webMethods EntireX

Software AG IDL Extractor for WSDL

Innovation Release

Version 9.9

October 2015

WEBMETHODS

This document applies to webMethods EntireX Version 9.9 and all subsequent releases.

Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

Document ID: EXX-EEXXWSDLEXTRACTOR-99-20171128

Table of Contents

1 Introduction to the Software AG IDL Extractor for WSDL

The Software AG IDL Extractor for WSDL is a wizard that generates Web service client artifacts from a WSDL file. With these artifacts, EntireX RPC client applications can access external Web services.

With the IDL Extractor for WSDL you can import from the following sources:

- local file
- URL (http, ftp etc.)
- UDDI registry
- CentraSite registry

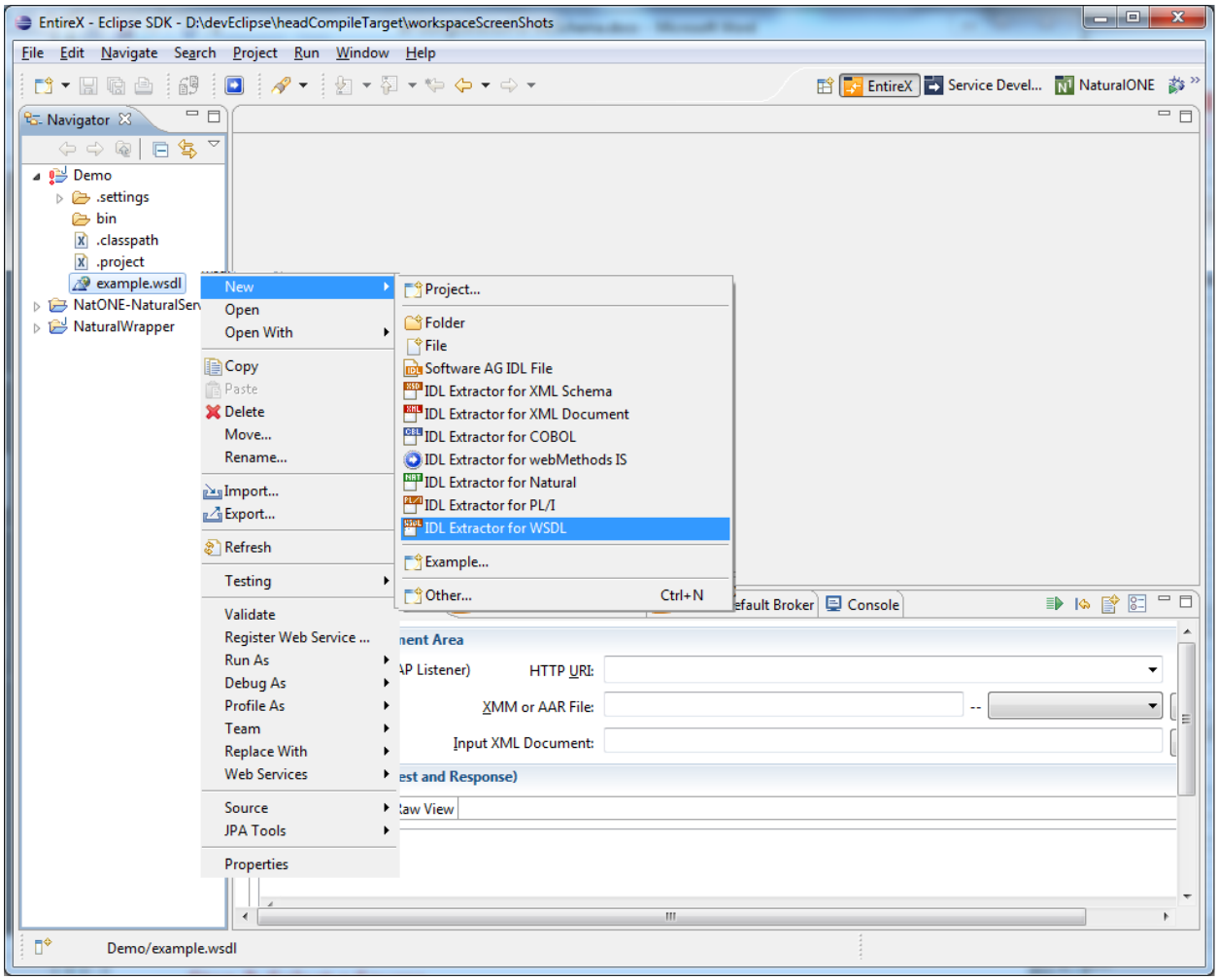
The IDL Extractor for WSDL produces the IDL file and an XML mapping file. The SOAP binding information is written into the XML mapping file (XMM), for example, the SOAPAction value and the namespace definitions. The two other bindings (HTTP and MIME) only return the IDL file, but no XML mapping file. In this case a warning dialog is displayed. WSDL files with mixed bindings, including a SOAP binding, also return an XML mapping file, but display the warning message too. The IDL Extractor for WSDL generates for each service definition in the WSDL file (according to the generation rules) IDL/XMM files named *wsdl-service-name*.*idl* and *wsdl-service-name*.*xmm*. The XML mapping and IDL parameter directions depend on the WSDL source file; INERR and OUTERR mapping trees are possible.

2 Using the Software AG IDL Extractor for WSDL

Caution: If you modify the imported IDL file, do this only in the XML Mapping Editor to ensure the correct dependencies between the IDL and the related XMM file.

