ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ

# Εισαγωγή στα Δίκτυα Υπηρεσιών

## Assisting Lecture 9 - Top Down SOAP Web Services

Μύρων Παπαδάκης
Τμήμα Επιστήμης Υπολογιστών

# Introduction to Service Networks
# CS-592 – Spring 2015

Assisting Lecture: Top- Down WS with Apache Tomcat, Axis2, Eclipse

Myron Papadakis (myrpap@gmail.com)

# Outline

- Axis2, Tomcat, Eclipse
- Top-Down Web Services
  - Area rectangle calculator
  - Area rectangle calculator client
- Bottom-up Web Services
- SoapUI


# Axis2

- Axis2 is a **SOAP processing engine** with the main function of delivering incoming SOAP messages into correct applications (every application is assumed to be a Web Service)
- Generate code from both service clients (=stubs) and service providers (=skeletons)
  - **WSDL2Java** tool: code generation from WSDL
  - **Java2WSDL**: generate WSDL from code
- *Data binding* is the term used for techniques that handle the conversion between XML and application data structures
- Axis2 provides a variety of data binding frameworks
  - ADB (Axis2 Data Binding): Limitations only for Axis2 Web services
  - XMLBeans
  - JiBX
  - None (AXIOM)
    - AXIOM is Axis2 document model used for XML Message handling
- More information at: http://www.ibm.com/developerworks/webservices/library/ws-java3/

# Axis2 Data Binding

- The primary objective of any data binding framework is to map the XML schema constructs to programming language objects,
  - provide the marshaling (i.e., produce an equivalent XML document from a programing language object structure) and
  - unmarshaling (i.e, produce an equivalent programing language object structure from an XML document) capabilities.

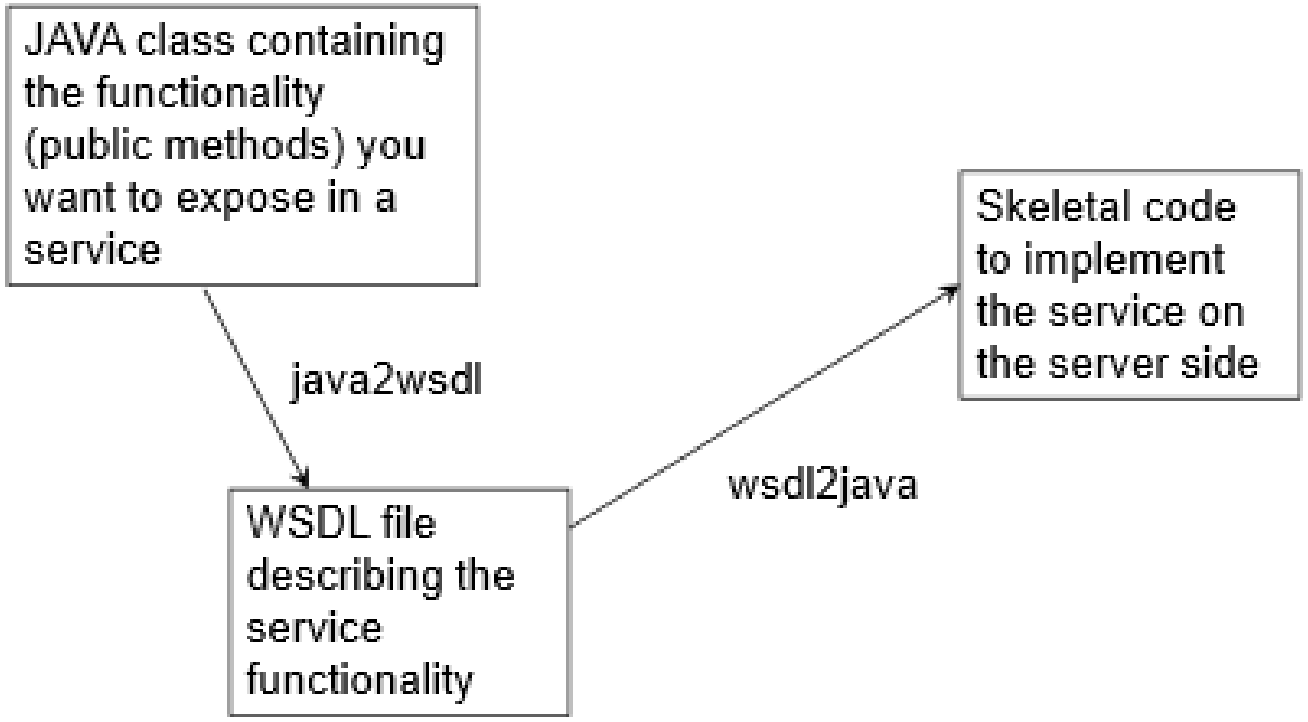
- In fact, ADB is designed to support any programming language with some customized templates and also those who write the programing language.

- Currently it has a full implementation only for the Java programing language, and a relatively less implementation for the C programing language.

# Apache Axis2

- Set of tools to simplify Web Services
  - Services
    - Create a Web Service from any Java class
    - Create Web Service skeletons from WSDL files
    - Build war file for deployment on any Java-based browser
  - Clients
    - Create client stubs from WSDL files
- Usage
  - Eclipse plugins
    - Integrated into Java EE Version of Eclipse
    - Download free from http://www.eclipse.org/downloads/
    - Choose “Eclipse IDE for Java EE Developers”
  - Command-line tools
    - Windows and Unix

# Axis2 > Creating Services

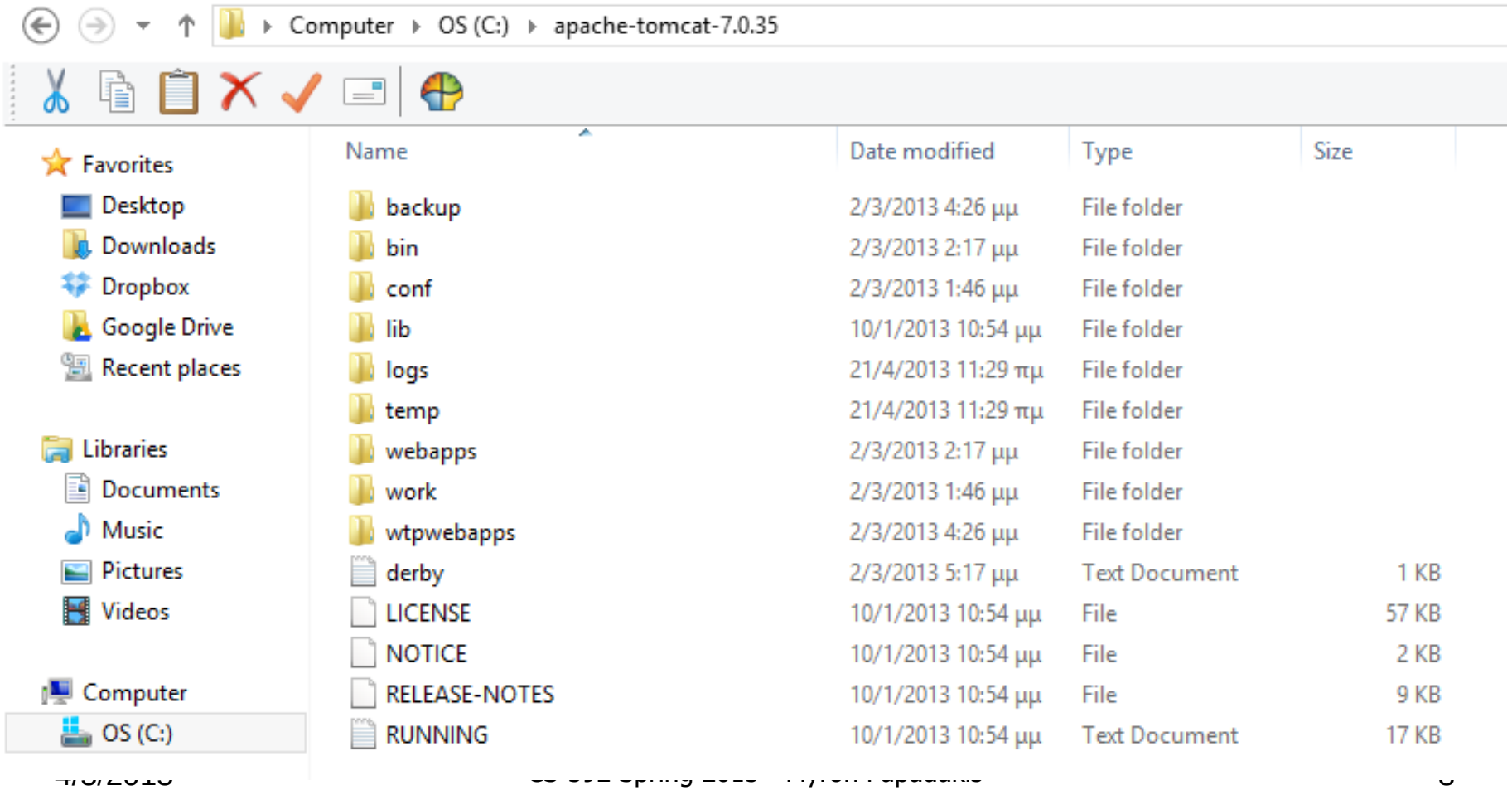


# Apache Tomcat

- Download Apache Tomcat 7
- http://tomcat.apache.org/download-70.cgi
- Building Apache Tomcat requires a JDK to be installed.
- You can download one from http://www.oracle.com/technetwork/java/javase/downloads/index.html or from another JDK vendor.
- Set an environment variable JAVA_HOME to the pathname of the directory into which you installed the JDK release

# Apache Tomcat

- Extract the zip file for example to local disk C:

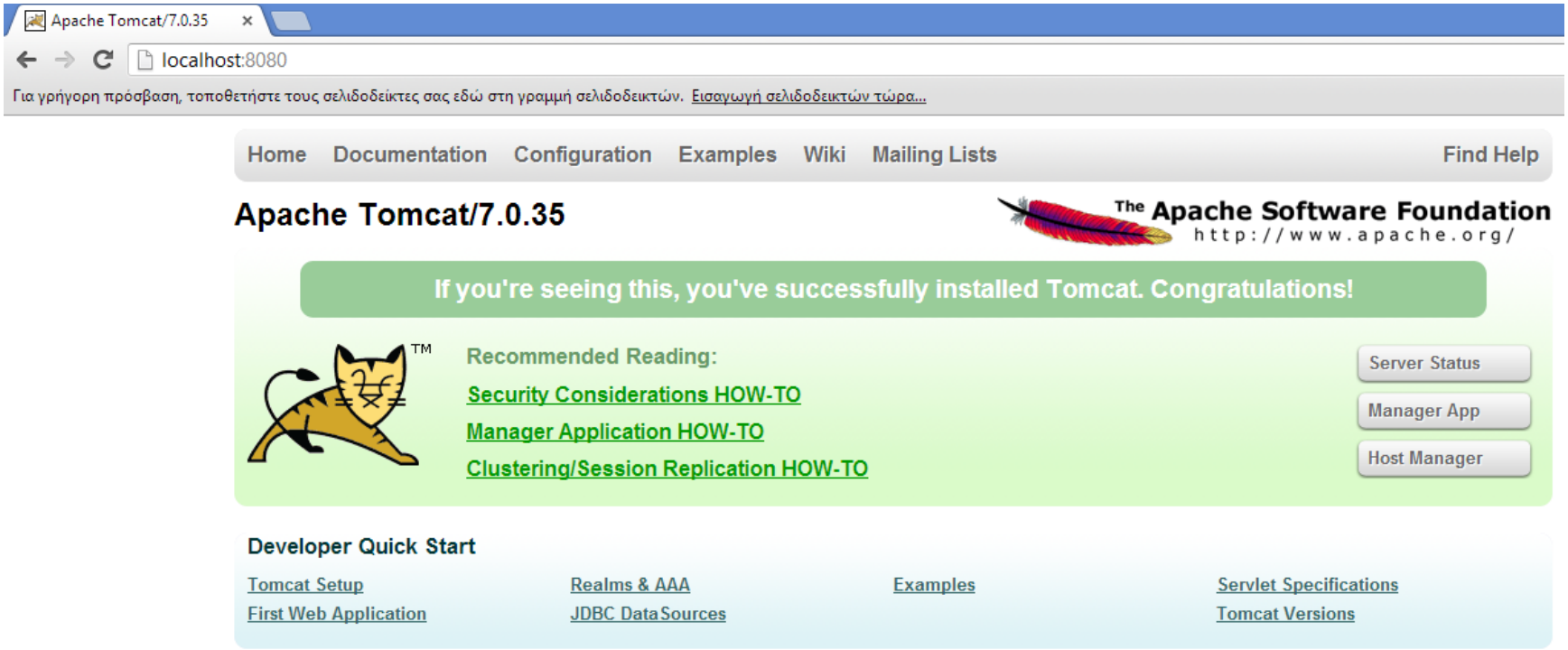


# Apache Tomcat

- Environment Variable: **CATALINA_HOME** to the path of apache tomcat
- Scripts: **startup**, shutdown inside %CATALINA_HOME%/bin
- Test Tomcat: http://localhost:8080/
- **Tomcat instances**
  - if Tomcat has been configured for multiple instances, each instance will have its own CATALINA_BASE configured.

# Test Apache Tomcat

*Tomcat Running on port 8080*



# Multiple Tomcat Instances

- Copy files from the initial tomcat folder to another folder (i.e to C:\tomcat_instance2)
  - Change the following ports of the new instance (conf/server.xml)
  - Shutdown port
  - Connector port
  - Ajp port
  - Redirect port

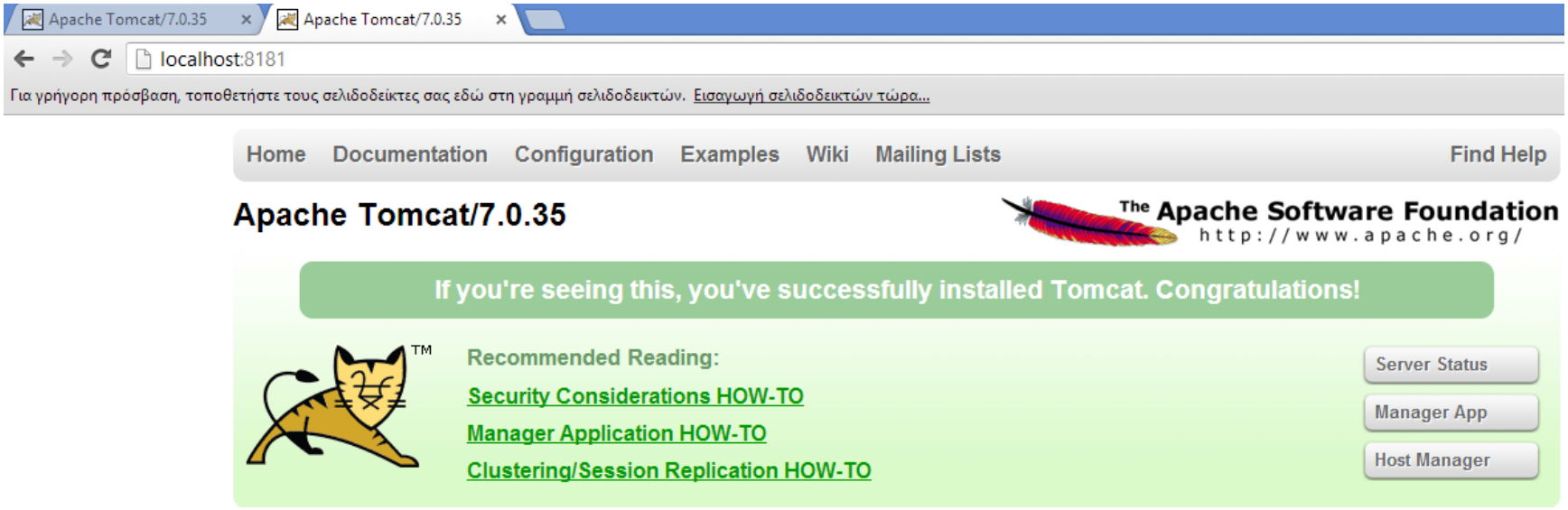
```
21    -->
22    <Server port="8105" shutdown="SHUTDOWN">
```

```
70    <Connector port="8181" protocol="HTTP/1.1"
71               connectionTimeout="20000"
72               redirectPort="81443" />
```

```
89
90        <!-- Define an AJP 1.3 Connector on port 8009 -->
91        <Connector port="8109" protocol="AJP/1.3" redirectPort="81443" />
92
```

