Rozproszone systemy internetowe

Web serwisy
JAX-WS (SOAP web services)

Sources and help:

Web services (javaTpoint)

Java Web Services - Book online

JAX-WS Tutorial by mkyong

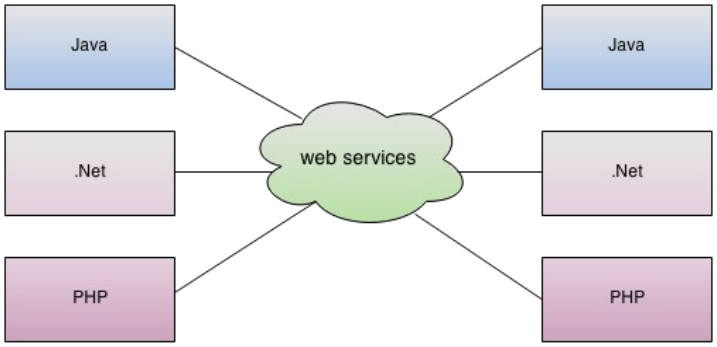
Java EE Tutorial -Web services

Java API for XML Web Services (**JAX-WS**), is a set of APIs for creating web services in **XML format** (**SOAP**). JAX-WS provides many annotation to simplify the development and deployment for both web service clients and web service providers (endpoints).

Java API for XML Web Services is a technology for building **web services and clients** that **communicate** using **XML**.

In **JAX-WS**, a web service operation invocation is represented by an **XML-based protocol**, such as **SOAP**. The SOAP specification defines the envelope structure, encoding rules, and conventions for **representing web service invocations** and **responses**. These calls and responses are transmitted as **SOAP messages** (XML files) over **HTTP**.

Although SOAP messages are complex, the JAX-WS API hides this complexity from the application developer. On the **server side**, the developer **specifies the web service operations** by defining **methods** in an **interface written in the Java** programming language. The developer also codes one or more classes that implement those methods. **Client programs** are also easy to code. A client **creates a proxy** (a local object representing the service) and then **simply invokes methods** on the proxy. With JAX-WS, the developer **does not generate or parse SOAP messages**. It is the **JAX-WS runtime** system that **converts the API calls and responses** to and from **SOAP messages**.



Java, .net or PHP applications can communicate with other applications through web service over the network. For example, java application can interact with Java, .Net and PHP applications. So web service is a **language independent way of communication.**

Ćwiczenie 1. Tworzenie web serwisu

1.1 Tworzenie Web Service Endpoint Interface (*HelloWorld.java*)

```
package org.jg.rsi;

import javax.jws.WebMethod;

import javax.jws.WebService;

import javax.jws.soap.SOAPBinding;

import javax.jws.soap.SOAPBinding.Style;

import javax.jws.soap.SOAPBinding.Use;

//Service Endpoint Interface

@WebService

@SOAPBinding(style = Style.DOCUMENT, use = Use.LITERAL) //optional

public interface HelloWorld {

@WebMethod

String getHelloWorldAsString(String name);

}
```

1.2 Tworzenie Web Service Endpoint implementacji

```
package org.jg.rsi;

//Service Implementation

import javax.jws.WebService;

@WebService(endpointInterface = "org.jg.rsi.HelloWorld")

public class HelloWorldImpl implements HelloWorld {

@Override

public String getHelloWorldAsString(String name) {

return "Witaj świecie JAX-WS: " + name;

}

}
```

1.3 Tworzenie Endpoint publikatora.

```
package webservices;

import javax.xml.ws.Endpoint;
import org.jg.rsi.HelloWorldImpl;

public class HelloWorldPublisher {

    public static void main(String[] args) {
        Endpoint.publish("http://localhost:9999/ws/hello", new HelloWorldImpl());
        System.out.println("Web serwis czeka na kliena....");
    }
```

```
run:
Web serwis czeka na kliena....
```

Publikowanie serwisu (bez użycia serwera Glassfish) do celów testowych (szybsze, prostrze)

```
Endpoint.publish("http://localhost:9999/ws/hello", new HelloWorldImpl());
```

Ćwiczenie 2. Podgląd WSDL serwisu

W naszym przypadku serwis powinien być dostpny pod adresem http://localhost:9999/ws/hello