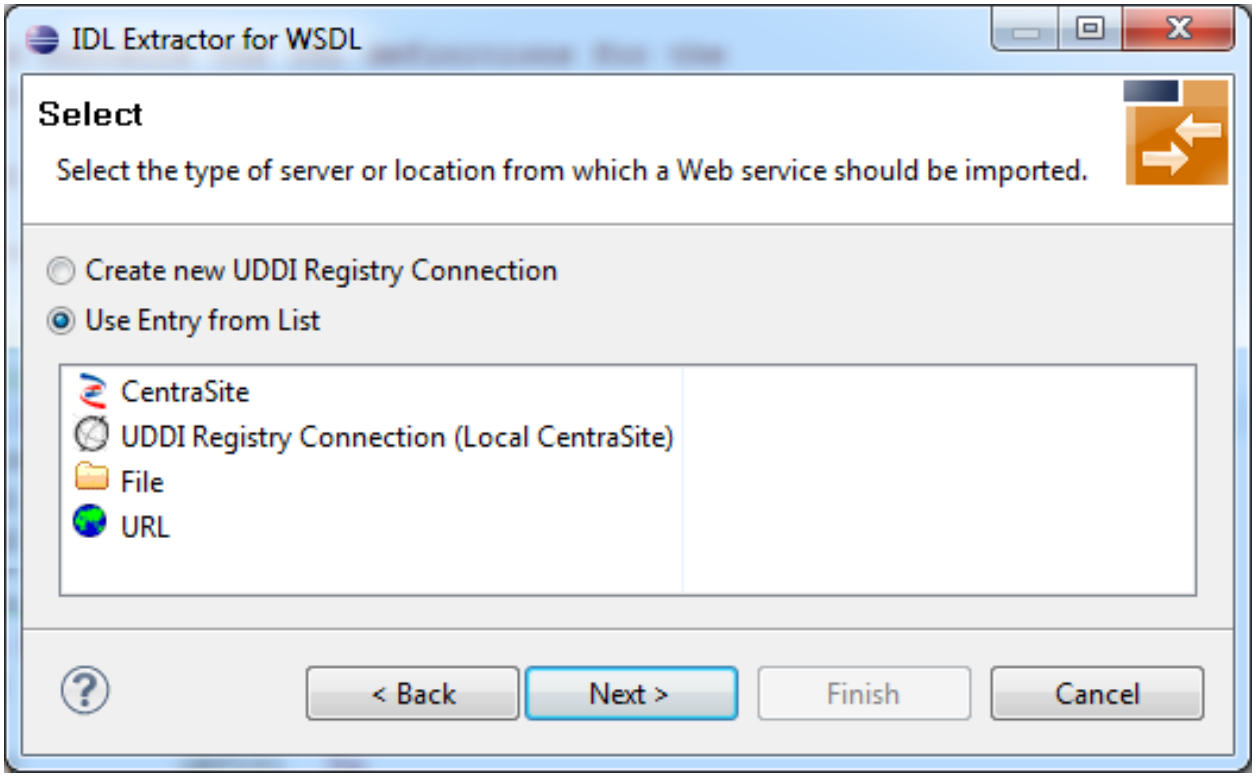
Step 1: Start the IDL Extractor for WSDL

Start the IDL Extractor for WSDL as any other Eclipse New wizard:



Step 2: Select a Source

Depending on the location of the WSDL document to analyze, choose one of the following options:



For **File**, **URL**, **CentraSite** and already defined UDDI registry connections, check the radio button **Use Entry from List**. To define additional connections to UDDI server, check the radio button **Create new UDDI Registry Connection**. UDDI registry connection are defined in the preferences; see also *UDDI Registration*.

Notes:

1. The supported URL protocols are FILE, FTP, HTTP, HTTPS and JAR, for example

```
http://host/myservice?WSDL
```

2. If the connection is over HTTPS, you need to set up HTTPS in Software AG Designer:

   Define `trustStore` in Designer, for example with the following lines in file *eclipse.ini*

```
-Djavax.net.ssl.trustStore=<path to keystore>
-Djavax.net.ssl.trustStorePassword=<keystore password>
```

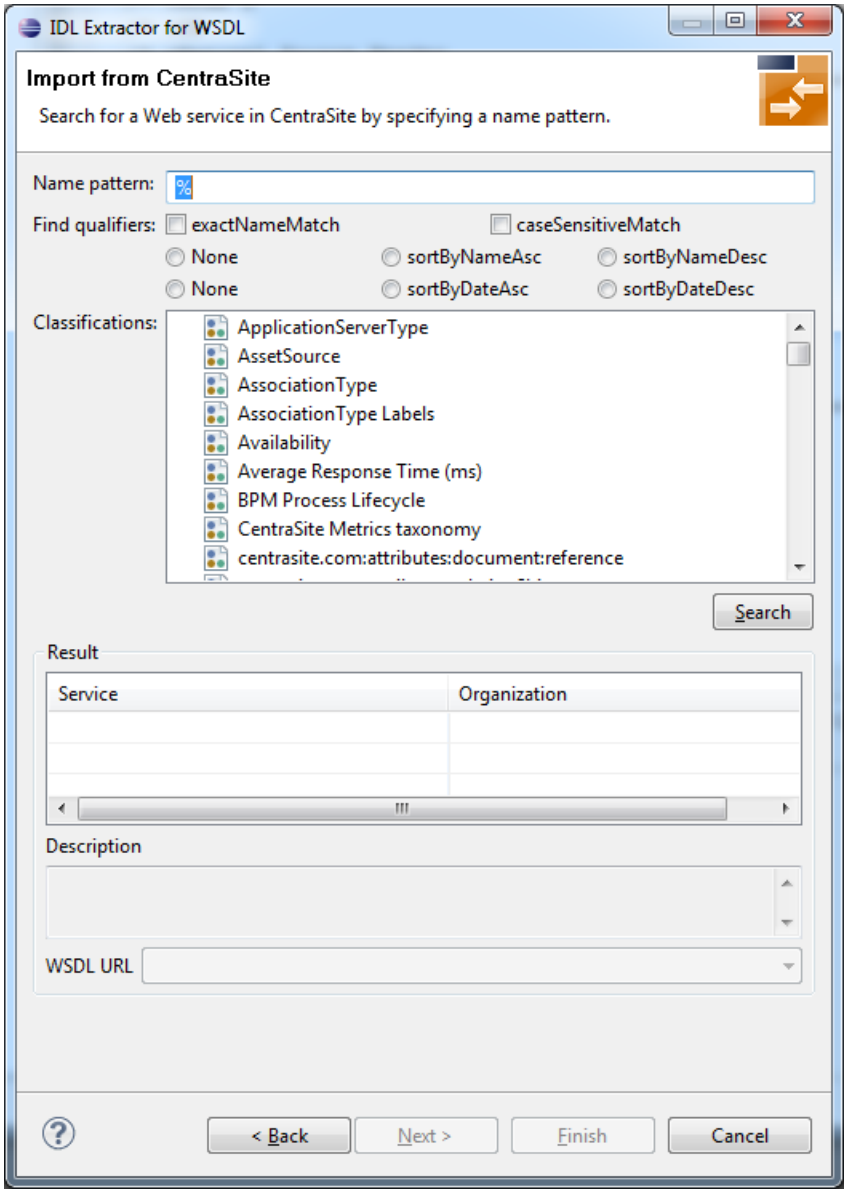
If hostname verification for certification is to be disabled, also add the line:

```
-Dcom.softwareag.entirex.ssl.hostnameverify=false
```

