TIBCO iProcess® Web Services Plug-in

User's Guide

Software Release 11.3
October 2011

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Important Information

Contents

Back to Library

Back to Library

Back to Library

Back to Library

Preface

This guide explains how to define and use the TIBCO iProcess™ Web Services Plug-in to integrate external applications with the TIBCO iProcess™ Engine.

Topics

Back to Library

How to Use This Guide

This guide contains the following chapters:

- Chapter 1 provides an overview of the iProcess Web Services Plug-in
- Chapter 2 describes the iProcess Web Services Plug-in architecture, high-availability configurations and deployment.
- Chapter 3 describes the different types of Web Services security that are available.
- Chapter 4 describes how to create an iProcess Web Services step in your iProcess procedure.
- Chapter 5 contains some examples that show how to use the TIBCO iProcess Web Services Plug-in.
- Chapter 6 describes iProcess Web Services Plug-in configuration files that you can modify.
- Chapter 7 describes the iProcess Web Services operations that can be called by third-party applications.
- Appendix A contains information about the **WebServicesStaffwareData.xsd** schema that is provided for field mapping to iProcess Engine fields.
- Appendix A describes how to troubleshoot problems using the iProcess Web Services Plug-in.
- Appendix B describes how iProcess field data is converted to XML data types.

Back to Library

Target Audience

This guide is aimed at *system integrators* and *procedure definers* who need to implement web services with iProcess procedures.

It assumes that:

- you have prior knowledge of iProcess concepts. You should be familiar with the concepts described in the TIBCO iProcess™ Modeler set of guides.
- you have a detailed understanding of Java Message Service (JMS) and how to administer your JMS Provider as well as web service technologies and Java.
- you have some understanding of Extensible Markup Language (XML) and Extensible Stylesheet Language Transformations (XSLT).
- (Optional) you have some understanding of TIBCO BusinessWorks™ or other target applications.

Back to Library

Changes From the Previous Issue

The major technical change from the information presented in the previous issue of this guide is:

Using Security Profiles to Send iProcess Field Data

Using the Security Profile Administrator, you can include iProcess field data in your SOAP header to outbound web services at runtime. For example, you could use custom headers to send context-sensitive iProcess field data that could be used in the web service at runtime. This is achieved by inserting a token into any field in the main dialog of the Security Profile Administrator. The fields can contain both SOAP and security information, see Using Security Profiles to Send iProcess Field Data, page 41.

Back to Library

Connecting with TIBCO Resources

How to Join TIBCOmmunity

TIBCOmmunity is an online destination for TIBCO customers, partners, and resident experts, a place to share and access the collective experience of the TIBCO community. TIBCOmmunity offers forums, blogs, and access to a variety of resources. To register, go to http://www.tibcommunity.com.

How to Access All TIBCO Documentation

After you join TIBCOmmunity, you can access the documentation for all supported product versions here:

http://docs.tibco.com/TibcoDoc

Back to Library

Documentation Conventions

Because this guide covers both Windows and UNIX versions of the iProcess Web Services Plug-in, this guide uses the Windows convention of a backslash (\). The equivalent pathname on a UNIX system is the same, but using the forward slash (/) as a separator character.

UNIX pathnames are occasionally shown explicitly, using forward slashes as separators, where a UNIX-specific example or syntax is required.

The following typographical conventions are used in this manual.

Table 1 General Typographical Conventions

Convention	Use
`code font`	Code font identifies commands, code examples, filenames, pathnames, and output displayed in a command window. For example: Use `MyCommand` to start the foo process.
`bold code font`	Bold code font is used in the following ways: • In procedures, to indicate what a user types. For example: Type **`admin`**. • In large code samples, to indicate the parts of the sample that are of particular interest. • In command syntax, to indicate the default parameter for a command. For example, if no parameter is specified, `MyCommand` is enabled: MyCommand [**`enable`** | disable]
italic font	Italic font is used in the following ways: • To indicate a document title. For example: See *TIBCO BusinessWorks Concepts*. • To introduce new terms For example: A portal page may contain several *portlets*. Portlets are mini-applications that run in a portal. • To indicate a variable in a command or code syntax that you must replace. For example: `MyCommand` *pathname*
Key combinations	Key name separated by a plus sign indicate keys pressed simultaneously. For example: Ctrl+C. Key names separated by a comma and space indicate keys pressed one after the other. For example: Esc, Ctrl+Q.

Back to Library

Table 1 General Typographical Conventions (Cont'd)

Convention	Use
webservices_server_location	The path you specify during installation in which the iPE Web Services Server files are installed. For example: On Windows: **C:\Program Files\TIBCO\iPEWebServicesPlugin** On UNIX/Linux: **/opt/tibco/iPEWebServicesPlugin/**
	The note icon indicates information that is of special interest or importance, for example, an additional action required only in certain circumstances.
	The tip icon indicates an idea that could be useful, for example, a way to apply the information provided in the current section to achieve a specific result.
	The warning icon indicates the potential for a damaging situation, for example, data loss or corruption if certain steps are taken or not taken.

Back to Library

Back to Library

Chapter 1 Introduction to the iProcess Web Services Plug-in

This chapter provides an introduction to the iProcess Web Services Plug-in and provides an overview of how it works.

Topics

Back to Library

What is the iProcess Web Services Plug-in?

The main function of the iProcess Web Services Plug-in is to provide an interface for both inbound and outbound communication between the iProcess Engine and external applications:

- **Outbound** - EAI steps in iProcess procedures make calls to external applications using Web Services to perform some operation.
- **Inbound** - External applications make calls to iProcess to perform iProcess Web Service operations such as starting cases, triggering events or suspending cases.

The iProcess Web Services Plug-in consists of three components:

- Web Services Engine - this consists of an Inbound Engine (to handle calls from external applications to iProcess operations using Web Services) and an Outbound Engine (to handle calls to external web services). Both of these engines are hosted by Jetty which is used as a JMX/servlet container.
- iProcess Engine Interface Component - This consists of an EAI Plug-in. It allows the iProcess background processes to communicate with the Web Services Engine.
- TIBCO iProcess Web Services Client Plug-in - This plug-in needs to be installed on your client machine that hosts your iProcess Workspace and iProcess Modeler. This plug-in enables you to define EAI Web Service steps in your iProcess procedures.

For more information about how these components interact, see Chapter 2.

Back to Library

Prerequisites for Using the iProcess Web Services Plug-in

Before using the iProcess Web Services Plug-in, you need to decide which data transport mechanism you are going to use.

There are two data transport mechanisms you can use to send data between the iProcess Engine and an external application.

- Simple Object Access Protocol (SOAP) requests over the Hypertext Transfer Protocol (HTTP) - (SOAP/HTTP)
- Extensible Markup Language (XML) text using a Java Message Server (JMS) - (XML/JMS).

The main difference between using SOAP/HTTP and XML/JMS is that SOAP/HTTP uses Web Services Description Language (WSDL) source to determine how the text is sent. However, when using XML/JMS you must define your own XML schema for sending data between an iProcess Engine and an external application. Whether the XML data is validated against any such schema is optional.

Back to Library

Deciding Which Data Transport Mechanism to Use

There are advantages to using both the SOAP/HTTP and XML/JMS data transport mechanisms.

Advantages of the SOAP/HTTP Data Transport Mechanism

The advantages to consider when using the SOAP/HTTP data transport mechancism are:

- It is a more recognised standard than XML/JMS.
- It is simpler to use than the XML/JMS data transport mechanism as it does not require an XML schema. When using XML/JMS you must define your own XML schema for sending text whereas using SOAP/HTTP, you use WSDL source to define how text is sent.
- You can use security profiles with the SOAP/HTTP data transport mechanism. You cannot use Security profiles with the XML/JMS data transport mechanism.

Advantages of the XML/JMS Data Transport Mechanism

Note that XML/JMS support only applies to queues. Topics are not supported using the XML/JMS data transport mechanism.

The advantages to consider when using the XML/JMS data transport mechanism are:

- Less data is sent using XML/JMS than SOAP/HTTP. This is because when data is sent using SOAP over HTTP, it is sent in a SOAP container which consists of two parts, a header and the body. The body is the message payload and the header contains system level information. However, when using XML/JMS, although the message still has a header, the amount of information that is contained in the header is smaller. Therefore, because there is less data, XML/JMS tends to be a faster data transport mechanism than SOAP/HTTP.
- The XML/JMS data transport mechanism can be more reliable because the JMS server has transactional capability. This means that if the connection is lost between the JMS Server and the iProcess Web Services Plug-in, then the data requests are retried. With SOAP/HTTP, if the connection between the external application and the iProcess Web Services Plug-in is lost, the SOAP requests are also lost.

Back to Library

Using the SOAP/HTTP Data Transport Mechanism

This section describes:

Prerequisites for Using SOAP/HTTP

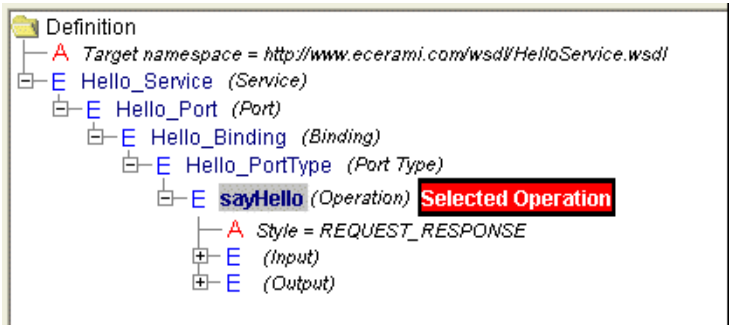
If you are using SOAP/HTTP, you need to be familiar with using web services and have access to the appropriate Web Services Definition Language (WSDL) source for the Web Service you want to call. The WSDL source can be either static, at a specific URL, or via a UDDI (Universal Description, Discovery and Integration) repository.

Information about a Web Service is stored in the WSDL source. The WSDL source describes all the methods that a Web Service exposes (in the form of XML messages it can accept and send), as well as the protocols over which the Web Service is available. The WSDL source provides all the information a client application needs to use the Web Service. For information about calling iProcess Engine Web Services, see Chapter 7.

The WSDL source contains a set of information linked together in the following hierarchy:

```
-Service
--Port
---Binding
----Port Name
-----Operation
```

The iProcess Web Service Integrator wizard enables you to browse this hierarchy to choose the operation you want to call from your procedure. For example:



Web Service Call Styles

When a Web Service call is made from iProcess, a message is sent to the Web Service. There are two types of messages: Remote Procedure Call (RPC) style or Document style.

- An RPC style message specifies the name of the procedure to call and contains a set of input parameters for the Web Service. An RPC style output message is received containing a return value and any output parameters returned from the Web service. The messages can be defined using an XML schema so that custom data types can be used.
- Document style messages enable more loosely coupled communication between two applications in that the sender does not need to know anything about the implementation of the service. The Web Service determines how to process the message based on the contents of the message. The format of the message is defined by XML schema definitions, which can be defined in the WSDL or in a separate schema.

The style used for your Web Service call is decided when you choose the Web Service operation from the WSDL source:

- A Document style message is used when a Document style WSDL operation is selected or custom data types are used.
- A RPC style message is used when there are no custom data types and the WSDL operation is not Document style.

When the Document style messages are required, iProcess uses Extensible Stylesheet Language Transformation (XSLT) to generate XML based on iProcess fields. The resulting XML data is used when calling the Web Service operation.

Back to Library

Using the XML/JMS Data Transport Mechanism

There are many different JMS Providers that you can use to integrate between the iProcess Engine and external applications. You need to know how to configure the iProcess Web Services Plug-in for the JMS providers you want to use.

Note that XML/JMS support only applies to queues. Topics are not supported in iProcess Web Services Plug-in.

Prerequisites for Using XML/JMS

If you are using XML/JMS, you need to be familiar with using XML and have access to the appropriate XML for the external application you want to call. This means that you must configure the following:

- **XML Schema**: You need to understand the XML schema of the external application you are sending data to and define an XML Schema for the data you are passing between the iProcess Engine and the external application.
- **JMS Target Name**: You need to identify a JMS target queue name when you define an iProcess Web Services step in a procedure. The JMS target name is the alias of a JMS queue that has already been associated with a particular JMS Provider. You must define aliases for the queues that the client is allowed to access. This is because you may use more than one JMS provider and each provider has its own unique way of connecting to its queues. Specifying a JMS target means you do not have to provide the specific connection details for a particular JMS provider. See Configuring JMS Provider Aliases on page 125 for more information about creating different JMS targets for different JMS providers.
- **Input/output mappings**. You map the input and output data by creating an XSLT so that the data can be passed correctly between iProcess and the Web Service operation you are using.

Back to Library

Creating Secure Web Service Operations

The TIBCO iProcess Web Services Plug-in supports transport layer security using Secure Socket Layer (SSL), and SOAP security features.

You can create "security profiles" that contain settings for SOAP security so that the settings can be reused for different web services steps at design time. The security profile can also be associated with a URL alias so that at design time, when you subsequently select the URL alias, the associated security profile is displayed as well (for more information, see URL Alias Management on page 25).

Back to Library

Chapter 2

Understanding the iProcess Web Services Plug-in Architecture

This chapter describes the iProcess Web Services Plug-in architecture.

Topics

Back to Library

Overview

Communication between the iProcess Engine and external applications is enabled by the iProcess Web Services Plug-in which provides the interface for both inbound and outbound calls. The data is sent using either of the following data transport mechanisms:

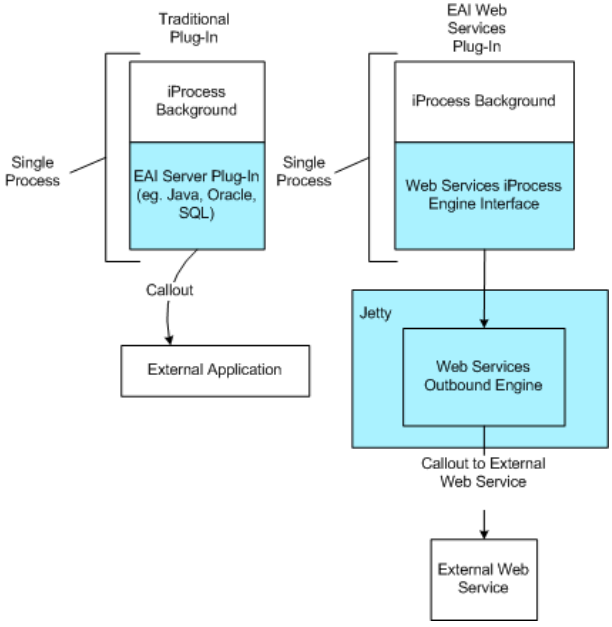
- a Simple Object Access Protocol (SOAP) request over the HTTP protocol to the Web Service, or
- as XML text using the JMS Server.

The iProcess Web Services Plug-in is different from other TIBCO plug-ins in several respects:

- It runs as a standalone process (unlike for example EAI Java, which is in process with the iProcess Engine background), as well as an iProcess Engine interface.
- It has an Inbound Engine (to handle calls from external Web Services to iProcess operations) and an Outbound Engine (to handle calls to external web services). Both of these engines are hosted by Jetty which is used as a JMX/servlet container.

Back to Library

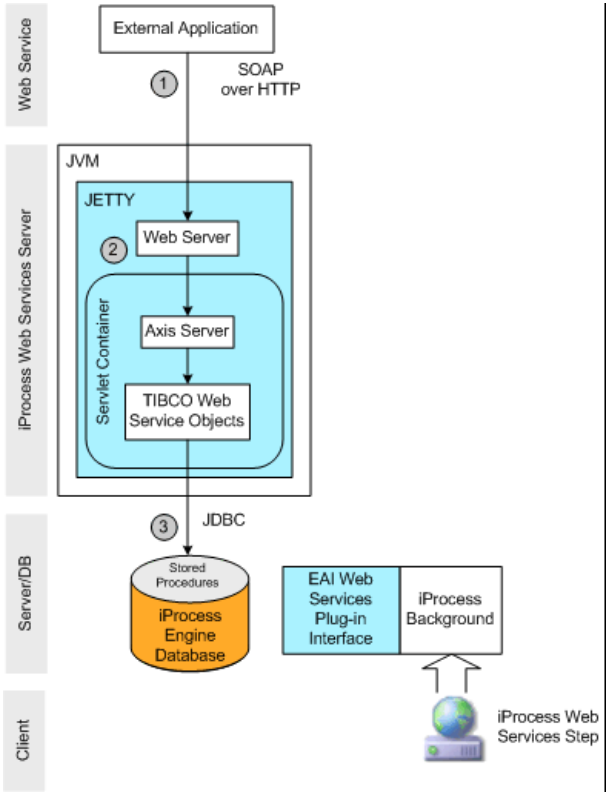
The following diagram shows the path for outbound communication in a traditional EAI Plug-in and in the iProcess Web Services Plug-in. The iProcess Web Services Plug-in architecture is discussed in more detail in subsequent sections.



Back to Library

Understanding Inbound Calls Using SOAP/HTTP

The following diagram provides a high level overview of how the components of the iProcess Web Services Plug-in interact with the other applications during inbound calls over SOAP/HTTP. The numbers on the diagram correspond to the subsequent explanations.



1. An external application sends a SOAP request over HTTP.
2. The Web Server hosted inside Jetty receives the request. Jetty is an open-source Java HTTP Server and Servlet Container. The Web Server sends

Back to Library

the request to the Axis Server which sends it to the TIBCO Web Service Objects.

Prior to version 10.6, in the WSDL file that the iProcess Web Services Plug-in presents, the endpoint address for iProcess Web Services Plug-in inbound web services was http://localhost:8090/axis2/services/WebiPE. This release of the iProcess Web Services Plug-in has been upgraded to use Axis2, which has caused the endpoints to change. The new endpoints are:

— for SOAP 1.1; http://localhost:8090/axis2/services/WebiPE.WebiPEHttpSoap11Endpoint/ for SOAP 1.1

— for SOAP 1.2; http://localhost:8090/axis2/services/WebiPE.WebiPEHttpSoap12Endpoint/ for SOAP 1.2.

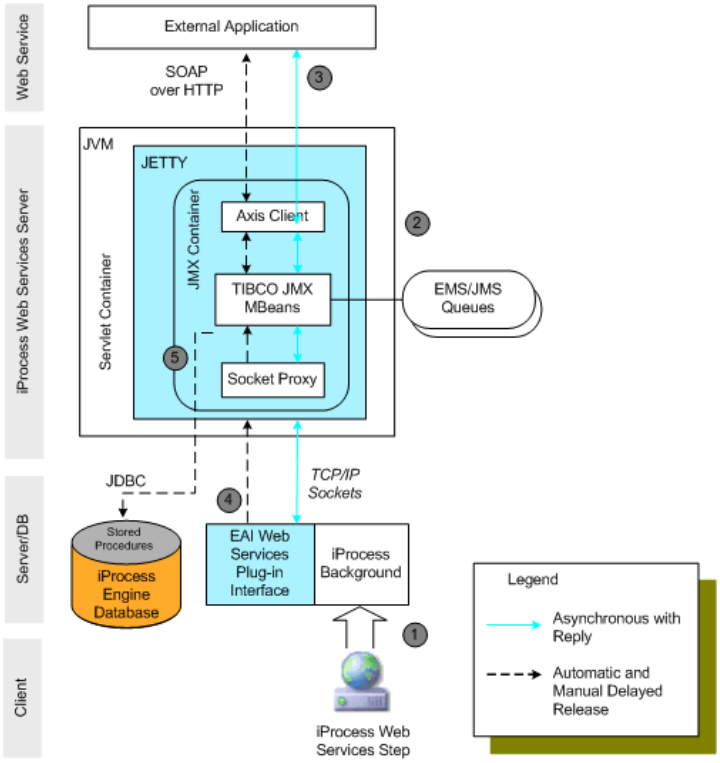
However, you can still access the iProcess Web Services Plug-in using the old endpoint.

3. The TIBCO Web Service Objects connect to the TIBCO iProcess database using Java Database Connectivity (JDBC) and run stored procedures to perform actions (for example, a case start).

Back to Library

Understanding Outbound Calls Using SOAP/HTTP

The following diagram provides a high level overview of how the components of the iProcess Web Services Plug-in interact with the other applications during outbound calls over SOAP/HTTP. The numbers on the diagram correspond to the subsequent explanations.



1. **Asynchronous with Reply** - A iProcess Web Services Step communicates with the EAI Web Services Plug-in Interface, which sends its request to the Socket Proxy using TCP/IP Sockets.
2. The request is sent to TIBCO Java Management Extensions (JMX) MBeans, which uses TIBCO Enterprise Message Service/JMS queues for its internal operations. It is then sent to the Axis client.
3. The Axis client sends the request to the external application using SOAP over HTTP. The reply is sent back via the same route as described for the outbound call.
4. **Automatic and Manual Delayed Release** - the outbound call proceeds in the same way as previously described for outbound Asynchronous with Reply.

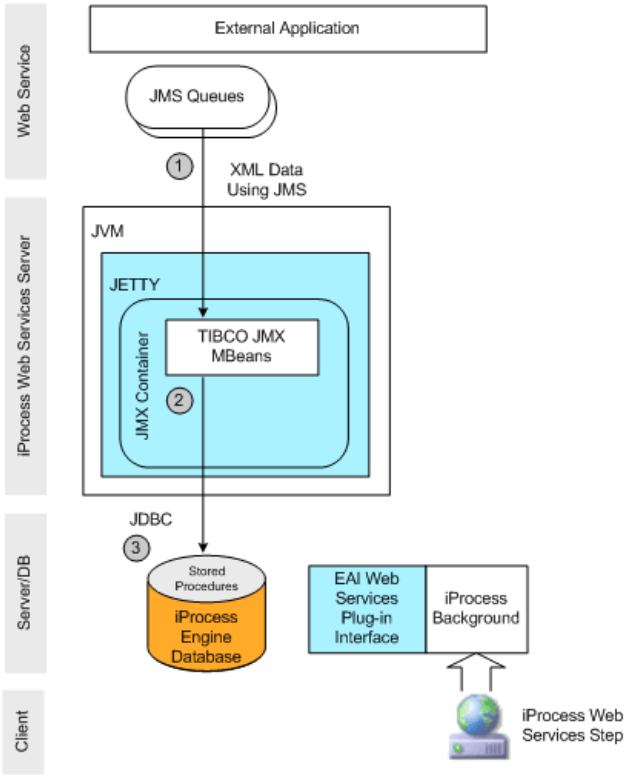
Back to Library

5. The reply depends on the invocation style:
   - For a Manual Delayed Release step, the reply is initiated from an external application.
   - For an Automatic Delayed Release step, the release is accomplished by using JDBC to connect to the iProcess database to run a stored procedure.
   - For an Asynchronous with Reply step, the external application responds directly to the iProcess background.

Back to Library

Understanding Inbound Calls Using XML/JMS

The following diagram provides a high level overview of how the components of the iProcess Web Services Plug-in interact with the other applications during inbound calls using XML/JMS. The numbers on the diagram correspond to the subsequent explanations.



1. An external application sends XML data using JMS.

If the inbound call contains a correlation ID, the iProcess Web Services Plug-in includes the correlation ID in the JMS Correlation ID field in the response message that it sends. This enables you to use a single, permanent response queue if required, and use the correlation ID to match request messages to response messages.

2. The request is sent to TIBCO JMX MBeans, which uses TIBCO Enterprise Message Service™ (EMS)/JMS queues for its internal operations.

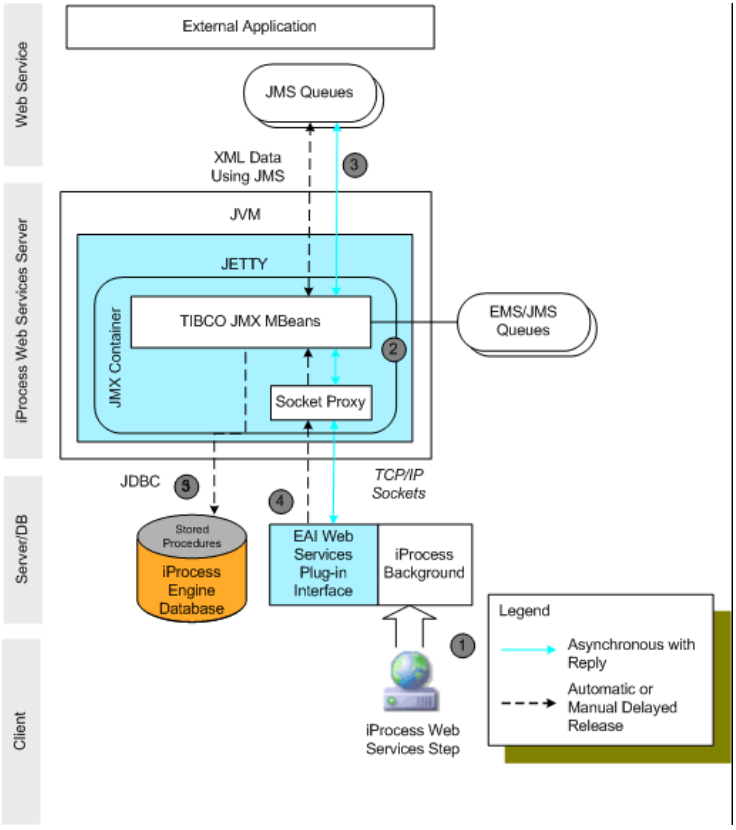
Back to Library

3. TIBCO JMX MBeans connects to the TIBCO iProcess database using JDBC and run stored procedures to perform actions (for example, a case start).

Back to Library

Understanding Outbound Calls Using XML/JMS

The following diagram provides a high level overview of how the components of the iProcess Web Services Plug-in interact with the other applications during outbound calls using XML/JMS. The numbers on the diagram correspond to the subsequent explanations.



1. **Asynchronous with Reply** - A iProcess Web Services Step communicates with the EAI Web Services Plug-in Interface, which sends its request to the Socket Proxy using TCP/IP Sockets.
2. The request is sent to TIBCO JMX MBeans, which uses EMS/JMS queues for its internal operations.
3. TIBCO JMX MBeans sends the message containing XML to the external application's JMS queue. The reply is sent back via the same route as described for the outbound call.

Back to Library

4. **Automatic and Manual Delayed Release** - the outbound call proceeds in the same way as previously described for outbound Asynchronous with Reply.
5. The reply for a delayed release step uses TIBCO JMX MBeans to connect to the TIBCO iProcess database using JDBC and run stored procedures to perform actions (for example, a case start).

Back to Library

Configuring a High Availability iProcess Web Services Plug-in

Either during installation or afterwards, you can create a high availability configuration. This type of configuration uses multiple Jetty servers to provide redundancy in case one Jetty Server fails.

