Developing a JAX-WS EJB Stateless Session Bean Web Service

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This tutorial will take you through the steps required in developing, deploying and testing a EJB Stateless Session Bean Web Service in Apache Geronimo. After completing this tutorial you should be able to understand how to develop simple JAX-WS compliant EJB web services in Apache Geronimo using Eclipse development environment.

It is highly recommended that you go through the Developing a JAX-WS POJO Web Service tutorial before jumping into this. We will be using the same sample from the tutorial to develop a EJB Web Service.

Client Development

Client development is excluded from this tutorial because there is no difference in creating a client for EJB Stateless Session Bean Web Service and a POJO Web Service.

You can refer to Developing a JAX-WS POJO Web Service tutorial for further knowledge about how to develop a client for Web Services.

To run this tutorial, as a minimum you will be required to have installed the following prerequisite software.

- 1. Sun JDK 6.0+ (J2SE 1.6)
- 2. Eclipse IDE for Java EE Developers, which is platform specific
- 3. Apache Geronimo Eclipse Plugin 2.1.x
- 4. Apache Geronimo Server 2.1.x

Geronimo version 2.1.x, Java 1.5 runtime, and Eclipse Ganymede are used is used in this tutorial but other versions can be used instead (e.g., Geronimo version 2.2, Java 1.6, Eclipse Europa)

Details on installing eclipse are provided in the Development environment section. This tutorial will take you through the following steps:

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Setting Up Eclipse for Application Development

- 1. Create a Stateless Session EJB Project
 - Select File --> New --> Project

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File Eo	lit Navigate	Search	Project	Run	Window	Help			
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1 Co	nverterClient	.java [jax	ws-conve	ert]					
2 re	sult.jsp [jaxw	s-convert	ter/WebCo	ontenț]				
3 Co	nverter.java	[jaxws-co	onverter/]					
4 in	lex.jsp [jaxw	s-convert	er/WebCo	ontent]					

• In the popup window, select EJB --> EJB Project and then click Next

🖨 New Project	×
Select a wizard	
<u>W</u> izards:	
type filter text	
General General CVS CVS Eclipse Modeling Framework General Definition Definit Definition Definition	
IPA Image: Plug-in Development Image: Plug-in Developme	~
(2) < Back Next > Finish Cancel	

• Type jaxws-converterejb as the Project Name and click Next..

🗣 New EJB Project
EJB Project Create an EJB Project and add it to a new or existing Enterprise Application.
Project name: jaxws-converterejb Project contents: ✓ ✓ Use default Directory: C:\workspaces\webservices\jaxws-converterejb Target Runtime Apache Geronimo v2.1
Configurations Default Configuration for Apache Geronimo v2.1
A good starting point for working with Apache Geronimo v2. 1 runtime. Additional facets can later be installed to add EAR Membership Add project to an EAR EAR Project Name: EAR New
? < Back

• The default option should work for Geronimo, so click Next

🖨 New EJB Project			
Project Facets Select the facets that sh	ould be enabled for this project.		V
Configurations: Default	Configuration for Apache Geronimo v	/2.1	ave <u>D</u> elete
Project Facet EIB Module EIB Collect (X) Geronimo De I ava I ava	Version 3.0 Doclet) 1.2.3 ployment 1.2 5.0 ence 1.0	•	< Show <u>R</u> untimes
0		< <u>B</u> ack <u>N</u> ext > <u>Finish</u>	Cancel

• Here also default options will work, but the service and wsdl file will be located at the URL specified by the annotations

EJB Project	
EJB Module Configure ejb module settings.	
Source Folder:	
ejbModule	
Create an EJB Client JAR module to hold the dient interfaces and dasses. Name: Jaxws-converterejbClient	
Client JAR URI:	
Generate Deployment Descriptor	
⑦	Cancel

Changing Service Location If you want to change the service location to any custom URL you want, make sure that the check box **Generate Deployment Descriptor** is selected.

• Modify the Group Id to org.apache.geronimo.samples.jaxws and the artifact id to jaxws-converterejb.

🖨 New EJB F	Project
Geronimo De Configure the	geronimo deployment plan.
Group Id:	org.apache.geronimo.samples.jaxws
Artifact Id:	jaxws-converterejb
Version:	1.0
Artifact Type:	car
Add a runun	ne dependency to Geronimo's shared library
?	< <u>B</u> ack <u>N</u> ext > <u>Finish</u> Cancel

Click Finish

This completes the configuration of Eclipse for application development.