- **CentraSite**
  If the WSDL source file to be extracted is available in CentraSite, continue with ***Step 3a: Specify CentraSite Location***. If the connection is over HTTPS, see the ***Note*** below.
- **UDDI Registry Connection**
  If the WSDL source file to be extracted is accessible using a UDDI registry connection (UDDI server), continue with ***Step 3b: Specify UDDI Server***. If the connection is over HTTPS, see the ***Note*** below.
- **File**
  If the WSDL source file to be extracted is available in your workspace and you have selected it, the file location will be entered in the wizard automatically in the next ***Step 3c: Specify WSDL File***.
- **URL**
  Continue with ***Step 3d: Specify WSDL File URL***. If the connection is over HTTPS, see the ***Note*** below.

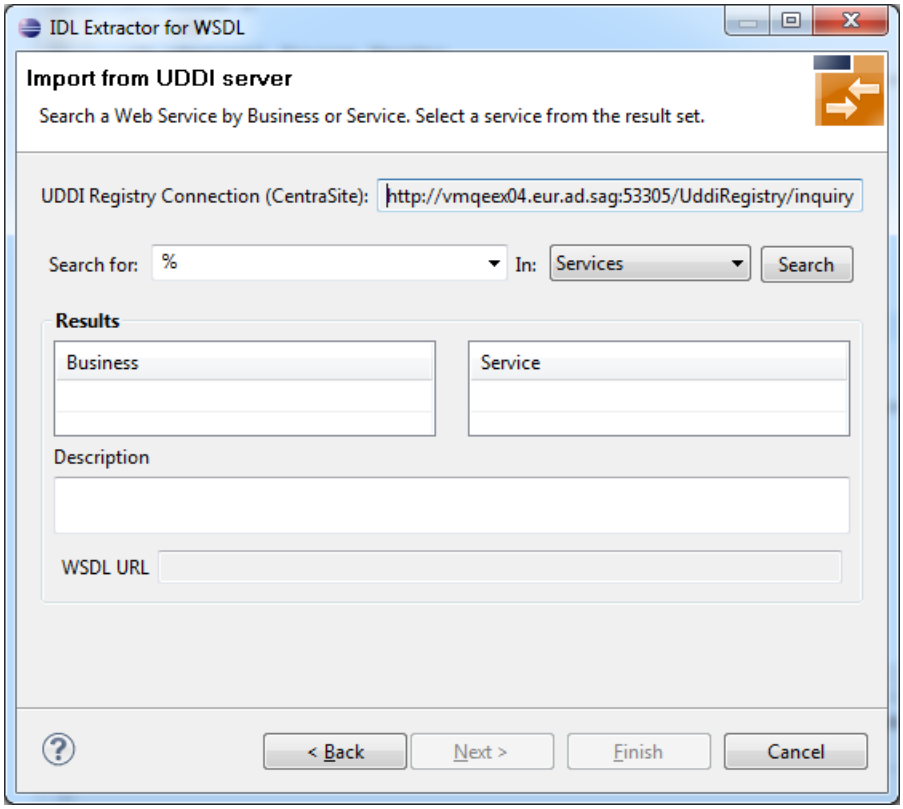
Step 3a: Specify CentraSite Location

When importing from CentraSite, the following screen is displayed:



Step 3b: Specify UDDI Server

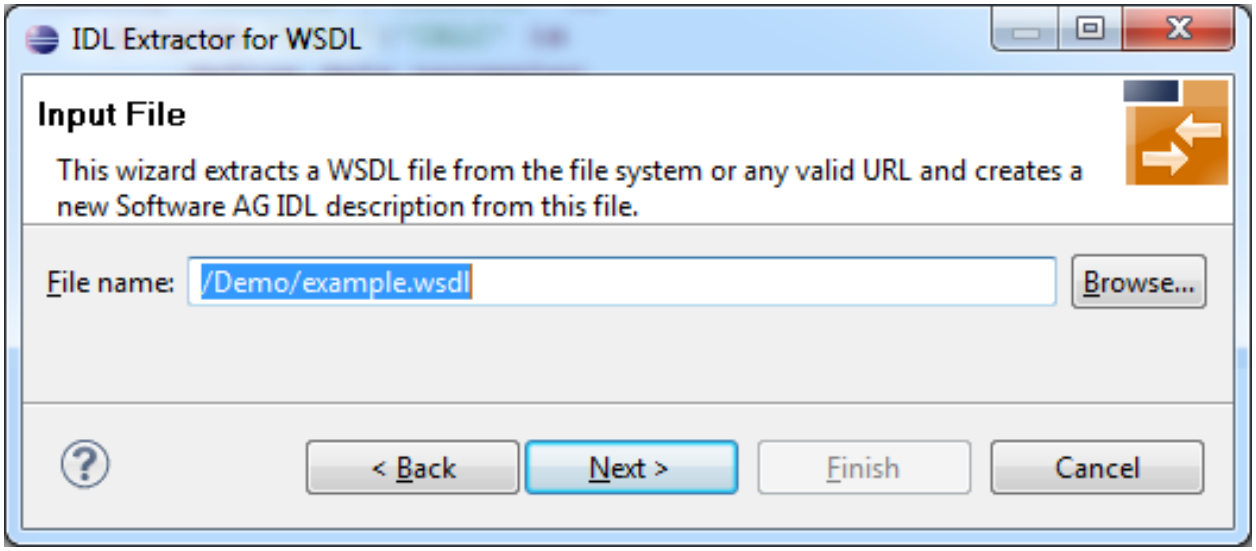
When importing from a UDDI server, the following screen is displayed:



You can search for Businesses or Services. You can restrict your search using % as a wildcard, for example ex%. The search returns a list of service providers and their respective services. Select one service and continue with **Next**.

