


jaxws-calculator - Simple Web Service with JAX-WS

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 [Sample applications](#)

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Application Overview

The sample application referred in this article is a simple calculator which performs addition of two integers. The web service is exposed as a Servlet in the Geronimo application server.

Two clients are provided: a jsp page and a non-javase client.

Service implementation

The **Calculator** interface defines the Service Endpoint Interface (SEI) for the Web Service.

Calculator.java

```
package org.apache.geronimo.samples.jws;

import javax.jws.WebMethod;
import javax.jws.WebParam;
import javax.jws.WebResult;
import javax.jws.WebService;
import javax.xml.ws.RequestWrapper;
import javax.xml.ws.ResponseWrapper;

@WebService(name = "CalculatorPortType",
            targetNamespace = "http://jws.samples.geronimo.apache.org")
public interface Calculator {

    /**
     * @param value1
     * @param value2
     * @return returns int
     */
    @WebMethod(operationName = "add")
    @WebResult(name = "return", targetNamespace = "http://jws.samples.geronimo.apache.org")
    @RequestWrapper(localName = "add", targetNamespace = "http://jws.samples.geronimo.apache.org", className =
"org.apache.geronimo.samples.jws.Add")
    @ResponseWrapper(localName = "addResponse", targetNamespace = "http://jws.samples.geronimo.apache.org",
className = "org.apache.geronimo.samples.jws.AddResponse")
    public int add(@WebParam(name = "value1", targetNamespace = "http://jws.samples.geronimo.apache.org")int
value1,
                  @WebParam(name = "value2", targetNamespace = "http://jws.samples.geronimo.apache.org")int
value2);
}
```

The **CalculatorService** class implements the Web Service business logic. It implements all the methods defined in the SEI. The class does not need to implement the **Calculator** interface but must reference it through the `@WebService.endpointInterface` annotation. This class will be exposed as a Servlet through **web.xml** file even though it does not extend the **javax.servlet.Servlet** class.

The **context** variable marked with the `@Resource` annotation will be injected at runtime. The **WebServiceContext** can be used to obtain the message context and security information relative to the call.

CalculatorService.java

```
package org.apache.geronimo.samples.jws;

import javax.annotation.Resource;
import javax.jws.WebService;
import javax.xml.ws.WebServiceContext;

@WebService(serviceName = "Calculator",
    portName = "CalculatorPort",
    endpointInterface = "org.apache.geronimo.samples.jws.Calculator",
    targetNamespace = "http://jws.samples.geronimo.apache.org",
    wsdlLocation = "WEB-INF/wsdl/CalculatorService.wsdl")
public class CalculatorService implements Calculator {

    @Resource
    private WebServiceContext context;

    /**
     * @return returns javax.xml.ws.WebServiceContext
     */
    public WebServiceContext getContext() {
        return context;
    }

    /**
     * @param value1
     * @param value2
     * @return returns int
     */
    public int add(int value1, int value2) {
        System.out.println("User Principal: " + context.getUserPrincipal());
        System.out.println("value1: " + value1 + " value2: " + value2);
        return value1 + value2;
    }
}
```

The **web.xml** descriptor is used to deploy the Web Service.

web.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns="http://java.sun.com/xml/ns/javaee" version="2.5">
    <servlet>
        <display-name>CalculatorService</display-name>
        <servlet-name>CalculatorService</servlet-name>
        <servlet-class>
            org.apache.geronimo.samples.jws.CalculatorService
        </servlet-class>
    </servlet>

    <servlet-mapping>
        <servlet-name>CalculatorService</servlet-name>
        <url-pattern>/calculator</url-pattern>
    </servlet-mapping>

    .....