Aby sprawdzić czy działa i pobrać WSDL należy użyć w przeglądarce http://localhost:9999/ws/hello?wsdl (do nazwy serwisu dodano: ?wsdl)

localhost:9999/ws/hello?wsdl

Podany plik XML nie zawiera żadnych informacji o stylach z nim związanych. Poniżej wyświetlone jest drzewo doku

```
- <!--
    Published by JAX-WS RI (http://jax-ws.java.net). RI's version is JAX-WS RI 2.2.9-b130926.1
  -->
- <!--
    Generated by JAX-WS RI (http://jax-ws.java.net). RI's version is JAX-WS RI 2.2.9-b130926.1
  -->
- <definitions targetNamespace="http://rsi.jg.org/" name="HelloWorldImplService">
  - <types>
    - <xsd:schema>
        <xsd:import namespace="http://rsi.jg.org/" schemaLocation="http://localhost:9999/ws/hello?xsd=1"/>
      </xsd:schema>
    </types>
  - <message name="getHelloWorldAsString">
      <part name="parameters" element="tns:getHelloWorldAsString"/>
    </message>
  - <message name="getHelloWorldAsStringResponse">
      <part name="parameters" element="tns:getHelloWorldAsStringResponse"/>
    </message>
  - <portType name="HelloWorld">
```

ZADANIA:

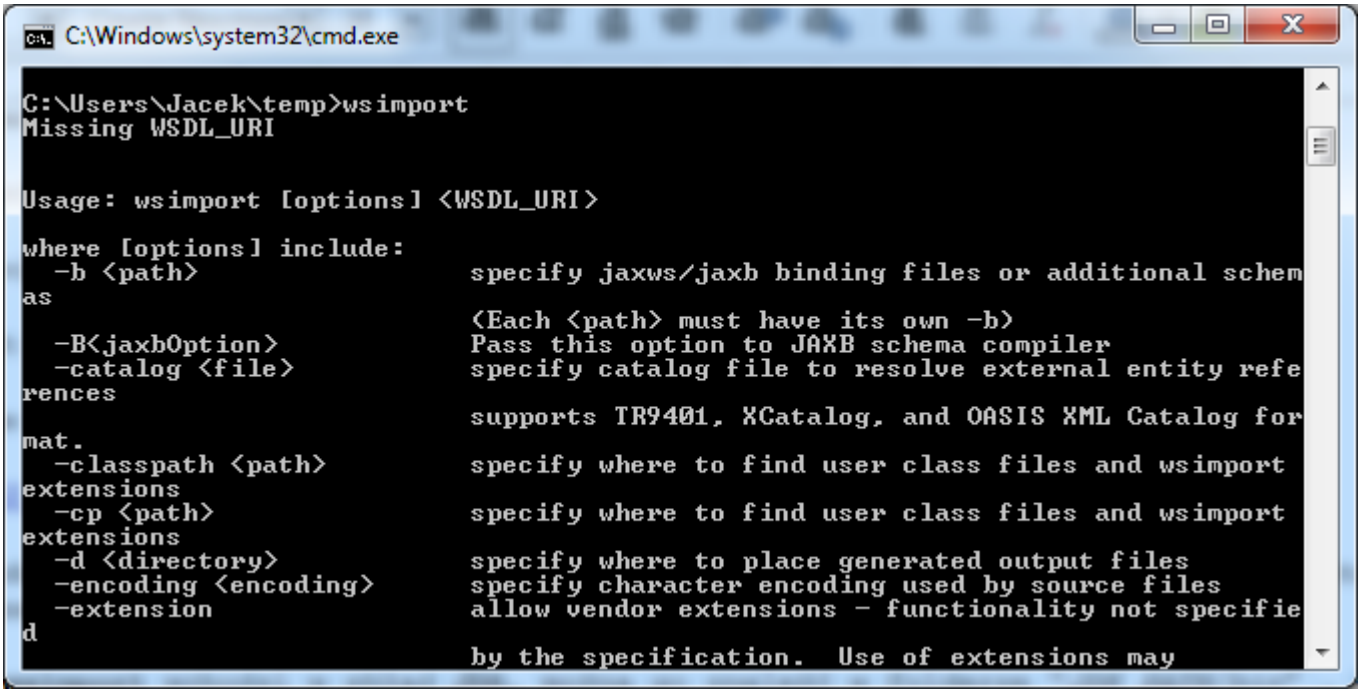
- Przeanalizować zawartość pliku WSDL
- Znaleźć znaczniki:
- <service name=...
- <port name=...
- Gdzie jest zdefiniowany XSD (XML Schema Definition)

Ćwiczenie 3. Tworzenie aplikacji klienta do web serwisu

Użyj narzędzia "**wsimport**" do parsowania publicznego pliku **wsdl**, i wygenerowanie potrzebnych dla klienta **plików** (stub) do dostępu do opublikowanego serwisu.