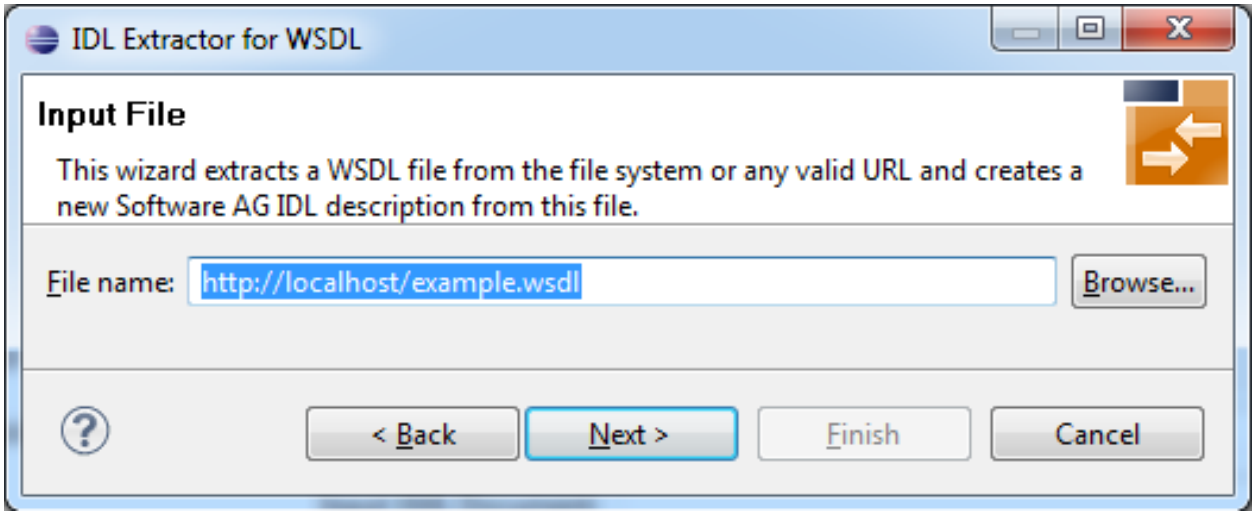
Step 3c: Specify WSDL File

If you selected the WSDL source file before you started the wizard, the file location is already present. Enter or browse for the WSDL source file. Continue with *Step 4: Specify Output Files*.

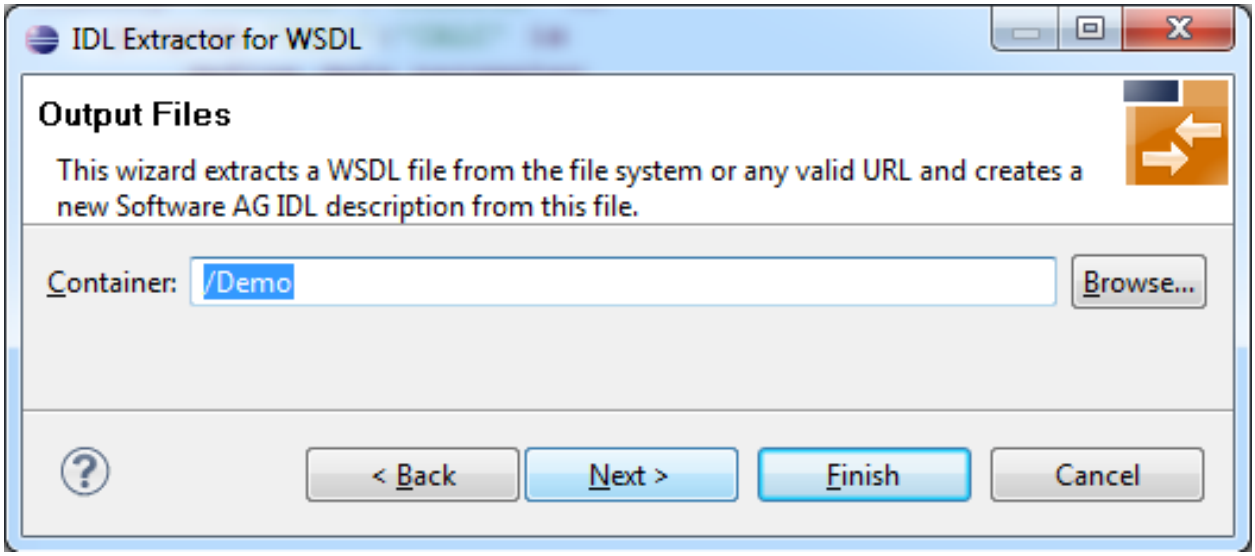


Step 3d: Specify WSDL File URL

Enter the URL for the WSDL source file.



