

Axis C++ User Guide

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2. Introduction

Welcome to Axis C++, the opensource c++ implementation of SOAP !

What is SOAP?

SOAP is an XML-based communication protocol and encoding format for inter-application communication. Originally conceived by Microsoft and Userland software, it has evolved through several generations and the current spec, SOAP 1.2 is fast growing in popularity and usage. The W3C's XML Protocol working group is in the process of turning SOAP into a true open standard, and as of this writing has released a working draft of SOAP 1.2, which cleans up some of the more confusing areas of the 1.1 spec. SOAP is widely viewed as the backbone to a new generation of cross-platform cross-language distributed computing

applications, termed Web Services. What is Axis C++? Axis C++ is essentially a SOAP engine.

This version is written in C++. Axis C++ SOAP engine adopts most of Axis Java architecture. But it has some major architectural innovations over Axis Java in order to achieve greater performance and efficiency.

3. What's in this release?

- Soap engine with both client and server support
- Support for both SOAP 1.1 and SOAP 1.2
- WSDDD based deployment with dynamic deployment tools.
- Support for all basic types, Complex types and Arrays
- WSDL2WS tool for building C/C++ components
- Server side – Skeletons and Wrappers
- Client side – Stubs
- WSDL2WS tool that generates wrappers, which perform the following functions. These wrappers act as RPC Providers.
 - Serialization
 - Deserialization
 - Method invocation
- WSDLs hosted statically in the server.
- Standalone server (with HTTP support)
- Web server modules for Apache 1.3 & Apache2 (Linux/Windows)
- Basic Wrapper Class Generator tool.
- Web interface to the deployed services and their WSDL s.
- Sample web services and client applications.
- Document style web services support

4. Axis C++ now delivers the following key features

- Speed: Axis uses SAX (event-based) parsing to achieve significantly greater speed
- Flexibility
- Stability , Component oriented Deployment
- Transport Framework
- WSDL support

AxisC++ 1.1 supports the Web Service Description Language, version 1.1, which allows you to easily build stubs to access remote services, and also to automatically export machine-readable descriptions of your deployed services from Axis. We hope you enjoy using Axis c++ 1.1. Please note that this is an open-source effort - if you feel the code could use some new features or fixes, please get involved and lend a hand! The Axis developer community welcomes your participation. Let us know what you think! Please send feedback about the package to axis-user@xml.apache.org

5. Installing Axis and Using this Guide

See the Axis Installation Guide for instructions on installing Axis C++

Before running the examples in this guide, you'll need to make sure that your environment variables and other configurations are set correctly as described in Installation guide. That is you need

- Axis C++
- Apache1.3 (or Apache2.0)
- expat
- j2SDK1.4

installed and configured.

Let's take a look at a sample Calculator service client that will call methods of a Calculator service deployed on Axis C++.

When starting with the valid WSDL file to use Axis C++ you have to get started with the tool called WSDL2Ws which is written in Java. source for WSDL2Ws tool is in

\$AXISCPP_HOME/src/wsdI

You need the following jar files included in the **CLASSPATH** .

- axis.jar
- commons-discovery.jar
- commons-logging.jar
- jaxrpc.jar
- saaj.jar
- wsdl4j.jar
- xml-apis.jar

The **CLASSPATH** Environment Variable should have the absolute paths of the jars (including the jar file name) given as a colon separated list

Here is a sample **/home/axisuser/.bash_profile** file where we specified those

```
AXIS_JARS_HOME="$AXISCPP_HOME/lib/axisjava"
```

```
AXIS_JARS="$AXIS_JARS_HOME/axis-  
ant.jar:$AXIS_JARS_HOME/axis.jar:$AXIS_JARS_HOME/commons-  
discovery.jar:$AXIS_JARS_HOME/commons-  
logging.jar:$AXIS_JARS_HOME/jaxrpc.jar:$AXIS_JARS_HOME/log4j-  
1.2.4.jar:$AXIS_JARS_HOME/saaj.jar:$AXIS_JARS_HOME/wsdl4j.jar"
```

```
JAVA_HOME="/usr/java"
```

```
PATH="$PATH:$JAVA_HOME/bin:."
```

```
CLASSPATH="$CLASSPATH:./:$JAVA_HOME/lib:$AXIS_JARS:"
```

```
export PATH USER LOGNAME MAIL HOSTNAME HISTSIZE INPUTRC  
AXIS_JARS_HOME
```

```
AXIS_JARS JAVA_HOME CLASSPATH
```

