Adabas SOA Gateway

Reference

Version 2012-12-17

December 2012

Adabas SOA Gateway

This document applies to Adabas SOA Gateway Version 2012-12-17.

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

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Reference

The following reference materials are available for SOA Gateway:

- Glossary
- **SOA Gateway Resource Access**
- **SOAP**
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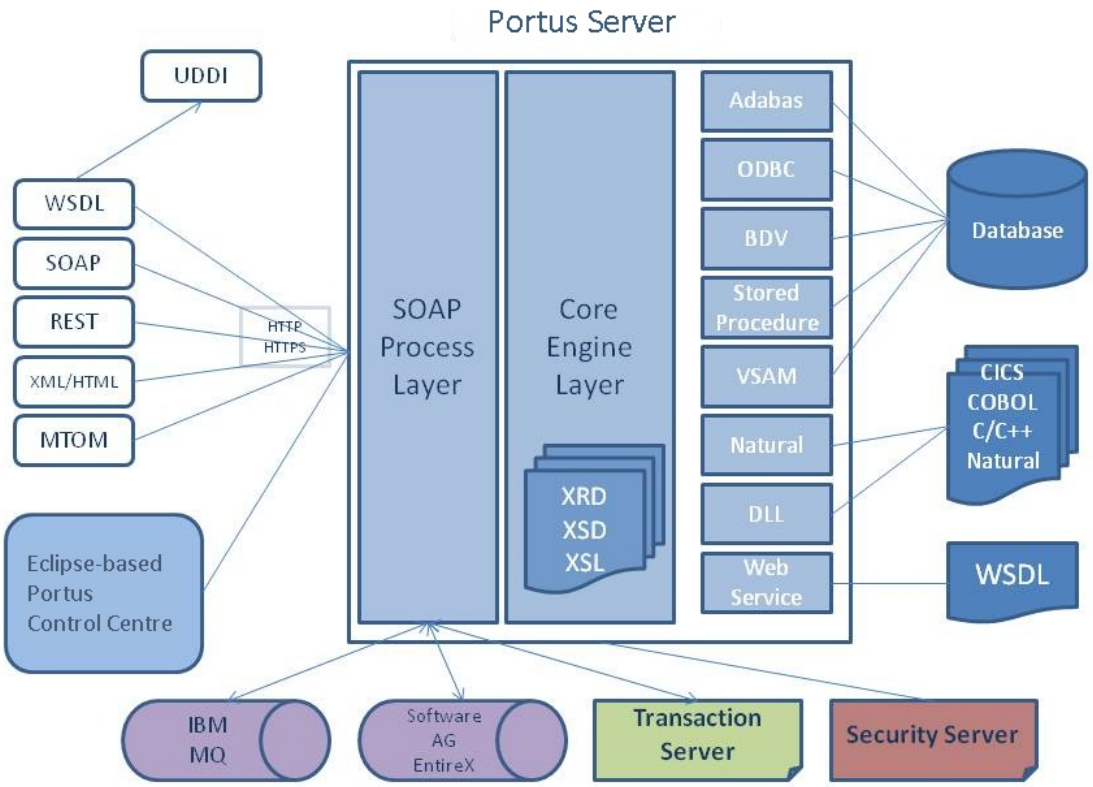
1 SOA Gateway Resource Access

Overview

This section describes the operations exposed by SOA Gateway to access data sources. These operations are described in a WSDL which is defined for each web service. A client program connecting to a web service can read the WSDL to determine what operations are available on the server. These operations can be invoked using **SOAP** or **RESTful** query.

SOA Gateway also supports MTOM for binary data, raw XML, and HTML. WSDLs can be registered in a UDDI server for service look-up.



Supported protocol Versions

WSDL 1.1

SOAP 1.1

MTOM 1.0

HTTP 1.1

ODBC Version 3

SOA Gateway can also connect to the Messaging systems such as IBM MQ and Software AG EntireX via their C-interfaces.

Web Service Security can be handled by HTTP Basic Profile authorization (via Apache), or connectivity with an external security manager, such as RACF.

Further Reading

Prerequisites

Retrieve WSDL

Web Service Operations

Providing Key Information

Prerequisites

At this point your SOA Gateway Server should be installed, configured and started.

If you have not yet configured any web services, please refer to the SOA Gateway Control Center section and add at least one web service

Retrieving the WSDL for your resource.

All web services defined will have a WSDL associated with them. This is the starting point for using the operations provided by SOA Gateway. The WSDL describes the operations that may be carried out, and how they are used. This includes a description of valid parameters, data and responses for each of the operations.

In order to get the WSDL for a particular resource you simply issue a standard http request, specifying:

- the server name or *IP-address* of the server where SOA Gateway is installed [and running]
- the *TCP Port number* that SOA Gateway is listening on (as provided in the installation)
- the *name* of the service. (this is the value of the "*Name*" field in the web service properties)

The following example shows the URL required to retrieve the WSDL for an Adabas "Employees" file.

Server Name	PortusGateway
Port Number	56000
Name	adabas_Employees
URL for WSDL	http://PortusGateway:56000/adabas_Employees?WSDL

SOA Gateway Web Services Operations for Data Resources

The operations provided by SOA Gateway for accessing data resources [files, databases, programs, etc.] are now explained.

Parameters are required unless otherwise stated.

Operation	*list* (SOAP) *LIST* (REST)
Description	The *list* operation returns a list of records or rows from your data source. The data returned can be limited or restricted by providing *key* information. This operation will only be available when the web service is a "database" type, for example, Adabas or MySQL
Parameters	■ *Key data* Key data must be entered for at least one of the fields defined as a key. Refer to the section **Specifying Key Data** for more information. ■ *Options* None
Result	SOAP The result will be either : ■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST The result will be either : ■ an XML document containing the requested data ■ a fault message

Operation	*select* (SOAP) *SELECT* (REST)
Description	The *select* operation returns a list of records or rows from your data source. The maximum number of rows/records returned can be set via the SOA Gateway Control Center. This operation will only be available when the web service is a "database" type, for example, Adabas or MySQL The data returned can be limited or restricted by providing *key* information. The select operation extends the capability of the list operation by enabling searches on a larger set of criteria. The key information for a select is wrapped in a condition block and can be repeated several times within that block. Each key entry represents an 'AND' condition. Condition blocks can also be repeated several times. Each condition block represents an 'OR' condition. The condition block accepts the following specifiers:
Conditions	■ *Less than a specific value (LT).* ■ *Less than or equal to a specific value (LE).* ■ *Equal to a specific value (EQ).* ■ *Greater than a specific value (GT).* ■ *Greater than or equal to a specific value (GE).* ■ *Not equal to a specific value (NE).* ■ *Starting with a specific value (START). Character based fields only.* ■ *Ending with a specific value (ENDS). Character based fields only.* ■ *Containing a specific value (CONTAINS). Character based fields only.*

Example	SOAP
	
	`<soapenv:Body>`
	`<nos:adabasEmployeeSelectElement>`
	`<!--1 or more repetitions:-->`
	`<condition>`
	`<!--Zero or more repetitions:-->`
	`<personnel_id Condition="GT">50012100</personnel_id>`
	`<personnel_id Condition="LE">50012700</personnel_id>`
	`</condition>`
	`<condition>`
	`<!--Zero or more repetitions:-->`
	`<personnel_id Condition="EQ">50012900</personnel_id>`
	`</condition>`
	`</nos:adabasEmployeeSelectElement>`
	`</soapenv:Body>`
	
	REST
	
	`http://localhost:56005/adabas_Employees_9?`
	`SELECT`
	`&condition[1].personnel_id>50012100`

	`&condition[1].personnel_id<=50012700`
	`&condition[2].personnel_id=50012900`
	
	The example above specifies 2 condition blocks. This will return data where the (personnel_id > 50012100 and personnel_id <= 50012700) or personnel_id = 50012900

Parameters	■ *Key data* Key data must be entered for at least one of the fields defined as a key. Refer to the section **Specifying Key Data** for more information. ■ *Options* None
Result	SOAP The result will be either : ■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST The result will be either : ■ an XML document containing the requested data ■ a fault message

