



# Creating SOAP Services and Web Clients with Ensemble

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# About This Book

This book describes how an Ensemble programmer can create the following:

- SOAP web services
- SOAP operations (clients to external SOAP web services)

You should be familiar with the web protocol, HTTP, REST, or SOAP, that you are using.

This book contains the following sections:

- [About SOAP and Web Services](#)
- [Creating an Ensemble Web Service](#)
- [Creating an Ensemble Web Client](#)
- [Configuring Ensemble for SOAP Services](#)
- [Using the SOAP Inbound Adapter](#)
- [Older Ensemble Web Service Variation](#)
- [Reference for Settings](#)

For a detailed outline, see the [table of contents](#).

For more information, try the following sources:

- SOAP pass-through services and operations, are described in “[Configuring Pass-through Business Services](#)” and “[Configuring Pass-through Business Operations](#)” in *Using Ensemble as an ESB*. Ensemble’s pass-through services and operations enable you to receive an HTTP, REST, or SOAP request and pass it through to an external service.
- *Ensemble Best Practices* describes best practices for organizing and developing Ensemble productions.
- *Developing Ensemble Productions* explains how to perform the development tasks related to creating an Ensemble production.
- *Configuring Ensemble Productions* describes how to configure the settings for Ensemble productions, business hosts, and adapters. It provides details on settings not discussed in this book.
- *Creating Web Services and Web Clients in Caché* describes the specific standards followed by InterSystems product support for SOAP and web services.
- *Projecting Objects to XML* describes how to project Caché objects to XML and how to control that projection. (If you want to use an object as an argument for a web method, the class must be XML-enabled.)

For general information, see the *InterSystems Documentation Guide*.



# 1

## About SOAP and Web Services

Ensemble provides support for SOAP 1.1 and 1.2 (Simple Object Access Protocol). This support is easy to use, efficient, and fully compatible with the SOAP specification. This support is built into Ensemble and is available on every platform supported by Ensemble. Using Ensemble SOAP support, you can do the following:

- Add a web service to an Ensemble production to provide a SOAP-enabled front end to the production. Client applications can invoke this Ensemble web service by using the SOAP protocol. Such methods can be discovered and invoked by other SOAP-aware applications. Ensemble runs SOAP methods directly within the database; the execution is highly efficient.
- Add a web client to an Ensemble production. You can use a tool to generate a business operation and the proxy client classes, given the existing WSDL document of the web service you want to use. The Ensemble web client invokes the external web service via the Ensemble SOAP outbound adapter and a generated proxy client class.

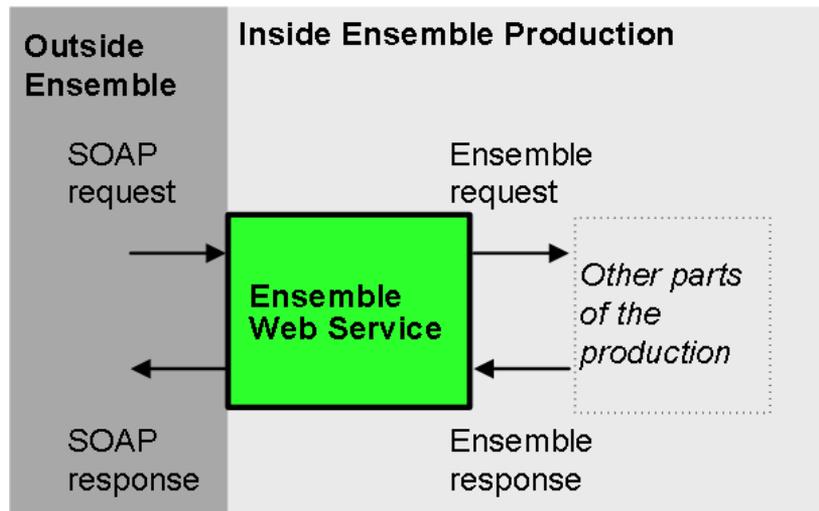
This chapter discusses the following topics:

- [Ensemble support for web services](#)
- [Ensemble support for web clients](#)

See the *Creating Web Services and Web Clients in Caché* book in the Caché documentation set for information on the specific standards followed by InterSystems product support for SOAP and web services, including WSDL limitations.

### 1.1 Ensemble Support for Web Services

You can provide a SOAP-enabled front end for your Ensemble production. To do so, you create an *Ensemble web service*, which is both a web service and an Ensemble business service. Internally, your web methods generally receive SOAP request messages, use them to create and send Ensemble request messages as needed within the production, receive the Ensemble response messages, and use them to create SOAP response messages.



To enable you to create an Ensemble web service, Ensemble provides the base Ensemble web service class (EnsLib.SOAP.Service), as well as supporting classes in the %SOAP and %XML packages.

Ensemble provides powerful, built-in support for web services. The base Ensemble web service class does the following for you:

- Validates incoming SOAP messages.
- Unpacks SOAP messages, converts data to Ensemble representation, and invokes the corresponding method, which sends an Ensemble request message to a destination inside the production.
- Runs the method.
- Receives an Ensemble response message and then creates and returns a response message (a SOAP message) to the caller.

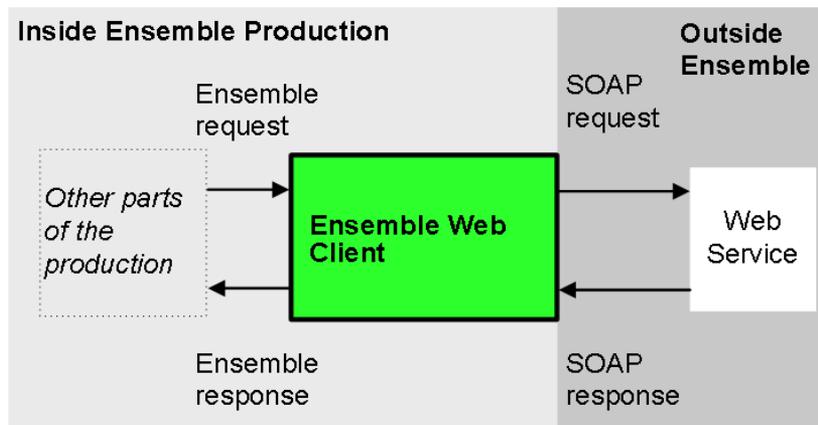
The SOAP specification does not include session support. However, it is often useful to maintain a session between a web client and the web service that it uses. You can do this with an Ensemble web service. If a web service uses sessions, it establishes a session ID and allows repeated calls on the service after one successfully authenticated call from a client.

The Ensemble web service class also provides the full functionality of any Ensemble business service.

**Note:** To create an Ensemble web service, you do not use an Ensemble adapter.

## 1.2 Ensemble Support for Web Clients

You can invoke an external web service from within an Ensemble production. To do so, you create an *Ensemble web client*.



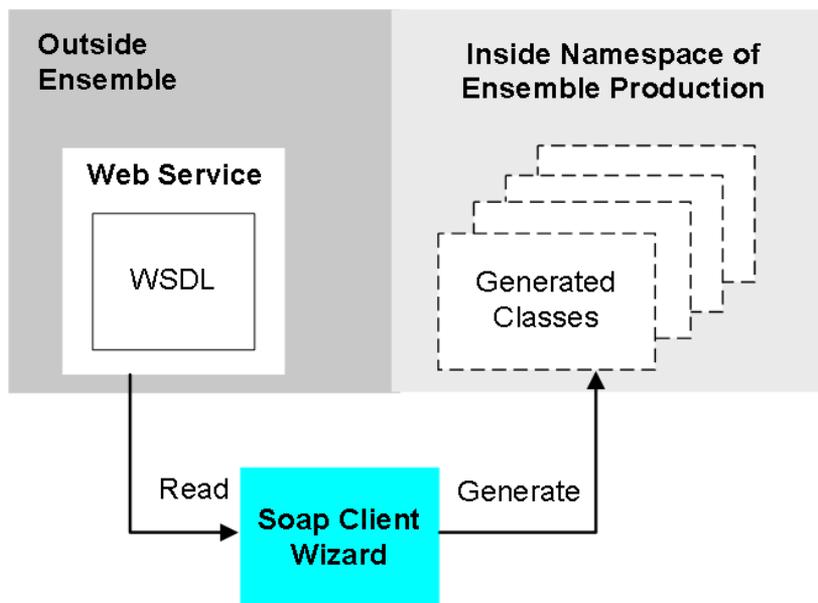
At a high level, your Ensemble web client receives Ensemble requests, converts them to SOAP requests and sends them to the appropriate web service. Similarly, it receives SOAP responses and converts them into Ensemble responses.

The Ensemble web client consists of the following parts, all of which you can generate in Studio by using the SOAP wizard:

- A *proxy client* class that defines a *proxy method* for each method defined by the web service. The purpose of the proxy client is to specify the location of the web service and to contain the proxy methods. Each proxy method uses the same signature used by the corresponding web service method and invokes that method when requested.
- A business operation that uses the Ensemble SOAP outbound adapter to invoke the proxy methods.
- Supporting classes as needed to define XML types and Ensemble messages.

