# 北京邮电大学软件学院

# 2019-2020 学年第 1 学期实验报告

**课程名称：** **XML & Web Service**

**实验名称：** web services implementation

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**日　　期：** 2019 **年** 12 **月** 29 **日**

## 一、 实验目的

通过本次实验了解并掌握 SOAP 协议和 WSDL

## 二、 实验内容

1. 创建 AddString 和 CompareStr 两个服务。

2. 使用 JAX_WS package 完成上面两个服务，创建 service 和 client 端，并使用 SoapUI 查看请求和响应，还有 XSDL，使用 *Web Services Explorer* 查看信息交换。

3. 使用 JDK1.6 package 完成上面两个服务，创建 service 和 client 端，并使用 SoapUI 查看请求和响应，还有 WSDL，使用 *Web Services Explorer* 查看信息交换。

## 三、 实验环境

Windows10、myEclipse、SoapUI

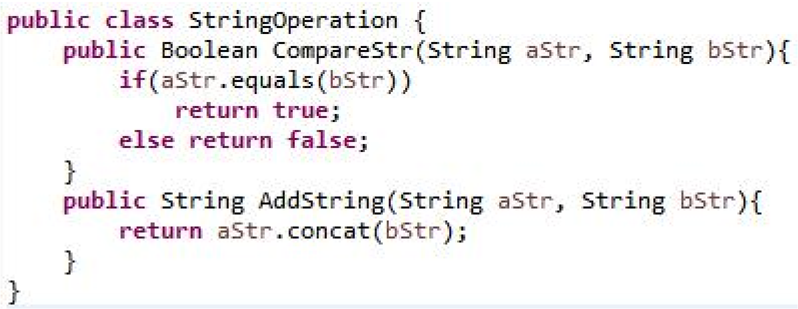
## 四、 实验结果

成功创建 AddString 和 CompareStr 两个服务，并且成功使用了 JAX_WS package 和 JDK1.6 package 完成了服务的使用，成功使用 SoapUI 进行了请求和回应的查看，使用浏览器查看了 WDSL 的内容。

# 五、 附录

## 5.1 创建 CompareStr( )和 AddString( )两个 web service

### 5.1.1 代码

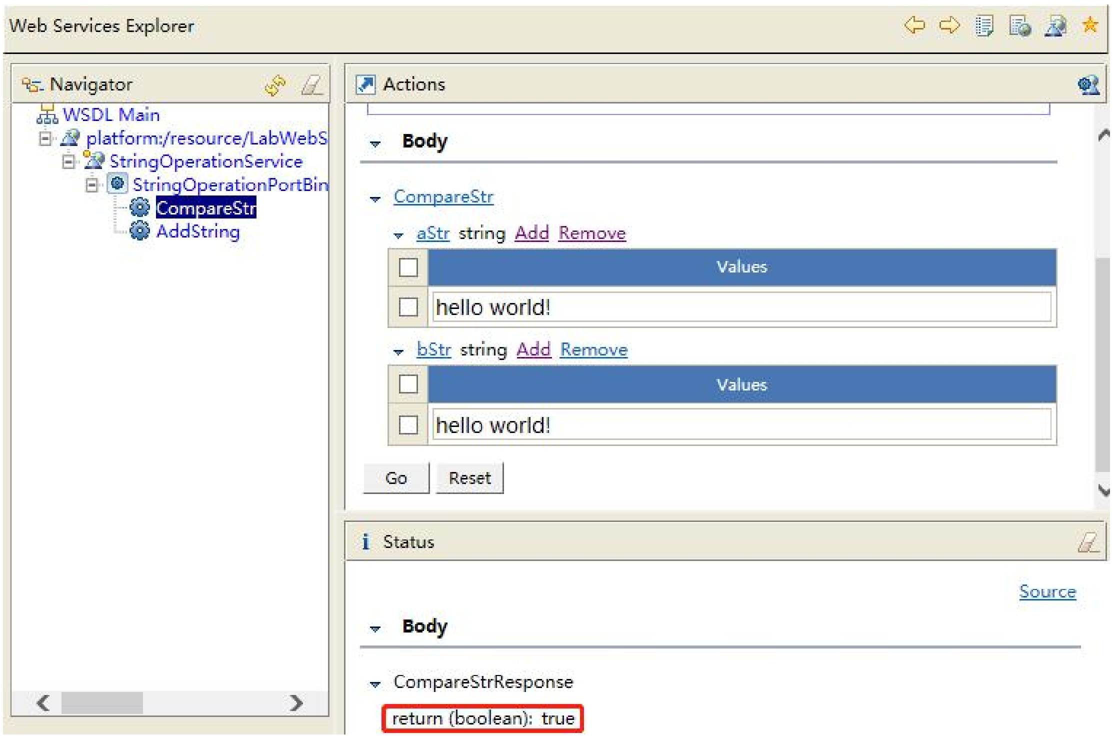


```
public class StringOperation {
    public Boolean CompareStr(String aStr, String bStr){
        if(aStr.equals(bStr))
            return true;
        else return false;
    }
    public String AddString(String aStr, String bStr){
        return aStr.concat(bStr);
    }
}
```

### 5.1.2 web service explorer 实验截图

### （1） CompareStr( ) web 服务

### aStr 和 bStr 相同时

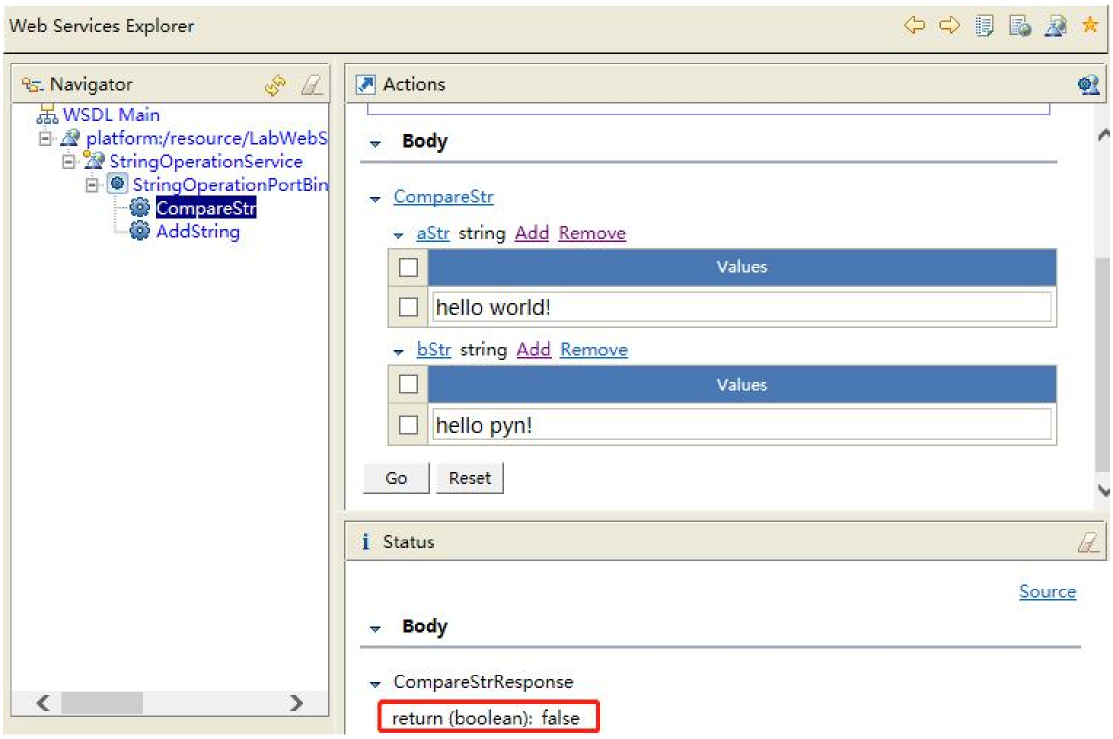


aStr: hello world!

bStr: hello world!

return (boolean): true

### aStr 和 bStr 不同时

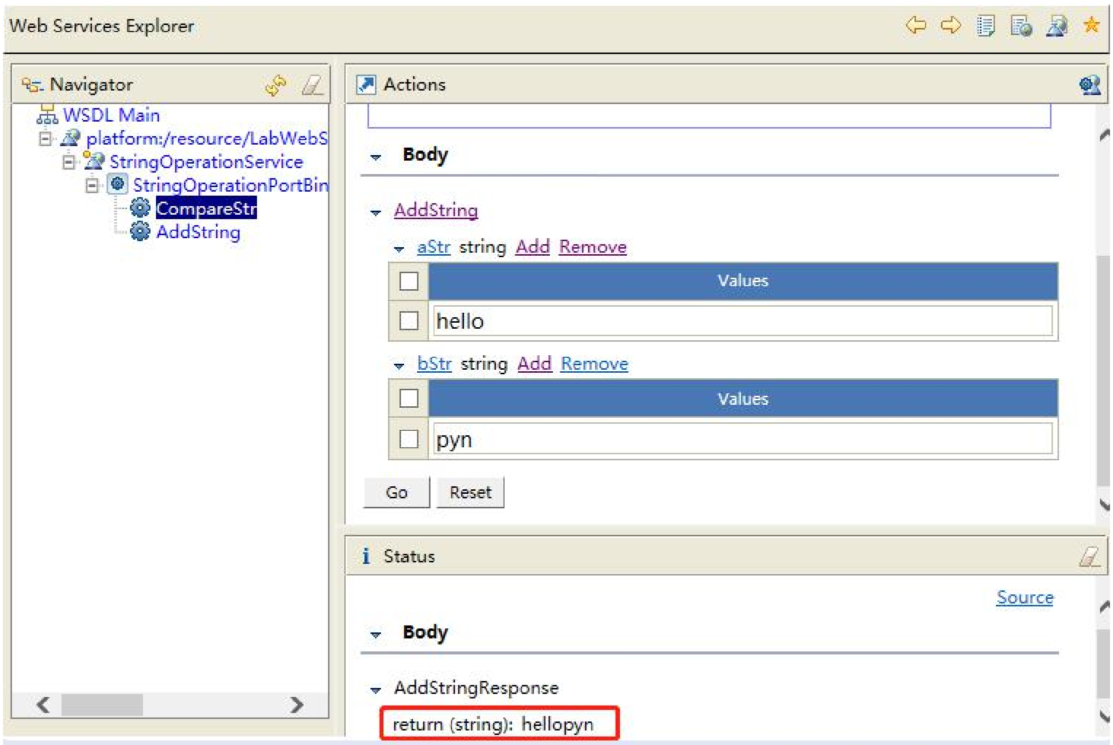


□ hello world!