The iProcess Web Services Plug-in is able to:

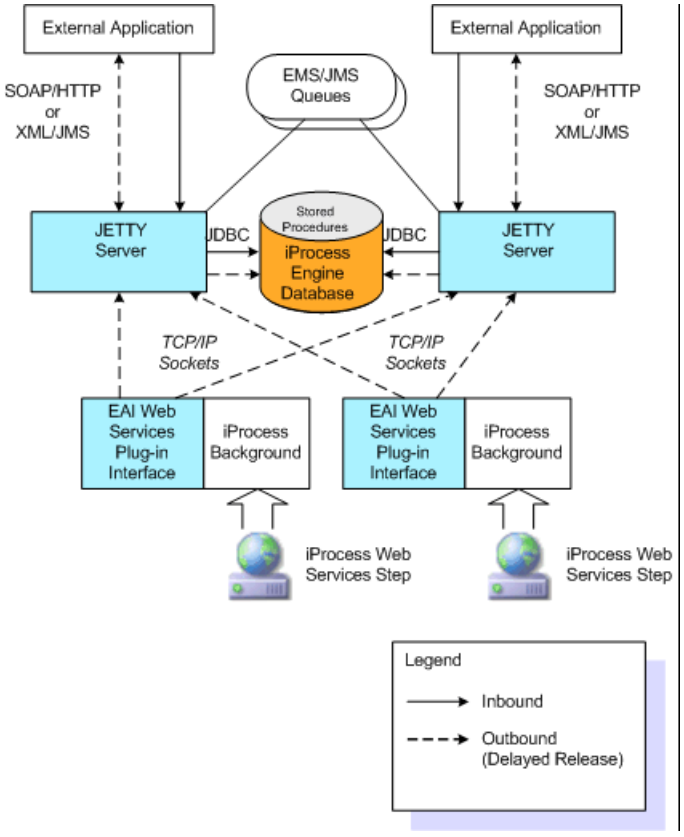
- Detect failures.
- Preserve the integrity of in-progress transactions.
- Seamlessly continue working when the Jetty Server returns.

In a high availability configuration, JMS queues are shared by Jetty Servers. This means that if a failure occurs, another instance of the Jetty Server takes over immediately with no or minimal impact on service.

The iProcess Web Services Plug-in High Availability configuration does not support Asynchronous with Reply. When a procedure with these types of steps is processed, they are treated as Automatic Delayed Release steps.

Back to Library

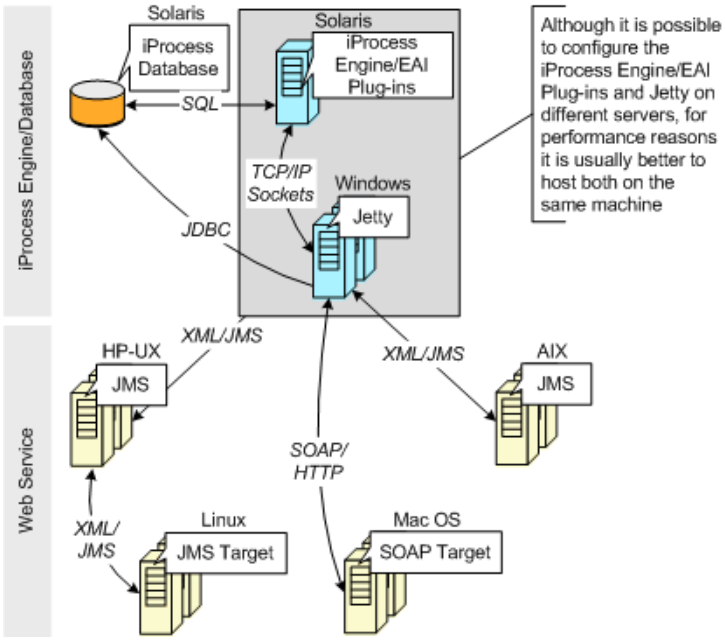
The following diagram shows the architecture of a High Availability configuration. Note that for clarity, the internal working of the Jetty server are not shown (refer to previous sections) and only two Jetty servers are illustrated (more can be configured):



Back to Library

About iProcess Web Services Plug-in Deployment

Because it uses XML/JMS and SOAP/HTTP for data transport, the components of the iProcess Web Services Plug-in can be deployed on a variety of platforms. For example:

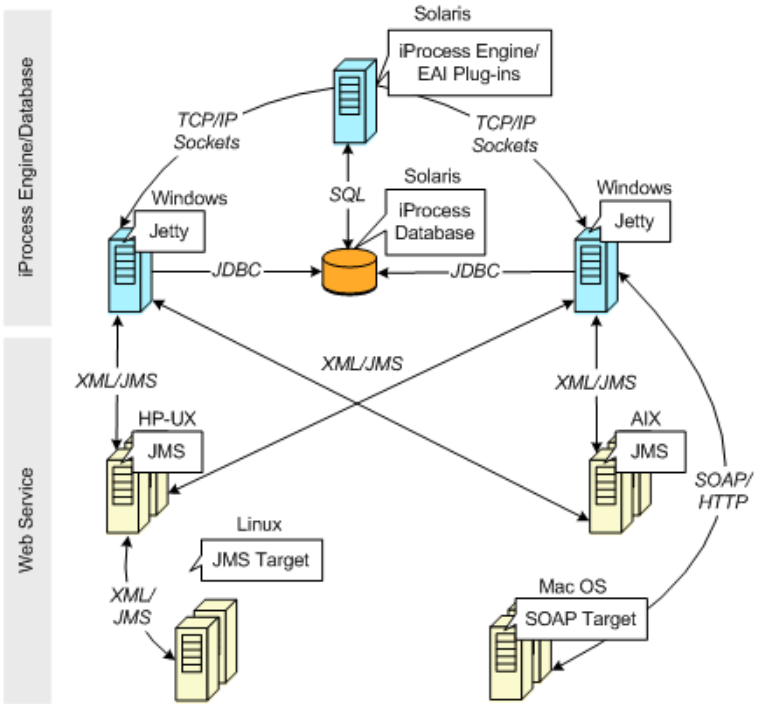


TIBCO have not tested multi-platform combinations. This means that, although there are no technical reasons why you could not have, for example, your Jetty on a Windows server and your iProcess Engine on a Solaris server, TIBCO have not tested this combination.

Back to Library

High Availability Deployment

In a High Availability configuration, multiple Jetty Servers on separate machines are employed to provide redundancy. For example:



A High Availability configuration automatically provides load balancing among its multiple Jetty servers.

For more information, see the *TIBCO iProcess Web Services Plug-in* installation guide.

High Availability Message Handling

Failed messages can be retried up to a maximum number, after which they are placed on the **SWPoison** queue. Your JMS Administrator can configure the maximum number of retries (see the *TIBCO iProcess Web Services Plug-in* installation guide).

There is also a slight possibility that duplicate Web Services calls can be created if a Jetty server fails before the TIBCO iProcess Engine has committed the call. In this case, the iProcess Engine retries the call, creating the duplicate. To avoid this scenario, do the following:

Back to Library

1. Monitor the **sw_warn** and **sw_error** files, *jetty_home*/**tibco/log.txt** file (where *jetty_home* is the location where Jetty is installed) and the SWException queue for any potential problems with Web Services transactions or Jetty servers.
2. If you cannot determine the cause of the failure, check to SWPoison queue for failed messages. Correct the problem and consider modifying the process to cater for failed messages.

Back to Library

URL Alias Management

The TIBCO iProcess Web Services Plug-in allows you to defer the location of the WSDL used to call the Web Service at runtime. This is achieved using URL Aliases. The aliases are stored as an entry in a database table which is used to locate the WSDL URL which will be used at runtime.

The aliases can be configured either with the command line utility or when you define your Web Services step. This allows you to change the location of the WSDL file or the WSDL endpoint without having to modify the Web Services step. For example, when a procedure is migrated from a test environment to a live environment, the URL alias can be updated to point to the new location of the WSDL file, see Administering URL Aliases and Security Profiles on page 121.

You can also associate a security profile with a URL alias by selecting the security profile when you define the step and URL alias. Then, when you next define a step and select the URL alias, the corresponding security profile is displayed.

Back to Library

Back to Library

Chapter 3

Understanding iProcess Web Services Plug-in Security

This chapter describes the iProcess Web Services Plug-in security mechanisms.

Topics

Back to Library

Overview

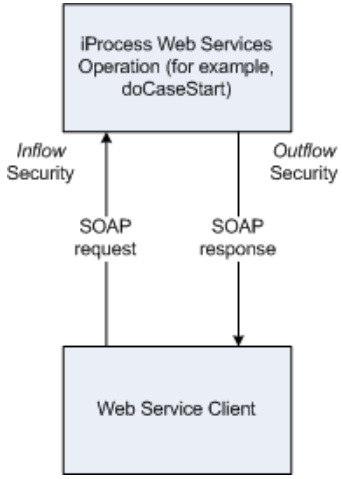
The TIBCO iProcess Web Services Plug-in supports transport layer security using Secure Socket Layer (SSL), and SOAP security features.

Security Profiles

You can create "security profiles" that contain settings for SOAP security so that the settings can be reused for different web services steps at design time. The security profile can also be associated with a URL alias at design time, so that when you subsequently select the URL alias, the associated security profile is displayed as well.

Inbound Web Services

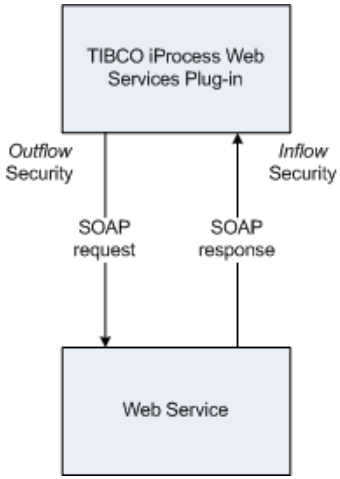
Inbound web services refer to web services provided by the iProcess Engine (see iProcess Web Service Operations on page 133). When defining a security profile for inbound web services, the parameters are defined *from the perspective of the web service provider* (the iProcess Web Services Plug-in). Therefore, "inflow" security applies to the request from the external web service to the iProcess Engine, and "outflow" security applies to the response from the iProcess Web Services Plug-in:



Back to Library

Outbound Web Services

Outbound web services are called by the iProcess Engine. When defining a security profile for outbound web services, the parameters are defined *from the perspective of the web service invoker* (the iProcess Web Services Plug-in). Therefore, "outflow" security applies to the request from the iProcess Engine to the external web service, and "inflow" security applies to the response from the external web service:



In addition to SOAP security, you can edit the SOAP header to include custom headers to outbound web service calls (see Using Security Profiles to Send iProcess Field Data on page 41).

Back to Library

About the Security Profile Administrator

The Security Profile Administrator is an application that allows you to configure the following types of security for use with the TIBCO iProcess Web Services Plug-in:

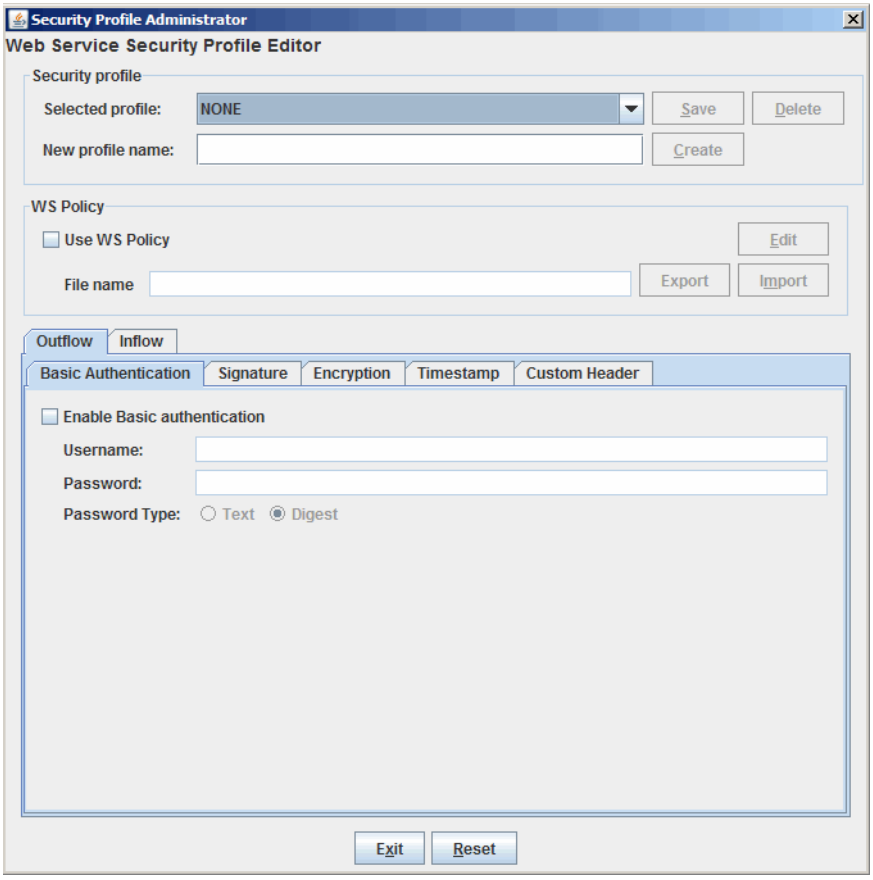
- Security applied to SOAP requests and responses from and to an external web service.
- iProcess Engine Inbound Web Services security - inflow and outflow security applied to requests from external web services to the iProcess Web Services listed in iProcess Web Service Operations on page 133, and responses to those requests. The security profile for Inbound web services is called **Inbound** and is created at installation. Note however that the **Inbound** profile does not specify any security by default.

As an advanced alternative to specifying SOAP security settings in the dialog of the Security Profile Administrator, you can use a WS Policy File to define SOAP Security settings for your environment. For more information, see Combining Security Types on page 39.

- You must start the Jetty server before you can run the Security Profile Administrator.
- The options available differ depending on whether you have Inflow or Outflow selected.

Back to Library

The main dialog of the Security Profile Administrator looks like this:



The profile you create using this dialog is encrypted and saved in the database in the EAIWS_SECURITY_PROFILE table (see The EAIWS_SECURITY_PROFILE Table on page 122).

The following sections examine how the different types of web services security can be achieved in the TIBCO iProcess Web Services Plug-in.

Back to Library

Types of Security

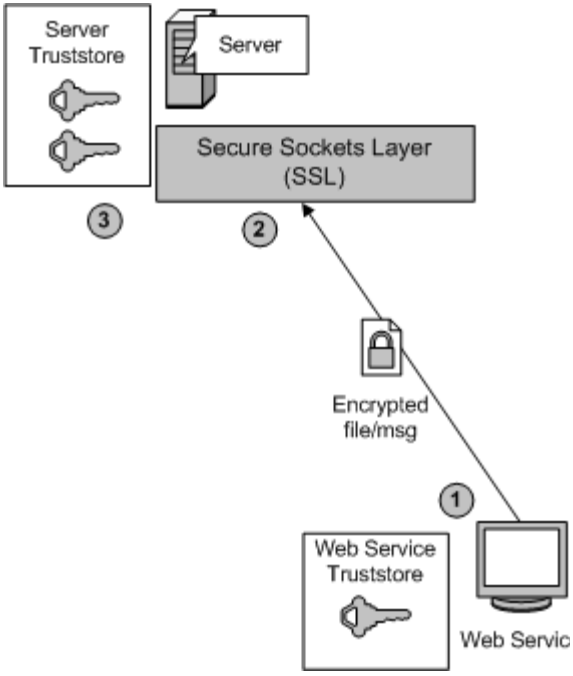
This section provides an overview of the various types of Web Services security, which provide the following types of protection:

- Authentication
- Integrity
- Confidentiality
- Non-repudiation

Transport Layer Security (SSL)

Secure Sockets Layer (SSL) allows web browsers and web servers (point-to-point) to communicate over a secure connection. SSL provides confidentiality because SSL responses are encrypted so that the data cannot be deciphered by third parties as it passes between the client and server on a network.

The following is an Inbound example with SSL:



1. The Web Service encrypts the message using the server's public key. Because the message is encrypted, a third party cannot intercept it.

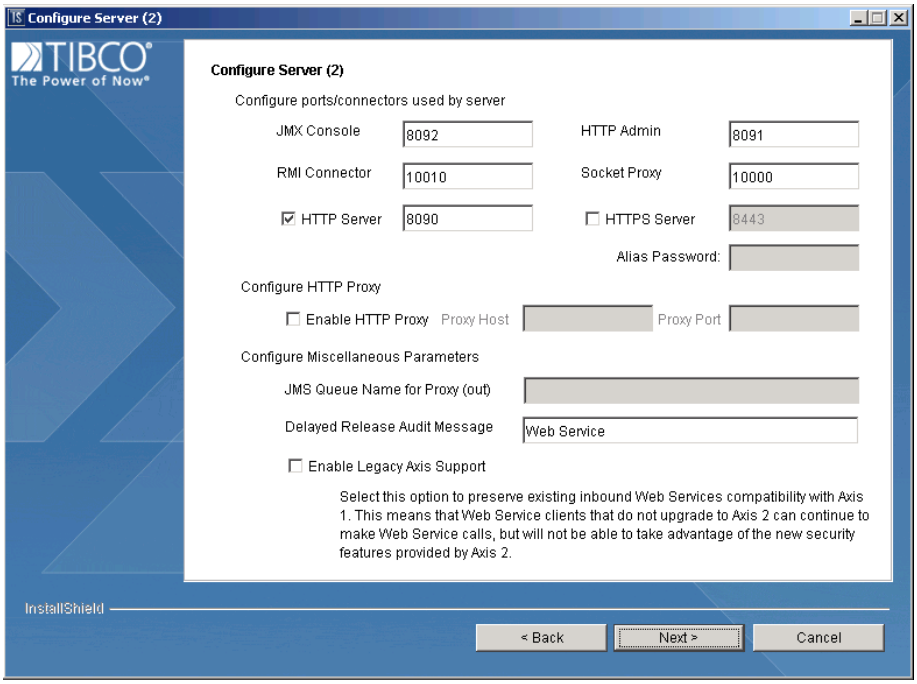
Back to Library

2. An SSL connection is opened and the encrypted message is sent.
3. The server's private key is used to decrypt the message.

The iProcess Web Services Plug-in implements SSL security as follows:

- For Outbound calls, iProcess EAI steps call Web Services over SSL, using a Truststore to obtain a server's public key. This truststore is the same as the SOAP/SSL Security keystore that you specified when you installed iProcess Web Services Plug-in.
- For Inbound calls, an SSL server is used (see following dialog) to allow external web services to connect to iProcess securely.

The Inbound SSL settings are configured during the installation of the TIBCO iProcess Web Services Client and Server Plug-ins.



When you enable SSL encryption, the alias is automatically selected by Jetty. You must supply the password here, and the name of the keystore/keystore password (on the previous dialog in the installation sequence). There should only be one key in the keystore for SSL encryption, and the alias must be **jetty**.

For more information see the *TIBCO iProcess Web Services Server Plug-in Installation Guide* and *TIBCO iProcess Web Services Client Plug-in Installation Guide*.

Back to Library

SOAP Authentication

The purpose of authentication is to verify that the originator of the message is a trusted partner.

This is done by inserting the following tokens in the SOAP message header:

- Username Password token (basic authentication)
- X.509 certificates
- Digital signature
- Timestamp token

Username - Password Token (Basic Authentication)

This form of authentication consists of a a simple XML description of the username the service claims to represent, and optionally, a password. The password can be a plain text password or for better security, a password digest.

```
<S11:Envelope xmlns:S11="..." xmlns:wsse="...">
  <S11:Header>
  ...
    <wsse:Security>
      <wsse:UsernameToken>
        <wsse:Username>Tibco</wsse:Username>
        <wsse:Password>secure</wsse:Password>
      </wsse:UsernameToken>
    </wsse:Security>
    ...
  </S11:Header>
  ...
</S11:Envelope>
```

Suppose that you specify basic authentication for outflow security (a SOAP request). When the web service call is made, the token is inserted into the SOAP header. The recipient of the request will authenticate the username/password token in the SOAP header, verifying that you are a trusted partner. Similarly if you specify basic authentication for outflow security (SOAP responses), when the response comes in, it must have the specified user/password token or it is rejected.

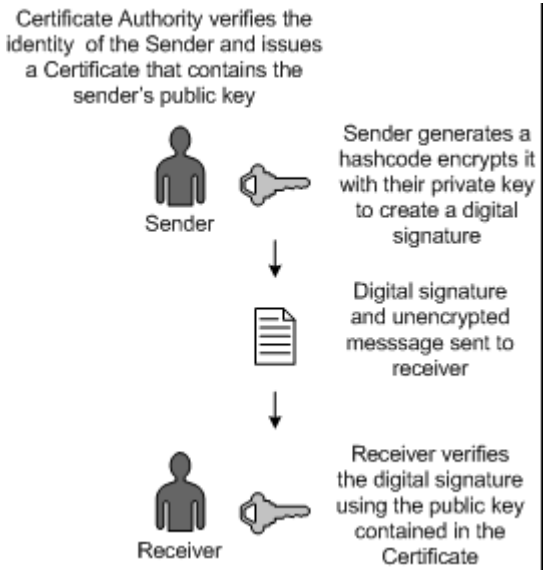
How to accomplish this with the TIBCO iProcess Web Services Plug-in

Refer to Example 2- Calling an Inbound Web Service Operation Using SOAP/HTTP and Basic Authentication on page 80 to see how this works in practice.

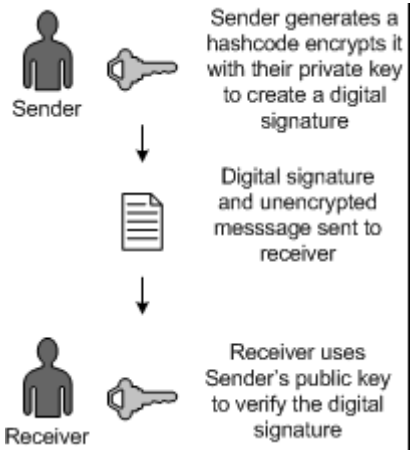
Back to Library

Digital Signatures and Certificates

The TIBCO iProcess Web Services Plug-in supports the use of SOAP digital signatures and digital certificates that conform to the X.509 standard. Certificates are used to verify your identity by means of a trusted third party (for example, Verisign).The following diagram shows how certificates can be used:



The following figure shows how SOAP digital signatures using public/private key encryption work.



Back to Library

How to accomplish this with the TIBCO iProcess Web Services Plug-in

1. **Certificates** - in a test environment, generate the certificate using your preferred tool. In a production environment, you should obtain a signed certificate from a trusted third party. Put the certificate in the SOAP/SSL Security keystore that you specified when you installed iProcess Web Services Plug-in. For more information see the *TIBCO iProcess Web Services Server Plug-in Installation Guide* and *TIBCO iProcess Web Services Client Plug-in Installation Guide*.

   Signatures - generate the signature using your preferred tool.

   The Java Development Kit (JDK) provides a command line tool called **keytool** located in the **%JAVA_HOME%/bin** directory of the JDK. You can use this tool to generate and store public/private keys. For more information, see http://java.sun.com/j2se/1.5.0/docs/tooldocs/index.html#security. There are also several tools available that use graphical interfaces.

2. Specify the signature or certificate details in the Security Profile Administrator (see Setting Up and Managing Security Profiles on page 111).

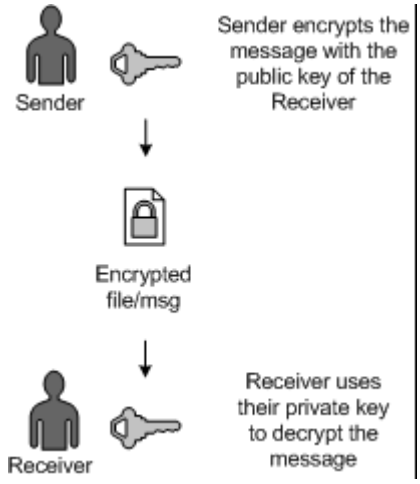
Timestamps

You can insert a timestamp that specifies the creation and expiration of a message. The receiver of the message can detect whether a message has expired, indicating possible tampering.

Back to Library

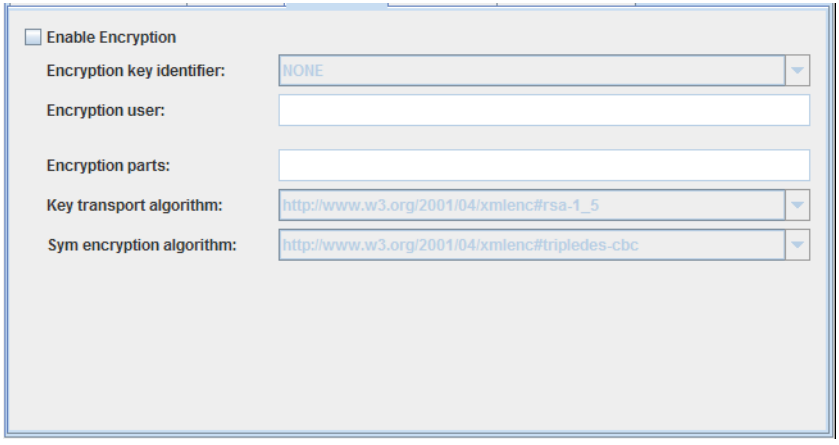
Encryption - Ensuring Privacy

Encryption is used to ensure that no-one except for the intended recipient of a SOAP message can read it. SOAP message body encryption is done using public key encryption/decryption:



How to accomplish this with the TIBCO iProcess Web Services Plug-in

The Java Development Kit (JDK) provides a command line tool called **keytool** located in the **%JAVA_HOME%/bin** directory of the JDK. You can use this tool to generate and store public/private keys. For more information, see http://java.sun.com/j2se/1.5.0/docs/tooldocs/index.html#security. There are also several tools available that use graphical interfaces.



Back to Library

Securing iProcess Engine Inbound Web Services

The Security Profile Administrator allows you to apply security to calls from external applications to the iProcess Web Services listed in iProcess Web Service Operations on page 133. This is done by modifying the Inbound profile in the Security Manager (see Setting Up and Managing Security Profiles on page 111).

Deployment

Inbound web services (iProcess Web Services located on your server) are implemented by an Axis2 service. The service is deployed to Axis2 in the form of an **.aar** archive file.

If you modify inbound security profile using the Security Profile Administrator, you need to restart Jetty for the changes to take effect.

Deployment in a High Availability Environment

If you have created a high availability environment with multiple Jetty servers, each would need a re-deployment of the iProcess Engine Web Service. You do not have to do this manually, the new security profile is picked up automatically when the Jetty server restarts. For more information see the *TIBCO iProcess Web Services Plug-in Server Installation Guide*.

Back to Library

Combining Security Types

There are two ways that you can combine the security types described in this chapter: either by using the Security Manager or by using WS Policy files.

Using WS Policy Files

Apache Axis2 Rampart allows SOAP security settings to be customized and deployed using a special file called a WS Policy File. The WS Policy file defines the security contract between two web services for both inflow and outflow security. The specifics of how this contract is implemented is defined by settings you make in the Security Manager.

Creating a policy file is outside the scope of this document; refer to any of the available web resources for more information.

Using the Security Manager

If you use the Security Manager to apply various types of security, you should be aware that tokens are inserted into messages in the following order:

- Timestamp
- Basic authentication
- Encryption
- Digital signatures

When reading a message, the reverse order is enforced.

Back to Library

Using Custom Headers

The Security Profile Administrator provides a custom header field that you can use to send any additional data that you want to include in your SOAP header to outbound web services at runtime. You may want to send user ID or User Type information as well as the username when authenticating for example.