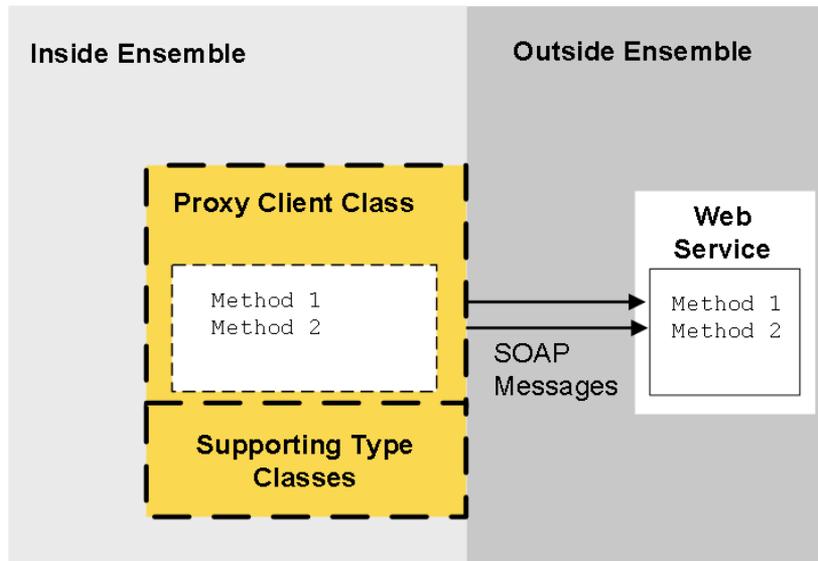
## 1.2.1 The SOAP Wizard

In order to understand these parts, it is useful to consider how they are generated. First, when you use the SOAP wizard, you provide the URL for the WSDL of the web service of interest. The wizard reads the WSDL and then generates a set of classes.



## 1.2.2 The Proxy Client

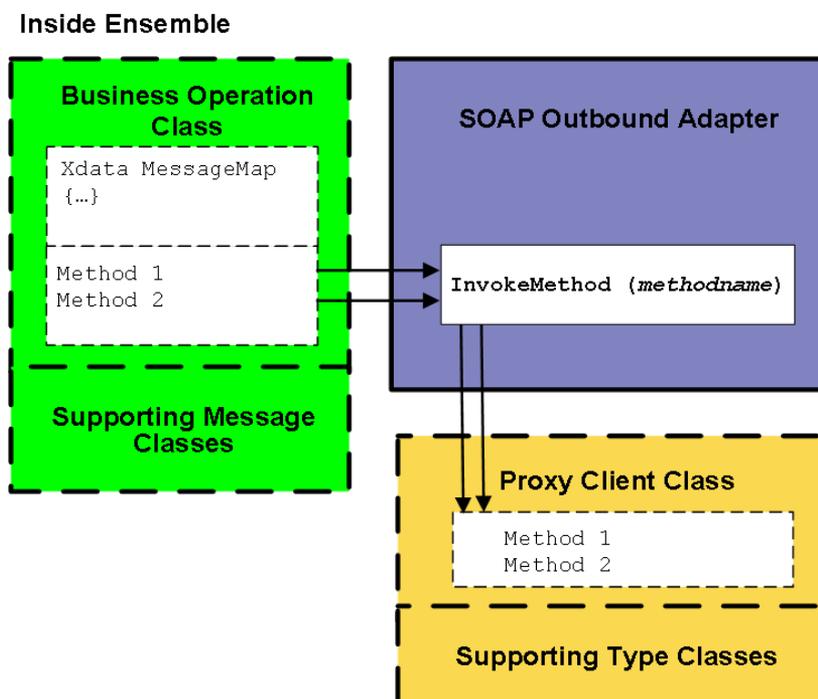
The generated classes include the proxy client class that defines a proxy method for each method of the web service. Each proxy method sends a SOAP request to the web service and receives the corresponding SOAP response.



As shown in the figure, the generated classes also include classes that define any XML types needed as input or output for the methods.

## 1.2.3 The Business Operation of an Ensemble Web Client

The wizard can also generate a business operation class that invokes the proxy client, as well as classes that define message types as needed. The following figure shows how these classes work:



The classes and methods shown within dashed lines are all generated by the SOAP wizard.

The business operation uses the SOAP outbound adapter, which provides useful runtime settings and the generic method **InvokeMethod()**. To invoke a proxy method in the proxy client class, the business operation class calls **InvokeMethod()**, passing to it the name of the method to run, as well as any arguments. In turn, **InvokeMethod()** calls the method of the proxy client class.



# 2

## Creating an Ensemble Web Service

This chapter describes how to create an *Ensemble web service*, which is a web service in an Ensemble production. When you do this, you are providing a SOAP-enabled interface to the production. This chapter discusses the following:

- [Overall behavior of an Ensemble web service](#)
- [Basic requirements](#)
- [How to define web methods](#)
- [How to view the generated WSDL for your web service](#)
- [A simple web service example](#)
- [How to enable SOAP sessions](#)
- [A summary of ways you can fine-tune the web methods](#)
- [How to add and configure the web service](#)

For settings not listed in this book, see “[Settings in All Productions](#)” in *Managing Ensemble Productions*.

For an alternative approach, see the appendix “[Using the SOAP Inbound Adapter](#).”

**Tip:** Ensemble also provides specialized business service classes that use SOAP, and one of those might be suitable for your needs. If so, no programming would be needed. See “[Connectivity Options](#)” in *Introducing Ensemble*.

### 2.1 Overall Behavior

An Ensemble web service is based on `EnsLib.SOAP.Service` or a subclass. This class extends both `Ens.BusinessService` (so that it is an Ensemble business service) and `%SOAP.WebService` (so that it can act as a web service as well). An Ensemble web service behaves as follows:

- Because it is a web service, it has a WSDL document (generated automatically) that describes the web methods available in it. The service can receive any SOAP message that conforms to the WSDL and sends SOAP responses in return.
- Because it is an Ensemble business service, it is an integral part of the Ensemble production to which you add it. Monitoring, error logging, runtime parameters, and all the rest of the Ensemble machinery are available as usual.

**Note:** An Ensemble web service is not available unless the production is running (and the business service is enabled).

Communication with the outside world is done via SOAP request and response messages. Ensemble request and response messages are used within the production.

## 2.2 Basic Requirements

To create a web service in an Ensemble production, you create a new business service class as described here. Later, [add it to your production and configure it](#).

You must also create appropriate message classes, if none yet exist. See “[Defining Ensemble Messages](#)” in *Developing Ensemble Productions*.

The following list describes the basic requirements of the business service class:

- Your class should extend `EnsLib.SOAP.Service`. This class extends both `Ens.BusinessService` (so that it is an Ensemble business service) and `%SOAP.WebService` (so that it can act as a web service as well).
- The class should define the `ADAPTER` parameter as null (""). For example:

```
Parameter ADAPTER = "";
```

Or, equivalently:

```
Parameter ADAPTER;
```

- The class should specify values for other parameters:

Parameter	Description
<code>SERVICENAME</code>	Name of the web service. This name must start with a letter and must contain only alphanumeric characters. The default service name is "MyEnsembleRequestWebService"
<code>NAMESPACE</code>	URI that defines the target XML namespace for your web service, so that your service, and its contents, do not conflict with another service. This is initially set to <code>http://tempuri.org</code> which is a temporary URI used by SOAP developers during development.
<code>TYPENAMESPACE</code>	XML namespace for the schema in the types defined by the web service. If you do not specify this parameter, the schema is in the namespace given by <code>NAMESPACE</code> instead.
<code>RESPONSENAMESPACE</code>	URI that defines the XML namespace for the response messages. By default, this is equal to the namespace given by the <code>NAMESPACE</code> parameter.

- The class should define web methods, as described in the “[Defining Web Methods](#)” section.
- For other options and general information, see “[Defining a Business Service Class](#)” in *Developing Ensemble Productions*.

The following example shows in general what the class might look like:

```
Class Hospital.MyService Extends EnsLib.SOAP.Service
{
  ///For this business service, ADAPTER should be "" so that we use the normal SOAP processing
  Parameter ADAPTER = "";

  Parameter SERVICENAME = "MyService";
```

```

Parameter NAMESPACE = "http://www.myhospital.org";

Parameter USECLASSNAMESPACES = 1;

Method GetAuthorization(patientID As %Integer, RequestedOperation As %String,
LikelyOutcome As %String) As %Status [ WebMethod ]
{
    set request = ##class(Hospital.OperateRequest).%New()
    set request.PatientID = patientID
    set request.RequestedOperation = RequestedOperation
    set request.LikelyOutcome = LikelyOutcome
    set tSC=..SendRequestSync("Hospital.PermissionToOperateProcess",request,.response)
    // Create the SOAP response, set its properties, and return it.
}
}

```

## 2.3 Defining Web Methods for Use in Ensemble

This section describes the basic requirements for an Ensemble web method.

