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Service Integration course

Bonita Connectors

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Contents

Chapter 1

Integrating Bonita

Source code snippets and URLs are available in https://svn.inf.mit.bme.hu/edu/trunk/mdsd/handout/public/2014/.

A detailed guide in Hungarian is available in https://njszt.hu/sites/default/files/Informatikai-Navigator-10.pdf.

1.1 Introduction

1. Start the **Bonita BPM Community** application and choose the **ApplicationStore (1.0)** process.
2. Start the workflow and inspect it. The **Show the application names** step shows the applications available in our application store. Currently this list is generated by the Groovy connector of the **Download the application names** task.
3. Go to the **Connectors** of the **Download the application names** task and delete the Groovy connector.

1.2 Creating a Connector

1. A connector consist of a **definition** (interface) and an implementation.
2. First, define the **definition**. Go to **Development | Connectors | New Definition...**. Set the **Definition id** to `ApplicationConnector` and the **Category** to **Script**. Click **Next**, **Next**. On the the **Output** page, click **Add...*** and set the **Name** to `applications` and the **Type** to `java.util.List`. Click **Finish**.
3. Go to **Development | Connectors | New Implementation**. Pick the **ApplicationConnector** and set the package to `hu.bme.mit.inf.sysint`.
4. An Eclipse JDT-based Java editor will show up with the `ApplicationConnectorImpl` file. Edit the `executeBusinessLogic` method to get the following.

```
@Override
protected void executeBusinessLogic() throws ConnectorException {
  //Get access to the connector input parameters

  //WARNING : Set the output of the connector execution.
  //If outputs are not set, connector fails
  List<String> applications = new ArrayList<String>();
  applications.add("App1");
```

```
    applications.add("App2");
    setApplications(applications);
}
```

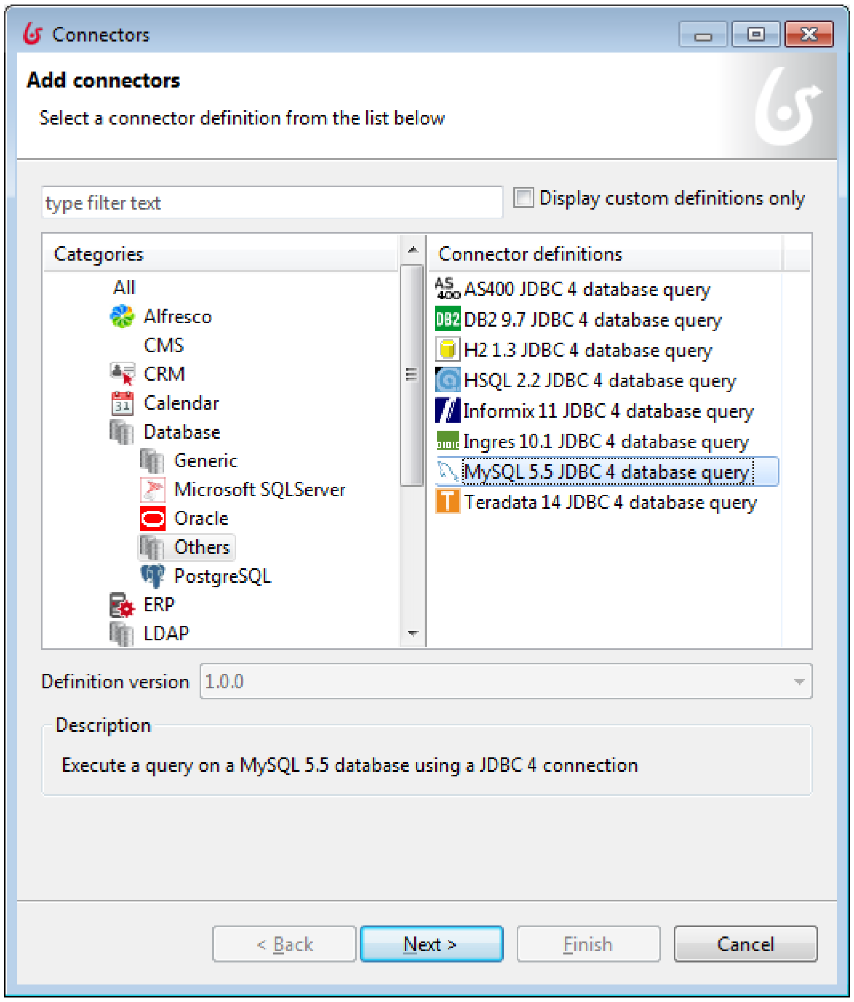
5. The connector can be tested in **Development | Connectors | Test connector**. Choose the **ApplicationConnector** and click **Test** and **OK**.