This is achieved by inserting the data into the custom header field in the main dialog of the Security Profile Administrator. The field can contain both SOAP and security information.

Example of a Custom Header

The custom header consists of simple XML descriptions of the data.

```
<header>
<userId>XYZ0001</userId>
</header>
```

Back to Library

Using Security Profiles to Send iProcess Field Data

Using the Security Profile Administrator, you can include iProcess field data in your SOAP header to outbound web services at runtime. You may want to send user or organization identity, for example, to allow referencing of a user across multiple service invocations or you could use custom headers to send context-sensitive iProcess field data that could be used in the web service at runtime.

This is achieved by inserting a token into any field in the main dialog of the Security Profile Administrator. The fields can contain both SOAP and security information.

By default, the token has the following format `%%_customtoken_%%` where *customtoken* is the name of the custom token you have defined. The format of the token is stored in the Web Services configuration file (**wsconfig.properties**) but you can change it if you wish, see Security Profile Tokenization, page 105. You can also insert iProcess field names in tokens. For example, if you wanted to include the username of the user who started the process in the custom header, you could insert `%%_sw_starter_%%`.

Any iProcess fields used in the Security Profile must be defined in the **Export iProcess Fields** dialog, see Mark iProcess Fields for Export, page 63. The iProcess fields will not be automatically poplulated in the Security Profile Administrator. You must manually select them. As there is no validation available at designtime, any errors are only apparent at runtime.

By creating a security profile for outflow security (a SOAP request), when the web service call is made, the token is inserted into the SOAP header. The recipient of the request will take the token from the SOAP header, and use the data in the web service. For example, you could insert the token %%_SW_STARTER_%% in the **Username** field in the Security Profile Administrator dialog and add a password field to the first step in your process. At runtime, when the web service starts, it enables the user who has started the web service to enter their password at that point.

Back to Library

Back to Library

Chapter 4 Creating a Web Services Step

This chapter describes how to define an iProcess Web Services step in your iProcess procedure to integrate your procedure with external applications.

Topics

Back to Library

Overview

To create an iProcess Engine Web Services step in your procedure, you need to perform the following steps:

1. Defining Basic Web Services Step Information (step name, description, type, deadline and audit trail information).
2. Defining the Call to the External Application. Use the **Web Service Integrator** wizard to define the necessary information required for the operation.

The invocation style: Asynchronous with Reply, Manual Delayed Release or Automatic Delayed Release is configured using the Web Service Integrator wizard. The options on the **Delayed Release** tab in the **Step Definition** dialog are grayed out.

You can specify that a web service is invoked as part of a Withdraw action. Doing so means that after defining the main web service call, the wizard allows you to perform the same steps to define the web service call for the Withdraw action.

When you have completed these steps, the step type is defined as an iPE Web Service step and the following icon is displayed:  .

Back to Library

Defining Basic Web Services Step Information

To define the basic iProcess Web Services step information, do the following:

1. Start the iProcess Modeler, click the EAI Step tool  and click in the window where you want to place the EAI Step.
2. In the **Step Definition** dialog, enter the **Name** and **Description** for the step.
3. In the **EAI Type** drop-down list, select **EAI_WEBSERVICES - TIBCO iProcess Web Services Step Plug-in**.

   You must select the step type when you first create the step; it cannot be changed later. The list box displays EAI step types that have been installed as client EAI plug-ins.

   (*Optional*) Select the **Don't delete work items on withdraw** option. If this option is selected, and the deadline on an outstanding step expires or it is withdrawn as an action (release or deadline expire) of another step:

   — the deadline actions are processed.

   — the step remains outstanding (the step remains in the workqueue or the sub-procedure case is not purged).

When the step is released (or the sub-procedure case completes) the normal release actions are not processed but the case field data associated with the release step (e.g. the field values set in a normal step whilst in a work queue or the output parameters of a sub-case) is applied to the main case data.

4. (*Optional*) Click the **Ignore Case Suspend** checkbox if you want the step to still be processed as normal while a case is suspended.

   If **Ignore Case Suspend** is not checked (the default option), the step is *not processed* while the case is suspended.
5. Click the **Audit Trail** tab to define custom audit trail entry expressions that are inserted into the audit entry when the step is processed. For more information about customizing the audit trail, see "Audit Trails" in the *TIBCO iProcess swutil and swbatch Reference Guide*.
6. Click the **Deadlines** button if you want to enter deadline information for this step. You can also enter the step duration if you are using case prediction. Refer to "Using Deadlines" in the *TIBCO iProcess Modeler - Basic Design Guide* for an explanation of defining deadlines and using case prediction.
7. Click the **General** tab, then click **EAI Call-Out Definition**. The **Web Service Integrator** wizard is displayed.

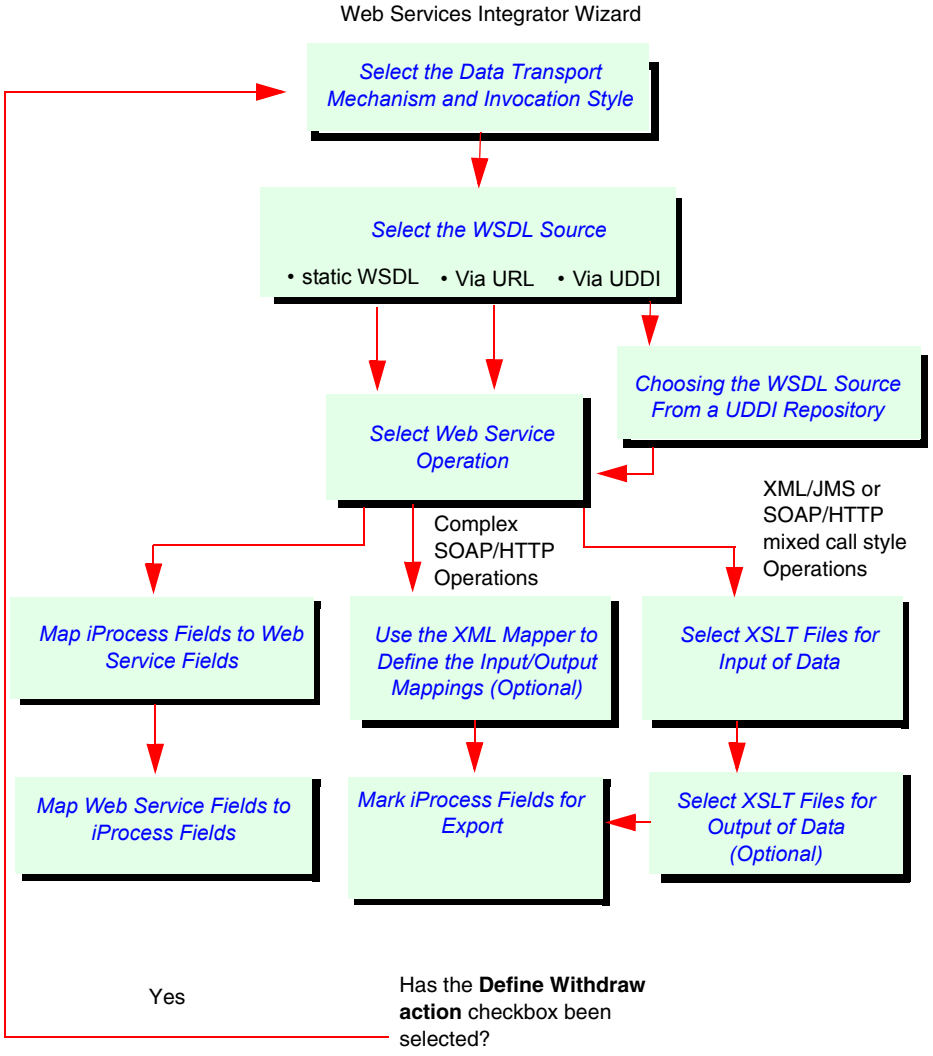
Back to Library

Defining the Call to the External Application

Click the **General** tab, then click **EAI Call-Out Definition**. The **Web Service Integrator** wizard is displayed. The **Web Service Integrator** wizard enables you to define the calls to the external application you want to integrate with to specify the case data that is passed to the external application and (optionally) the data that is passed back to the iProcess case.

Back to Library

The following flowchart provides an overview of the steps involved to define your call. More detailed information about each step can be found using the hypertext links.



Back to Library

Select the Data Transport Mechanism and Invocation Style

1. Choose which data transport mechanism you want to use, select either:
   - **SOAP/HTTP**
   - **XML/JMS -** If you select XML/JMS, the **JMS target** field is enabled. Specify the name of the JMS target you have configured. This should have been done during installation. For more information about aliases and JMS targets, see the *TIBCO iProcess Web Services Plug-in Installation Guide*.
2. Select the **Invocation Style**:
   - **Automatic Delayed Release**

     Once the call has been made, the iProcess background process carries on processing so that iProcess can continue processing other cases.

     The Web Service needs to restart the case when required.
   - **Manual Delayed Release**

     Once the call has been made, the iProcess background process carries on so that iProcess can continue processing other cases.

     User intervention is required to restart the case.
   - **Asynchronous with Reply (Deprecated)**

     Select this option so that the request and response calls are de-coupled into separate requests from the iProcess Background process. If a procedure is designed with multiple, parallel steps, they can be invoked asynchronously and allowed to run simultaneously but the Background process will be blocked until all of the responses are received. This means that no other processing can occur by that Background process. However if the response time is too slow, then the iProcess Web Services Plug-in will automatically switch to Delayed Release. For information about setting the timeout value for the Asynchronous with Reply invocation style, see Asynchronous With Reply Timeout on page 104.

   For more information about invocation styles and transaction scope, refer to the *TIBCO iProcess Modeler - Integration Techniques Guide*.

Back to Library

3. Select the Withdraw action:

   — **Define Withdraw action** - selecting this option means that after defining the main web service, you can define a web service that is invoked when the step is withdrawn.

   Web services invoked from Withdraw actions cannot return data. If you select a WSDL operation with a return parameter, the wizard displays an error dialog and you cannot proceed with the next dialog.

   If this option is used with the **Asynchronous with Reply** invocation mode, the wizard displays a warning that the withdraw action can only be invoked at run time when a timeout occurs, and the step becomes Delayed Release. For information about setting the timeout value for the Asynchronous with Reply invocation style, see Asynchronous With Reply Timeout on page 104.

   — **Edit only the Withdraw action** - Use this option when editing a step. It allows you to skip the dialogs related to the main web service and proceed directly to the dialogs for the Withdraw action web service. For more information, see Editing an EAI Web Service Step on page 67.

4. Continue with the next section.

Select the WSDL Source

You must select the location of the WSDL source:

Option	Use to:
Static WSDL	Specify that you have a WSDL template that you want to use. You can paste the WSDL contents into the **WSDL Data/Location** text area (see the following section).

Back to Library

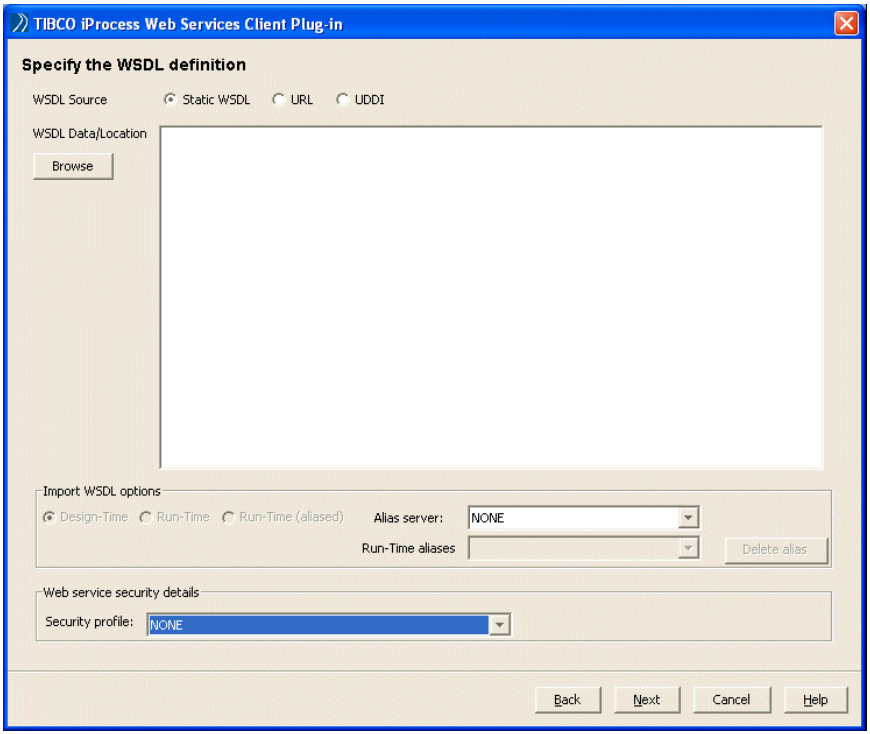
Option	Use to:
URL	Choose this option if you want to specify the location of your WSDL code using a URL. You must then enter the URL of the WSDL template in the **WSDL Data/Location** text area. You can leave the **WSDL Data/Location** text area empty if you are planning to use an existing alias for the URL (see Specifying a URL or Alias on page 51). You can also acquire the WSDL using SSL. For example: `https://myserver:8443/axis2/services/WebiPE?wsdl` This assumes that you specified the location and password of your key store during the installation. This is stored in: **eai_websvcs/truststore.properties**.
UDDI	Select **UDDI** to select a Web Service from a UDDI repository. This means you can search for a Web Service that is listed in the UDDI registry (see Choosing the WSDL Source From a UDDI Repository on page 53).

Specifying a Static WSDL

1. Select the **Static WSDL** option.

Back to Library

2. Paste the WSDL code into the **WSDL Data/Location** text area. For example:



3. If you are using Web Services security and have set up a security profile that you want the step to use at run time, select the appropriate **Alias Server**, and select a profile from the **Security profile** list. For more information about creating security profiles, see Setting Up and Managing Security Profiles on page 111.

4. Continue with Select Web Service Operation on page 54.

Specifying a URL or Alias

By using the **URL** option in conjunction with **Import URL Data** options you can specify a URL location for the WSDL code that is to be used (either at designtime or runtime).

You can also associate a security profile with the Web Services step or with the URL alias by selecting the security profile. When you next define a step and select the URL alias, the corresponding security profile is displayed.

- Specify an alias that corresponds to a URL for the WSDL code
- Create a new alias for the specified URL
- Modify an existing alias with the new URL information specified

Back to Library

To specify a URL or alias, do the following:

1. Select the **URL** option.
2. Depending on what you are trying to do, you may need to enter a URL or an alias. The following table summarizes the various combinations.

- You must make sure that the URL to the WSDL template can be resolved on both your client and server machines.
- You can enter a URL that points to a file on your local machine using the format **file://*host/path***. For example:

```
file://localhost/E:\WSDL.wsdl
file:C:\MyTests\WebServices\WSDL.wsdl
```

URL Specified?	Import WSDL Option	Result
Yes	Design-Time	The WSDL template is derived from the provided URL when the step definition is saved.
Yes	Run-Time	The WSDL template is overwritten with the new WSDL template that is derived from the provided URL only when the case is run and when the step is processed. You may want to use this if the host machine specified in the WSDL may change at run-time.
Yes	Run-Time (Aliased)	Using this option, you must select an **Alias server** from the list and then an alias from the **Run-Time aliases** list: • If you select an existing alias, the **WSDL Data/Location** field is updated with the URL stored for that alias. • You can create a new alias by specifying a name and URL. • You can modify an alias by selecting an existing name and modifying the URL.

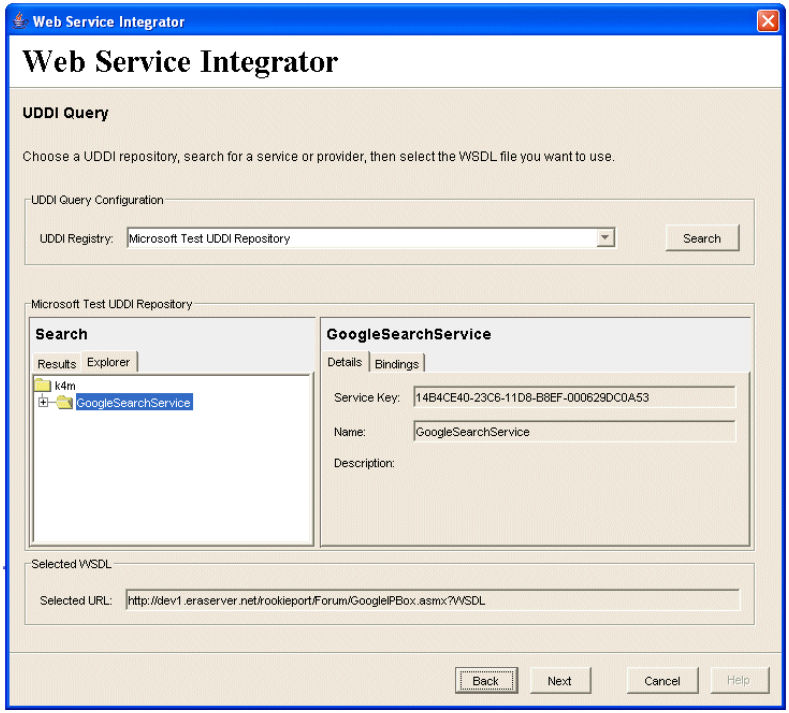
Back to Library

You can only change the address location/target end point in the new WSDL template that is being used at run-time.

3. If you are using Web Services security and have set up a security profile that you want the step to use at run time, select a profile from the **Security profile** list. This list of security profiles depends on the **Alias server** that you have selected. The security profile that you select will be associated with any **Run-Time aliases** that are selected. For more information about creating security profiles, see Setting Up and Managing Security Profiles on page 111.
4. Continue with Select Web Service Operation on page 54.

Choosing the WSDL Source From a UDDI Repository

1. Choose the **UDDI** option and click **Next**.
2. The wizard displays a dialog in which you can locate the WSDL source by searching a UDDI repository. You can search the UDDI either by the Web Service name or by a Service provider name.



Back to Library

3. From the **UDDI Registry** drop-down list, select the UDDI repository in which to search for a Web Service or Service Provider.

The list of UDDI repositories can be edited using the **uddiconfig.xml** configuration file - refer to Configuring UDDI Repositories on page 129 for more information.

4. Click the **Service** or **Provider** tab accordingly depending on how you want to search the UDDI. In the **Search** field enter the name of the service or provider you want to find. If you only know part of the name, you can use % as a wildcard. Click **Search**.
5. The left hand pane displays the Search results for your query. Select the Web Service you require.

   When you click on a service, the right hand pane displays the properties of the service. You can use the tabs to view the properties.

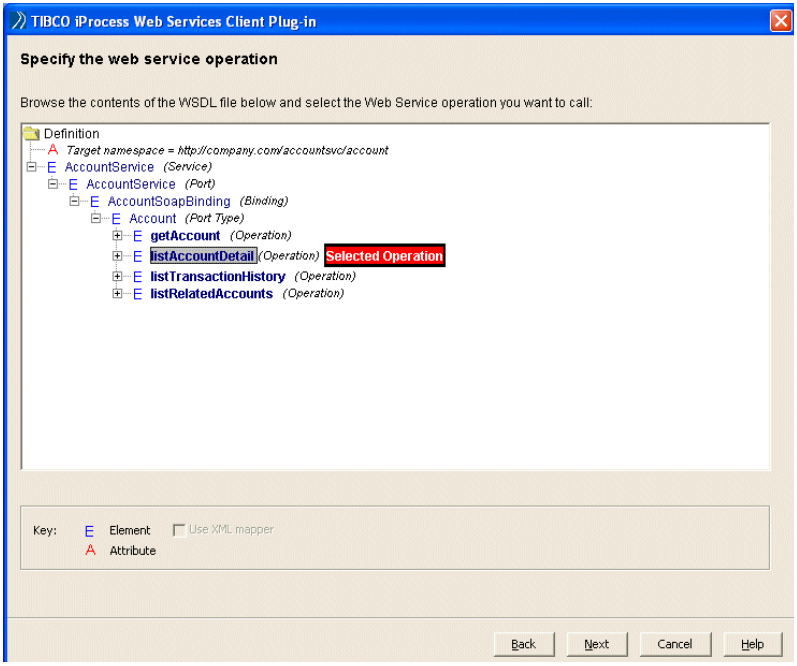
   The chosen WSDL source is displayed in the **Selected URL** field.
6. If you are using Web Services security and have set up a security profile that you want the step to use at run time, select the appropriate **Alias Server**, and select a profile from the **Security profile** list. For more information about creating security profiles, see Setting Up and Managing Security Profiles on page 111.
7. Continue with Select Web Service Operation on page 54.

Select Web Service Operation

Select the Web Service operation from your WSDL source. The wizard displays a graphical tree view of the Web Service operations available.

Back to Library

Browse the tree view and select the required operation. In the dialog shown below, the **listAccountDetail** operation has been selected.



The wizard determines the type of mapping to be used based on the contents of the WSDL file and whether you selected XML/JMS as the data transport mechanism. This affects the subsequent screens that the wizard displays:

- If you are using XML/JMS as the data transport mechanism, continue with Select XSLT Files for Input of Data on page 59.
- If you are using either XML/JMS or SOAP/HTTP *and* you are mixing complex and simple call styles (for example, sending a document/literal style message and receiving an RPC/encoded style), continue with Select XSLT Files for Input of Data on page 59.
- If you are using SOAP/HTTP and the selected operation is a document/literal style, continue with the next section (Use the XML Mapper to Define the Input/Output Mappings (Optional) on page 56).

If you are using custom types, the **Use XML mapper** checkbox is enabled. By default, this checkbox is selected allowing you to use the XML Mapper. However if you want to manually construct the XSLT as in previous versions of the iProcess Web Services Plug-in, de-select the **XML mapper** checkbox and refer to Select XSLT Files for Input of Data on page 59.

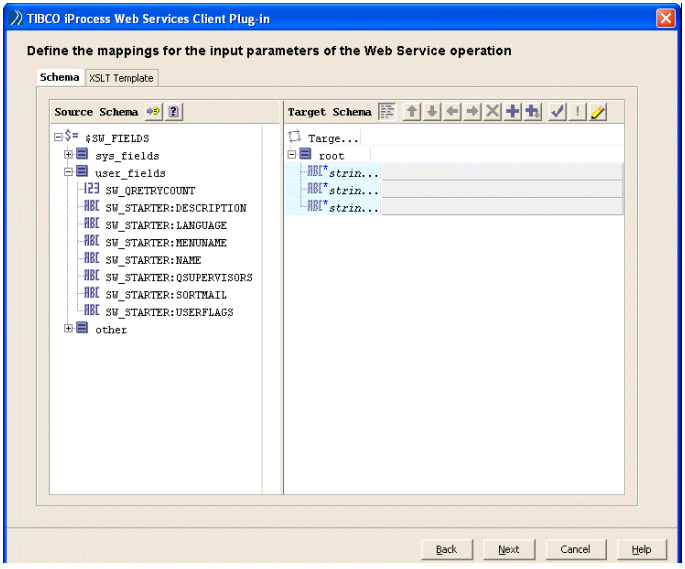
Back to Library

- If you are using SOAP/HTTP and the selected operation is of the RPC/encoded style, simple data mapping is used. Continue with Map iProcess Fields to Web Service Fields on page 65.

Use the XML Mapper to Define the Input/Output Mappings (Optional)

If your Web Service operation uses complex data types using SOAP/HTTP, you can use the XML Mapper to specify which input and output fields are populated with data at runtime.

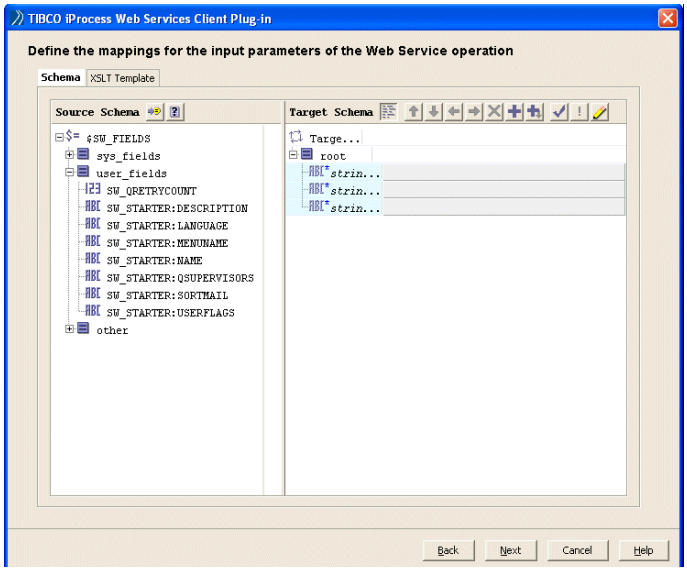
1. The schema mapping dialog is displayed.



2. On the **Schema** tab, The XML Mapper displays the source schema on the left (iProcess Engine) and the target schema on the right (Web Service). To map

Back to Library

fields, expand the fields and simply drag the iProcess Engine field to the Web Services field to create the mapping.



The XML Mapper automatically generates the XSLT based on the mappings that you select.

Note the following points that also apply when mapping from a Web Service to the iProcess Engine:

— Mapping must be completed correctly because if there are any errors you will not be able to proceed with the next dialog (any errors are displayed in a dialog when you click **Next**). The XML Mapper highlights in yellow mappings that can cause problems at runtime. Similarly, mandatory elements that have not mapped are shown in red. You can also click the button to check and repair any errors.

— Elements in iProcess Engine array fields start at 0. However, XML arrays start at 1. This means that if you map an iProcess Engine array field to a Web Service field, the 0 array field element from the iProcess Engine array field is mapped to the 1 array field element in the Web Service field.

— Dates must be entered in XML format and not in iProcess format.

— When mapping date and time iProcess fields, the data mapper will show these yellow to indicate a possible error. This, and date/time errors in the **Mapper Check and Repair** dialog, can be ignored as, at runtime, the mappings are interpreted correctly.

Back to Library

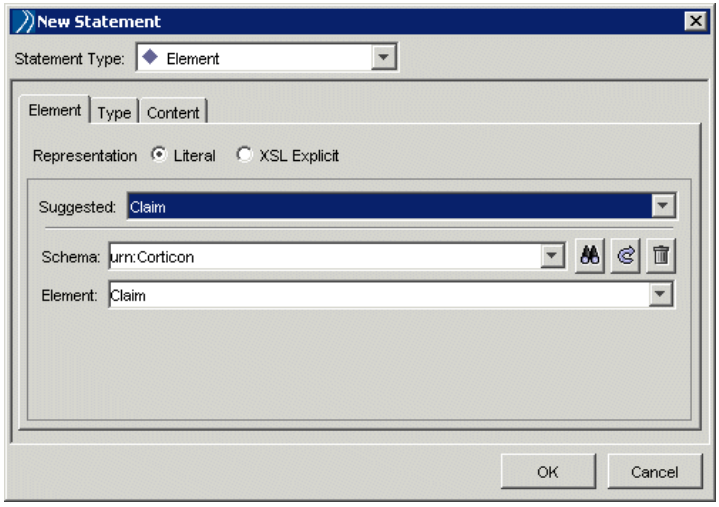
When you have a choice of elements in the target schema, it is indicated as follows:

In this example, you must choose whether you want to map to the **Claim**, **Payment** or **Policy** Element of the target schema. To do this:

a. Highlight the choice and click the button at the top of the dialog.

b. Select **Element** from the Statement Type list.

c. Select the required type from the Suggested list.