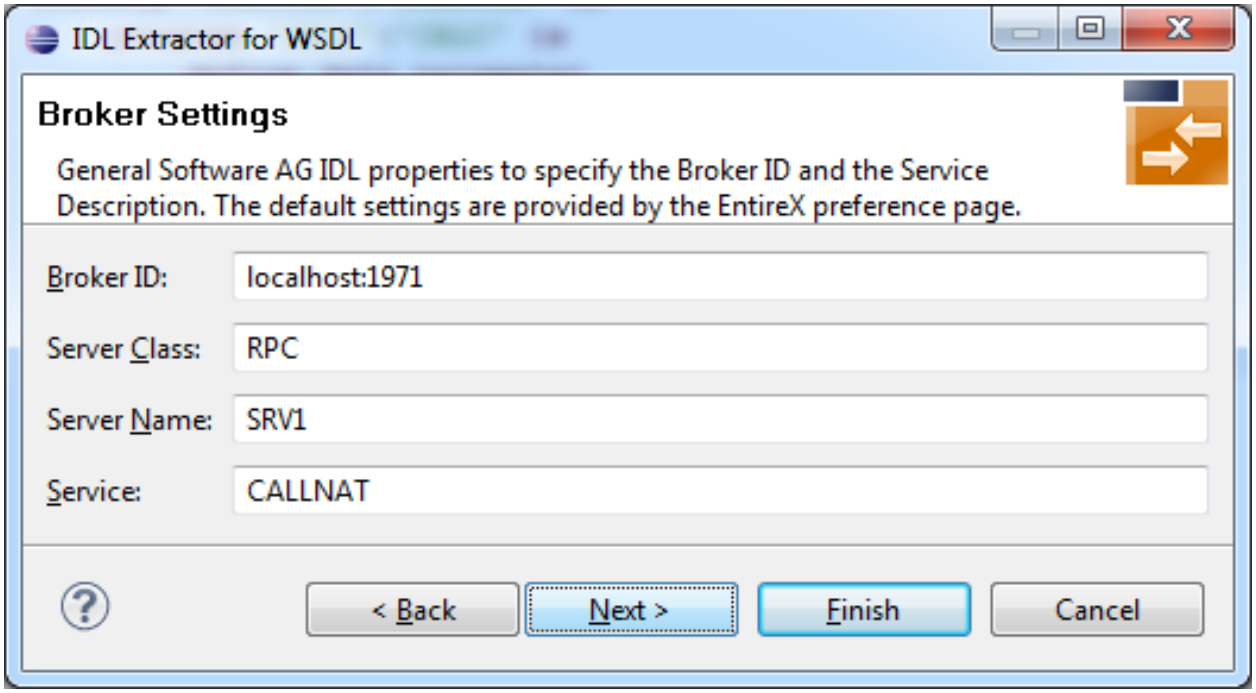
Step 4: Specify Output Files



Select the container where the IDL and XMM files will be stored.

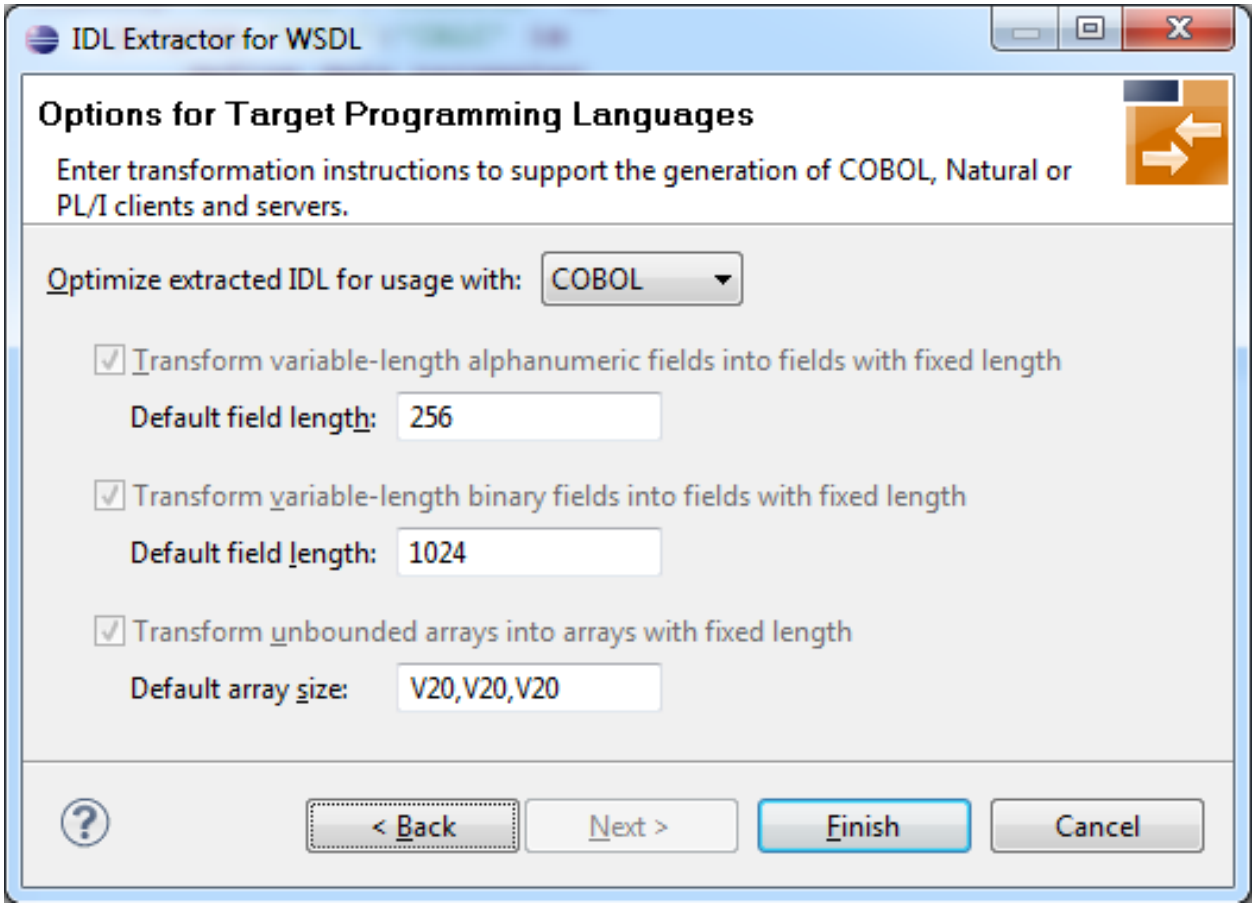
Step 5: Specify Broker Settings

In the following screen you can optionally modify Broker settings.



Step 6: Specify Options for Target Programming Language

The **Options for Target Programming Language** page allows you to specify transformation rules for variable-length fields and unbounded arrays. This is required if you later use the COBOL Wrapper or PL/I Wrapper with the extracted IDL - otherwise COBOL or PL/I wrapping is not possible. If you later use the Natural Wrapper, transformation rules are optional. If they are used, the interface from a Natural point of view is more legacy-like, easier to use but with restrictions.



With the transformation rules, you define default (maximum) lengths and sizes depending on the originating data types on the XML side. If you need different (maximum) lengths and sizes for fields with the same data type, use the XML Mapping Editor. See *Using the XML Mapping Editor*

Caution: If you modify the imported IDL file, do this only in the XML Mapping Editor to ensure the correct dependencies between the IDL and the related XMM file.

Depending on the target programming language of your scenario, the available/possible transformation rules differ. Use the combo-box and choose the target programming language:

- COBOL
- Natural
- PL/I Client
- PL/I Server

- Other

COBOL

For generation of clients and servers with the *COBOL Wrapper*.