Now

```
$ cd $AXISCPP_HOME/src/wsdI/
```

```
$ mkdir temp
```

```
$javac -d ./temp -sourcepath ./org/apache/axis/wsdl/wsdl2ws/*.java
```

```
$cd temp
```

```
$jar -cvf wsdl2ws.jar org
```

```
$cp -f wsdl2ws.jar $AXISCPP_HOME/lib/axis
```

add this jar to the classpath as well.(In the binary distribution you don't need to create this jar. It is already in \$AXISCPP_HOME/lib/axis)

6. Server side Skeleton And Wrappers Generated by the wsdl2ws Tool

We use the sample at

```
$AXISCPP_HOME/samples/server/simple
```

We use this sample to demonstrate the generation of serverside skeletons and how to deploy a web service using it.

Inside this folder you will find Calculator.wsdl file using which we generate skeleton and Wrappers. Here is the command line arguments to generate the skeleton.

***important:In this sample we generate the skeletons using Calculator.wsdl and wsdl2ws tool. But in the folder you will find already generated files. If you wish to use those without generating new ones you can do so. We recommend that you deploy the sample with the already generated files in the first round and later do the same with code generated from Calculator.wsdl.**

```
cd $AXISCPP_HOME/samples/server/simple
```

```
% java org.apache.axis.wsdl.wsdl2ws.WSDL2Ws Calculator.wsdl -lc++ -sserver
```

Note: If you give **-o. /GenClassesServer** then the server create a folder named GenClassServer and put the source there. Otherwise the source is put in the current folder where the tool is run.

7. Deploying the Service

The Folder called deploy in the \$AXISCPP_HOME/ should be copied to a folder of your choice .Rename the deploy folder as "Axis" . Give all permissions to this folder.

```
$ cp -rf $AXISCPP_HOME/deploy /usr/local
```

```
$ cd /usr/local
```

```
$ mv deploy Axis
```

```
$ chmod -R 777 Axis
```

Now set the environment variable **AXIS_HOME** pointing to this directory.

```
AXIS_HOME="/usr/local/Axis"
```

Note that inside \$AXIS_HOME directory there are files called axiscpp.conf_linux and axiscpp.conf_win. Rename axiscpp.conf_linux to axiscpp.conf. Make sure that it has read permissions. This file contains key, value pairs of paths used by the Axis Soap Engine. You can change the WSDDFILEPATH and AXISLOGPATH inside this file according to your choice.

```
$ cd $AXISCPP_HOME/samples/server
```

```
$ sh build.sh
```

By typing above in the command line the dynamic library (**libcalculator.so** for example) is created and installed in

\$AXIS_HOME/webservices where **\$AXIS_HOME = /usr/local/apache/Axis**

Modify the **\$AXIS_HOME/conf/server.wsdd** . (You have a sample server.wsdd file entry given below appropriately filled for this service).

```
<?xml version="1.0" encoding="UTF-8"?>
<deployment
xmlns="http://xml.apache.org/axis/wsdd/" xmlns:C="http://xml.apache.org/axis/wsdd/providers/c">
<service>
<service name ="Calculator" provider ="CPP:RPC" description:"Simple calculator
web      service">      <parameter      name="classname"      value      =
"/usr/local/Axis/webservices/libcalculator.so" />

<parameter name= "allowedMethods" value="add sub mul div "/> </service>

</deployment>
```

Start the Apache server

```
$ /usr/local/apache/bin/apachectl start
```

Now open a browser and enter the link <http://localhost/axis> If the service is correctly deployed then it will be displayed in a table of deployed services which contain information such as service name, link to wsdl and a description of the service.