The elements available for mapping are then displayed.

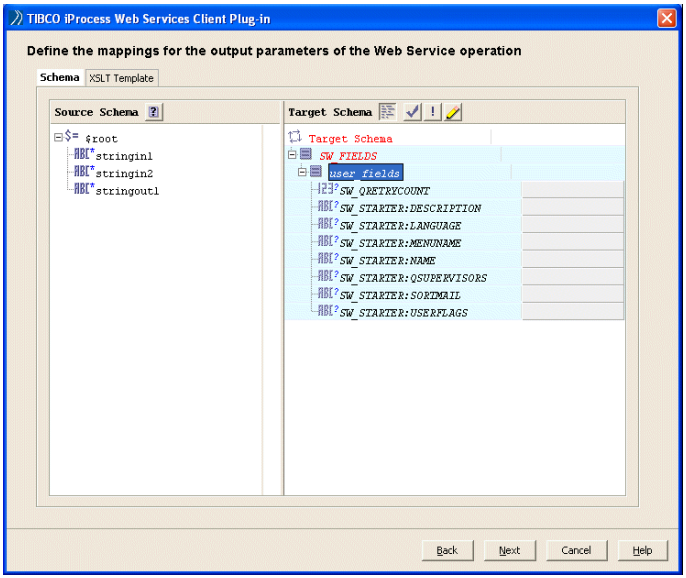
3. Click the **XSLT Template** tab to view the XSLT you have created as a result of the field mappings you have set in the **Schema** tab.

4. Click **Next** to continue. If the Web Service operation that you are calling enables responses, you can define the output data. The **Define the Web Service to iProcess Engine Mappings** dialog is displayed.

   — The **Define the Web Service to iProcess Engine Mappings** dialog enables you to define the output mappings so that data is returned from the Web Service to the iProcess Engine case. Click the **Schema** tab to use the XML Mapper to define the field mappings between the Web Service and the iProcess Engine procedure. This means that you can specify which iProcess Engine fields are populated with the return data from the Web Service at

Back to Library

runtime. To map fields, simply drag the Web Service field to the iProcess Engine field to create the mapping.



5. Click **Next** and continue with Map iProcess Fields to Web Service Fields on page 65.

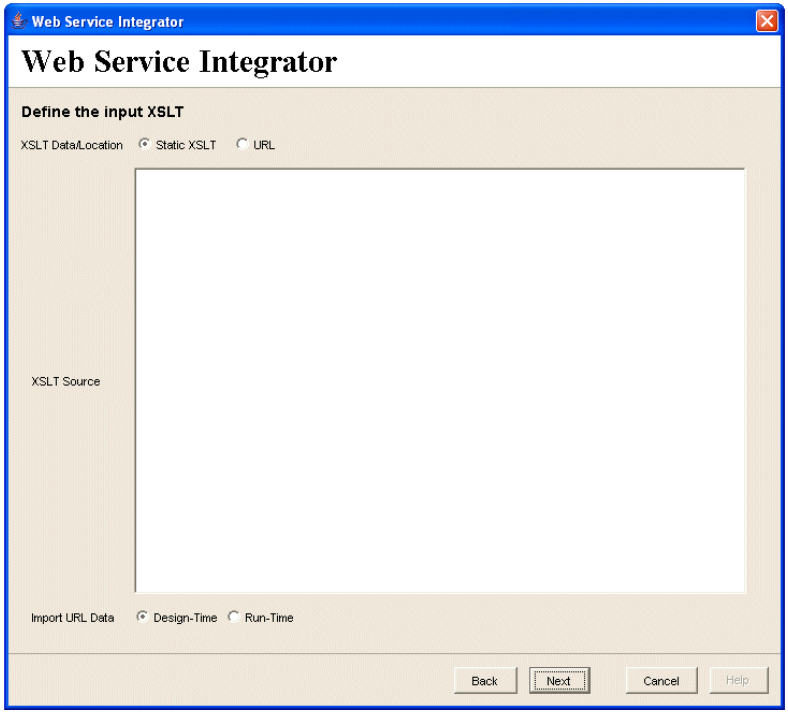
Select XSLT Files for Input of Data

If your Web Service operation uses mixed call styles or XML/JMS, you need to use XSLT transformations so that the data can be passed correctly to the Web Service.

Back to Library

1. You must select where the XSLT source is derived from. The following table describes your options:

Option	Use to:
Static XSLT	Specify that you have a XSLT template that you want to use. You can paste the XSLT contents into the **XSLT Data/Location** text area.
URL	Choose this option if your XSLT code will be derived from a URL. You must then enter the URL of the XSLT template in the **XSLT Data/Location** text area.



2. Specify the contents of the XSLT template as either static data or the URL location of the XSLT template.

Back to Library

In the **XSLT Data/Location** text area, enter the XSLT code if you have chosen the **Static XSLT** option or enter a URL to specify the location of the XSLT template.

You must make sure that the URL to the WSDL template can be resolved on both your client and server machines.

3. Choose if you want to import the XSLT template from the URL now (design time) or when a case is run (run-time).
   - **Design-Time** - the XSLT template is derived from the provided URL when the step definition is saved.
   - **Run-Time** - the XSLT template will be derived from the provided URL only when the case is run and when the step is processed. You may want to use this if you know that the XSLT is dynamic and you always want to use the latest code.

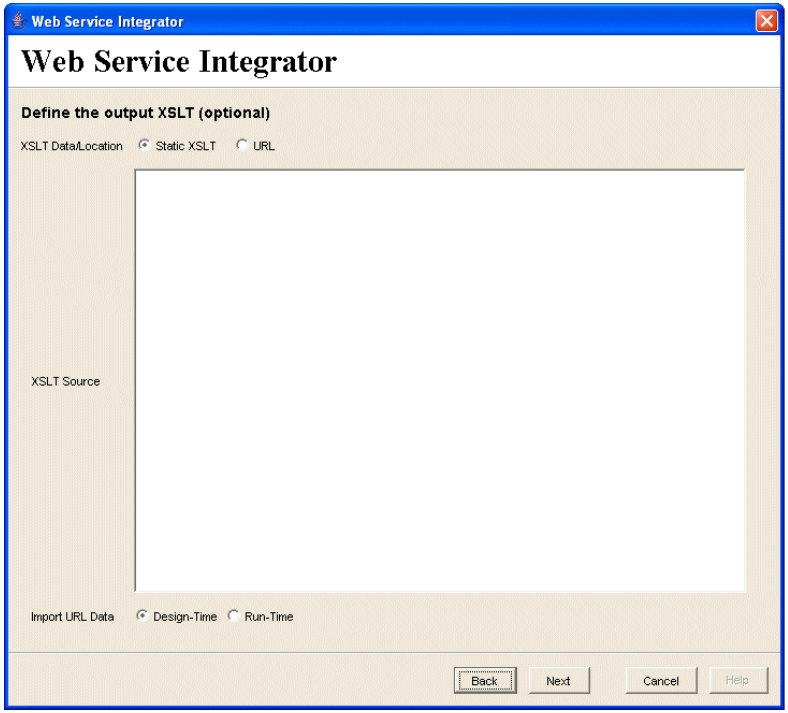
Select XSLT Files for Output of Data (Optional)

If the Web Service operation you are calling enables responses, you can define output data that can be returned to the case.

Back to Library

1. Choose where the XSLT source is derived from.

Option	Use to:
Static XSLT	Specify that you have a XSLT template that you want to use. You can paste the XSLT contents into the **XSLT Data/Location** text area.
URL	Choose this option if your XSLT code will be derived from a URL. You must then enter the URL of the XSLT template in the **XSLT Data/Location** text area.



2. Specify the contents of the XSLT template as either static data or the URL location of the XSLT template.

Back to Library

In the **XSLT Data/Location** text area, enter the XSLT code if you have chosen the **Static XSLT** option or enter a URL to specify the location of the XSLT template.

You must make sure that the URL to the WSDL template can be resolved on both your client and server machines.

3. Choose if you want to import the XSLT template from the URL now (design time) or when a case is run (run-time).
   - **Design-Time** - the XSLT template is derived from the provided URL when the step definition is saved.
   - **Run-Time** - the XSLT template will be derived from the provided URL only when the case is run and when the step is processed. You may want to use this if you know that the XSLT is dynamic and you always want to use the latest code.

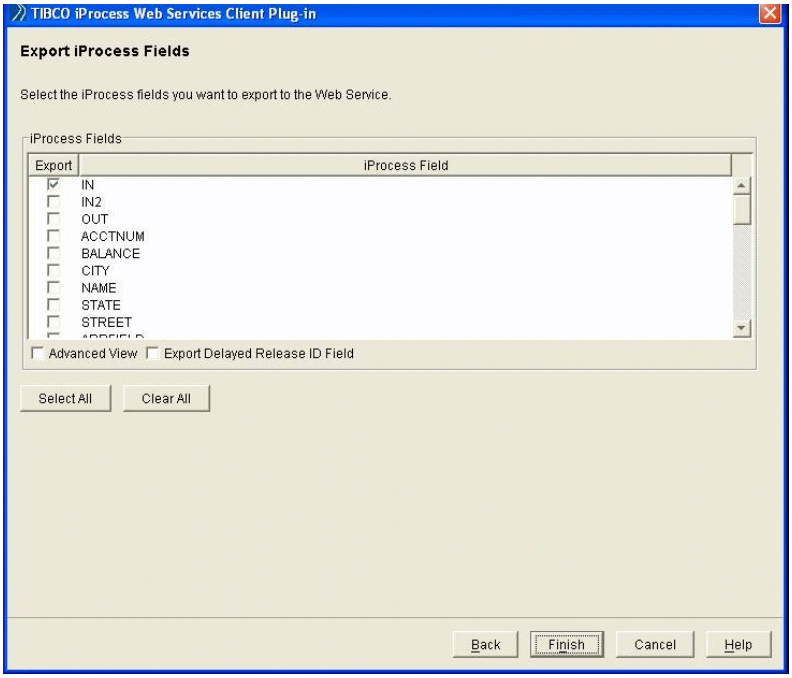
Mark iProcess Fields for Export

The iProcess fields that you used to define mappings with the XML mapper should be automatically selected in the **Export iProcess Fields** dialog. However, you should confirm that each iProcess field you want to export is selected. The XSLT fields will be used to generate XML based on the iProcess fields. The resulting XML definitions are used when calling the Web Service.

Any mappings of iProcess fields involving XPath formulas that contain arithmetic expressions or functions can result in the list of pre-selected fields in the Export iProcess Fields dialog being incomplete. You should therefore carefully check the list against your mappings, and manually select any missing fields that you need to export.

Any iProcess fields used as security profile tokens in the Security Profile must be defined in the **Export iProcess Fields** dialog, see Using Security Profiles to Send iProcess Field Data, page 41. Errors are only identified at runtime, not designtime.

Back to Library



- If you want to select all the iProcess fields, click **Select All**.
- To deselect a field, click the checkbox again. To deselect all fields, click **Clear All**.
- To export SW_DELAYED_RELEASE as a field to export, click the **Export Delayed Release ID Field** box.
- Select the **Advanced View** checkbox if you want to see the type, length and number of decimal places for each iProcess field.
- Select **Export Delayed Release ID** Field to include this field in the list of fields that are exported.

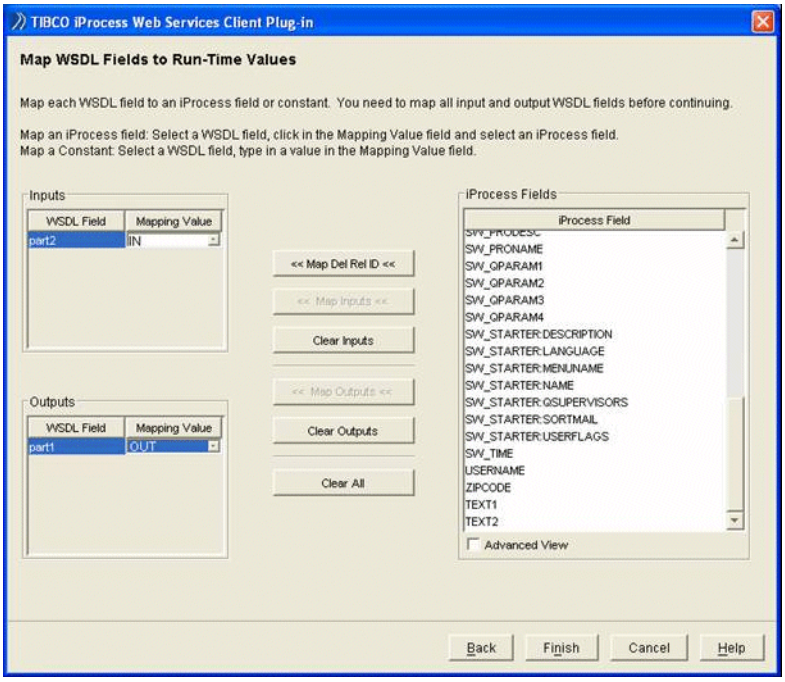
Proceed as follows:

- If you are defining a Withdraw action web service (you selected the **Define Withdraw action** checkbox in **Select the Data Transport Mechanism and Invocation Style** dialog), click **Next** and continue with Select the Data Transport Mechanism and Invocation Style on page 48 to define the details of the web service that you want to invoke for the Withdraw action.
- If you are not defining a Withdraw action web service, click **Finish** to complete the EAI call-out definition.

Back to Library

Map iProcess Fields to Web Service Fields

If you selected an RPC operation, you can use single parameter mapping as described in this section. Follow the instructions in this section to define the Web Service fields that will be mapped to the iProcess fields.



The list of input fields from the WSDL definition source is displayed in the Inputs section. For each field, create a mapping to a iProcess field or a constant. You can either:

- Click in the **Mapping Value** text box and select a iProcess field or,
- Click in the **Mapping Value** text box and type in a constant value or,
- Click in the **WSDL Field** text box, select a iProcess field from the **iProcess fields** list and click **Map Input**. Select the **Advanced View** checkbox if you want to see the type, length and number of decimal places for each iProcess field.

You can clear all the Input mappings by clicking **Clear All**.

If the Web Service operation you are calling enables responses, click **Next** and continue with the next section.

Back to Library

If the Web Service operation that you are calling does not enable responses, proceed as follows:

- If you are defining a Withdraw action web service (you selected the **Define Withdraw action** checkbox in **Select the Data Transport Mechanism and Invocation Style** dialog), click **Next** and continue with Select the Data Transport Mechanism and Invocation Style on page 48 to define the details of the web service that you want to invoke for the Withdraw action.
- If you are not defining a Withdraw action web service, click **Finish** to complete the EAI call-out definition.

Map Web Service Fields to iProcess Fields

(*Optional*) If the Web Service operation you are calling enables responses, you can define the output mappings so that data is returned to the case.

In the **Outputs** section, repeat the mapping process described in Map iProcess Fields to Web Service Fields on page 65 so that all the Web Service output fields are mapped to iProcess fields. Then, proceed as follows:

- If you are defining a Withdraw action web service (you selected the **Define Withdraw action** checkbox in **Select the Data Transport Mechanism and Invocation Style** dialog), click **Next** and continue with Select the Data Transport Mechanism and Invocation Style on page 48 to define the details of the web service that you want to invoke for the Withdraw action.
- If you are not defining a Withdraw action web service, click **Finish** to complete the EAI call-out definition.

Calling Web Service operations that supply multiple parameters (parts) as a response, as per the general conventions for SOAP RPC/encoded invocations, is not supported in this release. To work around this, you should do the following:

1. Pass the parameters back as a single string using delimiters.
2. Call a iProcess script to parse the string and map the resulting values to iProcess fields. How you do this depends on your data and application.

Back to Library

Editing an EAI Web Service Step

To edit an EAI Web Service step, do the following:

1. Double-click the Web Service step in your procedure.
2. The **EAI Step Definition** dialog is displayed.
3. Click **EAI Call-Out Definition**.The Web Service Integrator wizard is displayed.

- If you are editing a step that has a web service defined for a Withdraw action, you can select the **Edit only the Withdraw action** checkbox to skip the dialogs related to the main web service and proceed directly to the dialogs for the Withdraw action web service. Do not deselect the **Define Withdraw action** checkbox unless you want to delete the web service that has been specified for the Withdraw action (see Deleting a Withdraw Action on page 67).
- If you are editing an EAI Web Service step created with a previous version of the TIBCO iProcess Web Services Plug-in, it will not contain security information, to apply SOAP security features, you must re-edit the step and select a security profile.

4. Continue through the wizard and modify any settings as required.

If when the step was created, the WSDL was obtained from a UDDI repository, when you edit the step, the WSDL that was obtained is presented as a static WSDL. You can re-retrieve the WSDL by selecting **UDDI** and searching again. If the WSDL in the repository has changed since the step was created, the displayed WSDL is updated.

5. Click **Finish** to save your new settings.

Deleting a Withdraw Action

A Web Service that has been defined for a Withdraw action can be deleted by simply editing the step as described previously, and deselecting the **Define Withdraw action** checkbox. Then, when you save the step, the Web Service selection for the Withdraw action is deleted.

Back to Library

Back to Library

Chapter 5 Examples

This chapter contains some examples of using the TIBCO iProcess Web Services Plug-in. The schemas, iProcess procedures, and BusinessWorks processes can all be found in the **examples** folder on the TIBCO iProcess Engine Web Services Server Plug-in product physical media.

These examples are subject to change. Checkhttp://www.tibcommunity.com for updates or to find further examples.

Back to Library

Topics

Overview

The aim of this chapter is to demonstrate how to make outbound and inbound web service calls. BusinessWorks is used to host an external web service, and to call an Inbound web service. Although each integration project is different, the following sections should provide you with an overview of the integration process that you can adapt to your own requirements.

The preferred method of integrating the TIBCO iProcess Engine with TIBCO BusinessWorks is to use the TIBCO BusinessWorks iProcess Connector.

The iProcess BusinessWorks Connector allows applications designed using either BusinessWorks or the TIBCO iProcess suite of products to communicate easily. For more information about using the BusinessWorks Connector, see the *TIBCO iProcess BusinessWorks Connector User's Guide*.

Back to Library

About Integrating the iProcess Engine with Business Works

These examples demonstrate the following iProcess Engine and BusinessWorks integration concepts:

- Outbound - iProcess procedures make calls to BusinessWorks processes.
- Inbound - BusinessWorks makes calls to the iProcess Engine to perform operations such as starting cases, triggering events or suspending cases.

There are two data transport mechanisms you can use to implement these integration scenarios:

- Simple Object Access Protocol (SOAP) requests over the Hyper text Transfer Protocol (HTTP) - (SOAP/HTTP).
- Extensible Markup Language (XML) text using a Java Message Server (JMS) - (XML/JMS).

For an overview of the components used, the transport protocols involved and how each component interacts with each other, see Introduction to the iProcess Web Services Plug-in on page 1.

Back to Library

Pre-requisite Tasks

You need to perform the following pre-requisite tasks to configure the iProcess Engine and BusinessWorks for integration:

Task 1: Configure TIBCO EMS

These examples assume that you are using TIBCO Enterprise Message Service as your JMS Provider. To configure Enterprise Message Service, you must create the following in the TIBCO EMS Administration Tool:

Refer to the documentation supplied with TIBCO EMS for information on how to do this.

1. Create the following queue and a JNDI name for it (the queue is used by the XML/JMS example):

   queue.Bank

2. Ensure that the new queue that you created is configured in the file ***jettydirectory*/tibco/alias.xml**. For example:

   ```
   <Alias name="Bank" id="ems" topic="false"
      topicorqueuename="queue.Bank"/>
   ```

3. Restart Jetty.

Task 2: Import the BusinessWorks Project

The TIBCO BusinessWorks Project contains all the necessary BusinessWorks schemas, processes and connection objects necessary for these examples. Import the Project as follows:

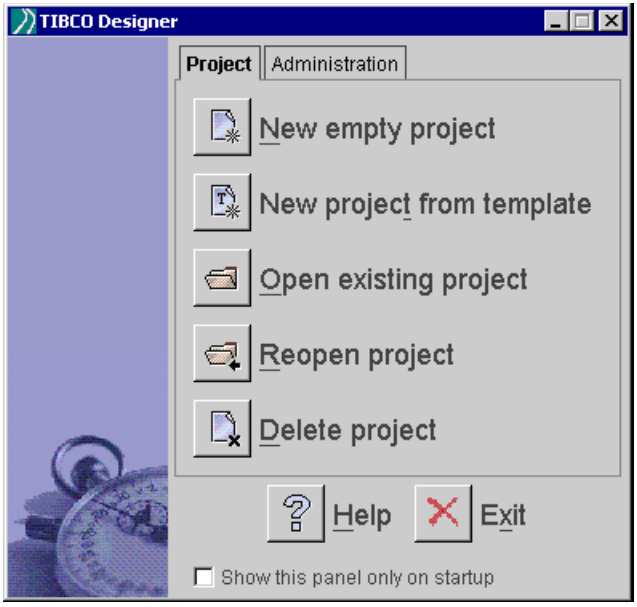
1. Copy the **examples** folder from the physical distribution media to a local directory.

Back to Library

2. From the **Start** Menu, select **Programs** > **TIBCO** > **TIBCO Designer 5.x** > **Designer 5.x**.

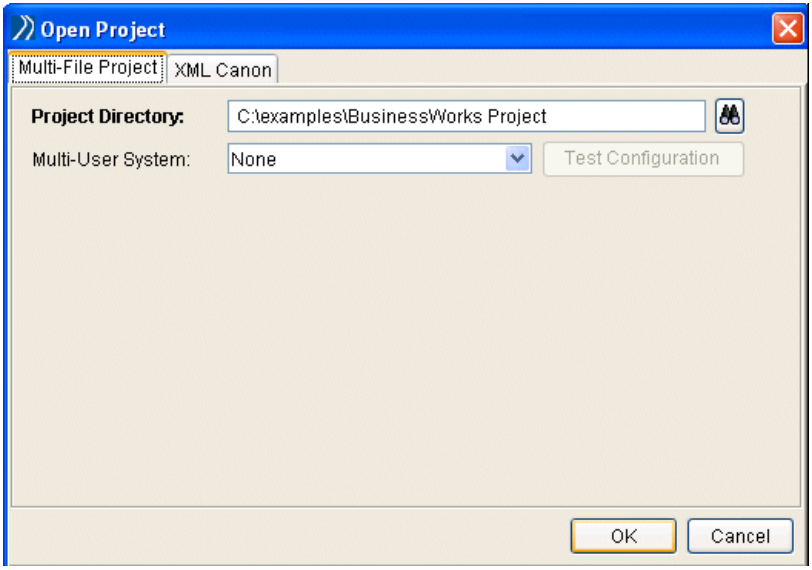
The example BusinessWorks processes were created using TIBCO Designer 5.3. You cannot open the processes in earlier versions. If you open them in a later version than 5.3, you will be prompted to upgrade the processes to the later version.

The following dialog is displayed:



Back to Library

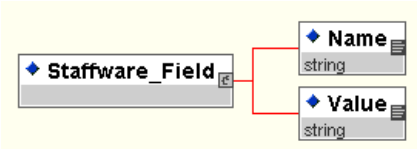
3. Click **Open existing project**. The **Open Project** dialog is displayed.



4. Browse to select the **examples\BusinessWorks Project** directory (the location where you copied the **examples** folder), and click **OK**. The BusinessWorks project opens.
5. Expand the **DEMO** folder.

Task 3: Review the Schema

The **sw** schema is provided for field mapping to iProcess Engine fields. You use this schema when writing your own XSLT to integrate with the iProcess Engine. It is also essential to understand this schema when calling web services using XML/JMS. For more information about this schema, click **schema.html** in the **swschema** folder on the distribution CDROM or browse the schema in BusinessWorks:



Back to Library

Task 4: Review the HTTP and JMS Connections

For the purposes of this example, the HTTP and JMS connection objects have been created for you. The HTTP connection object uses **localhost** and port **8002**. If the Web Services Client and Server Plug-ins and TIBCO EMS are running on the same machine, you can skip the remainder of this step. If you need to change the HTTP or JMS Connection, do so as follows:

1. Open the **DEMO** folder by double clicking on it, and double-click **HTTP Connection** to open the connection object.
2. Click the **Configuration** tab *and ensure that* ***Host*** represents the machine running the BusinessWorks process, and that **Port** specifies a port that is not in use.
3. Click **Apply**.
4. Double-click **JMS Connection** to open the connection object.
5. The field **JNDI Context URL** is configured to **tibjmsnaming://localhost:7222**. If TIBCO EMS is configured on a different machine, modify the **JNDI Context URL** as necessary. If you have implemented security, enter the **User Name** and **Password** for TIBCO EMS.

Task 5: Import the iProcess Procedures

1. Copy the **banksoap.xfr**, **bankxml.xfr,** and **inbound.xfr** files from the **examples\iProcess Procedures** directory to the ***SWDIR*\util** directory.
2. Navigate to the ***SWDIR*\util** directory and enter the following command:

   ```
   swutil import
   ```

3. Enter **BANKSOAP** when prompted for the name of the procedure to import.
4. When prompted, accept the default owner (**swpro**) and enter **U** to import the procedure as Unreleased.
5. In the same way, import the **BANKXML** and **INBOUND** procedure.
6. Start the TIBCO iProcess Workspace and confirm that the procedures were imported.

If you changed the hostname or port in the BusinessWorks process, the WSDL used in the iProcess Engine BANKSOAP procedure must be changed to match the BusinessWorks WSDL. Ensure that the target endpoint in both WSDLs match.

Back to Library

Task 6: Import the Example Security Profiles

Import the example security profiles as follows:

1. Copy **example_profiles.xml** file from the **examples** folder on the TIBCO iProcess Engine Web Services Server Plug-in product physical media to the *webservices_server_location*/**jetty-6.1.25** directory.
2. Navigate to the *webservices_server_location*/**jetty-6.1.25** directory and enter the following command:

   ```
   urladmin imp_security example_profiles.xml
   ```

   You will be prompted to overwrite the **Inbound** profile. Click **Yes** to do so.
3. Restart the Jetty server.

Back to Library

Creating Working Examples

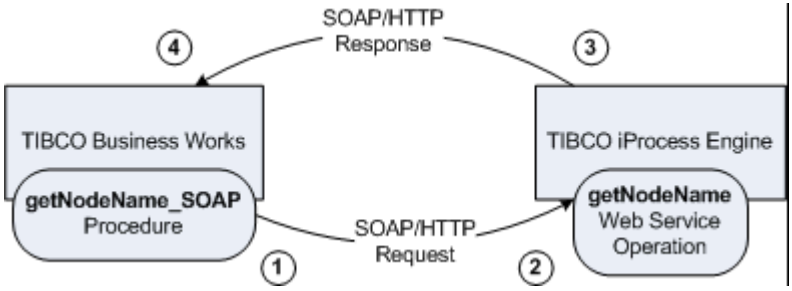
This section examines the actual iProcess procedures and BusinessWorks processes that demonstrate specific scenarios.