- Define the method within a subclass of `EnsLib.SOAP.Service`, as described in “[Basic Requirements](#).”
- Mark the method with the `WebMethod` keyword.
- Ensure that all arguments and return values are XML-enabled:
  - If the method uses an object as an argument or a return value, you must ensure that the object is XML-enabled. That is, the class definitions for the types must extend `%XML.Adaptor`. The default settings for this class are normally suitable; if not, see *Projecting Objects to XML*.
  - If the method uses a data set as an argument or return value, you must ensure the data set is of type `%XML.DataSet`, which is an XML-enabled subclass of the standard `%ResultSet`.
  - To use a collection (`%ListOfObjects` or `%ArrayOfObjects`) as an argument or a return value, you must ensure that the `ELEMENTTYPE` parameter of the collection is set and refers to an XML-enabled class.

**Important:** In most cases, web methods should be instance methods. Within a web method, it is often necessary to set properties of and invoke methods of the web service instance to fine-tune the behavior of the method. Because a class method cannot do these tasks, a class method is usually not suitable as a web method.

For additional notes, see “Basic Requirements” in the chapter “Creating Web Services” in *Creating Web Services and Web Clients in Caché*.

### 2.3.1 Basic Steps of an Ensemble Web Method

Within an Ensemble web service, a web method should generally do the following:

1. Create an Ensemble request message and set its properties with information from the inbound SOAP message.
2. Call a suitable method of the business service to send the request to a destination within the production. Specifically, call `SendRequestSync()`, `SendRequestAsync()`, or (less common) `SendDeferredResponse()`. For details, see “[Sending Request Messages](#)” in *Developing Ensemble Productions*

Each of these methods returns a status (specifically, an instance of `%Status`).

3. Check the status returned from the previous step and react appropriately.
4. Then:

- In the case of success, look at the Ensemble response message that is returned by reference and use it to create the return value of the web method. As noted previously, the return value must be XML-enabled so that it can be packaged as a SOAP response.
- In the case of failure, call the **ReturnMethodStatusFault()** or **ReturnStatusFault()** method of the web service so that a SOAP fault can be returned and an Ens.Alert can be generated; see the next section for details.

## 2.3.2 Returning Faults to the Caller

By default, if an error occurs when a web method runs, the web service returns a SOAP message to the caller, but this message does not indicate where precisely the fault occurred. An example follows:

```
<SOAP-ENV:Body>
<SOAP-ENV:Fault>
  <faultcode>SOAP-ENV:Server</faultcode>
  <faultstring>Server Application Error</faultstring>
  <detail>
    <error xmlns='http://www.myapp.org' >
      <text>ERROR #5002: Cache error: <INVALID OREF>
        zGetCustomerInfo+10^ESOAP.WebService.1</text>
    </error>
  </detail>
</SOAP-ENV:Fault>
</SOAP-ENV:Body>
```

Your web methods should check for an error and use **ReturnMethodStatusFault()** or **ReturnStatusFault()**. In case of error, the message will be more informative, as follows:

```
<SOAP-ENV:Body>
<SOAP-ENV:Fault>
  <faultcode>SOAP-ENV:Method</faultcode>
  <faultstring>Server Application Error</faultstring>
  <faultactor>ESOAP.WebService</faultactor>
  <detail>
    <error xmlns='http://www.myapp.org' >
      <text>ERROR <Ens>ErrException:
        <DIVIDE>zGetCustomerRequest+8^ESOAP.MyOperation.1 -
          logged as '13 Jul 2007' number 4 @'      set x=100/0'</text>
    </error>
  </detail>
</SOAP-ENV:Fault>
</SOAP-ENV:Body>
```

The **ReturnMethodStatusFault()** and **ReturnStatusFault()** methods return a SOAP fault to the caller and then generate an exception which will create an Ensemble alert (depending on settings). These methods have the following signatures:

```
ClassMethod ReturnStatusFault(pCode As %String,
                              pStatus As %Status)
ClassMethod ReturnMethodStatusFault(pStatus As %Status)
```

Here:

- *pCode* is a string that represents the error code to use in the <faultcode> element of the SOAP fault. The **ReturnMethodStatusFault()** method uses the generic error code SOAP-ENV:Method
- *pStatus* is the status to use in the returned SOAP fault. This is used to create the details of the SOAP fault.

Also notice that these methods set the <faultactor> element of the SOAP fault.

## 2.3.3 Example

The following shows a simple example:

```
Method GetCustomerInfo(ID As %Numeric) As ESOAP.SOAPResponse [WebMethod]
{
  //create Ensemble request message with given ID
```

```

set request=##class(ESoap.CustomerRequest).%New()
set request.CustomerID=ID

//send Ensemble request message
set sc=..SendRequestSync("GetCustomerInfoBO",request,.response)
if $$$ISERR(sc) do ..ReturnMethodStatusFault(sc)

//use info from Ensemble response to create SOAP response
set soapresponse=##class(ESoap.SOAPResponse).%New()
set soapresponse.CustomerID=response.CustomerID
set soapresponse.Name=response.Name
set soapresponse.Street=response.Street
set soapresponse.City=response.City
set soapresponse.State=response.State
set soapresponse.Zip=response.Zip

quit soapresponse
}

```

## 2.4 Viewing the WSDL

Ensemble automatically creates and publishes a WSDL document that describes your Ensemble web service. Whenever you modify and recompile the web service, Ensemble automatically updates the WSDL correspondingly.

To view the WSDL for the web service, use the following URL:

```
base/app-name/web_serv.cls?WSDL
```

Here *base* is the base URL for your web server (including port if necessary), */csp/app* is the name of the CSP application in which the web service resides, and *web\_serv* is the class name of the web service. (Typically, */csp/app* is */csp/namespace*, where *namespace* is the Ensemble namespace that contains the CSP application.)

For example:

```
http://localhost:57772/csp/samples/MyApp.StockService.cls?WSDL
```

The browser displays the WSDL document as an XML document. The following shows an example:

```

<?xml version="1.0" encoding="UTF-8" ?>
- <definitions xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/" xmlns:s="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:s0="http://www.myapp.org"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/" targetNamespace="http://www.myapp.org"
  xmlns:head="http://www.intersystems.com/SOAPheaders"
  xmlns="http://schemas.xmlsoap.org/wsdl/">
- <types>
- <s:schema elementFormDefault="qualified" targetNamespace="http://www.myapp.org">
- <s:element name="GetCustomerInfo">
- <s:complexType>
- <s:sequence>
  <s:element name="ID" type="s:decimal" minOccurs="0" />
</s:sequence>
</s:complexType>
</s:element>
- <s:element name="GetCustomerInfoResponse">
- <s:complexType>
- <s:sequence>
  <s:element name="GetCustomerInfoResult" type="s0:SOAPResponse" minOccurs="0" />
</s:sequence>
</s:complexType>
</s:element>
- <s:complexType name="SOAPResponse">
- <s:sequence>
  <s:element name="CustomerID" type="s:decimal" minOccurs="0" />
  <s:element name="Name" type="s:string" minOccurs="0" />
  <s:element name="Street" type="s:string" minOccurs="0" />
  <s:element name="City" type="s:string" minOccurs="0" />

```

## 2.5 Web Service Example

The following simple example shows an Ensemble web service that can be used to look up customer information, given a customer ID.

```

Class ESOAP.WebService Extends EnsLib.SOAP.Service
{
Parameter ADAPTER;
Parameter NAMESPACE = "http://www.myapp.org";
Parameter SERVICENAME = "CustomerLookupService";
Method GetCustomerInfo(ID As %Numeric) As ESOAP.SOAPResponse [WebMethod]
{
    //create Ensemble request message with given ID
    set request=##class(ESOAP.CustomerRequest).%New()
    set request.CustomerID=ID

    //send Ensemble request message
    set sc= ..SendRequestSync("GetCustomerInfoBO",request,.response)
    if $$$ISERR(sc) do ..ReturnMethodStatusFault(sc)

    //use info from Ensemble response to create SOAP response
    set soapresponse=##class(ESOAP.SOAPResponse).%New()
    set soapresponse.CustomerID=response.CustomerID
    set soapresponse.Name=response.Name
    set soapresponse.Street=response.Street
    set soapresponse.City=response.City
    set soapresponse.State=response.State
    set soapresponse.Zip=response.Zip

    quit soapresponse
}
}

```

The SOAP response class is as follows:

```

///
Class ESOAP.SOAPResponse Extends (%RegisteredObject, %XML.Adaptor)
{
Property CustomerID As %Numeric;
Property Name As %String;
Property Street As %String;
Property City As %String;
Property State As %String;
Property Zip As %Numeric;
}

```

Note the following points:

- The example web method (`GetCustomerInfo`) uses **SendRequestSync()** to communicate with a business operation elsewhere in the production. The method receives an Ensemble response message and uses it to create a SOAP response message.
- The SOAP response class has the same properties as the corresponding Ensemble response class. Unlike the Ensemble response, however, the SOAP response class is XML-enabled and non-persistent.

