 2009
2. Web Services Addressing 1.0 - SOAP Binding, W3C Recommendation 9 May 2006, Available: http://www.w3.org/TR/2006/REC-ws-addr-soap-20060509/, Accessed: September 2009
3. Web Services Addressing 1.0 - Metadata, W3C Recommendation 4 September 2007, Available: http://www.w3.org/TR/2007/REC-ws-addr-metadata-20070904/, Accessed: September 2009

In this section only SOAP 1.1 Addressing Extensions are discussed and used in examples. See referenced specifications [2] for SOAP 1.2-related discussion.

In this section only WSDL 1.1 is used. See referenced specifications [2] for SOAP 1.2-related discussion.

Note that using non-anonymous addressing implies asynchronous messaging, in which response to a request, if any, is sent to a distinct endpoint and explicitly correlated with the request, instead of being returned in a HTTP response.

The Metro stack takes care of all aspects of the WS-Addressing work. The Metro Configuration Wizard, built into the HTTP BC, automatically configures WS-Addressing when certain security policies are chosen. It does so in a manner which makes the Addressing optional or ignored. For this reason WS-Addressing-related WS Policy must be modified if WS-Addressing is to be mandatory.

5.14.1 Enabling WS-Addressing

Create the PersonSvc_CA_WSAddressing Composite Application, drag the PersonSvc BPEL Module onto the CASA canvas, add and connect a SOAP Binding and Build the project.

The original WSDL does not use any security policies at all. It can not, because most security policies are applied to the concrete part of he WSDL and our original WSDL does not have a concrete part. By dragging the SOAP BC onto the CASAS canvas and connecting it to the BPEL Module we created a WSDL which imports our original WSDL and adds the concrete part.

Click the "Paper-and-key" icon and choose "Server Configuration", as illustrated in Figure 5.14.1.

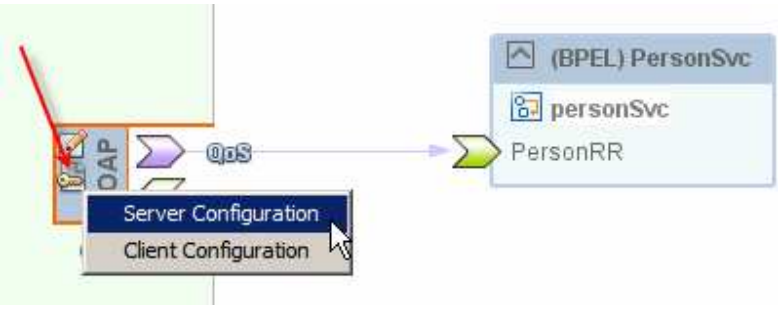


Figure 5.14.1 *Start the Server Configuration Wizard*

Check the “Secure Service” checkbox and choose “Transport Security (SSL)” from the “Security Mechanism” drop-down. Figure 5.14.2 shows the wizard at this point.

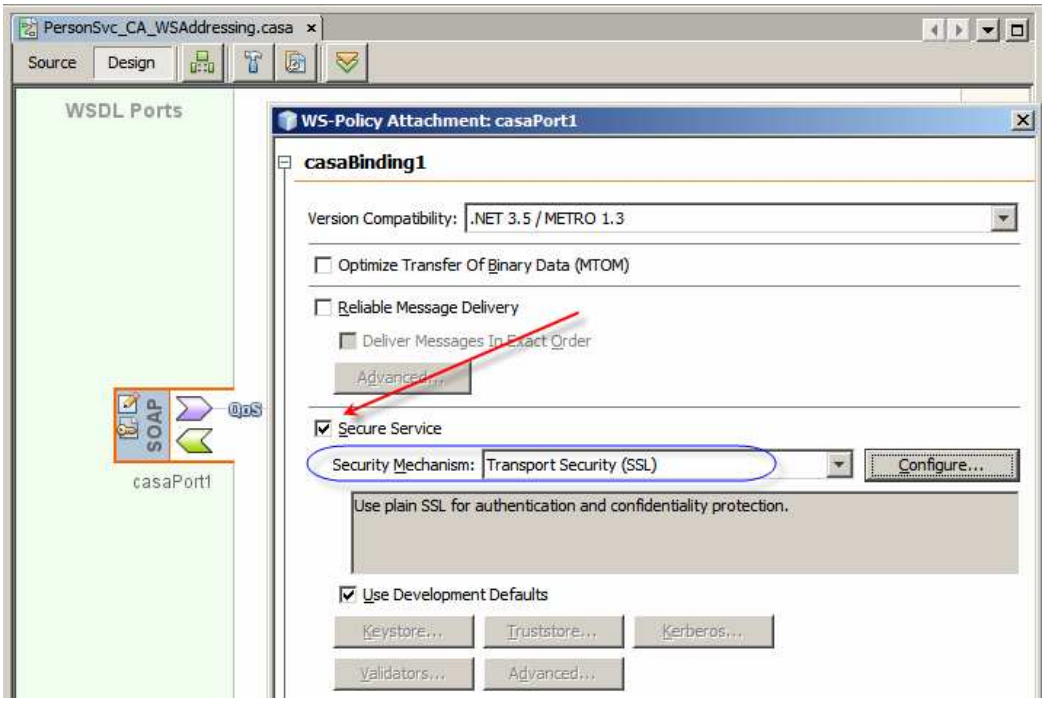


Figure 5.14.2 *Create Transport Security Policy*

We chose the “Transport Security (SSL)” because the wizard does not allow us to choose individual policy formulations, like WS-Addressing policy. Instead, it offers a series of pre-configured policy combinations, which somebody or another decided were good, most useful, or whatever criteria they used to decide what to offer. The “Transport Security (SSL)” policy template adds minimum extraneous policies in addition to WS-Addressing policy.

Open the Concrete WSDL in the editor and look at the Policy stanza, paying particular attention to the WS-Addressing policy, highlighted in Figure 5.14.3.

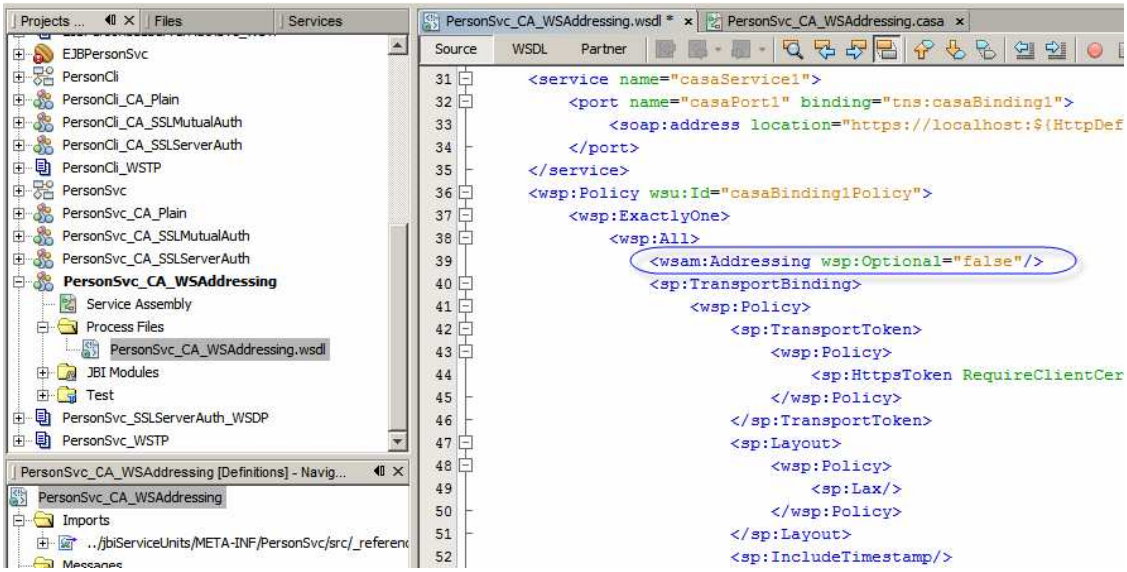


Figure 5.14.3 *WS-Addressing Policy*

Inspect more of the WSDL before going on to modify it.

Note the PolicyReference Tag, at Line 16 in my WSDL, shown in Figure 5.14.4. It names the policy which is to be applied to this binding.

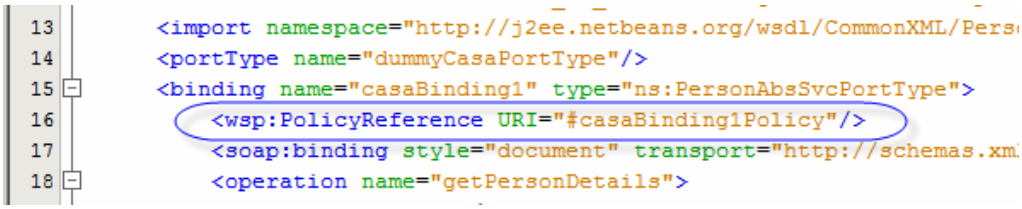


Figure 5.14.4 *Policy Reference applied to the binding*

This reference names the wsp:Policy structure whose wsu:Id attribute value is the literal following the # sign, shown on lines 36-63 in my WSDL, Figure 5.14.5.

Figure 5.14.5 *Policy structure*

Delete lines starting with “<sp:TransportBinding” and ending with “<sp:Wss10/>”, both inclusive, to obtain a policy formulation with jus the WS-Addressing policy, as shown in Figure 5.14.6.

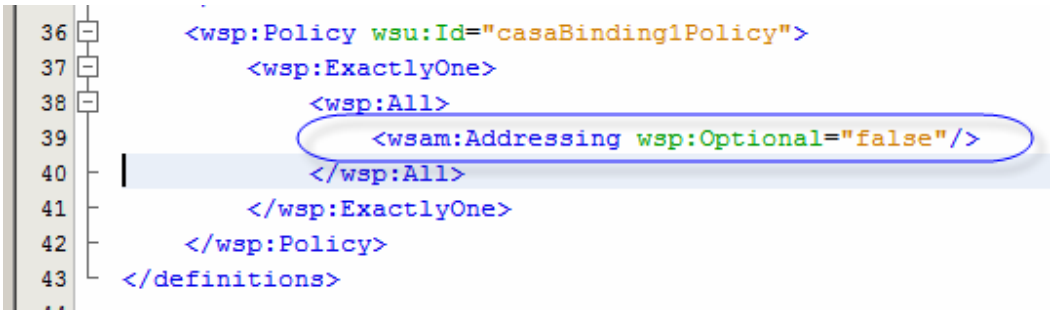


Figure 5.14.6 *WS-Addressing policy*

Modify the URL in the soap:address tag to use the “http”, rather then the “https” scheme / protocol. The Metro wizard is “clever” in that it changes http to https when we select the “Transport Security (SSL)” but is not clever enough to change ${HttpDefaultPort} to ${HttpsDefaultPort}. This is where the Java tapestry shows what it really is, a patchwork quilt. The seams are showing. Since we modified the policy such that it no longer uses transport security the scheme has to be manually set to http.

Build and Deploy the Composite Application.

The service is built and deployed.

Create a Client Composite Application, PersonCli_CA_WSAddressing, much as we have done previously, using the BPEL Module PersonCli. Build the project.

In the new project's Process Files folder create New -> External WSDL Document(s), using the service WSDL URL. For me this will be:

```
http://localhost:29080/casaService1/casaPort1?WSDL
```

Right-click in the WSDL Ports and "Load WSDL Port".

Connect the new SOAP BC "Provides" connector to the BPEL Module "Consumes" connector. Click the "paper and key" icon and choose "Configure Client". This is shown in Figure 5.14.7.

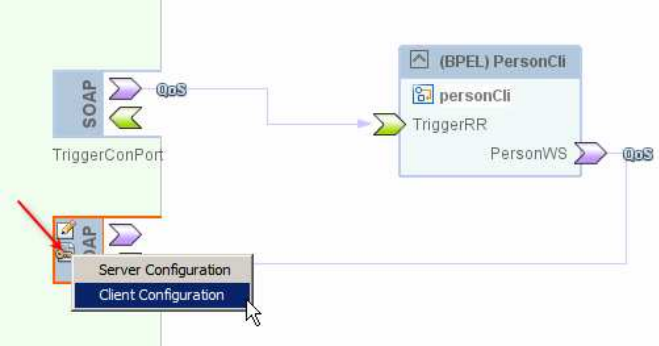


Figure 5.14.7 *Configure Client WSDL*

Notice, as shown in Figure 5.14.8, that there is nothing to configure for the WS-Addressing policy.

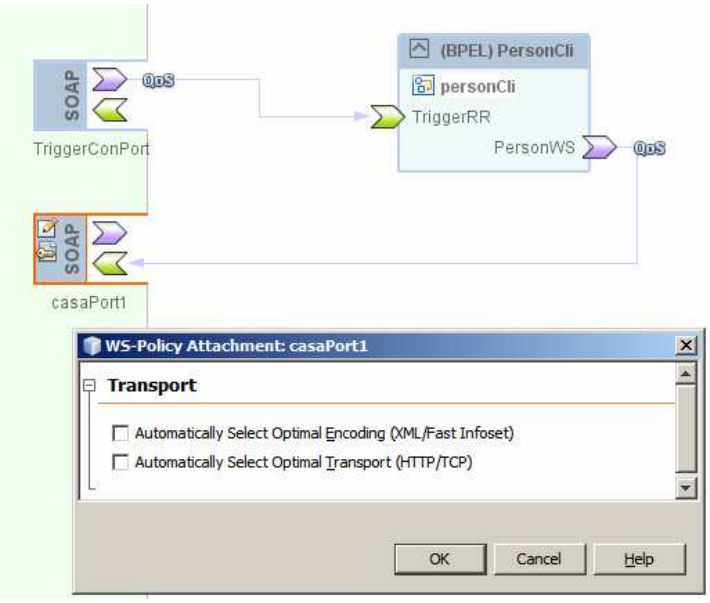


Figure 5.14.8 *No WS-Addressing policy objects in the Client wizard*

Build and Deploy this project.

Use the PersonCli_WSTP Web Service Testing Projet to exercise the solution.