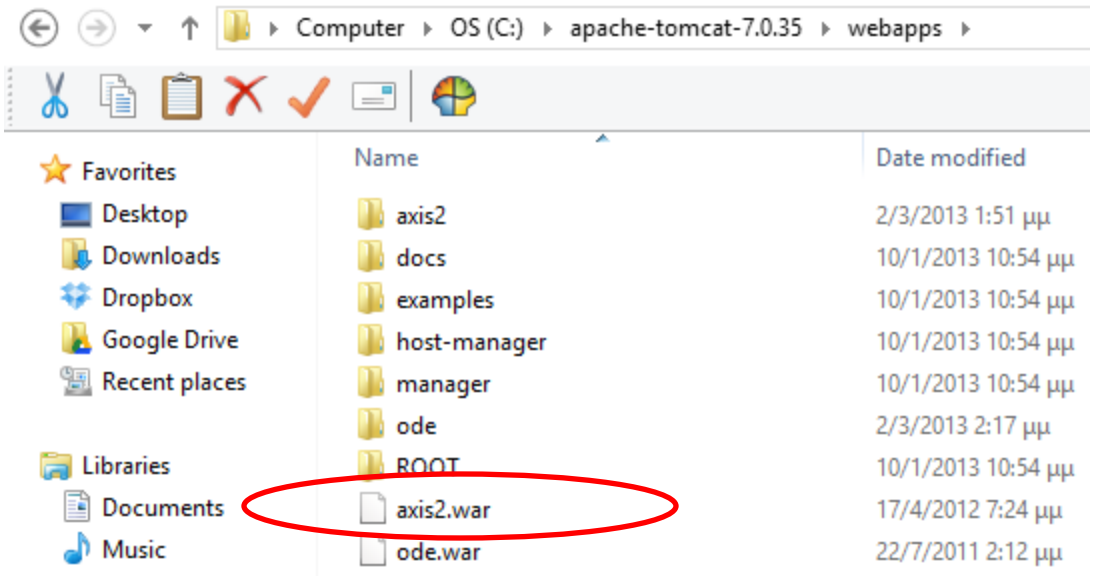
# Testing Additional Tomcat Instances

*2nd Tomcat Instance running on port 8181 (the 1st runs already on port 8080)*



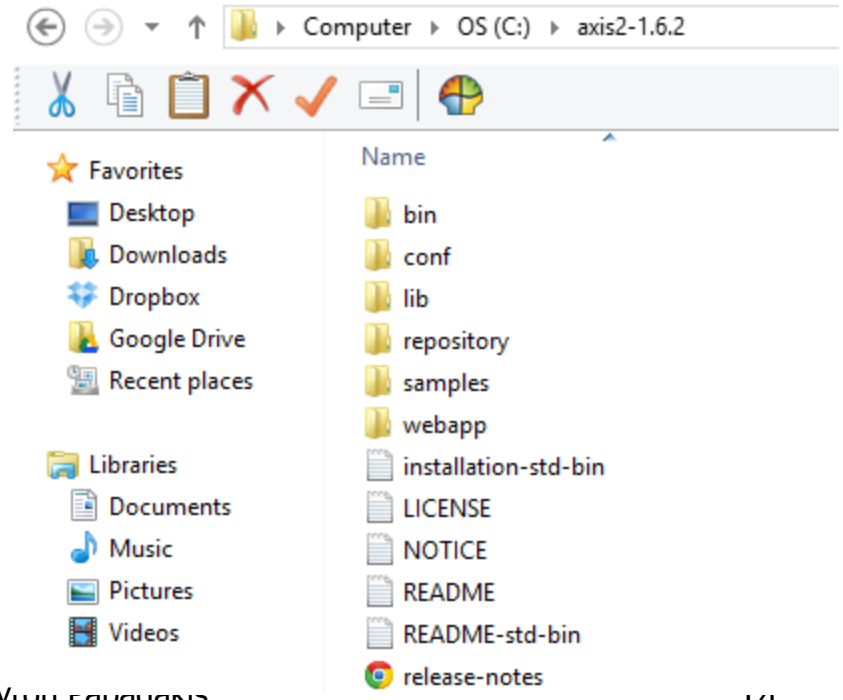
# Axis2 Installation

- http://axis.apache.org/axis2/java/core/download.cgi
- Get the **WAR** distribution for deployment on Tomcat
- Place it into the "*webapps*" folder of tomcat



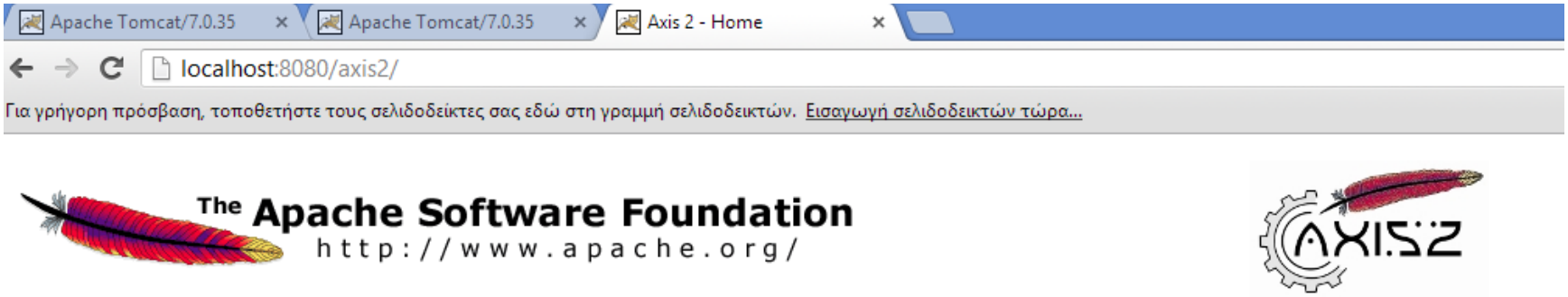
# Axis2 Installation

- Get also the **standard distribution** for service and client programming
- **Choose "zip" under *Binary* Distribution**
- Unzip to folder of your choice, ie "C:\"
- Test Axis2 deployment
- http://localhost:8080/axis2/



# Testing Axis2 Deployment

http://localhost:8080/axis2/

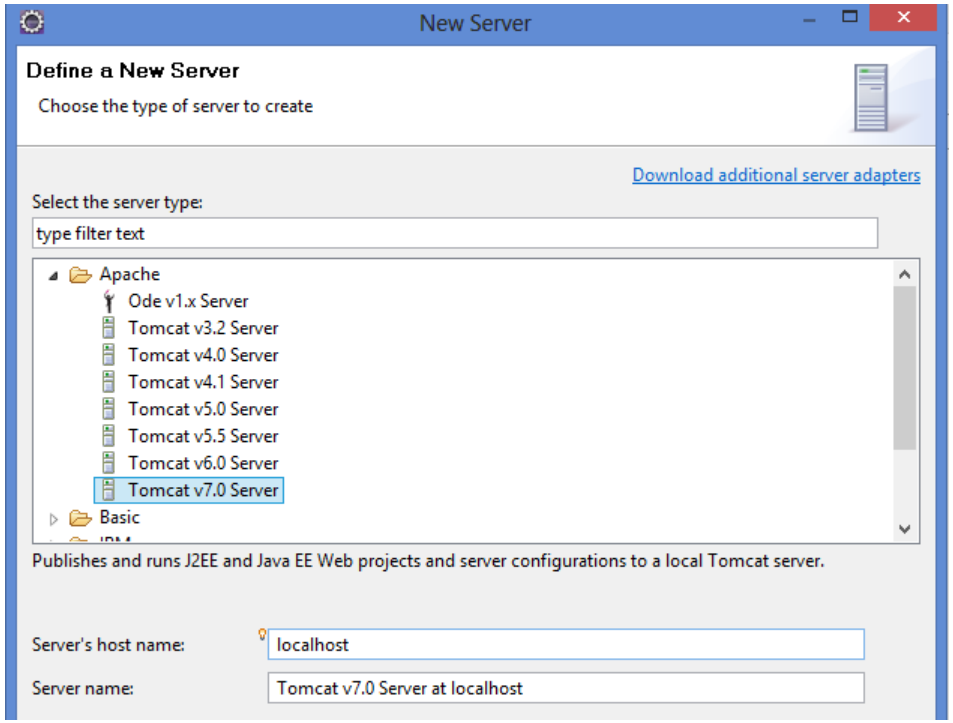


# Eclipse Axis2 Lab Example



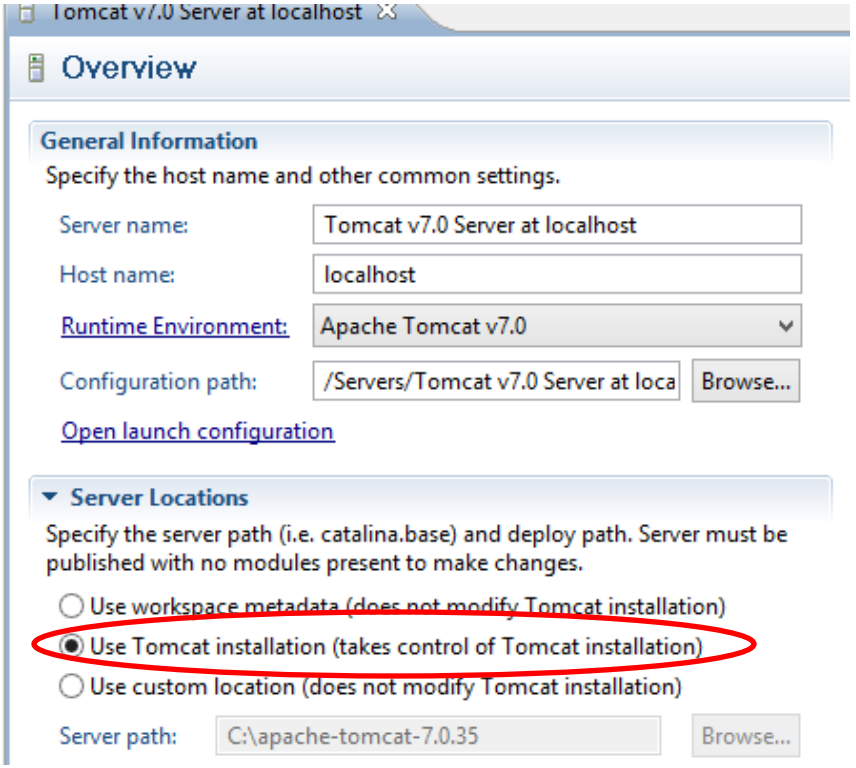
# Eclipse > Add Server

- Download Eclipse for Java EE developers (i.e Helios, Indigo, Juno)
  - Helios is the preferred one
- Window → Show view → Servers → Add server
- Select "***Server Type***" and then under "***Apache***", "***Tomcat VX.0 Server***" .
- Then, define "Tomcat installation Directory", JRE



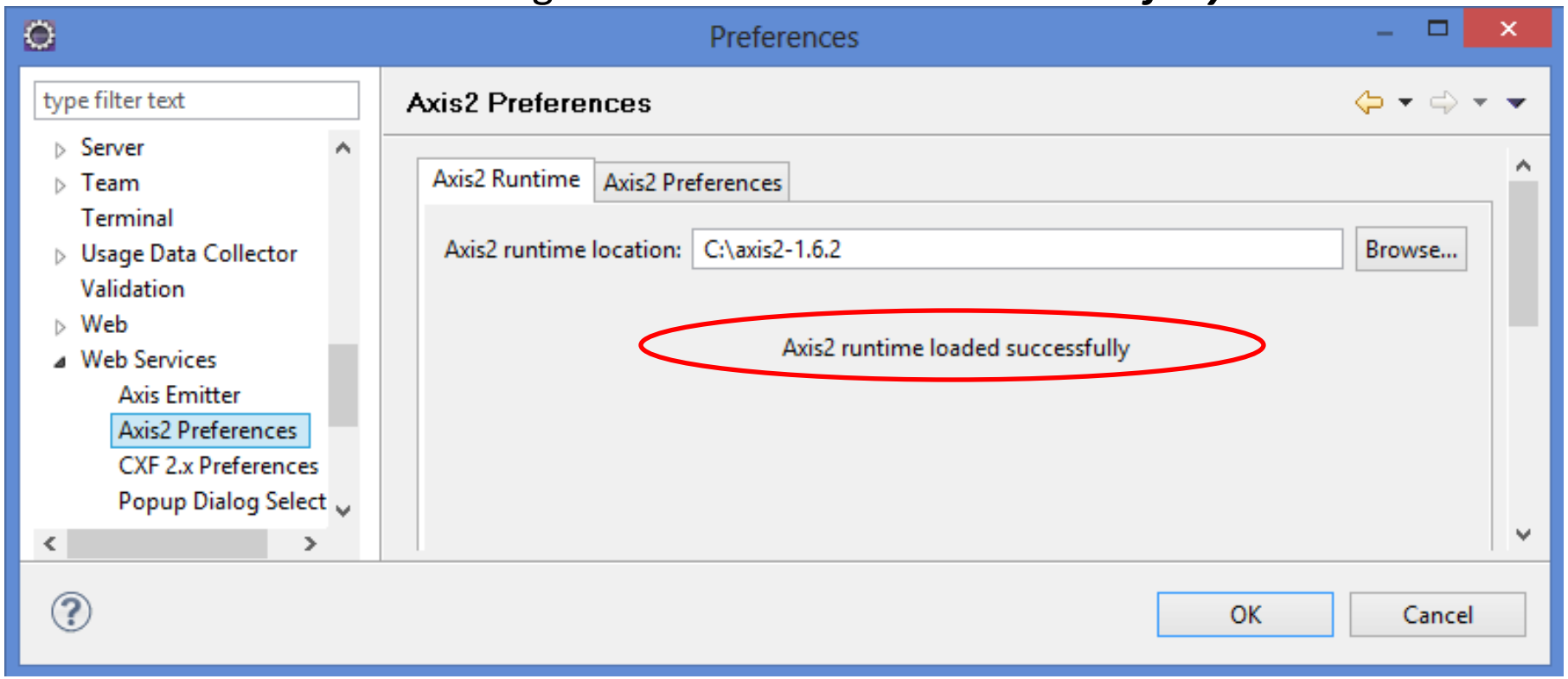
# Eclipse > Add Server

- By default, Eclipse does not modify referenced Tomcat but rather creates an instance of the specified server
- If you want to use the genuine, then select from "**Servers**", right click and select "**Open**".
- Choose "**Use Tomcat Installation**" under "**Server Locations**" and set the server path