## 2.6 Enabling SOAP Sessions

The SOAP specification does not include session support. However, it is often useful to maintain a session between a web client and the web service that it uses. You can do this with an Ensemble web service. If a web service uses sessions, it establishes a session ID and allows repeated calls on the service after one successfully authenticated call from a client.

Support for SOAP sessions is controlled by the *SOAPSESSION* class parameter. The default is 0, which means that the web service does not use sessions.

To enable SOAP sessions, create a subclass of `EnsLib.SOAP.Service` and set *SOAPSESSION* to 1 in the subclass. Base your Ensemble web service on this subclass.

For more information on SOAP sessions, see *Creating Web Services and Web Clients in Caché* in the Caché documentation.

## 2.7 Additional Options

Because your Ensemble web service extends `%SOAP.WebService`, you can use all the SOAP support provided by that class. This support includes options for the following customizations, among others:

- Customizing the SOAP headers
- Passing attachments in the SOAP messages
- Changing the binding style of the SOAP messages from document-style (the default) to rpc-style
- Changing the encoding style of the messages from literal (the default) to SOAP-encoded
- Customizing the XML types used in the SOAP messages
- Customizing the `SOAPAction` header used to invoke a web method
- Controlling whether elements are qualified (controlling the `elementFormDefault` attribute of the web service)
- Controlling the form of null arguments (to be an empty element rather than omitted)
- Writing the web method to have output parameters instead of return values

For these options and others, see *Creating Web Services and Web Clients in Caché* in the Caché documentation set.

## 2.8 Adding and Configuring the Web Service

To add your Ensemble web service (a business service) to an Ensemble production, use the Management Portal to do the following:

1. Add an instance of your custom class to the Ensemble production.

**Important:** Ensure that the configuration name is the same as the full class name, including package. This is a requirement for running an Ensemble web service.

2. Enable the business service.
3. Set the [Pool Size](#) setting to 0.

For other settings, see [Configuring Ensemble Productions](#).

4. Run the production.

# 3

## Creating an Ensemble Web Client

This chapter describes how to create an Ensemble web client. At a high level, your Ensemble web client receives Ensemble requests from elsewhere within the production, converts them to SOAP requests, and sends them to the appropriate web service. Similarly, it receives SOAP responses, converts them into Ensemble responses, and sends them back within the production. This chapter discusses the following topics:

- [An overview of the parts of an Ensemble web client](#)
- [The basic steps to create an Ensemble web client](#)
- [Information on the generated classes](#)
- [Details on how to create your own business operation class manually](#)
- [How to add and configure the web client](#)

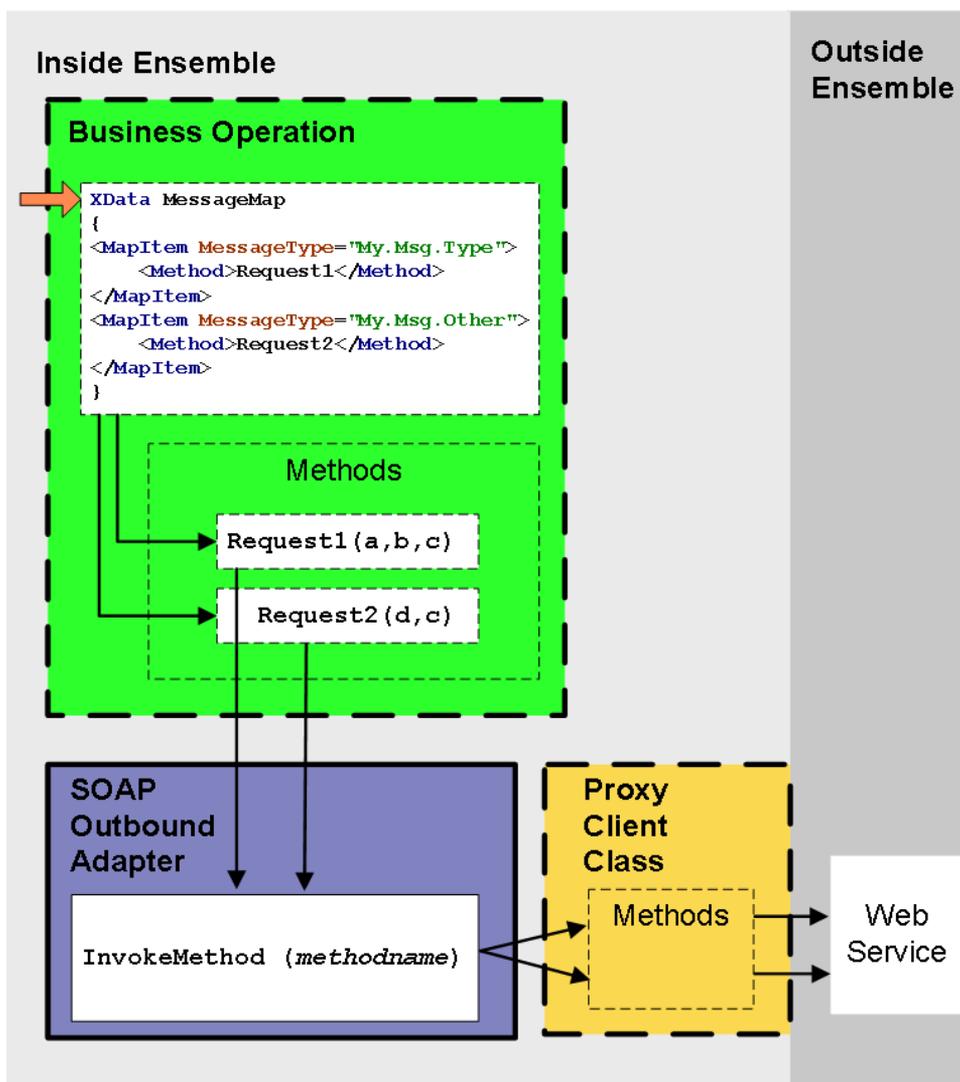
**Tip:** Ensemble also provides specialized business service classes that use SOAP, and one of those might be suitable for your needs. If so, no programming would be needed. See “[Connectivity Options](#)” in *Introducing Ensemble*.

### 3.1 Overview

An Ensemble web client consists of the following parts:

- A *proxy client* class that defines a *proxy method* for each method defined by the web service. Each proxy method uses the same signature used by the corresponding web service method and invokes that method when requested.
- A business operation that uses the Ensemble SOAP outbound adapter to invoke the proxy client.
- Supporting classes as needed to define XML types and Ensemble messages.

The following figure shows how the business operation, adapter, and proxy client class work together. Supporting classes are not shown here.



In the preceding figure, all items within dashed lines can be generated by the SOAP client wizard in Studio. You can then edit this code as needed.

For a more detailed look at these parts, see “[Ensemble Support for Web Clients](#),” earlier in this book.

## 3.2 Basic Steps

This section outlines the basic steps to create an Ensemble web client.

To create an Ensemble web client, do the following within Studio:

1. Use the SOAP wizard to generate the business operation class, proxy client class, and supporting classes. This tool is described in “[Using the SOAP Wizard](#)” in this chapter.
2. Check whether you need to adjust the types of the inputs and outputs of the methods. In particular, if any of the methods of the web service have inputs or outputs that could exceed 32 KB in length, and if you have not enabled support for long strings in Ensemble, you should change the types of those inputs or outputs to an appropriate stream class.

## 3.2.1 Using the SOAP Wizard

To use the SOAP wizard to generate an Ensemble web client, do the following:

1. In Studio, make sure that you are in the appropriate Ensemble namespace.
2. Click **Tools** → **Add-ins** → **SOAP Wizard**.
3. On the first screen, enter the entire URL of the WSDL document for the web service you want to work with.
4. Click **Next**.
5. Select the check box to the left of **Create Business Operation in Package**. This option instructs the wizard to define a business operation class that invokes the proxy client, as well as message classes for use with that business operation.
6. For **Create Business Operation in Package**, optionally change the subpackage name from `BusOp` to another name.
7. For **Optional Package Name**, type a package name for the proxy client and related classes. The default package name is the service name. Also see the “[Generated Classes and XMLKEEPCLASS](#) section.”
8. For **Class Type**, choose a general type for the proxy client class: persistent or serial (the default).
9. Click **Next**. The wizard generates and compiles the classes and displays a list of these classes.
10. Click **Finish**.

### 3.2.1.1 Generated Classes and XMLKEEPCLASS

The SOAP wizard generates a set of classes; the [details of these classes](#) are discussed later in this chapter.

You specify the package in which the tool should create the proxy client class and the supporting classes. If this package is the same as an existing package, by default the tool will overwrite any existing classes that have the same name. To prevent the wizard from overwriting a class definition, add the `XMLKEEPCLASS` parameter to that class and set this parameter equal to 1.