6. Add this connector to the **Download the application names** task. On the **Output operations** page, set that the **applications** variable takes the value of the **applications** output of the connector.

7. Delete the connector from the **Download the application names** task.

8. Test the workflow.

1.3 Database Integration


Connectors
Add connectors
Select a connector definition from the list below
type filter text
Display custom definitions only
Categories
All
Alfresco
CMS
CRM
Calendar
Database
Generic
Microsoft SQLServer
Oracle
Others
PostgreSQL
ERP
LDAP
Connector definitions
AS400 JDBC 4 database query
DB2 9.7 JDBC 4 database query
H2 1.3 JDBC 4 database query
HSQL 2.2 JDBC 4 database query
Informix 11 JDBC 4 database query
Ingres 10.1 JDBC 4 database query
MySQL 5.5 JDBC 4 database query
Teradata 14 JDBC 4 database query
< Back
Next >
Finish
Cancel

Definition version 1.0.0

Description

Execute a query on a MySQL 5.5 database using a JDBC 4 connection

Figure 1.1: Database connector configuration

1. In this section, we integrate our workflow with a MySQL database. Start the **MySQL Workbench 6.0 CE** application.

2. Choose the **SQL development** section and select the **applications** database.
3. The username and password are both `root`.
4. An SQL development environment will appear. We have created a database table for the workflow: select the **application** table in the **applications** database, **right click** and select **Select Rows - Limit 1000**.
5. The query and the results will appear with the applications `Flashlight`, `News` and `Weather`.
6. Go back to **Bonita**. Select the **Download the application names** task and add a **MySQL 5.5 JDBC4 database query** connector. Name it `MySQLConnector` and click **Next**.
7. On the **Database access information** page, set the following and click **Next**:
   - Driver: `com.mysql.jdbc.Driver`
   - URL: `jdbc:mysql://localhost:3306/applications`
   - Username: `root`
   - Password: `root`
8. On the **Enter query** page, use the **Switch editor** button to switch to a single line editor (defining a **Constant** expression). Else you would get an error message (*Unsupported expression type for testing: …*).

   Set the **Query or Batch Script** field in the next page:

   ```
   SELECT * FROM application;
   ```
9. Click **Test configuration**. It will throw the following error: **java.lang.reflect.InvocationTargetException org.bonitasoft.engine.exception.BonitaRuntimeException: java.lang.ClassCastException: com.mysql.jdbc.JDBC4ResultSet cannot be cast to java.io.Serializable**. The reason for this is that we first have to process the **JDBC4ResultSet** object to a serializable representation.
10. On the **Output operations definition page** set that the **applications** variable takes the value of a Groovy script. The content of the script is the following:

    ```
    def res = []
    while (resultset.next()) {
      res.add(resultset.getString("name"))
    }
    res
    ```

    Set the return type to `java.util.List`
11. Use the **Back** button and press **Test**. The connector should work now and list the applications available in the database.