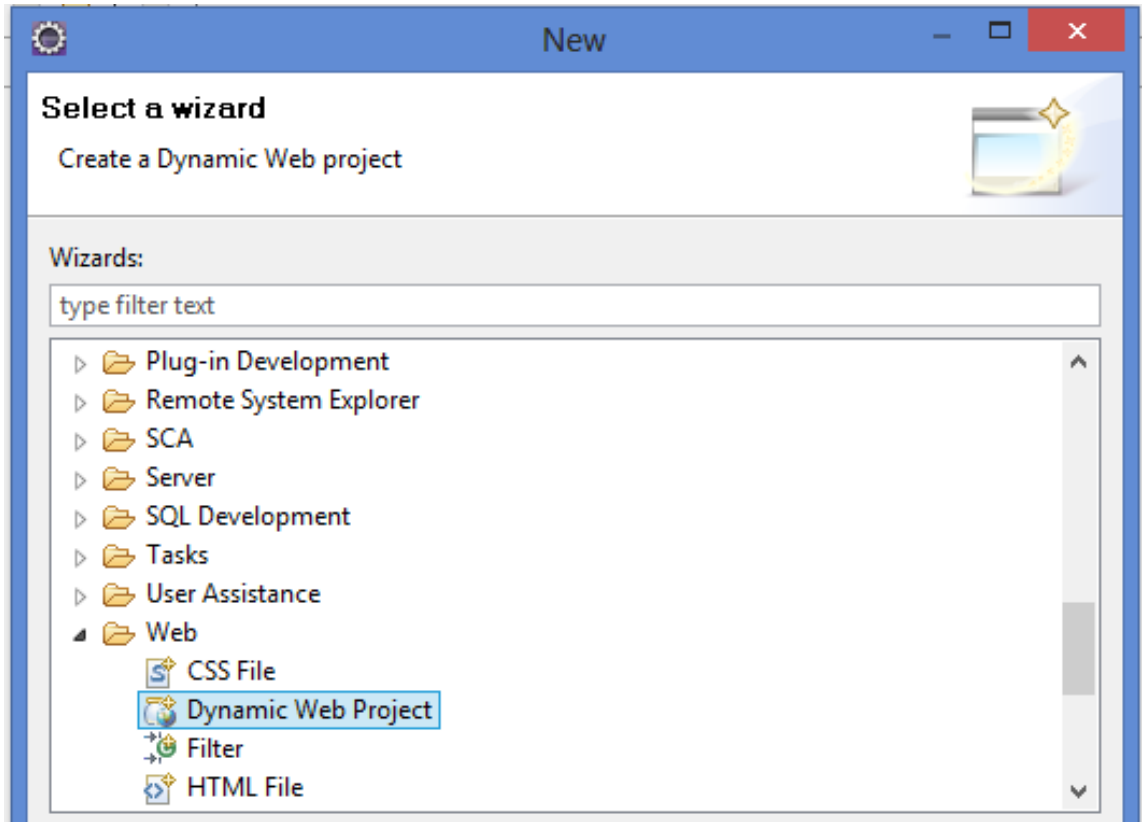
# Tell Eclipse About Axis2

- Window → Preferences → Web Services → Axis2 Preferences
- Set install path of Axis2 Set ***"Axis2 runtime location"*** to the path you have unzipped Axis2 (i.e C:\axis2-1.6.2)
- You will see the message ***"Axis2 runtime loaded succesfully"***.



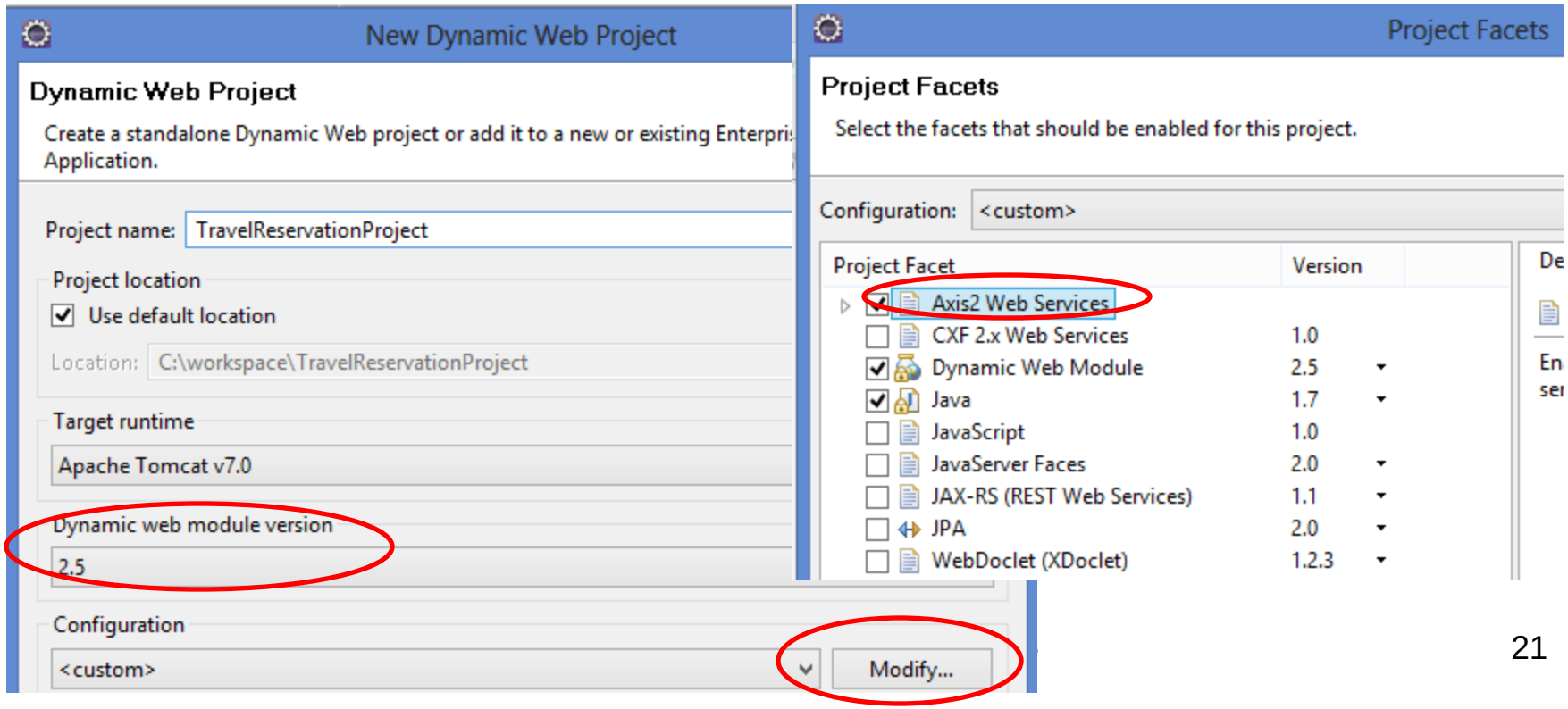
# Eclipse and Axis2 Project

- File → New → Other → Web → Dynamic Web Project



# Eclipse and Axis2 Project

- Set the following:
  - **Target Runtime**: set to the server you want
  - **Dynamic web module version**: Don't use "3", but one of "2.2 ,2.3, 2.4, 2.5"
  - **Under Configuration:** Project Facets add: **"Axis2 Web Services"**



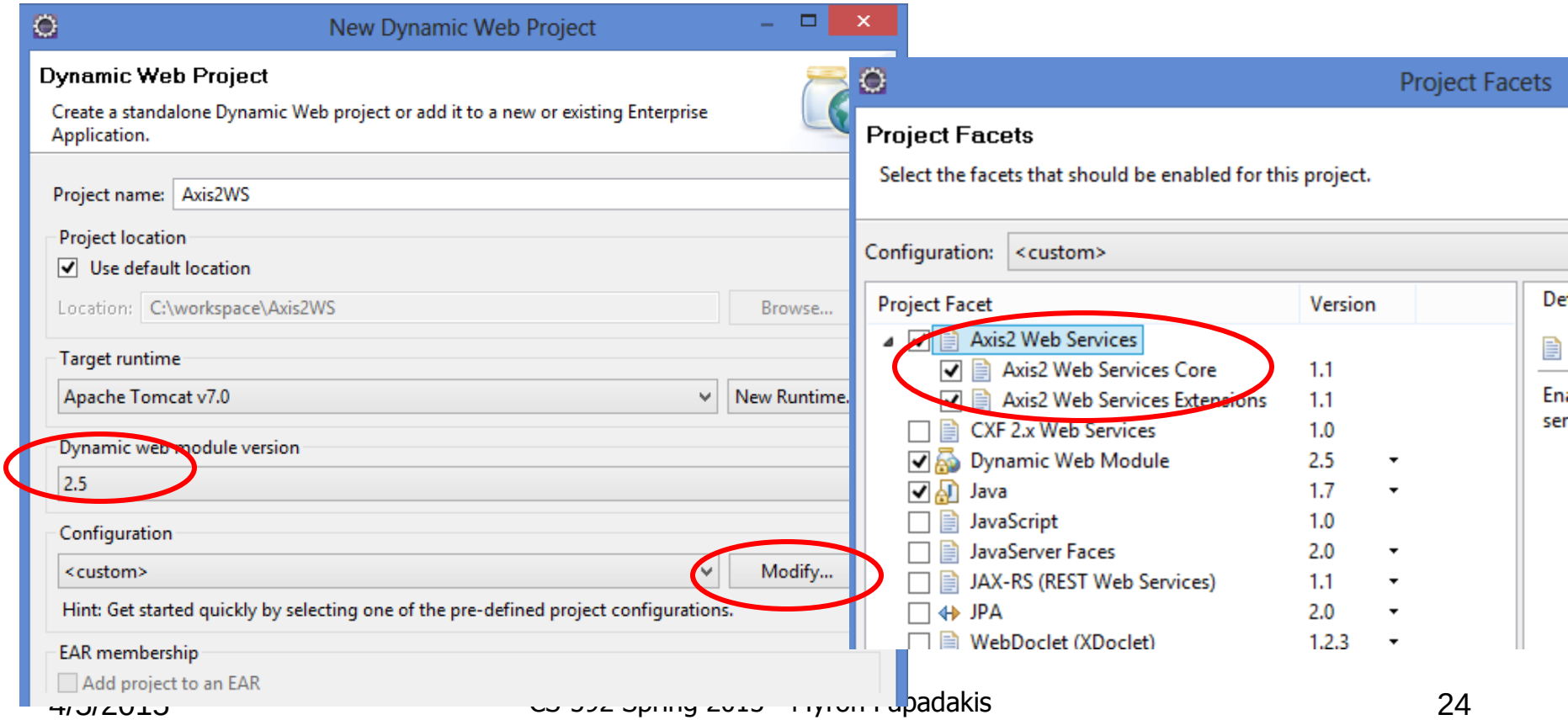
# Eclipse Top-Down WS Example

# Eclipse Lab Example (Top-Down Approach)

- Create a new Web Service that calculates the area of a rectangle. We need a single operation (i.e. calculateRectangleArea)
  - Input: width and height (float).
    - Use a complexType (i.e Dimension) for the input
  - Output: float
- Use the top-down for building this service (first we must define the WSDL file for this service)
- Test the WS using a client (Web Services Explorer, manually written client or SOAPUI)

# Eclipse Lab Example (Area Calculation)

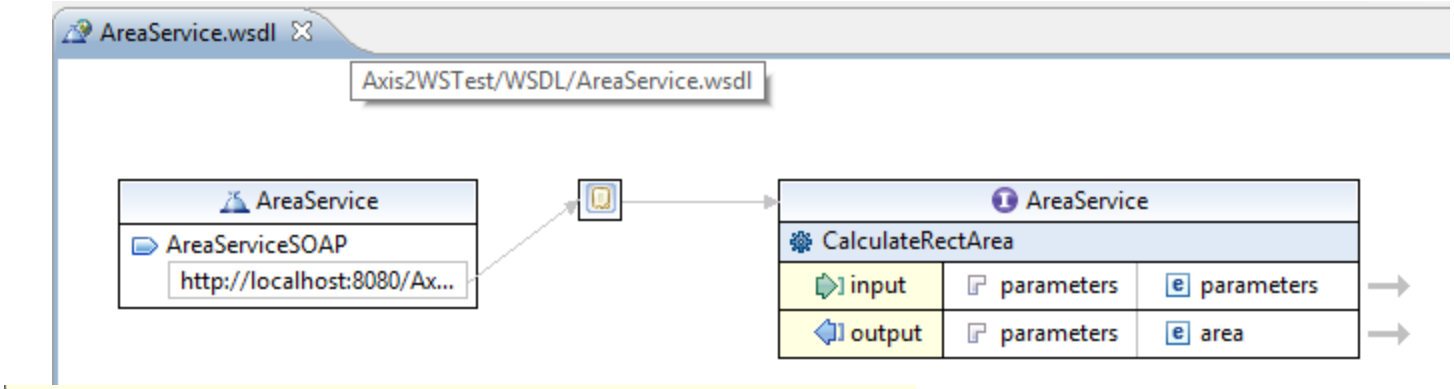
- Create a project with the support of Axis2 features. Open **File -> New -> Other... -> Web -> Dynamic Web Project**

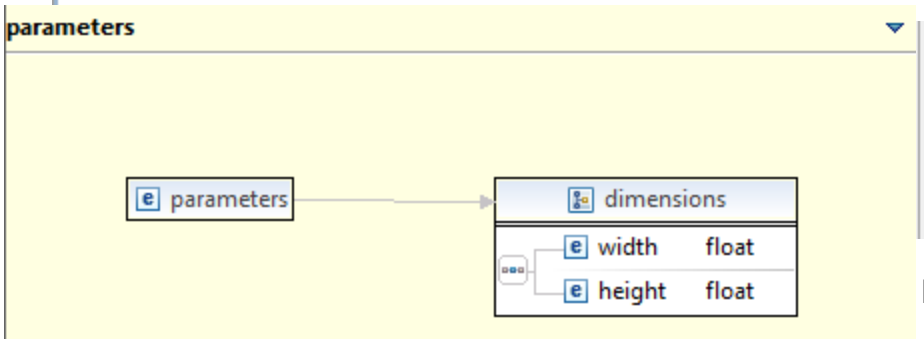


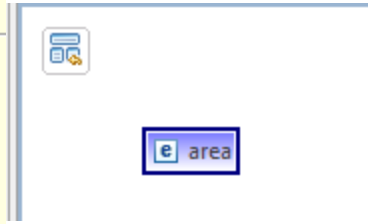
# Eclipse Lab Example > Create WSDL

- Create a folder called WSDL on the Axis2WSTest project.
- Right click on this folder and then New→ Other → Web Services →WSDL and name this file AreaService.wsdl