□ hello pyn!

return (boolean): false

### （2） AddString( ) web 服务



□ hello

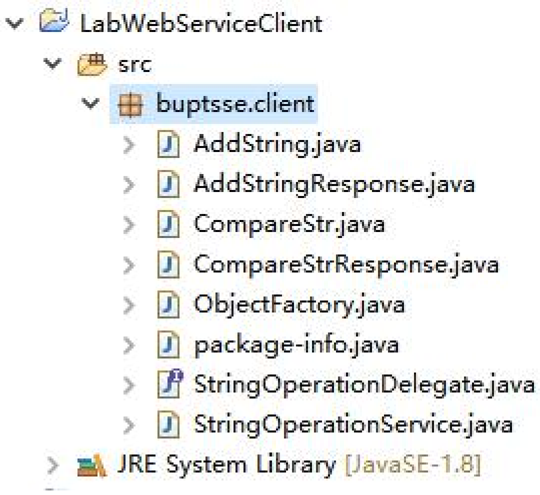
□ pyn

return (string): hellopyn

## 5.2 implement the service

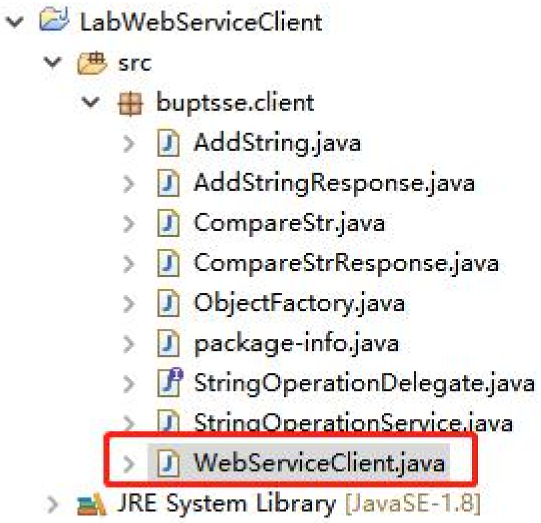
A. Using JAX_WS package to implement the above two methods, write the service and its client side.

### 创建 java project，并生成 web service client



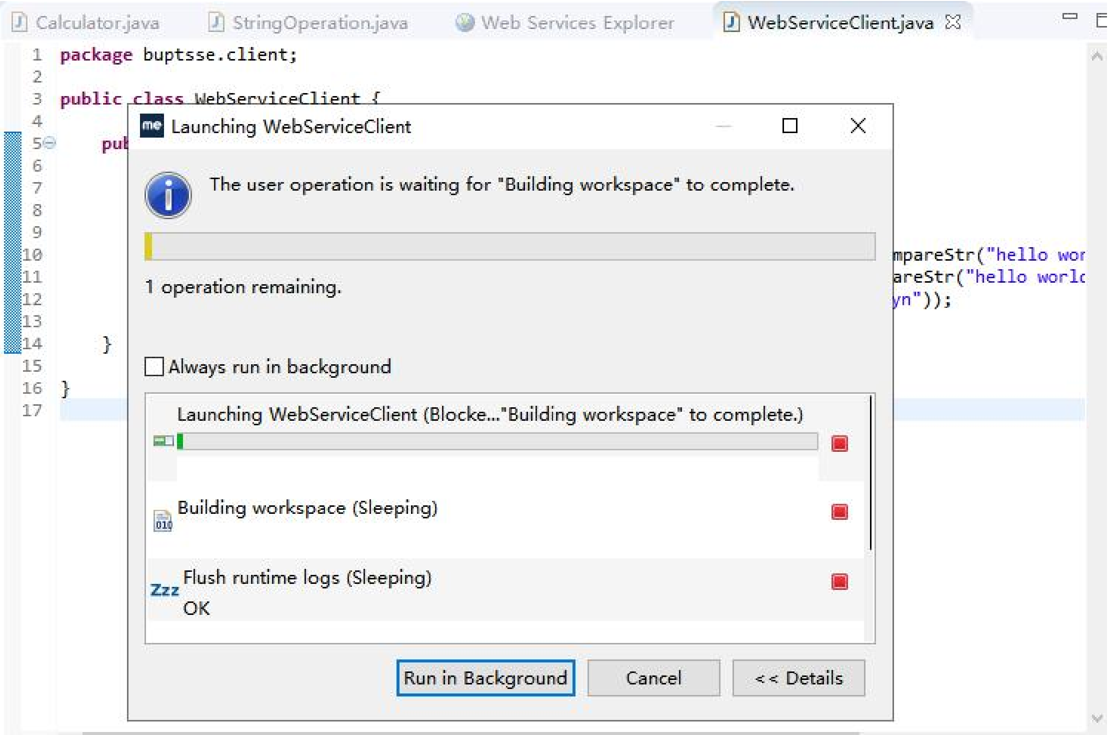
```
LabWebServiceClient
  src
    buptsse.client
      AddString.java
      AddStringResponse.java
      CompareStr.java
      CompareStrResponse.java
      ObjectFactory.java
      package-info.java
      StringOperationDelegate.java
      StringOperationService.java
  JRE System Library [JavaSE-1.8]
```

### 创建 java 类，名为 WebServiceClient



```
LabWebServiceClient
  src
    buptsse.client
      AddString.java
      AddStringResponse.java
      CompareStr.java
      CompareStrResponse.java
      ObjectFactory.java
      package-info.java
      StringOperationDelegate.java
      StringOperationService.java
      WebServiceClient.java
  JRE System Library [JavaSE-1.8]
```

### 运行客户端



```
package buptsse.client;

public class WebServiceClient {

    pub
                                                    mpareStr("hello wor
                                                    areStr("hello worlc
                                                    yn"));
    }
}
```

Launching WebServiceClient

The user operation is waiting for "Building workspace" to complete.

1 operation remaining.

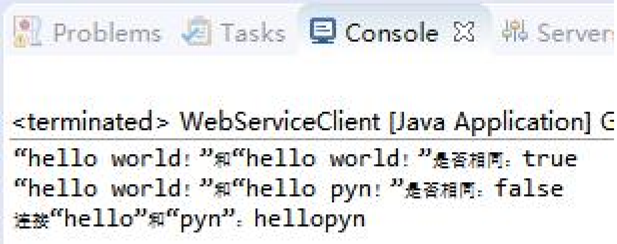
□ Always run in background

Launching WebServiceClient (Blocke..."Building workspace" to complete.)

Building workspace (Sleeping)

Flush runtime logs (Sleeping)
OK

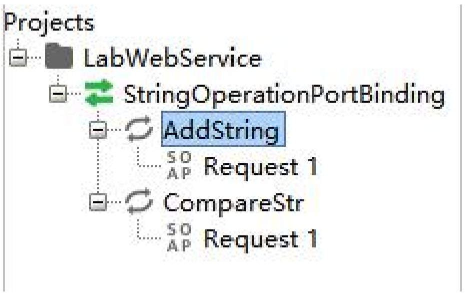
### 运行结果



```
<terminated> WebServiceClient [Java Application] C
“hello world! ”和“hello world! ”是否相同: true
“hello world! ”和“hello pyn! ”是否相同: false
连接“hello”和“pyn”: hellopyn
```

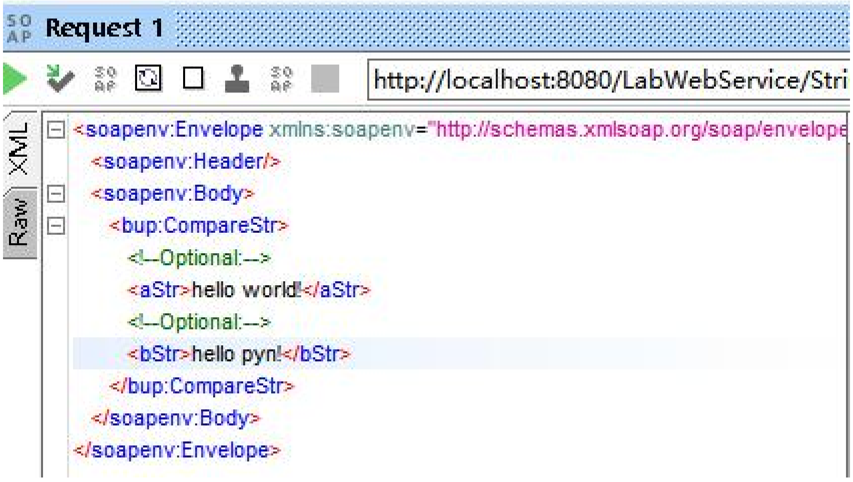
B. using SOAPUI tool to display the process of message exchange by display the SOAP request XML、 SOAP response XML and wsdl.