Variable-length fields and unbounded arrays with unlimited number of elements are not directly supported by COBOL. There are two possibilities to specify options:

- **Transform to Fixed-length COBOL Fields and Tables**
  Variable-length fields on the XML side are mapped to fixed-length COBOL data items, that is, they will always be padded (alphanumeric with trailing blanks; binary with x00). Unbounded arrays on the XML side are mapped to fixed-size COBOL tables, see *COBOL Tables with Fixed Size*. This means they will always be filled up to the maximum number of elements. To use this possibility, enter the length or size to define the restriction, for example 256, 1024 or 20.
- **Limit Variable-length Fields and Unbounded Arrays to a Maximum**
  For variable-length fields, EntireX provides a possibility to transform them into variable-length fields with a maximum length. See *IDL Data Types* under *Software AG IDL File* in the IDL Editor documentation, AVnumber and BVnumber under column Type and Length. In this case the variable-length fields are also mapped to fixed-length COBOL data items, but they will be trimmed (alphanumeric with blank, binary with x00) on the COBOL side. Unbounded arrays with a maximum are directly supported in COBOL in the form of COBOL tables with the `OCCURS DEPENDING on` clause, see *COBOL Tables with Variable Size - `DEPENDING ON` Clause*. Only filled elements are transferred. In this case the RPC message size is reduced compared with the alternative *Transform to Fixed-length COBOL Fields and Tables* above. To use this possibility, enter a leading V-character before the limited length or limited size of unbounded arrays, such as V256, V1024 or V20.

Natural

For generation of clients and servers with the *Natural Wrapper*.

Variable-length fields and unbounded arrays with unlimited number of elements are directly supported by Natural. As an alternative, EntireX also provides the possibility to transform to a more legacy-like interface with fixed length.

- **Transform to Fixed-length Fields and Fixed-size Arrays on the Natural Side**
  Variable-length fields on the XML side are mapped to fixed-length Natural data types, that is, they will always be padded (alphanumeric with trailing blanks; binary with x00). Unbounded arrays on the XML side are mapped to fixed-length Natural arrays, that is, they will always be filled up to the maximum number of elements. Using this possibility you benefit from easier and simpler Natural programming. To use this possibility, check the check boxes and enter the restricted length for variable-length alphanumeric fields, such as 253, variable-length binary fields such as 126, and the restricted size, for example 20,20,20 for unbounded arrays.

- **Transform to Variable-length Fields and Variable-size Arrays on the Natural Side**
  Variable-length fields on the XML side are mapped to Natural `DYNAMIC` data types. No padding occurs on the Natural side. Unbounded arrays on the XML side are mapped to Natural X-Arrays. Only filled elements are transferred. In this case the RPC message size is reduced compared with the alternative *Transform to Fixed-length Fields and Fixed-size Arrays on the Natural Side* above. To use this possibility, clear the check boxes.

PL/I Client

For generation of clients with the *PL/I Wrapper*. The following possibilities exist in scenarios with PL/I clients:

- **Transform to Fixed-length Fields and Arrays**
  Variable-length fields on the XML side are mapped to fixed-length PL/I data items, that is, they will always be padded (alphanumeric with trailing blanks; binary with x00). Unbounded arrays on the XML side are mapped to fixed-size PL/I arrays, see *Arrays* under *PL/I to IDL Mapping*. This means they will always be filled up to the maximum number of elements. To use this possibility, enter the length or size to define the restriction, for example 256, 1024 or 20.
- **Limit Variable-length Fields to a Maximum**
  As an alternative, variable-length fields can be mapped to PL/I data type with the attribute `VARYING`. See also *IDL Data Types* under *Software AG IDL File* in the IDL Editor documentation AVnumber and BVnumber under column Type and Length. In this case no padding occurs on the PL/I side. To use this possibility, enter a leading V-character before the limited length, such as V256 or V1024.

  Note: This alternative does not exist for unbounded arrays.

PL/I Server

For generation of servers with the *PL/I Wrapper*. The following possibilities exist in scenarios with PL/I servers:

- **Transform to Fixed-length Fields and Arrays**
  Variable-length fields on the XML side are mapped to fixed-length PL/I data items, that is, they will always be padded (alphanumeric with trailing blanks; binary with x00). Unbounded arrays on the XML side are mapped to fixed-size PL/I arrays, see *Arrays* under *PL/I to IDL Mapping* in the IDL Extractor for PL/I documentation. This means they will always be filled up to the maximum number of elements. To use this possibility, enter the length or size to define the restriction, for example 256, 1024 or 20.

- **Limit Variable-length Fields to a Maximum**
  As an alternative, variable-length fields can be mapped to PL/I data type with the attribute `VARYING`. See also *IDL Data Types* under *Software AG IDL File* in the IDL Editor documentation, AVnumber and BVnumber under column Type and Length. In this case no padding occurs on the PL/I side. To use this possibility, enter a leading V-character before the limited length, such as V256 or V1024.

  Note: This alternative does not exist for unbounded arrays.

- **Transform to Variable-size Arrays on the PL/I Side**
  As an alternative for unbounded arrays on the XML side, they can be mapped to PL/I arrays using `(*,*,*)` notation. Only filled elements are transferred. Note that PL/I does not allow resizing of these data types and arrays. In this case the RPC message size is reduced compared with the first alternative *Transform to Fixed-length PL/I Fields and Arrays* above. To use this possibility, uncheck the check box.

  Note: This alternative does not exist for variable-length fields.

Other

If you later use wrappers other than the COBOL Wrapper, Natural Wrapper or PL/I Wrapper, no transformation rules are required. Variable-length fields and unbounded arrays are extracted as is; there are no restrictions regarding data length that can be transferred in variable-length fields and the number of elements that can be transferred in unbounded arrays.

Press **Finish** to start extraction.

Extraction Result

When the operation is completed, the IDL file is opened with the *Software AG IDL Editor*.

If the WSDL source files to extract from contain parameters that cannot be mapped to IDL parameters, an IDL file with incorrect IDL syntax is created. The unsupported parameters lead to IDL parameters of data type Error, which is not supported. In the **Problems View** you get a marker for the first error in the IDL file.

3 Using the IDL Extractor for WSDL in Command-line Mode

See *Using the EntireX Workbench in Command-line Mode* for the general command-line syntax. The table below shows the command-line option for the IDL Extractor for WSDL.

Task	Command	Option	Description
Extract an IDL file and an XMM file from a Web service.	`-extract:wsdl`	`-help`	Display this usage message.
		`-project`	Name of the project or subfolder where the IDL and XMM files are stored.

Example

```
<workbench> -extract:wsdl /Demo/example.wsdl
```

where *<workbench>* is a placeholder for the actual Workbench starter as described under *Using the EntireX Workbench in Command-line Mode*.