*http://localhost:8080/Axis2WSTest/services/AreaService*

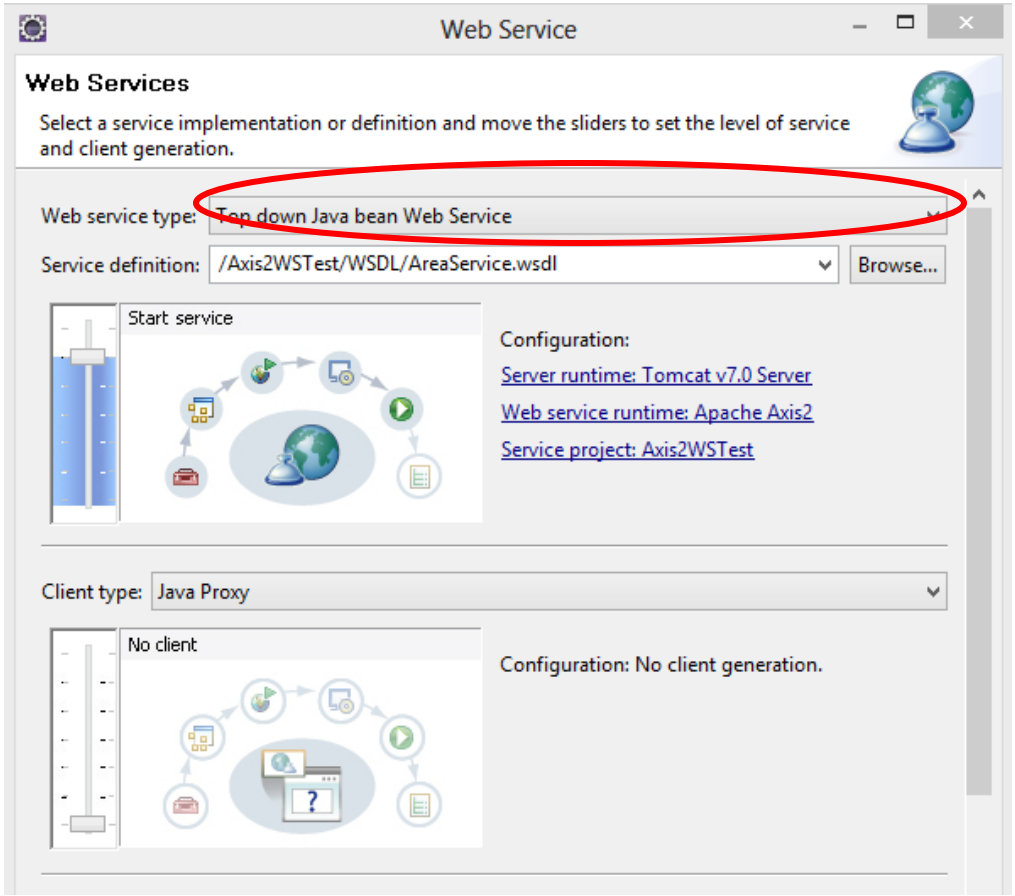


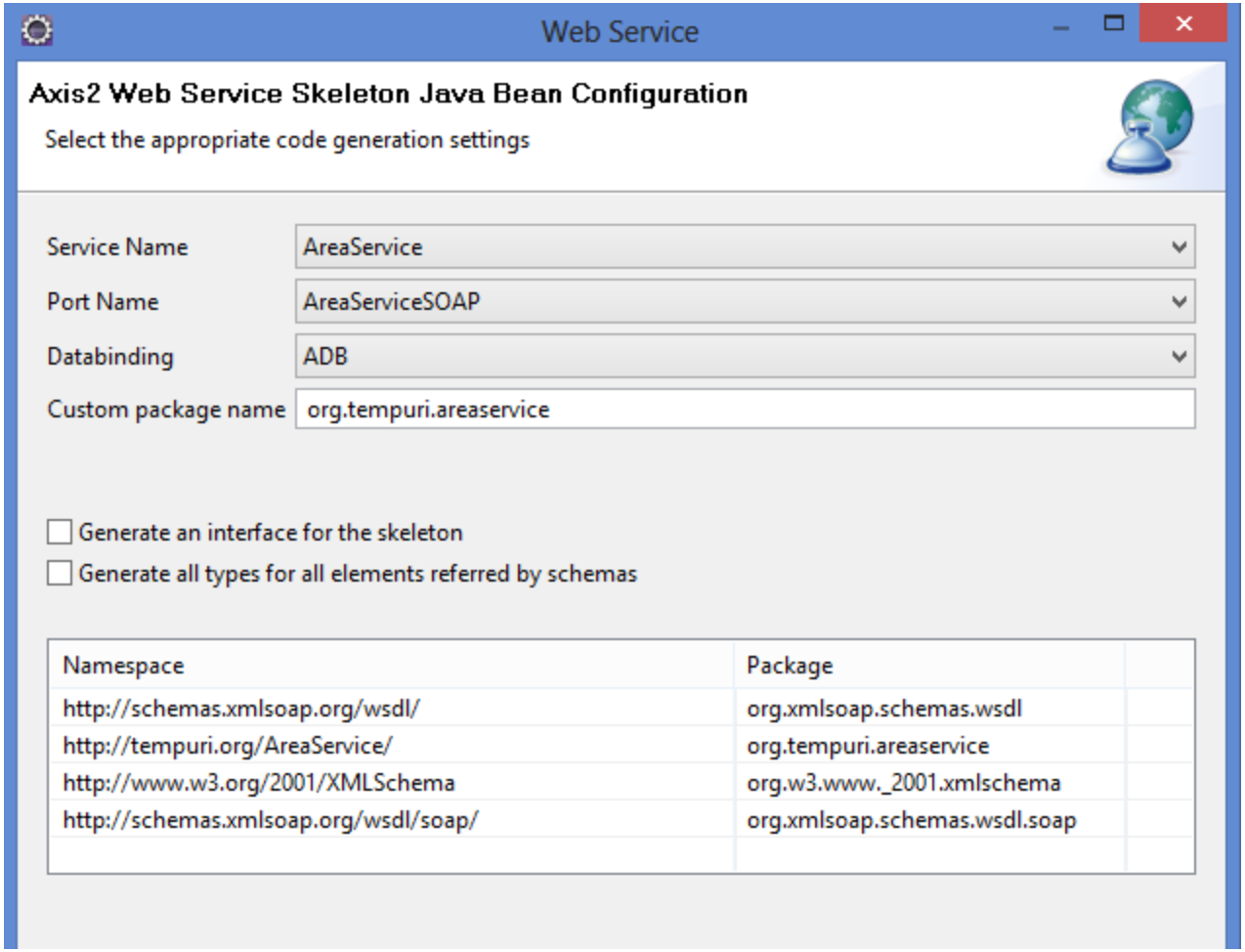



# Eclipse Lab Example

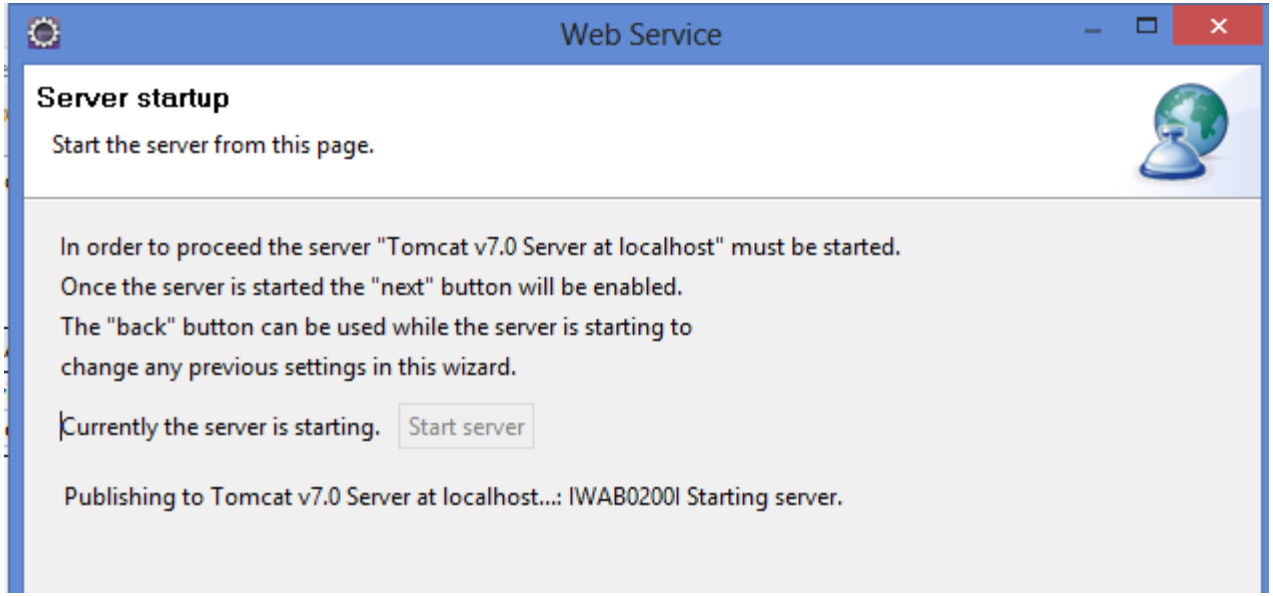
- By selecting AreaService.wsdl source the Open File -> New -> Other... -> Web Services -> Web Service