Operation	selectNext
Description	The *selectNext* operation returns a list of records or rows from your data source. A selectNext operation may only be called following a select and subsequently other selectNext calls. For this functionality the initial select operation has to initiate a new Conversation. See **Conversational Processing.** The resultant conversation id must be passed in any associated selectNext calls. selectNext calls may be issued until end of file is reached or may be terminated by a selectEnd call. The maximum number of rows/records will be that set for set via the SOA Gateway Control Center. This operation will only be available when the web service is a "database" type, for example, Adabas or MySQL There is no key information for a selectNext operation as this will have been passed in by the initiating select operation.
Parameters	■ *Key data* None ■ *Options* None

Result	SOAP The result will be either : ■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST Not available

Operation	selectEnd
Description	The *selectEnd* operation terminates a sequence of select and/or selectNext calls with a conversation. A selectEnd operation may only be called following select or selectNext operations. For this functionality the select operation has to initiate a new Conversation. The resultant conversation id must be passed in the selectEnd call. This operation will only be available when the web service is a "database" type, for example, Adabas or MySQL There is no key information for a selectEnd operation as this will have been passed by the initiating select operation.
Parameters	■ *Key data* None ■ *Options* None
Result	SOAP The result will be either : ■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST Not available

Operation	selectCount
Description	The *selectCount* operation returns a count of the records or rows that match the criteria set in the condition block(s). This operation will only be available when the web service is a "database" type, for example, Adabas or MySQL The selectCount operation is identical to that of the select operation in terms of its search capabilities.

	The key information for a selectCount is wrapped in a condition block and can be repeated several times within that block. Each key entry represents an 'AND' condition. Condition blocks can also be repeated several times. Each condition block represents an 'OR' condition. The condition block accepts the following specifiers:
Conditions	■ *Less than a specific value (LT).* ■ *Less than or equal to a specific value (LE).* ■ *Equal to a specific value (EQ).* ■ *Greater than a specific value (GT).* ■ *Greater than or equal to a specific value (GE).* ■ *Not equal to a specific value (NE).* ■ *Starting with a specific value (START). Character based fields only.* ■ *Ending with a specific value (ENDS). Character based fields only.* ■ *Containing a specific value (CONTAINS). Character based fields only.*
Parameters	■ *Key data* Key data must be entered for at least one of the fields defined as a key. Refer to the section **Specifying Key Data** for more information. ■ *Options* None
Result	SOAP The result will be either : ■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST The result will be either : ■ an XML document containing the requested data ■ a fault message

Operation	*get* (SOAP) *GET* (REST)
Description	The *get* operation returns a single record or row from your data source. The data returned is specified by providing *unique key* information identifying a single record / row.

	This operation will only be available when the web service is a "database" type, for example, Adabas or MySQL
Parameters	■ *Key Data* Key data must be entered for at least one of the fields defined as a primary key field, so that a single record can be identified. Refer to the section **Specifying Key Data** for more information. ■ *Options* None
Result	SOAP The result will be either : ■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST The result will be either : ■ an XML document containing the requested data ■ a fault message

Operation	*add* (SOAP) *ADD* (REST)
Description	The *add* operation adds a single record or row of data to your data source. This operation will only be available when the web service is a "database" type, for example, Adabas or MySQL
Parameters	■ *Add Data* Provide values for each of the fields defined. These are the fields / columns of the data on your data source. You must add data for at least one of the fields specified as being *primary key* fields. Refer to the section **Specifying Key Data** for more information. ■ *Options* None
Result	SOAP The result will be either :

	■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST The result will be either : ■ an XML document containing the requested data ■ a fault message

Operation	*update* (SOAP) *UPDATE (REST)*
Description	The *update* operation updates a single record or row of data. This operation will only be available when the web service is a "database" type, for example, Adabas or MySQL
Parameters	■ *Update Data* Provide values (NULL or otherwise) for each of the fields defined. These are the fields / columns of the data on your data source. Key data must be entered for at least one of the fields defined as a *primary key* field. Refer to the section **Specifying Key Data** for more information. Fields that have been left empty or NULL, e.g. `<data></data>` will be set to this value accordingly. ■ *Options* None
Result	SOAP The result will be either : ■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST The result will be either : ■ an XML document containing the requested data ■ a fault message

Operation	*delete (SOAP)* *DELETE (REST)*
Description	The *delete* operation deletes a single record or row of data from the data source. This operation will only be available when the web service is a "database" type, for example, Adabas or MySQL
Parameters	■ *Key Data* Key data must be entered for at least one of the fields defined as a *primary key* field, so that a single record can be identified. Refer to the section **Specifying Key Data** for more information. ■ *Options* None
Result	SOAP The result will be either : ■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST The result will be either : ■ an XML document containing the requested data ■ a fault message

Operation	*invoke (SOAP)* *INVOKE (REST)*
Description	The *invoke* operation makes a call to a function or program. This operation will only be available when the web service is a "program" type, for example, NATURAL, COBOL or when the web service describes a database stored procedure.
Parameters	■ *Parameters* Each of the fields defined can be input, output, or input+output. Provide values for each of the fields defined as input or input+output. These match the function/program parameters that are required on the call.
Result	SOAP The result will be either :

	■ an XML document wrapped in a SOAP message and containing the requested data ■ a SOAP fault message REST The result will be either : ■ an XML document containing the requested data ■ a fault message

Specifying Key Data

Keys or *Key Fields* in SOA Gateway terms are simply fields or columns on your data source (file, table, etc) that may be used to narrow a search for a record or row of data.

Note: *key fields* may or may not be *indexed* at your data source. Indexing provides better response times from your data source. If you are unsure what, if any, fields are key fields (in Adabas terms: Descriptors) or allowed to be used for searching, contact your data source administrator (DBA, etc.).

Key fields are specified to SOA Gateway by setting the appropriate value for the attribute "*key type*" in the Resource Description.

Key Types

There are two types of *key fields* for data sources:

Primary Key Fields

Primary Key Fields are fields in a data source that must always contain unique values.

They are required on all data source operations except the *list* operation, where they are optional. Secondary keys may be used instead or in addition on a list request.

Their values will not be altered in the *update* operation.

Primary Keys cannot contain *wild card* symbols, except on the *list* operation.

Secondary Key Fields

Secondary Key Fields are fields that may be used in narrowing a search.

They are not required in any operation, and their values can be updated.

They may contain wild card symbols.

Using Wild card Symbols and other Generic Search criteria

Wild cards are used where you do not wish to specify an exact value in a key field, but use a generic specification that will match for a range of different values.

These search modifiers may only be used on the *list* operation.

SOA Gateway currently supports the following generic search criteria :

Wild card for one or more characters

The character "*" may be used as a wild card for all characters.

It may only be used on fields defined as "*string*" fields.

Where it appears, it will match any character or group of characters.

Note: for Adabas resources, this wildcard may only appear at the *end* of the string data supplied.

Example

"Ga*" would match "Gat", "Gate", "Gateway", etc.

2 SOAP

SOAP Headers

In SOA Gateway, the SOAP Headers are used for versioning, the support of conversational SOAP processing, support of transactions, and specific settings on the datasource you are accessing. By default all elements are "empty". To get the default behaviour, all header elements should be left blank, or removed altogether. Example:

```
<soap:Envelope xmlns:rapdv="http://www.risaris.com/namespaces/xmiddle" ↩
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" ↩
xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <rapdv:AdabasEmployeeHeader>
      <Version/>
      <ConversationState/>
      <ConversationId/>
      <TransactionState/>
      <TransactionId/>
    </rapdv:AdabasEmployeeHeader>
  </soap:Header>
  <soap:Body>
  ...
  </soap:Body>
</soap:Envelope>
```

Conversational Processing

Every time a SOAP request is made to SOA Gateway, this request must be associated with a specific context. By default, a new context is created and destroyed for every SOAP Request.

The user may also use the SOAP Headers to re-use and re-connect to a specific context.

When a user starts, re-uses, and ultimately finishes with their context, the process is known as a "conversation". In the SOAP Header, the "ConversationState" and "ConversationId" are used for conversational processing, see below for more information.

The Version Element

The 'Version' element is currently unused. It will be brought into use in future versions of SOA Gateway.