1.4 Web Services

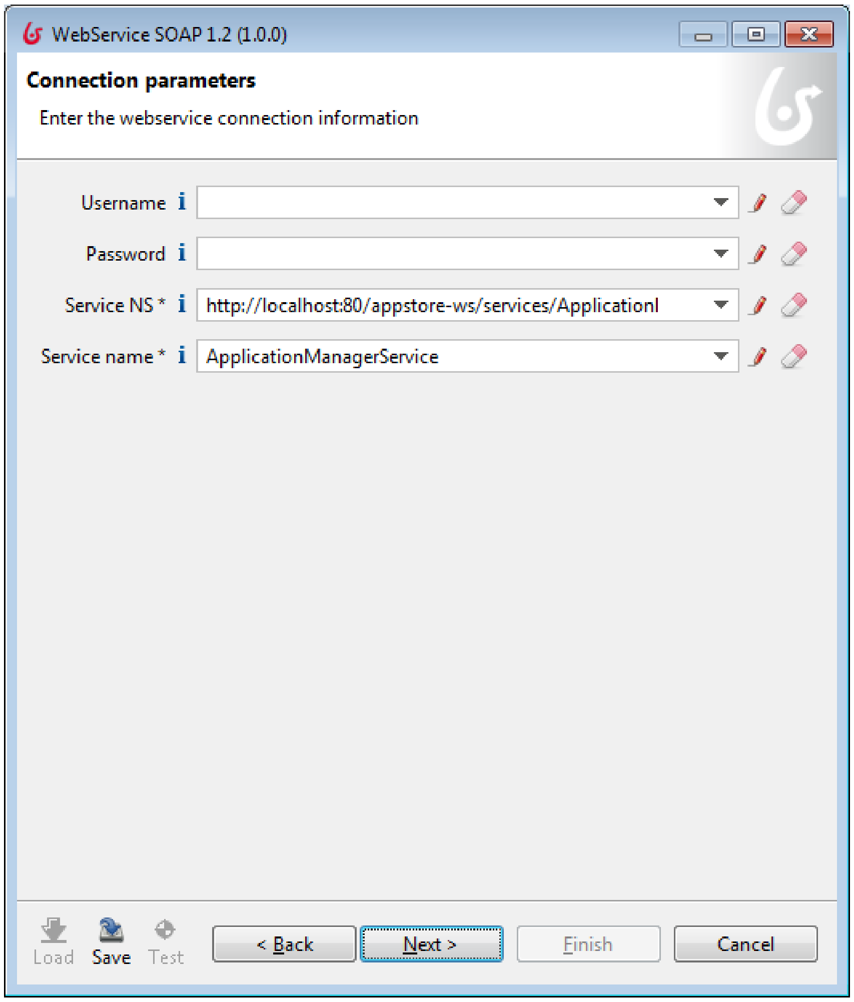
1. You can start the Tomcat server with the `Start Tomcat` shortcut on the Desktop. The WAR files in the `C:\tomcat\webapps` directory are deployed.
2. You may wish to set the port configuration of the server in the `server.xml`. In the laboratory, we used the following configuration: `Connector port="80" protocol="HTTP/1.1"`, `Connector port="89" protocol="AJP/1.3"`.)
3. On the Tomcat server, you have two web applications available: a JAX-WS SOA web service and a JAX-RS REST web service. Both offer the same functionality: they generate an arbitrary number of `Application` objects.

1.4.1 SOA Web Service

To test the SOA web service, open the **Google Chrome** browser and start the **Advanced REST Client** plug-in. Set the **URL** to http://localhost:80/appstore-ws/services/ApplicationManager and the **HTTP method** to **POST**. Add a header field `SOAPAction` (with an empty value) to the **Headers**. Paste the following code to the **Payload** field.