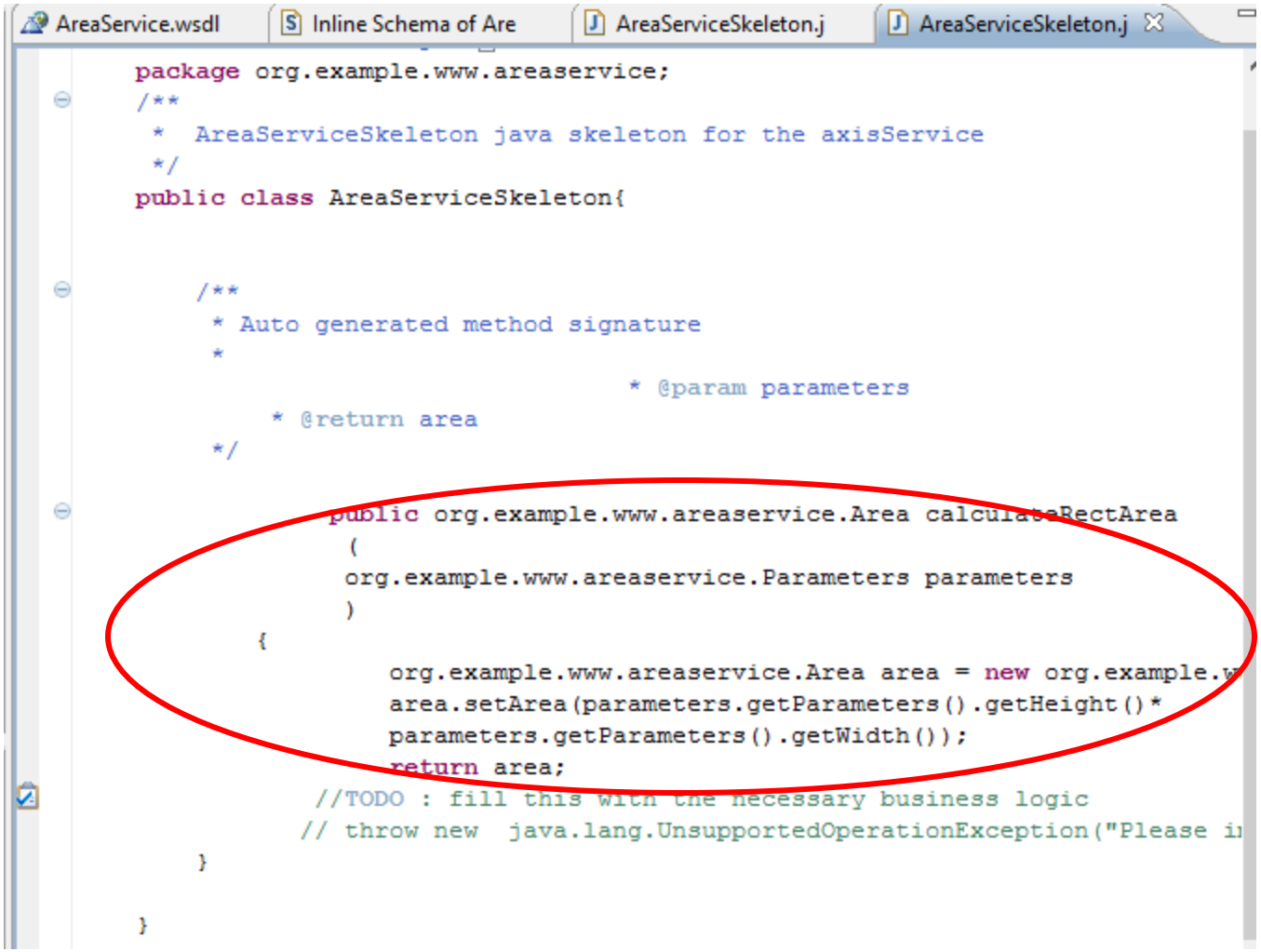
# Skeleton JAVA bean configuration page



# Eclipse Lab Example

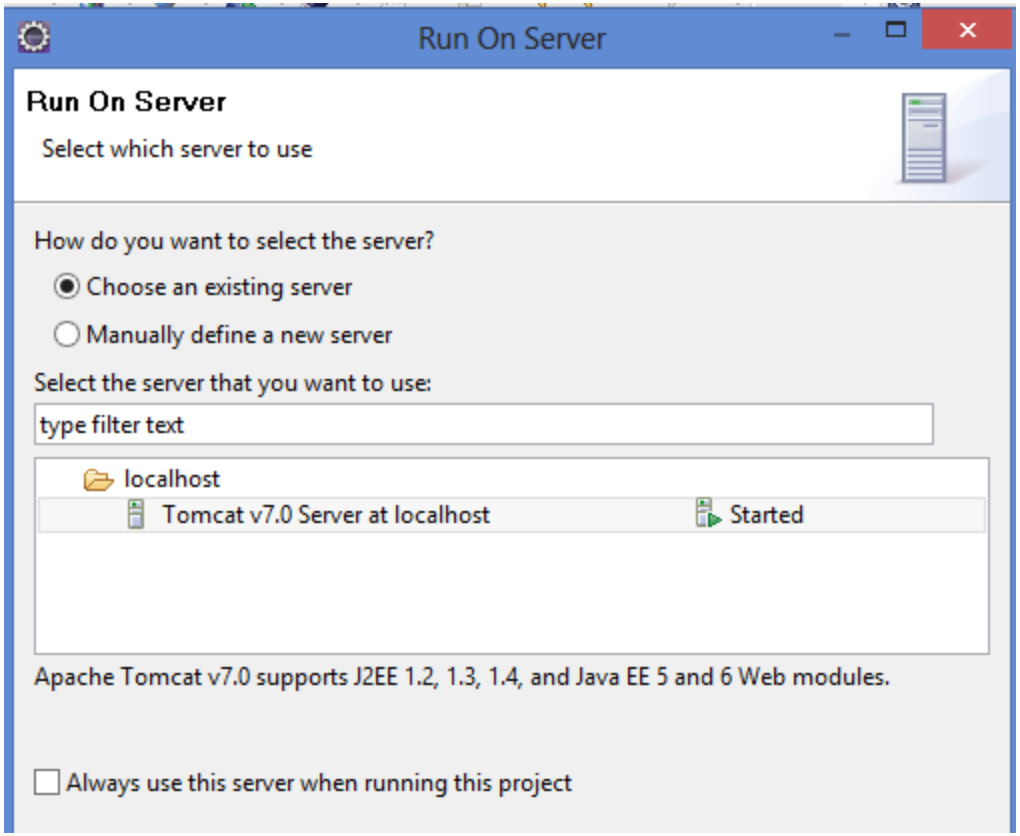



# Area Service Skeletion

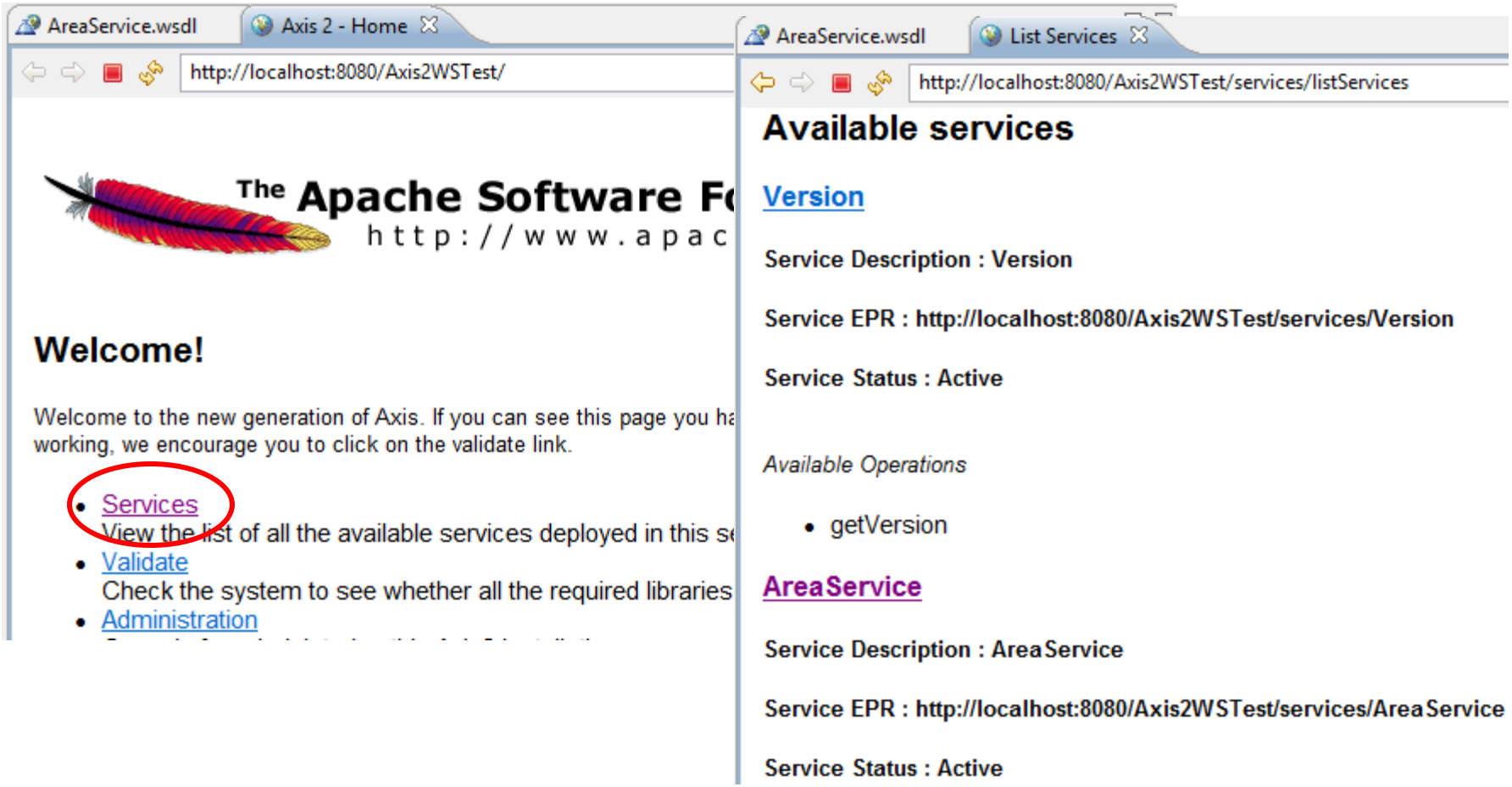


# Running the project

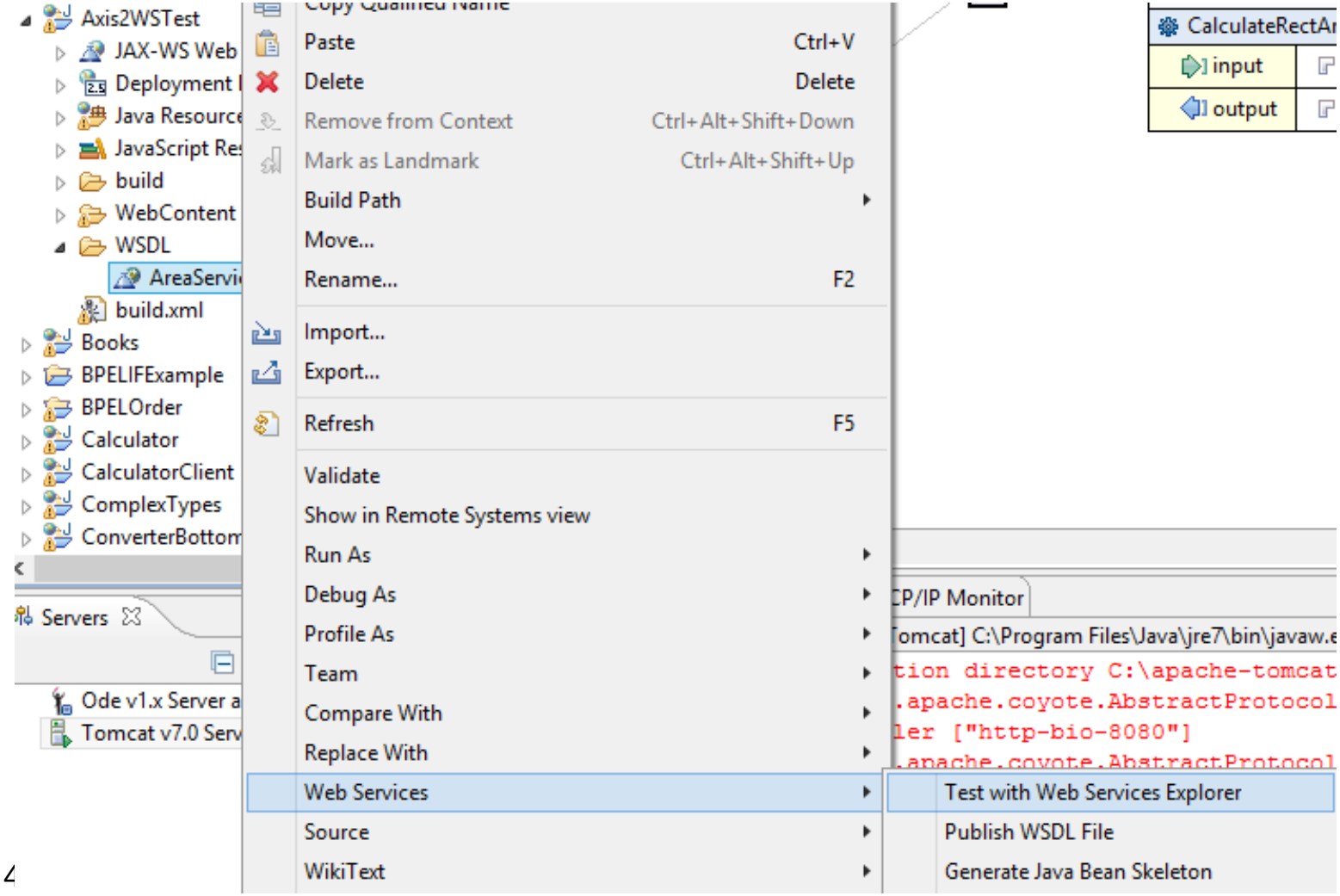
- Right Click the Project and select Run As → Run on Server
- Restart the server if prompted to do so



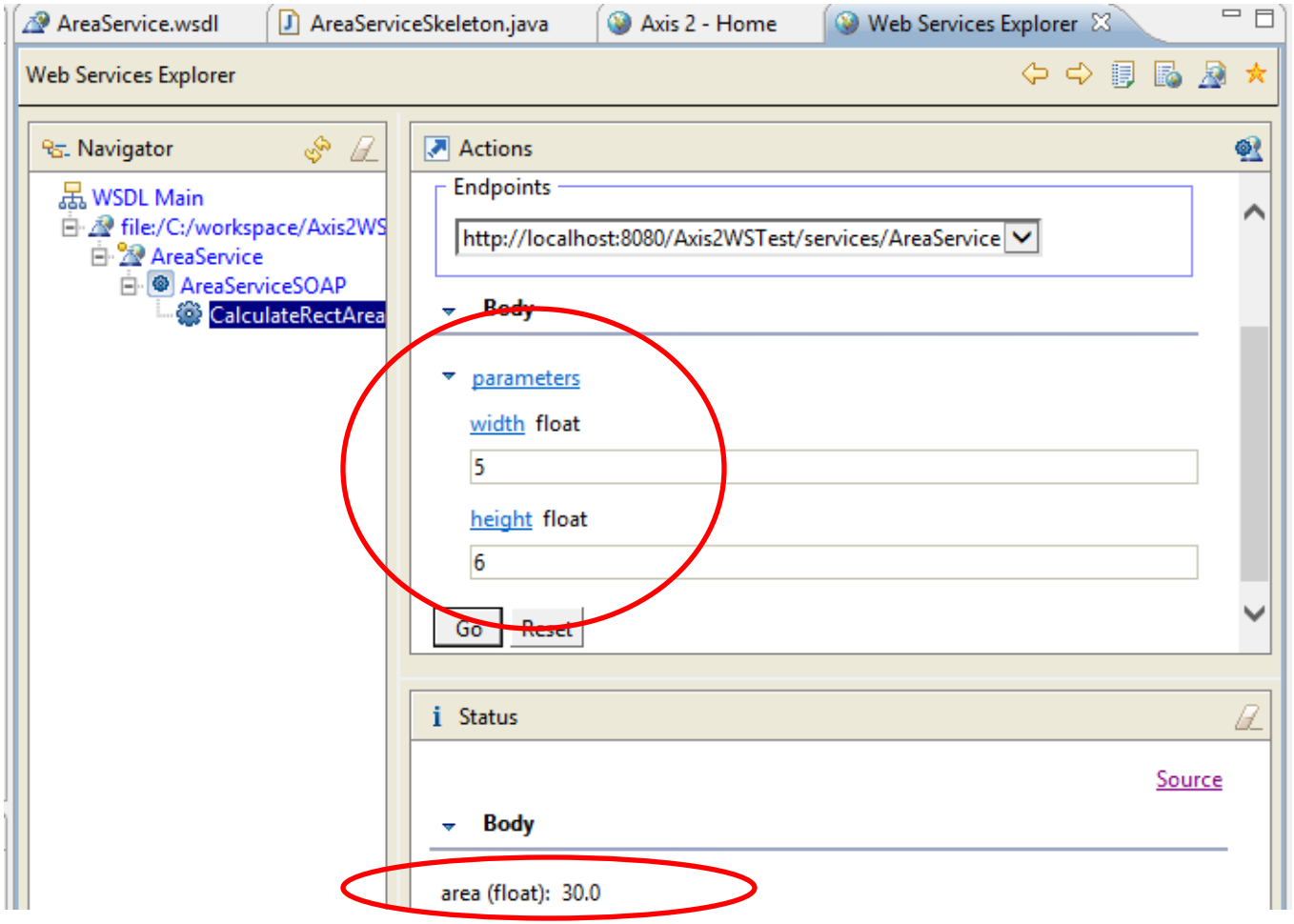
# Axis2 Services



# Web Service Client



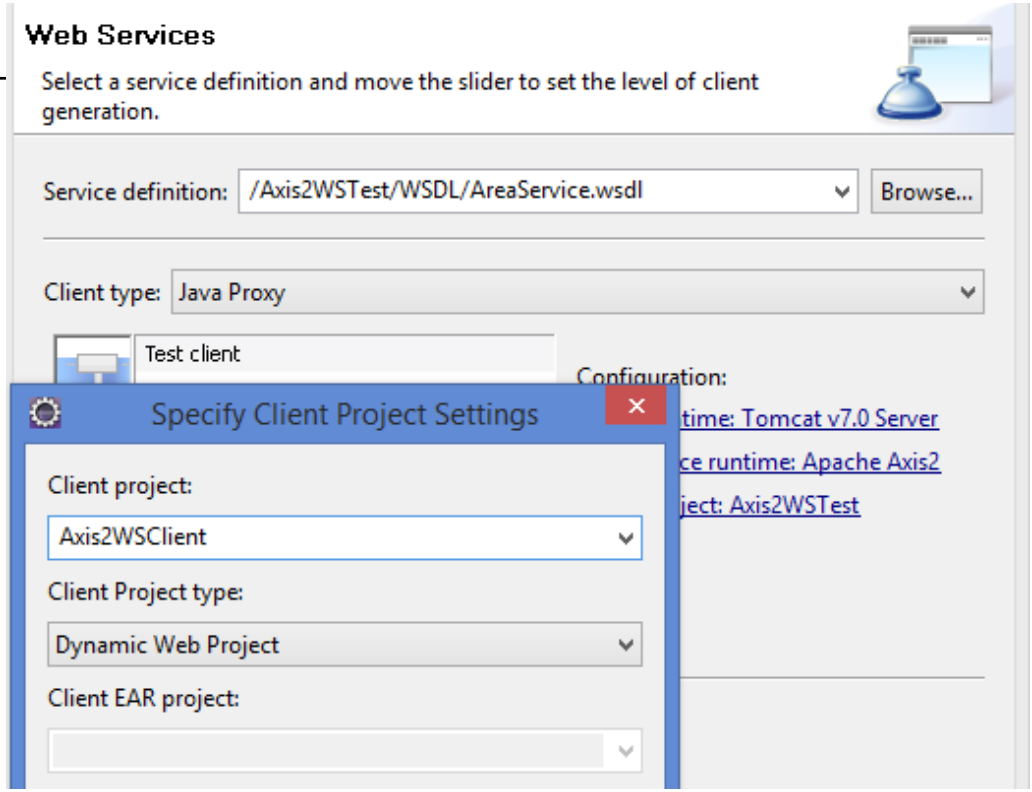
# Web Service Client



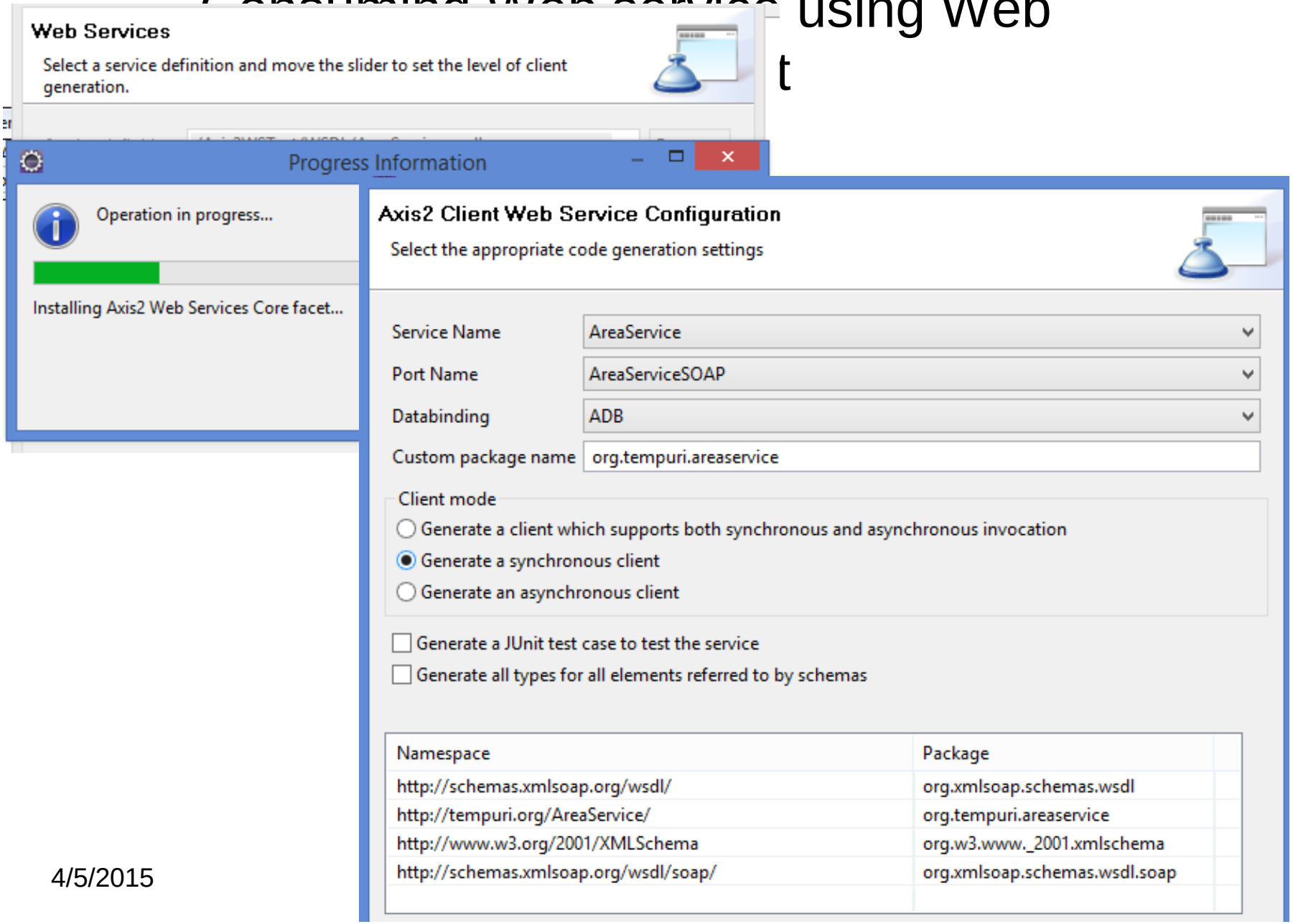
# Consuming Web service by writing a Web Service Client