### 下图为在 SOAPUI 中创建的 SOAP 项目



```
Projects
  LabWebService
    StringOperationPortBinding
      AddString
        Request 1
      CompareStr
        Request 1
```

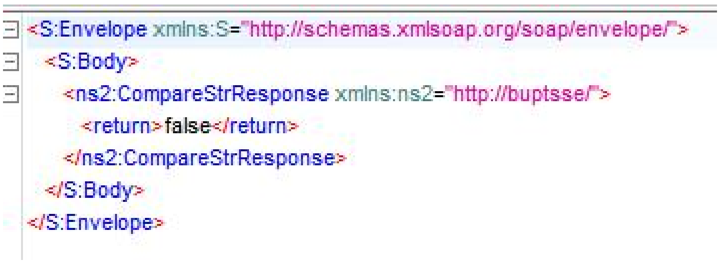
## CompareStr 的请求



http://localhost:8080/LabWebService/Stri

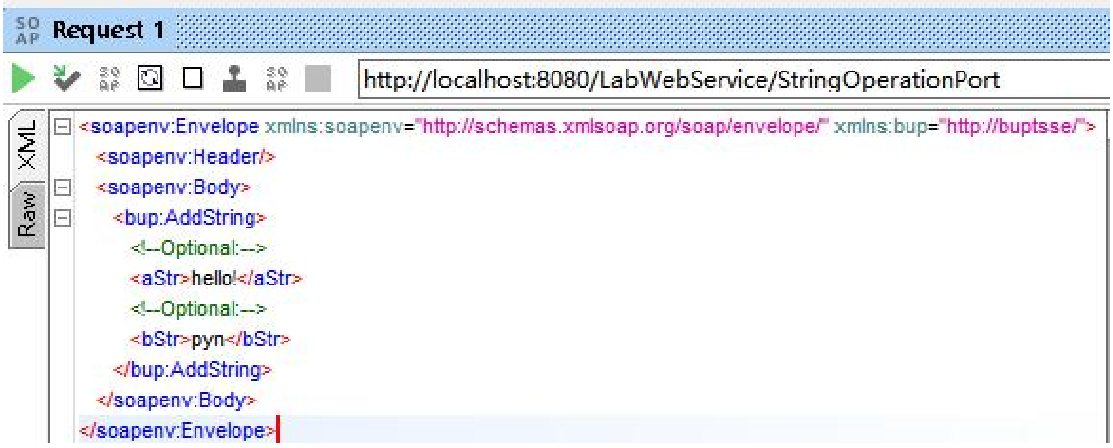
```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope
  <soapenv:Header/>
  <soapenv:Body>
    <bup:CompareStr>
      <!--Optional:-->
      <aStr>hello world!</aStr>
      <!--Optional:-->
      <bStr>hello pyn!</bStr>
    </bup:CompareStr>
  </soapenv:Body>
</soapenv:Envelope>
```

## CompareStr 的响应



```
<S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/">
  <S:Body>
    <ns2:CompareStrResponse xmlns:ns2="http://buptsse/">
      <return>false</return>
    </ns2:CompareStrResponse>
  </S:Body>
</S:Envelope>
```

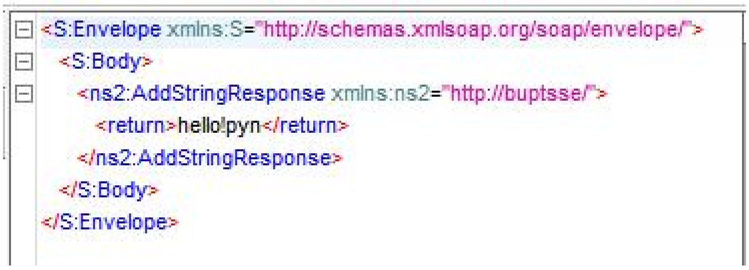
## AddString 的请求



http://localhost:8080/LabWebService/StringOperationPort

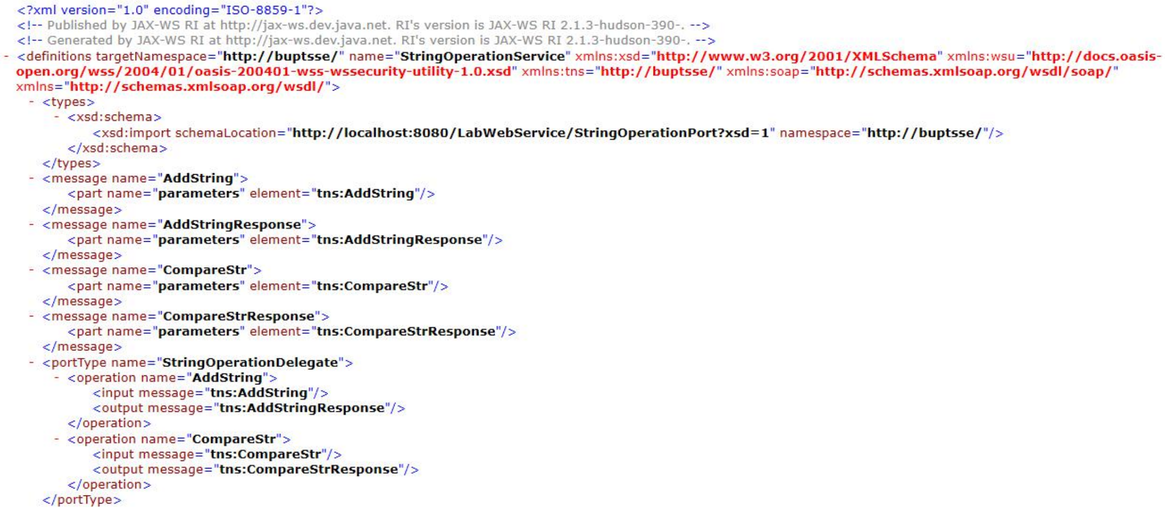
```xml
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:bup="http://buptsse/">
   <soapenv:Header/>
   <soapenv:Body>
      <bup:AddString>
         <!--Optional:-->
         <aStr>hello!</aStr>
         <!--Optional:-->
         <bStr>pyn</bStr>
      </bup:AddString>
   </soapenv:Body>
</soapenv:Envelope>
```

## AddString 的响应

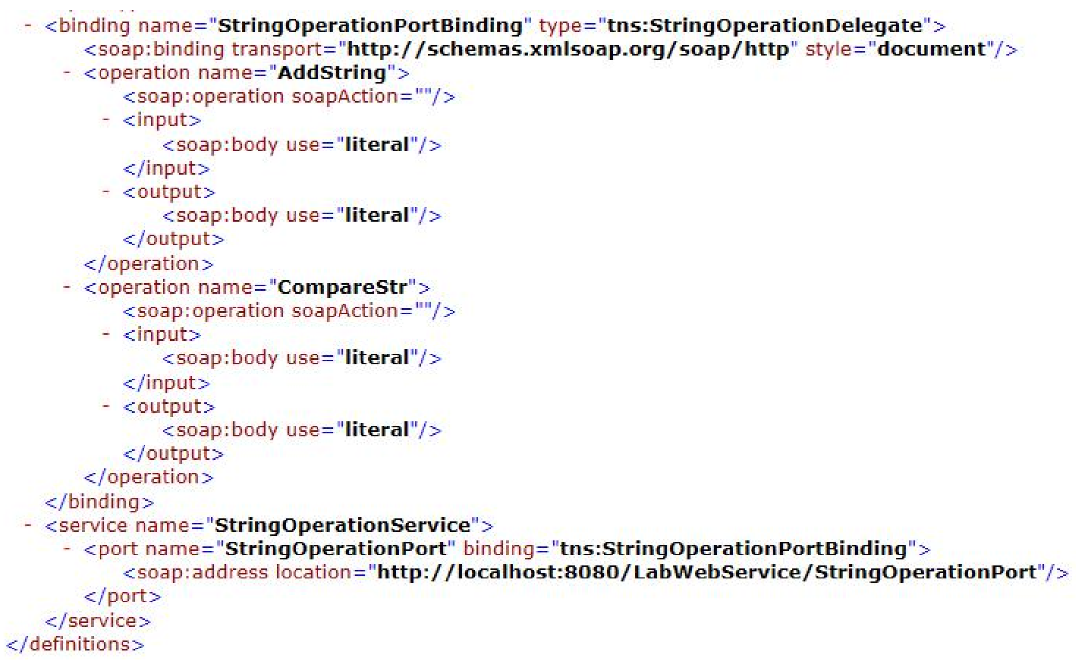


```xml
<S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/">
   <S:Body>
      <ns2:AddStringResponse xmlns:ns2="http://buptsse/">
         <return>hello!pyn</return>
      </ns2:AddStringResponse>
   </S:Body>
</S:Envelope>
```