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Body>
    <generateApplications xmlns="http://ws.server.appstore.inf.mit.bme.hu">
      <count>20</count>
    </generateApplications>
  </soapenv:Body>
</soapenv:Envelope>
```

Notes: we can generate the SOA envelope with the **Eclipse WTP platform**. If you generate the client (as seen in the *web service laboratory*), you can observe the SOA envelope in the **TCP/IP monitor**.

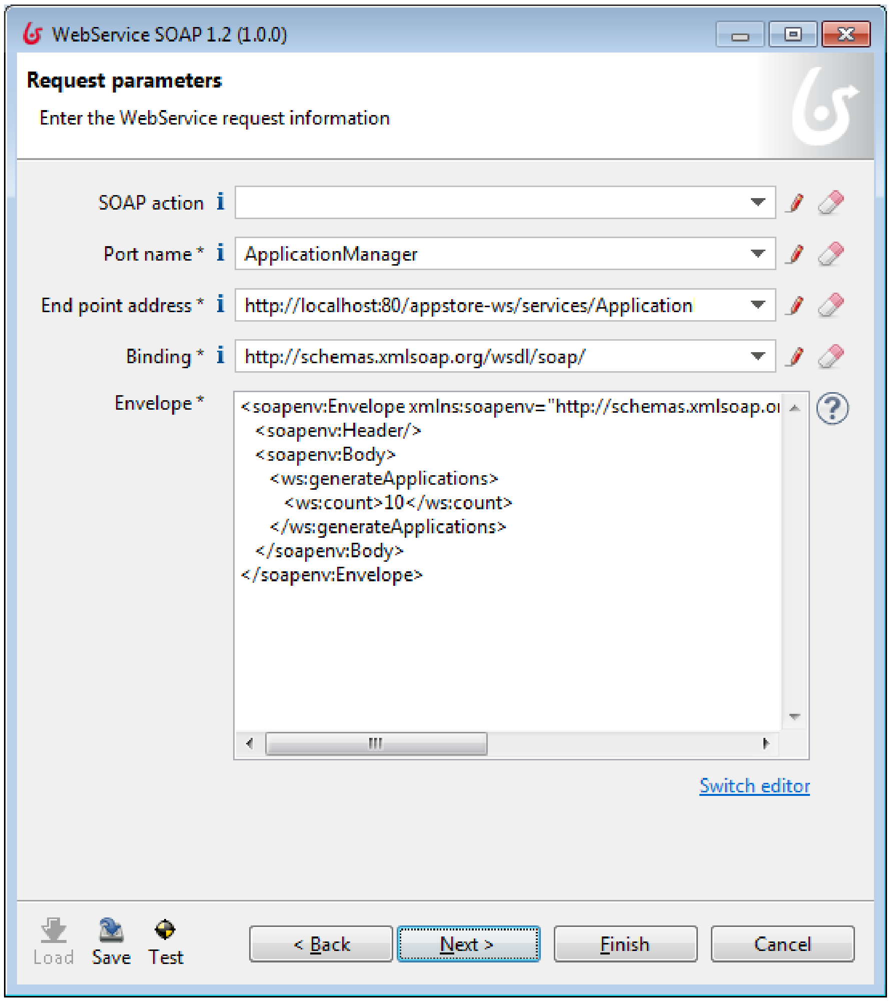

WebService SOAP 1.2 (1.0.0)

Connection parameters

Enter the webservice connection information

Username	
Password	
Service NS *	http://localhost:80/appstore-ws/services/Applicationl
Service name *	ApplicationManagerService

Figure 1.2: SOA web service



WebService SOAP 1.2 (1.0.0)

Request parameters

Enter the WebService request information