Status and processing messages are written to standard output (stdout), which is normally set to the executing shell window.

4 WSDL to IDL Mapping

Extracting IDL from WSDL Files

The Software AG IDL Extractor for WSDL produces the IDL file and an XML mapping file. The SOAP-binding information is written into the XML mapping file (XMM), for example, the SOAPAction value and the namespace definitions. The two other bindings (HTTP and MIME) only return the IDL file, but no XML mapping file. In this case, a warning dialog is displayed. WSDL files with mixed bindings, including a SOAP binding, also return an XML mapping file, but display the warning message too. The XML mapping and IDL parameter directions depend on the WSDL source file; INERR and OUTERR mapping trees are possible.

Mapping WSDL XML Schema Data Type to Software AG IDL

WSDL / XML Schema	XMM	Software AG IDL
`binary`, `base64Binary`	`binary`	`BV` (or `BV`*n* or `B`*n*) (3)
`hexBinary` (1)	`binary`	`BV` (or `BV`*n* or `B`*n*) (3)
`boolean`	`boolean`	`L`
`date`	`date:yyyy-MM-dd` (2)	`D`
`float`	`float`	`F4`
`double`	`float`	`F8`
`byte`, `unsignedByte`	`integer`	`I1`
`short`, `unsignedShort`	`integer`	`I2`
`int`, `unsignedInt`	`integer`	`I4`
`integer`, `positiveInteger`, `nonPositiveInteger`, `negativeInteger`, `nonNegativeInteger`	`number`	`N29.0`
`decimal`, `number`	`number`	`N22.7`
`long`, `unsignedLong`	`number`	`N19.0`
`time`	`dateTime:HH:mm:ss` (2)	`T`
`dateTime`	`dateTime:yyyy-MM-dd'T'HH:mm:ss` (2)	`T`
`gYearMonth`	`string`	`A8`
`gDay`, `gYear`	`string`	`A11`
`gMonth`	`string`	`A12`
`gMonthDay`	`string`	`A13`
`string` (and all types not listed here)	`string`	`AV` (or `AV`*n* or `A`*n*) (3)

Notes:

1. The `hexBinary` format is not supported by the XML/SOAP Runtime.
2. Edit the `date` and `dateTime` patterns manually to match the formats of the original documents.

   Example: `<myTime xsi:type="xsd:date">11:08:23+01:00</myTime> --> dateTime:HH:mm:ss' +01:00 ' --> T`

   Note: The `+01:00` is not supported by IDL (EntireX RPC protocol).

3. Mapped according to specified transformation rules. See *Step 6: Specify Options for Target Programming Language*.

Extracting the Name for the IDL Library

The IDL library name (see `library-definition` under *Software AG IDL Grammar* in the *IDL Editor* documentation) will be used from the value of the name attribute of the tag `<service>`, for example:

```
<definitions ...>
    <service name="LIBRARYNAME">
        <port .../>
    </service>
</definitions>
```

Extracting the Name for the IDL Program

The RPC program name (see `program-definition` under *Software AG IDL Grammar* in the *IDL Editor* documentation) will be used from the value of the name attribute of the tag `<operation>` as child of the tag `<portType>`, for example:

```
<definitions ...>
    <portType name="...">
        <operation name="PROGRAMNAME">
            <input .../>
            <output .../>
        </operation>
    </portType>
</definitions>
```

5 Writing Web Service Client Applications

Web Service Clients

EntireX, in conjunction with the Software AG Common Web Services Stack (WSS), provides development and runtime functionality to support EntireX RPC clients consuming (or calling) Web services. The relevant products parts are:

- IDL Extractor for WSDL to generate an XML/SOAP mapping from the service's WSDL.
- XML Mapping Editor to adapt the mapping file if necessary. See *XML Mapping Editor*.
- EntireX XML/SOAP RPC Server, acting as the EntireX Web service runtime, to deploy the XML mapping file into and perform the Web service call. See *Administering the EntireX XML/SOAP RPC Server* in the UNIX and Windows administration documentation.
- Web Services Stack client runtime, which handles the underlying SOAP, WS-Policy and message transport. See the separate Software AG Common Web Services Stack documentation.

For each Web service client that is deployed in XML/SOAP RPC Server, a special configuration is required. The default name of the configuration file is *entirex.xmlrpcserver.configuration.xml*. Example configuration:

```
...
<TargetServer name="http://localhost:10010/wsstack/services/example">
  <xmms>
    <exx-xmm
      name="C:\MyWorkspace\Example\example.xmm"
      wsdl="http://localhost:10010/wsstack/services/example?wsdl"
      service="example"
      port="EXAMPLESOAP11Port"
      soapVersion="1.1"
      repository="C:\SoftwareAG\WS-Stack\repository" />
  </xmms>
</TargetServer>
...
```

where	`code`	is the XMM mapping file for the service
	`wsdl`	is the reachable URL for the WSDL file of the service. This WSDL file can contain additional WS-Policy information for the service that is supported by the Web Services Stack
	`service`	is the service name inside the WSDL file of the service
	`port`	is the port inside the WSDL file. This information is needed when the WSDL file can contain more than one port. The value in this example is the default number; this number can be changed during installation
	`soapVersion`	can be "1.1" or "1.2"

`repository` is the client "repository" of the Web Services Stack (containing the *conf* and *modules* subfolders)

Configuring Advanced Web Service Clients

A Web Services Stack client using advanced Web services functionality (WS-Security, WS-ReliableMessaging, etc.) requires the following configuration data:

- A "repository" containing configuration files and extension modules (.mar files). The "repository" is a folder containing subfolders *conf* and *modules*.
- The *conf* folder contains the client's global configuration file *axis2.xml* for the Web Services Stack engine.
- The modules folder contains modules for WS-* extensions, for example
  - addressing-1.4.mar if WS-Addressing is used
  - rampart-1.4.mar if WS-Security is used
  - rahas-1.4.mar if WS-Trust is used
- If WS-Security is used, an additional security configuration file *wsclientsec.properties* is required. The name and location of this file can be configured in the client's global configuration file *axis2.xml*, using the `securityConfigFile` property.