In the serever.log look for the line with the literal “---[HTTP Request]---“. After this line look for a trace that looks similar to that shown in Figure 5.14.9.

```
[#|2009-10-03T18:19:31.870+1000|INFO|sun-appserver2.1|javax.enterprise.system.stream.out|_ThreadID=128;_ThreadName=HTTPBC-JAXWS-Engine-4;|
====[com.sun.xml.ws.assembler.server:request]====|#]

[#|2009-10-03T18:19:31.870+1000|INFO|sun-appserver2.1|javax.enterprise.system.stream.out|_ThreadID=128;_ThreadName=HTTPBC-JAXWS-Engine-4;|
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Body>
    <PersonReq xmlns:msgns="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc" xmlns="http://xml.netbeans.org/schema/Person">
      <PersonID>54321</PersonID>
    </PersonReq>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
|#]
```

Figure 5.14.9 *Undecorated request*

Notice that the SOAP Request has no markup that has anything to do with WS-Addressing. The policy is ineffective, it would seem. Confirm this by looking at the XML produced by the -Dcom.sun.xml.ws.assembler.server.wsa.before directive, and elsewhere in the log.

Open the PersonSvc_CA_WSAddressing.wsdl, in the PersonSvc_CA_WSAddressing Composite Application project and inspect line 39, shown in Figure 5.14.10.

```
35      </service>
36      <wsp:Policy wsu:Id="casaBinding1Policy">
37          <wsp:ExactlyOne>
38              <wsp:All>
39                  <wsam:Addressing wsp:Optional="false"/>
40              </wsp:All>
41          </wsp:ExactlyOne>
42      </wsp:Policy>
43  </definitions>
```

Figure 5.14.10 *wsam:Addressing tag with wsp:Optional attribute*

From practical experience I know that the presence of this tag causes the infrastructure to ignore the Addressing policy regardless of the value of the attribute. Remove the attribute and its value, leaving just the “<wsam:Addressing/>” tag. Build and Deploy the service project.

Build and Deploy the client project, PersonCli_CA_WSAddressing.

Submit the request. Note the SOAP Fault. Inspect the log to see what the issue is. Observe:

“A required header representing a Message Addressing Property is not present”

The client is not decorating the SOAP Request with WS-Addressing markup where the serevice policy requires such decoration.

At present there is no graceful way to “refresh” the service WSDL in the client project. Delete all folders and file under the Process Files folder in the client project. Figure 5.14.11 illustrates the project hierarchy and points out the files to be deleted.

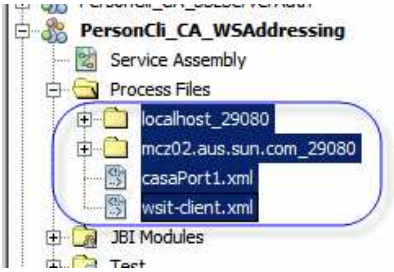


Figure 5.14.11 *Delete content of the Project Files folder*

Create the External WSDL Document, using service WSDL URL, all over again. Create Client Configuration in the CASA map all over again.

Build and Deploy the project.

Submit the request.

Notice that the response comes as expected.

Inspect the server.log, looking for com.sun.xml.ws.assembler.client.wsa.before:request literal. The XML markup will be similar to that shown in Figure 5.14.12.

```
[#|2009-10-03T18:49:57.979+1000|INFO|sun-appserver2.1|javax.enterprise.system.stream.out|_ThreadID=121;_ThreadName=HTTPBC-OutboundReceiver-2;Context=
ing-{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
====[com.sun.xml.ws.assembler.client.wsa.before:request]====|#]

[#|2009-10-03T18:49:57.995+1000|INFO|sun-appserver2.1|javax.enterprise.system.stream.out|_ThreadID=121;_ThreadName=HTTPBC-OutboundReceiver-2;Context=
ing-{http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc}getPersonDetails;|
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Header>
    <To xmlns="http://www.w3.org/2005/08/addressing">http://mcz02.aus.sun.com:29080/casaService1/casaPort1</To>
    <Action xmlns="http://www.w3.org/2005/08/addressing">http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc/PersonAbsSvcPortType/input1</Action>
    <ReplyTo xmlns="http://www.w3.org/2005/08/addressing">
    <Address>http://www.w3.org/2005/08/addressing/anonymous</Address>
</ReplyTo>
    <MessageID xmlns="http://www.w3.org/2005/08/addressing">uuid:df7df62a-92d6-4e05-b2e2-13966d8b0dec</MessageID>
  </SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <PersonReq xmlns:msgns="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc" xmlns="http://xml.netbeans.org/schema/Person">
      <PersonID>54321</PersonID>
    </PersonReq>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
|#]
```

Figure 5.14.12 *WS-Addressing headers added to the SOAP Request*

Consult WS-Addressing standards document for what these tags and their values mean.

Look, in server.log, for literal text “com.sun.xml.ws.assembler.server.wsa.before:response”. The XML markup shown will look similar to that in Figure 5.14.13, and will contain message ids of the original request and the response to it. These were, in this case, generated by the underlying web services infrastructure.

```
[#|2009-10-03T18:49:58.120+1000|INFO|sun-appserver2.1|javax.enterprise.system.stream.out|_ThreadID=128;_ThreadName=HTTPBC-JAXWS-Engine-4;|
====[com.sun.xml.ws.assembler.server.wsa.after:response]====|#]

[#|2009-10-03T18:49:58.120+1000|INFO|sun-appserver2.1|javax.enterprise.system.stream.out|_ThreadID=128;_ThreadName=HTTPBC-JAXWS-Engine-4;|
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Header>
    <To xmlns="http://www.w3.org/2005/08/addressing">http://www.w3.org/2005/08/addressing/anonymous</To>
    <Action xmlns="http://www.w3.org/2005/08/addressing">http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc/PersonAbsSvcPortType/output1</Action>
    <MessageID xmlns="http://www.w3.org/2005/08/addressing">uuid:fd27e4df-47fe-45a5-92d3-c5f762163621</MessageID>
    <RelatesTo xmlns="http://www.w3.org/2005/08/addressing">uuid:df7df62a-92d6-4e05-b2e2-13966d8b0dec</RelatesTo>
  </SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <PersonRes xmlns:msgns="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc" xmlns="http://xml.netbeans.org/schema/Person">
      <PersonID>54321</PersonID>
      <FamilyName>Kowalski</FamilyName>
      <GivenName>Jan</GivenName>
      <Gender>M</Gender>
      <AddressDetails>
        <StreetAddress>Ul Florianska 22, m 11</StreetAddress>
        <CityTown>Siedlce</CityTown>
        <PostCode>08-110</PostCode>
        <Country>PL</Country>
      </AddressDetails>
      <CreditCardDetails>
        <CardType>AmEx</CardType>
        <CardNumber>CN1234-5678-9012</CardNumber>
        <ExpiryDate>03/12</ExpiryDate>
        <SecurityCode>seccode</SecurityCode>
      </CreditCardDetails>
    </PersonRes>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
|#]
```

Figure 5.14.13 *Response with WS-Addressing markup*

5.14.2 Interacting with WS-Addressing Headers in BPEL

By itself, enabling WS-Addressing support is not particularly useful. It is true that the infrastructure assigned message IDs to requests and responses, and that the response carries the message ID of the request but nothing is done with these values. To make WS-Addressing useful one must be able to use WS-Addressing headers in processing logic.

One uses NMProperties, the associated tooling and a bit of manual WSDL editing, to expose WS-Addressing headers in BPEL.

The WS-Addressing Core specification includes standard headers shown in Figure 5.14.14.

```
<wsa:To>xs:anyURI</wsa:To> ?
<wsa:From>wsa:EndpointReferenceType</wsa:From> ?
<wsa:ReplyTo>wsa:EndpointReferenceType</wsa:ReplyTo> ?
<wsa:FaultTo>wsa:EndpointReferenceType</wsa:FaultTo> ?
<wsa:Action>xs:anyURI</wsa:Action>
<wsa:MessageID>xs:anyURI</wsa:MessageID> ?
<wsa:RelatesTo RelationshipType="xs:anyURI"?>xs:anyURI</wsa:RelatesTo> *
<wsa:ReferenceParameters>xs:any*</wsa:ReferenceParameters> ?
```

Figure 5.14.14 *WS-Addressing standard headers*

Note the “?” denotes an optional header and “*” denotes an optional and repeating header.

Figure 5.14.15, taken form the WS_Addressing Core specification, shows WS-Addressing headers in a sample request message.

```
<S:Envelope xmlns:S="http://www.w3.org/2003/05/soap-envelope"
  xmlns:wsa="http://www.w3.org/2005/08/addressing">
  <S:Header>
  <wsa:MessageID>http://example.com/someuniquestring</wsa:MessageID>
    <wsa:ReplyTo>
      <wsa:Address>http://example.com/business/client1</wsa:Address>
    </wsa:ReplyTo>
    <wsa:To>mailto:fabrikam@example.com</wsa:To>
    <wsa:Action>http://example.com/fabrikam/mail/Delete</wsa:Action>
  </S:Header>
  <S:Body>
    <f:Delete xmlns:f="http://example.com/fabrikam">
```

Figure 5.14.15 *Request WS-Addressing headers*

Figure 5.14.16, also taken from the WS-Addressing Core specification, shows the WS-Addressing headers in the response message.

```
<S:Envelope
  xmlns:S="http://www.w3.org/2003/05/soap-envelope"
  xmlns:wsa="http://www.w3.org/2005/08/addressing">
  <S:Header>
    <wsa:MessageID>http://example.com/someotheruniquestring</wsa:MessageID>
    <wsa:RelatesTo>http://example.com/someuniquestring</wsa:RelatesTo>
    <wsa:To>http://example.com/business/client1</wsa:To>
    <wsa:Action>http://example.com/fabrikam/mail/DeleteAck</wsa:Action>
  </S:Header>
  <S:Body>
```

Figure 5.14.16 *Response WS-Addressing headers*

The value of the RelatesTo header is the response is the same as the value of the MessageID header in the request.

When using the HTTP BC for this the headers will look like these shown in Listings 5.14.1 and 5.14.2.

Listing 5.14.1 HTTP BC WS-Addressing headers in Request

```
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
   <SOAP-ENV:Header>
      <To
xmlns="http://www.w3.org/2005/08/addressing">http://192.168.56.1:29080/casaService1/casaPo
rt1</To>
      <Action
xmlns="http://www.w3.org/2005/08/addressing">http://j2ee.netbeans.org/wsdl/CommonXML/Perso
nAbsSvc/PersonAbsSvcPortType/input1</Action>
      <ReplyTo xmlns="http://www.w3.org/2005/08/addressing">
         <Address>http://www.w3.org/2005/08/addressing/anonymous</Address>
      </ReplyTo>
      <MessageID xmlns="http://www.w3.org/2005/08/addressing">uuid:a9293398-34be-419a-
9cde-b73810b524cd</MessageID>
   </SOAP-ENV:Header>
   <SOAP-ENV:Body>
      <PersonReq xmlns:msgns="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc"
xmlns="http://xml.netbeans.org/schema/Person">
```

```
         <PersonID>54321</PersonID>
      </PersonReq>
   </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

Listing 5.14.1 HTTP BC WS-Addressing headers in Response

```
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Header>
    <ReplyTo xmlns="http://www.w3.org/2005/08/addressing">
      <Address>http://mcz.com.au/MyProperty</Address>
    </ReplyTo>
    <To
xmlns="http://www.w3.org/2005/08/addressing">http://www.w3.org/2005/08/addressing/anonymou
s</To>
    <Action
xmlns="http://www.w3.org/2005/08/addressing">http://j2ee.netbeans.org/wsdl/CommonXML/Perso
nAbsSvc/PersonAbsSvcPortType/output1</Action>
    <MessageID xmlns="http://www.w3.org/2005/08/addressing">uuid:f9b19f55-46e7-470a-bd2e-
5ceb31269274</MessageID>
    <RelatesTo xmlns="http://www.w3.org/2005/08/addressing">uuid:a9293398-34be-419a-9cde-
b73810b524cd</RelatesTo>
  </SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <PersonRes xmlns:msgns="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc"
xmlns="http://xml.netbeans.org/schema/Person">
      <PersonID>54321</PersonID>
      <FamilyName>Kowalski</FamilyName>
      <GivenName>Jan</GivenName>
      <Gender>M</Gender>
      <AddressDetails>
        <StreetAddress>Ul Florianska 22, m 11</StreetAddress>
        <CityTown>Siedlce</CityTown>
        <PostCode>08-110</PostCode>
        <Country>PL</Country>
      </AddressDetails>
      <CreditCardDetails>
        <CardType>AmEx</CardType>
        <CardNumber>CN1234-5678-9012</CardNumber>
        <ExpiryDate>03/12</ExpiryDate>
        <SecurityCode>seccode</SecurityCode>
      </CreditCardDetails>
    </PersonRes>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

Compare the value of the MessageID in the request to the value of the RelatesTo in the response.

Note, also, the value of the ReplyTo header in the request and the To header in the response. Both are "…/anonymous". This is a synchronous request/response.

So far we have been reusing the same two BPEL Module projects, PersonSvc and PersonCli. This is because we did not need to make any changes to the business logic. Now that we would like to interact with the WS-Addressing headers we need to modify BPEL logic to get header values. Rather then modifying the original BPEL Modules we will clone the projects for this occasion and modify the cloned BPEL logic.

Since the WS-Addressing headers are not specified in the WSDL Interface Document, and are added by the Metro infrastructure, we can not access to them in BPEL through the request and response message structures. A document “Java CAPS 5 / 6, OpenESB, GlassFish ESB – Handling SOAP Headers in BPEL”, available at http://blogs.sun.com/javacapsfieldtech/entry/java_caps_5_6_openesb, discusses how one could add SOAP Headers to a WSDL so that they are accessible in BPEL. To preserve the original WSDL we will not use this method. We will use the NMProperties (Normalized Message Properties) and the associated tooling. This technique can be used to access arbitrary SOAP Header values without having them declared in the WSDL.

The NMProperties technique requires us to define a NMProperty for each header we need to access. Tooling provides only partial support for what we need to do so certain amount of manual XML modification will be required. Both properties and logic to manipulate them will be added to the BPEL process, which will make it non-generic and dependent, in our case, on WS-Addressing policy being enforced for the service and the client.

The WS-addressing headers with which we wish to work are the “MessageID” in the Request, the “RelatesTo” in the Response.

Let’s start by deploying the projects PersonSvc_CA_WSAddressing, if it is not deployed, and undeploying the project PersonCli_CA_WSAddressing, if it is deployed. We worked on these earlier in this section.

Let’s clone the consumer BPEL Module project. Right-click on the name of the PersonCli project and choose Copy. Give the project the name of PersonCli_WSA. Figure 5.14.17 illustrates the copy dialogue box.