Narzędzie wsimport wchodzi w skład **JDK**, można go znaleźć w folderze "*JDK_PATH/bin*" .

Utwórz katalog np. **temp** a następnie będąc w nim uruchom **wsimport**



```
C:\Windows\system32\cmd.exe

C:\Users\Jacek\temp>wsimport -keep http://localhost:9999/ws/hello?wsdl
parsing WSDL...


Generating code...


Compiling code...


C:\Users\Jacek\temp>_
```

Skopiuj wygenerowane ***.java** files skopiuj do swego projektu.

Dla zainteresowanych - przetestuj różne opcje programu **wsimport (-s, -verbose, -d).**

Uruchom klienta.

```
14
15  public class WebServicesClient {
16
17      public static void main(String[] args) {
18          HelloWorldImplService helloService = new HelloWorldImplService();
19          HelloWorld hello = helloService.getHelloWorldImplPort();
20
21          String zapytanie = "To ja - KLIENT";
22          String response = hello.getHelloWorldAsString(zapytanie);
23          System.out.println("Klient wysłał: " + zapytanie);
24          System.out.println("Klient otrzymał: " + response);
25      }
26  }
27
```

```
run:
Klient wysłał: To ja - KLIENT
Klient otrzymał: Witaj świecie JAX-WS: To ja - KLIENT
BUILD SUCCESSFUL (total time: 0 seconds)
```

ZADANIA:

Sprawdź co zawierają pliki:

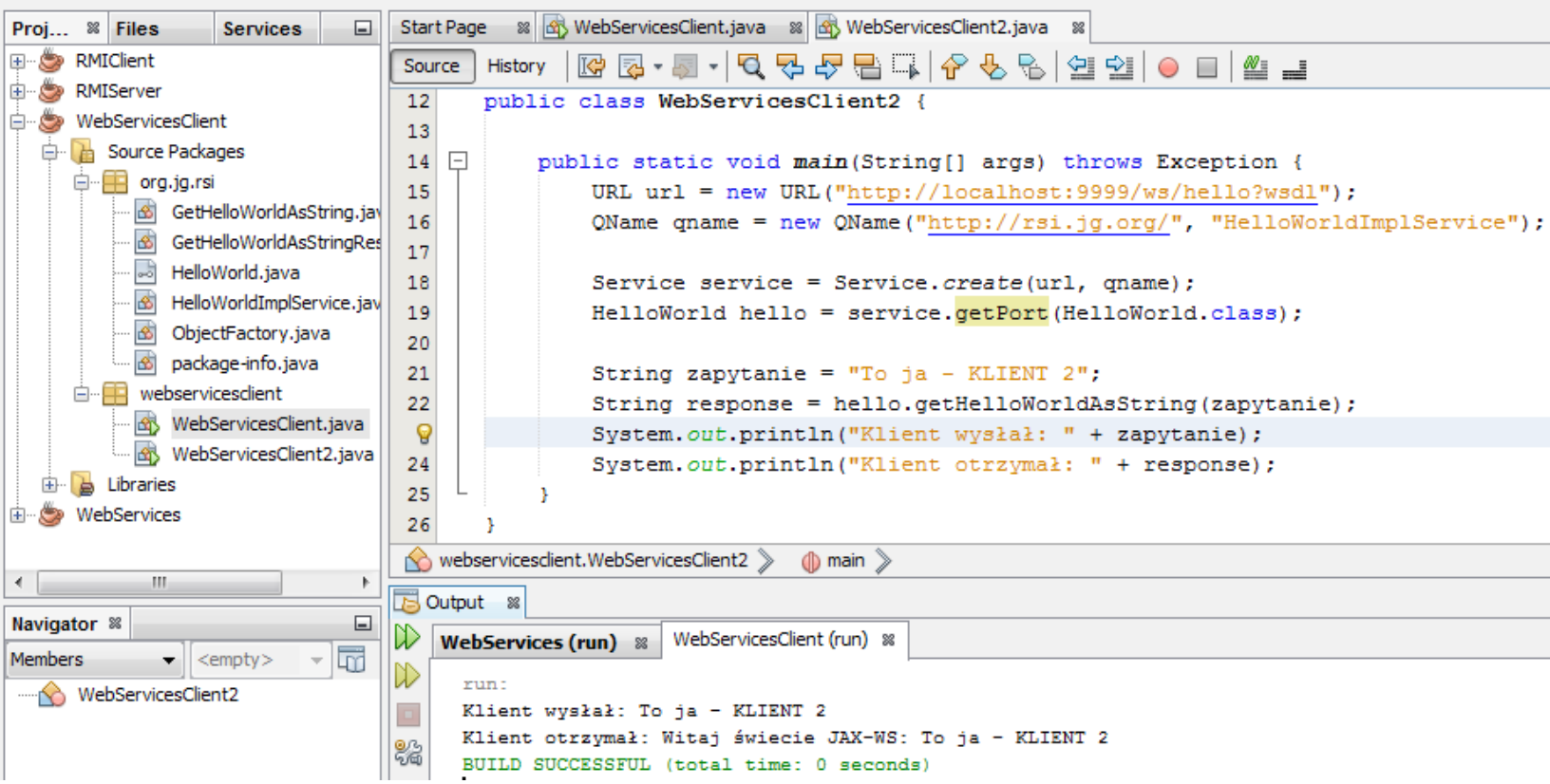
- HelloWorldImplService.java
- HelloWorld.java