The ConversationState Element

The 'ConversationState' element is used to control conversation processing. It should be one of the following:

State	Description
New	A new conversation is being started. In this case, the ConversationID (see below) value must by NULL or an error will occur.
Old	An existing conversation is active with which the current SOAP message should be associated. When the SOAP request is processed, the conversation must remain active as there are further SOAP requests to be sent. The ConversationID found must have been returned as a result of a previous 'new' request. An error will occur if the ConversationId (see below) provided cannot be found.
End	An existing conversation is active with which the current SOAP message should be associated. When the SOAP request is processed, the conversation must be terminated. The ConversationID (see below) found must have been returned as a result of a previous 'new' request. An error will occur if the ConversationId provided cannot be found.

The ConversationId Element

The ConversationId unquely identifies the conversation, and it returned only after a 'New' request is successfully processed. The user should never modify or create this ID. The ConversationId must be present on an 'Old' or 'End' request.

Transaction Processing

In SOA Gateway, the platform's Transaction Manager (TM) will be engaged to handle transactions. A default TM is provided as part of the ASG installation. It can be found in <asg install dir>/libraries/transactionManagerDummyDll.so. The environment variable TMSTUB is used to point to the transaction manager shared object. This shared object provides interfaces to handle the transaction.

Note: The framework for engaging transaction managers is subject to change. Currently the transactionManagerDummyDll.so does not provide any "real" transactionality. Rísarís are current looking for early adopters to work with us to fully implement and test this technology.

In the SOAP Header, the "TransactionState" and "TransactionId" are used for transactional processing; see the table below for more information.

The TransactionState Element

If a transaction involves modifications that will occur over multiple SOAP messages, the conversational processing logic must be used to associate the SOAP messages and thus the transactional information.

If a transaction involves modifications that will all be completed as part of the one SOAP message, the conversational processing logic is not required.

When the request uses an active conversation, and is add/update/delete, a transaction is implicitly started.

If a conversation is ended before the transaction is committed, a implicit back out will occur.

The Transaction State may be one of the following:

State	Description
Commit	This will cause a commit to be issued when the current SOAP message has been processed. If no conversation existed previously for this SOAP request, an error will result. When returned in the SOAP response, it indicates that the transaction has been committed, and transaction ID is provided for reference.
Backout	This will cause a backout to be issued when the current SOAP message has been processed. If no conversation existed previously for this SOAP request, an error will result. When returned in the SOAP response, it indicates that the transaction has been backed out, and transaction ID is provided for reference.

The Transaction Id Element

The Transaction ID is purely informational, and has no functional bearing on the transaction process. It is returned on any SOAP message and is intended to be used for tracking purposes.

It is not mandatory to provide the Transaction ID. As only 1 transaction can ever be active on a conversation, SOA Gateway will auto-reconnect to the current transaction internally.

Adabas specific headers

When working with Adabas services, there are a number of specific SOAP headers that will be available

These headers are listed in the Using SOA Gateway with Adabas section.

Relational database specific headers

When working with relational database services, i.e. MySQL, MS SQL Server, DB2, Oracle, etc, the specific SOAP Header are

SOAGateway_Internal_AutoCommit	Turn off the AutoCommit flag on the database

Soap Operations for Server Configuration

SOA Gateway exposes a number of SOAP operations / methods to retrieve and alter the SOA Gateway Server Configuration from any SOAP enabled client.

Note: These interfaces are likely to change in the future, they are provided on a trial basis, be aware that you might have to change any "applications" built on top of these interfaces ! As soon as "stable" interfaces are available, this fact will be announced and documented.

adaptorList

This operation is used to load up a SOA Gateway driver library, and return the assoicated internal information.

This operation takes 1 input, libraryName should be set to the name of the library to load and query.

configList

This operation is used to list the current configuration in use by the SOA Gateway server. The current configuration is useful where you wish to make changes to existing configuration items, or just to make sure you are not trying to add, for example, a resource *URI* that is already in use.

This operation currently has no options.

The full configuration document, minus the XML header, is returned in the *soap response*.

configRemove

This operation is used to reset the value of an item in the configuration, or to remove an item from the configuration.

Only certain items or levels of items may be altered using this operation. The definition in the WSDL shows what elements may be used. Refer to it for further details on what type of items may be removed and what items may only have their value reset.

A configuration item which is reset will assume it's default value if it is an item that cannot be removed from the configuration.

Configuration items changed by this operation are effective as soon as the engine can make them so.

This operation currently has no options.

configReplace

This operation is used to replace the current configuration file, or to write a new configuration to file on the server.

If the element '*configFileName*' is omitted or left empty, then the configuration file currently in use will be overwritten - if it is in the configuration directory.

If the element '*configFileName*' is specified, then the configuration will be written to a file of that name in the configuration directory.

The newly written configuration will not come into effect until the SOA Gateway server is next started.

If the element '*configFileName*' was specified, and you wish to use this configuration, then before re-starting the SOA Gateway server you must alter the system environment variable *XMIDDLE_CONFIGURATION_FILE* so that it refers to your new configuration file.

This operation currently has no options.

configSet

This operation is used to set the value of an item in the configuration, or to add an item to the configuration.

Only certain items or levels of items may be altered using this operation. The definition in the WSDL shows what elements may be used. Refer to it for further details on what type of items may be added and what items may only have their value altered.

Configuration items changed by this operation are effective as soon as the engine can make them so.

This operation currently has no options.

3 REST

Introduction

Web services can also use other technologies, apart from SOAP, such as RESTful implementations on top of HTTP. Representational State Transfer (REST) is an approach based on the architectural style of the Web itself. The SOA Gateway also provides this URL based approach to access resources.

REST Overview

SOA Gateway allows users to access any web service via a REST-style URL request. In general, this is a more simplistic way of accessing services, useful in demo scenarios, and with clients that do not have support for SOAP, but do have support for retrieving URLs information (such as Microsoft Excel).

A REST request is similar to the WSDL request, but with extra arguments. Generally, it is recommended that the WSDL is retrieved first, as it gives the client the ability to see what fields have been set as keys. All operations that are possible using the WSDL are possible with REST, with some caveats.

Operation	*Notes*
get	MTOM is not supported. In the case where binary objects are returned on request, the XML will be escaped into HTML, and a link to the binary object will also be returned.
add/update	HTTP POST must be used.
delete	HTTP DELETE must be used.

Example

The following is an example of retrieving data with a REST request

```
http://host:port/myService?LIST&ID=4*&Name=J*
```

This will attempt to call the "list" operation, passing in a value of 4* to the ID field (which has been defined as a primary/secondary key) AND the Name field set to J*

Enhanced REST Operations

SOA Gateway provides several operations for each web service so it has enhanced its REST implementation to support them e.g. SELECT and INVOKE. Typically these may require complex parameters in order to be called.

```
http://localhost:56005/adabas_Employees_9?
SELECT
&condition[1].personnel_id>50012100
&condition[1].personnel_id<=50012700
&condition[2].personnel_id=50012900
```

The example above specifies 2 condition blocks. This will return data where the (personnel_id > 50012100 and personnel_id <= 50012700) or personnel_id = 50012900

Database WSDLs

A SOA Gateway database WSDL defines requests which reflect database access.

Supported Requests

1. LIST
2. GET
3. DELETE
4. ADD
5. UPDATE
6. SELECT
7. SELECTCOUNT

URI

As usual in the definitions element there will be a value for the targetNamespace uri:

```
<definitions targetNamespace="uri://46.46.46.46:56421/Customers"
name="CustomersRootCollection">
```

The uri gives us the starting portion of a REST request:

```
http//46.46.46.46:56421/Customers
```

Note that in Portus WSDLs a unique identifier (UNIQID) is prepended to various elements and aslo contained in the uri e.g. in this case Customers in the name CustomersRootCollection.

Messages

For each the above requests there will be a message entry in the WSDL with the following names:

getRequest, listRequest, deleteRequest, addRequest, updateRequest, selectRequest and selectCountRequest

e.g.

<message name="listRequest">

<part name="CustomersGroupListKey" element="asg:CustomersGroupListElement"/>

</message>

.

.

<message name="getRequest">

<part name="CustomersGroupGetKey" element="asg:CustomersGroupGetElement"/>

</message>

.

.

<message name="deleteRequest">

<part name="CustomersGroupDeleteKey" element="asg:CustomersGroupDeleteElement"/>

</message>

.

.

.