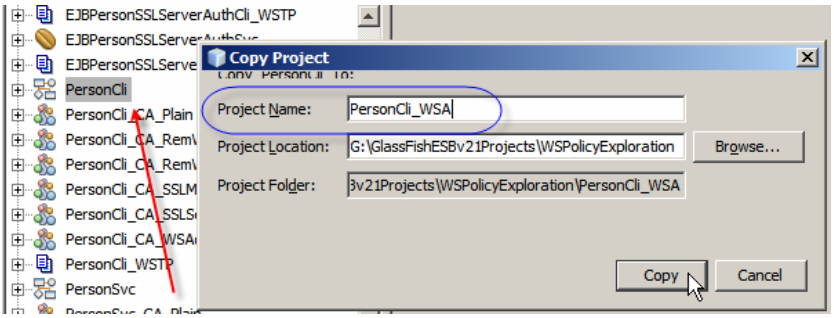


Figure 5.14.17 *Copy dialogue box*

Expand the new project. Open personCli.bpel business process in the editor, select the Assign1 activity and switch to the Mapper. Expand the vPersonRes structure, right-click on Properties node and choose “Add NMProperty…”, as illustrated in Figure 5.14.18.

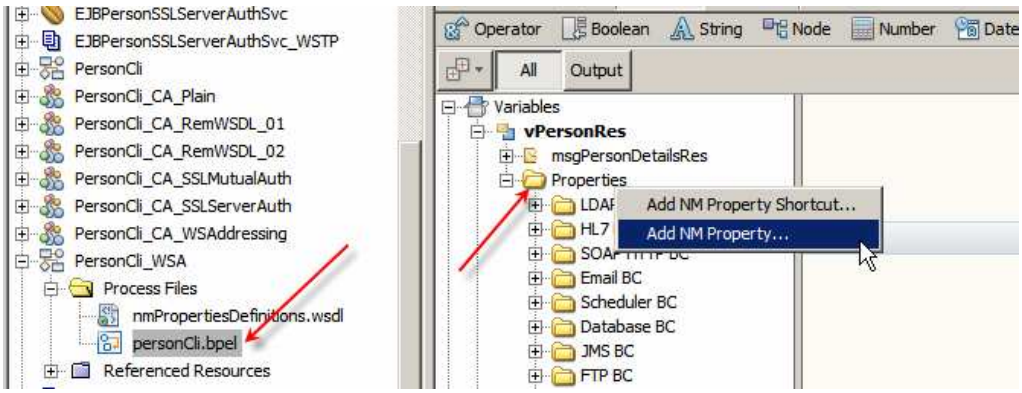


Figure 5.14.18 *Add NMProperty*

Provide the name for this property: WSA_MessageID, check the "Associate property with message" checkbox, expand "SOAP HTTP BC" and choose "SOAP Header" node then enter "wsa:MessageID/." as the Query value. Figure 5.14.19 illustrates these points.

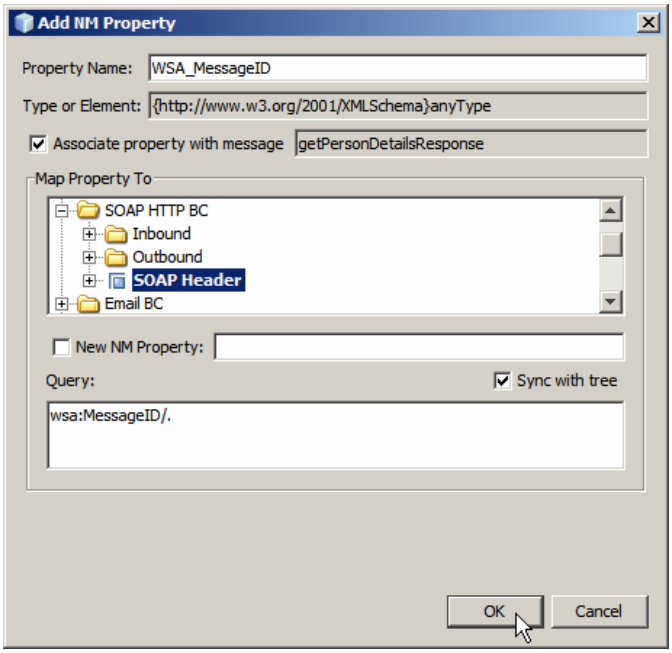


Figure 5.14.19 *WSA_MessageID WS-Addressing Header NMProperty*

Click OK. Note a new WSDL document, nmPropertiesDefinitons.wsdl in the project tree, as illustrated in Figure 5.14.20.

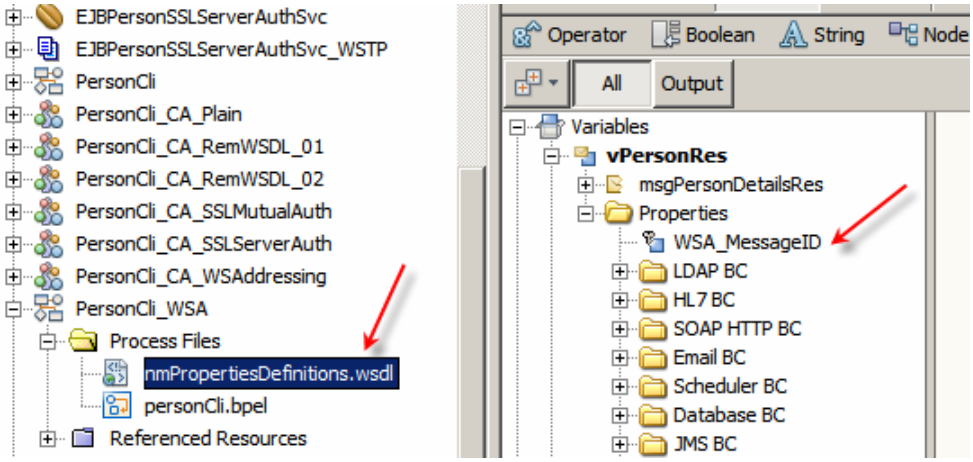


Figure 5.14.20 *New NMProperty and nmPropertiesDefinitions WSDL*

Open the nmPropertiesDefinitions WSDL and switch to Source mode. Figure 5.14.21 illustrates the WSDL which was generated for me, with long lines reformatted for better readability.

```
1   <?xml version="1.0" encoding="UTF-8"?>
2
3   <definitions
4       xmlns="http://schemas.xmlsoap.org/wsdl/"
5       xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
6       xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
7       xmlns:xsd="http://www.w3.org/2001/XMLSchema" targetNamespace="http:,
8       <import namespace="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAb:
9       <types/>
10      <vprop:property name="WSA_MessageID" type="xsd:anyType"/>
11      <vprop:propertyAlias
12          messageType="ns:getPersonDetailsResponse"
13          part="msgPersonDetailsRes"
14          propertyName="tns:WSA_MessageID"
15          sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
16          <vprop:query>wsa:MessageID/.</vprop:query>
17      </vprop:propertyAlias>
18  </definitions>
```

Figure 5.14.21 *nmPropertiesDefiniotions WSDL with WSA_MessageID property*

Note the stanza in Listing 5.14.3, which was generated by addition of the property through the wizard. This definition is not complete, as will transpire shortly.

Listing 5.14.3 Initial WSA_MessageID property definition

```
<vprop:property name="WSA_MessageID" type="xsd:anyType"/>
<vprop:propertyAlias
    messageType="ns:getPersonDetailsResponse"
    part="msgPersonDetailsRes"
    propertyName="tns:WSA_MessageID"
    sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
    <vprop:query>wsa:MessageID/.</vprop:query>
</vprop:propertyAlias>
```

The XPath query, “wsa:MessageID/.”, will not work until we specify the namespace whose prefix is wsa and which “anchors” the relative path. Figure 5.14.22 shows the example WS-Addressing headers generated for the request. Note the namespace, to which the MessageID header belongs, and its relative position with respect to SOAP Header element.

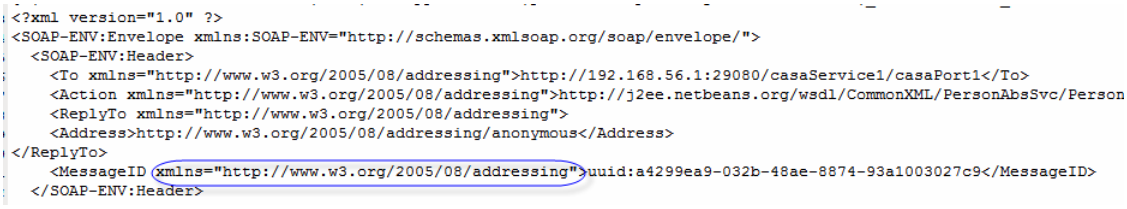


Figure 5.14.22 *MessageID header and the namespace to which it belongs*

The namespace, http://www.w3.org/2005/08/addressing, is the namespace defined in the WS-Addressing specification.

Manually edit the nmPropertiesDefinitions WSDL changing “<vprop:query>” tag to read “<vprop:query **xmlns:wsa=”http://www.w3.org/2005/08/addressing”**>”. This defines the wsa prefix used in the XPath expression and provides the context for this expression. Note, too, the literal “/.”, following “wsa:MessageID”. Empirical knowledge tells me that it is necessary to append this literal to the ‘top level” WS-Addressing nodes in order to obtain the actual value of the element. The final XML markup will look like that shown in Listing 5.14.4.

Listing 5.14.4 Modified WSA_MessageID property

```
<vprop:property name="WSA_MessageID" type="xsd:anyType"/>
<vprop:propertyAlias
    messageType="ns:getPersonDetailsResponse"
    part="msgPersonDetailsRes"
    propertyName="tns:WSA_MessageID"
    sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
    <vprop:query
       xmlns:wsa=”http://www.w3.org/2005/08/addressing">wsa:MessageID/.</vprop:query>
</vprop:propertyAlias>
```

This property will allow us to read the value of the response’s MessageID property.

Now we need to define the NMProperty for the RelatesTo header so that we can read the original request MessageID property value.

Replicate the XML structure shown in Listing 5.14.4 and change all occurrences of MessageID to RelatesTo. Listing 5.14.5 illustrates the fragment of nmPropertiesDefinitions WSDL after this is done.

Listing 5.14.4 nmPropertiesDefinitons WSDL with two NM Properties defined

```
<vprop:property name="WSA_MessageID" type="xsd:anyType"/>
<vprop:propertyAlias
    messageType="ns:getPersonDetailsResponse"
    part="msgPersonDetailsRes"
    propertyName="tns:WSA_MessageID"
    sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
    <vprop:query
       xmlns:wsa="http://www.w3.org/2005/08/addressing">wsa:MessageID/.</vprop:query>
</vprop:propertyAlias>
```

```
<vprop:property name="WSA_RelatesTo" type="xsd:anyType"/>
<vprop:propertyAlias
    messageType="ns:getPersonDetailsResponse"
    part="msgPersonDetailsRes"
    propertyName="tns:WSA_RelatesTo"
    sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
    <vprop:query
        xmlns:wsa="http://www.w3.org/2005/08/addressing">wsa:RelatesTo/.</vprop:query>
</vprop:propertyAlias>
```

Figure 5.14.23 shows a fragment of a response with WS-Addressing headers to allow us to place this property and the XPath query in the context of an actual XML Instance Document.

```
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Header>
    <ReplyTo xmlns="http://www.w3.org/2005/08/addressing">
      <Address>http://mcz.com.au/MyProperty</Address>
    </ReplyTo>
    <To xmlns="http://www.w3.org/2005/08/addressing">http://www.w3.org/2005/08/addressing/anonymous</To>
    <Action xmlns="http://www.w3.org/2005/08/addressing">http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc/Perso
    <MessageID xmlns="http://www.w3.org/2005/08/addressing">uuid:664d5ac7-315b-42a4-a20f-9607189c3aaf</MessageID>
    <RelatesTo xmlns="http://www.w3.org/2005/08/addressing">uuid:a4299ea9-032b-48ae-8874-93a1003027c9</RelatesTo>
  </SOAP-ENV:Header>
```

Figure 5.14.23 *WS-Addressing RelatesTo header in a response*

Now we need to modify the consumer BPEL process to echo to the log the response's MessageID and RelatesTo header values.

Switch to the Design view, select the Assign2 activity and switch to Logging view. Add logging "mapping" as shown in Figure 5.14.24.

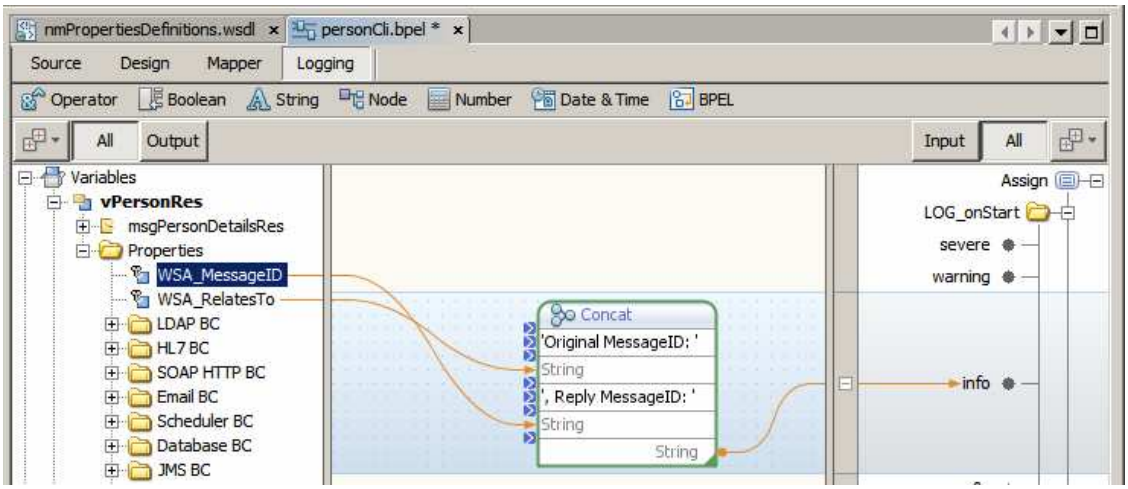


Figure 5.14.24 *Log MessageID values for the request and the response*

Build the BPEL Module project.

Create a new Composite Application Project, PersonCli_CA_WSAddressing_WSA, much as we have done in Section 5.14.1 with PersonCli_CA_WSAddressing, but use the PersonCli_WSA BPEL Module project instead of the PersonCli BPEL Module project. As we have done previously, create a new External WSDL Document using the service WSDL URL, "Load WSDL Port" into the CASA, connect, Build and Deploy.

Exercise the end-to-end solution using the PersonCli_WSTP Web Service Testing project.