Example 1- Calling an Inbound Web Service Operation Using SOAP/HTTP

This section describes:

Aims of the Example

The aim of this example is for BusinessWorks to call an inbound Web Service using SOAP/HTTP as the transport. Specifically, it does the following:

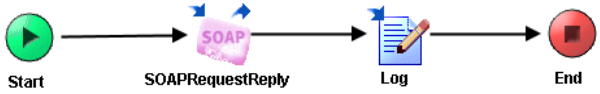


1. The BusinessWorks Process **getNodeName_SOAP** sends a SOAP request message over HTTP to the TIBCO iProcess Engine.
2. The inbound message from BusinessWorks calls the iProcess web service operation **getNodeName**.
3. The operation returns the result of the **getNodeName** operation to BusinessWorks by sending a SOAP message over HTTP.
4. The node name is displayed in the console log file.

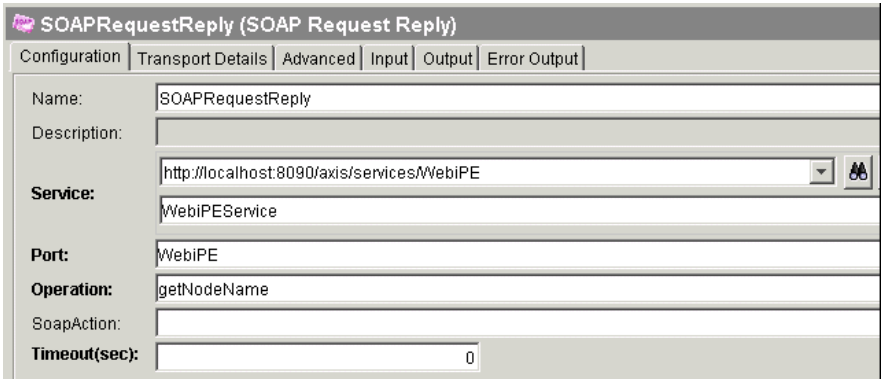
Back to Library

Looking at the getNodeName_SOAP Process

1. Start BusinessWorks Designer and open the **getNodeName_SOAP** process:

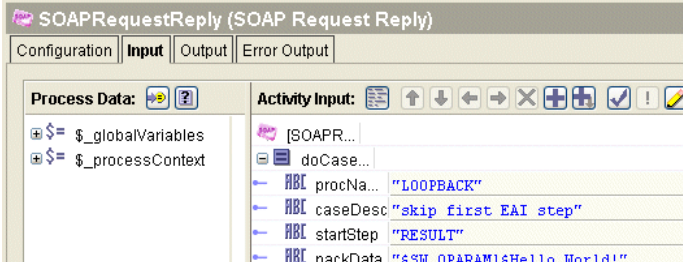


2. The **SOAP Request Reply** activity performs a request (**getNodeName**) on the specified Web Service and expects a reply from the Web Service. The Configuration tab is set up as follows:



If you are running Jetty on different machine, you need to edit the WebiPE WSDL to specify the correct endpoint, then restart TIBCO Designer.

3. The **Input** tab is configured as follows:

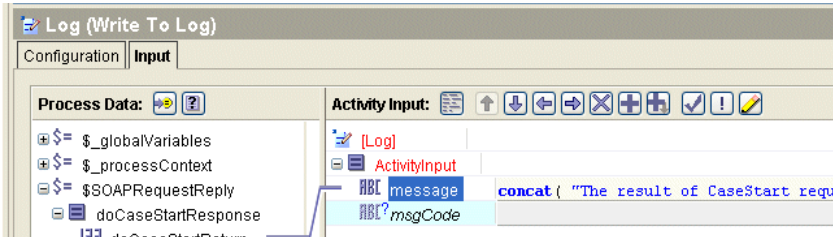


4. The **Log** activity writes the result of the request from the **SOAP Request Reply** activity to the log of the process engine that is running the BusinessWorks process. The actual string is:

```
concat("Result of getNodeName: ",
$SOAPRequestReply/getNodeNameResponse/getNodeNameReturn)
```

Back to Library

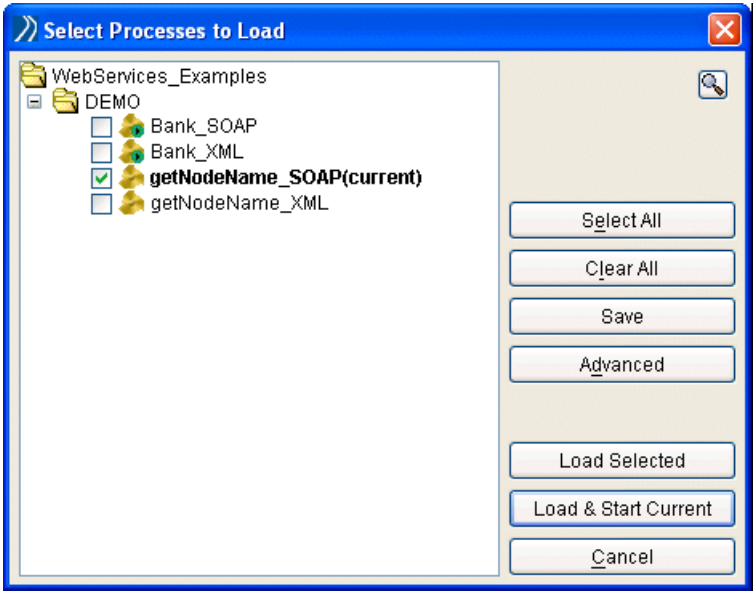
It is configured as follows:



How to Run the Example

To run this example, do the following:

1. Start TIBCO Designer.
2. Start Jetty.
3. On the Project Panel, select the Tester tab.
4. Press **F9** to display the **Select Processes to Load** dialog.
5. Select **getNodeName_SOAP** and click **Load Selected**:



Back to Library

6. Select **Windows** > **Show Console** to view the **Console Log** to verify that the **getNodeName** operation has performed correctly. If it has performed correctly, the log should contain lines similar to the following:

```
2007 Jul 02 11:58:44:020 GMT +1 BW.WebServices_Examples Info
[BW-Core] BWENGINE-300002 Engine WebServices_Examples started


2007 Jul 02 11:58:46:020 GMT +1 BW.WebServices_Examples User
[BW-User] - Job-32000 [DEMO/getNodeName_SOAP.process/Log]: Result
of getNodeName: staffw_nod1
```

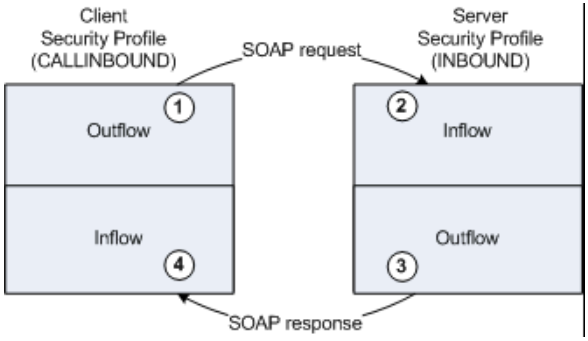
Example 2- Calling an Inbound Web Service Operation Using SOAP/HTTP and Basic Authentication

This section describes:

- Aims of the Example on page 77
- Looking at the getNodeName_SOAP Process on page 78
- How to Run the Example on page 79

Aims of the Example

The following example shows a loopback test that demonstrates how basic authentication works when enabled for both inflow and outflow:



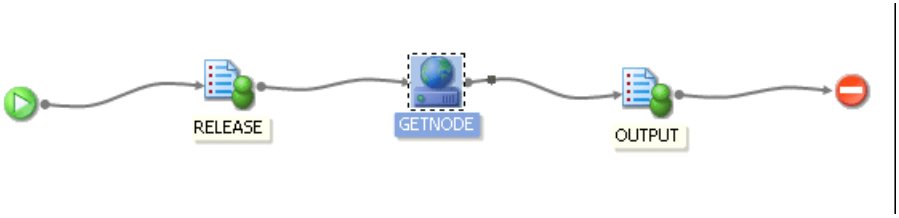
1. The Web Service Client has a security profile **callinbound** that specifies a username and password for outflow security. The username - password token is inserted into the SOAP request to the Server.
2. The Server has a security profile **Inbound** to deal with SOAP requests. The username and password in the SOAP Request must match the username and password specified for Inflow security defined in the **Inbound** profile.
3. The Server sends the SOAP response with the username - password token specified for Outflow Security defined in the **Inbound** profile.

Back to Library

4. The Client receives the SOAP response and compares the received username and password to those specified for Inflow Security in the **callinbound** security profile. The usernames and passwords must match.

Looking at the INBOUND Procedure

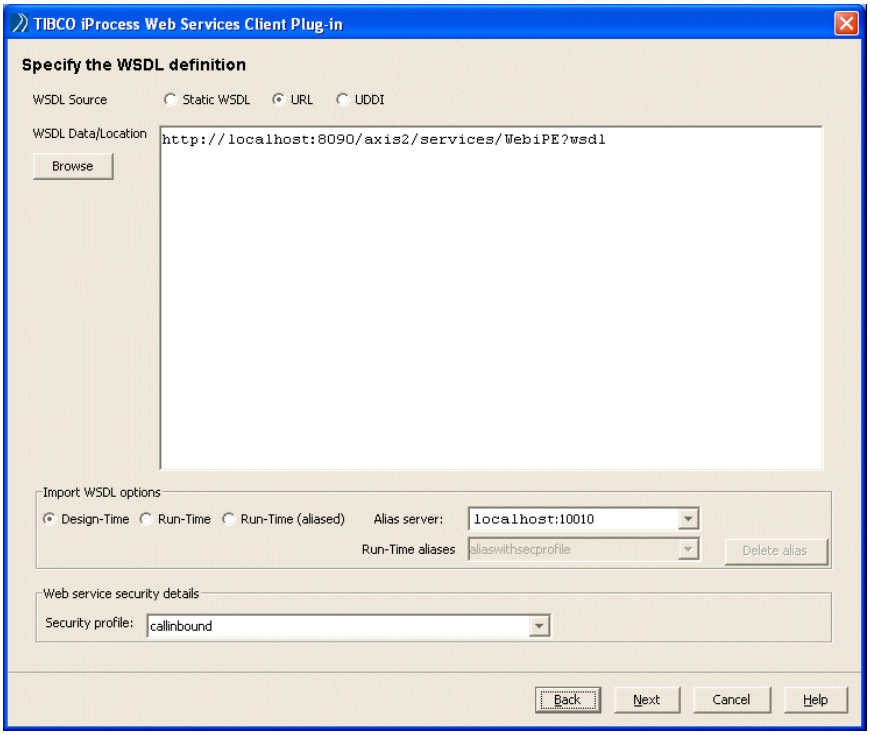
1. The **INBOUND** Procedure has three steps:



2. The first step, **RELEASE** displays a form stating that the Procedure will next call Inbound web service **getNodeName**. The Web Services step **GETNODE** performs the call, and **OUTPUT** displays the result.
3. Double-click **GETNODE** to see how the call-out is defined.

Back to Library

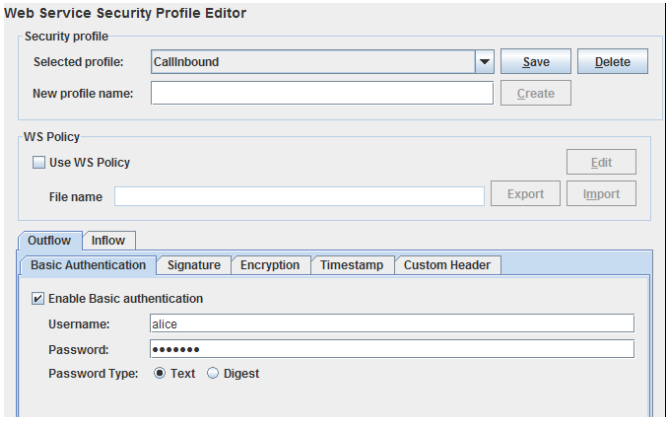
4. Note that in the **Specify the WSDL definition** dialog, the WSDL is obtained via URL from **localhost**. If this is not the case for your environment, modify the URL as necessary. Also make sure that you have the correct **Alias server** selected (if you do not, you will not be able to see the example security profile that you imported in Task 6: Import the Example Security Profiles. Note that the security profile is defined as **callinbound**.



5. Examine the **callinbound** security profile by starting the Security Profile Administrator - run the *JETTY_HOME***securitymanager** script (on Windows, **securitymanager.cmd**, on UNIX, **securitymanager.sh**).

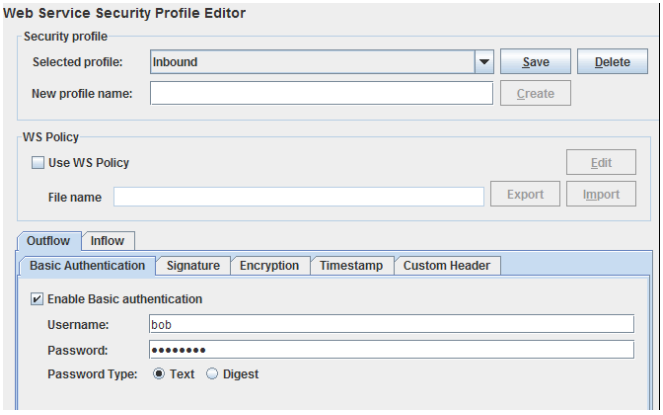
Back to Library

6. The Outflow security of **callinbound** specifies **alice** as the username. This username and password will be applied to the SOAP request from the **INBOUND** Procedure to the iProcess Web Service.



7. Now examine the Inflow portion of the **Inbound** security profile. You can see that this also specifies **alice** as the username. This means that if the passwords match, the SOAP request will be authenticated.

8. The SOAP response (from **getNodeName**) will have the security specified on the Outflow portion of the **Inbound** profile. This specifies **bob** as the username.



9. Now examine the Inflow portion of the **callinbound** security profile. You can see that this also specifies **bob** as the username. This means that if the passwords match, the SOAP response will be authenticated.

Back to Library

How to Run the Example

To run this example, do the following:

1. Start a case of the **INBOUND** procedure.
2. Release the first form step.
3. The node name returned by **getNodeName** is displayed in a form.
4. The Jetty log file (**log.txt**) located in the following directory shows messages related to the authentication of the username and password:

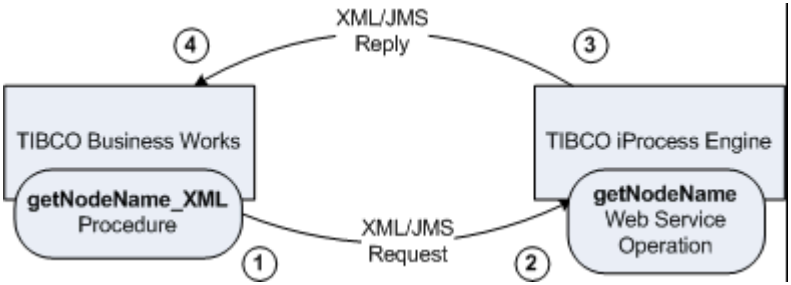
   SWDIR`/jetty-6.1.25/tibco`
5. The Case Administrator also shows information about the processing of the case.

Example 3- Calling an Inbound Web Service Operation Using XML Over JMS

This section describes:

Aims of the Example

The aim of this example is for BusinessWorks to call an inbound Web Service using XML/JMS as the transport. Specifically, it does the following:



1. The BusinessWorks Process **getNodeName_XML** sends XML text to the TIBCO iProcess Engine using JMS.
2. The inbound message from BusinessWorks calls the iProcess web service operation **getNodeName**.
3. The operation returns the result of the **getNodeName** operation to BusinessWorks by sending XML text using JMS.

Back to Library

4. The node name is displayed in the console log file.

Looking at the getNodeName_XML Process

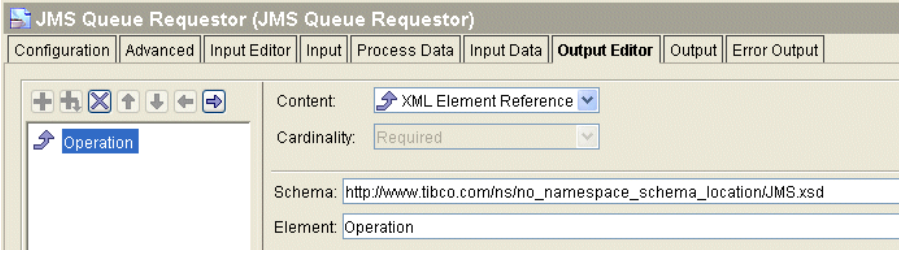
1. Start Business Works Designer and open the **getNodeName_XML** process:

2. Look at the **Parse XML** activity. This takes an XML file or an XML string and processes it, turning it into an XML schema tree based on the XSD or DTD specified. It should be configured as follows:
   a. On the **Configuration** tab, **text** is selected from the **Input Style:** drop-down list.
   b. On the **Input** tab, the following string is contained in the **XMLstring** box:

      ```
      '<Operation><getNodeName/></Operation>'
      ```

      This is the XML message that instructs the iProcess Engine to perform a **getNodeName** operation. This is based on the **JMS.XSD** schema for iProcess Engine Inbound web services, which is supplied as part of the BusinessWorks project. For more information, see getNodeName on page 135.

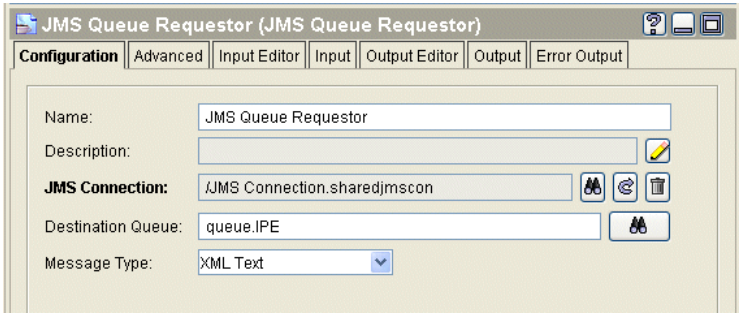
3. An example of the **Output Editor** tab is shown below:



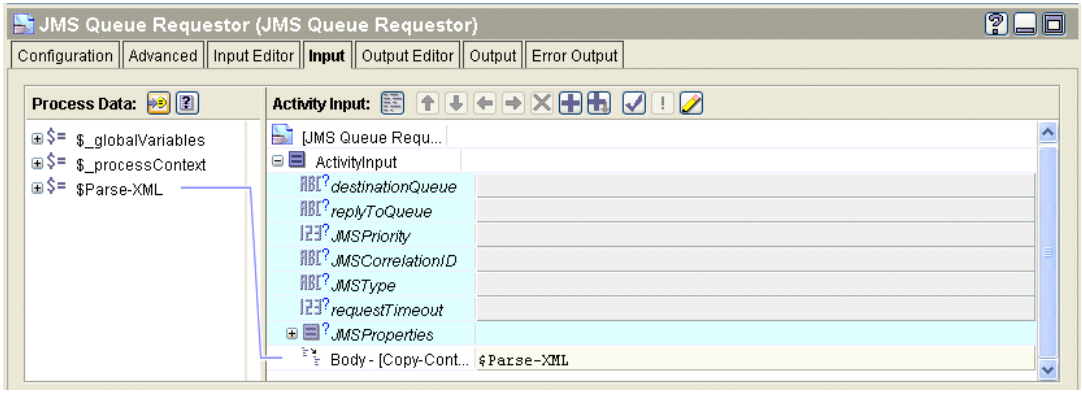
You can see that the JMX.xsd schema is being used.

Back to Library

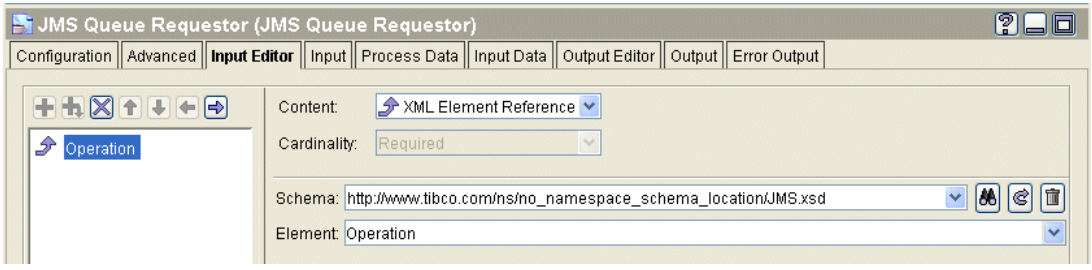
4. The **JMS Queue Requestor** activity is used to send a request to a JMS queue name (**queue.IPE**) and receive a response back from the JMS client. The **Configuration** tab should be set up as follows:



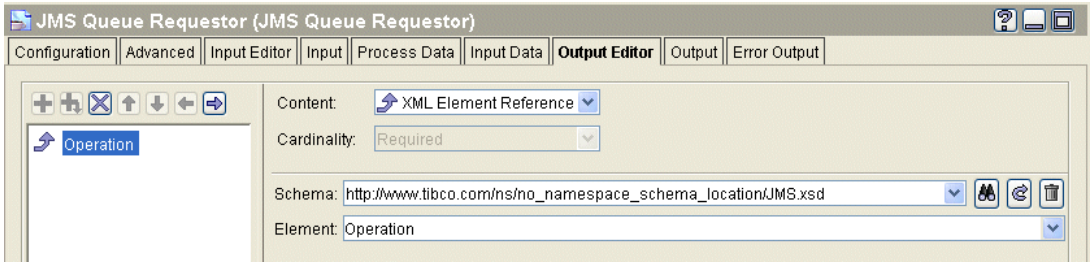
An example of the **Input** tab is shown below:



5. The **JMS Queue Requestor** activity references the **JMS** schema in both the **Input Editor** and **Output Editor**. This means that the same schema is used for both the inbound XML request to the iProcess Engine and its reply. You can see that this has been configured on both the **Input Editor** and **Output Editor** tabs:



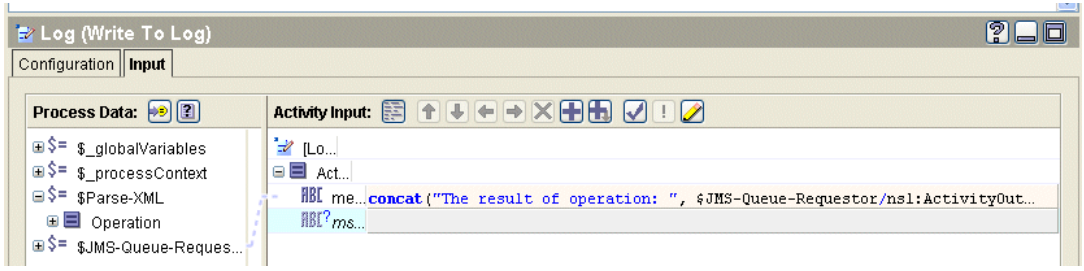
Back to Library



6. The **Log** activity writes the result of the request from the **JMS Queue Requestor** activity to the log of the process engine that is running the BusinessWorks process. From the **Input** tab, drill down to $JMS-Queue-Requester\ActivityOutput\Body\Operation\Response\ in the **Process Data** box. You can see that @operation and @response are mapped to the $Log\ActivityInput\ABC message box in the **Activity Input** box. The following string is contained in the ABC Message box.

```
concat("The result of operation: ",
$JMS-Queue-Requestor/ns1:ActivityOutput/Body/Operation/Response/@o
peration, " is: ",
$JMS-Queue-Requestor/ns1:ActivityOutput/Body/Operation/Response/@r
esult)
```

An example of the **Input** tab is shown below:



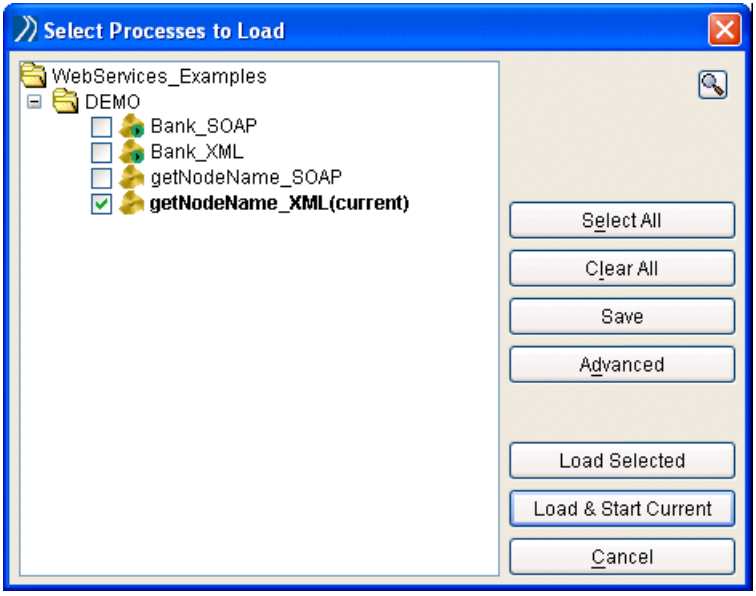
How to Run the Example

To run this example, do the following:

1. Start TIBCO Designer.
2. Start Jetty.
3. On the Project Panel, select the Tester tab.
4. Press **F9** to display the **Select Processes to Load** dialog.

Back to Library

5. Select **getNodeName_XML** and click **Load Selected**:



6. View the **Console Log** to verify that the **getNodeName** operation has performed correctly. If it has performed correctly the log should contain lines similar to the following:

```
2007 Jul 02 12:38:56:927 GMT +1 BW.WebServices_Examples Info
[BW-Core] BWENGINE-300002 Engine WebServices_Examples started 2007

Jul 02 12:38:58:833 GMT +1 BW.WebServices_Examples User [BW-User] -
Job-35000 [DEMO/getNodeName_XML.process/Log]: The result of
operation: getNodeName is: staffw_nod1
```

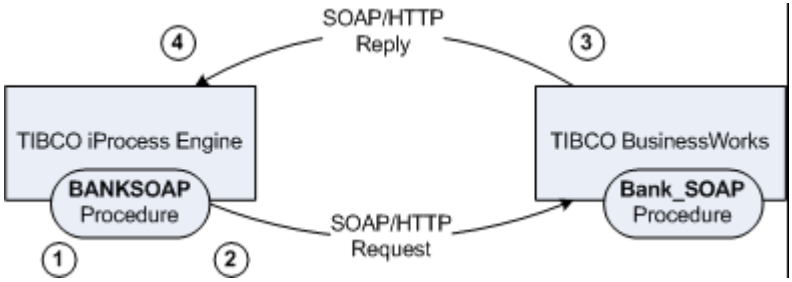
Example 4- Calling an Outbound Web Service using SOAP/HTTP

This section describes:

Back to Library

Aims of the Example

The aim of this example is for a BANKSOAP procedure on the iProcess Engine to take some customer details and send them to a Web Service on BusinessWorks. BusinessWorks then sends an account balance back to the iProcess Engine, which displays it in a form. Specifically, it does the following:



1. The iProcess Engine Procedure **BANKSOAP** prompts you to enter the customer details in a form.
2. When the form is released, the iProcess Engine sends a SOAP request to BusinessWorks using HTTP.
3. BusinessWorks receives the request and sends a hardcoded value for customer balance in the SOAP response message using HTTP.
4. The iProcess receives the balance information and displays it in a form.