Note that there will be some others which are in the WSDL which are not supported in a REST request i.e. selectNext and selectEnd.

e.g.

<message <message name="selectNextRequest">

<part name="CustomersGroupSelectNextRequest" element="asg:CustomersGroupSelectNextElement"/>

</message>

Each message element has a part element which gives further details about the request structure via REST:

LIST

<part name="UNIQIDGroupListKey" element="asg:UNIQIDGroupListElement"/>

<xs:element name="UNIQIDGroupListElement" type="asg:UNIQIDGroupKeyType"/>

<xs:complexType name="UNIQIDGroupKeyType">

<xs:sequence>

<xs:element name="ID" nillable="true" type="xs:int"/>

<xs:element name="Account_ID" nillable="true" type="xs:int"/>

</xs:sequence>

</xs:complexType>

At this point we know our input parameter(s). A feature of the LIST request is that these parameters can be wild carded as shown below and/or omitted:

http://46.46.46.46:56421/Customers?LIST&ID=*

http://46.46.46.46:56421/Customers?LIST&ID=2

http://46.46.46.46:56421/Customers?LIST&ID=2*

http://46.46.46.46:56421/Customers?LIST&ID=*&Account_ID=2*

http://46.46.46.46:56421/Customers?LIST&Account_ID=2*

http://46.46.46.46:56421/Customers?LIST&Account_ID=*5

GET

<part name="UNIQIDGroupGetKey" element="asg:UNIQIDGroupGetElement"/>

<xs:complexType name="UNIQIDGroupPrimaryKeyType">

<xs:sequence>

<xs:element name="ID" nillable="true" type="xs:int"/>

</xs:sequence>

</xs:complexType>

At this point we know our input parameter(s). Note that a GET targets a specific row in the database and returns one record or none if not found:

http://46.46.46.46:56421/Customers?GET&ID=25

DELETE

<part name="UNIQIDGroupDeleteKey" element="asg:UNIQIDGroupDeleteElement"/>

<xs:element name="UNIQIDGroupDeleteElement" type="asg:UNIQIDGroupPrimaryKeyType"/>

<xs:complexType name="UNIQIDGroupPrimaryKeyType">

<xs:sequence>

<xs:element name="ID" nillable="true" type="xs:int"/>

</xs:sequence>

</xs:complexType>

At this point we know our input parameter(s). Note that a DELETE targets a specific row in the database. If successful it returns a 'delete successful' message or an error stating that it does not exist.

http://46.46.46.46:56421/Customers?DELETE&ID=25

ADD

<part name="UNIQIDRoot" element="asg:UNIQIDRootAddElement"/>

<xs:element name="UNIQIDRootAddElement" type="asg:UNIQIDRootType"/>

<xs:complexType name="UNIQIDRootType">

<xs:sequence>

<xs:element maxOccurs="unbounded" minOccurs="0" name="UNIQIDGroup"
type="asg:UNIQIDGroupType"/>

</xs:sequence>

</xs:complexType>

<xs:complexType name="UNIQIDGroupType">

<xs:sequence>

<xs:element name="ID" nillable="true" type="xs:int"/>

<xs:element name="FirstName" type="xs:string"/>

<xs:element name="Surname" type="xs:string"/>

<xs:element name="Street" type="xs:string"/>

<xs:element name="City" type="xs:string"/>

<xs:element name="State" type="xs:string"/>

<xs:element name="Zip" type="xs:string"/>

<xs:element name="Phone" type="xs:string"/>

<xs:element name="SSN" nillable="true" type="xs:int"/>

<xs:element name="Account_ID" nillable="true" type="xs:int"/>

</xs:sequence>

</xs:complexType>

At this point we know our input parameter(s). All elements are at the same level i.e. not in a structure so can be sequentially added to the REST request.

http://46.46.46.46:56421/Customers?ADD&ID=Value&FirstName=Value&Surname=Value&Street=Value&City=Value&State=Value&Zip&Phone=Value&SSN&Account_ID=Value

UPDATE

<part name="UNIQIDRootUpdate" element="asg:UNIQIDRootUpdateElement"/>

<xs:element name="UNIQIDRootUpdateElement" type="asg:UNIQIDRootType"/>

<xs:complexType name="UNIQIDRootType">

<xs:sequence>

<xs:element maxOccurs="unbounded" minOccurs="0" name="UNIQIDGroup" type="asg:UNIQIDGroupType"/>

</xs:sequence>

</xs:complexType>

<xs:complexType name="UNIQIDGroupType">

<xs:sequence>

<xs:element name="ID" nillable="true" type="xs:int"/>

<xs:element name="FirstName" type="xs:string"/>

<xs:element name="Surname" type="xs:string"/>

<xs:element name="Street" type="xs:string"/>

<xs:element name="City" type="xs:string"/>

<xs:element name="State" type="xs:string"/>

<xs:element name="Zip" type="xs:string"/>

<xs:element name="Phone" type="xs:string"/>

<xs:element name="SSN" nillable="true" type="xs:int"/>

<xs:element name="Account_ID" nillable="true" type="xs:int"/>

</xs:sequence>

</xs:complexType>

At this point we know our input parameter(s). All elements are at the same level i.e. not in a structure so can be sequentially added to the REST request. Note that as ID (see UNIQID-GroupPrimaryKeyType)is the primary key, the value passed in the request should exist in the database table.

http://46.46.46.46:56421/Customers?UPDATE&ID=existingKeyValue&FirstName=Value&Surname=Value&Street=Value&City=Value&State=Value&Zip&Phone=Value&SSN&Account_ID=Value

SELECT

<part name="UNIQIDGroupSelectKey" element="asg:UNIQIDGroupSelectElement "/>

<xs:element name="UNIQIDGroupSelectElement" type="asg:UNIQIDGroupSelectType"/>

<xs:complexType name="UNIQIDGroupSelectType">

<xs:sequence>

<xs:element maxOccurs="unbounded" minOccurs="1" name="condition">

<xs:complexType>

<xs:sequence>

<xs:element maxOccurs="unbounded" minOccurs="0" name="ID">

<xs:complexType>

<xs:simpleContent>

<xs:extension base="xs:string">

<xs:attribute name="Condition" type="asg:conditionType"/>

</xs:extension>

</xs:simpleContent>

</xs:complexType>

</xs:element>

<xs:element maxOccurs="unbounded" minOccurs="0" name="Account_ID">

<xs:complexType>

<xs:simpleContent>

<xs:extension base="xs:string">

<xs:attribute name="Condition" type="asg:conditionType"/>

</xs:extension>

</xs:simpleContent>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

At this point we know our input parameter(s).

N.B.

Both select and selectCount have input the elements of which are contained in a structure. The parent element is condition which will contain elements which are primary and secondary keys (in the underlying database). The SOAP equivalent message portion would be:

<!--1 or more repetitions:-->

<condition>

<!--Zero or more repetitions:-->

<ID Condition="?"></ID>

<!--Zero or more repetitions:-->

<Account_ID Condition="?"></Account_ID>

</condition>

(As per the WSDL the Condition type can be EQ, NE, LT, LE, GT, GE, STARTS, CONTAINS and ENDS).

<condition>

<ID Condition="GT">4</ID>

<ID Condition="LE">10</ID>

</condition>

<condition>

<Account_ID Condition="EQ">23</Account_ID>

</condition>

The above element will select records where the ID is greater than 4 AND less than or equal to 10 OR where Account_ID is equal to 23.

There are 2 condition elements so use array notation for those (one being the base).

Use numeric notation for the condition type i.e. for GT use >

e.g.

http://46.46.46.46:56421/Customers?SELECTCOUNT&condition[1].ID>4&condition[1].ID<=10&condition[2].Account_ID=23

Program WSDLs

A SOA Gateway WSDL which is program based supports an INVOKE request.