## WSDL 信息



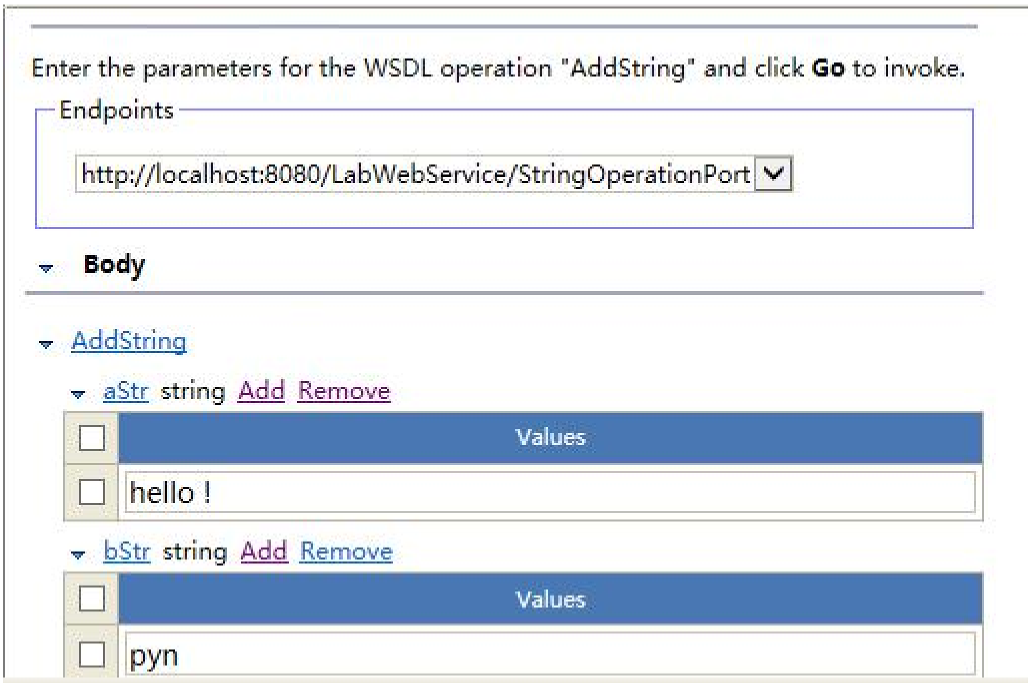
```xml
  <?xml version="1.0" encoding="ISO-8859-1"?>
  <!-- Published by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is JAX-WS RI 2.1.3-hudson-390-. -->
  <!-- Generated by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is JAX-WS RI 2.1.3-hudson-390-. -->
- <definitions targetNamespace="http://buptsse/" name="StringOperationService" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd" xmlns:tns="http://buptsse/" xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/" xmlns="http://schemas.xmlsoap.org/wsdl/">
  - <types>
    - <xsd:schema>
        <xsd:import schemaLocation="http://localhost:8080/LabWebService/StringOperationPort?xsd=1" namespace="http://buptsse/"/>
      </xsd:schema>
    </types>
  - <message name="AddString">
      <part name="parameters" element="tns:AddString"/>
    </message>
  - <message name="AddStringResponse">
      <part name="parameters" element="tns:AddStringResponse"/>
    </message>
  - <message name="CompareStr">
      <part name="parameters" element="tns:CompareStr"/>
    </message>
  - <message name="CompareStrResponse">
      <part name="parameters" element="tns:CompareStrResponse"/>
    </message>
  - <portType name="StringOperationDelegate">
    - <operation name="AddString">
        <input message="tns:AddString"/>
        <output message="tns:AddStringResponse"/>
      </operation>
    - <operation name="CompareStr">
        <input message="tns:CompareStr"/>
        <output message="tns:CompareStrResponse"/>
      </operation>
    </portType>
```



```
  - <binding name="StringOperationPortBinding" type="tns:StringOperationDelegate">
      <soap:binding transport="http://schemas.xmlsoap.org/soap/http" style="document"/>
    - <operation name="AddString">
        <soap:operation soapAction=""/>
      - <input>
          <soap:body use="literal"/>
        </input>
      - <output>
          <soap:body use="literal"/>
        </output>
      </operation>
    - <operation name="CompareStr">
        <soap:operation soapAction=""/>
      - <input>
          <soap:body use="literal"/>
        </input>
      - <output>
          <soap:body use="literal"/>
        </output>
      </operation>
    </binding>
  - <service name="StringOperationService">
    - <port name="StringOperationPort" binding="tns:StringOperationPortBinding">
        <soap:address location="http://localhost:8080/LabWebService/StringOperationPort"/>
      </port>
    </service>
</definitions>
```

C. Using Web Services Explorer in MyEclips to display your message exchange.

**AddString 的 web services**



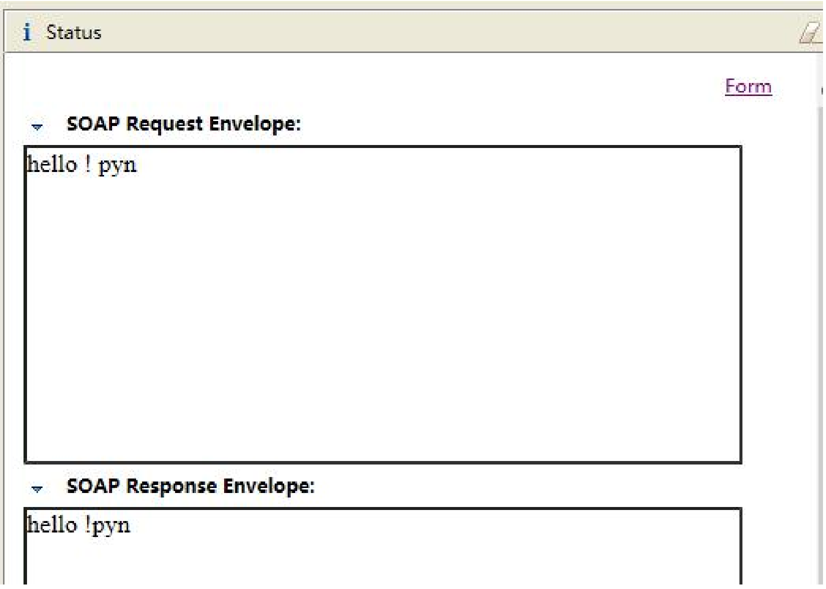
Enter the parameters for the WSDL operation "AddString" and click **Go** to invoke.

Endpoints

http://localhost:8080/LabWebService/StringOperationPort

| □ | Values |
|---|---|
| □ | hello ! |

| □ | Values |
|---|---|
| □ | pyn |



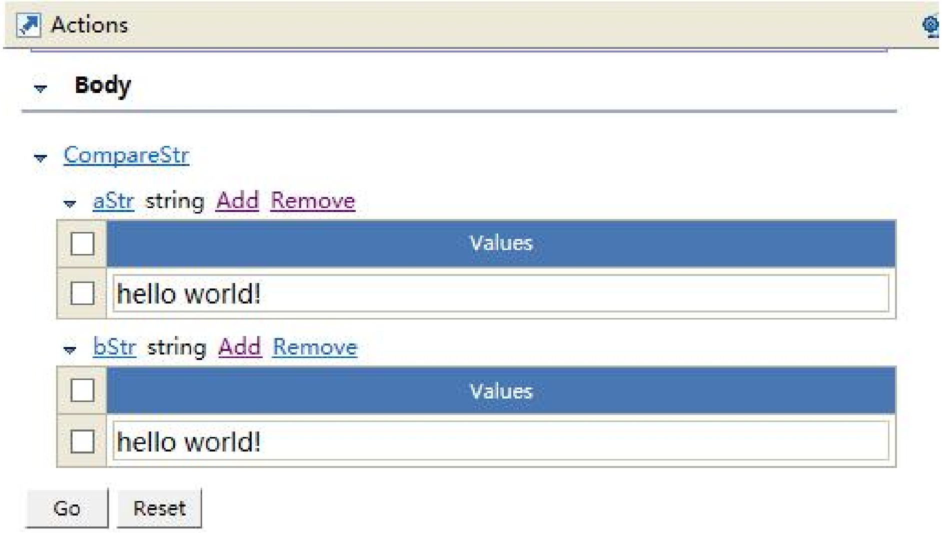
SOAP Request Envelope:

hello ! pyn

SOAP Response Envelope:

hello !pyn

## CompareStr 的 web services

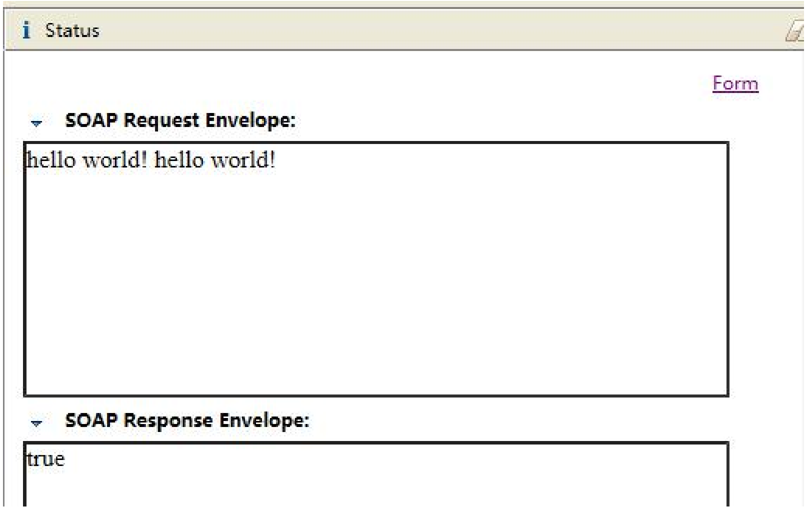


aStr string

□ hello world!

bStr string

□ hello world!