8. Client side Stubs Generated by the wsdl2ws Tool

WSDL2Ws tools will generate the stubs for the client side. You will have C++ Client class and header file.

```
$ cd $AXISCPP_HOME/samples/client/simple
```

```
$ cp -f $AXISCPP_HOME/samples/server/simple/Calculator.wsdl ./
```

***important:**In this sample we generate the stubs using Calculator.wsdl and wsdl2ws tool. But in the folder you will find already generated files. If you wish to use those without generating new ones you can do so. We recommend that you run the sample with the already generated files in the first round and later do the same with code generated from Calculator.wsdl.

```
$ java org.apache.axis.wsdl.wsdl2ws.WSDL2Ws Calculator.wsdl -lc++ -sclient
```

Note: again if you specify **-o./GenClassesClient** you will have source generated inside GenClassClient folder instead of current folder where the tool is run. Before compiling the client you have to write a class which contain a main method in which Calculator instance is created and its methods are called.

Then fill the samples with the relevant business logics .

Then fill the main method in a file as follows

```
#include "Calculator.h"
#include<stdio.h>
int main()
{
    Calculator c;
    int intOut;
    c.add(20, 40, intOut);
    printf("result is = %d\n", intOut);
    return 0;
}
```

Then build by

```
cd $AXISCPP_HOME/samples/client
```

```
sh build.sh
```

Then to run the calculator sample

```
$ cd $AXISCPP_HOME/samples/simple
```

./calculator <server> <port> <command> <param1> <param2>

Example:

./calculator localhost 80 add 10 20

9. Building Serverside of provided Samples

Basically this will include all the InteropTest Samples and calculator sample.

cd \$AXISCPP_HOME/samples/server

\$ sh autogen.sh

\$ sh runconfig

\$ make

\$ make install

OR

\$ sh build.sh

Once you type the above command all the samples will be deployed in \$AXIS_HOME/webservices folder.

you also have sample \$AXIS_HOME/conf/server.wsdd_linux file which you should rename to server.wsdd,

which contain all the necessary entries for these services.

Restart Apache

10. Building Client Side of the provided samples

cd \$AXISCPP_HOME/samples/client

\$ sh autogen.sh

\$ sh runconfig

\$ make

\$ make install

OR

\$ sh build.sh

sample executables will be created in your current folder.
to run samples one by one

\$./base localhost 80

to run all the samples at once
sh run_interoptests.sh (Note: local host and port 80 is assumed)

11. Handlers

Handlers are pluggable components to Axis C++. We have included a set of sample handlers for your reference. You could write your own handlers by following the instructions which are given for the sample Handlers.

Note: If you are using Client side Handlers you need to enter the following entry in the AXIS_HOME/axiscpp.conf configuration file.

CLIENTWSDDFILEPATH:Axis\conf\client.wsdd

After entering this entry your AXIS_HOME/axiscpp.conf configuration file will look like:

AXISLOGPATH:Axis\logs\AxisLog.txt

WSDDFILEPATH:Axis\conf\server.wsdd

CLIENTWSDDFILEPATH:Axis\conf\client.wsdd

Testing the sample Handlers

We have included the following sample Handlers for your reference.

1) echoStringHeaderHandler (A server side handler sample)

This sample handler will simply echo (i.e send back) the string which you send in the SOAP request.

2) testHandler (A client side handler sample)

This sample handler will simply add a SOAP Header to the generated SOAP request.

Please note that these are very primitive sample handlers and are presented here to give you an idea about writing your own Handlers.

echoStringHeaderHandler

Building the Sample Handlers in RedHat linux

Building echoStringHeaderHandler (A server side handler sample)

The build files are available at `AXISCPP_HOME/samples/server/echoStringHeaderHandler`. Change your current directory to this directory and then you could execute the following.

```
sh autogen.sh
sh runconfig
make
make install
```

The handler so file will be created at `$AXIS_HOME/handlers/custom/echoStringHeaderHandler`.