# Consuming Web service using Web Service Client

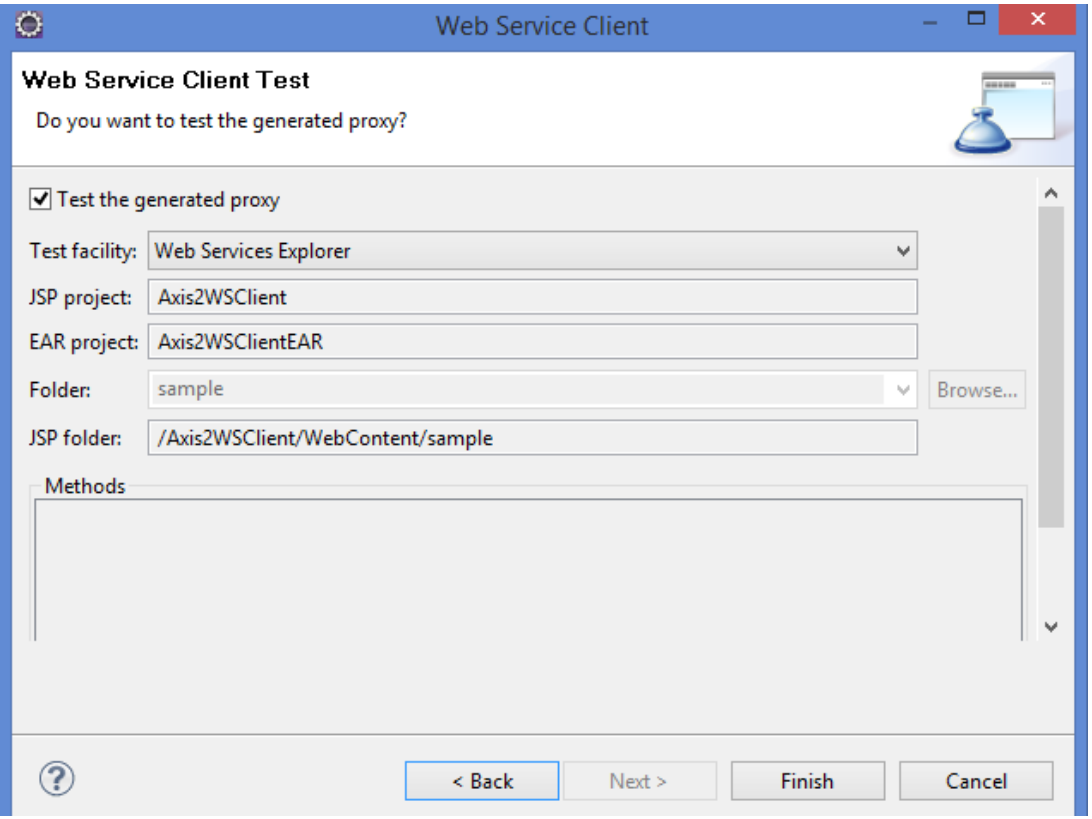
- Select the AreaService.wsdl file in the Axis2Test/WSDL folder Open File -> New -> Other... -> Web Services -> Web Service Client.
- Click Next.
- Move the client slider to the Test Client position.
- Click the Client project link under Configuration and type in Axis2WSClient as the name of the Client project in the dialog that appears:

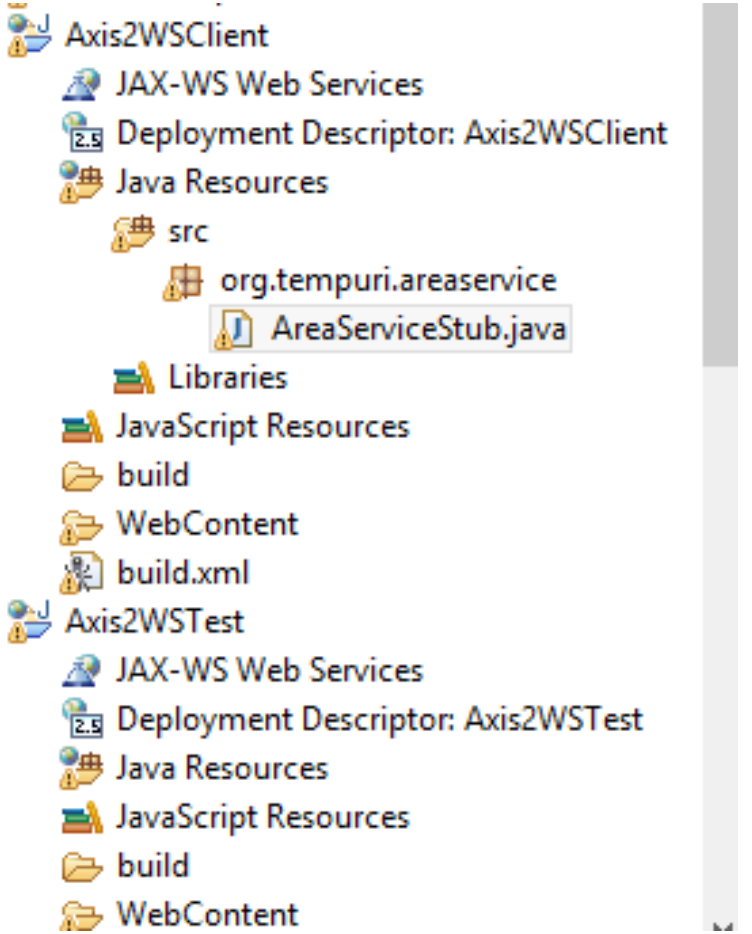


# Consuming Web service using Web t

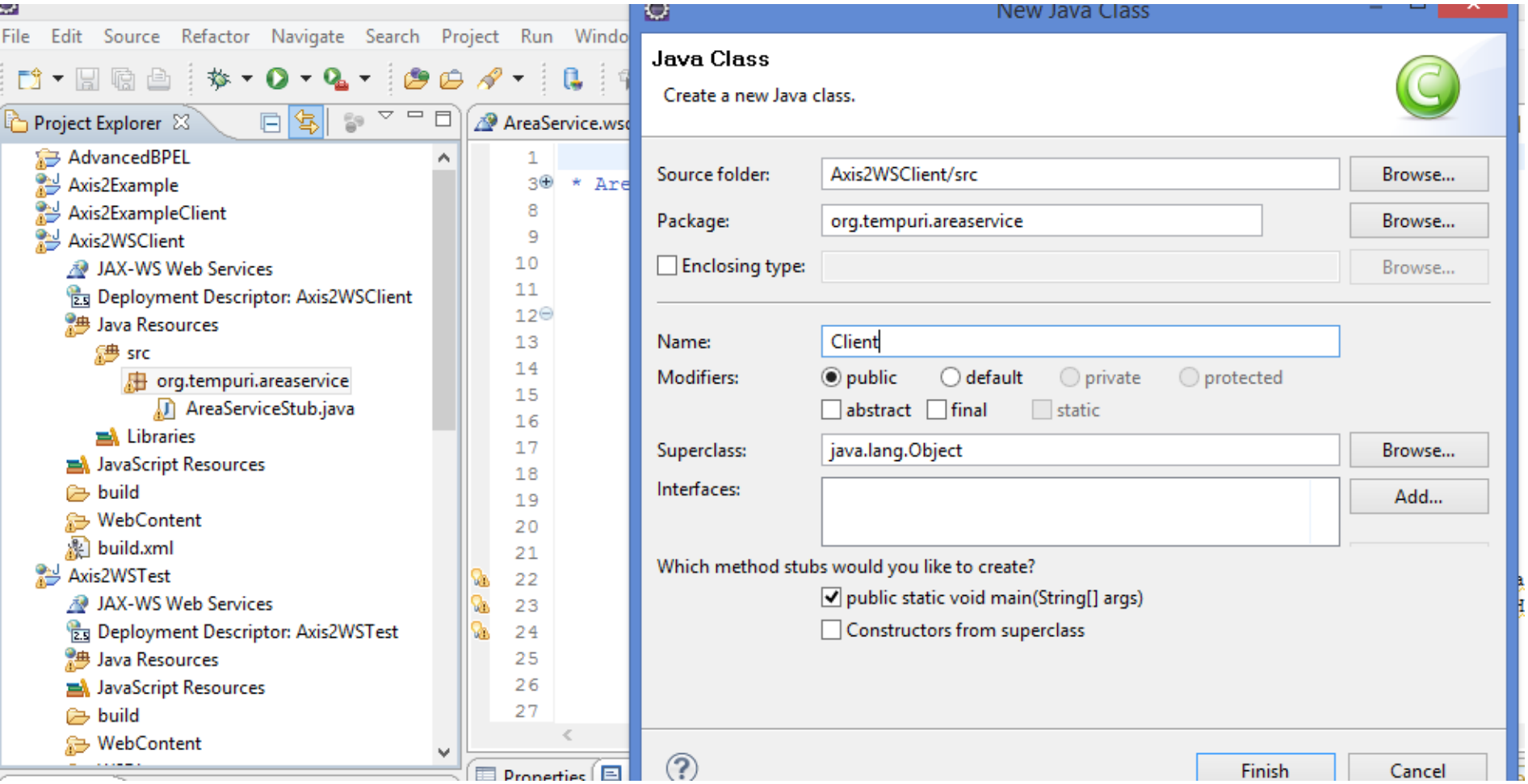


# Consuming Web service using Web Service Client



# Consuming Web service using Web Service Client



# Consuming Web service using Web Service Client

AreaService.wsdl | http://localhost:8080/Axis2WSTest/ser | Web Services Explorer

```
16    public static void main(String[] args) {
17
18        AreaServiceStub stub;
19        try {
20            stub = new AreaServiceStub();
21            Parameters parameters = new Parameters();
22            Dimensions dimensions = new Dimensions();
23            float height = 0, width = 0;
24
25            Scanner scanner = new Scanner(System.in);
26            System.out.println("Enter height:");
27            height = scanner.nextFloat();
28            dimensions.setHeight(height);
29
30            System.out.println("Enter width:");
31            width = scanner.nextFloat();
32            dimensions.setWidth(width);
33
34            parameters.setParameters(dimensions );
35            Area resp = stub.calculateRectArea(parameters);
36            float area = resp.getArea();
37            System.out.printf("The area
```

Properties | Console | TCP/IP Monitor

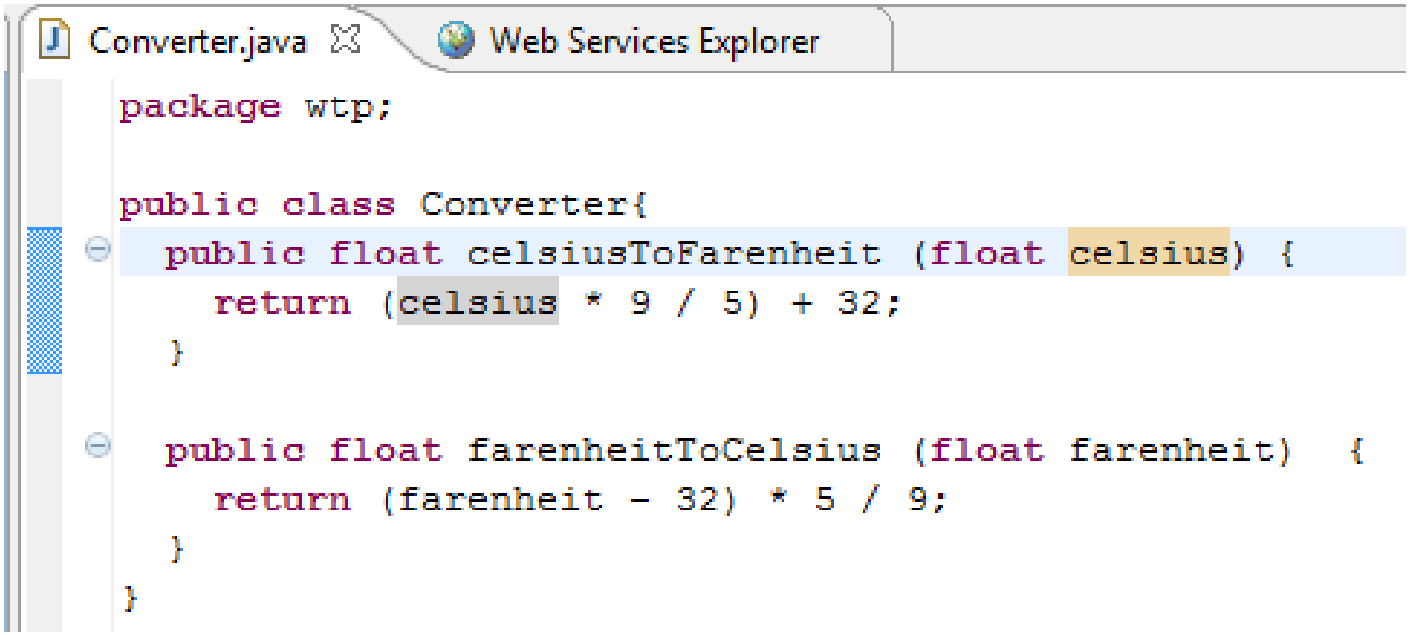
```
<terminated> Client (1) [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (A
Enter height:
5
Enter width:
6
The area is 30.0
```