SOAP action	
Port name *	ApplicationManager
End point address *	http://localhost:80/appstore-ws/services/Application
Binding *	http://schemas.xmlsoap.org/wsdl/soap/

Envelope *

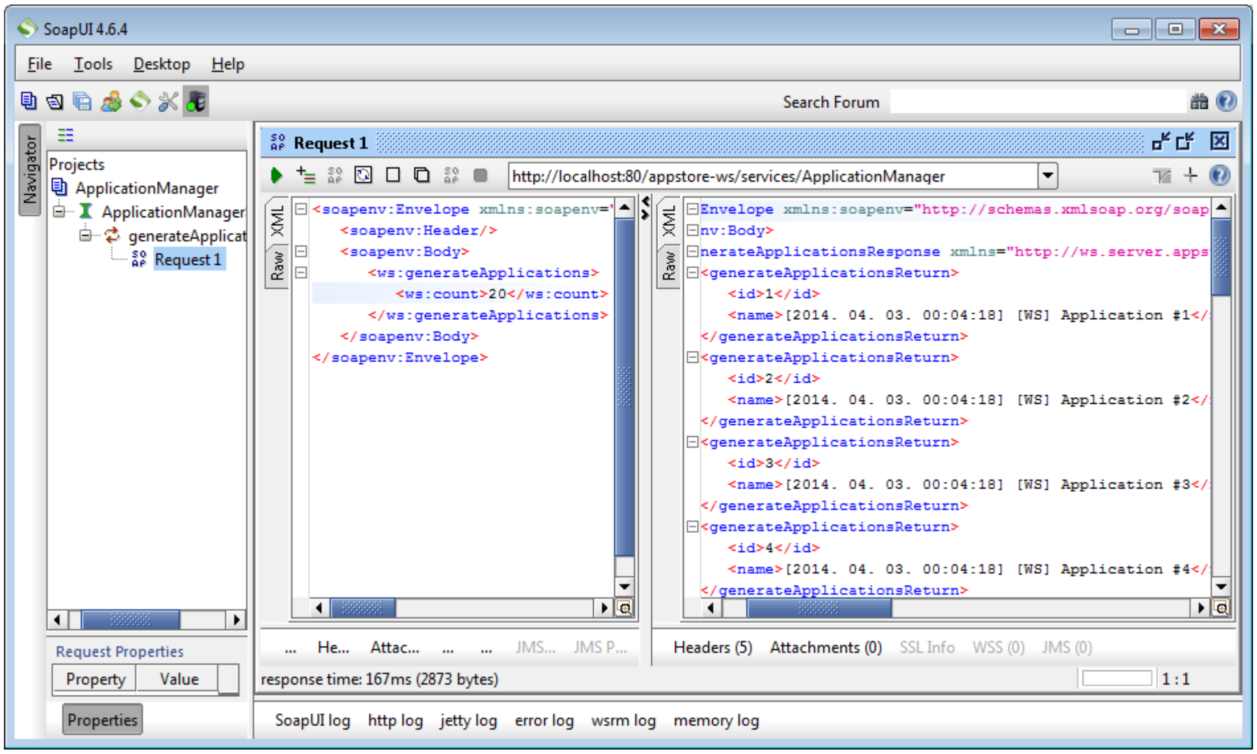
```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.or
  <soapenv:Header/>
  <soapenv:Body>
    <ws:generateApplications>
      <ws:count>10</ws:count>
    </ws:generateApplications>
  </soapenv:Body>
</soapenv:Envelope>
```

Figure 1.3: SOA web service

SoapUI

SoapUI (http://www.soapui.org/) is a tool capable of generating SOA envelopes from the WSDL file.

Just create a **New SOAP Project**, add the `ApplicationManager.wsdl` WSDL file as **Initial WSDL**. Tick **Create Requests** and click **OK**. The SOA envelope will be generated.



http://localhost:80/appstore-ws/services/ApplicationManager