### 3.2.1.2 Using the Process() Method

Instead of using the wizard, you can use the `Process()` method of the `%SOAP.WSDL.Reader` class. To use this method:

1. Create an instance of `%SOAP.WSDL.Reader`.
2. Optionally set properties to control the behavior of your instance.

Property	Purpose
CompileFlags	Specifies the flags to use when compiling the generated classes. The initial expression is "dk" ; use <code>\$\$System.OBJ.ShowFlags()</code> to get information on the available flags.
MakePersistent	If this property is 1, the proxy client is a persistent object; otherwise, it is a registered object. The initial expression is 0.
MakeSerial	If this property is 1 and if MakePersistent is 1, the proxy client is a serial class. The initial expression is 0.
OutputTypeAttribute	Controls how the WSDL reader sets the <code>OUTPUTTYPEATTRIBUTE</code> parameter in the proxy client that it generates; which controls the use of the <code>xsi:type</code> attribute in the SOAP messages. See <i>Creating Web Services and Web Clients in Caché</i> in the Caché documentation set.

Property	Purpose
MakeBusinessOperation	Specifies whether to generate an Ensemble business operation and related request and response objects. The <i>ADAPTER</i> setting for this business operation is <i>EnsLib.SOAP.OutboundAdapter</i> . This option works only if you are working within an Ensemble-enabled namespace.

For other properties, see the class documentation for %SOAP.WSDL.Reader.

- Invoke the **Process()** method, providing the following arguments:
  - The first argument must be the URL of the WSDL of the web service or the name of the WSDL file (including its complete path). Depending on the configuration of the web service, it may be necessary to append a string that provides a suitable username and password; see the examples.
  - The optional second argument is the name of the package in which the reader should place the generated classes. If you do not specify a package, Caché uses the service name as the package name.

## 3.3 Generated Classes for an Ensemble Web Client

This section provides information about the classes that the SOAP wizard generates.

Consider a web service named *MyService* that has the following details:

- It is hosted at `http://localhost:57772/csp/gsoap/MyApp.AddService.CLS`
- The target XML namespace for the web service is `http://www.myapp.org`
- It defines a web method named *AddService*, which accepts two complex numbers as arguments and returns the result.

Suppose that you use the SOAP wizard to generate an Ensemble web client for this web service. If you specify the package for the client classes as *MyClient*, the SOAP wizard will generate the following classes and add them all to your current project:

- It generates the `MyClient.BusOp.MyServiceSoap` class, which defines the business operation.

```

Class MyClient.BusOp.MyServiceSoap Extends Ens.BusinessOperation
{
    Parameter ADAPTER = "EnsLib.SOAP.OutboundAdapter";

    Method Add(pRequest As MyClient.BusOp.AddRequest,
    Output pResponse As MyClient.BusOp.AddResponse) As %Library.Status
    {
        Set ..Adapter.WebServiceClientClass = "MyClient.MyServiceSoap"
        Set tSC = ..Adapter.InvokeMethod("Add",..AddResult,
pRequest.a,pRequest.b) Quit:$$$ISERR(tSC) tSC

        Set tSC = pRequest.NewResponse(.pResponse) Quit:$$$ISERR(tSC) tSC
        Set pResponse.AddResult=AddResult
        Quit $$$OK
    }

    XData MessageMap
    {
    <MapItems>
        <MapItem MessageType="MyClient.BusOp.AddRequest">
            <Method>Add</Method>
        </MapItem>
    </MapItems>
    }
}

```

- It generates the `MyClient.AddServiceSOAP` class, the proxy client class:

```

Class MyClient.AddServiceSoap Extends %SOAP.WebClient
{
    /// This is the URL used to access the web service.
    Parameter LOCATION = "http://localhost:57772/csp/gsoap/MyApp.AddService.cls";

    /// This is the namespace used by the Service
    Parameter NAMESPACE = "http://www.myapp.org";

    /// Use xsi:type attribute for literal types.
    Parameter OUTPUTTYPEATTRIBUTE = 1;

    /// This is the name of the Service
    Parameter SERVICENAME = "AddService";

    Method Add(a As MyClient.ComplexNumber, b As MyClient.ComplexNumber)
        As MyClient.ComplexNumber [ Final,
        SoapBindingStyle = document, SoapBodyUse = literal, WebMethod ]
    {
        Quit ..WebMethod("Add").Invoke($this,
            "http://www.myapp.org/MyApp.AddService.Add", .a,.b)
    }
}

```

- It generates the request and response message classes needed by the business operation. The request class is as follows:

```

Class MyClient.BusOp.AddRequest Extends Ens.Request
{
    Parameter RESPONSECLASSNAME = "MyClient.BusOp.AddResponse";

    Property a As MyClient.ComplexNumber;

    Property b As MyClient.ComplexNumber;

}

```

The response class is as follows:

```

Class MyClient.BusOp.AddResponse Extends Ens.Response
{
    Property AddResult As MyClient.ComplexNumber;

}

```

- Finally, it generates the `MyClient.ComplexNumber` class, which defines a complex number and which is used by the other classes.

```

/// Created from: http://localhost:57772/csp/gsoap/MyApp.AddService.CLS?WSDL=1
Class MyClient.ComplexNumber Extends (%RegisteredObject, %XML.Adaptor)
{
    Parameter XMLNAME = "ComplexNumber";

    Parameter XMLSEQUENCE = 1;

    Property Real As %xsd.double(XMLNAME = "Real") [ SqlFieldName = _Real ];

    Property Imaginary As %xsd.double(XMLNAME = "Imaginary");

}

```

When you compile these classes, the compiler also generates a class for each method defined in the web service. These classes are *not* automatically added to your project and their internal details are subject to change. These classes extend `%SOAP.ProxyDescriptor`, which you should never subclass yourself.

## 3.4 Creating a Business Operation Class Manually

Rather than using the business operation class that the SOAP wizard generates, you can create your own class. This section describes how to do so. It discusses the following:

- [Basic requirements of the business operation class](#)
- [Basic requirements of the methods](#)
- [Specific techniques, with examples, for calling the proxy methods](#)
- [Reference information](#) for the adapter property and methods used here

### 3.4.1 Basic Requirements of the Class

The following list describes the basic requirements of the business operation class:

- Your business operation class should extend `Ens.BusinessOperation`.
- In your class, the *ADAPTER* parameter should equal `EnsLib.SOAP.OutboundAdapter`.
- In your class, the *INVOCATION* parameter should specify the invocation style you want to use, which must be one of the following.
  - **Queue** means the message is created within one background job and placed on a queue, at which time the original job is released. Later, when the message is processed, a different background job will be allocated for the task. This is the most common setting.
  - **InProc** means the message will be formulated, sent, and delivered in the same job in which it was created. The job will not be released to the sender's pool until the message is delivered to the target. This is only suitable for special cases.
- Your class should define one method for each method of the proxy client, as described in the following section.
- Your class should define a *message map* that includes one entry for each method. A message map is an XData block entry that has the following structure:

```
XData MessageMap
{
  <MapItems>
    <MapItem MessageType="messageclass">
      <Method>methodname</Method>
    </MapItem>
    . . .
  </MapItems>
}
```

You will also need to define the Ensemble message classes that the business operation uses.

### 3.4.2 Basic Requirements of the Methods

Within your business operation class, your methods should invoke the proxy methods. Here the general requirements are as follows:

1. The method should have the same signature as the proxy method that it is invoking.
2. The method should be marked with the `WebMethod` keyword.
3. The method should set the `SoapBindingStyle` and `SoapBodyUse` keywords as expected by the proxy client. (That is, use the same values as in the signature of the corresponding proxy method.)

4. The method should set the `WebServiceClientClass` property of the adapter. When this property is set, a proxy client instance is created and placed in the `%Client` property of the adapter.
5. The method should call the corresponding proxy method, using one of the techniques in the [next section](#).
6. The method should check the status.
7. Then:
  - In the case of success, create a new response message (via the `NewResponse()` method of the request) and set its properties as appropriate.
  - In the case of failure, quit with the error.

### 3.4.3 Ways to Execute the Proxy Methods

Within your business operation, your methods should execute the proxy methods of the proxy client class. You can do this in multiple ways, which are best shown via an example. This section uses an example web service that has a web method named `GetStock` that accepts a stock symbol (a string) and returns a number. Suppose that you have used the SOAP wizard to generate a proxy client (`GetStock.StockServiceSoap`), which contains a method called `GetStock`.

Also suppose that you have created message classes as follows:

```
Class GetStock.BusOp.GetQuoteRequest Extends Ens.Request
{
Parameter RESPONSECLASSNAME = "GetStock.BusOp.GetQuoteResponse";
Property StockName As %String;
}
```

And

```
Class GetStock.BusOp.GetQuoteRequest Extends Ens.Request
{
Parameter RESPONSECLASSNAME = "GetStock.BusOp.GetQuoteResponse";
Property StockName As %String;
}
```

To execute the proxy method `GetStock`, your business operation class can do any of the following:

- Call the `InvokeMethod()` method of the adapter and specify the name of the proxy method to run, as well as any number of arguments. In this case, there is only one argument (which we specify as `pRequest.StockName`). For example:

```
Method GetQuote1(pRequest As GetStock.BusOp.GetQuoteRequest,
Output pResponse As GetStock.BusOp.GetQuoteResponse) As %Status
{
set ..Adapter.WebServiceClientClass = "GetStock.StockServiceSoap"

set status = ..Adapter.InvokeMethod("GetQuote", .answer, pRequest.StockName)
if $$$ISERR(status) quit status

set pResponse=##class(GetStock.BusOp.GetQuoteResponse).%New()
set pResponse.GetQuoteResult=answer
quit $$$OK
}
```

When you use the SOAP wizard to generate the business operation, it uses this method.