# Bottom-up Example

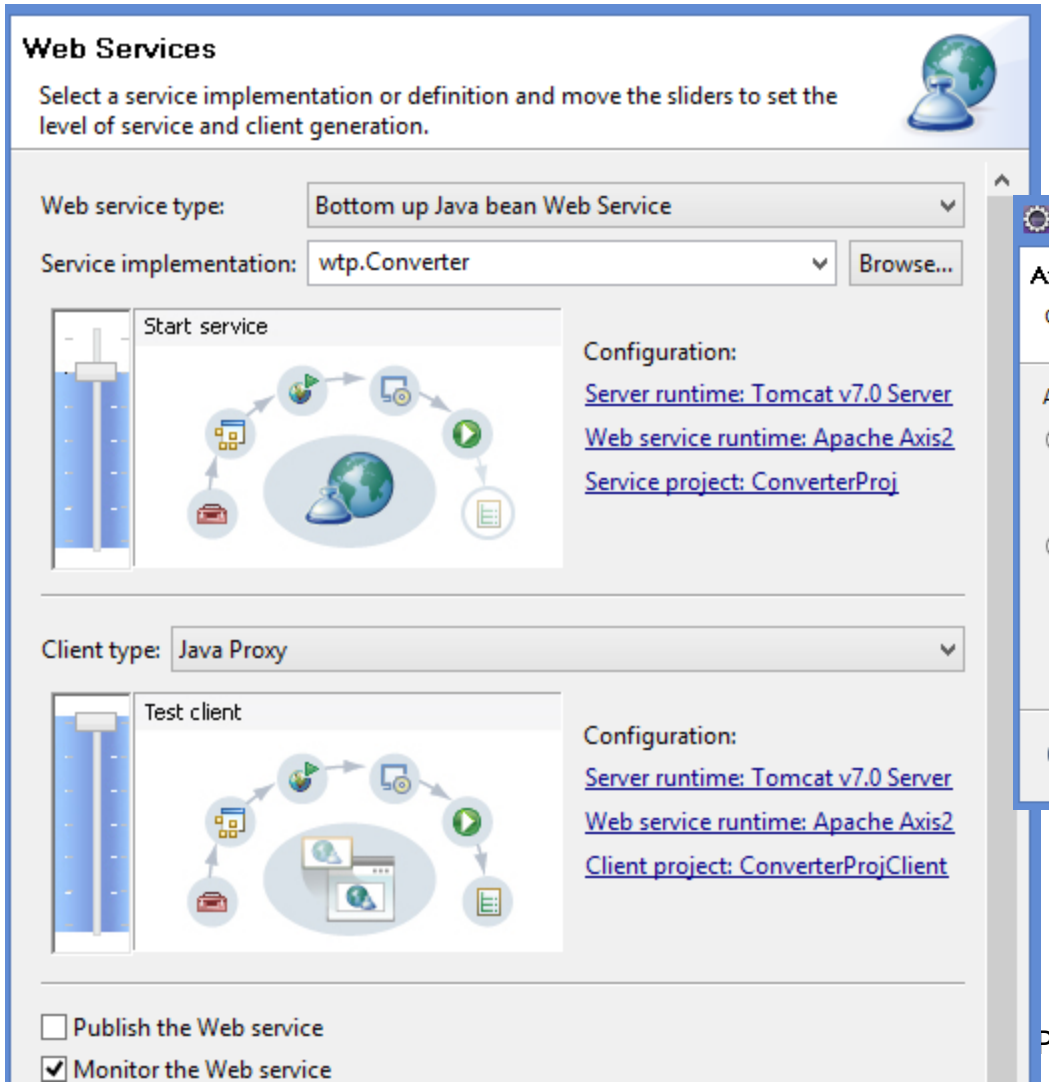
Temperature Example

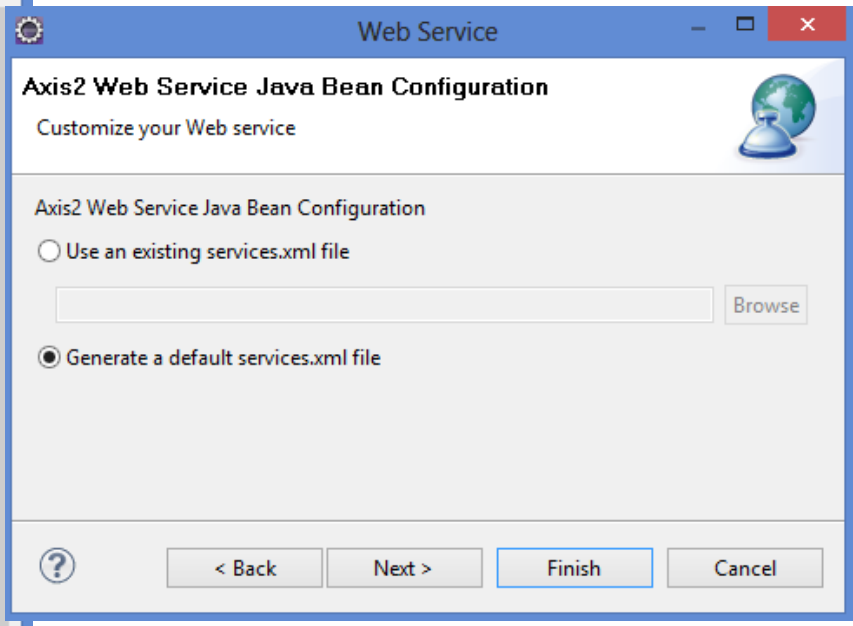
# Eclipse Lab Example : Creating a Bottom Up Web Service

- Create a new Dynamic Project and a new Java class
- Select the **Converter.java** file.
- Open **File -> New -> Other... -> Web Services -> Web Service**

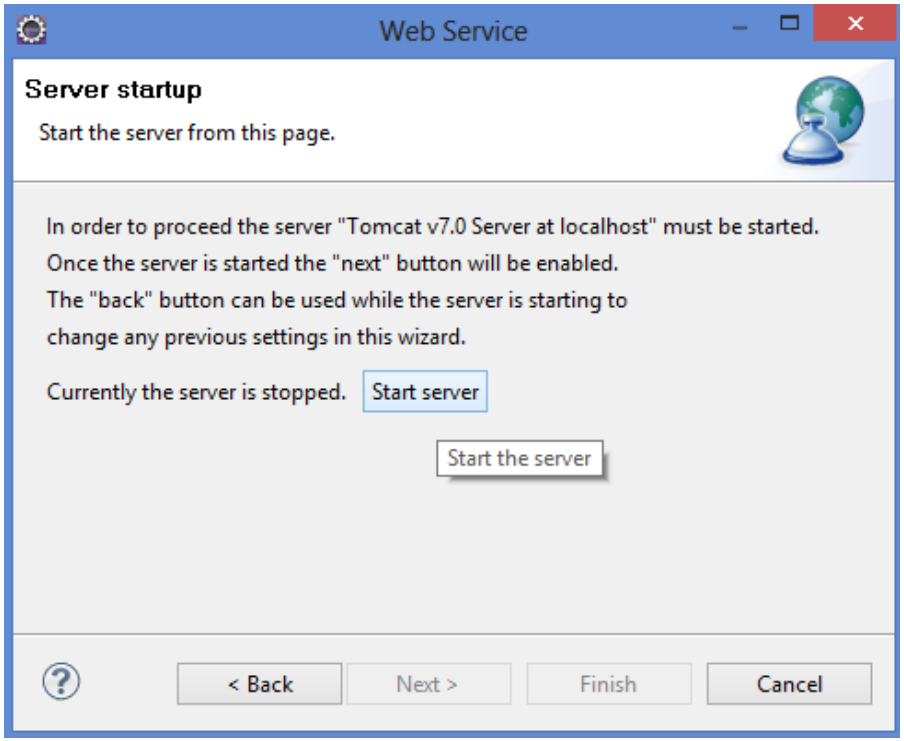


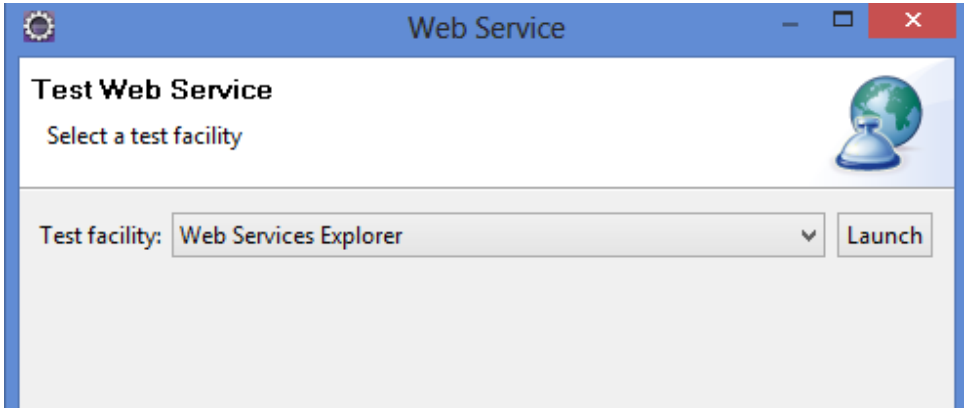
# Eclipse > Creating a Bottom Up Web Service



# Eclipse > Creating a Bottom Up Web Service



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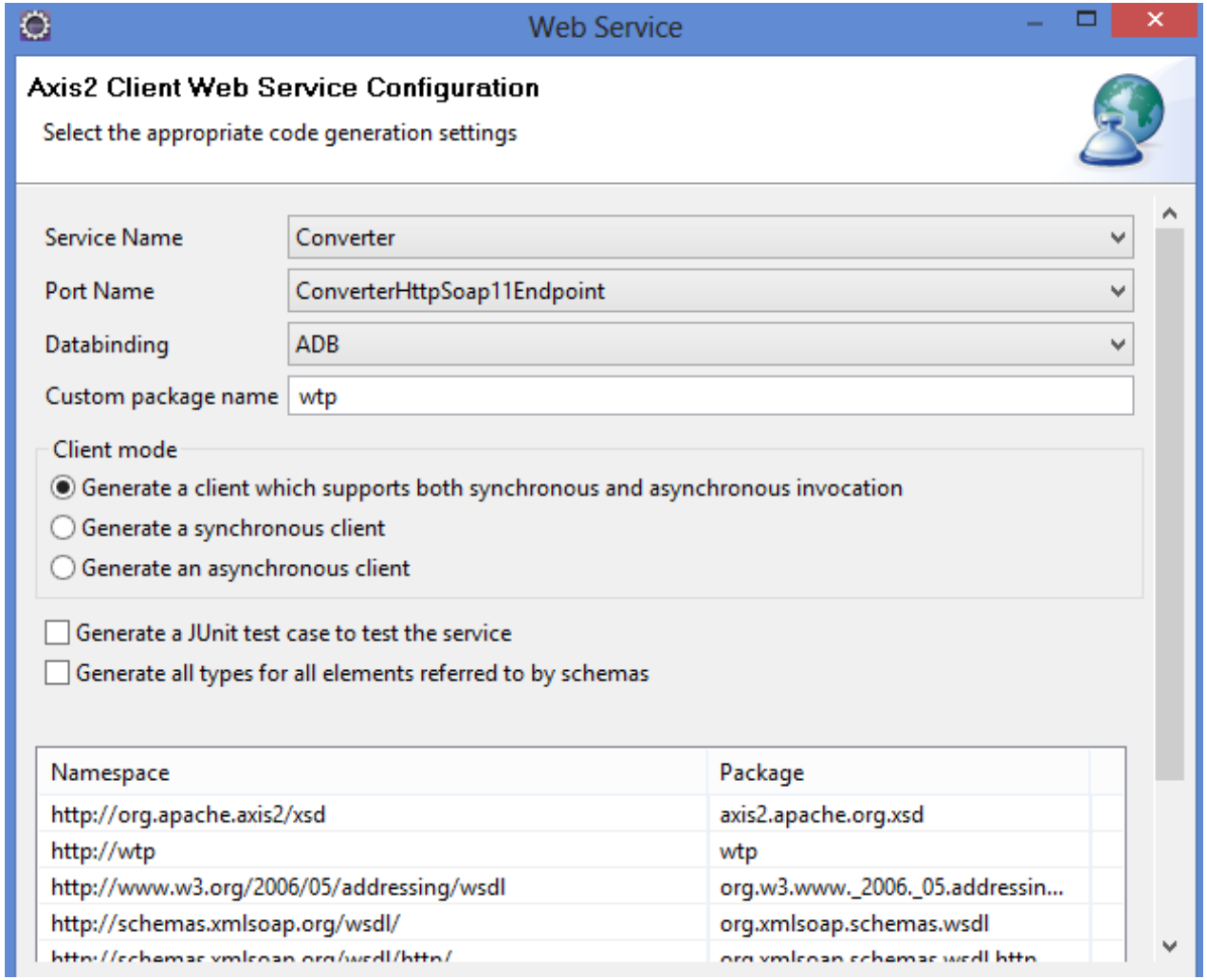

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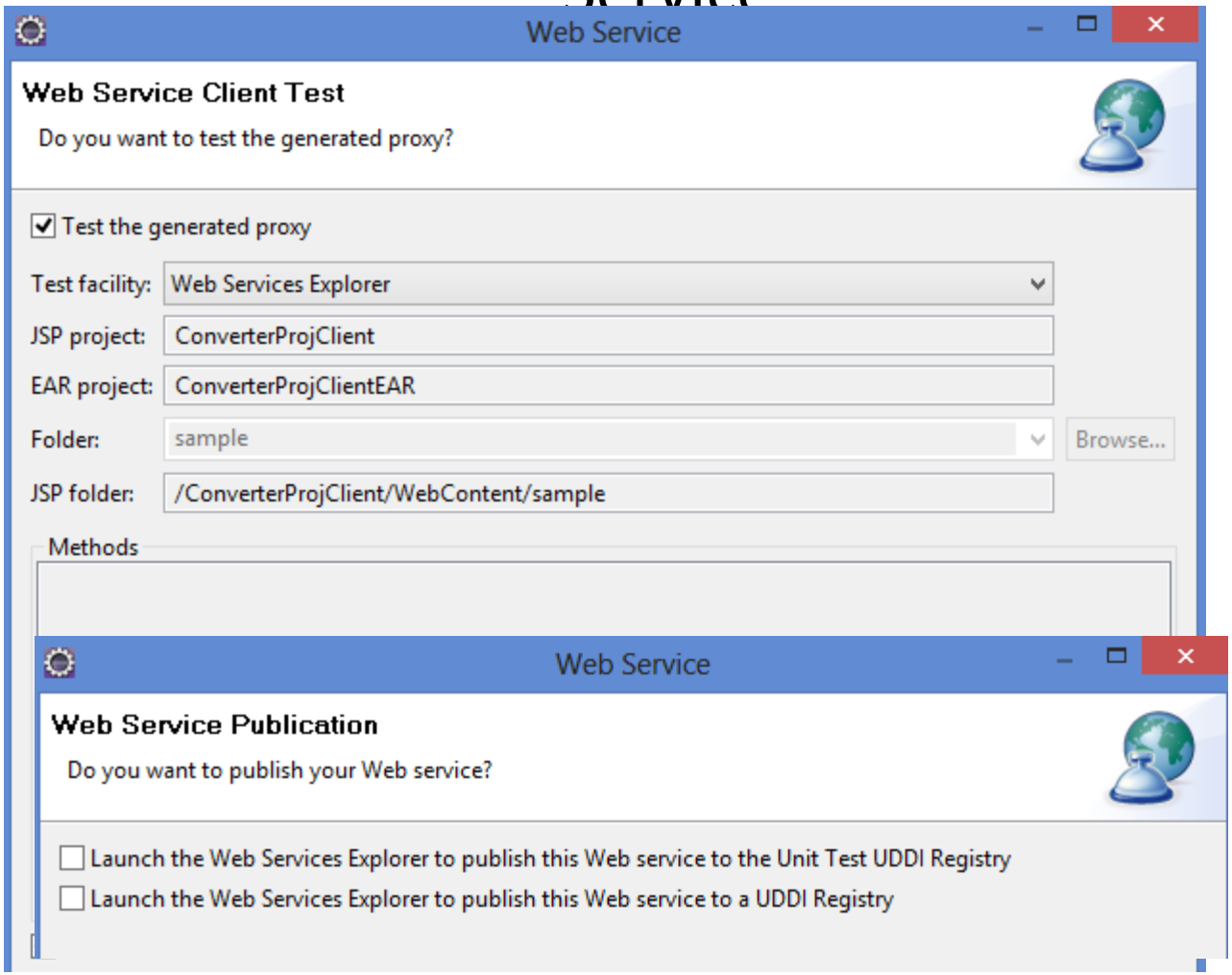
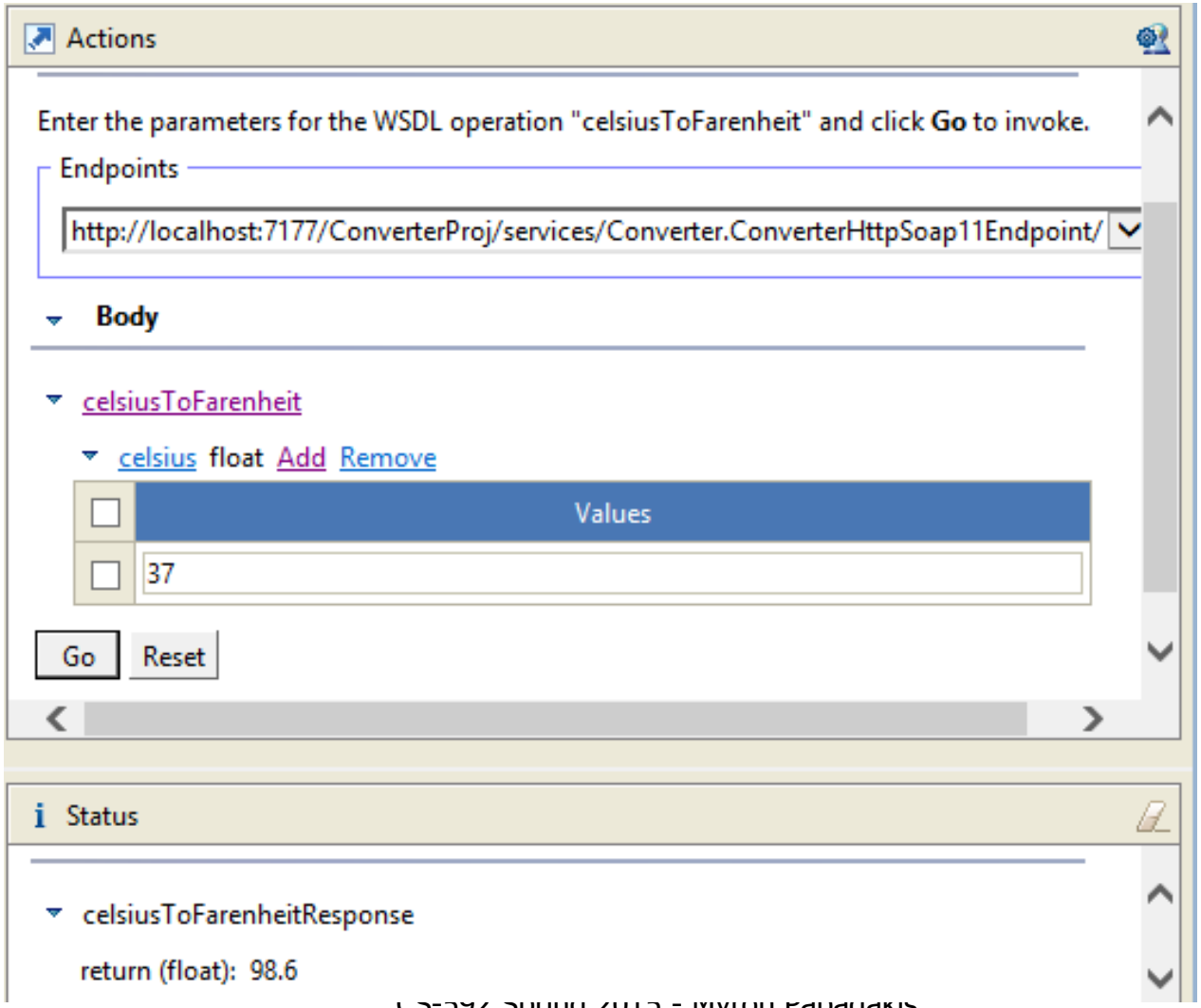