Here is an example of a client security configuration file *wsclientsec.properties*:

```
USERNAME=client
ENCRYPTION_USER=service
PASSWORD_CALLBACK_HANDLER_CLASS=com.softwareag.wsstack.test.PasswordCallbackHandler
KEYSTORE_FILE_ENCRYPT=client.jks
KEYSTORE_TYPE_ENCRYPT=jks
KEYSTORE_PASSWORD_ENCRYPT=apache
KEYSTORE_FILE_SIGN=client.jks
KEYSTORE_TYPE_SIGN=jks
KEYSTORE_PASSWORD_SIGN=apache
KEYSTORE_SSL_LOCATION=clientKS.jks
SSL_KEYSTORE_TYPE=jks
SSL_KEYSTORE_PASSWORD=apache
TRUSTSTORE_SSL_LOCATION=clientKS.jks
TRUSTSTORE_SSL_TYPE=jks
TRUSTSTORE_SSL_PASSWORD=apache
```

The `USERNAME` specifies the user name that the Web service client uses to authenticate itself with the Web service. It corresponds to `Alias` as described for the service configuration. `ENCRYPTION_USER` and `PASSWORD_CALLBACK_HANDLER` correspond accordingly. The example Java password callback handler from above can also be used for the client. The Web Services Stack provides some default

password callback handlers that can be instantly used without needing to write a custom one. For example `com.softwareag.wsstack.pwcb.ConfigFilePasswordCallbackHandler`, which uses a simple user configuration file `users.xml`. See the separate WS-stack documentation for more details.

A Web Services Stack client that connects to a Web Service that requires advanced Web Services policies (which are attached to the service's WSDL as policy attachment) automatically sets up and processes the necessary SOAP headers in the SOAP message exchange with the service and fills the required parameters according to the configuration information described above.

Example: Setting up an EntireX Client to Consume a Secured Web Service

This section describes how to set up EntireX RPC clients calling a remote Web service that has a WS-Security `UsernameToken` policy in effect. Two scenarios are described: one where the security policy is defined in the WSDL, and one where the policy is *not* defined.

Setting up an EntireX RPC Server to Configure WS-Security

To set up a dedicated XML/SOAP RPC Server instance to connect EntireX RPC clients to a secured Web service, the following prerequisites apply, for example in a folder of their own in the file system:

- A startup script, `jxmlserver.bat`. You can copy this from <*Install-Dir*>\EntireX\bin and adapt it.
- Property file and config file, `entirex.xmlrpcserver.properties` and `entirex.xmlrpcserver.configuration.xml`. You can copy these from <Install-Dir>\EntireX\conf and adapt them.
- A WSS client repository containing the subfolders `conf`, `modules` and `services`. You can copy this from <*Install-Dir*>\WS-Stack\repository and adapt it

  Note: For this example only the `addressing` and `rampart` modules are required; delete the others.

- A WSS client security configuration properties file, `wsclientsec.properties`, containing at least values for `USERNAME` and `PASSWORD_CALLBACK_HANDLER_CLASS`. You can copy this from <*Install-Dir*>\EntireX\bin and adapt it.

Scenario 1: Service requires UsernameToken and has a Security Policy in the WSDL

In this scenario, the Web Services Stack runtime can use the WS-Security policy from the WSDL to determine which security headers need to be attached to the SOAP message. Follow the steps below:

To set up an XML/SOAP RPC server with defined security policy

1 Store a copy of the service's WSDL (which also includes the policy attachment) in the test folder.

2 Generate an XML/SOAP mapping file (.xmm) with the IDL Extractor for WSDL. Enter the name of the XML/SOAP RPC Server ("XMLSERVER" in this example) under **Broker Settings** on the wizard page.

3 Start the XML/SOAP RPC Server in a command window, using the `start` script.

4 Deploy the mapping file to the XML/SOAP RPC Server. Provide the location of the WSDL and specify the desired service endpoint, name and port.

5 Configure the Web Services Stack repository for the service, using the following steps:

1. Stop the XML/SOAP RPC Server.
2. Edit the file `entirex.xmlrpcserver.configuration.xml` and add the repository definition to the `TargetServer` section. For example:

```
<TargetServer
 name="http://localhost:10010/wsstack/services/example.EXAMPLESOAP11Port/">
  <xmms>
    <exx-xmm
      name="D:\TestWS\example.xmm"
      port="EXAMPLESOAP11Port"
      wsdl="D:\TestWS1\example.wsdl"
      service="example"
      soapVersion="1.1"
      repository="repository"/>
  </xmms>
</TargetServer>
```

3. Restart the XML/SOAP RPC Server.

6 Configure security for the WSS client runtime by modifying files `wsclientsec.properties` and `users.xml`:

- File `wsclientsec.properties`, containing the lines

```
USERNAME=user
PASSWORD_CALLBACK_HANDLER_CLASS=
  com.softwareag.wsstack.pwcb.ConfigFilePasswordCallbackHandler
```

Specify the desired `username`, which should go into the `UsernameToken`. The password callback handler class is used by the WSS client runtime to inquire a password for this user. The `ConfigFilePasswordCallbackHandler` is a simple default handler delivered with Web Services Stack that reads the password of a given user from a flat file `users.xml`. You can write a custom password callback handler for other methods to acquire passwords.

- File `users.xml`. Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<users>
  <user username="user" password="pass" />
  <user username="client" password="apache" />
  <user username="service" password="apache" />
  <user username="bob" password="bobPW" />
</users>
```

To test access to the remote Web service, use the XML Tester on the IDL file. See *XML Tester* in the XML/SOAP Wrapper documentation.

Scenario 2: Service requires UsernameToken but does not declare this in the WSDL

For this scenario, perform the steps as described above. Because the WSDL does not contain a security policy stating that `UsernameToken` is required, perform this additional step:

- Explicitly tell the Web Services Stack client runtime about the `UsernameToken` required by the service. Edit *<SuiteInstallDir>/profiles/CTP/workspace/wsstack/repository/conf/axis2.xml*, uncomment the `rampart` module and add the `OutFlowSecurity` parameters:

```
<module ref="rampart"/>
<parameter name="OutflowSecurity">
  <action>
    <items>UsernameToken</items>
    <user>user</user>
    <passwordType>PasswordText</passwordType>
    <passwordCallbackClass>
    com.softwareag.wsstack.pwcb.ConfigFilePasswordCallbackHandler
    </passwordCallbackClass>
  </action>
</parameter>
```

where *user* is a valid user name for authentication.