```
<soapenv:Envelope xmlns:soapenv='
   <soapenv:Header/>
   <soapenv:Body>
      <ws:generateApplications>
         <ws:count>20</ws:count>
      </ws:generateApplications>
   </soapenv:Body>
</soapenv:Envelope>
```

```
Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap
nv:Body>
nerateApplicationsResponse xmlns="http://ws.server.apps
<generateApplicationsReturn>
   <id>1</id>
   <name>[2014. 04. 03. 00:04:18] [WS] Application #1</
</generateApplicationsReturn>
<generateApplicationsReturn>
   <id>2</id>
   <name>[2014. 04. 03. 00:04:18] [WS] Application #2</
</generateApplicationsReturn>
<generateApplicationsReturn>
   <id>3</id>
   <name>[2014. 04. 03. 00:04:18] [WS] Application #3</
</generateApplicationsReturn>
<generateApplicationsReturn>
   <id>4</id>
   <name>[2014. 04. 03. 00:04:18] [WS] Application #4</
</generateApplicationsReturn>
```

```
response time: 167ms (2873 bytes)    1 : 1
```

Figure 1.4: SOA web service

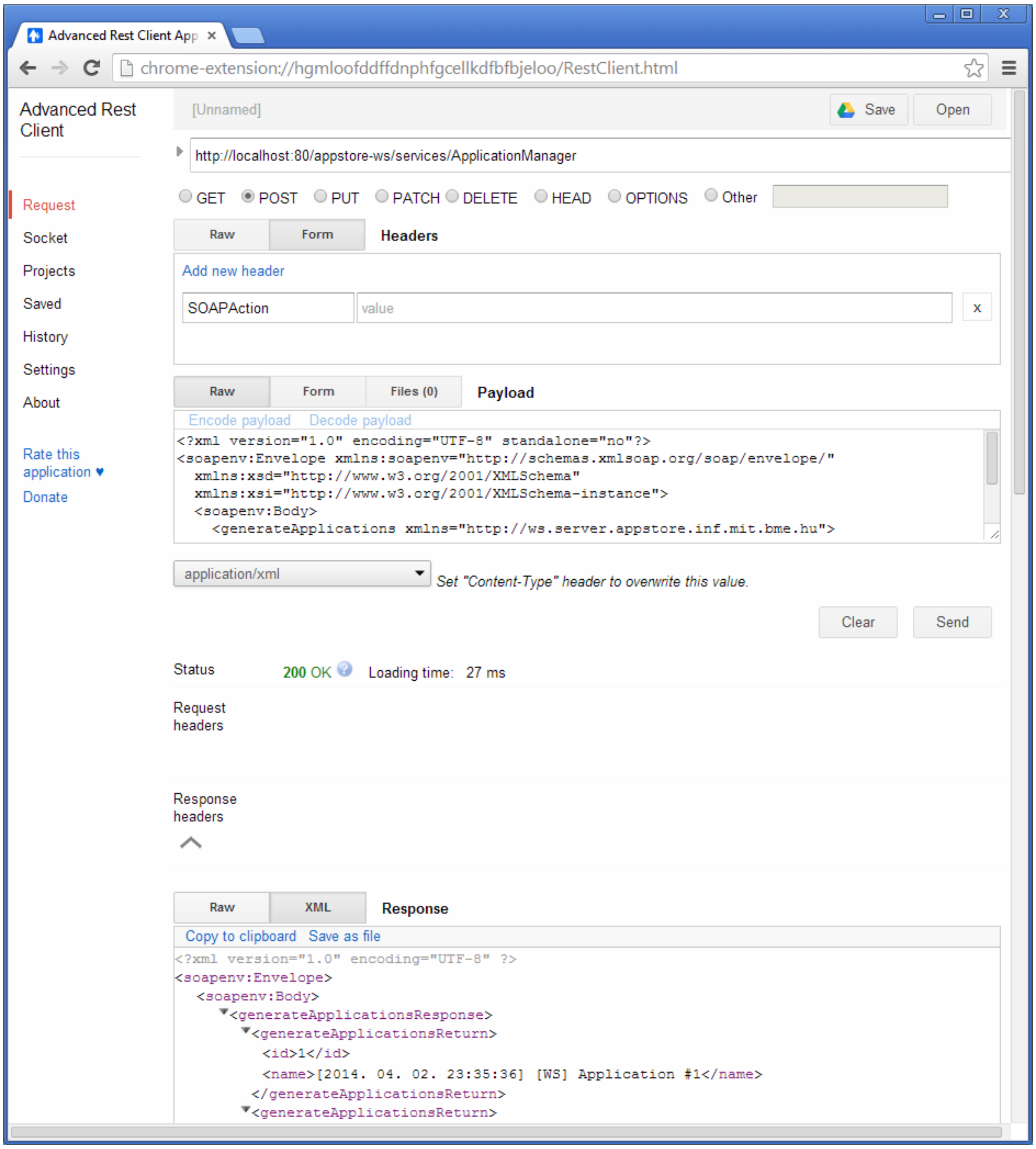
1.4.2 REST Web Service

To observe the REST web service, simply visit http://localhost:80/appstore-rest/rest/applicationmanager/generate/20.

1.5 Creating a SOAP Connector

1. Go to **Connectors**, **Add...** and add a **SOAP Web Services | WebService SOAP 1.2** and name it `ApplicationRestConnector`.

   - Service NS: `http://localhost:80/appstore-ws/services/ApplicationManager`
   - Service name: `ApplicationManagerService`
   - Port name: `ApplicationManager`
   - End point address: as above, `http://localhost:80/appstore-ws/services/ApplicationManager`
   - Binding: `http://www.w3.org/2003/05/soap/bindings/HTTP/`
   - Envelope: same XML as above.