SOAP Request Envelope:

hello world! hello world!

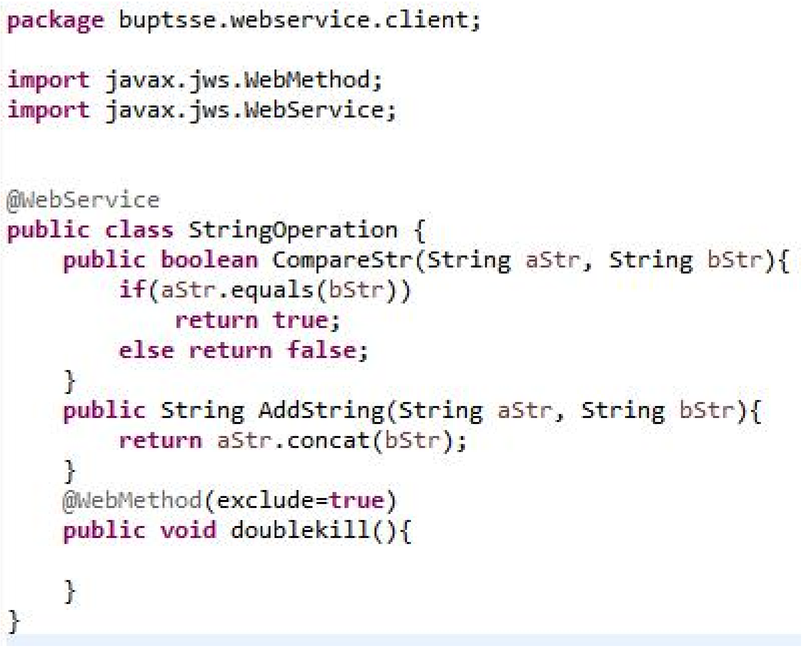
SOAP Response Envelope:

true

## 5.3 implement the service

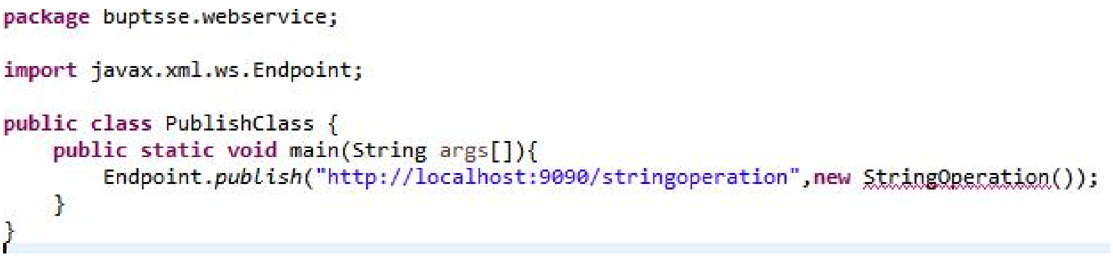
A. Using JDK1.6 package directly to implement the above two methods, write the service and its client side(with wsimport command).

### 下图为 StringOperation 类的代码



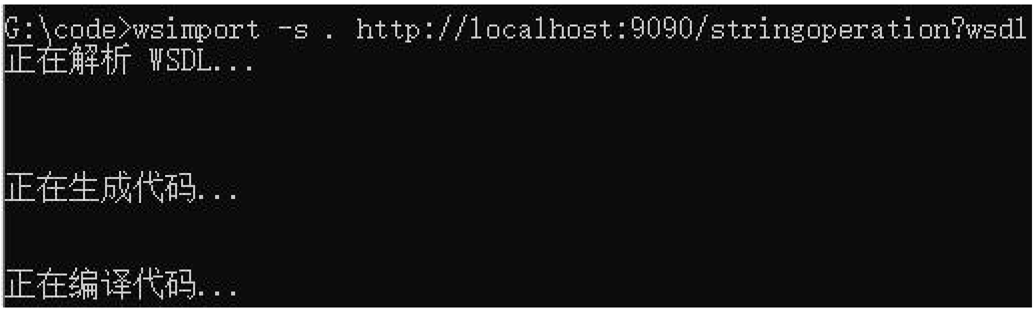
```
package buptsse.webservice.client;

import javax.jws.WebMethod;
import javax.jws.WebService;


@WebService
public class StringOperation {
    public boolean CompareStr(String aStr, String bStr){
        if(aStr.equals(bStr))
            return true;
        else return false;
    }
    public String AddString(String aStr, String bStr){
        return aStr.concat(bStr);
    }
    @WebMethod(exclude=true)
    public void doublekill(){

    }
}
```

### 下方为 PublishClass 类的代码



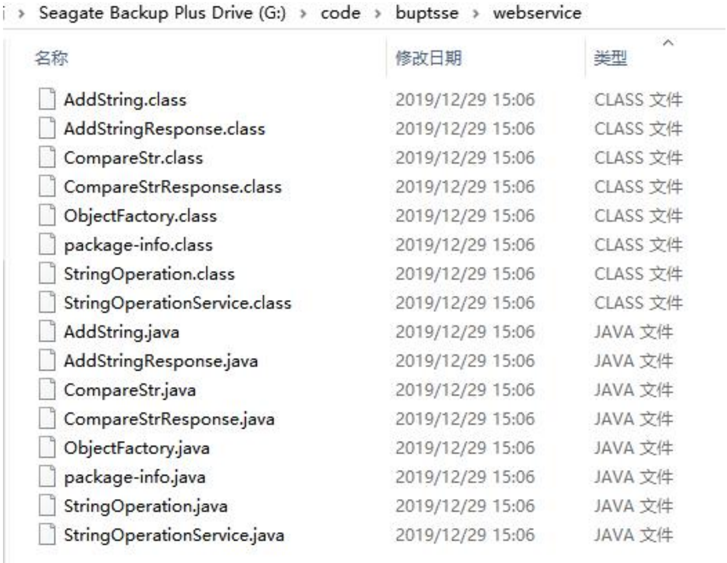
```
package buptsse.webservice;

import javax.xml.ws.Endpoint;

public class PublishClass {
    public static void main(String args[]){
        Endpoint.publish("http://localhost:9090/stringoperation",new StringOperation());
    }
}
```

### 在命令行中生成代码



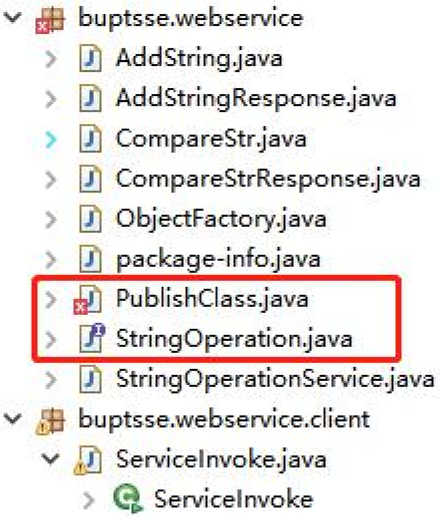
```
G:\code>wsimport -s . http://localhost:9090/stringoperation?wsdl
正在解析 WSDL...


正在生成代码...


正在编译代码...
```

**下图为生成的代码，并且将其粘贴进项目中**



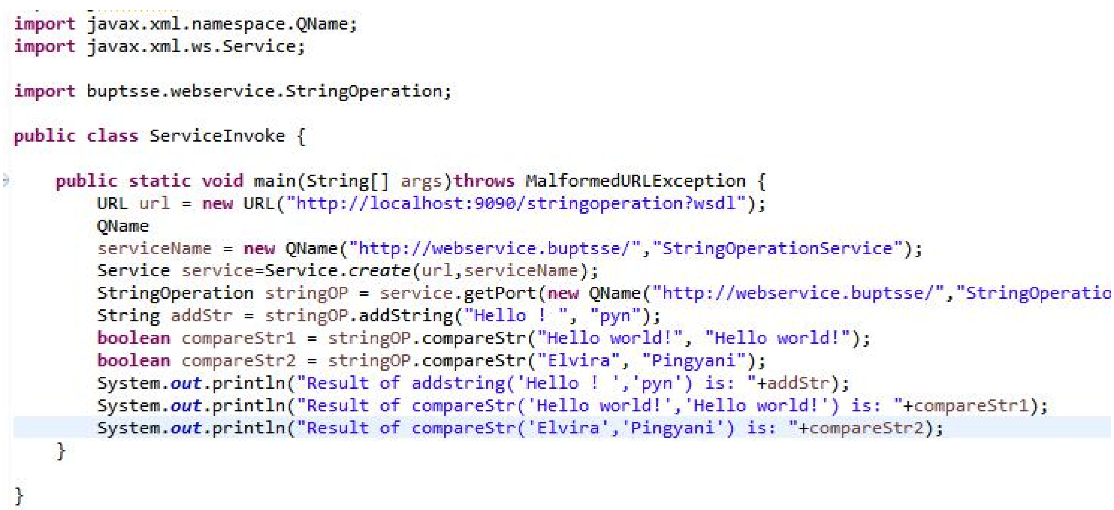
› Seagate Backup Plus Drive (G:) › code › buptsse › webservice