Looking at the iProcess BANKSOAP Procedure

1. In the iProcess Workspace, open the iProcess **BANKSOAP** procedure:

2. The INPUT step contains a form in which you enter values for the two required iProcess fields, USERNAME (**NAME)** and USERID (**ID)**:

Back to Library

3. Open the BANK iProcess Web Services step and click **EAI Call-Out Definition**. You can see that the step is configured to use the **SOAP/HTTP** data transport mechanism with the **Asynchronous with reply** Invocation Style.

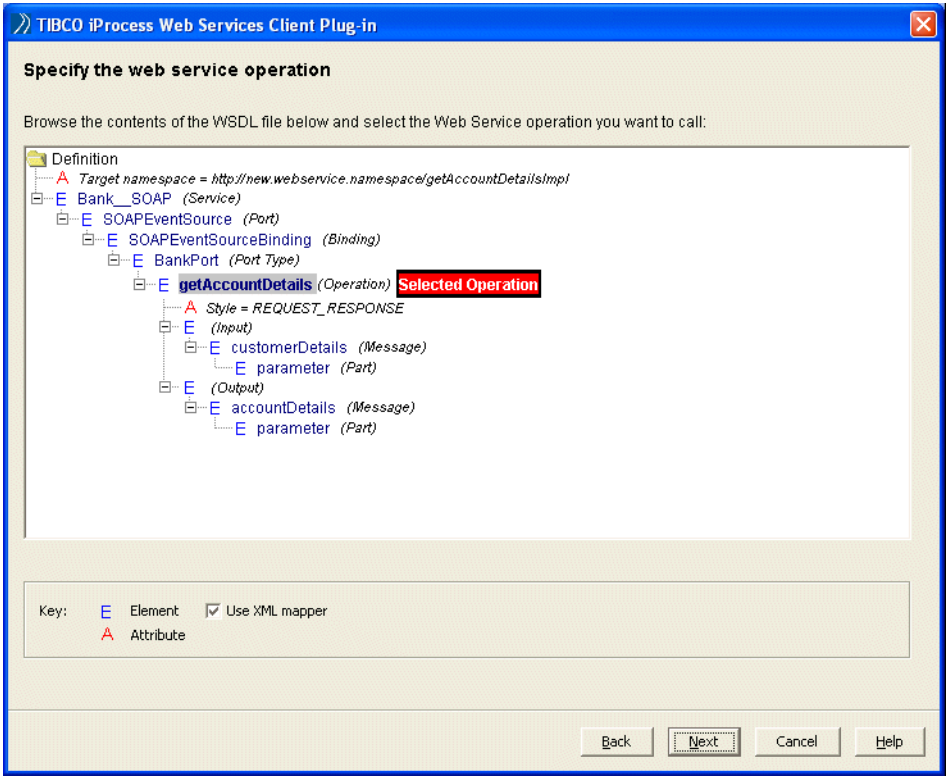
   Click **Next**.

4. The **Specify the WSDL Definition** dialog shows the static WSDL that is used to define the web services operations that you can use. In this case, there is only one defined, (**getAccountDetails**).

If you changed the **host** in the HTTP connection, you should make sure that the static WSDL in this dialog is correct. You can copy the WSDL from the WSDL Source tab of the SOAPEventSource activity of the Bank_SOAP process (see Looking at the Bank_SOAP Process on page 93). Then paste the WSDL into this dialog.

Click **Next**.

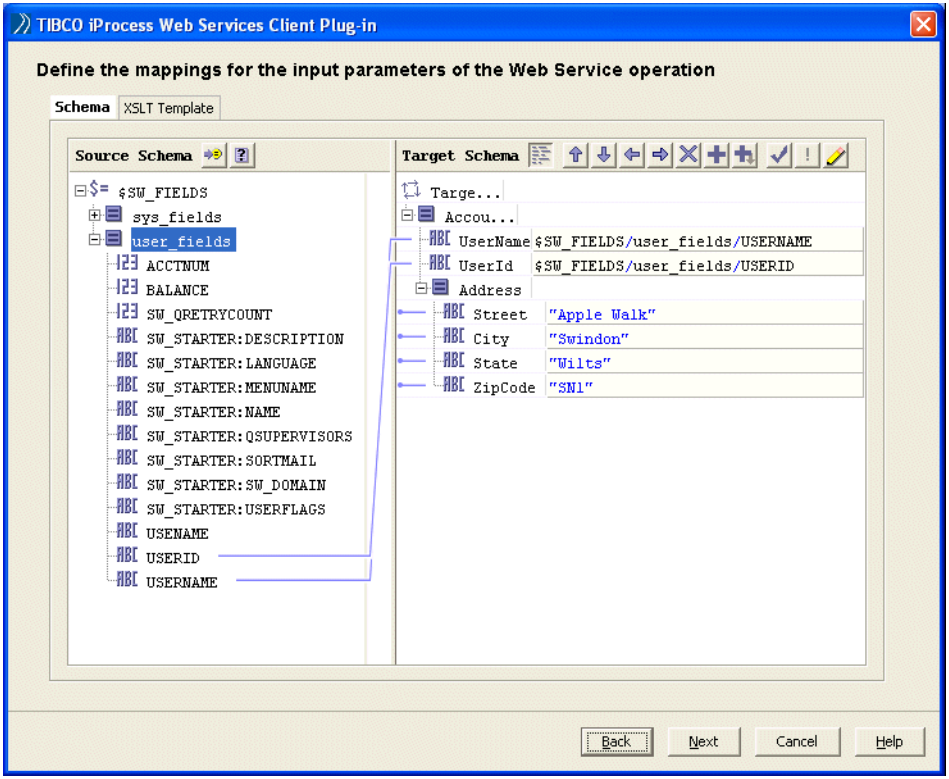
5. You can see that the getAccountDetails operations has been selected:



Click **Next**.

Back to Library

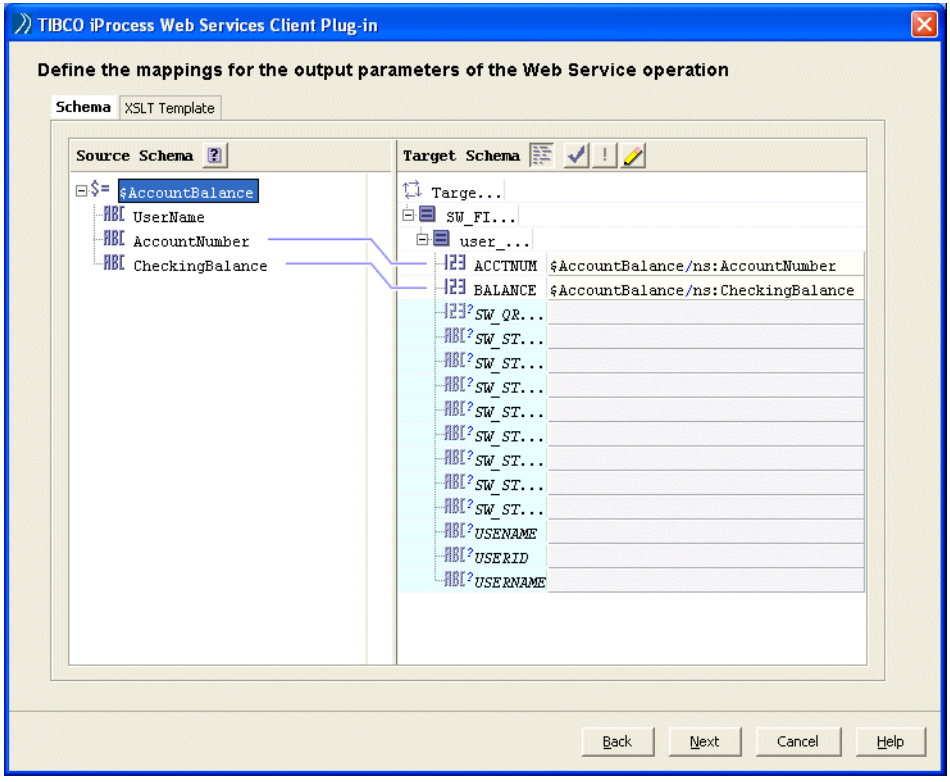
6. The following dialog maps the USERNAME and USERID fields to elements in the target schema specified using the mapper. You can also click the XSLT Template tab to see the XSLT that the mapper creates.



Click **Next**.

Back to Library

7. The following dialog shows how information from the source schema (**AccountNumber** and **CheckingBalance**) will be returned from BusinessWorks and mapped to the iProcess fields **ACCTNUM** and **BALANCE**:



Click **Next**.

8. Note that the **ACCTNUM**, **BALANCE**, **USERNAME**, and **USERID** fields are both selected for export.

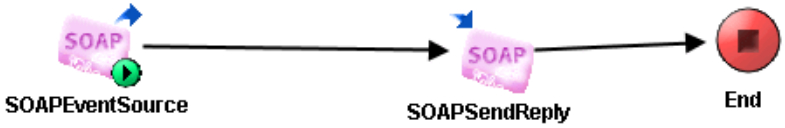
   Click **Cancel**.

9. The OUTPUT step displays the **ACCTNUM** and **BALANCE** fields that are returned from the BANK step.

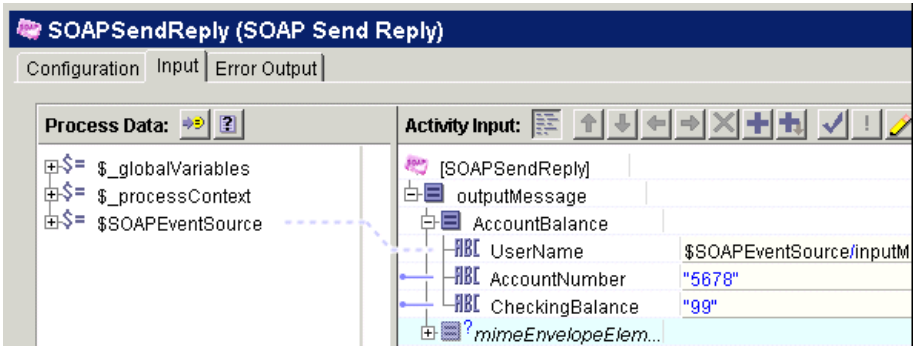
Back to Library

Looking at the Bank_SOAP Process

1. Start Business Works Designer and open the Bank_SOAP process:



2. Look at the **SOAPEventSource** activity. This receives the SOAP message from the TIBCO iProcess Web Services Plug-in.
3. Next, examine the **SOAPSendReply** activity. This sends the SOAP response message to the iProcess Engine with the following hard coded values for **AccountNumber** and **CheckingBalance**:



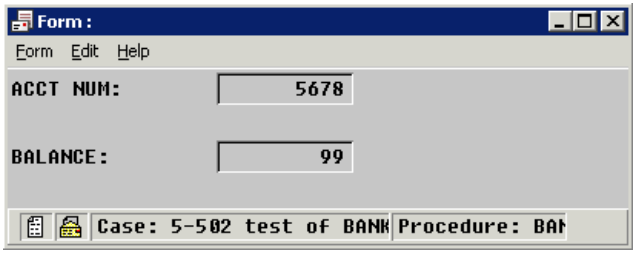
How to Run the Example

To run this example, do the following:

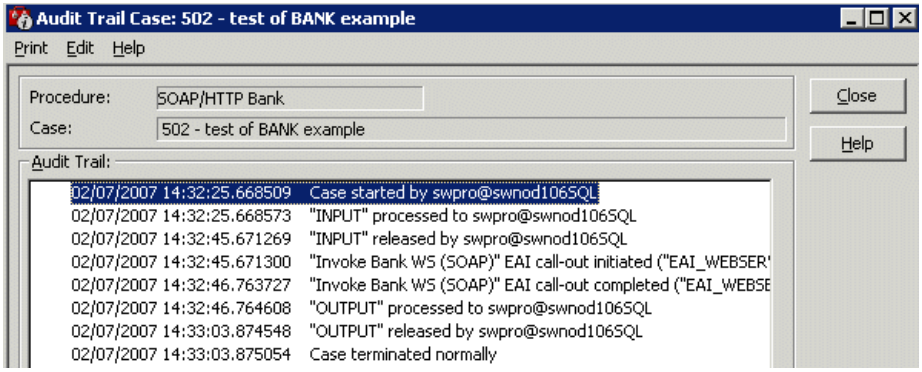
1. Start TIBCO Designer.
2. Start Jetty.
3. On the Project Panel, select the Tester tab.
4. Press **F9** to display the **Select Processes to Load** dialog.
5. Select **Bank_SOAP** and click **Load Selected**.
6. Start a case of the Bank procedure and in the form that is generated, enter a **NAME** and **ID**. Release the step.

Back to Library

7. The iProcess Web Services step sends the customer information to the bank application and returns a balance. The balance is displayed in a form:



8. Use the Case Administrator to view the audit trail. This should show the Web Services call-out and the messages associated with the processing of the case:



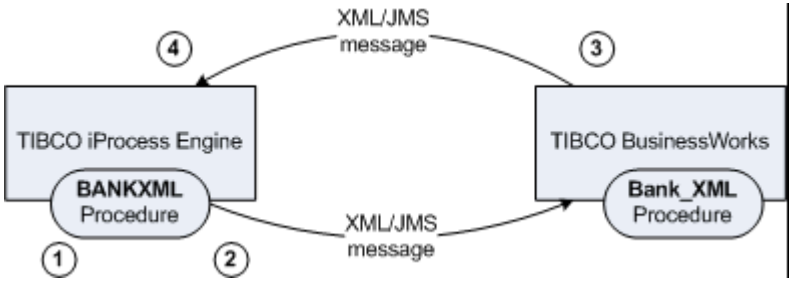
Example 5- Calling an Outbound Web Service using XML/JMS

This section describes:

Back to Library

Aims of the Example

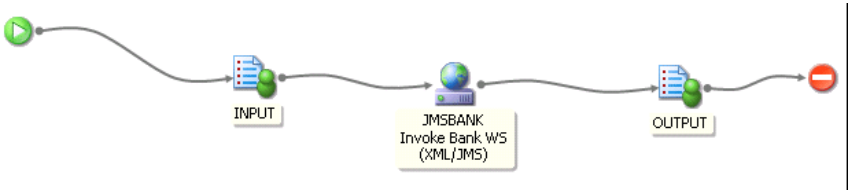
The aim of this example is for a BANKXML procedure on the iProcess Engine to take some customer details and send them to a Web Service on BusinessWorks. BusinessWorks then sends an account balance back to the iProcess Engine, which displays it in a form. Communications in both directions uses XML over JMS as the transport. Specifically, it does the following:



1. The iProcess Engine Procedure **BANKXML** prompts you to enter the customer details in a form.
2. When the form is released, the iProcess Engine sends an XML message to BusinessWorks using JMS.
3. BusinessWorks sends the hardcoded customer balance to the iProcess Engine in an XML message using JMS.
4. The iProcess Engine receives the balance information and displays it in a form.

Looking at the iProcess BANKXML Procedure

1. In the iProcess Workspace, open the iProcess **BANKXML** procedure:



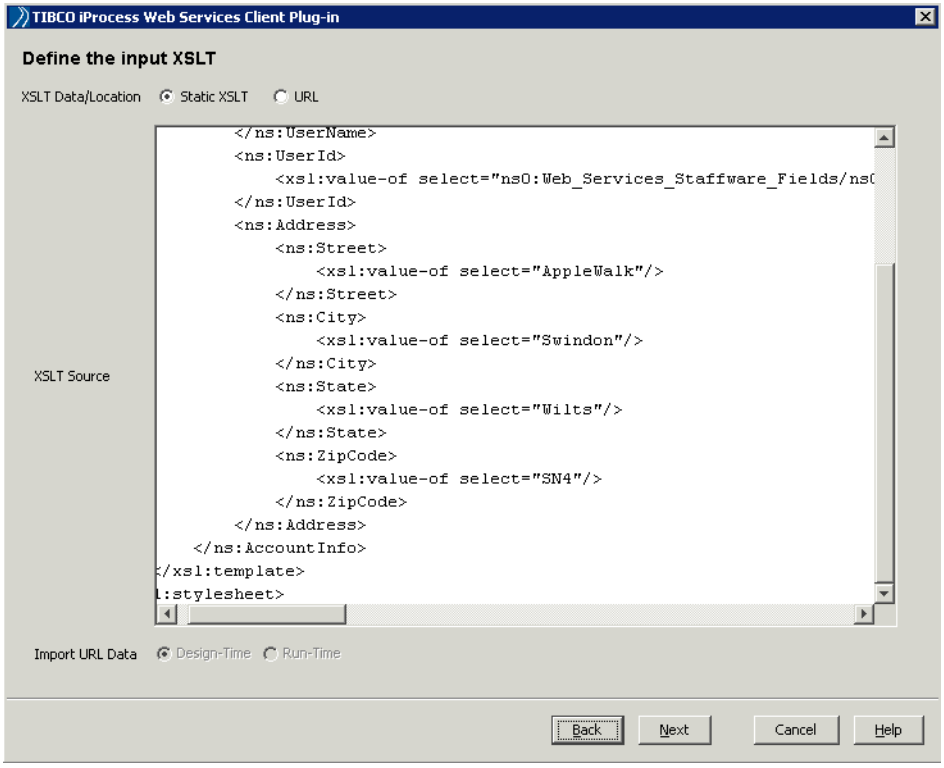
2. The INPUT step contains a form in which you enter values for the two required iProcess fields, USERNAME (**NAME)** and USERID (**ID)**:

Back to Library

3. Open the JMSBANK iProcess Web Services step and click **EAI Call-Out Definition**. You can see that the step is configured to use the **XML/JMS** data transport mechanism (JMS target **Bank**), with the **Asynchronous with reply** Invocation Style.

   Click **Next**.

4. The **Define the Input XSLT** dialog shows the XSLT that maps the iProcess fields to the target schema.



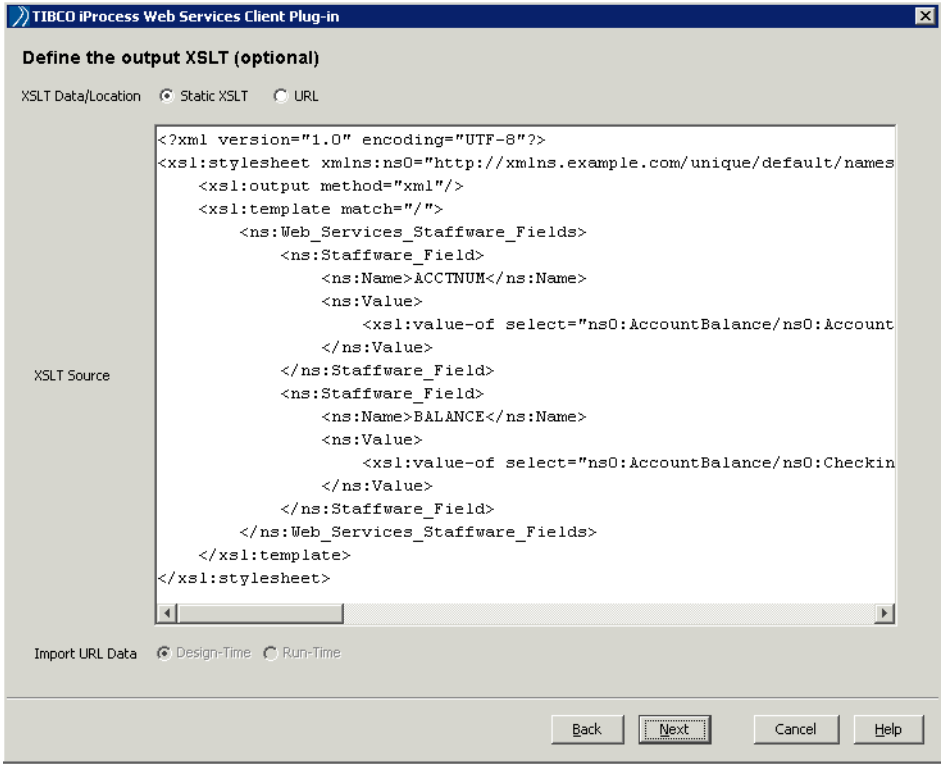
   For example:

```
<ns:UserId>
  <xsl:value-of
  select="ns0:Web_Services_Tibco_Fields/ns0:Tibco_Field
  [ns  0:Name='USERID']/ns0:Value"/>
</ns:UserId>
```

   Click **Next**.

Back to Library

5. The **Define the Output XSLT** dialog shows how balance information returned from BusinessWorks is mapped to iProcess Fields:



For example:

```
<ns:Web_Services_Tibco_Fields>
  <ns:Tibco_Field>
     <ns:Name>ACCTNUM</ns:Name>
     <ns:Value>
       <xsl:value-of
       select="ns0:AccountBalance/ns0:AccountNumber"/>
     </ns:Value>
  </ns:Tibco_Field>
  <ns:Tibco_Field>
     <ns:Name>BALANCE</ns:Name>
     <ns:Value>
       <xsl:value-of
       select="ns0:AccountBalance/ns0:CheckingBalance"/>
     </ns:Value>
  </ns:Tibco_Field>
</ns:Web_Services_Tibco_Fields>
```

Click **Next**.

Back to Library

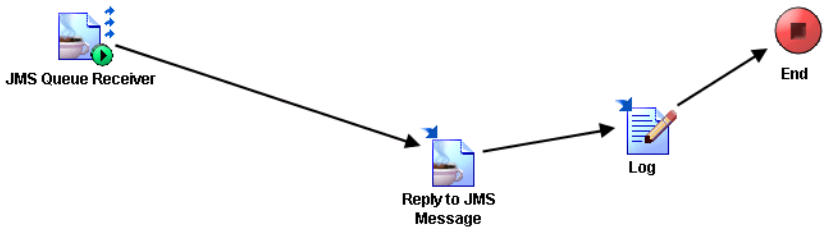
6. Note that the **ACCTNUM**, **BALANCE**, **USENAME**, and **USERID** fields are both selected for export.

   Click **Cancel**.

7. The OUTPUT step displays the **ACCTNUM** and **BALANCE** fields that are returned from the JMSBANK step.

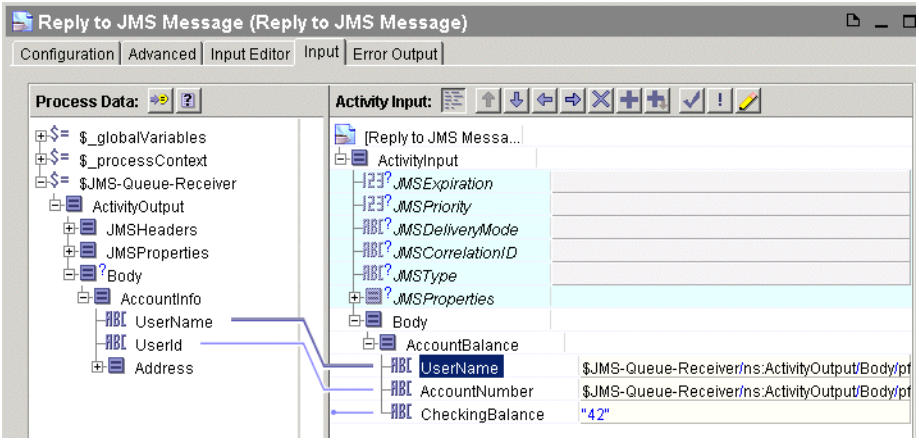
Looking at the Bank_XML Process

1. Start BusinessWorks Designer and open the Bank_XML process:



2. Look at the **JMS Queue Receiver** activity. This receives the JMS message from the iProcess Engine on the **Bank** queue.

3. Next, examine the **Reply to JMS Message** activity. This sends the XML message to the iProcess Engine with a hardcoded value for **CheckingBalance**. This is configured on the Input tab:



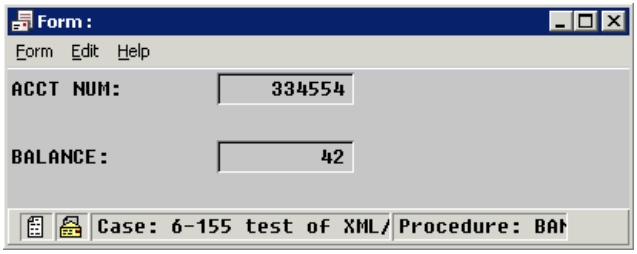
4. The Log activity writes the username that was entered in the Input iProcess form to the BusinessWorks console log.

Back to Library

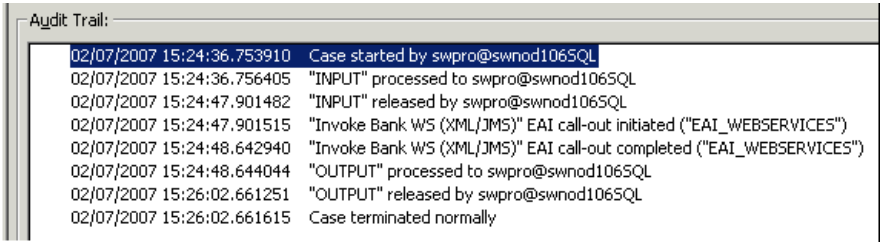
How to Run the Example

To run this example, do the following:

1. Start TIBCO Designer.
2. Start Jetty.
3. On the Project Panel, select the Tester tab.
4. Press **F9** to display the **Select Processes to Load** dialog.
5. Select **Bank_XML** and click **Load Selected**
6. Start a case of the Bank procedure and in the form that is generated, enter a **NAME** and **ID**. Release the step.
7. The iProcess Web Services step sends the customer information to the bank application and returns a balance. The balance is displayed in a form:



8. Use the Case Administrator to view the audit trail. This should show the Web Services call-out and the messages associated with the processing of the case:



9. You can also view the console log in BusinessWorks to see that the username entered in the iProcess form is displayed:

```
2007 Jul 02 15:24:08:769 GMT +1 BW.WebServices_Examples Info
[BW-Core] BWENGINE-300002 Engine WebServices_Examples started

2007 Jul 02 15:24:48:628 GMT +1 BW.WebServices_Examples User
[BW-User] - Job-39000 [DEMO/Bank_XML.process/Log]: username: T.
Smith
```

Back to Library

Back to Library

Chapter 6

Web Services Configuration and Administration

This chapter describes aspects of the TIBCO iProcess Web Services Plug-in that can be configured or changed.

Topics

Back to Library

Web Services Configuration File

The Web Services configuration file (**wsconfig.properties**) allows you to perform most of the ongoing administration and configuration tasks related to the iProcess Web Services Plug-in. It is located in:

webservices_server_location\jetty-6.1.25\tibco

Take care when editing this file as it is possible to render the iProcess Web Services Plug-in inoperable by incorrectly editing certain settings. TIBCO recommends making a backup copy of the configuration file as a safeguard.