Creating the Web Services Implementation code

To deploy the Converter EJB Service, we are going to create a remote interface and a stateless session bean that implements the interface. The steps required are as follows:

1. Right-click on ejbModule and select New --> Package

jaxws-calcula	atorclient		
🧰 jaxws-calcul	New		Project
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jaxws-conve	Copy	Ctrl+C	💕 Enum 🗊 Interface
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	. № Remove from Context Build Path	Ctrl+Alt+Shift+Down	Example
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jaxws-conve	≧ Import ≧ Export		
i jaxws-war-b	Refresh	F5	1 Server at localhost
<	Run As Debug As Profile As Validate		
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 $\label{eq:constraint} \textbf{2. Name the package to } \textbf{org.apache.geronimo.samples.jaxws} \text{ and click } \textbf{Finish}$

🖨 New Java	Package	
Java Packag Create a Java	ge package.	Ť
Creates folder: Source fol <u>d</u> er: Na <u>m</u> e:	s corresponding to packages. jaxws-converterejb/ejbModule org.apache.geronimo.samples.jaxws	Br <u>o</u> wse
0	Einish	Cancel

3. Right-click on the new package and select New --> Interface

jaxws-calcu	llator		
jaxws-calcu	New		Project
jaxws-conv	Open Type Hierarchy	F4	
jaxws-conv	Show In	Alt+Shift+W	Class
jaxws-conv	Сору	Ctrl+C	🚱 Enum
ejbMoc	Copy Qualified Name	Ctrlay	Interface Package
	🔛 Paste	Delete	Example.
🗈 🛁 JRE Sy	. Remove from Context	Ctrl+Alt+Shift+Down	E Other
	Build Path Source	Alt+Shift+S	• Other
i → build	Refactor	Alt+Shift+T	🕨 🕅 Servers 🛛 🙀
jaxws-conv	import		
jaxws-conv jaxws-war	🛃 Export		
	🔊 Refresh	F5	z, i Server at localhost
	Run As Debug As		
	Profile As		▶
	Validate		

4. Name the interface as Converter and use the org.apache.geronimo.samples.jaxws package, then click Finish

🖶 New Java Inter	face				
Java Interface Create a new Java in	terface.				
Source fol <u>d</u> er: Pac <u>k</u> age:	jaxws-conv	erterejb/ejbMo .geronimo.sam;	dule bles.jaxws		Browse Browse
Enclosing type:					Bro <u>w</u> se
Na <u>m</u> e: Modifiers:	Converter	Odefault	Oprivate		
Extended interfaces:			- bullane	- projected	<u>A</u> dd
Do you want to add c	omments as c <u>G</u> enerate	configured in the comments	e <u>properties</u> of	the current proje	ct?
0				Einish	Cancel

- 5. Add the following code to the **Converter** class: solidConverter.java package org.apache.geronimo.samples.jaxws; import java.math.BigDecimal; import javax.ejb.Remote; import javax.jws.WebService; @Remote @WebService(name = "ConverterPortType", targetNamespace = "http://jaxws. samples.geronimo.apache.org") public interface Converter { public BigDecimal dollarToRupees(BigDecimal dollars); public BigDecimal rupeesToEuro(BigDecimal rupees); }
- 6. Right-click on the new package and select New --> Class



7. Name the class as ConverterBean and use the org.apache.geronimo.samples.jaxws package, then click Finish

🖨 New Java Clas	35	
Java Class Create a new Java	class.	0
Source fol <u>d</u> er: Pac <u>k</u> age: Enclosing t <u>y</u> pe:	jaxws-converterejb/ejbModule org.apache.geronimo.samples.jaxws	Browse Browse Browse
Na <u>m</u> e: Modifiers: Superclass: Interfaces:	ConverterBean • gublic • default • private • protected • abstract • final • static • java.lang.Object • • •	Brows <u>e</u>
Which method stubs Do you want to add	would you like to create? public static void main(String] args) Constructors from superclass Inherited abstract methods comments as configured in the properties of the current proj Generate comments	ject?
0	Einish	Cancel

8. Add the following code to the ConverterBean class: solidConverterBean.java package org.apache.geronimo.samples.jaxws; import java.math. BigDecimal; import javax.ejb.*; import javax.jws.WebService; @Stateless @WebService(serviceName = "Converter", portName = "ConverterPort", endpointInterface = "org.apache.geronimo.samples.jaxws.Converter", targetNamespace = "http://jaxws.samples.geronimo. apache.org") public class ConverterBean implements Converter { private BigDecimal rupeeRate = new BigDecimal("40.58"); private BigDecimal euroRate = new BigDecimal("0.018368"); public BigDecimal dollarToRupees(BigDecimal dollars) { BigDecimal result = dollars.multiply (rupeeRate); return result.setScale(2, BigDecimal.ROUND_UP); } public BigDecimal rupeesToEuro(BigDecimal rupees) { BigDecimal result = rupees.multiply(euroRate); return result.setScale(2, BigDecimal.ROUND_UP); }

A little observation

If you have already gone through the Developing a JAX-WS POJO Web Service tutorial, you might have observed that there's not much difference between an EJB Web Service and POJO Web Service except for the EJB specific annotations.