# Eclipse > Creating a Bottom Up Web Service



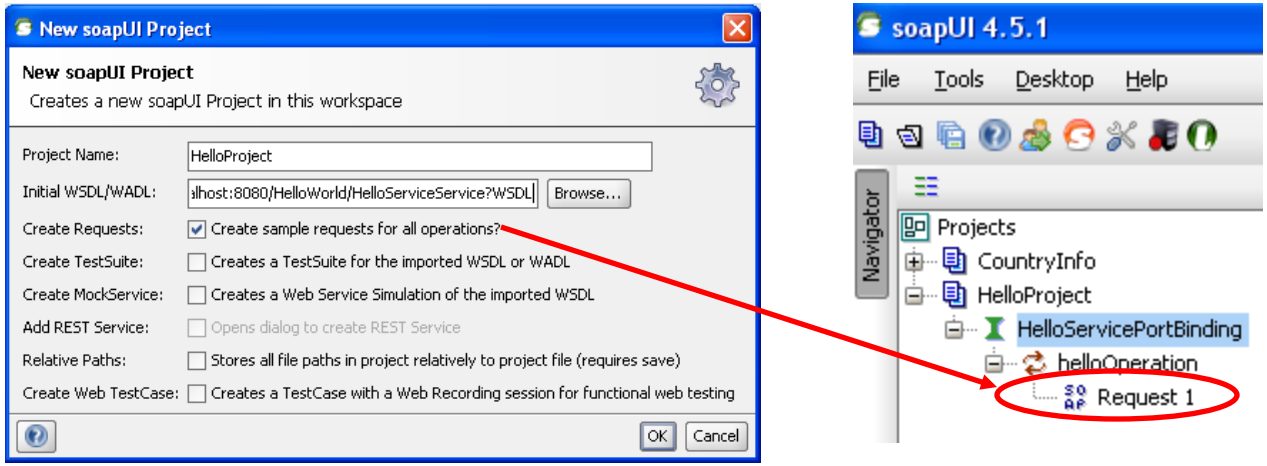
# SoapUI

# Soap UI tool

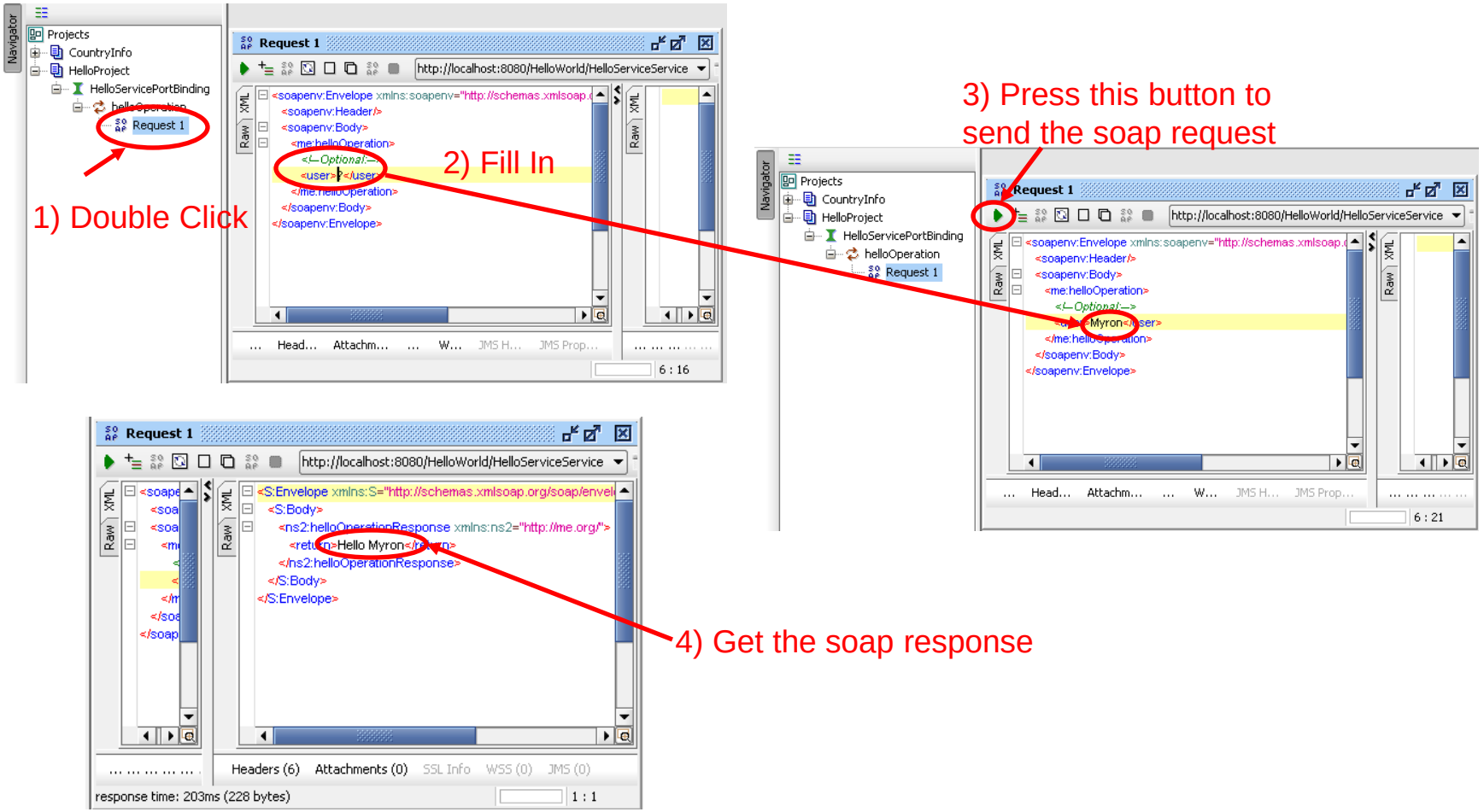
- http://www.soapui.org/Working-with-soapUI/getting-started.html
- Plugins for netbeans and eclipse also exist.
- Some slides from the 1st Assisting Lecture follow next..

# SOAPUI Example 1 (1/2)

- Assume a web service “HelloService” that has a single operation which takes as input a single string from a user (e.g “Myron”) and returns a greeting message to the user (e.g “Hello Myron”)
- Assume that the WSDL of this web service is located in the following url: http://localhost:8080/HelloWorld/HelloServiceService?WSDL
- Invoke this web service using the SOAPUI tool
  - Create a new project (*File > New soapUI Project),* then set the project’s name and the url of the WSDL and press ok

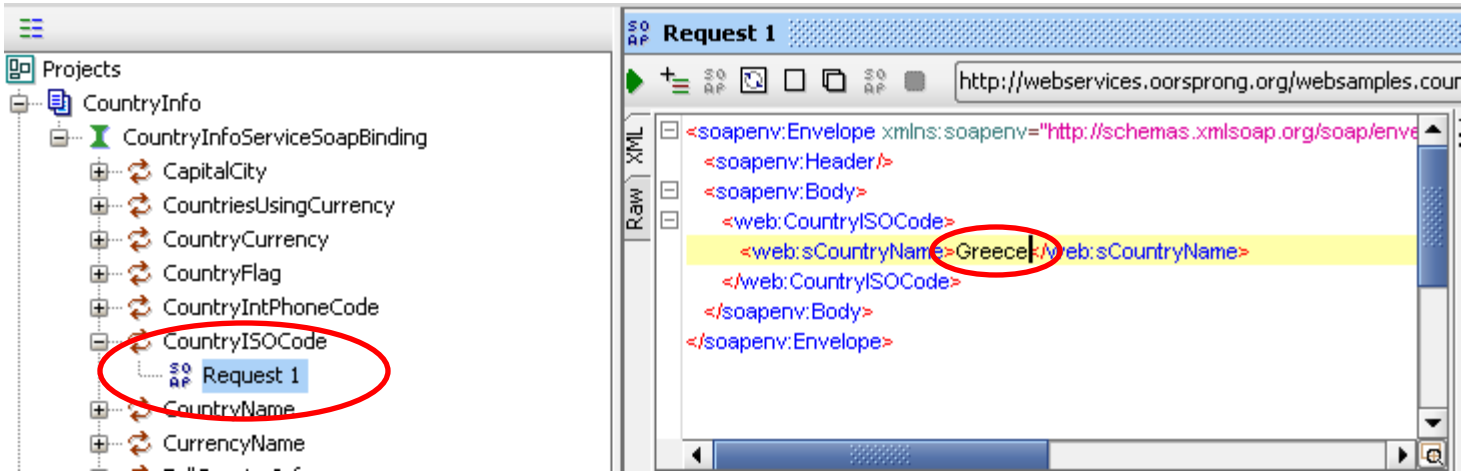


# SOAPUI Example 1 (2/2)

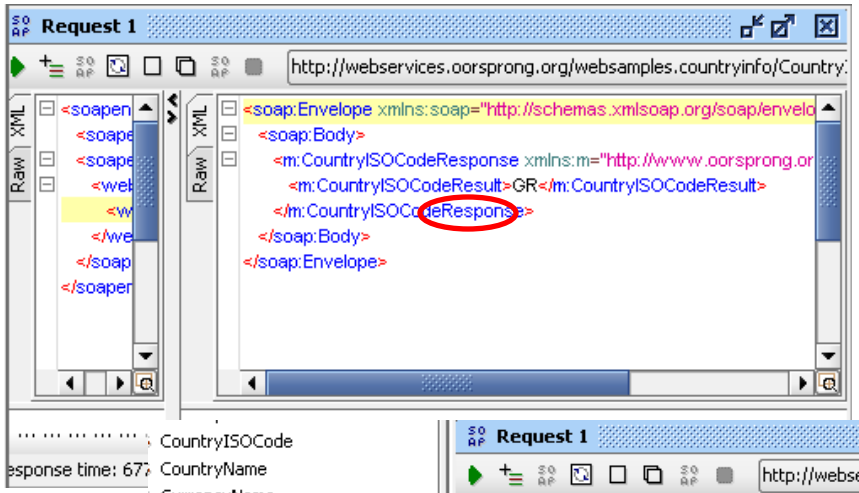


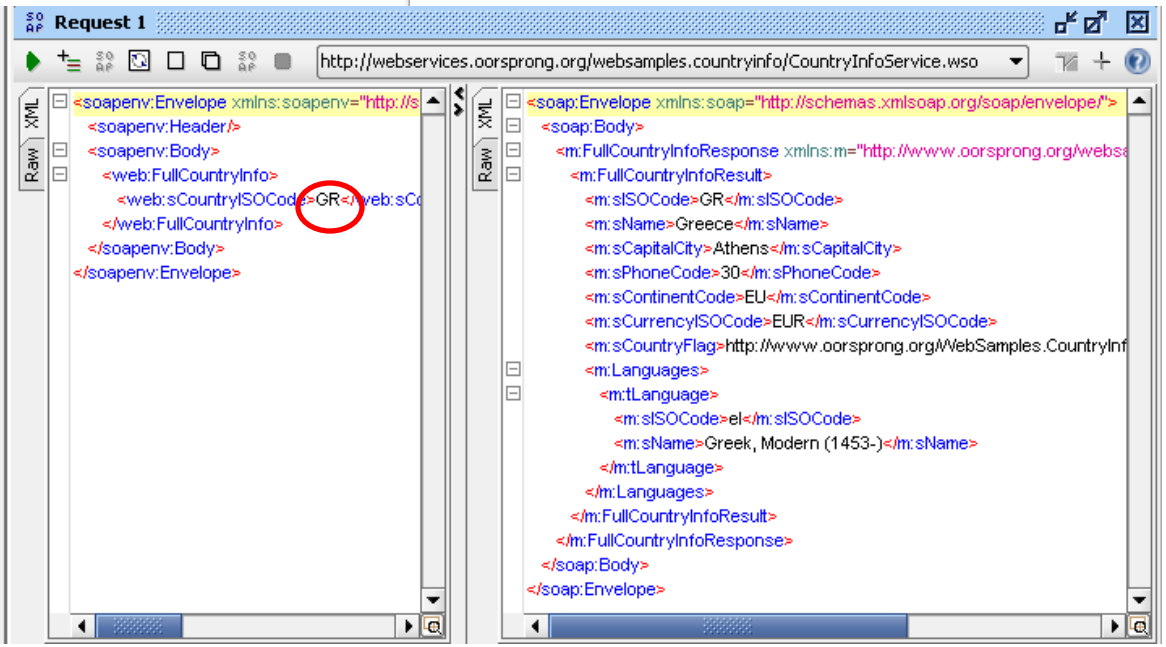
# SOAPUI Example 2 (1/2)

- Create a new project “CountryInfo” and set the WSDL to the following url:
  - http://webservices.oorsprong.org/websamples.countryinfo/CountryInfoService.wso?WSDL
  - This service provides several operations for retrieving information about a particular country
  - Find the iso code of “Greece” by sending a request (soap message)



# SOAPUI Example 2 (2/2)




- The response shows that the iso code of Greece is “GR”
- Use this code to make a request to the operation “FullCountryInfo”

# References

- **Bottom-up Approach:** http://www.eclipse.org/webtools/community/tutorials/BottomUpAxis2WebService/bu_tutorial.html

- **Top-down Approach:** http://www.eclipse.org/webtools/community/tutorials/TopDownAxis2WebService/td_tutorial.html

- http://www.soapui.org/Working-with-soapUI/getting-started.html

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ΕΣΠΑ 2007-2013
πρόγραμμα για την ανάπτυξη
ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΩΝΙΚΟ ΤΑΜΕΙΟ

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

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