Keystore Location

The keystore location is usually specified during the installation; however if you need to change it, you can do so by modifying the following line:

ServerEngineConfigMBean.KeyStore=

Although there is an entry in the configuration file for **KeyStorePassword**, do not modify it directly. Use the password manager to change this password (see Using the Password Manager on page 108).

JDBC Connection details

The JDBC connection details are specified during the installation. If you need to, you can change the settings using the following section of the configuration file:

```
# JDBC Connection URI
DBPoolMBean.ConnectionURI=jdbc:oracle:thin:@host:port:service;Sele
ctMethod=cursor

# JDBC Driver Name
DBPoolMBean.DriverName=oracle.jdbc.driver.OracleDriver

# JDBC Jar File locations
DBPoolMBean.CustomPath=;C:/Microsoft SQL Server JDBC Driver
3.0/sqljdbc_3.0/enu/sqljdbc4.jar

# JDBC User to Connect As
DBPoolMBean.UserName=swpro

# JDBC Password for user
# NOTE: This entry is encrypted and should only be modified using
the PasswordManager
DBPoolMBean.Password=password

# The username used when creating Audit Messages
```

Back to Library

```
DelayedReleaseHandler.userName=swadmin

# The message used when creating Audit Messages
DelayedReleaseHandler.auditMessage=Web Services

# The Database Type
DelayedReleaseHandler.dbType=SQLServer

# The schema owner for the iPE Database
DelayedReleaseHandler.dbUserName=swproX15
```

Date Formats

You can modify the format and separators of the date format used for communicating with the iProcess Engine by using the following lines:

The format that you specify should be consistent with the format specified in the *SWDIR***etc****staffpms** file. For more information, see the *TIBCO iProcess Engine Administrator's Guide*.

```
eaiws.iPEdateFormat dd/mm/yyyy
eaiws.iPEdateSeparator /
eaiws.iPEtimeFormat hh:mm
eaiws.iPEtimeSeparator \:
```

JMS Message Timeout

Previously, XML over JMS messages did not timeout. This sometimes led to a situation where if the remote system was not running, or there was an error, a message remained waiting indefinitely for a response on the **replyTo** queue.

New timeout functionality has been introduced that can be controlled by setting the following four parameters (all times are in milliseconds):

- **ServerEngineConfigMBean.ResponseTimeout** (Default: 20000) - This timeout controls how long a Web Service response should be awaited before dropping into one of the scenarios below.
- **ServerEngineConfigMBean.ConsumeTimeout** (Default: 500) - In a scenario where a JMS Message fails to respond in a timely fashion (before the **responseTimeout**), the outgoing message is reconsumed in an attempt to keep iProcess Engine and the remote system in sync about which calls have been made. This timeout controls how long the TIBCO iProcess Web Services Plug-in waits to reconsume this message.
- **ServerEngineConfigMBean.DeadlockTimeout** (Default: 240000) - In a scenario where the outgoing message could not be reconsumed, it is assumed

Back to Library

that the remote system is working on the call but is very slow. This timeout controls how long the response is awaited in this scenario.

- **ServerEngineConfigMBean.ExpiryTimeout** (Default: 0, off) - As an additional fail-safe, the outgoing JMS Message can have an expiry set on it, which will cause it to be removed from the queue if it is not processed by that time.

This functionality requires that the server running Jetty and the JMS Provider have synchronized clocks. Ignoring this requirement can cause undesirable behavior.

SOAP/HTTP Timeout

This property allows you to specify the timeout period for a Web Services call. The default is 30000 milliseconds, and the provided value must be a multiple of 100:

```
Axis.SOAPTimeout=30000
```

AXIS Concurrent Connections

Do not modify this setting unless you have consulted with TIBCO Support.

This property allows you to specify the number of concurrent HTTP connections that Axis can make. Normally, this setting should not need to be changed. However, in a slow environment it may be necessary to increase this. The default is:

```
Axis.maxConcurrentConnections=64
```

Asynchronous With Reply Timeout

If the response to a callout made with the **Asynchronous with Reply** invocation style exceeds the timeout value, the call is converted to **Automatic Delayed Release**. The timeout value after which this conversion occurs is set with the following line in the configuration file:

```
WSDocumentController.timeout=30000
```

Back to Library

Field Cache Timeout

The following property controls how long items are allowed to remain in the Field Cache before being purged as old (dirty) items. The default value is 600 milliseconds and any provided value should be longer than you expect any transactions to last, including potential Jetty restarts.

```
FieldCache.DirtyItemTimeout=600
```

Security Profile Tokenization

This section controls how security profile tokenization is specified. By specifying a token in any field in the Security Profile Administrator, you can include static data in your SOAP header to outbound web services at runtime. You could include one or more iProcess fields in a token (for example, %%_SW_CASEDESC_%%). By default, security profile tokenization is enabled. To disable, modify the following property as shown below:

```
SecurityProfileDetails.disableTokenization=false
```

The format of the token is set with the following lines in the configuration file, but you can change the format of them if you wish:

```
SecurityProfileDetails.startToken=%%_
SecurityProfileDetails.endToken=_%%
```

The final property in this section defines a delayed release id token.

```
SecurityProfileDetails.delayedReleaseIdToken=SW_DELAYED_RELEASE_ID
```

This means if you inserted the following token `%%_SW_DELAYED_RELEASE_ID_%%` in a field in the Security Profile Administrator, the delayed release id would be passed in the SOAP header to the outbound web services at runtime.

The following should not be used in a security profile token:

- $
- *
- Anything that can be used as a regular expression.
- A character that is already being used in the header should not be used as a token.

Error Handling for Security Profile Tokenization

The Error Handling Configuration section controls how errors are handled when defining security profile tokens. There are two paremeters in this section:

- `ErrorHandling.continueOnTokenFieldNotFound=false` This parameter allows you to specify whether a web service call should abort if a field token

Back to Library

used in a Security Profile/Custom Header has not been found. By default this is set to `false`.

- `ErrorHandling.continueOnsecurityProfileNotFound=true` This parameter allows you to specify whether web service should continue or abort if the specified security profile cannot be found. By default, this is set to `true`.

Configuring Ports for Web Services

There are several ports that must be configured for various features of the iProcess Web Services Plug-in. If the configuration of these ports changes from that specified during the installation, you can modify the configuration file as described in this section.

- **RMIConnector.port=10010** - The Security Profile Administrator and URLAliasManager (iProcess Web Services Client Plug-in) listen on this port.
- **SocketProxyMBean.doc0=5555|com.staffware.integration.socketproxy.library.handlers.WSDocumentController** - This string is used to configure the connection from the Web Services Outbound Engine to the iProcess Engine Plug-in. The number between the equals sign (**=**) and the (**|**) symbol specifies the port used for the connection (in this example, **5555**).
- The following information is used by the Security Profile Administrator to connect to the Security Profile Administrator service. With the exception of high availability environments, the port setting is typically the same as that for **RMIConnector.port**.

```
SecurityProfileManager.host=localhost
SecurityProfileManager.port=10010
```

Configuring Encoding

The following parameter is used to define the Java-compliant encoding scheme used when communicating with the iProcess Engine:

```
WSDocumentHandler.Encoding=8859_1
```

Back to Library

Configuring Pooling

Do not modify the pooling settings unless you have consulted with TIBCO Support.

```
FrameworkProxy.PooledQueueBrowser.maxActiveInPool=10
FrameworkProxy.PooledQueueBrowser.timeBetweenEvictions=100
FrameworkProxy.PooledQueueBrowser.maxIncrementOfPool=2
FrameworkProxy.PooledQueueBrowser.sleepInterval=1000
FrameworkProxy.PooledQueueBrowser.pooledWorkerClassName=com.staffw
are.integration.frameworkproxy.library.FrameworkProxy
FrameworkProxy.PooledQueueBrowser.aliasID=SWOutbound
FrameworkProxy.QueueReader.queueName=SWOutbound
FrameworkProxy.QueueReader.queueBlockInterval=100

DelayedReleaseHandler.PooledQueueBrowser.maxActiveInPool=10
DelayedReleaseHandler.PooledQueueBrowser.timeBetweenEvictions=100
DelayedReleaseHandler.PooledQueueBrowser.maxIncrementOfPool=2
DelayedReleaseHandler.PooledQueueBrowser.sleepInterval=1000
DelayedReleaseHandler.PooledQueueBrowser.pooledWorkerClassName=com
.staffware.integration.delayedrelease.library.handler.DelayedRelea
seHandler
DelayedReleaseHandler.PooledQueueBrowser.aliasID=SWDelayedRelease
DelayedReleaseHandler.QueueReader.queueName=SWDelayedRelease
DelayedReleaseHandler.QueueReader.queueBlockInterval=100
```

Back to Library

Using the Password Manager

The iProcess Web Services Plug-in provides a Password Manager that allows you to change and manage the various passwords required to use the client and server plug-ins such as the keystore password, JDBC password, and so on.

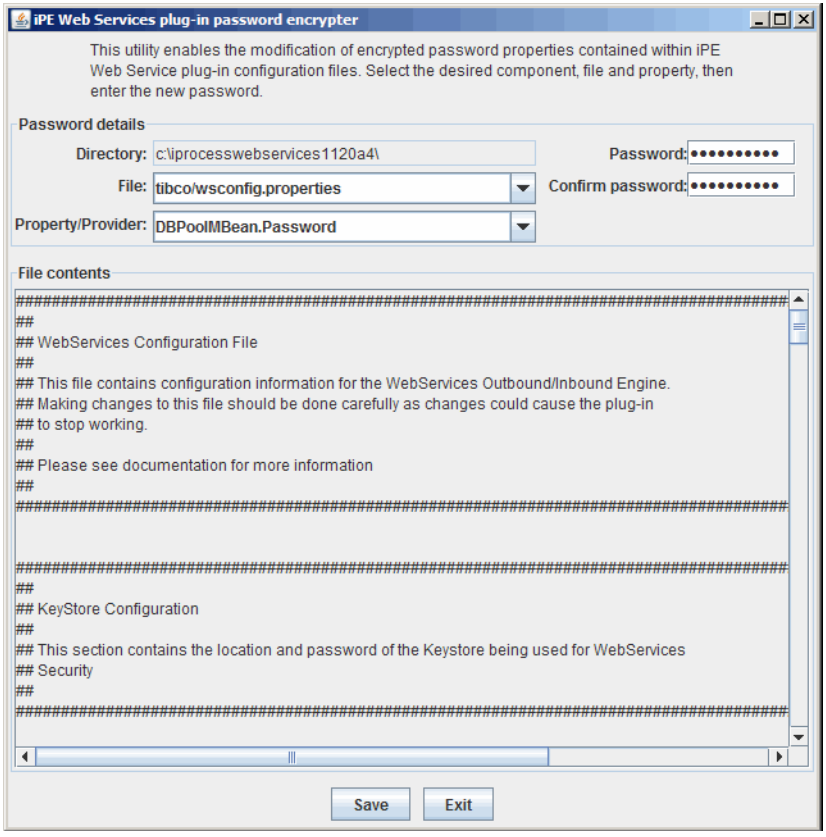
Running the Password Manager from the client allows you to change passwords for properties and files that pertain to the iProcess Web Services Client Plug-in. Similarly different files and properties are available when running the Password Manager on the server.

To start the Password Manager:

- **Server Plug-in** - Run the *JETTY_HOME***passwordmanager** script (on Windows, **passwordmanager.cmd**, on UNIX, **passwordmanager.sh**).
- **Client Plug-in** - Run the *webservices_client_location***eai_websvcs****passwordmanager.cmd** script.

Back to Library

- The main dialog of the Password Manager looks like this:



To change a password, do the following:

1. Select a configuration file from the **File** drop-down list. The contents of the file are displayed in the main area of the dialog.
2. Select a **Property** from those available for the file you selected. The following table shows the files and properties available for the server.

File	Property	Purpose
wsconfig.properties *(Server)*	DBPoolMBean.Password	Specifies the JDBC password for the user that connects to the iProcess Engine database.

Back to Library

File	Property	Purpose
	ServerEngineConfigMBean .KeyStorePassword	Specifies the password of the keystore used for web services security.
jetty-ssl.xml *(Server)*	password	Specifies the keystore password used for configuring SSL security with Jetty.
	trustPassword	Specifies the truststore password used for configuring SSL security with Jetty.
alias.xml *(Server)*	*jmsprovider*	Allows you to change the JNDI password for each *jmsprovider* configured on your system.
truststore.properties *(Client)*	javax.net.ssl.trustStorePassword	Allows you to change the password of the truststore.

3. For the selected property, enter a new password and confirm the password in the fields provided.
4. Click **Save**.

You must click **Save** after entering the new password. If you change the property, select a different file, or click **Exit** without clicking **Save**, the password change will be lost.

5. When you have finished changing and saving passwords, click **Exit**.
6. Restart Jetty.

Back to Library

Setting Up and Managing Security Profiles

As mentioned in previous sections, the Security Profile Administrator allows you to create and manage the SOAP security profiles that you want to use when your Web Services steps are invoked. This section describes how to create and manage these profiles.

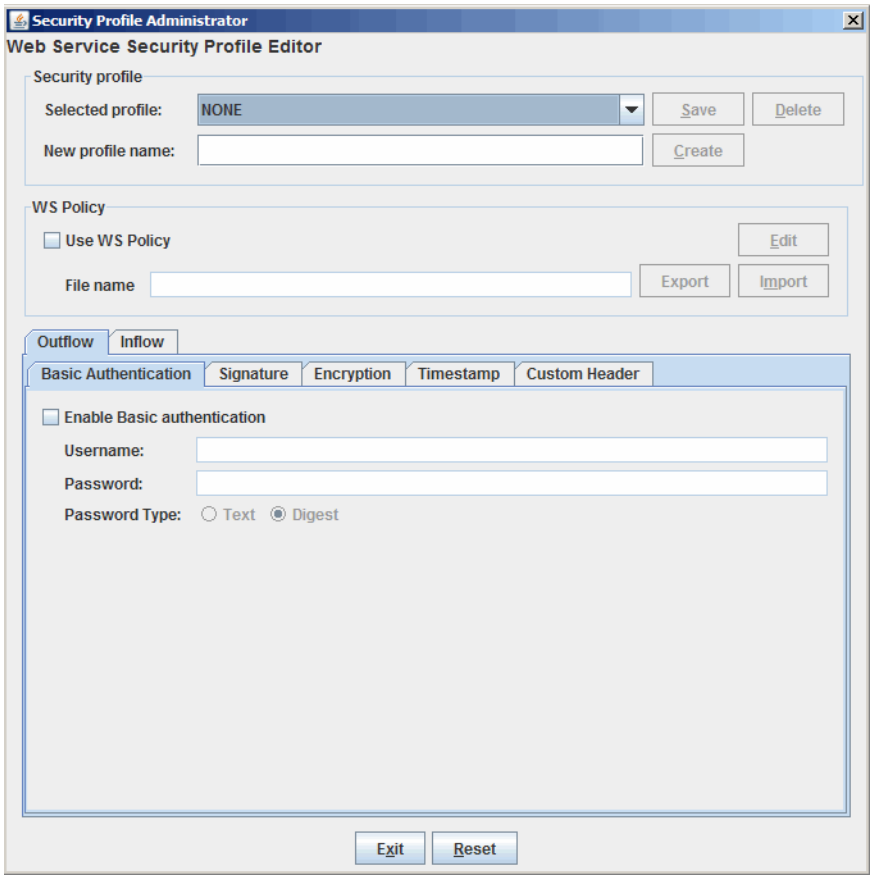
Starting the Security Profile Administrator

Start the Security Profile Administrator by running the *JETTY_HOME***securitymanager** script (on Windows, **securitymanager.cmd**, on UNIX, **securitymanager.sh**).

- You must start the Jetty server before you can run the Security Profile Administrator.
- Custom headers are not applicable for inbound components of outbound security profiles.

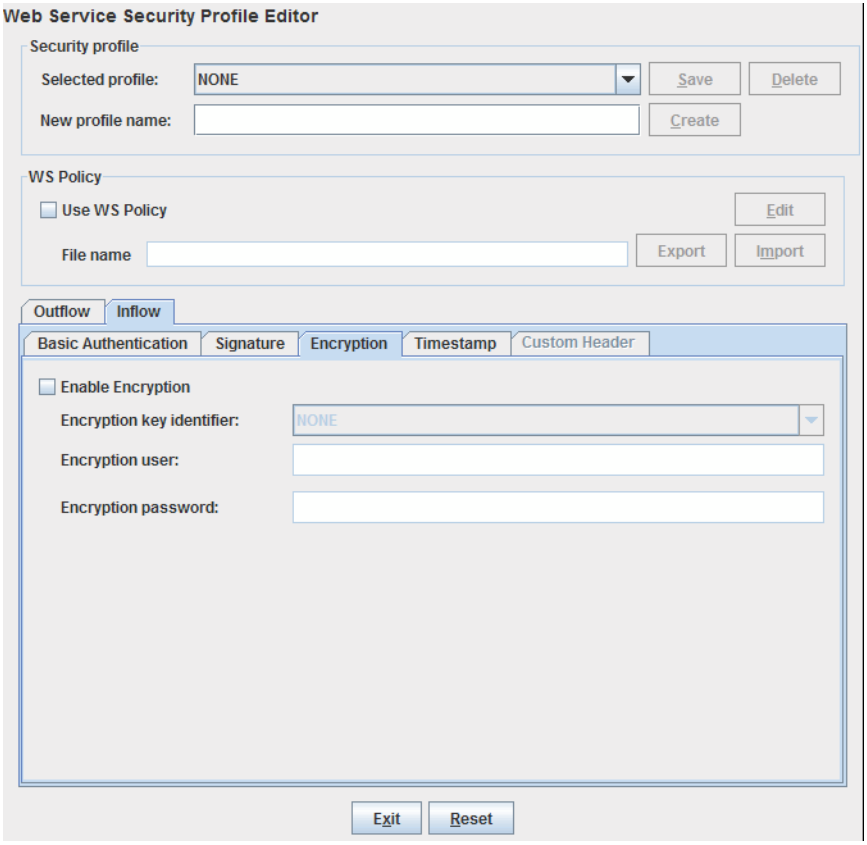
Back to Library

The main dialog of the Security Profile Administrator for Outflow security looks like this:



Back to Library

Clicking the Inflow tab displays the following options:



Creating a New Profile

Create a new security profile as follows:

1. Start the Security Profile Administrator by running the *JETTY_HOME***securitymanager** script.

Back to Library

2. Enter the security options as follows. Note that for each profile you can specify security options for **Outflow security** and **Inflow security**. The profile for iProcess Engine Inbound Web Services is called **Inbound**. (The **Inbound** security profile is unique from other profiles because it is used to determine how security is provided for the web services that the iProcess Engine provides i.e. case start. The **Inbound** security profile is used when Jetty starts to determine the security. This is different from how the outbound profiles are used. See Understanding iProcess Web Services Plug-in Security on page 27 for more information). Additional options for Outflow security are noted.

Option	You specify...	Effect
Use WS Policy File	File name of a XML policy file that specifies the web services security options that you want to implement. (see Combining Security Types on page 39).	Click **Import** to browse for an existing WS Policy file to use for SOAP security. In the WS Policy Editor, select **Actions** > **Merge** to add the Rampart sections (for more information, see Specifying a WS Policy File on page 118). Click **Edit** to add security assertions to an existing policy file.

Back to Library

Option	You specify...	Effect
Basic Authentication (for an overview, see Username - Password Token (Basic Authentication) on page 34)	**Outflow security** ...you can specify the **Username**, **Password**, and **Password Type**, either **Text** or **Digest**. **Inflow security** ...the **Username**, **Password**.	**Outflow:** The specified username - password token is inserted into the SOAP message. For Outflow security you can specify whether the password that is inserted into the SOAP message is in text format or a password digest. Password digests are recommended because of their inherent security advantage. **Inflow:** The recipient of a message must verify the username/password in the received message against the username/password in the Inflow security profile to establish that the message comes from a trusted partner.

Back to Library

Option	You specify...	Effect

Digital Signature
 	
(for an overview, see Digital Signatures and Certificates on page 35)
	Outflow security
	
	...the **Signature key identifier** associated with the digital signature, as well as the **Signature user** and **Signature password** that has been set up for the signature. The **Signature user** must match the **Username** specified for Basic authentication.
	
	If **Signature Confirmation** is selected, the Web Service verifies the signature of the sender. This means that the SOAP response message contains a signature confirmation token. For example:
	
	`<wsse11:SignatureConfirmation wsu:Id="SigConf" Value="fNa57H35Xm/14dDK3wBJ1pkW6i4=" />`
	
	Advanced users can also choose to specify which parts of the message to digitally sign (**Signature Parts**). By default, the following is used for the signature:
	
	`<signatureParts> {}{http://schemas.xmlsoap.org/soap/envelope/}Body </signatureParts>`
	
	You can also specify whether to sign just the body or the body and headers, by selecting either **Sign body** or **Sign body and headers** (these are mutually exclusive options).
	
	Inflow security
	
	...the **Signature key identifier** (the method used to encode the signature key in the SOAP header).
	
	If **Signature Confirmation** is selected, the Web Service verifies the signature of the sender. This means that the SOAP response message contains a signature confirmation token.
		Outflow security
		
		When the web service step is invoked by the specified user, the associated digital signature is inserted in the message. The receiver of the request or response must then verify the message using the provided public key.
		
		For the Inbound security profile, the **Signature Confirmation** checkbox is only applicable to the outflow (response) direction.
		
		Inflow security
		
		The alias is decoded from the incoming message. The corresponding alias must exist in the keystore.
		
		For security profiles besides **Inbound**, the **Signature Confirmation** is only applicable to the inflow direction. *This means that the external web service must be configured to insert the signature confirmation token into its response message.*

Back to Library

Option	You specify...	Effect

Encryption
 	
(for an overview, see Encryption - Ensuring Privacy on page 37)
	Outflow security
	
	...the **Encryption user** associated with the encryption key and the **Encryption key identifier** (the method used to encrypt the alias).
	
	Advanced users may wish to specify which parts (**Encryption Parts**) of the message are to be encrypted as well as the **Key transport algorithm** and **Symmetrical transport algorithm**.By default, the following is used for the encryption:
	
	`<encryptionParts>`
	`{}{http://schemas.xmlsoap.org/soap/envelope/}Body`
	`</encriptionParts>`
	
	Inflow security
	
	...the **Encryption key identifier** (the method used to encrypt the alias), as well as the **Encryption user** and **Encryption password** that have been set up for the encryption key.
		Outflow security
		
		When the web service step is invoked by the specified user, the SOAP message body (or the specified Part) is encrypted. The receiver of the request or response must then decrypt the message using their private key.
		
		Inflow security
		
		The alias is decoded from the incoming message. The corresponding alias and password must exist in the keystore. The encryption key is then used to decrypt the message.

Timestamp	Select the checkbox.	Inserts a timestamp in the message that indicates the creation and expiration of the message. The receiver can then verify whether the message has expired.
Custom Headers	...custom security (not displayed for **Inbound** profile or Inflow security)	Allows you to insert any custom security you have defined.

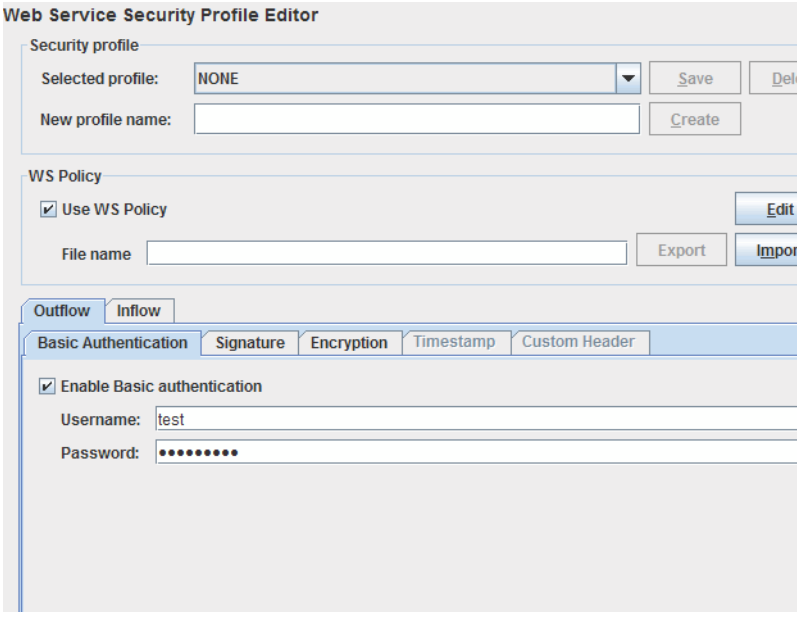
3. Once you have specified the security options you want to implement, enter a **New Profile Name** for the profile.
4. Click **Create**.

Back to Library

The profile will now be available in the **Selected profile** drop-down list when you define a Web Services step and use the **Web Service Integrator** wizard.

Specifying a WS Policy File

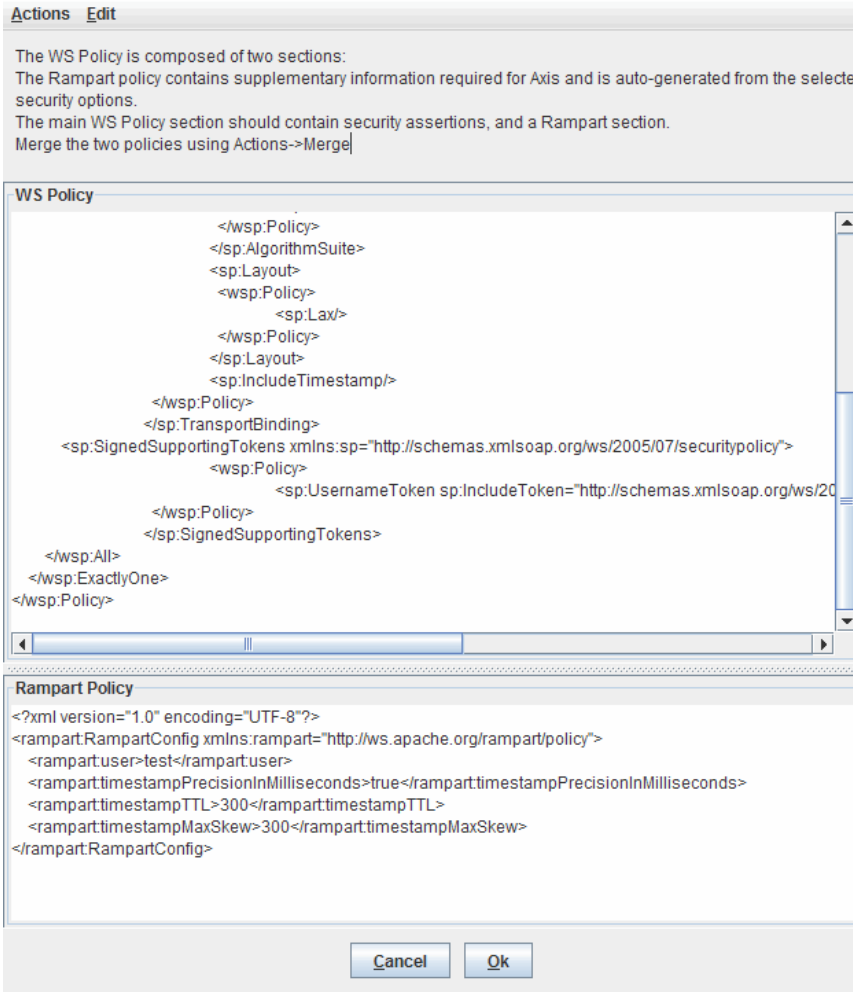
1. Start the Security Profile Administrator as described previously.
2. Specify the security options you want to implement for Inflow and Outflow. For example, the following profile has Basic authentication selected for Outflow security.