The server.log shows the trace of the request and response message IDs, as shown in Figure 5.14.25.

```
[#|2009-10-11T11:39:16.277+1100|INFO|sun-appserver2.1|com.sun.jbi.engine.bpel.core.bpel.trace.BPELTraceManag
er|_ThreadID=60;_ThreadName=sun-bpel-engine-thread-8;Process Instance Id=192.168.60.2:-74c67492:1244063fc08:
-7e5a;Service Assembly Name=PersonSvc_CA_WSAddressing_WSA;Activity Name=Assign2;BPEL Process Name=personCli;
Original MessageID: uuid:e8bd7ea9-d00e-4661-b446-0e55384cea9a, Reply MessageID: uuid:724caae0-ab7b-4208-8f4
6-bdd3fbc7f62f|#]
```

Figure 5.14.25 *Request with WS-Addressing MessageID header explicitly set*

The trace of the request message, in server.log, looks like that shown in Figure 5.14.26.

```
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Header>
    <To xmlns="http://www.w3.org/2005/08/addressing">http://www.w3.org/2005/08/addressing/anonymous</To>
    <Action xmlns="http://www.w3.org/2005/08/addressing">http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc/Perso
    <MessageID xmlns="http://www.w3.org/2005/08/addressing">uuid:724caae0-ab7b-4208-8f46-bdd3fbc7f62f</MessageID>
    <RelatesTo xmlns="http://www.w3.org/2005/08/addressing">uuid:e8bd7ea9-d00e-4661-b446-0e55384cea9a</RelatesTo>
  </SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <PersonRes xmlns:msgns="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc" xmlns="http://xml.netbeans.org/sc
      <PersonID>54321</PersonID>
      <FamilyName>Kowalski</FamilyName>
      <GivenName>Jan</GivenName>
      <Gender>M</Gender>
      <AddressDetails>
        <StreetAddress>Ul Florianska 22, m 11</StreetAddress>
        <CityTown>Siedlce</CityTown>
        <PostCode>08-110</PostCode>
        <Country>PL</Country>
      </AddressDetails>
      <CreditCardDetails>
        <CardType>AmEx</CardType>
        <CardNumber>CN1234-5678-9012</CardNumber>
        <ExpiryDate>03/12</ExpiryDate>
        <SecurityCode>seccode</SecurityCode>
      </CreditCardDetails>
    </PersonRes>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

Figure 5.14.26 *SOAP Response with WS-Addressing headers*

We demonstrated that the WS-Addressing headers can be accesses by the BPEL logic, if required.

For completeness' sake it is worth pointing out that WS-Addressing headers can also be set using NMProperties. Simply assign values to the properties. Dues to a bug in the infrastructure used by the GlassFish ESB v2.1 HTTP BC the headers will be duplicated, however, and will cause SOAP Faults to be thrown by the recipient of such malformed messages.

5.14.3 Using WS-Addressing for Explicit Routing

What good is WS-Addressing, one might ask. I sometimes wondered about that myself. In theory one can use WS-Addressing to allow the consumer to specify the target of provider's response, for example.

In this section we will implement a solution in which a one-way service invoker invokes a request/reply service and explicitly specifies the address to which the provider must send the

response. This, in effect, is an explicit routing implementation. Further more, it is a dynamic explicit routing implementation, in that the invoker determines the route.

To implement this solution we need three separate components:

1. Service Invoker
   This component will explicitly create WS-Addressing headers and will explicitly set the URL, to which the Request Processor must send the response it generates, in the wsa:ReplyTo/wsa:Address header

2. Request Processor
   This is a regular Request/Response provider. It receives the request, processes it and returns a response, exactly the same way as we have done before. This component is unaware of the fact that the URL provided in the wsa:ReplyTo/wsa:Address is explicitly set in the invoker

3. Response Receiver
   This component is a One-Way Listener which expects to be invoked to receive a response from the Request Processor

We will exploit the WS-Addressing infrastructure processing functionality in the Metro stack. It will parse the WS-Addressing headers, work out that the response needs to go to a different component then the one which invoked the service and will invoke that component for us.

We will develop this set of components “bottom up”, that is we will first develop the Response Receiver, then the Request processor and finally the Service Invoker.

Let’s start by creating the Listener project, BPEL Module named PersonResRcv.

Right-click on the “Referenced Resources” node under in the project tree, choose “Add” -> “Project Resource”, as illustrated in Figure 5.14.27.

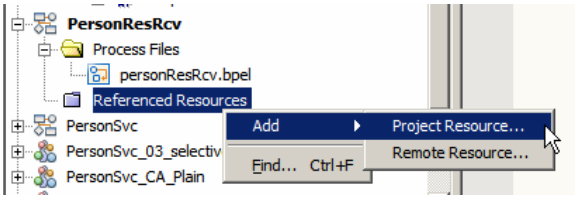


Figure 5.14.27 *Add Project Resource*

Navigate to the CommonXML project in the file system, locate the Person.xsd XML Schema and add it to the project references. Figure 5.14.28 illustrates the project tree on completion of this step.

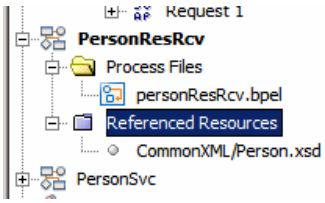


Figure 5.14.28 *Person.xsd in the project references*

Right-click on the “Process Files” node in the project tree, choose “New” -> “WSDL Document”, name the WSDL PersonResRcv and configure it as a Concrete WSDL, SOAP Binding, Type “Document Literal”. Figure 5.14.29 shows a snapshot of this process.