Simple Example

Excerpt from typical program WSDL:

<xs:element name="invokeInputElement">

<xs:complexType>

<xs:sequence>

<xs:element name="SOABSP_CALCULATRoot">

<xs:complexType>

<xs:sequence>

<xs:element name="SOABSP_CALCULATGroup">

<xs:complexType>

<xs:sequence>

<xs:element name="OPERATION" type="xs:string"/>

<xs:element name="OPERAND_1" nillable="true" type="xs:int"/>

<xs:element name="OPERAND_2" nillable="true" type="xs:int"/>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

- In the definitions element there will be a value for the targetNamespace uri:

  <definitions targetNamespace="uri://www.versatec.info:56421/SOABSP_CALCULAT" …

  The uri gives us the starting portion of a REST request:

  http://www.versatec.info:56421/SOABSP_CALCULAT

  Note also that in Portus WSDLs a unique identifier (UNIQID) is prepended to various elements and also contained in the uri e.g. in this case SOABSP_CALCULAT:

  <xs:element name="SOABSP_CALCULATRoot">
- There will be an element with a name of invokeInputElement. This is reflected in the F=INVOKE portion of the REST request.

  http://www.versatec.info:56421/SOABSP_CALCULAT?F=INVOKE
- invokeInputElement will contain an element with a name UNIQIDRoot
- UNIQIDRoot will contain an element with a name UNIQIDGroup

- UNIQIDGroup will contain the elements that are passed in the INVOKE for a REST request e.g.

  <xs:element name="OPERATION" type="xs:string"/>

  <xs:element name="OPERAND_1" nillable="true" type="xs:int"/>

  <xs:element name="OPERAND_2" nillable="true" type="xs:int"/>

  http://www.versatec.info:56421/SOABSP_CALCULAT?F=INVOKE&OPERATION=mul&OPERAND_1=2345&OPERAND_2=6789

Complex Example

Excerpt from more complex program WSDL:

<xs:element name="invokeInputElement">

<xs:complexType>

<xs:sequence>

<xs:element name="QEESPN01Root">

<xs:complexType>

<xs:sequence>

<xs:element name="QEESPN01Group">

<xs:complexType>

<xs:sequence>

<xs:element name="QEESPS01">

<xs:complexType>

<xs:sequence>

<xs:element name="REDEFINE_001_IPF">

<xs:complexType>

<xs:sequence>

<xs:element name="TIPO_IPF" type="xs:string"/>

<xs:element name="REDEFINE_002_NUM_IPF">

<xs:complexType>

<xs:sequence>

<xs:element maxOccurs="10" name="NUMN_IPF" type="xs:string"/>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

<xs:element name="FECHA_DESDE" nillable="true" type="xs:decimal"/>

<xs:element name="REDEFINE_003_COD_IPF">

<xs:complexType>

<xs:sequence>

<xs:element name="ALFA2" type="xs:string"/>

<xs:element name="ALFA8" type="xs:string"/>

</xs:sequence>

</xs:complexType>

</xs:element>

<xs:element name="FECHA_NAC" type="xs:string"/>

<xs:element maxOccurs="10" name="DUP_F10" nillable="true" type="xs:decimal"/>

<xs:element maxOccurs="100" name="D_SALIDA">

<xs:complexType>

<xs:sequence>

<xs:element name="MOMMAP" type="xs:string"/>

<xs:element name="SALIDA_DATA" type="xs:string"/>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

- In the definitions element there will be a value for the targetNamespace uri:

  <definitions targetNamespace="uri://meath-nua:56008/QEESPN01" name="QEESPN01RootCollection">…

  The uri gives us the starting portion of a REST request:

  http//meath-nua:56008/QEESPN01

  In Portus WSDLs a unique identifier (UNIQID) is prepended to various elements and also contained in the uri e.g. in this case QEESPN01
- There will be an element with a name of invokeInputElement. This is reflected in the F=INVOKE portion of the REST request.

  http//meath-nua:56008/QEESPN01?F=INVOKE
- invokeInputElement will contain an element with a name UNIQIDRoot
- UNIQIDRoot will contain an element with a name UNIQIDGroup
- UNIQIDGroup will contain the elements that are passed in the INVOKE for a REST request e.g.

  <xs:element name="QEESPS01">

  <xs:complexType>

<xs:sequence>

<xs:element name="REDEFINE_001_IPF">

<xs:complexType>

<xs:sequence>

<xs:element name="TIPO_IPF" type="xs:string"/>

<xs:element name="REDEFINE_002_NUM_IPF">

<xs:complexType>

<xs:sequence>

<xs:element maxOccurs="10" name="NUMN_IPF" type="xs:string"/>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

<xs:element name="FECHA_DESDE" nillable="true" type="xs:decimal"/>

<xs:element name="REDEFINE_003_COD_IPF">

<xs:complexType>

<xs:sequence>

<xs:element name="ALFA2" type="xs:string"/>

<xs:element name="ALFA8" type="xs:string"/>

</xs:sequence>

</xs:complexType>

</xs:element>

<xs:element name="FECHA_NAC" type="xs:string"/>

<xs:element maxOccurs="10" name="DUP_F10" nillable="true" type="xs:decimal"/>

<xs:element maxOccurs="100" name="D_SALIDA">

<xs:complexType>

<xs:sequence>

<xs:element name="MOMMAP" type="xs:string"/>

<xs:element name="SALIDA_DATA" type="xs:string"/>

</xs:sequence>

</xs:complexType>

</xs:element>

</xs:sequence>

</xs:complexType>

</xs:element>

- If the element names within UNIQIDGroup are in a structure then the REST request must reflect that:

QEESPN01?INVOKE&QEESPS01.REDEFINE_001_IPF.TIPO_IPF=0&QEESPS01.RE-DEFINE_001_IPF.REDEFINE_002_NUM_IPF.NUMN_IPF[0]=0&QEESPS01.RE-DEFINE_001_IPF.REDEFINE_002_NUM_IPF.NUMN_IPF[1]=0&QEESPS01.RE-DEFINE_001_IPF.RE-DEFINE_002_NUM_IPF.NUMN_IPF[2]=0&QEESPS01.FECHA_DESDE=0&QEESPS01.RE-DEFINE_003_COD_IPF.ALFA2=0&QEESPS01.RE-

1. QEESPS01 is the top level element name. It has a child REDEFINE_001_IPF which in turn has a child element TIPO_IPF so the parameter should be specified as:

&QEESPS01.REDEFINE_001_IPF.TIPO_IPF=0

2. If an element can occur more than once (maxOccurs > 1) then use array notation:

&QEESPS01.REDEFINE_001_IPF.REDEFINE_002_NUM_IPF.NUMN_IPF[0]=0&QEESPS01.RE-DEFINE_001_IPF.REDEFINE_002_NUM_IPF.NUMN_IPF[1]=0&QEESPS01.RE-DEFINE_001_IPF.REDEFINE_002_NUM_IPF.NUMN_IPF[2]=0

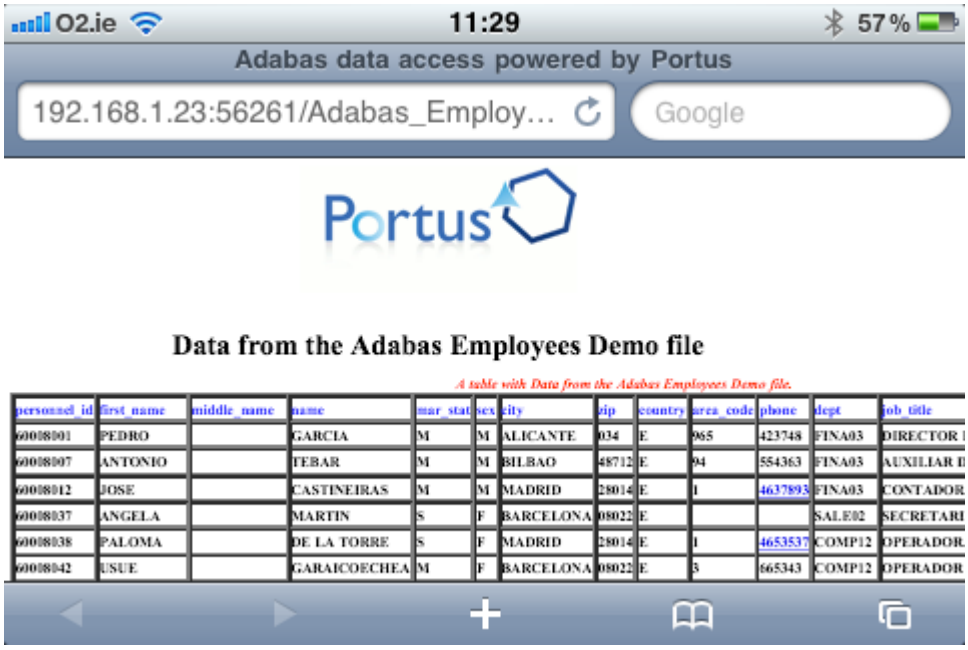
XSL Transformation

REST requests also support XSL transformation. The XSL file should be defined in the Control Centre, and have the same name as the XRD and XSD file. When a REST request is made, the URL for the XSL is added into the returned XML response, thus allowing the client to retrieve the XSL, and apply the transformation.