- Access the `%Client` property of the adapter, which gives you an instance of the proxy client class, and execute the proxy method of that property. The `%Client` property is set when you set the `WebServiceClientClass` property. In this case, `%Client` has a method named `GetQuote`, which accepts a string stock symbol. For example:

```
Method GetQuote2(pRequest As GetStock.BusOp.GetQuoteRequest,
Output pResponse As GetStock.BusOp.GetQuoteResponse) As %Status
{
    set ..Adapter.WebServiceClientClass = "GetStock.StockServiceSoap"

    set client=..Adapter.%Client
    set answer=client.GetQuote("GRPQ")

    set pResponse=##class(GetStock.BusOp.GetQuoteResponse).%New()
    set pResponse.GetQuoteResult=answer
    quit $$$OK
}
```

Note that with this technique, you do not have access to the retry logic of Ensemble.

- Create a proxy method object by calling the **WebMethod()** method of the adapter. Set properties of this object as appropriate (one property per named argument). In this case, **WebMethod()** returns an object with one property: **StockName**. After setting properties as needed, call the **Invoke()** method of that object. For example:

```
Method GetQuote3(pRequest As GetStock.BusOp.GetQuoteRequest,
Output pResponse As GetStock.BusOp.GetQuoteResponse) As %Status
{
    set ..Adapter.WebServiceClientClass = "GetStock.StockServiceSoap"

    set proxymethod=..Adapter.WebMethod("GetQuote")
    set proxymethod.StockName=pRequest.StockName

    set status=..Adapter.Invoke(proxymethod)
    if $$$ISERR(status) quit status

    set pResponse=##class(GetStock.BusOp.GetQuoteResponse).%New()
    set pResponse.GetQuoteResult=proxymethod.%Result
    quit $$$OK
}
```

In this case, you can provide any number of arguments.

### 3.4.4 Reference Information

This section provides reference information for the adapter property and methods mentioned in the previous section.

#### %Client property

```
%SOAP.WebClient
```

The associated instance of the proxy client (an instance of %SOAP.WebClient). This property is set when you set the **WebServiceClientClass** property of the adapter.

#### InvokeMethod() method

```
Method InvokeMethod(pMethodName As %String,
Output pResult As %RegisteredObject,
pArgs...) As %Status
```

Calls the specified method of the proxy client class, passing all the arguments and returns the status. The output is returned by reference as the second argument.

#### WebMethod() method

```
Method WebMethod(pMethodName As %String) As %SOAP.ProxyDescriptor
```

Returns an object that corresponds to the specified method. This object has one property corresponding to each method argument; you should set this properties before using the **Invoke()** method. For details on %SOAP.ProxyDescriptor, see the class reference.

**Invoke() method**

```
Method Invoke(pWebMethod As %SOAP.ProxyDescriptor) As %Status
```

Calls the given method and returns the status.

## 3.5 Adding and Configuring the Web Client

To add your Ensemble web client to an Ensemble production, use the Management Portal to do the following:

1. Add an instance of your custom business operation class to the Ensemble production, specifically the business operation class generated by the SOAP wizard.
2. Enable the business operation.
3. Specify appropriate values for the runtime settings of the associated adapter, as discussed below.
4. Run the production.

The following subsections describes the runtime settings for your Ensemble web client, which fall into several general groups:

- [Basic settings](#)
- [Settings related to credentials](#)
- [The setting that controls use of SSL](#)
- [Settings that control the use of a proxy server](#)

For settings not listed in this book, see “[Settings in All Productions](#)” in *Managing Ensemble Productions*.

### 3.5.1 Specifying Basics

The following settings specify the basic information for the Ensemble web client:

- [Web Service URL](#)
- [Web Service Client Class](#)
- [Response Timeout](#)

### 3.5.2 Specifying Credentials

The web service that you are accessing might require a username and password. In general, the Ensemble SOAP client can log into a web service in either of the following ways:

- You can use WS-Security user authentication. In this case, you include a WS-Security header in the SOAP request; this header includes the username and password. The proxy client automatically does this if you specify a value for the [SOAP Credentials](#) setting.

**CAUTION:** Ensure that you are using SSL between the web client and the web service. The WS-Security header is sent in clear text, so this technique is not secure unless SSL is used.

- You can use basic HTTP user authentication, which is less secure than WS-Security but is sometimes required. In this case, you include the username and password in the HTTP header of the SOAP request. The proxy client automatically does this if you specify a value for the [Credentials](#) setting.

Use the technique that is appropriate for the web service you are using.

### 3.5.3 Specifying an SSL Configuration

If the web server supports it, you can connect with SSL. To do so, specify a value for the [SSL Configuration](#) setting.

**Note:** You must also ensure the web service is at a URL that uses `https://`. The web service location is determined by the [Web Service URL](#) setting; if this is not specified, the Ensemble web client assumes the web service is at the URL specified by the *LOCATION* parameter in the proxy client class.

### 3.5.4 Specifying a Proxy Server

You can communicate with the web service via a proxy server. To set this up, use [Proxy Server](#) and other settings in the **Proxy Settings** group.

# A

## Configuring Ensemble for SOAP Services

This appendix briefly discusses how to configure your system so that you can use HTTP and SOAP services through the Ensemble CSP port. This information is intended to help you set up a development or test system for these services. Complete information about these topics is provided in the Caché documentation. See “Configuring Caché” in the Caché System Administration Guide for more details.

To set up an Ensemble development or test system for HTTP or SOAP services, follow these steps:

1. If you have installed Ensemble in a locked down installation, Studio access is disabled. Open the Management Portal and enable Studio access:
  - a. Start the Management Portal from the Ensemble cube. You will have to use your Windows login username rather than `_system` to access the portal. Enter the password that you specified during installation.
  - b. Select **System Administration**, **Security**, and **Services** to get to the Services portal page.
  - c. The `%Services_Bindings` service is disabled by default. Select the service name and check the **Service Enabled** checkbox and save the setting.
2. If you are not using an existing Ensemble namespace, create a new namespace:
  - a. Select **System Administration**, **Configuration**, **System Configuration**, and **Namespaces** to get to the Namespaces portal page.
  - b. Click the **Create New Namespace** button, specify a name for the namespace, such as `SERVICESNS`.
  - c. Click the **Create New Database** button for the globals database.
  - d. In the Database Wizard, enter a name for the globals database, such as `SERVICES_GDB`. The wizard uses the name to create a directory for the database.
  - e. Click the **Next** button twice to get to the Database Resource form. Select the **Create a new resource** radio button. The wizard displays a Create New Resource form. Accept the suggested name, such as `%DB_SERVICES_GDB` and ensure that Public Permissions Read and Write checkboxes are *not* checked. Click the **Save** button on the Database Resource form and the **Finish** button on the Database Wizard form.
  - f. Repeat steps c through e for the routines database.
  - g. Click the **Save** button to complete creating the namespace.
  - h. Click **Close** to close the log.
3. Create an empty role and assign it to the unknown user:
  - a. Select **System Administration**, **Security**, and **Roles** to display the Roles portal page.
  - b. Click the **Create New Role** button and name the role, for example, `Services_Role`, and click the **Save** button.

- c. Select the **Members** tab, select the Unknown User, click the right arrow, and click the **Assign** button.
4. Define a web application that will handle calls to the Ensemble CSP port. The web application name defines the root of the URL that will call the service. A single web application can support multiple business services but they must all have a class that is the same or a subclass of the web application dispatch class.
    - a. Select **System Administration, Security, Applications, and Web Applications** to display the **Web Applications** portal page. Click the **Create New Web Application** button.
    - b. Name the web application, such as /weatherapp or /math/sum. You must start the name with a / (slash) character.
    - c. Set the **Namespace** to the namespace that the production is running in, such as SERVICESNS. Leave the Namespace Default Application unchecked.
    - d. You can check the Application, CSP/ZEN, and Inbound Web Services checkboxes.
    - e. Leave the Resource Required and Group By ID fields empty.
    - f. Check the Unauthenticated checkbox on the **Allowed Authentication Methods** line.
    - g. Set the Dispatch Class to the component class, such as EnsLib.REST.GenericService or EnsLib.SOAP.GenericService.
    - h. Click Save.
    - i. Select the Matching Roles tab.
    - j. In the **Select a Matching Role:** field, select the role that you created in the previous step.
    - k. In the **Select target roles to add to the selected matching role** field, select the role or roles associated with the namespace globals and routines. The globals and routines may be in the same database or in separate databases. If your service, accesses another Caché database, you should also select its role. For example, if you are defining a web application for the Demo.REST.DirectoryService class in ENSDEMO, you must also select the %DB\_SAMPLES role. You can select multiple roles while holding the Ctrl key.