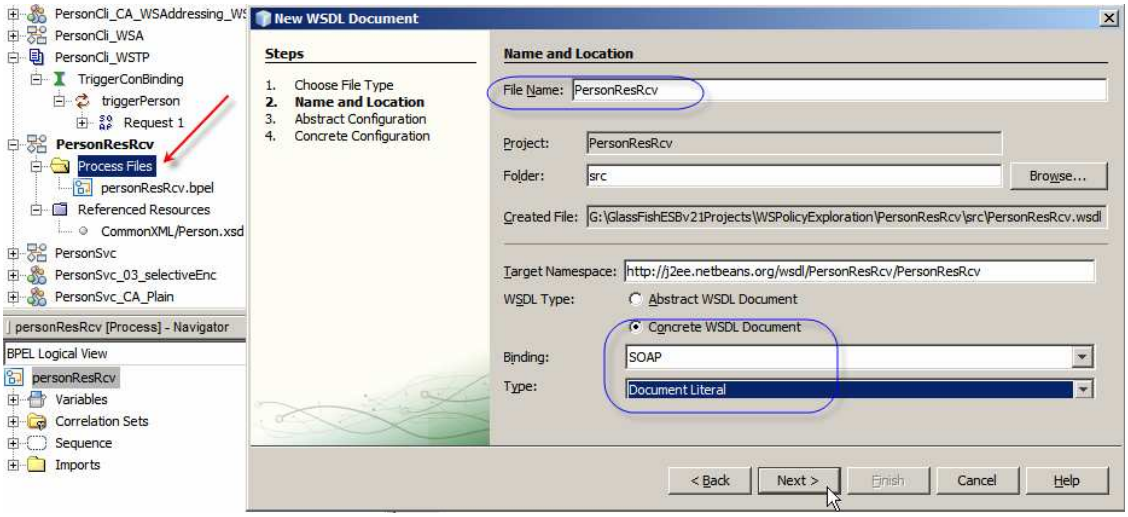


Figure 5.14.29 *Snapshot of WSDL creation process*

Click Next.

Change Operation Name to “GetResponse”, Operation Type to “One-Way Operation” and “Message Part Name” to “sResponse”. Click on the ellipsis button and choose the PersonRes element as the “Element Or Type” value, as illustrated in Figure 5.14.30.

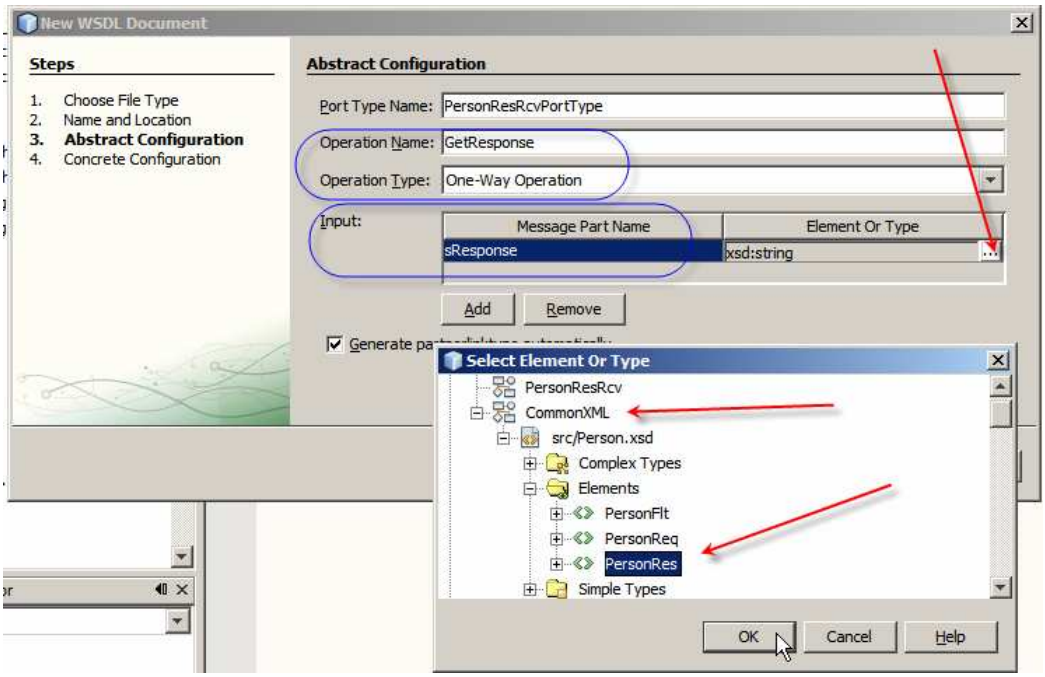


Figure 5.14.30 *Configure Abstract part of the WSDL*

Accept all default on the next wizard panel and Finish.

Open the BPEL process personResRcv.bpel and drag the new WSDL onto the target marker in the left hand swim line. Name the Partner Link “GetRes”. Drag a “Receive” and “Empty” activities onto the process scope. Connect the Receive Activity to the GetRes Partner Link. Figure 5.14.31 shows the process at this point in development.

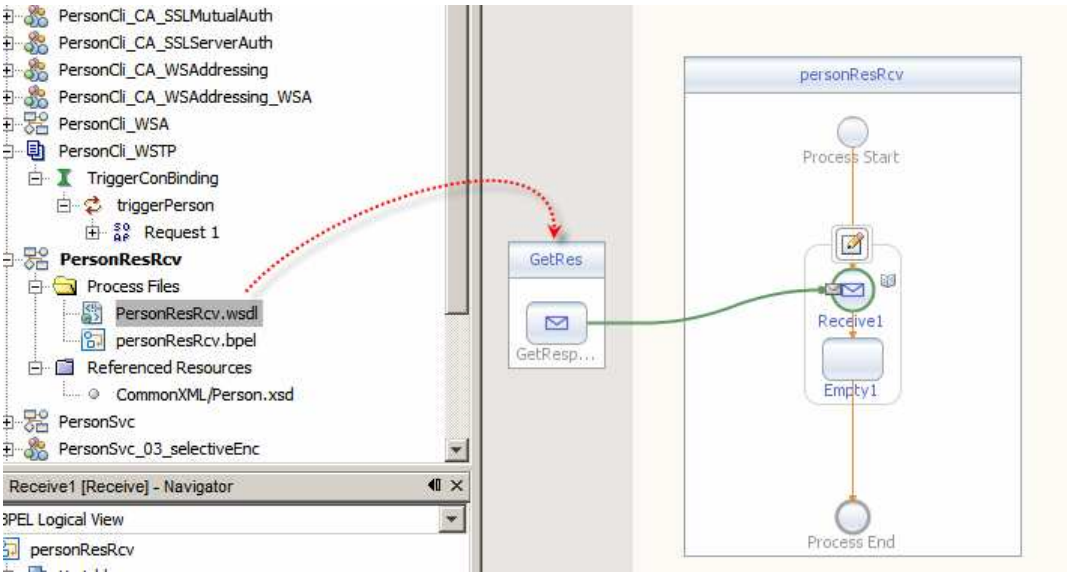


Figure 5.14.31 *BPEL Process before configuration*

Add a variable vResponse to the Receive1 activity, to contain the response from the partner, as illustrated in Figure 5.14.32.

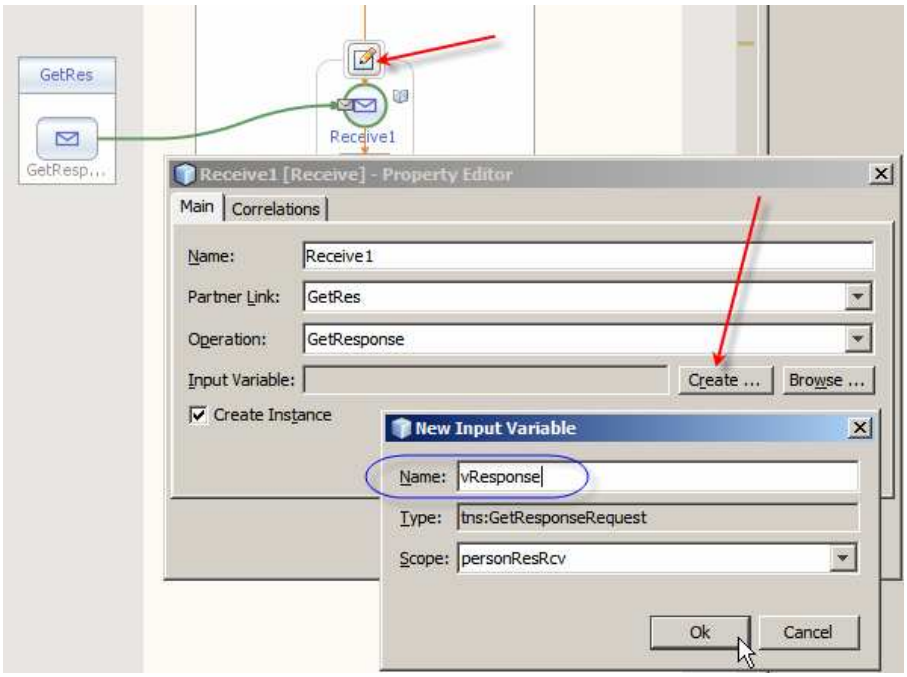


Figure 5.14.32 *Add a variable to contain the response*

Right-click the Empty1 activity, choose “Go To” and choose “Logging”.

Expand left and right node trees to expose the sResponse node on the one hand and the LOG_OnComplete->info node on the other. Select the “info” node, drag the “BPEL”->”Do Marshal” function onto the canvas and connect as shown in figure 5.14.33.

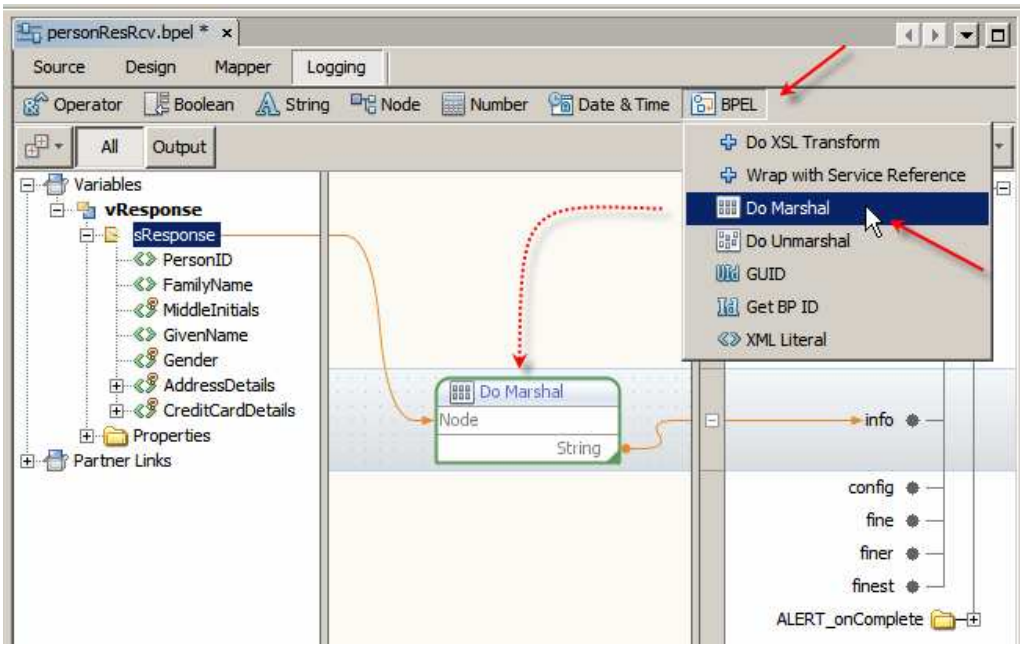


Figure 5.14.33 *Configure log message to show the content of the response XML*

The Response Receiver component is ready. Build the project. We will add this module to a CASA later.

The Request Processor is none other then the PersonSvc BPEL Module, which we have been using in most sections before. Since it already exists we don’t need to develop it. Let’s simply Deploy the PersonSvc_CA_WSAddressing Composite Application, which we developed in the previous two sections.

Let’s now create the Service Invoker BPEL Module, named PersonCliOneWay. From the CommonXML BPEL Module project drag the TriggerCon.wsdl onto the left-hand swim line of the new BPEL process and rename the Partner Link to “Trigger”. Figure 5.14.34 shows this.

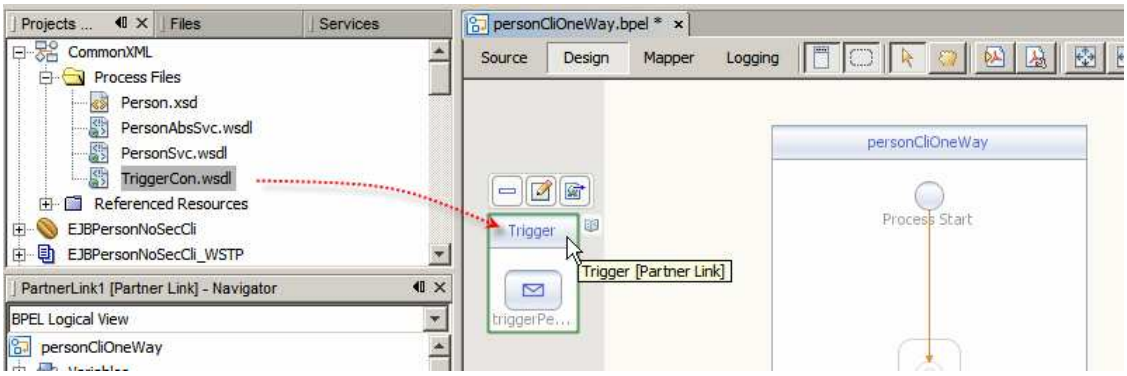


Figure 5.14.34 *Add TriggerCon partner to the process*

We need the Person.xsd for the new One-Way WSDL which we will use to invoke the PersonSvc. Right-click on the “Referenced Resources” node in the project, choose “Add” -> “Project Resource”, navigate to the CommonXML/Person.xsd and select it.

Create “New” -> “WSDL Document”, PersonCliReq, a Concrete WSDL, with SOAP Binding, of Type “Document Literal”. Figure 5.14.35 illustrates this.

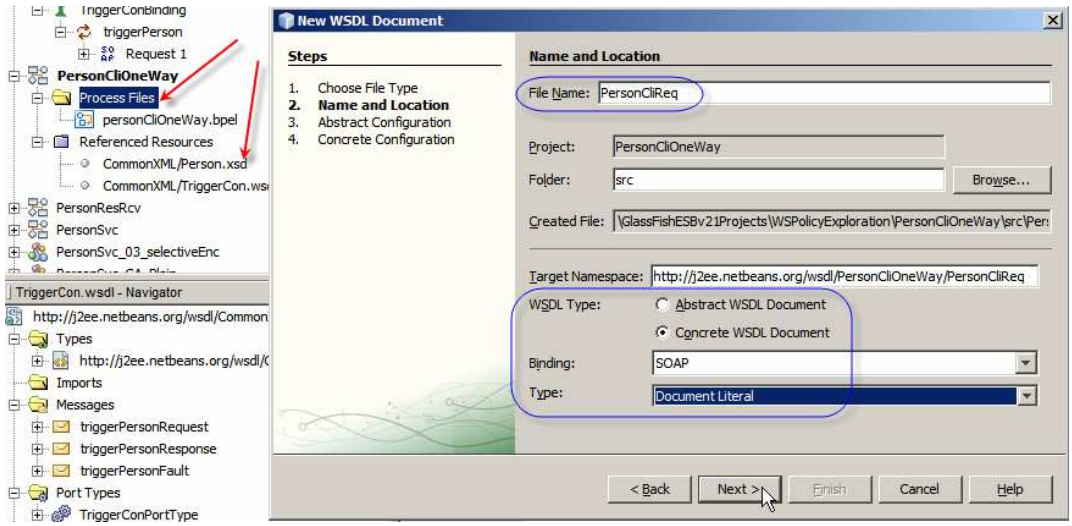


Figure 5.14.35 *New Client WSDL*

Click Next.

Rename Operation to TriggerGetperson, choose “One-Way Operation”, change “Input Message Part Name” to sPersonID and choose the PersonReq as the “Element Or Type”. Figure 5.14.36 illustrates these points.

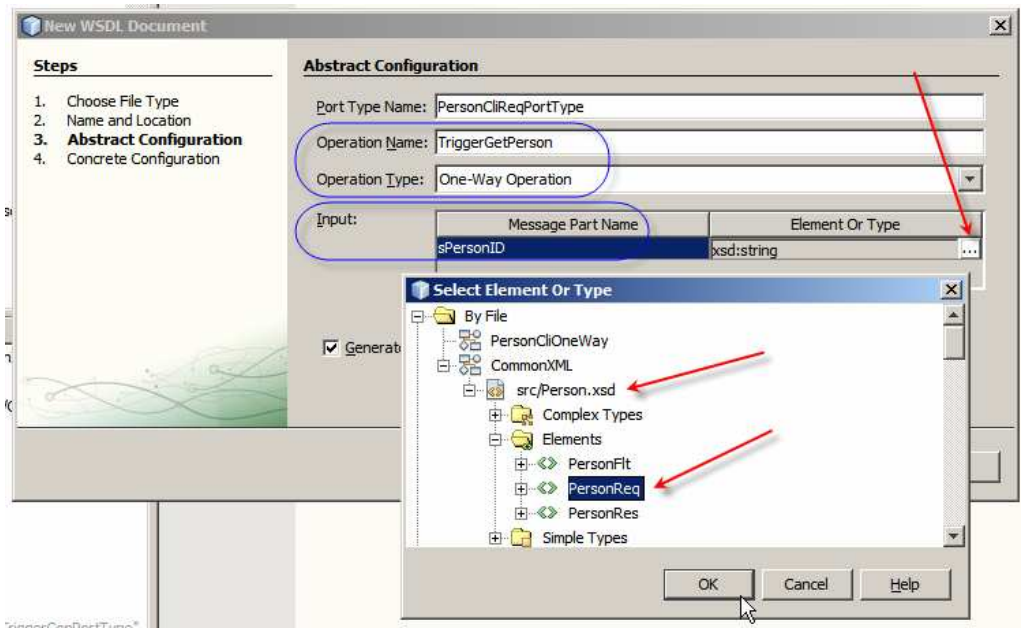


Figure 5.14.36 *Abstract part of the WSDL*

Accept all defaults in the next panel and click Finish.

Drag the new WSDL onto the right-hand swim line in the personCliOneWay process. Add Receive, Assign, Invoke, Assign and Reply activities and connect as shown in Figure 5.14.37.

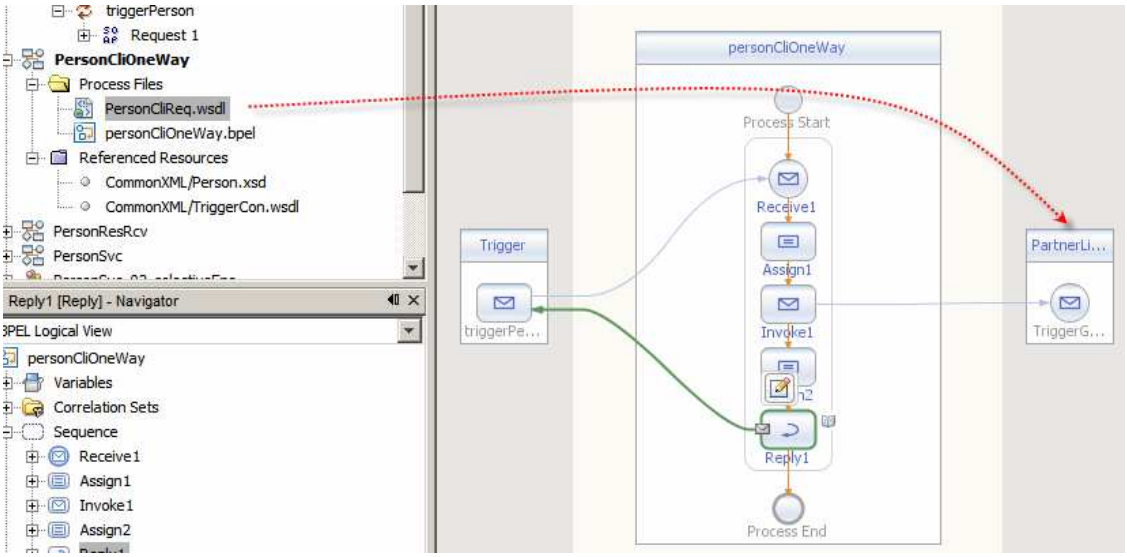


Figure 5.14.37 *Business process with all activities added to the canvas*

Right-click the Receive1 activity and choose Edit. Create an Input Variable vIn.

Right-click the Invoke1 activity and choose Edit. Create an Input Variable vReq.

Right-click the Reply1 activity and choose Edit. Create a Normal Response vOut.

Double-click the Assign1 activity to open the Mapper. Map vIn->msgPersonDetailsReq->PersonID to vReq->sPersonID->PersonID, as shown in Figure 5.14.38.

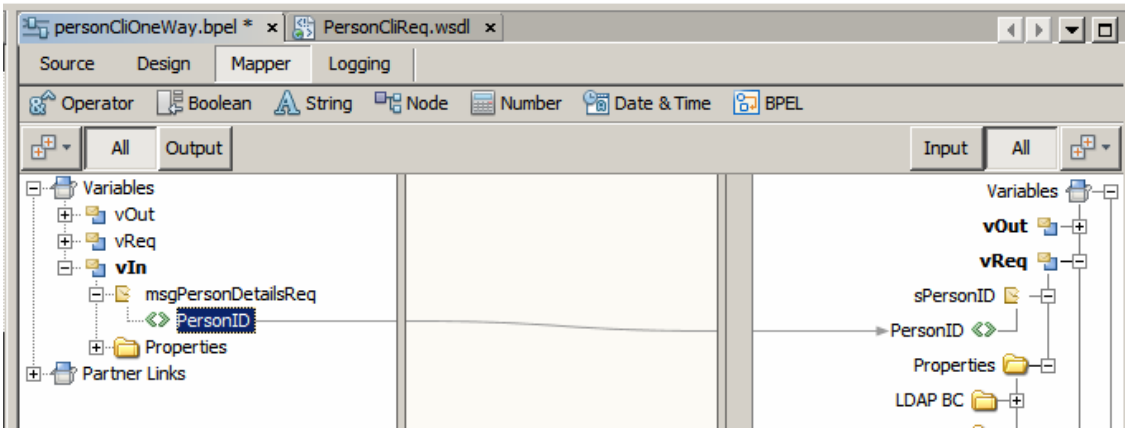


Figure 5.14.38 *Map PersonID from the trigger to the request*

Switch back to the Design view and double click the Assign2 activity to switch to the Mapper view. Map the PersonID from the trigger request to the vOut->msgPersonDetailsRes->PersonID and the literal “Doe” to the vOut->msgPersonDetailsRes->FamiliyName. Leave all other optional nodes unmapped. Figure 5.14.39 illustrates this mapping.

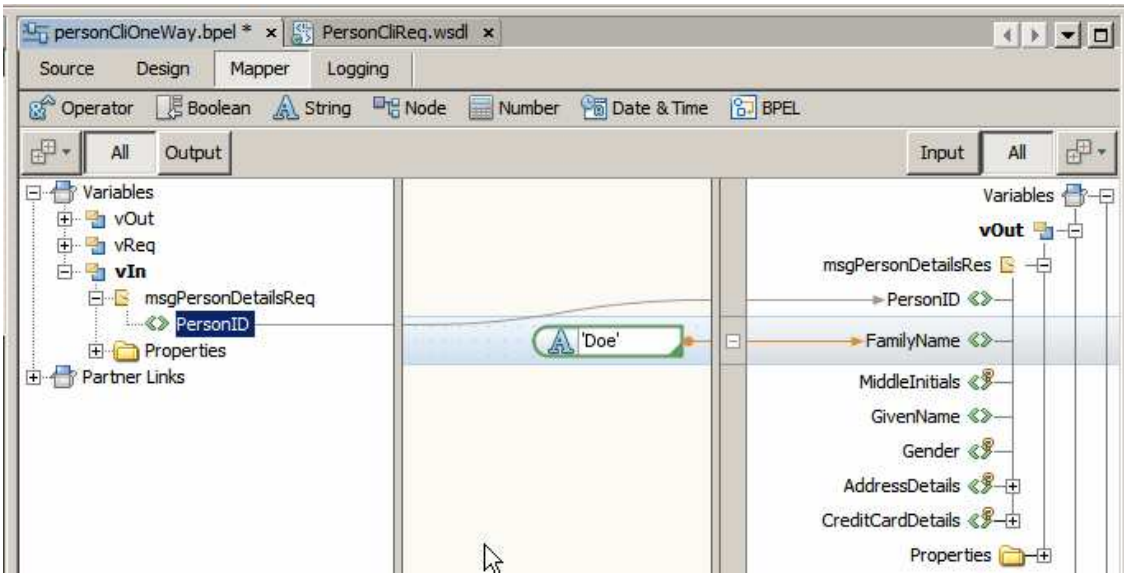


Figure 5.14.38 *Trigger Response Mapping*

Switch back to the Design view and double-click the Assign1 activity to open it in the Mapper.

Right-click the Properties node under the vReq node and choose “Add NM Property…” as shown in Figure 5.14.40.

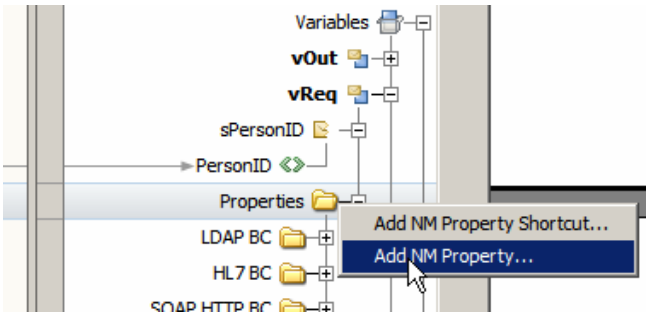


Figure 5.14.40 *Choose to Add NM Property …*

Name the new property WSA_From, leave “Associate property with message” checked, choose “SOAP HTTP BC”->”SOAP Headers” node and enter “wsa:From” into the Query text box, as shown in Figure 5.14.41.

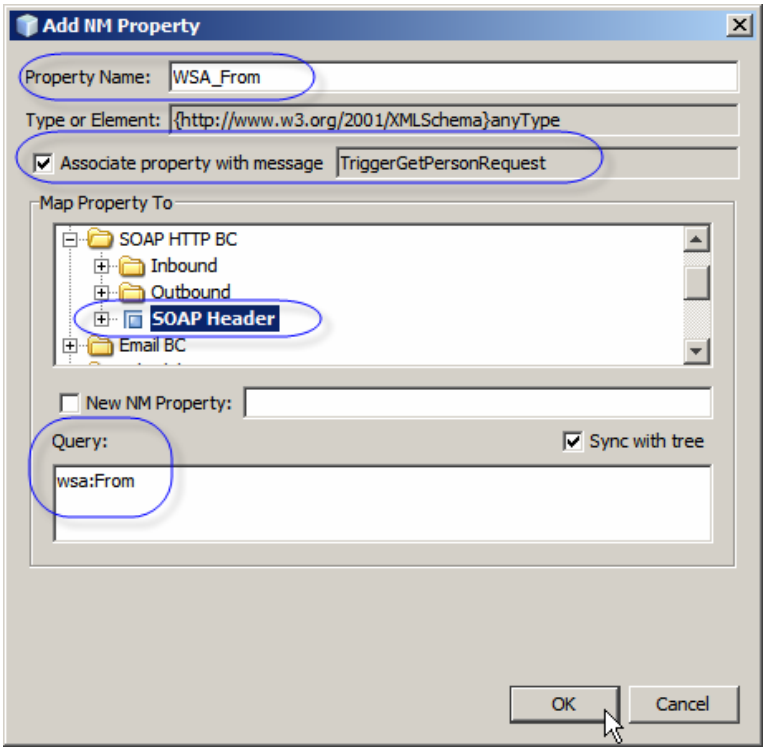


Figure 5.14.41 *New NM Property*

A new WSDL, nmPropertiesDefinitions.wsdl, will appear in the project tree. Open this WSDL in the WSDL editor and switch to the Source view. The WSDL, reformatted for better readability, will look like that shown in Figure 5.14.42.