For clients that do not support client-side XSL transformation, such as some Android and Blackberry devices, it is possible to apply the transformation on the server side (e.g. SOA Gateway will apply the transformation, and return the transformed data). This is determined by the HTTP User-Agent header, and should normally be done transparently. It is possible to force client or server transformation with an option on the REST URL.

```
http://host:port/myService?LIST&__xslTransform=server&ID=1*

http://host:port/myService?LIST&__xslTransform=client&ID=1*
```



Using different encodings

See here for more information about the __encoding option on REST request.

4 Frequently Asked Questions

How do I modify the machine identifier in the JESMSGLG?

During the FTP of SOA Gateway to z/OS, the machine identifier will be set to the hostnam or IP address of the FTP server. This text will be displayed on messages appearing in the JESMSGLG. To change this, modify the SYSPARM member of the CONF dataset and set this as required. It is recommended that this is set to the hostname or IP address of the z/OS machine.

5 Performance Hints

This section outlines some suggestions to improve the performance of SOA Gateway.

- **Turning off Access Logging**

  Each time SOA Gateway handles a request, it writes some logging information to the access log via Apache. By default, this file is access_log / access.log / DD:ACCESS based on the platform, *nix, Windows, z/OS respectively.

  To restrict this logging, see the following Apache directive **here**

  To remove this logging, remove the CustomLog directive from your httpd.conf / HTCONF. This can be accomplished by adding a # in front of the directive.

- **Use PFS caching**

  This only applies on z/OS or z/VSE.

  Edit your SYSPARM and ensure caching of the SOA Gateway filesystem has been turned on. The option is `CACHESIZE=N` option on the CDI_DRIVER directive

  E.g
  ```
  CDI_DRIVER=('pfs,PAANPFS,CONTAINER=CIO://DD:PFS,CHARSET=ASCII,LRECL=4096,CACHESIZE=4096')
  ```

- **Enable/disable Streaming**

  By default, when a user issues a list request, with key data of "*", i.e. listing all records in the database, SOA Gateway will send back records in a "streamed" fashion. For example, as soon as one record is retrieved, it is immediately sent back to the client using the HTTP chunking protocol. It has been found that this is the most effective way of handling large amounts of data, but there is a small performance offset in doing this. There are a number of directives that affect how streaming is applied. These directives must be part of the Apache configuration file.

  SoaGatewayStreaming On : *This is the default setting. Responses will be streamed back to the client using the HTTP Chunking protocol when a list is requested that will retrieve every record in the database.*

SoaGatewayStreaming Off : *No streaming will ever take place. Use this option if you are concerned about performance, and will be listing every record in the database.*
SoaGatewayStreaming Force : *SOA Gateway will always to attempt to stream data back to the client. This is most effective if the SOA Gateway is running on a machine with low resources, and low memory usage is a priority.*

- **Change MPM settings**

  The SOA Gateway uses the **Apache worker MPM** to handle requests. This can be modified to increase server threads, therefore allowing the server to serve more requests. See the Apache documentation for more information.

  Important: Ensure that the ServerLimit of 1 is maintained at all times. SOA Gateway will not function correctly if more than server process is started.

6 Internationalization

SOA Gateway uses IBM's **International Components for Unicode** to support internationization (i18n). This supports text data conversion between almost any codepage.

Which codepage do I use?

This depends on what sort of information your service is going to return. Generally the ASCII codepage is sufficient for the English language. The ISO-8859-1 (often called latin1) codepage should suffice for most languages of Western Europe. The windows-1251 codepage supports Cyrillic languages such as Russian and Bulgarian. The ISO-8859-8 codepage can be used for Hebrew script.

The ICU home page has provided a **useful web page** which displays the ICU internal name, and a list of the aliases that SOA Gateway will recognise. This page will also display the codepage map, which will allow you to choose the codepage best suited to your service.

SOAP versus REST differences

Generally when using WSDL and SOAP, once the correct codepage has been set, the payload should be recognised or returned correctly.

When using REST requests, things are slightly different. Non-ASCII characters entered on a URL bar of a browser will be escaped into their native hex value, of the form %XX. This native hex value differs depending on what codepage the browser recognises the character as. For example, a browser running in the latin1 codepage will recognise Á as %C1, but a browser running in the Cyrillic codepage will recognise Б as %C1.

For this reason SOA Gateway allows users to provide an extra field on the REST request. This field is called `__encoding`. Thus users can indicate what codepage their browser is running in.

Important: By default, SOA Gateway assumes the escaped values are in the ISO-8859-1. The `__encoding` field is not required in this case.

Example 1

The browser escapes the Russian Б into %C1. You need to tell SOA Gateway that this is the Cyrillic encoding.

The URL should be `http://host:port/Service?LIST&key=%C1&__encoding=windows-1251`.

Example 2

The browser escapes the Hebrew Shin (ש) into %F9. You need to tell SOA Gateway that this is the Hebrew encoding

The URL should be `http://host:port/Service?LIST&key=%F9&__encoding=iso-8859-8`.

Troubleshooting

When SOA Gateway cannot display a character in the requested codepage, it writes a message to the error log, and continues to attempt to process the rest of the payload. If you find your responses are missing some characters, check the error_log / error.log / XMIDCARD on *nix, Windows and z/OS respectively.

The error message to check should be something like this :

```
Unicode char 0xF1 is not representable in encoding ASCII.
```

7 Creating a Stylesheet for your SOA Gateway Data

XSL stands for EXtensible Stylesheet Language, and is a style sheet language for XML documents. XSLT stands for XSL Transformations.

XSLT can be applied to the response payload of SOA Gateway REST requests.

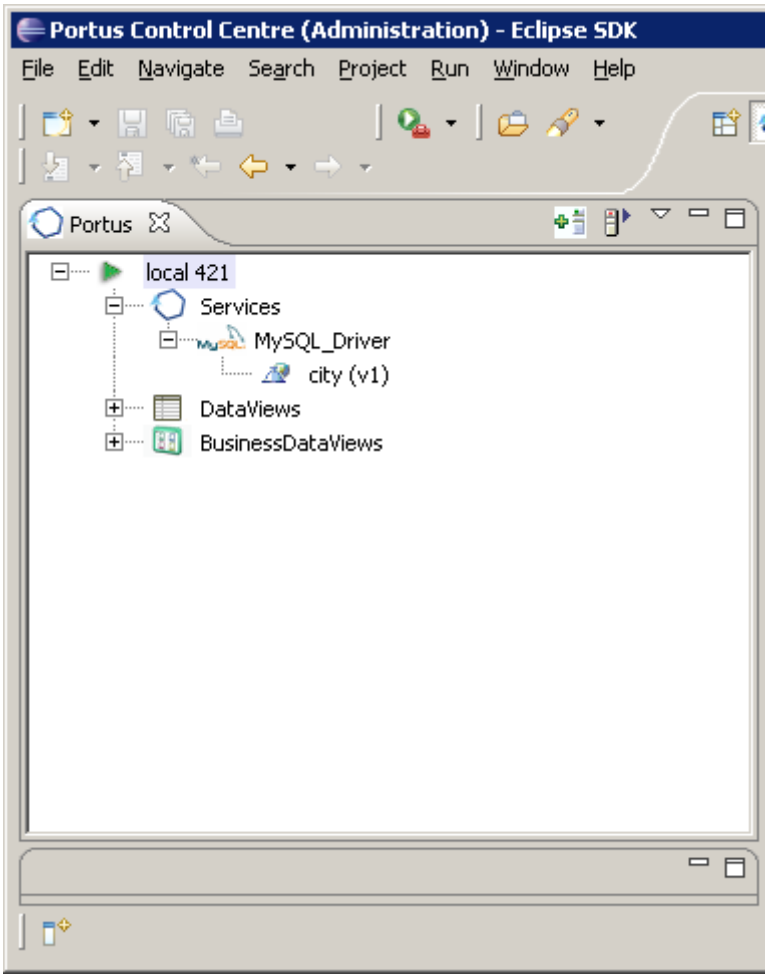
It is commonly used, but not restricted, to creating HTML pages based on the REST response.