| 名称 | 修改日期 | 类型 |
|---|---|---|
| AddString.class | 2019/12/29 15:06 | CLASS 文件 |
| AddStringResponse.class | 2019/12/29 15:06 | CLASS 文件 |
| CompareStr.class | 2019/12/29 15:06 | CLASS 文件 |
| CompareStrResponse.class | 2019/12/29 15:06 | CLASS 文件 |
| ObjectFactory.class | 2019/12/29 15:06 | CLASS 文件 |
| package-info.class | 2019/12/29 15:06 | CLASS 文件 |
| StringOperation.class | 2019/12/29 15:06 | CLASS 文件 |
| StringOperationService.class | 2019/12/29 15:06 | CLASS 文件 |
| AddString.java | 2019/12/29 15:06 | JAVA 文件 |
| AddStringResponse.java | 2019/12/29 15:06 | JAVA 文件 |
| CompareStr.java | 2019/12/29 15:06 | JAVA 文件 |
| CompareStrResponse.java | 2019/12/29 15:06 | JAVA 文件 |
| ObjectFactory.java | 2019/12/29 15:06 | JAVA 文件 |
| package-info.java | 2019/12/29 15:06 | JAVA 文件 |
| StringOperation.java | 2019/12/29 15:06 | JAVA 文件 |
| StringOperationService.java | 2019/12/29 15:06 | JAVA 文件 |



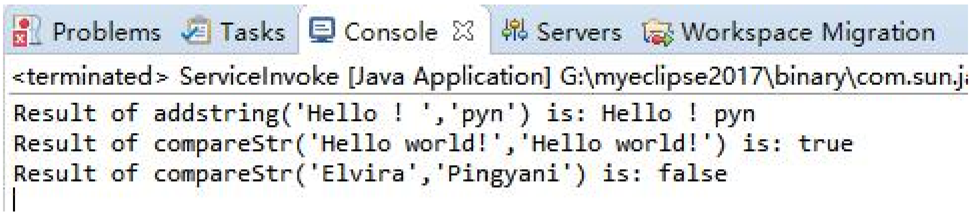
```
buptsse.webservice
    AddString.java
    AddStringResponse.java
    CompareStr.java
    CompareStrResponse.java
    ObjectFactory.java
    package-info.java
    PublishClass.java
    StringOperation.java
    StringOperationService.java
buptsse.webservice.client
    ServiceInvoke.java
        ServiceInvoke
```

**ServerInvoke 类的代码如下图所示**



```
import javax.xml.namespace.QName;
import javax.xml.ws.Service;

import buptsse.webservice.StringOperation;

public class ServiceInvoke {

    public static void main(String[] args)throws MalformedURLException {
        URL url = new URL("http://localhost:9090/stringoperation?wsdl");
        QName
        serviceName = new QName("http://webservice.buptsse/","StringOperationService");
        Service service=Service.create(url,serviceName);
        StringOperation stringOP = service.getPort(new QName("http://webservice.buptsse/","StringOperatio
        String addStr = stringOP.addString("Hello ! ", "pyn");
        boolean compareStr1 = stringOP.compareStr("Hello world!", "Hello world!");
        boolean compareStr2 = stringOP.compareStr("Elvira", "Pingyani");
        System.out.println("Result of addstring('Hello ! ','pyn') is: "+addStr);
        System.out.println("Result of compareStr('Hello world!','Hello world!') is: "+compareStr1);
        System.out.println("Result of compareStr('Elvira','Pingyani') is: "+compareStr2);
    }

}
```

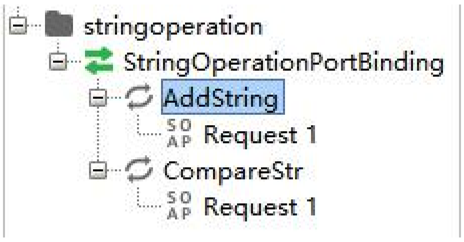
**运行结果**



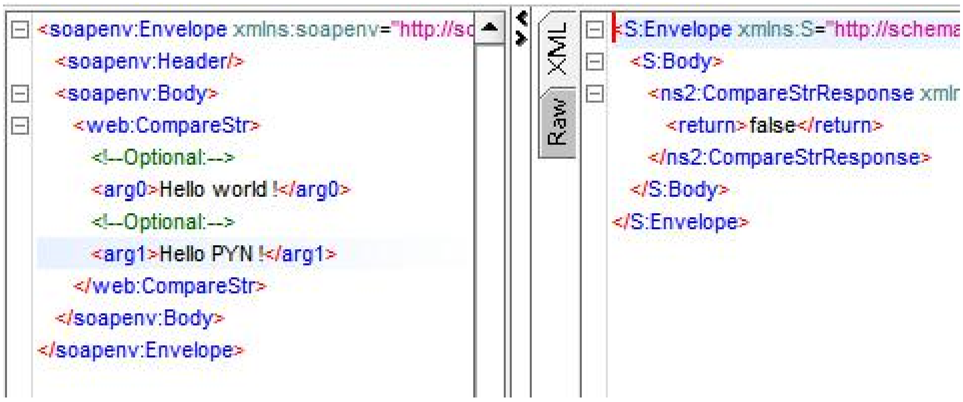
```
<terminated> ServiceInvoke [Java Application] G:\myeclipse2017\binary\com.sun.j
Result of addstring('Hello ! ','pyn') is: Hello ! pyn
Result of compareStr('Hello world!','Hello world!') is: true
Result of compareStr('Elvira','Pingyani') is: false
```

B. using SOAPUI tool to display the process of message exchange by display the SOAP request XML、 SOAP response XML and wsdl.

**使用 URL 为 http://localhost:9090/stringoperation?wsdl 在 SOAPUI 中创建 SOAP 项目，如下图所示**



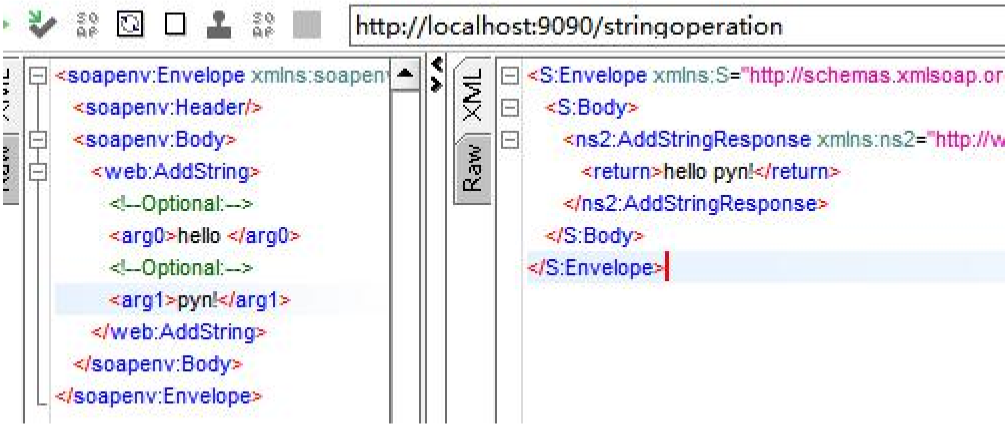
**下图为 CompareStr 的请求和响应**



```
<soapenv:Envelope xmlns:soapenv="http://sc
  <soapenv:Header/>
  <soapenv:Body>
    <web:CompareStr>
      <!--Optional:-->
      <arg0>Hello world !</arg0>
      <!--Optional:-->
      <arg1>Hello PYN !</arg1>
    </web:CompareStr>
  </soapenv:Body>
</soapenv:Envelope>
```

```
<S:Envelope xmlns:S="http://schema
  <S:Body>
    <ns2:CompareStrResponse xmlr
      <return>false</return>
    </ns2:CompareStrResponse>
  </S:Body>
</S:Envelope>
```