**Note:** The globals database also may have a secondary database and a corresponding role, such as %DB\_GDBSECONDARY. This secondary database is used to store passwords. You don't need access to this database for pass-through services and operations, but if you create a custom web service that uses password access, you should also add the secondary database role to the target database.
    - l. After the roles are highlighted, click the right-arrow key to move them to the **Selected** text box.
    - m. Then click the **Assign** button.

This completes the system configuration.

# B

## Using the SOAP Inbound Adapter

This appendix briefly discusses the class `EnsLib.SOAP.InboundAdapter`, which you can use as an alternative to `EnsLib.SOAP.Service` (which is described in “[Creating an Ensemble Web Service](#).”)

The standard way to create an Ensemble web service is to create a subclass of `EnsLib.SOAP.Service` and set up a web server to be your production web server. In this way, your system will be able to utilize all the SOAP and security features provided by a commercial web server and the Ensemble SOAP framework. Using the `EnsLib.SOAP.InboundAdapter` is easier to configure and lighter weight but doing so bypasses the above mentioned formal web support machinery. Also, the adapter does not expose the WSDL and test page the way the standard Ensemble SOAP framework does.

### B.1 Notes

The SOAP inbound adapter (`EnsLib.SOAP.InboundAdapter`) does not require web server software. Instead it spawns a TCP listener job using the Ensemble super server. This lets you run your service in a foreground window, which is useful for debugging. (To do this, you must be running the service locally. Also make sure the `PoolSize` setting is 1 and the `JobPerConnection` setting is false.) It also supports SSL.

The `EnsLib.SOAP.InboundAdapter` listens for HTTP input on a given port. When the adapter receives input, the following occurs:

1. It extracts the HTTP `SOAPAction` header.
2. It creates a stream (`%Library.GlobalBinaryStream`) that contains the body of the input.
3. It calls the web method that corresponds to the given `SOAPAction`.

This adapter provides an advantage in that it supports persistent connections for successive SOAP calls. Also, if you use it with `JobPerConnection=0`, it can retain expensively instantiated resources such as XPath parsers even across successive connections that encompass individual SOAP service calls.

### B.2 Development Tasks

To use the Ensemble SOAP inbound adapter, write and compile a new business service class in Studio. The following list describes the basic requirements:

- Your class should extend `EnsLib.SOAP.Service`. This class extends both `Ens.BusinessService` (so that it is an Ensemble business service) and `%SOAP.WebService` (so that it can act as a web service as well).

- Your class should provide values for *SERVICENAME* and other parameters, as described in “[Basic Requirements.](#)”
- The class should define web methods, as described in “[Defining Web Methods for Use in Ensemble.](#)”

Optionally, to disable support for calls via the adapter in your service, add this to your class:

```
Parameter ADAPTER="";
```

## B.3 Configuration Tasks

Use the Management Portal to do the following:

1. Add an instance of your custom class to the Ensemble production.  
**Important:** Ensure that the configuration name is the same as the full class name, including package. This is a requirement for running an Ensemble web service.
2. Enable the business service.
3. Set the PoolSize setting to 1 so that the adapter can use its TCP listener.
4. Set the StayConnected setting to 0. Otherwise, clients may hang for their timeout period while waiting for the server to drop the connection.
5. Specify other settings as needed; see “[Settings for the SOAP Inbound Adapter](#)” in “[Reference for Settings.](#)”
6. Run the production.

# C

## Older Ensemble Web Service Variation

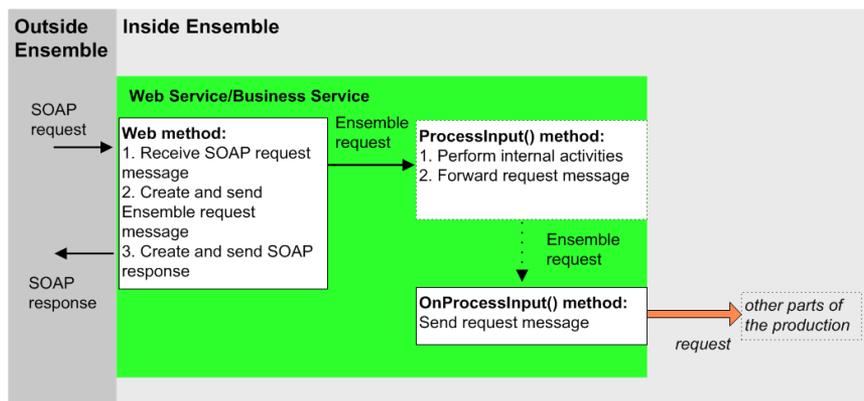
In previous releases, an Ensemble web method could not directly call **SendRequestSync()**, **SendRequestAsync()**, or **SendDeferredResponse()**. An alternative approach was needed. This appendix provides the details, for the benefit of anyone who is maintaining code that uses this alternative approach.

### C.1 Overview

In previous releases, an Ensemble web method could not directly call **SendRequestSync()**, **SendRequestAsync()**, or **SendDeferredResponse()**. Instead, there were two requirements for an Ensemble web service, in addition to the requirements discussed earlier in this book:

- Each web method had to invoke the **ProcessInput()** method as appropriate, passing to it the appropriate request Ensemble message and receiving an Ensemble response message.
- The web service class had to define the **OnProcessInput()** callback method. In *this* method, you would call **SendRequestSync()**, **SendRequestAsync()**, or **SendDeferredResponse()**.

The following figure shows the overall flow of request messages in this scenario:



### C.2 Implementing the OnProcessInput() Method

The **OnProcessInput()** method has the following signature:

```
Method OnProcessInput(pInput As %RegisteredObject,
                    ByRef pOutput As %RegisteredObject,
                    ByRef pHint As %String) As %Status
```

Here:

1. *pInput* is the Ensemble request message that you are sending.
2. *pOutput* is the Ensemble response message that is sent in return.
3. *pHint* is an optional string that you can use to decide how to handle the Ensemble request; see the subsection “[Using the pHint Argument.](#)”

The following shows an example:

```
Method OnProcessInput(pInput As %RegisteredObject, ByRef pOutput As %RegisteredObject) As %Status
{
    set sc= ..SendRequestSync("Lookup",pInput,.pOutput)
    Quit sc
}
```

## C.2.1 Using the pHint Argument

If a web service defined multiple methods, and you wanted to send them to different destinations within the production, you used the optional hint argument of the **ProcessInput()** and **OnProcessInput()** methods, as follows:

1. When you invoke **ProcessInput()**, you used a value for the hint argument to indicate which web method is making this call. For example:

```
Method GetCustomerInfo(ID As %Numeric) As ESOAP.SOAPResponse [ WebMethod ]
{
    //create Ensemble request message with given ID
    set request=##class(ESOAP.CustomerRequest).%New()
    set request.CustomerID=ID

    //send Ensemble request message
    //ProcessInput() calls OnProcessInput(), which actually
    //sends the message
    set sc=..ProcessInput(request,.response,"GetCustomerInfo")
    ...
    quit soapresponse
}
```

2. Within **OnProcessInput()**, you used the hint argument to determine the flow. For example:

```
Method OnProcessInputAlt(pInput As %RegisteredObject,
ByRef pOutput As %RegisteredObject, pHint As %String) As %Status
{
    if pHint="GetCustomerInfo" {
        set sc= ..SendRequestSync("GetCustomerInfoBO",pInput,.pOutput)
    }
    elseif pHint="GetStoreInfo" {
        set sc= ..SendRequestSync("GetStoreInfoBO",pInput,.pOutput)
    }
    Quit sc
}
```

# Reference for Settings

This section provides the following reference information:

- [Settings for the SOAP Inbound Adapter](#)
- [Settings for the SOAP Outbound Adapter](#)

Also see “[Settings in All Productions](#)” in *Managing Ensemble Productions*.

# Settings for the SOAP Inbound Adapter

Provides reference information for settings of the SOAP inbound adapter, `EnsLib.SOAP.InboundAdapter`. Also see “[Creating an Ensemble Web Service](#),” which does not require this adapter.

## Summary

The inbound SOAP adapter has the following settings:

Group	Settings
Basic Settings	<a href="#">Call Interval</a> , <a href="#">Port</a>
Additional Settings	<a href="#">Enable Standard Requests</a> , <a href="#">Adapter URL</a> , <a href="#">Job Per Connection</a> , <a href="#">Allowed IP Addresses</a> , <a href="#">OS Accept Connection Queue Size</a> , <a href="#">Stay Connected</a> , <a href="#">Read Timeout</a> , <a href="#">SSL Configuration</a> , <a href="#">Local Interface</a> , <a href="#">Generate SuperSession ID</a>

The remaining settings are common to all business services. For information, see “[Settings for All Business Services](#)” in *Configuring Ensemble Productions*.

## Adapter URL

A specific URL for the service to accept requests on. For SOAP services invoked through the SOAP inbound adapter on a custom local port, this setting allows a custom URL to be used instead of the standard `jsp/namespace/classname` style of URL.