Configuring the Handler

Now edit the `AXIS_HOME/conf/server.wsdd` to include the handler for a particular service.

```
<service name="Calculator" provider="CPP:RPC" description="Simple Calculator Axis C++
Service ">
<requestFlow name="CalculatorHandlers">
<handler name="ESHandler"
type="AXIS_HOME/handlers/custom/echoStringHeaderHandler/libeshhandler.so">
</handler>
</requestFlow>
<responseFlow name="CalculatorHandlers">
<handler name="ESHandler"
type="AXIS_HOME/handlers/custom/echoStringHeaderHandler/libeshhandler.so">
</handler>
</responseFlow>
<parameter name="allowedMethods" value="add sub mul div "/>
<parameter name="className" value="Axis\webservices\Calculator.dll" />
</service>
```

Note: Make sure you specify the correct path of the handler so in the server.wsdd file. Replace the `AXIS_HOME` with the exact relative path which `AXIS_HOME` points to. (eg: `type="/usr/local/apache2/Axis/handlers/custom/echoStringHeaderHandler/libeshhandler.so`)

Now you are almost done to run your server side handler.

Restart the Apache server and that is it.

Running the Handler

Since this Handler is configured to the Calculator web service in the above step, this Handler will be executed when a client send a SOAP request to the Calculator web service.

testHandler

Building the Sample Handlers in RedHat linux

Building testHandler (A client side handler sample)

The build files are available at `AXISCPP_HOME/samples/client/testHandler`. Change your current directory to this directory and then you could execute the following.

```
sh autogen.sh
sh runconfig
make
make install
```

The handler so file will be created at `$AXIS_HOME/handlers/client/test_handler`.

Configuring the Handler

Now edit the `AXIS_HOME/conf/client.wsdd` to include the handler for a particular service.

```
<service name="Calculator" provider="CPP:DOCUMENT" description="Calculator web
service">

<requestFlow name="CalculatorHandlers">

<handler name="TestHandler"
type="AXIS_HOME/handlers/client/test_handler/libtest_client_handler.so">
</handler>

</requestFlow>
```

</service>

Note: Make sure you specify the correct path of the handler so in the client.wsdd file. Replace the AXIS_HOME with the exact relative path which AXIS_HOME points to. (eg: type="/usr/local/apache2/Axis/handlers/client/test_handler/libtest_client_handler.so")

Now you are almost done to run your client side handler.

Note: If you are using Client side Handlers you need to enter the CLIENTWSDDFILEPATH entry in the AXIS_HOME/axiscpp.conf configuration file. (See above)

Running the Handler

Since this Handler is configured to the Calculator web service in the above step, this Handler will be executed when you run the calculator web service client. (It is at AXISCPP_HOME/samples/client/simple/calculator)

Handler Notes:

1) You can see the Handler behavior through the TCP Monitor. (TCP Monitor is a Axis Java tool)

2) To get an idea of Handlers look at the Handler sample source files.

a. echoStringHeaderHandler
(AXISCPP_HOME/samples/server/echoStringHeaderHandler)

b. testHandler (AXISCPP_HOME/samples/client/testHandler)

12. Getting a CVS checkout

Visit <http://ws.apache.org/> click on "axis" and then on "CVS Repository" to find details on accessing the CVS Repository. It will have instructions similar to the following. "Anyone can checkout source code from our anonymous CVS server. To do so, simply use the following commands (if you are using a GUI CVS client, configure it appropriately):

```
cvs -d :pserver:anoncvs@cvs.apache.org:/home/cvspublic login
```

```
password: anoncvs
```

```
cvs -d :pserver:anoncvs@cvs.apache.org:/home/cvspublic checkout -d <your local folder> ws-axis/c"
```