When configured to use XSLT, a SOA Gateway service will (by default) return an XML stylesheet processing instruction embedded in the XML. Therefore, the client consuming this data should be able to load the XSL link, and apply the XSLT to the payload. In some cases, the client may not have the ability to understand XML processing instructions (browsers on mobile devices are a good example). In this case, SOA Gateway has the ability to apply the XSLT on the server side, and send the transformed results. In this case, providing the __xslTransform=server option on the REST request will tell Portus to apply the XSLT before sending the payload, and no XML stylesheet instruction will be included.

E.g http://host/Service?LIST&ID=*&__xslTransform=server

Create HTML page from City XML

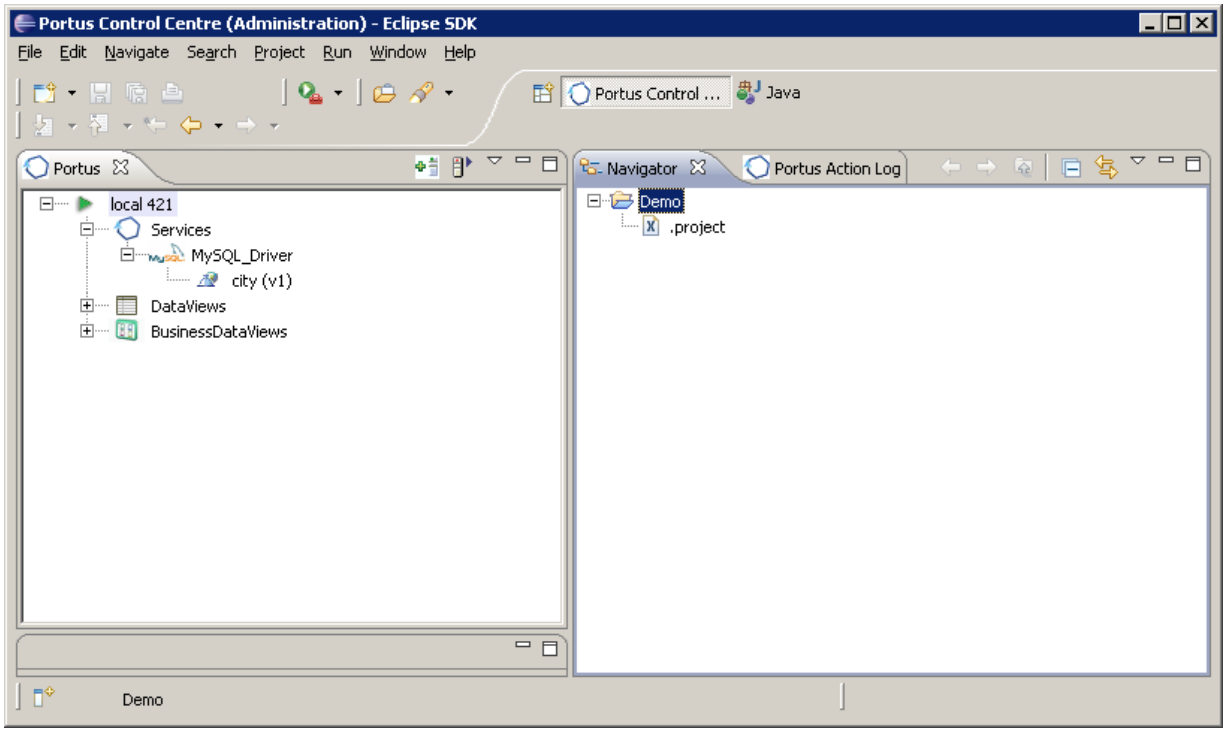
- When this step is completed you should have a Service similar to that shown below e.g. a Service capable of accessing the city table.



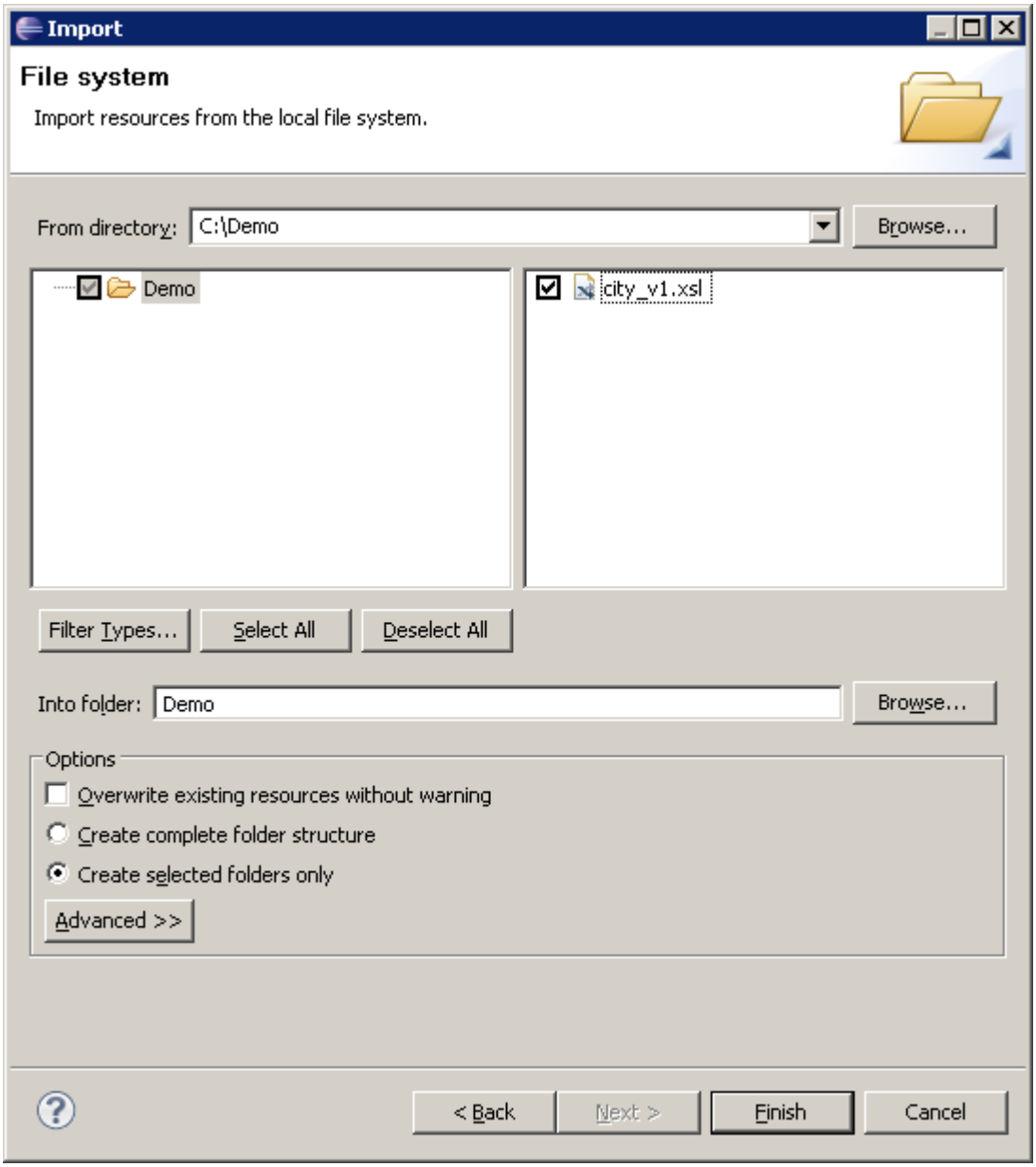
- A generic stylesheet is provided which can be modified to support your Service. Save the following XSL file to disk.