```
http://localhost:80/appstore-ws/services/ApplicationManager
```

Method: [✓ POST]

Headers: SOAPAction | value

Payload:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Body>
    <generateApplications xmlns="http://ws.server.appstore.inf.mit.bme.hu">
```

application/xml *Set "Content-Type" header to overwrite this value.*

Status 200 OK Loading time: 27 ms

Request headers

Response headers

```
<?xml version="1.0" encoding="UTF-8" ?>
<soapenv:Envelope>
  <soapenv:Body>
    ▾<generateApplicationsResponse>
      ▾<generateApplicationsReturn>
        <id>1</id>
        <name>[2014. 04. 02. 23:35:36] [WS] Application #1</name>
      </generateApplicationsReturn>
      ▾<generateApplicationsReturn>
```

Figure 1.5: Using the **Advanced REST client** for accessing the REST service

2. If you encounter the following exception, change the envelope accordingly: *Caused by: com.sun.xml.internal.ws.protocol.soap.VersionMismatchException.: Couldn't create SOAP message. Expecting Envelope in namespace http://www.w3.org/2003/05/soap-envelope, but got http://schemas.xmlsoap.org/soap/envelope/ ( ).*

3. The exception indicates that the error is in the `SecureWSConnector` class. A quick web search will guide you to the source code of the class: https://github.com/bonitasoft/bonita-connector-webservice/blob/master/bonita-connector-webservice-impl/src/main/java/org/bonitasoft/connectors/ws/cxf/SecureWSConnector.java.

4. As of now, the error is unresolved. Please drop an email to the author if you have found the solution.

1.6 Creating a REST Connector

1. Create a new implementation for the **ApplicationConnector** definition.

2. Edit the Java code to get the following:

```
@Override
protected void executeBusinessLogic() throws ConnectorException {
  ArrayList<String> results;
  URL url;
  try {
    url = new URL("http://localhost:80/appstore-rest/rest/applicationmanager/generate/3");
  } catch (MalformedURLException e1) {
    throw new ConnectorException(e1);
  }
  URLConnection connection;
  try {
    connection = url.openConnection();
    Document document = parseXmlDom(connection.getInputStream());
    results = new ArrayList<String>();
    NodeList apps = document.getElementsByTagName("applications").item(0)
        .getChildNodes();
    for (int i = 0; i < apps.getLength(); i++) {
      results.add(apps.item(i).getTextContent());
    }
  } catch (IOException e) {
    throw new ConnectorException(e);
  }

  setResults(results);
}

public static Document parseXmlDom(InputStream is) {
  Document document = null;
  try {
    // getting the default implementation of DOM builder
    DocumentBuilderFactory dbf = DocumentBuilderFactory.newInstance();
    dbf.setValidating(false);
    dbf.setIgnoringComments(true);
    dbf.setIgnoringElementContentWhitespace(true);
    dbf.setNamespaceAware(true);
    DocumentBuilder builder = dbf.newDocumentBuilder();
```

```
        // parsing the XML file
        document = builder.parse(is);
      } catch (Exception e) {
        // catching all exceptions
        System.out.println(e.toString());
      }
      return document;
    }
```

1.7 Working with Bonita from Java

You can work with a Bonita workflow from java using by using the following dependency. The corresponding dependency is:

```
<dependency>
    <groupId>org.bonitasoft.engine</groupId>
    <artifactId>bonita-client</artifactId>
    <version>6.2.6</version>
</dependency>
```

Do not forget to set the version to the actual version number of your Bonita installation.

The `BonitaAPI.zip` file in https://svn.inf.mit.bme.hu/edu/trunk/mdsd/handout/public/2014/bonita_connector_materials/ contains an example Java code.