## Allowed IP Addresses

Specifies a comma-separated list of remote IP addresses from which to accept connections. The adapter accepts IP addresses in dotted decimal form. An optional `:port` designation is supported, so either of the following address formats is acceptable: `192.168.1.22` or `192.168.1.22:3298`.

**Note:** IP address filtering is a means to control access on private networks, rather than for publicly accessible systems. InterSystems does not recommend relying on IP address filtering as a sole security mechanism, as it is possible for attackers to spoof IP addresses.

If a port number is specified, connections from other ports will be refused.

If the string starts with an exclamation point (!) character, the inbound adapter initiates the connection rather than waiting for an incoming connection request. The inbound adapter initiates the connection to the specified address and then waits for a message. In this case, only one address may be given, and if a port is specified, it supersedes the value of the `Port` setting; otherwise, the `Port` setting is used.

## Call Interval

Specifies the number of seconds that the adapter will listen for incoming data from its configured source, before checking for a shutdown signal from the Ensemble framework.

If the adapter finds input, it acquires the data and passes it to the business service. The business service processes the data, and then the adapter immediately begins waiting for new input. This cycle continues whenever the production is running and the business service is enabled and scheduled to be active.

The default is 5 seconds. The minimum is 0.1 seconds.

## Enable Standard Requests

If this setting is true, the adapter can also receive SOAP requests in the usual way (bypassing the TCP connection). The default is false.

## Generate SuperSession ID

This property controls whether the message will have a SuperSessionID, which can be used to identify messages that cross from one namespace to another. If this property is set, the business service first checks the HTTP header of the inbound message for a SuperSession ID. If it has a SuperSessionID value, it uses it; otherwise, it generates a new SuperSession value. It sets the SuperSession value in the Ensemble message and can also return the value in any HTTP response it sends to the caller.

## Job Per Connection

If this setting is true, the adapter spawns a new job to handle each incoming TCP connection and allows simultaneous handling of multiple connections. When false, it does not spawn a new job for each connection. The default is true.

## Local Interface

Specifies the network interface through which the connection should go. Select a value from the list or type a value. An empty value means use any interface.

## OS Accept Connection Queue Size

Specifies the number of incoming connections should the operating system should hold open. Set to 0 if only one connection at a time is expected. Set to a large number if many clients will connecting rapidly.

## Port

Identifies the TCP port on the local machine where the adapter is listening for SOAP requests. Avoid specifying a port number that is in the range used by the operating system for ephemeral outbound connections. See “[Inbound Ports May Conflict with Operating System Ephemeral Ports](#)” in the *Ensemble Release Notes* for more information.

## Read Timeout

Specifies the number of seconds to wait for each successive incoming TCP read operation, following receipt of initial data from the remote TCP port. The default is 5 seconds. The range is 0–600 seconds (a maximum of 10 minutes).

## SSL Config

The name of an existing SSL/TLS configuration to use to authenticate this connection. This should be a server configuration.

To create and manage SSL/TLS configurations, use the Management Portal. See the chapter “Using SSL/TLS with Caché” in the *Caché Security Administration Guide*. The first field on the **Edit SSL/TLS Configuration** form is **Configuration Name**. Use this string as the value for the **SSLConfig** setting.

## Stay Connected

Specifies whether to keep the connection open between requests.

- If this setting is 0, the adapter will disconnect immediately after every event.
- If this setting is -1, the adapter auto-connects on startup and then stays connected.
- This setting can also be positive (which specifies the idle time, in seconds), but such a value is not useful for this adapter, which works by polling. If the idle time is longer than the polling interval (that is, the `CallInterval`) the adapter stays connected all the time. If the idle time is shorter than the polling interval, the adapter disconnects and reconnects at every polling interval.

# Settings for the SOAP Outbound Adapter

Provides reference information for settings of the SOAP outbound adapter, `EnsLib.SOAP.OutboundAdapter`.

## Summary

The outbound SOAP adapter has the following settings:

Group	Settings
Basic Settings	<a href="#">Web Service URL</a> , <a href="#">Web Service Client Class</a> , <a href="#">SOAP Credentials</a> , <a href="#">Credentials</a>
Connection Settings	<a href="#">SSL Configuration</a> , <a href="#">SSL Check Server Identity</a>
Proxy Settings	<a href="#">Proxy Server</a> , <a href="#">Proxy Port</a> , <a href="#">Proxy HTTPS</a> , <a href="#">ProxyHttpTunnel</a> , <a href="#">ProxyHttpSSLConnect</a>
Additional Settings	<a href="#">ResponseTimeout</a> , <a href="#">HttpVersion</a> , <a href="#">ConnectTimeout</a> , <a href="#">SendSuperSession</a>

The remaining settings are common to all business operations. For information, see “[Settings for All Business Operations](#)” in *Configuring Ensemble Productions*.

## ConnectTimeout

Specifies the number of seconds to wait for the connection to the server to open. The default value is 5.

If the connection is not opened in this time period, the adapter retries repeatedly, up to the number of times given by Failure Timeout divided by Retry Interval.

## Credentials

Specify the ID of the *Ensemble credentials* that contain the username and password to be used in the HTTP header. For information on creating Ensemble credentials, see *Configuring Ensemble Productions*.

## HttpVersion

Specifies the HTTP version that the adapter should report in the HTTP request it sends to the server.

## ProxyHTTPS

Specifies whether the proxy (if any) uses HTTPS to communicate with the real HTTP/HTTPS server.

## ProxyHttpTunnel

Specifies whether the adapter uses the HTTP CONNECT command to establish a tunnel through the proxy to the target HTTP server. If true, the request uses the HTTP CONNECT command to establish a tunnel. The address of the proxy server is taken from the Proxy Server and Proxy Port properties. If Proxy Https SSL Connect is true, then once the tunnel is established, Ensemble negotiates the SSL connection. The default value is false.

## ProxyPort

Specifies the proxy server port on which to send HTTP requests, if using a proxy server. The default value is 80.

## ProxyServer

Specifies the proxy server through which to send HTTP requests, if any.

## ProxyHttpSSLConnect

Specifies whether the adapter should use a proxy SSL connection to the proxy. Note that the use of SSL to the eventual endpoint is determined by the protocol part of web service's location URL.

## ResponseTimeout

Specifies the timeout for getting a response from the remote web server (the timeout for opening the connection to the server is set by `ConnectTimeout`). The default value is 30.

## SendSuperSession

The `SendSuperSession` is a Boolean setting that controls whether the outbound adapter creates a `SuperSession` header in the HTTP header and assigns an identifier to it. When finding a message, you can use the `SuperSession` value to match a message in one production with the related message in another production. Within a production, it is easy to track a message as it travels between business services, processes, and operations using the `SessionId`. But once a message leaves a business operation via a SOAP message and enters a different production, the production receiving the message assigns a new `SessionId`.

If `SendSuperSession` is selected, the SOAP outbound adapter does the following:

1. Check if the message has an empty value in `Ens.MessageHeaderBase.SuperSession` property. If it does have an empty value, the adapter generates a new value and stores it in the `SuperSession` property.
2. Stores the value of the `SuperSession` property in the private `InterSystems.Ensemble.SuperSession` HTTP header of the outgoing message.

When an SOAP incoming adapter receives a message, it checks for the `SuperSession` value in the incoming HTTP message header. If the value is present, it sets the `Ens.MessageHeaderBase.SuperSession` property. This property is preserved as the message passes from one production component to another.

**Note:** There are no tools to automate tracking messages between productions using `SuperSession`.

## SOAPCredentials

Specify the ID of the *Ensemble credentials* that contain the username and password to be used in the WS-Security header of the SOAP request. For more information on WS-Security support, see *Securing Caché Web Services* in the Caché documentation set.

## SSLCheckServerIdentity

Specifies that when making an SSL connection, the adapter should check that the server identity in the certificate matches the name of the system being connecting to. This defaults to specifying that the check should be made. Uncheck this for test and development systems where the name specified in the SSL certificate does not match the DNS name.

## SSLConfig

The name of an existing SSL/TLS configuration to use to authenticate this connection. Choose a client SSL/TLS configuration, because the web client initiates the communication.

To create and manage SSL/TLS configurations, use the Management Portal. See the chapter “Using SSL/TLS with Caché” in the *Caché Security Administration Guide*. The first field on the **Edit SSL/TLS Configuration** form is **Configuration Name**. Use this string as the value for the **SSLConfig** setting.

**Note:** You must also ensure the web service is at a URL that uses `https://`. The web service location is determined by the `WebServiceURL` setting; if this is not specified, the Ensemble web client assumes the web service is at the URL specified by the `LOCATION` parameter in proxy client class.

## WebServiceClientClass

Specifies the full name (including package) of the proxy client class, specifically the class that actually sends and receives SOAP messages to the web service.

## WebServiceURL

Specifies the URL where the web service is located. If this setting is not given, the adapter uses the default location (the *LOCATION* parameter) declared in the proxy client class; see the *WebServiceClientClass* setting. Note that SSL will only work if this URL uses `https://`