  Important: The name of the saved stylesheet has to be in the format 'ServiceName_version.xsl'. e.g. we will save our file as city_v1.xsl

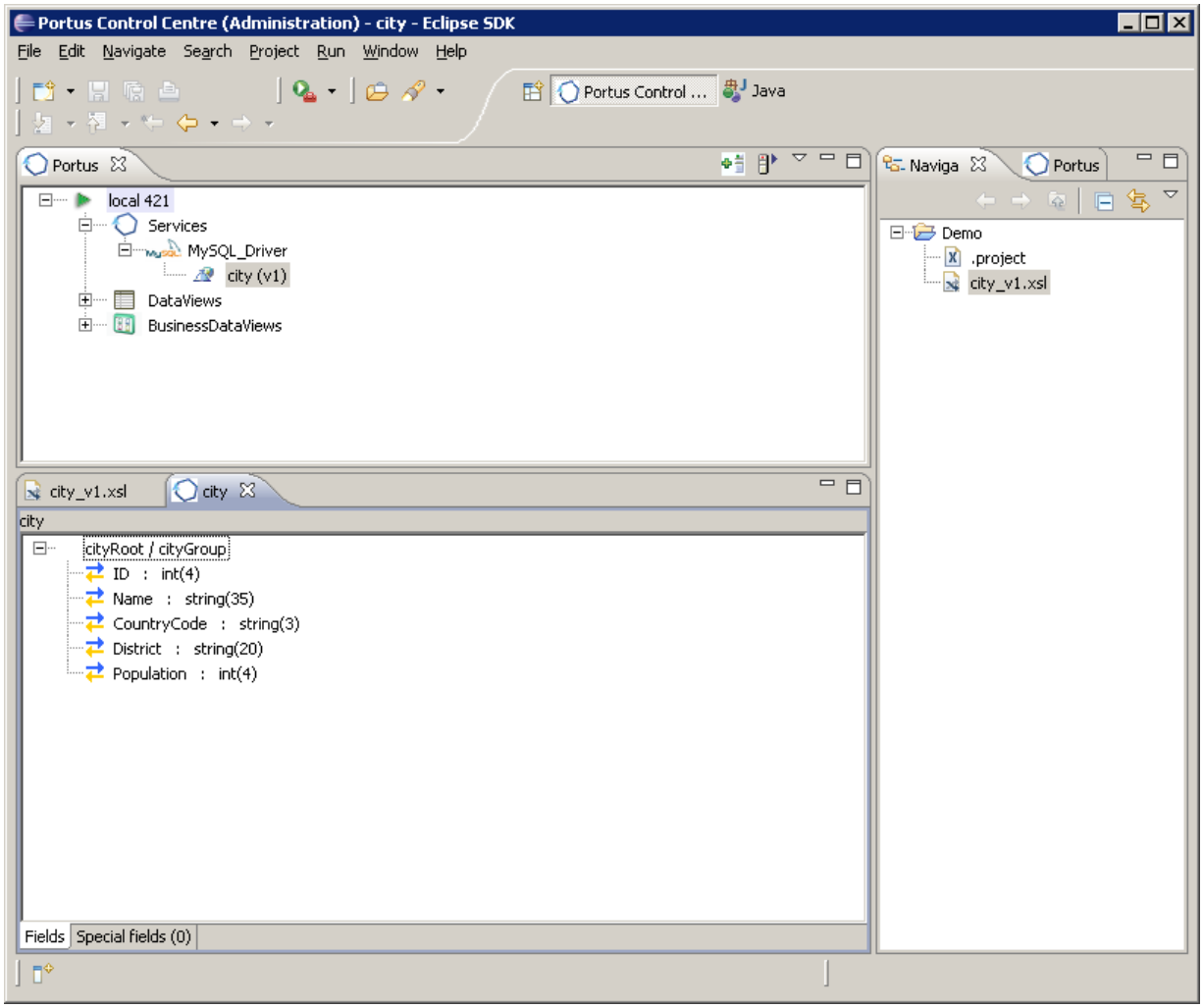
- If you do not already have a project created see here on how to do so. In our case we have created a project named Demo. If this is not visible open Window -> Show View -> Navigator You should have a view similar to this:



- Right-click your project in the Navigator View and select **Import**
- Expand **General** and select **File System**. Click **Next**
- Click **Browse** and select the directory where you saved the above XSL. Check the XSL, and click **Finish e.g.**



- Double-click your XSL file to open it for editing in a default editor or right-click on the file and select Open With... to choose your own editor.
- Right-click on your Service in the Servers View and select Edit DataView.
- You should now have a view similar to this:



- The DataView provides us with 3 important items which are required when we come to edit the stylesheet:
  1. The ROOT name: e.g. cityRoot.
  2. The GROUP name e.g. cityGroup.
  3. The element names e.g. ID, Name, CountryCode, District and Population.
- Select the XSL tab to edit its contents.
  1. Find the entry <xsl:template match="changeThisRoot"> and modify changeThisRoot to your root name.
  2. Find the entry <xsl:template match="changeThisGroup"> and modify changeThisGroup to your group name.
  3. Find the entry ColumnHeader1. It should be wrapped in TR tags as follows:

     <TR>

<Td>ColumnHeader1</Td>

</TR>

Create as many Td tags entries within the TR tag as there are elements in your DataView e.g. in this case 5.

Change each ColumnHeader1 value to the element names. For headers these do not have to match the element names but for simplicity we will do so here e.g.

<TR>

<Td>ID</Td>

<Td>Name</Td>

<Td>CountryCode</Td>

<Td>District</Td>

<Td>Population</Td>

</TR>

4. Find the entry XRDElementName1. It should be wrapped in tr tags as follows:

<tr>

<td><xsl:value-of select="XRDElementName1" /></td>

</tr>

Create as many td tags entries within the tr tag as there are elements in your DataView e.g. in this case 5.

Change each XRDElementName1 value to the element names.

Important: These must match the element names exactly e.g.

<tr>

<td><xsl:value-of select="ID" /></td>

<td><xsl:value-of select="Name" /></td>

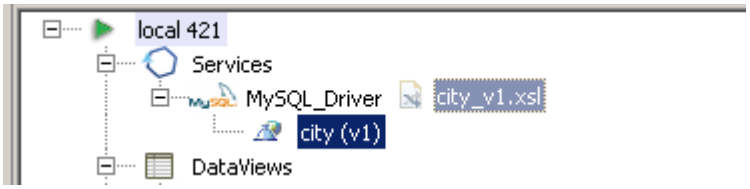
<td><xsl:value-of select="CountryCode" /></td>

<td><xsl:value-of select="District" /></td>

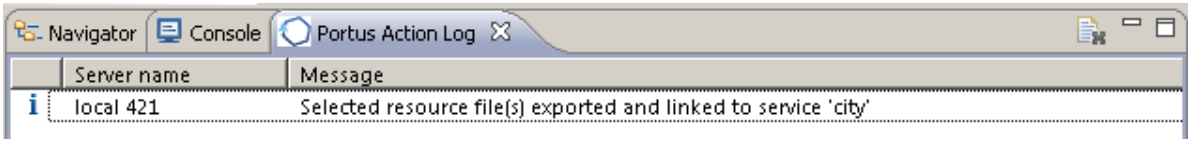
<td><xsl:value-of select="Population" /></td>

</tr>

5. Save the XSL (Ctrl+S).
6. In the Navigator View left-click the XSL file and, holding down the left button, drag and drop the file onto the Service as shown:.



7. You should see a message similar to this in the SOA Gateway Action Log:.



8. Select the Service in the Servers View. If the Properties View is not open select Window -> Show View -> Properties.

   Select the 'WSDL URL is ...' entry in the Properties View which should open a browser window.

   In the browser window change ?WSDL to ?LIST&CountryCode=BO* e.g. http://local-host:56005/city?LIST&CountryCode=BO* and hit enter.

   The results should be displayed as follows:

Data

ID	Name	CountryCode	District	Population
193	Santa Cruz de la Sierra	BOL	Santa Cruz	935361
194	La Paz	BOL	La Paz	758141
195	El Alto	BOL	La Paz	534466
196	Cochabamba	BOL	Cochabamba	482800
197	Oruro	BOL	Oruro	223553
198	Sucre	BOL	Chuquisaca	178426
199	Potosí	BOL	Potosí	140642
200	Tarija	BOL	Tarija	125255

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9. Congratulations! You have now created a stylesheet for your Service.