## 下图为 AddString 的请求和响应

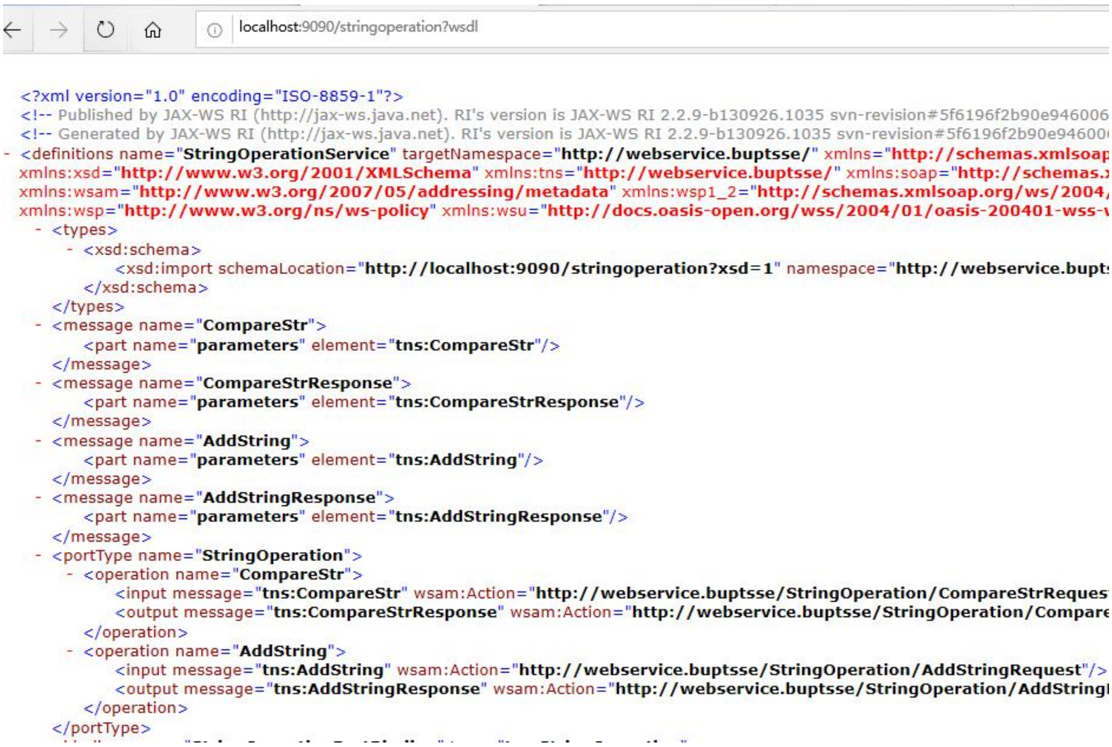


http://localhost:9090/stringoperation

```
<soapenv:Envelope xmlns:soapen
  <soapenv:Header/>
  <soapenv:Body>
    <web:AddString>
      <!--Optional:-->
      <arg0>hello </arg0>
      <!--Optional:-->
      <arg1>pyn!</arg1>
    </web:AddString>
  </soapenv:Body>
</soapenv:Envelope>
```

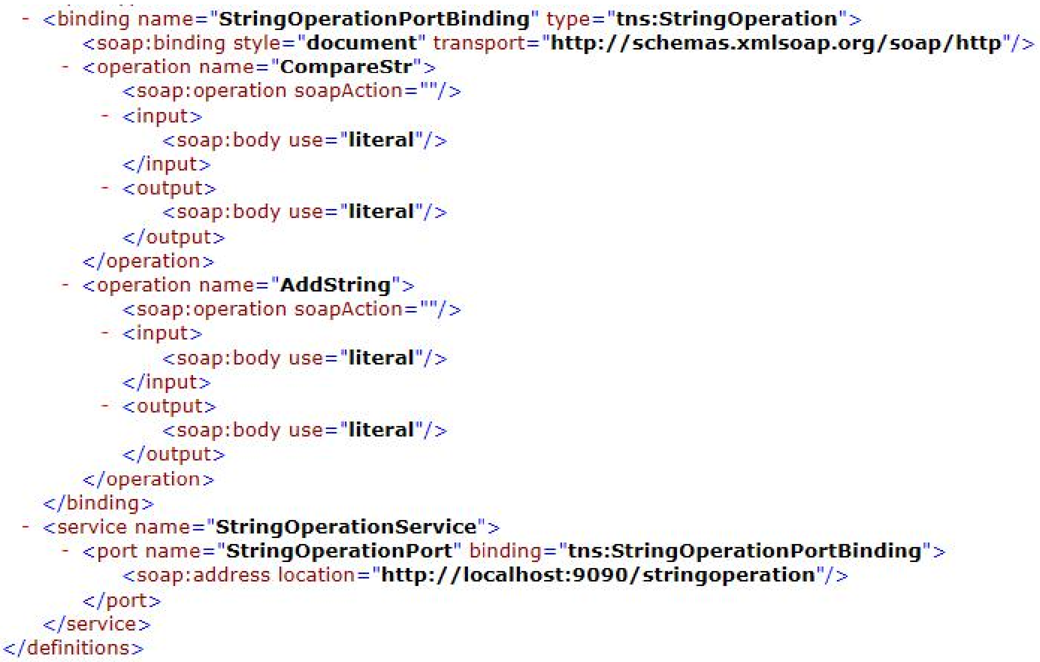
```
<S:Envelope xmlns:S="http://schemas.xmlsoap.or
  <S:Body>
    <ns2:AddStringResponse xmlns:ns2="http://w
      <return>hello pyn!</return>
    </ns2:AddStringResponse>
  </S:Body>
</S:Envelope>
```

## 下图为 WSDL 信息的截图



localhost:9090/stringoperation?wsdl

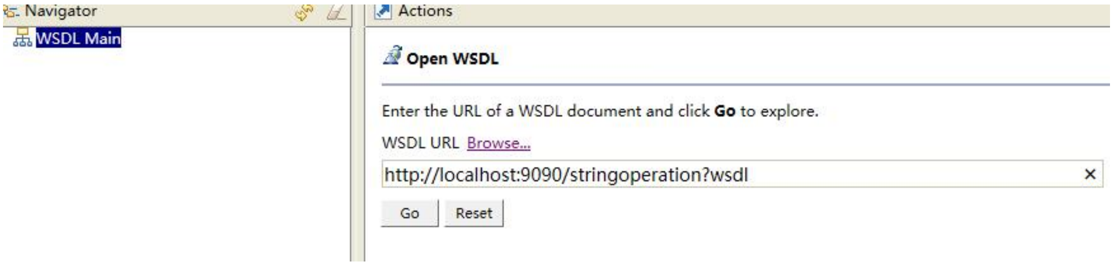
```
  <?xml version="1.0" encoding="ISO-8859-1"?>
  <!-- Published by JAX-WS RI (http://jax-ws.java.net). RI's version is JAX-WS RI 2.2.9-b130926.1035 svn-revision#5f6196f2b90e946006
  <!-- Generated by JAX-WS RI (http://jax-ws.java.net). RI's version is JAX-WS RI 2.2.9-b130926.1035 svn-revision#5f6196f2b90e94600
- <definitions name="StringOperationService" targetNamespace="http://webservice.buptsse/" xmlns="http://schemas.xmlsoap
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:tns="http://webservice.buptsse/" xmlns:soap="http://schemas.
  xmlns:wsam="http://www.w3.org/2007/05/addressing/metadata" xmlns:wsp1_2="http://schemas.xmlsoap.org/ws/2004/
  xmlns:wsp="http://www.w3.org/ns/ws-policy" xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-
  - <types>
    - <xsd:schema>
        <xsd:import schemaLocation="http://localhost:9090/stringoperation?xsd=1" namespace="http://webservice.bupt
      </xsd:schema>
    </types>
  - <message name="CompareStr">
      <part name="parameters" element="tns:CompareStr"/>
    </message>
  - <message name="CompareStrResponse">
      <part name="parameters" element="tns:CompareStrResponse"/>
    </message>
  - <message name="AddString">
      <part name="parameters" element="tns:AddString"/>
    </message>
  - <message name="AddStringResponse">
      <part name="parameters" element="tns:AddStringResponse"/>
    </message>
  - <portType name="StringOperation">
    - <operation name="CompareStr">
        <input message="tns:CompareStr" wsam:Action="http://webservice.buptsse/StringOperation/CompareStrReques
        <output message="tns:CompareStrResponse" wsam:Action="http://webservice.buptsse/StringOperation/Compare
      </operation>
    - <operation name="AddString">
        <input message="tns:AddString" wsam:Action="http://webservice.buptsse/StringOperation/AddStringRequest"/>
        <output message="tns:AddStringResponse" wsam:Action="http://webservice.buptsse/StringOperation/AddString
      </operation>
    </portType>
```



```
  - <binding name="StringOperationPortBinding" type="tns:StringOperation">
      <soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
    - <operation name="CompareStr">
        <soap:operation soapAction=""/>
      - <input>
          <soap:body use="literal"/>
        </input>
      - <output>
          <soap:body use="literal"/>
        </output>
      </operation>
    - <operation name="AddString">
        <soap:operation soapAction=""/>
      - <input>
          <soap:body use="literal"/>
        </input>
      - <output>
          <soap:body use="literal"/>
        </output>
      </operation>
    </binding>
  - <service name="StringOperationService">
    - <port name="StringOperationPort" binding="tns:StringOperationPortBinding">
        <soap:address location="http://localhost:9090/stringoperation"/>
      </port>
    </service>
</definitions>
```

C. Using Web Services Explorer in MyEclips to display your message exchange.

**打开 Web Services Explorer，输入 URL**



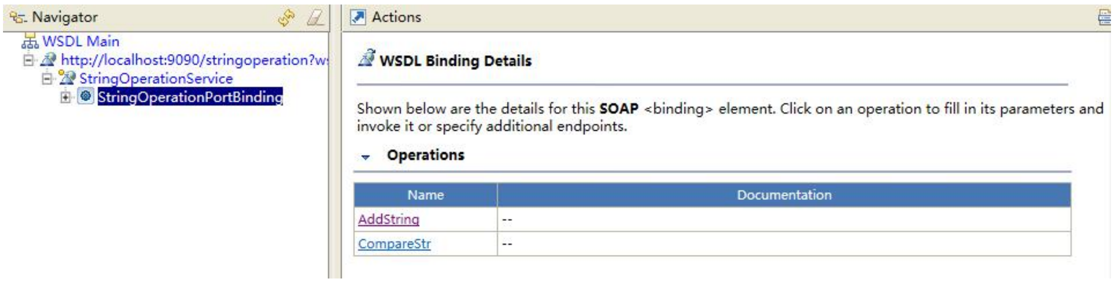
**Open WSDL**

Enter the URL of a WSDL document and click **Go** to explore.