The single WS Policy file covers both Inflow and Outflow security; it is not possible to have different WS Policy files for Inflow and Outflow security.

Back to Library

3. Click **Import** to locate the WS Policy file that you have created. The following dialog is displayed.



The top half of the dialog displays the policy file that you imported. The bottom half displays the Rampart policy that will be included (in this example, Basic authentication for Outflow security).

4. Select **Actions** > **Merge**. The Rampart policy is merged with your WS Policy file.

5. Click **OK**. In this example, the Rampart section of the WS Policy file contains the Outflow username. This username, along with the password gets transmitted to the server, which then validates the user/password combination.

Back to Library

For the response message (inflow), the SOAP message contains the server user and password. The client's callback handler return a password that is compared to the one received in the SOAP message. If the password match, the response message is valid.

Copying a Profile

Copy an existing security profile as follows:

1. Select the security profile that you want to copy from the **Selected profile** drop-down list. This populates security options with the settings defined in the selected profile.
2. Enter the name of the new profile in the **New profile name** field.
3. Click **Create**.

Modifying a Profile

Modify an existing security profile as follows:

1. Select the security profile that you want to modify from the **Selected profile** drop-down list. This populates security options with the settings defined in the selected profile.
2. Modify the security options as necessary.
3. Click **Save**.

Disabling an Inbound Profile

Disable the inbound security profile as follows:

It is not possible to delete the inbound security profile; however you can modify it to have no effect as shown in this section.

1. Select the **Inbound** security profile from the **Selected profile** drop-down list. This populates security options with the settings defined for the inbound security profile.
2. Deselect the security options for both inflow and outflow.
3. Click **Save**.
4. Restart Jetty.

Back to Library

Administering URL Aliases and Security Profiles

This section describes the structure of the **EAIWS_URL_ALIAS** and **EAIWS_SECURITY_PROFILE** tables and how to use the command line interface to configure URL aliases and security profiles.

The EAIWS_URL_ALIAS Table

The iProcess Web Services Plug-in allows you to specify the WSDL location using an alias rather than an explicit URL when creating a Web Services step. The aliases, their corresponding URLs, and any associated security profiles are stored in the database table **EAIWS_URL_ALIAS**, which has the following structure:

Column	Datatype	Description
ID	Integer(10)	Unique identifier of the alias used internally by the software.
Name	Varchar(255)	User-entered alias name.
URL	Varchar(255)	URL that corresponds to the alias.
security_profile	Integer	Refers to the **ID** column of the **EAIWS_SECURITY_PROFILE** table and indicates the default security profile (if any) that is associated with this URL alias.

You can add and modify aliases when creating a Web Services step (see Specifying a URL or Alias on page 51). This command line interface described in this appendix also allows you to add or modify aliases in the **EAIWS_URL_ALIAS** table.

Back to Library

The EAIWS_SECURITY_PROFILE Table

This table specifies information about security profiles that are associated with a URL alias at design time.

Column	Datatype	Description
ID	Integer	Unique identifier of the security profile used internally by the software.
Alias	Varchar(255)	Contains the profile name of the security profile (set using the Security Profile Administrator).
Profile	ntext	Contains the encrypted security profile.

Using the Command Line Interface to URL Aliases

You can add, modify or delete rows in the **EAIWS_URL_ALIAS** table as described in this section. On Windows, the command script is **urladmin.cmd**; on Unix, **urladmin.sh** and it is located in *webservices_server_location***jetty-6.1.25.**

Listing the Current Aliases

To obtain a list of the current aliases, enter a command in the following format:

```
urladmin list_url
```

Adding an Alias

To add an alias, enter a command in the following format:

```
urladmin add_url alias url
```

where:

- *alias* is the name that you want to use to refer to the WSDL in a Web Services step (rather than a URL).
- *url* is the location of the WSDL referred to by the alias.

Changing an Alias

To change the URL for an alias, enter a command in the following format:

```
urladmin chg_url alias url
```


Back to Library

where:

- *alias* is name whose URL you want to modify.
- *url* is the new location of the WSDL referred to by the alias.

You cannot change the security profile associated with a URL using the command line. You must do this Step Definer.

Deleting an Alias

To delete an alias, enter a command in the following format:

```
urladmin del_url alias
```

where *alias* is the name that you want to delete.

Exporting Aliases

To export aliases to a text file, enter a command in the following format:

```
urladmin exp_url [path]filename
```

where *[path]filename* is the location where you want to create the text file.

Importing Aliases

To import aliases from a text file, enter a command in the following format:

```
urladmin imp_url [path]filename
```

where *[path]filename* is the location of the text file that contains the aliases. Each line of the text file must contain an alias name and URL separated by a space.

Using the Command Line Interface to Security Profiles

You can also manipulate security profiles using the **urladmin** script. On Windows, the command script is **urladmin.cmd**; on Unix, **urladmin.sh** and it is located in *webservices_server_location***jetty-6.1.25.**

Listing Security Profiles

To obtain a list of security profiles, enter a command in the following format:

```
urladmin list_security
```

The utility displays the ID, Alias, and the Profile (in encrypted form) of each profile.

Back to Library

Exporting Security Profiles

To export security profiles to a text file, enter a command in the following format:

```
urladmin exp_security [path]filename
```

where *[path]filename* is the location where you want to create the text file.

Importing Security Profiles

To import security profiles from a text file, enter a command in the following format:

```
urladmin imp_security [path]filename
```

where *[path]filename* is the location of the text file that contains the security profiles. Each line of the text file must contain the alias of the profile and profile in encrypted form, each separated by a space.

Back to Library

Configuring JMS Provider Aliases

The *jettydirectory*/**tibco/alias.xml** file is where you specify the provider and queue information that Jetty requires. You should modify this file if for example you add a new JMS provider or create new JMS queues on your system. The Provider information is specified in the following section:

```
<Providers>
  <Provider id="internal" url="tibjmsnaming://localhost:7222"
factory="com.tibco.tibjms.naming.TibjmsInitialContextFactory"
jar="c:/tibco/ems/5.1/lib/tibjms.jar" jndiuser="" jndipassword=""
extraenv="" />
  </Providers>
```

If you have multiple providers, they are set up as follows:

```
<Providers>
<Provider id="internal" url="tcp://localhost:7222"
factory="com.tibco.tibjms.naming.TibjmsInitialContextFactory"
jar="c:/tibco/ems/5.1/lib/tibjms.jar" jndiuser="admin"
jndipassword="" extraenv="" />

<Provider id="external_1" url="tcp://main:7222"
factory="com.tibco.tibjms.naming.TibjmsInitialContextFactory"
jar="c:/tibco/ems/5.1/lib/tibjms.jar" jndiuser="admin"
jndipassword="" extraenv="" />

<Provider id="external_2" url="tcp://backup:7222"
factory="com.tibco.tibjms.naming.TibjmsInitialContextFactory"
jar="c:/tibco/ems/5.1/lib/tibjms.jar" jndiuser="admin"
jndipassword="" extraenv="" />
</Providers>
```

If you add new JMS queues to the system, add entries to the following section:

```
<Destinations inbound="default" outbound="SWOutbound">
  <Alias name="SWDelayedRelease" id="internal" topic="false"
  topicorqueuename="queue.SWDelayedRelease"/>
  <Alias name="SWFieldCache" id="internal" topic="false"
  topicorqueuename="queue.SWFieldCache"/>
  <Alias name="SWInbound" id="internal" topic="false"
  topicorqueuename="queue.SWInbound"/>
      .
      .
      .
  <Alias name="SWTimeout" id="internal" topic="false"
  topicorqueuename="queue.SWTimeout"/>
  <Alias name="default" id="internal" topic="false"
  topicorqueuename="queue.IPE"/>
  <Alias name="XMLOUT1" id="external_1" topic="false"
  topicorqueuename="queue.XMLOUT1"/>
  <Alias name="XMLOUT2" id="external_2" topic="false"
  topicorqueuename="queue.XMLOUT2"/>
</Destinations>
```

Back to Library

Setting Logging Properties

The following logs are captured by iProcess Web Services Plug-in:

- iProcess Web Services Plug-in Command Tool Logging Information. Information from the iProcess Web Services Plug-in command tool is located in *webservices_server_location***jetty-6.1.25**\tibco\log.txt*
- Jetty Logging Information Jetty logging information is located in: *webservices_server_location***jetty-6.1.25**\tibco\log.txt

If you are troubleshooting a problem, it can be useful to turn on extra debug messages. To do this, modify the file **log4j.properties** (in the same directory as the log file) and change the line:

```
log4j.rootLogger=warn, EAIJAVA
```

to

```
log4j.rootLogger=debug, EAIJAVA
```

For more information about Log4j, see http://logging.apache.org/log4j/docs/index.html.

Back to Library

Monitoring the System

During normal operation, you should monitor the following files and queues:

1. Monitor the **sw_warn** and **sw_error** files and the **SWException** and **SWPoison** queues for any potential problems with Web Services transactions or Jetty servers.
2. If you cannot determine the cause of the failure, check the SWPoison and SWException queue for failed messages. Correct the problem and resend the step using *SWDIR***bin****swutil** (see the chapter on "Work Items" in the *TIBCO iProcess swutil and swbatch Reference Guide*).

Back to Library

Configuring High Availability

The file *webservices_server_location***eaiwebsvcs****eaiws.cfg** defines whether High Availability is used, and what servers are included in the configuration.

Setting	Values
ha_mode	true, false
server*n*	machine name
port*n*	port number

For example:

```
ha_mode true

server0 localhost
port0 10000

server1 backup
port1 10000
```

Back to Library

Configuring UDDI Repositories

The Web Service Integrator wizard enables you to select a UDDI repository from which you can locate a WSDL file. This section describes how to:

- specify a default UDDI repository that is displayed in the Web Service Integrator wizard.
- add a new UDDI repository so that it is available in the wizard.

UDDI configuration is achieved by editing the following XML file:

iProcessWorkspace\eai_websvcs\uddiconfig.xml

where *iProcessWorkspace* is the directory in which you have installed the TIBCO iProcess Workspace.

Back to Library

Specifying a Default UDDI Repository

To specify a UDDI repository that is displayed by default on the UDDI dialog in the Web Service Integrator wizard, you can edit the **Default_Service_ID** tag in the **uddiconfig.xml** file.

Change **Default_Service_ID** to the value of the **Service_ID** tag relating to the UDDI you want to display by default.

Adding a New UDDI Repository

To add a new UDDI repository to the list available in the Web Service Integrator wizard, add a new section in the **uddiconfig.xml** file using the following template as a guideline.

```
<Configuration>
<Service_ID>n</Service_ID>
<Name>New Respository Name</Name>
<Search_URL>http://search</Search_URL>
<Publish_URL>http://publish</Publish_URL>
</Configuration>
```

where:

- *n* is a unique value in the **uddiconfig.xml** file. The **Default_Service_ID** tag can cross-reference this number to make it the default UDDI repository displayed in the wizard.
- *new repository name* is the name of the UDDI repository.
- *http://search* is the URL to search for Web Services
- *http://publish* is the URL of your published UDDI repository site.

Back to Library

Manually Configuring the Location of the Java Executable

You can manually configure (or edit an existing configuration) the location of the Java executable. For example, if you upgrade your JRE, you must modify the scripts related to web services as described in this section.

- If you are using UNIX, edit the *webservices_server_location*/**jetty-6.1.25/jetty.sh** file in a suitable text editor.
- If you are using Windows, edit the *webservices_server_location***jetty-6.1.25\jetty.cmd** file in a suitable text editor.

The following entry can be changed:

`JAVA_HOME_BIN=`*`pathname`*

where *pathname* is the path to your Java executable. For example, **c:/program files/java/jre1.6.1_25/jre/bin/**.

You should also change the **urladmin** script. On Windows, the command script is **urladmin.cmd**; on UNIX, **urladmin.sh** and it is located in *webservices_server_location***jetty-6.1.25**.

The following entry can be changed:

`JAVA_BIN=`*`pathname`*

where *pathname* is the path to your java executable. For example, **c:\program files\java\jre1.6.1_25\jre\bin**.

You should also edit the Security Manager and Password Manager scripts in a similar manner as these both refer to Java.

Back to Library

Manually Configuring the HTTP Proxy Server Settings

You can manually configure (or edit an existing configuration) the HTTP Proxy server details that are used for HTTP requests.

- If you are using UNIX, edit the *webservices_server_location*/**jetty-6.1.25/jetty.sh** file in a suitable text editor.
- If you are using Windows, edit the *webservices_server_location***jetty-6.1.25\jetty.cmd** file in a suitable text editor.

The following entries can be changed:

`PROXY_HOST=-Dhttp.proxyHost=`*`name`*`-Dhttp.proxyPort=`*`portnumber`*

where:

- *name* is the machine name of your Proxy server.
- *portnumber* is the port number for your Proxy server.

Back to Library

Chapter 7 iProcess Web Service Operations

This chapter describes the iProcess Web Service operations that can be called by third party applications using either Web Service SOAP requests or as XML text using JMS.

Topics

Back to Library

Accessing the iProcess Web Service Operations

To access the operations described in this appendix, when you create your iProcess Web Services step, specify the location of the WSDL as a URL:

`http://hostname:port/axis2/services/WebiPE?wsdl`

where:

- *host* is the name of the computer where you installed Jetty.
- *port* is the port number used to access the machine where you installed Jetty.

If you are using SSL, specify **https** instead of **http** in the URL.

Examples

```
http://merlin:8090/axis2/services/WebiPE?wsdl
https://merlin:8443/axis2/services/WebiPE?wsdl
```

Access to iProcess Web Service operations is either via Axis 1 or Axis2. This was configured during installation. If you enabled Axis2 support and need to restore Axis 1 support, see Monitoring the System on page 127. If you use Axis 1, replace **axis2** with **axis** in the previous example URLs.

Back to Library

getNodeName

This operation can be used to check that the correct nodename is being used for the operations you want to do. If you are not receiving a nodename, it can mean there are other problems such as a database connection problem.

Input None.

Output **getNodeNameResponse**

Outputs the result of the getNodeName operation.

Parameter	Description
result	Indicates the result of the getNodeName operation, which can either be: • a text string containing the nodename or, • an empty string if an error occurs such as a database connection problem.

Back to Library

doDelayedRelease

This operation completes a delayed release request.

Input

Parameter	Description
delayedReleaseId	The unique delayed release identifier.
auditDesc	An audit trail description for this delayed release operation.

Back to Library

Parameter	Description
packData	Define the iProcess field names and their values to send with the request. These are organized as one or more pairs. A field name/value pair MUST always start with one of the following delimiter characters ($, ^, !). However, choose a character that does not conflict with any fieldname/values that follow it. You must not use currency symbols or characters that form part of XML such as < or >. You can also use multi-character delimiter strings. This means that two of the same characters introduce the delimiter and the end is marked by the same matching pair, for example, **$$demo$$**. You can also use the default delimiter specified at installation as a delimiter string. This means you can have any combination of characters. For example, the first two characters need not be the same. The examples below show that a delimiter is also required between the fieldname and its value. An example of supplying a single field name and value would be: **$SW_QPARAM4$myvalue1$** To set multiple fields in one go, enter the fieldname/value pairs as follows: **$SW_QPARAM4$example$SW_QPARAM2$hello$ Douglas$Adams$** To set iProcess array fields, use the following format: **^MY_ARR[42]^ProductList^** To set the date, use the system date format. By default, this is "DD/MM/YYYY". For example, **03/04/2010**.
packMemo	Defines memos to send in the request. They are treated as strings and are passed just like any other packData. For example: **!MEMO!abcdefghijklmnopqrstuvwxyz!** The same delimiters are used as for packData.

Back to Library

Output **doDelayedReleaseResponse**

Call this operation to get the response back from the doDelayedRelease operation.

Parameter	Description
result	Indicates the result of the delayed release request performed by the doDelayedRelease operation. It returns either: • 0 for success • -1 if an error occurs.

Back to Library

doCaseStart

This operation enables you to start a case of a procedure on the iProcess system.

Input

Parameter	Description
procName	The iProcess procedure name e.g. order.
caseDesc	The case description e.g. order hire car. **Note: The case description must be 24 characters or less. If the case description is more than 24 characters long, then the case start fails.**
startStep	Defines the step to start the case at.
packData	Refer to the packData description in **doDelayed Release** for more information.
packMemo	Defines memos to send in the request. They are treated as strings and are passed just like any other packData. For example: **!MEMO!abcdefghijklmnopqrstuvwxyz!** The same delimiters are used as for packData.

Output **doCaseStartResponse**

Get a response back from your case start operation performed by the doCaseStart operation.

Parameter	Description
result	Indicates the result of the case start request performed by the doCaseStart operation. It returns either: • a positive integer, or • -1 if an error occurs.

Back to Library

doSuspend

Perform a case suspend operation.

Input

Parameter	Description
procName	Indicates the procedure name.
caseNum	The case number of the procedure to be suspended.

Output **doSuspendResponse**

Get a response back from the doSuspend operation.

Parameter	Description
result	Indicates the result of the case suspend request performed by the doSuspend operation. It returns either: • a positive integer, or • -1 if an error occurs.

Back to Library

doGraftCount

Enables the graft count to be set.

Input

Parameter	Description
procName	Procedure name you want to graft to
graftStep	Name of the step to graft the sub-procedure to
caseNum	Case number
graftId	Unique identifier for this graft step process
count	Graft count value

Output **doGraftCountResponse**

Request a response back from the doGraftCount operation.

Parameter	Description
result	Indicates the result of the doGraftCount operation. It returns either: • a positive integer, or • -1 if an error occurs.

Back to Library

doGraft

Perform the graft of the sub-procedure to your procedure.

Input

Parameter	Description
procname	Indicates the name of the procedure you want to graft the sub-procedure to.
graftStep	Name of the step to be grafted
caseNum	Case number that will be grafted.
graftId	Unique graft step identifier
subProcName	Name of the sub-procedure that will be grafted to your procedure.
packData	Refer to packData description in doCaseStart for more information.
packMemo	Defines memos to send in the request. They are treated as strings and are passed just like any other packData. For example: **!MEMO!abcdefghijklmnopqrstuvwxyz!** The same delimiters are used as for packData.

Output **doGraftResponse**

Request a response back from the doGraft operation.

Parameter	Description
result	Indicates the result of the doGraft operation. It returns either: • a positive integer, or • -1 if an error occurs.

Back to Library

doSuspendSub

Suspend an iProcess sub-procedure or multiple sub-procedures that are the result of graft steps.

Input

Parameter	Description
procName	Parent procedure name you are working with.
caseNum	Number of the main case whose sub-cases you want to suspend.
subProcName	Name of the sub-procedure to call.
subProcStep	Name of the step in the parent procedure that calls the sub-procedure.

Output **doSuspendSubResponse**

Request a response back from the doSuspendSub operation.

Parameter	Description
result	Indicates the result of the doSuspendSub operation. It returns either: • a positive integer, or • -1 if an error occurs.

Back to Library

doJumpTo

Perform a jump to operation from an active iProcess case to the specified step.

Input

Parameter	Description
procName	Procedure name you are working with.
stepName	Name of the step in the sub-procedure you want to jump to.
caseNum	Number of the sub-procedure case you want to jump to.
reason	Descriptive comment that is useful to see why the jump to operation was performed.

Output **doJumpToResponse**

Request a response back from the doJumpTooperation.

Parameter	Description
result	Indicates the result of the doJumpTo operation. It returns either: • a positive integer, or • -1 if an error occurs.

Back to Library

doActivateSub

Restart a single sub-procedure (or multiple sub-procedures that are the result of graft steps) that has been suspended by a doSuspendSub operation.

Input

Parameter	Description
procName	Name of the parent procedure you are working with.
caseNum	Case number you want to activate.
subProcName	Name of the sub-procedure.
subProcStep	Name of the step in the parent procedure that calls the sub-procedure.

Output **doActivateSubResponse**

Request a response back from the doActivateSub operation.

Parameter	Description
result	Indicates the result of the doActivateSub operation. It returns either: • a positive integer, or • -1 if an error occurs.

Back to Library

doActivate

Restart a procedure that has been suspended by a doSuspend operation.

Input

Parameter	Description
procName	Procedure name you are working with.
caseNum	Case number you want to activate.

Output **doActivateResponse**

Request a response back from the doActivate operation.

Parameter	Description
result	Indicates the result of the doActivate operation. It returns either: • a positive integer, or • -1 if an error occurs.

Back to Library

doEvent

Start a iProcess event step in a procedure.

Input

Parameter	Description
procName	Procedure name that contains the event step.
caseNum	Case number you want to start the event step for.
stepName	Event step name.
packData	Refer to the packData description in **doDelayedRelease** for more information.
packMemo	Defines memos to send in the request. They are treated as strings and are passed just like any other packData. For example: **!MEMO!abcdefghijklmnopqrstuvwxyz!** The same delimiters are used as for packData.

Output **doEventResponse**

Request a response back from the doEvent operation.

Parameter	Description
result	Indicates the result of the doEvent operation. It returns either: • a positive integer, or • -1 if an error occurs.

Back to Library

Back to Library

Appendix A Troubleshooting

This appendix describes problems you might encounter when using the iProcess Web Services Plug-in and recommended courses of action to resolve them.

Topics

Back to Library

Log Files

Jetty logging information is located in:

webservices_server_location/**jetty-6.1.25**`/tibco/log.txt`

If you are troubleshooting a problem, it can be useful to turn on extra debug messages. To do this, modify the file **log4j.properties** (in the same directory as the log file) and change the line:

```
log4j.rootLogger=warn, EAIJAVA
```

to

```
log4j.rootLogger=debug, EAIJAVA
```

Back to Library

Unable to Look Up Queue

Problem New JMS alias (in **alias.xml** file) created without the corresponding objects in the JMS provider configuration (queue and JNDI Name). When a case of the procedure containing the Web Services step is run, an error is written to the Jetty log file (see Log Files on page 150). For example:

```
2006-06-23 15:11:27,374 [DEBUG] [Thread-36] FieldCache - Looking up
queue: 'queue.SWFieldCache'
2006-06-23 15:11:27,374 [FATAL] [Thread-36] FieldCache - Unable to
lookup queue
```

What to do Create the correct queue and JNDI Name in your JMS configuration (in the preceding example, queue.SWFieldCache).

Back to Library

Step Fails to Release Due to Lack of Return Value

Problem An EAI Web Services step calls a web service that should provide a return value, but at runtime, the web service does not provide a return value. The EAI step does not release and error messages similar to the following are written to the log file:

```
org.xml.sax.SAXParseException: Element type "ns0:root" must be
followed by either attribute specifications, ">" or "/>".
```

What to do Contact the implementer of the web service to ensure that a return value is always provided.

Back to Library

EAI Plug-in Not Accessible

Problem When defining an EAI step, the iProcess Web Services Client Plug-in is not listed in the **EAI Type** drop-down list.

What to do Make sure the iProcess Web Services Client Plug-in is located in the following path:

```
swclient\eai_plugins\EAI_webservices
```

where *swclient* is the location of your iProcess Workspace. Refer to the *TIBCO iProcess Web Services Plug-in Installation Guide* for more information about installing the iProcess Web Services Client Plug-in.

If the plug-in still fails to load, make sure that the path to your **jvm.dll** is in your system path. Refer to the *TIBCO iProcess Web Services Client Plug-in Installation Guide* for more information.

Back to Library

Step Fails to Release Due to Missing iProcess Engine Field Data

Problem An EAI Web Services step calls a web service that specifys iProcess Engine field data in the custom header of the security profile, but at runtime, the web service does not provide the iProcess Engine field data. The EAI step does not release and error messages similar to the following are written to the log file:

```
SecurityProfileTokenizer - Couldn't locate a field required for
substitution, couldn't find field: MYTOKEN
```

If you have the `ErrorHandling.continueOnTokenFieldNotFound` property set to true, the following message is displayed:

```
tokens were not substituted into the security profile as they were
not found - but due to configuration settings, continuing anyway
```

If you have the `ErrorHandling.continueOnTokenFieldNotFound` property set to False, the following message is displayed:

```
Some tokens were not substituted as they could not be found -
aborting this transaction
```

What to do Makes sure that the iProcess Engine field data specified in the custom header exist in the process.

Back to Library

Appendix B Data Type Mapping

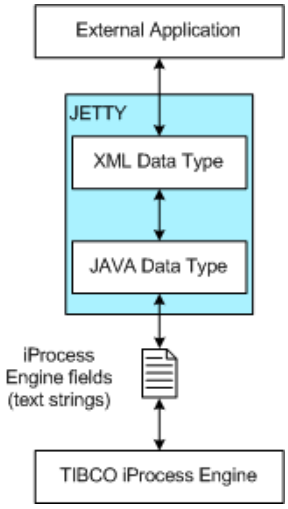
This section describes the data type mapping conversion process that happens when making calls from iProcess - see Data Type Mapping Conversion Process on page 156.

Topics

Back to Library

Data Type Mapping Conversion Process

When the iProcess Engine makes a call to an external application, iProcess fields are sent as text strings and these need to be converted to XML data types. The conversion process happens as follows:



iProcess data being passed to the external application is converted from a text string to a Java Data Type and then to an XML Data type by Jetty and passed to the external application. This conversion process depends on the XML schema data type that is required.

Similarly, data being returned from the external application starts as XML and is converted to Java and then to a text string for the iProcess Engine to use.

For a full list of XML Schema data types supported, as well as their corresponding Java datatypes, refer to the following web site:

http://ws.apache.org/axis/java/user-guide.html#XMLJavaDataMappingInAxis

Special consideration is needed for iProcess Date and Time fields (see Using iProcess Date and Time Fields in Web Services on page 157).

Any datatype that is not currently listed in the XML Schema table is not supported.

Back to Library

Using iProcess Date and Time Fields in Web Services

iProcess Date and Time fields are text strings that cannot easily be converted to Java data types because the Java data type requires that a date and time is concatenated as one field.

- If the mapper is displayed when you create your step, you can use Xpath expressions to concatenate two fields (for example, **yyyy-mm-ddThh:mm**).
- You can modify the date format as described in Date Formats on page 103.

If you need to use date and time fields in your external application calls, you can do the following:

1. Create a third field in iProcess and use a iProcess script to merge the date and time fields and populate the third field with the results. Therefore you have a field containing the date and time similar to the Java calendar data type.
2. This field can then be converted to a Java calendar data type (by Jetty).
3. Jetty then converts the Java data type into the required XML data type.

If a date/time is a required result from the external application, you will need to extract the data from the external application into two separate Date and Time fields using a script.

Back to Library

Back to Library

Index

C

D

E

H

Back to Library

I

J

L

M

P

R

Back to Library

S

T

U

W

X

Back to Library