```
1  <?xml version="1.0" encoding="UTF-8"?>
2
3  <definitions
4      xmlns="http://schemas.xmlsoap.org/wsdl/"
5      xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
6      xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
7      xmlns:xsd="http://www.w3.org/2001/XMLSchema" targetNamespace="http://enterprise.
8      <import namespace="http://j2ee.netbeans.org/wsdl/PersonCliOneWay/PersonCliReq" l
9      <types/>
10     <vprop:property name="WSA_From" type="xsd:anyType"/>
11     <vprop:propertyAlias
12         messageType="ns:TriggerGetPersonRequest"
13         part="sPersonID"
14         propertyName="tns:WSA_From"
15         sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
16         <vprop:query>wsa:From</vprop:query>
17     </vprop:propertyAlias>
18 </definitions>
```

Figure 5.14.42 *nmPropertiesDefinitions.wsdl*

Much as we have done in the previous section, we need to “fix” the property definition so that it uses the correct namespace. Replace the tag ‘<vprop:query>’ with the tag ‘<vprop query xmlns:wsa=”http://www.w3.org/2005/08/addressing”>’. Also append the literal “/.” To the end

of “wsa”From”. This will select the content of the element from. Figure 5.14.43 illustrates the modified WSDL fragment.

```
10      <vprop:property name="WSA_From" type="xsd:anyType"/>
11      <vprop:propertyAlias
12          messageType="ns:TriggerGetPersonRequest"
13          part="sPersonID"
14          propertyName="tns:WSA_From"
15          sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
16          <vprop:query
17              xmlns:wsa="http://www.w3.org/2005/08/addressing">wsa:From/.</vprop:query>
18      </vprop:propertyAlias>
```

Figure 5.14.43 *Modified property definition*

Copy this XML fragment and replicate it for “WSA_To”, “WSA_Action”, “WSA_MessageID” and “WSA_ReplyTo_Address”. Use the following Query expressions for the corresponding properties: “wsa:To/.”, “wsa:Action/.”, “wsa:MessageID/.” and “wsa:ReplyTo/wsa:Address”.

Listing 5.14.5 shows property definitions for all the properties.

Listing 5.14.5 WS-Addressing Properties

```
<vprop:property name="WSA_From" type="xsd:anyType"/>
<vprop:propertyAlias
    messageType="ns:TriggerGetPersonRequest"
    part="sPersonID"
    propertyName="tns:WSA_From"
    sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
    <vprop:query
        xmlns:wsa="http://www.w3.org/2005/08/addressing">wsa:From/.</vprop:query>
</vprop:propertyAlias>
<vprop:property name="WSA_To" type="xsd:anyType"/>
<vprop:propertyAlias
    messageType="ns:TriggerGetPersonRequest"
    part="sPersonID"
    propertyName="tns:WSA_To"
    sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
    <vprop:query
        xmlns:wsa="http://www.w3.org/2005/08/addressing">wsa:To/.</vprop:query>
</vprop:propertyAlias>
<vprop:property name="WSA_Action" type="xsd:anyType"/>
<vprop:propertyAlias
    messageType="ns:TriggerGetPersonRequest"
    part="sPersonID"
    propertyName="tns:WSA_Action"
    sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
    <vprop:query
        xmlns:wsa="http://www.w3.org/2005/08/addressing">wsa:Action/.</vprop:query>
</vprop:propertyAlias>
<vprop:property name="WSA_MessageID" type="xsd:anyType"/>
<vprop:propertyAlias
    messageType="ns:TriggerGetPersonRequest"
    part="sPersonID"
    propertyName="tns:WSA_MessageID"
    sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
    <vprop:query
        xmlns:wsa="http://www.w3.org/2005/08/addressing">wsa:MessageID/.</vprop:query>
</vprop:propertyAlias>
<vprop:property name="WSA_ReplyTo_Address" type="xsd:anyType"/>
<vprop:propertyAlias
    messageType="ns:TriggerGetPersonRequest"
```

```
    part="sPersonID"
    propertyName="tns:WSA_ReplyTo_Address"
    sxnmp:nmProperty="org.glassfish.openesb.headers.soap">
    <vprop:query
    xmlns:wsa="http://www.w3.org/2005/08/addressing">wsa:ReplyTo/wsa:Address</vprop:query>
</vprop:propertyAlias>
```

Figure 5.14.44 shows the new NM Properties in the Mapper view.

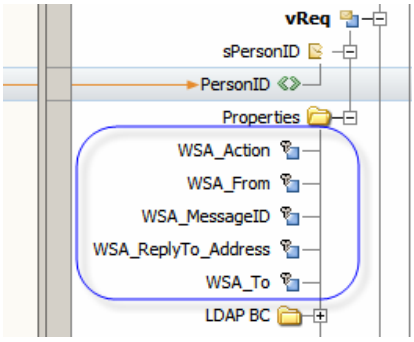


Figure 5.14.44 *WS-Addressing-related NMProperties*

Where do these properties come from? The properties we just added will be used to create the corresponding WS-Addressing headers. Recall Figure 5.14.14 and Listing 5.14.1. Both show WS-Addressing headers provided by the Metro stack. We need to reproduce these headers explicitly, instead of relying on the Metro stack, so that we can set them to the values we need there.

The “From” header will contain the name of the client project, PersonCliReq – it is not used by anything.

The “To” header will contain the address of the PersonSvc_CA_WSAddressing Composite Application. Recall from the previous section that for me this address will be:

`http://localhost:29080/casaService1/casaPort1`

For you the host name and the port number may vary. If you changed the servlet context in the CASA, it, too, can be different.

The “Action” header will have a fixed value "`http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc/PersonAbsSvcPortType/input1`", which is the concatenation of the TargetNamespace value in the CommonXML/PersonSvcAbs.wsdl, "http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc", the PortType Name from the same WSDL, "PersonAbsSvcPortType", and the name of the input message for the getPersonDetails operation in the same WSDL, “input1”. If you change any of these the Action header value will change as well. The simplest thing to do is to run the solution discussed in Section 5.14.1 and see the values in the server.log.

The “ReplyTo/Address” header will have the value of the URL for the Response Receiver project, which we developed earlier in this section. The URL in the PersonResRcv.wsdl soap:address location attribute is "http://localhost:${HttpDefaultPort}/PersonResRcvService/PersonResRcvPort". Since the infrastructure will not resolve ${DefaultHttpPort} in this instance, we

must replace the variable with the actual port number, 29080 for my environment, 9080 by default. So for me the ReplyTo/Address value will be:

```
http://localhost:29080/PersonResRcvService/PersonResRcvPort
```

Finally, the “MessageID” header will be set to the value of the PersonID from the trigger request. This is done to show how a “business value”, rather then a technical value such as a GUID, can be used to identify messages.

Switch to the Mapper view with the Assign1 activity selected and add the following mappings, changing host name and port number in the WSA_To URL to that appropriate for your environment. Figure 5.14.45 illustrates this mapping.

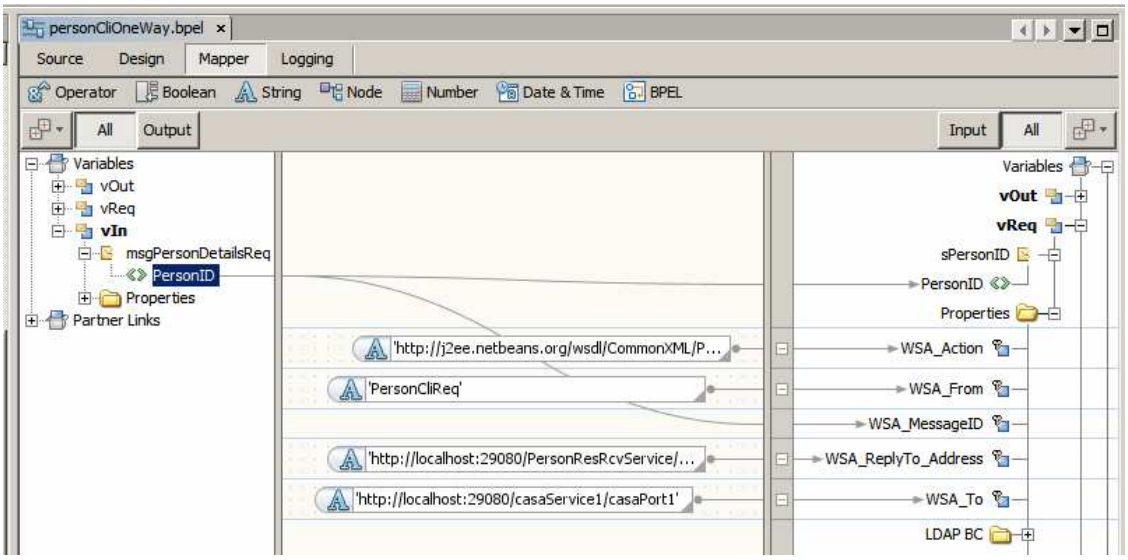


Figure 5.14.45 *WS-Addressing Header values*

The process is ready. Build it.

Ignore WARNING messages, like “WARNING: The types of "From" and "To" activities are different: "string" and "TriggerGetPersonRequest"”. They are benign in this case.

Create a Composite Application project, PersonCli_CA_WSAddressingExplicit. Drag onto it the PersonResRcv and PersonCliOneWay BPEL Modules and Build. Figure 5.14.46 shows the CASA map.

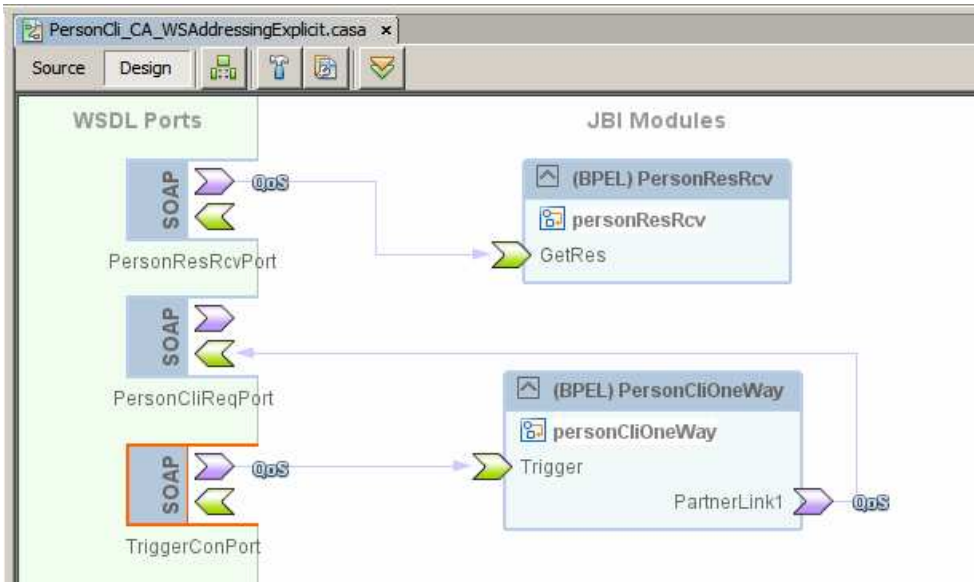


Figure 5.14.46 *Composite Application*

Looking at the soap:address location attribute value in the PersonCliReq.wsdl of the PersonCliOneWay project, which was generated at the time the WSDL was constructed, we see "`http://localhost:${HttpDefaultPort}/PersonCliReqService/PersonCliReqPort`". This URL bears no resemblance to the URL at which the PersonSvc_CA_WSAddressing service is actually available, which is "`http://localhost:29080/casaService1/casaPort1`". We need to make sure that the soap:address is set to the same value as the "To" address. Modify the PersonCliReq.wsdl of the PersonCliOneWay project, set the soap:address location attribute to the required value. Switch back to the "PersonCli_CA_WSAddressingExplicit" project, Build and Deploy the composite application. Once done, submit the request through the PersonCli_WSTP web service testing project to exercise the whole solution.

For me the request was submitted and the response from the PersonCliOneWay project was as expected. Figure 5.14.47 shows the request and the response.

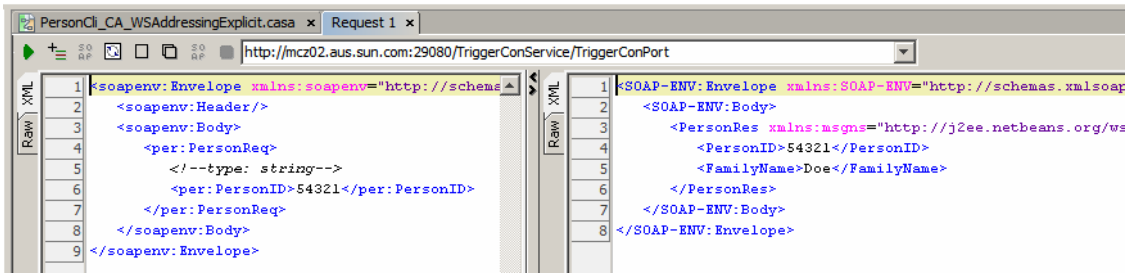


Figure 5.14.47 *SOAP Request and SOAP Response in SoapUI*

Inspection of the server.log will show the SOAP messages traveling between components. SoapUI to PersonCliOneWay request, Listing 5.14.6.

Listing 5.14.6 SoapUI to PersonCliOneWay Request