Znajdź gdzie w pliku WSDL są wskazane nazwy:

- HelloWorldImplService

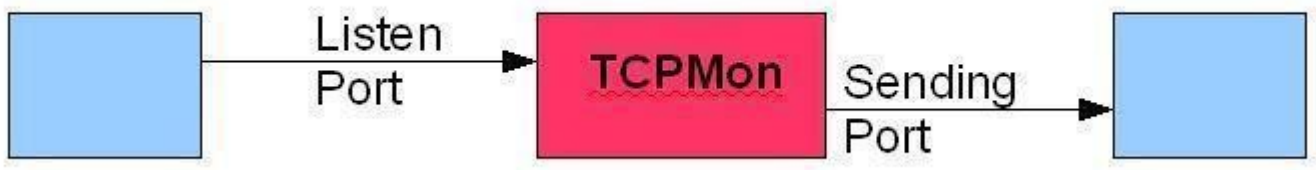
- HelloWorldImplPort
- HelloWorld

Ćwiczenie 4. Tworzenie aplikacji klienta ver.2 do web serwisu



Ćwiczenie 5. Monitorowanie pracy serwisu

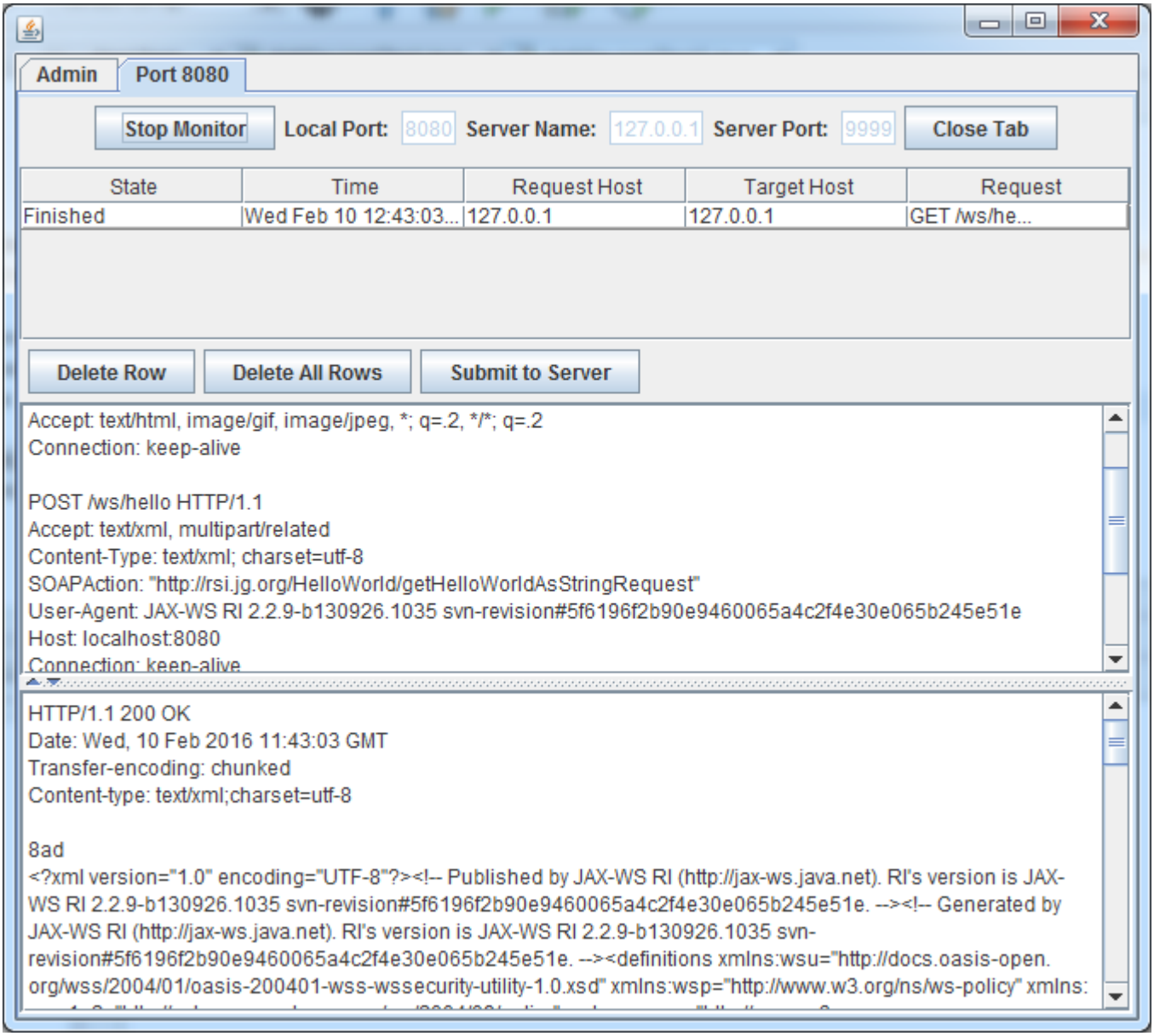
tcpmon - A Utility to Monitor A TCP Connection. TCPMon is a utility that allows the user to monitor the messages passed along in TCP based conversation. It is based on a swing UI and works on almost all platforms that Java supports. The aim of this simple tutorial is to explain how TCPMon works and also to explain some of its features.




```
1. Client ----> SOAP envelope ----> TcpMonitor:8080
2. TcpMonitor:8080 --> SOAP envelope ---> Server:9999
3. Server:9999 ----> SOAP envelope ---> TcpMonitor:8080
4. TcpMonitor:8080 ----> SOAP envelope ---> Client
```

Użytkowanie tcpmon tutorial

tcpmon.jar



Przy użyciu klienta 2 zmień numer portu w kodzie tak aby zapytanie przechodziło przez TCP Monitor

ZADANIA:

Na podstawie otrzymanych danych z TCP Monitor

1. Przeanalizuj zapytanie od klienta
    - nagłówek HTTP
    - Zawartość komunikatu SOAP
2. Przeanalizuj odpowiedź do serwera
    - nagłówek HTTP
    - Zawartość komunikatu SOAP

PS. How to change webservice url endpoint?

```
EchoService service = new EchoService();

Echo port = service.getEchoPort();

/* Set NEW Endpoint Location */

String endpointURL = "http://NEW_ENDPOINT_URL";

BindingProvider bp = (BindingProvider)port;

Srting address = (String) bp.getRequestContext().get(BindingProvider.ENDPOINT_ADDRESS_PROPERTY);

address = address.replaceFirst(„8080”, „4040”)

bp.getRequestContext().put(BindingProvider.ENDPOINT_ADDRESS_PROPERTY, address);

System.out.println("Server said: " + echo.echo(args[0]));
```