This completes the development of the Web Service Implementation code.

Setting Up the Deployment Descriptor and Deployment Plan

Geronimo default location

If you are comfortable with the location that Geronimo deploys the EJB Web Service, you can skip this section and go to the Deploy and Test Section below.

Expand the META-INF directory present under ejbModule and add the following code to ejb-jar.xml ejb-jar.xml lf ejb-jar.xml is not present, create a XML file and name it as ejb-jar.xml solidejb-jar.xml <?xml version="1.0" encoding="UTF-8"?> <ejb-jar.xml solidejb-jar.xml <?xml version="1.0" encoding="UTF-8"?> <ejb-jar version="3.0" xmlns="http://java.sun.com/xml/ns/javaee" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://java.sun.com/xml/ns/javaee http://java.sun.com/xml/ns/javaee/ejb-jar_3_0.xsd">

 </

endpoint>org.apache.geronimo.samples.jaxws.Converter</service-endpoint> <ejb-class>org.apache.geronimo.samples.jaxws.ConverterBean</ejb-class> <session-type>Stateless</session-type> <transaction-type>Container</transaction-type> </session> </ejb-class> </session> </ejb-class> </session> </setsion> </setsion

2. Also add the following code to the **openejb-jar.xml** present at the same location. solidopenejb-jar.xml <?xml version="1.0" encoding="UTF-8" standalone="yes"?> <ns4:openejb-jar xmlns="http://geronimo.apache.org/xml/ns/j2ee/connector-1.2" xmlns:ns2="http://geronimo.apache.org/xml/ns/j2ee/connector-1.2" xmlns:ns2="http://geronimo.apache.org/xml/ns/j2ee/application-2.0" xmlns:ns5="http://geronimo.apache.org/xml/ns/naming-1.2" xmlns:ns4="http://gee/application-2.0" xmlns:ns7=" http://geronimo.apache.org/xml/ns/j2ee/application-2.0" xmlns:ns9="http://gava.sun.com /xml/ns/j2ee/application-client-2.0" xmlns:ns9="http://gavas.sun.com /xml/ns/j2ee/application-client-2.0" xmlns:ns9

This completes the setting up of Deployment descriptor and Deployment Plan.

Deploy and Test the Web Service

Now, we will look into the steps involved in deploying and testing our web service without any clients.

Deploy

1. Right-click on the Apache Geronimo Server Runtime present in the servers view and select Add or Remove Projects



2. In the popup dialog, select the jaxws-converterejb project and click Add

Add and Remove Projects			
Add and Remove Projects Modify the projects that are configu	red on the server		
Move projects to the right to configu	re them on the server		
<u>A</u> vailable projects:		Configured projects:	
jaxws-converterejb	Add > < Remove		
0	< <u>B</u> ack <u>N</u> ext >	Einish	Cancel

3. Make sure that jaxws-converterejb is in the configured projects list and then click Finish

Add and Remove Projects									
Add and Remove Projects Modify the projects that are configured on the server									
Move projects to the right to configure them on the server									
<u>A</u> vailable projects:	Configured projects:								
Add > < Remove Add All >> << Remove All	🦗 jaxws-converterejb								
O	<u>Einish</u> Cancel								

4. Wait for some time till the server status is changed to synchronized. Errors at Deploy time If you see any errors at deploy time like **Unable to read WSDL file null**, simply ignore them.

	<pre>oublic BigDecimal rupeesToEuro(BigDecimal rupees) BigDecimal result = rupees.multiply(euroRate); return result.setScale(2, BigDecimal.ROUND_UP)</pre>	;		~			
<			>		<		>
Problem	s 🖉 Tasks 👭 Servers 🙀 Data Source Explorer 🔂 Snippets 🖉 Progress	8	TCP/IP Monito	r 📮	Console 8	3	- 8
Apache Geron	imo v2.1 Server at localhost [Apache Geronimo] C:\jdk1.5.0_11\bin\javaw.exe (Ju	"	🗙 🔆 🛛		FF	2 E] - 📬 -
11:20:22,	,890 ERROR [startup] Unable to read wsdl file null						^
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Testing

1. Once the application is deployed on to the server, Launch a browser and go to the following url:

http://localhost:8080/Converter/ConverterPortType

Custom location

If you have followed the steps to deploy the service onto custom location, go to the url http://localhost:8080/CUSTOM_URL

2. Now you should see the screen telling that service is located at the following URL:



Using Web Service Explorer in Eclipse You can also use Web Services Explorer present in Eclipse to rapidly test your web service without developing a client. To know how to use Web Services Explorer in Eclipse, one can refer to the Developing a JAX-WS POJO Web Service#Using Web Services Explorer in Eclipse