    <service-ref>
        <service-ref-name>services/Calculator</service-ref-name>
        <service-interface>javax.xml.ws.Service</service-interface>
        <wsdl-file>WEB-INF/wsdl/CalculatorService.wsdl</wsdl-file>
    </service-ref>
</web-app>
```



web.xml

The **web.xml** descriptor is not necessary for simple JAX-WS web service deployments. If the **web.xml** descriptor is not provided, it will be automatically generated during deployment. In this sample, while not required to implement the web service, it is required to provide the service-ref used by the jsp client.

The geronimo plan has no information for the web service but does specify more information for the service-ref for the jsp client. For tomcat, the plan can be located after building the project in `jaxws-calculator/jaxws-calculator-tomcat/target/resources/META-INF/plan.xml`. For Jetty, the plan can be located after building the project in `jaxws-calculator/jaxws-calculator-jetty/target/resources/META-INF/plan.xml`.

geronimo-web.xml for tomcat

```
<web-app xmlns="http://geronimo.apache.org/xml/ns/j2ee/web-1.1">
  <dep:environment xmlns:dep="http://geronimo.apache.org/xml/ns/deployment-1.2">
    <dep:moduleId>
      <dep:groupId>org.apache.geronimo.samples</dep:groupId>
      <dep:artifactId>jaxws-calculator-tomcat</dep:artifactId>
      <dep:version>2.1.2-SNAPSHOT</dep:version>
      <dep:type>car</dep:type>
    </dep:moduleId>
    <dep:dependencies>
      <dep:dependency>
        <dep:groupId>org.apache.geronimo.configs</dep:groupId>
        <dep:artifactId>jasper</dep:artifactId>
        <dep:version>2.1.2-SNAPSHOT</dep:version>
        <dep:type>car</dep:type>
      </dep:dependency>
      <dep:dependency>
        <dep:groupId>org.apache.geronimo.configs</dep:groupId>
        <dep:artifactId>tomcat6</dep:artifactId>
        <dep:version>2.1.2-SNAPSHOT</dep:version>
        <dep:type>car</dep:type>
      </dep:dependency>
      <dep:dependency>
        <dep:groupId>org.apache.geronimo.configs</dep:groupId>
        <dep:artifactId>axis2</dep:artifactId>
        <dep:version>2.1.2-SNAPSHOT</dep:version>
        <dep:type>car</dep:type>
      </dep:dependency>
    </dep:dependencies>
    <dep:hidden-classes/>
    <dep:non-overridable-classes/>
  </dep:environment>
  <context-root>/jaxws-calculator</context-root>
  <service-ref>
    <service-ref-name>services/Calculator</service-ref-name>
    <port>
      <port-name>CalculatorPort</port-name>
      <protocol>http</protocol>
      <host>localhost</host>
      <port>8080</port>
      <uri>/jaxws-calculator/calculator</uri>
    </port>
  </service-ref>
</web-app>
```



Optional geronimo-web.xml

You could also deploy the `jaxws-calculator-war/target/jaxws-calculator-war-version.war` file without a plan, use the steps below:

Update the "soap:address location" value in the `CalculatorService.wsdl` to reflect the correct version of the `jaxws-calculator-war` module, for example

```
<soap:address location="http://localhost:8080/jaxws-calculator-war-version/calculator"/>
```

Rebuild the sample and deploy the war.

The following WSDL file describes the Web Service:

CalculatorService.wsdl

```
<?xml version="1.0" encoding="UTF-8"?>
<wsdl:definitions name="Calculator"
  xmlns="http://schemas.xmlsoap.org/wsdl/"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
  xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://jws.samples.geronimo.apache.org"
  xmlns:tns="http://jws.samples.geronimo.apache.org">

  <wsdl:types>
    <xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
      xmlns="http://jws.samples.geronimo.apache.org"
      targetNamespace="http://jws.samples.geronimo.apache.org"
      attributeFormDefault="unqualified" elementFormDefault="qualified">

      <xsd:element name="add">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="value1" type="xsd:int"/>
            <xsd:element name="value2" type="xsd:int"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>

      <xsd:element name="addResponse">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="return" type="xsd:int"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:schema>
  </wsdl:types>

  <wsdl:message name="add">
    <wsdl:part name="add" element="tns:add"/>
  </wsdl:message>

  <wsdl:message name="addResponse">
    <wsdl:part name="addResponse" element="tns:addResponse"/>
  </wsdl:message>

  <wsdl:portType name="CalculatorPortType">
    <wsdl:operation name="add">
      <wsdl:input name="add" message="tns:add"/>
      <wsdl:output name="addResponse" message="tns:addResponse"/>
    </wsdl:operation>
  </wsdl:portType>