```
<?xml version="1.0" ?>
```

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:per="http://xml.netbeans.org/schema/Person">
  <soapenv:Body>
    <per:PersonReq>
         <!--type: string-->
         <per:PersonID>54321</per:PersonID>
      </per:PersonReq>
  </soapenv:Body>
</soapenv:Envelope>
```

PersonCliOneWay to PersonSvc Request, Listing 5.14.7. Note the WS-Addressing header, which we explicitly added in the BPEK process, and their values.

Listing 5.14.7 PersonCliOneWay to PersonSvc Request

```
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Header>
    <Action
xmlns="http://www.w3.org/2005/08/addressing">http://j2ee.netbeans.org/wsdl/Commo
nXML/PersonAbsSvc/PersonAbsSvcPortType/input1</Action>
    <MessageID xmlns="http://www.w3.org/2005/08/addressing">54321</MessageID>
    <To
xmlns="http://www.w3.org/2005/08/addressing">http://localhost:29080/casaService1
/casaPort1</To>
    <ReplyTo xmlns="http://www.w3.org/2005/08/addressing">

<Address>http://localhost:29080/PersonResRcvService/PersonResRcvPort</Address>
    </ReplyTo>
    <From xmlns="http://www.w3.org/2005/08/addressing">PersonCliReq</From>
  </SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <PersonReq
xmlns:msgns="http://j2ee.netbeans.org/wsdl/PersonCliOneWay/PersonCliReq"
xmlns="http://xml.netbeans.org/schema/Person">
      <PersonID>54321</PersonID>
    </PersonReq>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

PersonCliOneWay to SoapUI Response, Listing 5.14.8.

Listing 5.14.8 PersonCliOneWay to SoapUI Response

```
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Header></SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <PersonRes xmlns:msgns="http://j2ee.netbeans.org/wsdl/CommonXML/TriggerCon"
xmlns="http://xml.netbeans.org/schema/Person">
      <PersonID>54321</PersonID>
      <FamilyName>Doe</FamilyName>
    </PersonRes>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

PersonSvc to PersonResRcv Response, Listing 5.14.9. Note the WS-Addressing headers, which are added because the PersonSvc_CA_WSAddressing WSDL has the WS-Addressing policy.

The PersonResRcv process does not use these headers, If we needed to look at them we would do so in much the same manner as was shown in Section 5.14.2.

Listing 5.14.9 *PersonSvc to PersonResRcv Response*

```
<?xml version="1.0" ?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Header>
    <To
xmlns="http://www.w3.org/2005/08/addressing">http://localhost:29080/PersonResRcv
Service/PersonResRcvPort</To>
    <Action
xmlns="http://www.w3.org/2005/08/addressing">http://j2ee.netbeans.org/wsdl/Commo
nXML/PersonAbsSvc/PersonAbsSvcPortType/output1</Action>
    <MessageID xmlns="http://www.w3.org/2005/08/addressing">uuid:54d0989d-3e74-
4813-85ee-d3b0c6713828</MessageID>
    <RelatesTo xmlns="http://www.w3.org/2005/08/addressing">54321</RelatesTo>
  </SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <PersonRes
xmlns:msgns="http://j2ee.netbeans.org/wsdl/CommonXML/PersonAbsSvc"
xmlns="http://xml.netbeans.org/schema/Person">
      <PersonID>54321</PersonID>
      <FamilyName>Kowalski</FamilyName>
      <GivenName>Jan</GivenName>
      <Gender>M</Gender>
      <AddressDetails>
        <StreetAddress>Ul Florianska 22, m 11</StreetAddress>
        <CityTown>Siedlce</CityTown>
        <PostCode>08-110</PostCode>
        <Country>PL</Country>
      </AddressDetails>
      <CreditCardDetails>
        <CardType>AmEx</CardType>
        <CardNumber>CN1234-5678-9012</CardNumber>
        <ExpiryDate>03/12</ExpiryDate>
        <SecurityCode>seccode</SecurityCode>
      </CreditCardDetails>
    </PersonRes>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

In this section we constructed a BPEL process which invoked a PersonSvc service, as a one-way operation service, explicitly setting WS-Addressing headers in the SOAP Request, without using WS-Addressing Policy decoration in the WSDL. Amongst others we set the WS-Addressing ReplyTo/Address header, which the Metro Stack used to determine where to send the response produced by the PersonSvc service. The PersonSvc service was the same Request/Reply service which we used earlier. It was not aware of explicit routing taking place. The PersonResRcv One-Way Operation service, which we created for the occasion, received the response, which the Metro Stack explicitly redirected from the PersonSvc service as instructed by the PersonCliOneWay through the WS-Addressing ReplyTo/Address header.

Using this technique we can implement an explicit dynamic routing solution.

5.15 Pre-requisite Cryptographic Objects

Note

This section is not complete

The SSL/TLS discussions and projects used the cryptographic objects provided by the GlassFish Application Server installation, and already a part of the environment. Subsequent sections in this document deal with encryption and digital signatures which need cryptographic objects which are different from these distributed with the GlassFish Application Server. In this section I will briefly discuss the topic and point ot the cryptographic objects suitable for digital signing and encryption.

For a number of years I have been using tools produced by the OpenSSL Project (http://www.openssl.org/) to create and manipulated cryptographic objects. I developed a number of Windows-based DOS scripts to automate the process of requesting and issuing X.509 Certificates. The two sets of cryptographic objects that will be used in subsequent sections are available at ????. @@@@@@@@@@

Before using the cryptographic objects, let's provide a bit of context.

Cryptographic objects are used to secure message exchange. In the world of Web Services they are used to ensure that service invocation is "secure".

Why would we care if the service invocation is "secure"?

The answer to that question would depend on what might be the consequences of the message exchange being seen or altered by third parties. The likelihood that third parties can see or alter message exchange is also an important factor. The more likely an authorized activity is, and the more severe the consequences of such an activity, the more important it is to secure the message exchange, and the greater the complexity of security measures that need to be taken.

Let's assume that the service is to be invoked over the Internet and that the consequences of message exchange being seen or altered are severe.

Let's discuss what is meant by security in the context of web services.

One can "secure" a web service by requiring the use of WS-Security Standard-supported XML Digital Signatures, XML Encryption, Username Token, Timestamp Token, SAML Token, etc., individually or in combination. By requiring and using different combinations of security tokens one obtains varying degrees of "security".

Digital Signatures, more specifically XML Digital Signatures used in securing SOAP messages, are used to ensure integrity of messages on the wire, that is, facilitate detection of message alteration in transit. They are also used to convey authenticity of messages. The entire message or selected parts of the message can be digitally signed. The reason one would digitally sign parts of the message rather then the entire message is typically cost. If only certain parts of the message must be protected from tampering and must be guaranteed to be authentic then signing selected parts of the message will minimize the high resource consumption typically associated with cryptographic operations.

Public Key Cryptography (PKI) relies on the notion that a pair of related cryptographic keys exist and that the keys are used in specific patterns for encryption/decryption and digital signing/signature verification. Conveyance of authenticity relies on the properties and use patterns of key pairs. Both keys of the pair are generated at the same time. The two keys are related in such a way that one cannot be derived from the other and that plaintext encrypted with one key can only be decrypted with the other key. One of the keys, the private key, is kept confidential by the party that owns the key pair. The other key, the public key, embedded in a "certificate" which guarantees its authenticity and integrity, is distributed to any party with whom secure communication will be undertaken. Public Key Infrastructure is the means of guaranteeing public key authenticity and integrity through issuance and revocation of "certificates', and possibly distribution of public keys (certificates). There is a great deal more to all this but for the purpose of this discussion it is enough to say that if the owner of the private key encrypts some plaintext and sends it to the recipient, the recipient will be able to decrypt it only with sender's public key, to which he/she has ready access. Because of the properties of the key pair the recipient knows that only the "other" key of the pair could have been used to encrypt the plaintext that he/she just decrypted. Because the "other" key, the private key, is supposed to be kept secret by its owner, the recipient assumes that only the owner of the private key could possibly have encrypted the plaintext. This guarantees message authenticity.

Encryption, and specifically XML Encryption used in securing SOAP messages, can be used to ensure message integrity and protect confidentiality of information on the wire. Either the entire message or selected parts of the message can be encrypted for the same reasons that an entire message or selected parts of a message would be digitally signed. If the encrypted parts of the message are tampered with, decryption will fail and the recipient will conclude that the message was tampered with. The confidentiality of the message is guaranteed in a way similar to authenticity guarantee when using digital signatures. By encrypting the message with a public key of the recipient, the sender of the message ensures that only the recipient, the holder of the private key of the key pair, can possibly decrypt the message. This allows anyone to send a confidential message to the owner of the private key regardless of where there was a prior communication between them.

Using a Timestamp Token allows the infrastructure to reject messages that are "too old", combating "message reply" attacks, but only if it can be guaranteed that the timestamp itself cannot be modified without detection. By itself the Timestamp Token is pretty useless as a security device. In combination with Encryption or Digital Signature its integrity can be guaranteed and it can be used for message reply detection.

The Username Token, whether with a plaintext password or a digest password, can be used to provide user credentials for authentication. Much as the Timestamp Token, Username Token cannot be trusted unless it is protected from eavesdropping. XML Encryption must be added to the mix to ensure that the Username Token can not be intercepted and subsequently used for rouge access to resources that require authentication.

Whether to use specific WS-Security tokens, what combination of tokens, what token attribute values are appropriate, etc., is typically subject to organization's security policies. Configuring a web service consumer or a web service provider to use/support/require specific security tokens is the application of security policies.

Web Services security policy-mandated tokens are conveyed as part of the SOAP message using the SOAP Header extension mechanism. Different SOAP Header components convey different security policy tokens. I will not discuss this in details. It will suffice to say that whatever means

we use to apply security to SOAP messages, these means will add/modify SOA Headers, in many cases very extensively.

An observer would notice, in the foregoing discussion, that a third party is usually involved in "certifying" public keys by means of issuing X.509 Certificates in which public keys are embedded. The certificates, digitally signed by the Certification Authority, associate the public key with the identity of the party to whom the public key is supposed to belong. There are a number of "well know" Certification Authorities, amongst which there are Verisign, Baltimore Security, Entrust and others. They are "well known" because their X.509 certificates are widely distributed with web browsers, application servers and other software that uses PKI for security. These Certification Authorities (CAs) typically issue certificates for end-use for a fee. The implicit notion that CA verifies the identity of the party presenting their public key for certification, before issuing the X.509 Certificate to that party, is used as the basis for "trust". In this case the CA guarantees that the public key embedded in the X.509 Certificate belongs to the party whose identity is also embedded in the same X.509 Certificate – a user can trust that the public key belongs to the entity identified in the certificate. Note that this is all that the CA-issued certificate is good for. The X.509 Certificate does not imply anything else about the identified enterprise, most particularly that the identified enterprise is trustworthy, will not steal your money, will not cheat you, or will not damage your interests in any way.

As shipped, the GlassFish Application Server, which is the runtime environment for the GlassFish ESB, does not come with cryptographic objects suitable for message security. The WSIT Tutorial, http://java.sun.com/webservices/reference/tutorials/wsit/doc/WSITTutorial.pdf, section "Updating GlassFish Certificates", discusses how one can obtain X.509 v3 Certificates and related objects for use with Metro message security. Follow the instructions in there to get the certificates installed in the GlassFish Application Server domain which you are using to work through this material.

I performed the steps using my GlassFish ESB installation. Listing 5.15.1 shows the trace of task execution.

Listing 5.15.1 Adding v3 certificate to a GlassFish installation

```
.\copyv3>set AS_HOME=C:\GlassFishESBv21_16016\glassfish

.\copyv3>ant
Buildfile: build.xml

appserver-asadmin:

main:
     [echo] WARNING: currently we add non-CA certs to GF truststore, this will
not be required in later releases when we WSIT starts supporting CertStore(s)
     [java] Added Key Entry  :xws-security-server
     [java] Added Key Entry  :xws-security-client
     [java] Added Trusted Entry  :xwss-certificate-authority
     [java] Added Key Entry  :wssip
     [java] Added Trusted Entry  :xws-security-client
     [java] Added Trusted Entry  :xws-security-server
     [java] Added Trusted Entry  :wssip
     [echo] Adding JVM Option for https outbound alias, this will take atleast
One Minute....

init:

appserver-asadmin:
```

```
appserver-start-win:

appserver-start-notwin:

start-appserver:
     [echo] Appserver is starting up ... please wait
     [exec] Command create-jvm-options executed successfully.

appserver-asadmin:

stop-appserver:
     [echo] Appserver is shutting down ... please wait
     [exec] Domain domain1 stopped.