WSDL URL Browse...

http://localhost:9090/stringoperation?wsdl

## 出现 Operations


Navigator
WSDL Main
http://localhost:9090/stringoperation?w
StringOperationService
StringOperationPortBinding
Actions

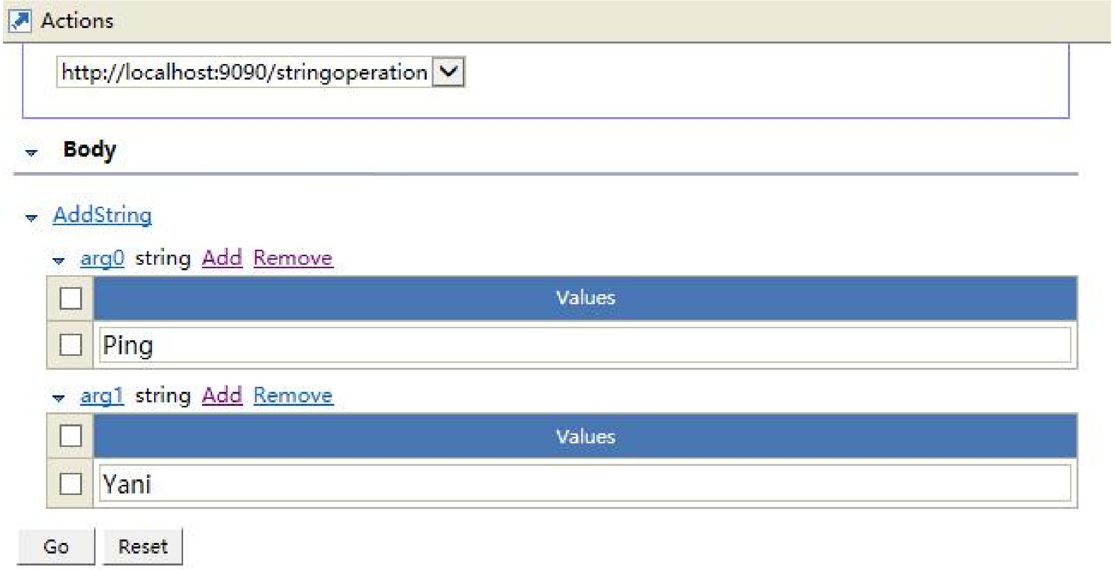
**WSDL Binding Details**

Shown below are the details for this **SOAP** <binding> element. Click on an operation to fill in its parameters and invoke it or specify additional endpoints.

**Operations**

| Name | Documentation |
|---|---|
| AddString | -- |
| CompareStr | -- |

## 下面是 AddString 操作的 source



http://localhost:9090/stringoperation

**Body**

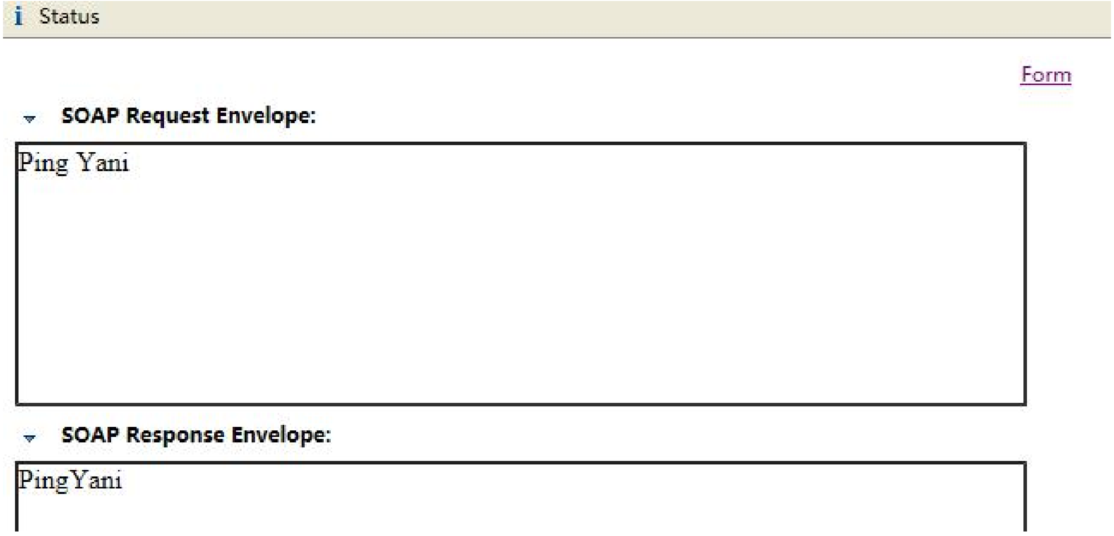
AddString

arg0 string Add Remove

| □ | Values |
|---|---|
| □ | Ping |

arg1 string Add Remove

| □ | Values |
|---|---|
| □ | Yani |



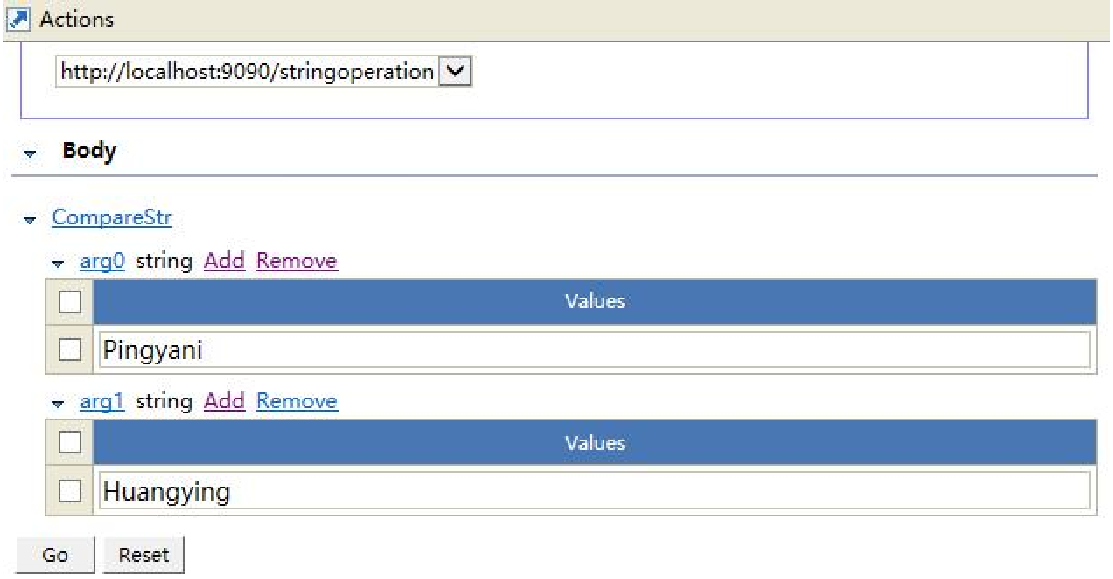
SOAP Request Envelope:

Ping Yani

SOAP Response Envelope:

PingYani

## 下面是 CompareStr 操作的 source



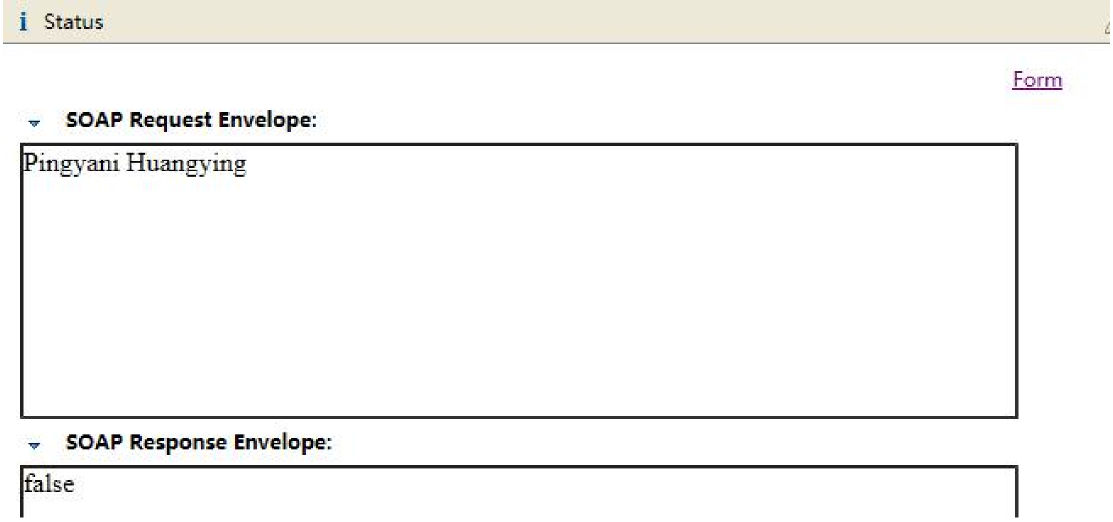
http://localhost:9090/stringoperation

arg0 string Add Remove

| □ | Values |
|---|---|
| □ | Pingyani |

arg1 string Add Remove

| □ | Values |
|---|---|
| □ | Huangying |



SOAP Request Envelope:

Pingyani Huangying

SOAP Response Envelope:

false