  <wsdl:binding name="CalculatorSoapBinding" type="tns:CalculatorPortType">
    <soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
```

```

    <wsdl:operation name="add">
      <soap:operation soapAction="add" style="document" />
      <wsdl:input name="add">
        <soap:body use="literal" />
      </wsdl:input>
      <wsdl:output name="addResponse">
        <soap:body use="literal" />
      </wsdl:output>
    </wsdl:operation>

  </wsdl:binding>

  <wsdl:service name="Calculator">
    <wsdl:port name="CalculatorPort" binding="tns:CalculatorSoapBinding">
      <soap:address location="http://localhost:8080/jaxws-calculator/calculator" />
    </wsdl:port>
  </wsdl:service>

</wsdl:definitions>

```



CalculatorService.wsdl

In J2EE version 1.4, **wsdl** file was required to describe the Web Service. In Java EE 5 **wsdl** file is optional. It can be generated at deployment time by the Geronimo server if **CalculatorService.wsdl** is not provided with the sample.



webservices.xml

In J2EE version 1.4, the **webservices.xml** file was also necessary to describe the Web Service. In Java EE 5 that file is optional and is not required in this example.

JSP-based JAX-WS client

The **add.jsp** is a basic client for the **CalculatorService** Web Service.

add.jsp

```
<%@ page language="java" contentType="text/html; charset=ISO-8859-1" pageEncoding="ISO-8859-1"%>
<%@ page import="javax.naming.InitialContext" %>
<%@ page import="javax.xml.ws.Service" %>
<%@ page import="org.apache.geronimo.samples.jws.Calculator" %>
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en">
<head>
  <title>Apache Geronimo Sample Application - JAX-WS Calculator</title>
  <meta content="text/html; CHARSET=iso-8859-1" http-equiv="Content-Type">
</head>

<BODY>
  <font face="Verdana, Helvetica, Arial">

    <h3>This is a JAX-WS web service sample application. Please type the value 1 and value 2 below to see the
add result.</h3>
    <form action="add.jsp">
      Value 1: <input type="text" name="value1"> Value 2: <input type="text" name="value2"> <input type="
submit" value="Add">
    </form>
    <br>
<%
  String value1 = request.getParameter( "value1" );
  String value2 = request.getParameter( "value2" );

  if (value1 != null && value1.trim().length() > 0 &&
      value2 != null && value2.trim().length() > 0) {

    out.println("<h4>");

    try {
      int v1 = Integer.parseInt(value1);
      int v2 = Integer.parseInt(value2);

      InitialContext ctx = new InitialContext();
      Service service = (Service)ctx.lookup("java:comp/env/services/Calculator");
      Calculator calc = service.getPort(Calculator.class);
      int sum = calc.add(v1, v2);
      out.println("Result: " + v1 + " + " + v2 + " = " + sum);
    } catch ( Exception e ) {
      out.println("Error: " + e.getMessage());
    }

    out.println("</h4>");
  }
%>

  </FONT>
</body>
</html>
```

The **add.jsp** looks up a Web Service reference in the JNDI tree. The Web Service reference must first be added the web.xml file.

web.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns="http://java.sun.com/xml/ns/javaee" version="2.5">
    ....

    <service-ref>
        <service-ref-name>services/Calculator</service-ref-name>
        <service-interface>javax.xml.ws.Service</service-interface>
        <wsdl-file>WEB-INF/wsdl/CalculatorService.wsdl</wsdl-file>
    </service-ref>

    ....
</web-app>
```



Resource injection in JSP

Since the resource injection is not supported in JSPs the service-ref must be added explicitly to the **web.xml** file.

Testing of the Sample

To test this sample service using the **add.jsp** (<http://localhost:8080/jaxws-calculator/>) to invoke the Web Service. Once the JSP page loads type in two values to add and press the **Add** button. The result of the addition should show up below. For example:

This is a JAX-WS web service sample application. Please type the value 1 and value 2 below to see the add result.

Value 1: Value 2:

Result: 5 + 10 = 15



Command line client **CalculatorClient.java** is not currently working yet.