BUILD SUCCESSFUL
Total time: 55 seconds
```

Note that the application server will be re-started by this process.

copyv3 folder contains a number of cryptographic objects, including client-truststore.jks. Open this truststore with a tool like Portecle Key Manager, for example (http://sourceforge.net/projects/portecle/), and export the certificate whit the alias of "certificate-authority". Figure 5.15.1 shows details of this certificate.

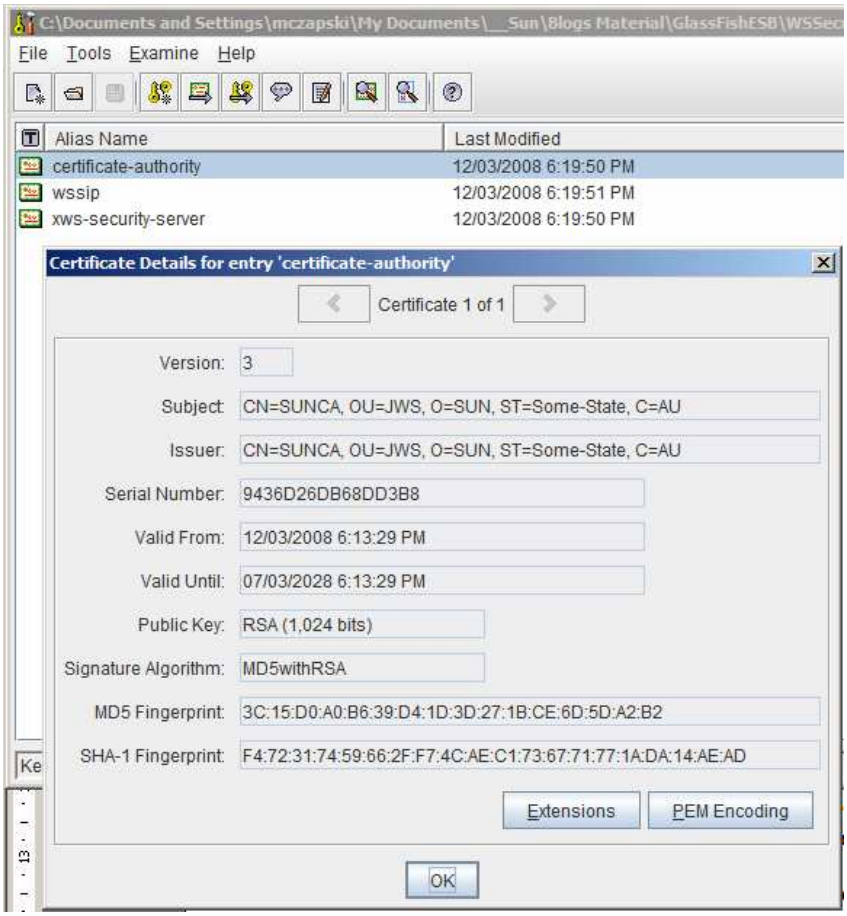


Figure 5.15.1 *"certificate-authority" certificate details*

This certificate was used in issuing the end-use certificates xws-security-client and xws-security-server, which were “installed” into the GlassFish Applicatin Server keystore and which will be used for message security.

??? no – this still does not work.

This certificate needs to be manually imported into the JDK’s truststore, cacerts, in {JDK-install-root}/jre/lib/security/cacerts. Use the keytool or the Portecle tool to import this certificate, giving it the alias of xws-certificate-authority. Re-start the application server and the NetBeans IDE.

To complete environment configuration one may need to install “Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files 6”, from https://cds.sun.com/is-bin/INTERSHOP.enfinity/WFS/CDS-CDS_Developer-Site/en_US/-/USD/ViewProductDetail-Start?ProductRef=jce_policy-6-oth-JPR@CDS-CDS_Developer, and “install” them. I live outside the USA so I have to do this. You may not need to.

5.16 Updating Metro to Version 1.5

Note

This section is no complete

To use the Username Token Profile 1.0 (2004) one must update the Metro stack, distributed with the GlassFisj ESB v2.1, to Version 1.5.

Metro 1.5 distribution can be downloaded from https://metro.dev.java.net/1.5/. Extract the archive and follow instructions to install.

Installation in my environment is briefly discussed below.

Listing 5.16.1 Metro install task usage

```
.\metro_1.5>ant –f metro-on-glassfish.xml
Buildfile: metro-on-glassfish.xml

help:
     [echo] install:
     [echo]   Installs Metro 1.5 FCS on GlassFish v2
     [echo]
     [echo] uninstall:
     [echo]   Uninstalls Metro 1.5 FCS from GlassFish v2
     [echo]
     [echo] $AS_HOME must be set to the installation directory of GlassFish v2.
     [echo]
     [echo] Usage:
     [echo]   ant -f metro-on-glassfish.xml {install,uninstall}

jdk6-message:
     [echo] NOTE: Metro is being installed using JDK6.
     [echo]
     [echo]   The file 'web-services-api.jar' must be installed
     [echo]   into $JAVA_HOME/lib/endorsed for Metro to prevent
     [echo]   conflicts between the JAX-WS 2.0 classes
     [echo]   bundled with Java SE 6 and JAX-WS 2.1 bundled with Metro.
     [echo]
     [echo]   You must have write-permissions on the JDK 6 directory.
     [echo]   This is a concern when using a system-wide JDK installation.
     [echo]
     [echo]   To install webservices-api.jar:
     [echo]
     [echo]   Invoke 'ant install-api' to install only
     [echo]   webservices-api.jar into the 'endorsed' directory.
     [echo]

gfv3-message:

BUILD SUCCESSFUL
```

Locate the install root of your GlassFish ESB installation and set AS_HOME environment variable to that value. For me it will be:

```
C:\GlassFishESBv21_16016\glassfish
```

Make sure the JAVA_HOME environment variable points to the JDK instance used when installing the GlassFish ESB which to update.

Execute the Ant task using the metro-on-glassfish.xml script with target “install”. Listing 5.16.2 shows the log of execution in my environment.

Listing 5.16.2 Metro 1.5 installation trace

```
.\metro_1.5>set AS_HOME=C:\GlassFishESBv21_16016\glassfish

.\metro_1.5>ant -f metro-on-glassfish.xml install
Buildfile: metro-on-glassfish.xml

gfv3-checkpoint:

init:
    [mkdir] Created dir: C:\GlassFishESBv21_16016\glassfish\.wsit-1.5
     [copy] Copying 3 files to C:\GlassFishESBv21_16016\glassfish\.wsit-
1.5

install:
     [echo] Installing Metro 1.5 FCS on
C:\GlassFishESBv21_16016\glassfish ...
     [copy] Copying 2 files to C:\GlassFishESBv21_16016\glassfish\lib
     [copy] Copying 1 file to
C:\GlassFishESBv21_16016\glassfish\lib\endorsed

gfv3-checkpoint:

install-api:
     [copy] Copying 1 file to C:\JDK16~2.0_1\jre\lib\endorsed
     [echo] ... installation complete.

BUILD SUCCESSFUL
Total time: 3 seconds
```

With Metro upgraded to 1.5 we can now explore Username Token Profile 1.0 (2004) policy.

5.17 Username Token Profile 1.0 (2004) Policy

Note

This section is not complete

The Metro stack, before release 1.5, did not allow formulation of a security policy which supported the Username Token Profile 1.0 (2004), as specified in http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-username-token-profile-1.0.pdf. In particular, it did not allow the Username Token to be sent in the clear, whether the policy specified the use of a secure channel (SSL / TLS) or not.

An attempt to deploy a project with the security policy we will configure shortly, without Metro 1.5 upgrade, will result in a "Not supported" exception. Listing 5.17.1 shows the Java stack trace illustrating this.

Listing 5.17.1 "Unsupported" exception Java stack trace

```
[#|2009-10-17T23:03:50.859+1100|SEVERE|sun-
appserver2.1|com.sun.jbi.httpsoapbc.HttpSoapBindingDeployer|_ThreadID=108;_ThreadName=Pers
onSvc_CA_UsernameToken-sun-http-binding;_RequestID=9095264a-cf00-4eeb-8cd7-
47f8f4a87249;|HTTPBC-E00205: Start failed. java.lang.UnsupportedOperationException: Not
supported
javax.jbi.JBIException: java.lang.UnsupportedOperationException: Not supported
        at com.sun.jbi.httpsoapbc.ServiceUnitImpl.start(ServiceUnitImpl.java:344)
        at
com.sun.jbi.httpsoapbc.HttpSoapBindingDeployer.start(HttpSoapBindingDeployer.java:276)
        at
com.sun.jbi.framework.ServiceUnitOperation.process(ServiceUnitOperation.java:185)
        at com.sun.jbi.framework.Operation.run(Operation.java:104)
        at java.lang.Thread.run(Thread.java:619)
Caused by: java.lang.UnsupportedOperationException: Not supported
        at
com.sun.xml.ws.security.impl.policy.TransportBinding.getProtectionOrder(TransportBinding.j
ava:126)
        at
com.sun.xml.ws.security.impl.policyconv.BindingProcessor.getEncryptionPolicy(BindingProces
sor.java:301)
        at
com.sun.xml.ws.security.impl.policyconv.BindingProcessor.processSupportingTokens(BindingPr
ocessor.java:275)
        at
com.sun.xml.ws.security.impl.policyconv.XWSSPolicyGenerator.processNonBindingAssertions(XW
SSPolicyGenerator.java:268)
        at
com.sun.xml.ws.security.impl.policyconv.XWSSPolicyGenerator.process(XWSSPolicyGenerator.ja
va:172)
        at
com.sun.xml.ws.security.impl.policyconv.XWSSPolicyGenerator.process(XWSSPolicyGenerator.ja
va:153)
        at
com.sun.xml.wss.jaxws.impl.SecurityPipeBase.constructPolicyHolder(SecurityPipeBase.java:12
21)
        at
com.sun.xml.wss.jaxws.impl.SecurityPipeBase.constructPolicyHolder(SecurityPipeBase.java:12
14)
        at
com.sun.xml.wss.jaxws.impl.SecurityServerPipe.addOutgoingMP(SecurityServerPipe.java:679)
```

```
        at
com.sun.xml.wss.jaxws.impl.SecurityPipeBase.collectPolicies(SecurityPipeBase.java:781)
        at com.sun.xml.wss.jaxws.impl.SecurityPipeBase.<init>(SecurityPipeBase.java:291)
        at
com.sun.xml.wss.jaxws.impl.SecurityServerPipe.<init>(SecurityServerPipe.java:143)
        at
com.sun.xml.ws.assembler.PipelineAssemblerFactoryImpl$WsitPipelineAssembler.createServer(P
ipelineAssemblerFactoryImpl.java:355)
        at
com.sun.xml.ws.api.pipe.TubelineAssemblerFactory$TubelineAssemblerAdapter.createServer(Tub
elineAssemblerFactory.java:140)
        at com.sun.xml.ws.server.WSEndpointImpl.<init>(WSEndpointImpl.java:152)
        at com.sun.xml.ws.server.EndpointFactory.createEndpoint(EndpointFactory.java:217)
        at com.sun.xml.ws.api.server.WSEndpoint.create(WSEndpoint.java:467)
        at com.sun.xml.ws.api.server.WSEndpoint.create(WSEndpoint.java:510)
        at
com.sun.jbi.httpsoapbc.jaxwssupport.JAXWSEndpointFactory.createWSEndpoint(JAXWSEndpointFac
tory.java:155)
        at
com.sun.jbi.httpsoapbc.HttpSoapBindingLifeCycle.endpointActivated(HttpSoapBindingLifeCycle
.java:665)
        at com.sun.jbi.httpsoapbc.ServiceUnitImpl.start(ServiceUnitImpl.java:326)
        ... 4 more
|#]
```

Metro 1.5 provides support for sending the Username Token as clear text. It is very insecure to send username and password in the clear however we will be using the SSL-encrypted channel between the endpoints so this is not an issue.

5.x Chapter Summary

This chapter explored selected methods of applying security to the channel over which SOAP messages are exchanged and the SOAP messages themselves, using a basic BPEL 2.0-based invoker and provider set.

A pair of projects, an invoker and a provider, were used to provide application logic.

Composite Applications were used to apply different variants of security policies.

The following aspects of security policies were explored:

- None
- HTP BC Channel Security - SSL / TLS with Server-side Authentication
- HTTP BC Channel Security - SSL / TLS with Mutual Authentication
- EJB Channel Security - SSL / TLS with Server-side Authentication
- EJB Channel Security - SSL / TLS with Mutual Authentication
- JBI-based Service – Exploring WS-Addressing
- Pre-requisite Cryptographic Objects
- Message Encryption
-

For each variant an end-to-end solution was built and exercised. Server.log traces from both sides were inspected and discussed as necessary to clarify what was happening during the process.

5.x References

1. [1] Michael Czapski, “GlassFish ESB v2.2 Field Notes - Installing GlassFish ESB on the Basic JeOS Appliance for LB and HA Testing”, Available: http://blogs.sun.com/javacapsfieldtech/entry/glassfish_esb_v2_2_field, Accessed: January 24, 2010
2. [2] “Portecle Key Manager”, Available: http://linux.softpedia.com/progDownload/Portecle-Download-3110.html, Accessed: January 24, 2010
3. [3]