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Кафедра информационных систем и программной инженерии

Лабораторная работа
по дисциплине
"Интеграция кроссплатформенных программных систем"
Тема: "Шаблоны интеграции с Apache Camel"

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ЦЕЛЬ РАБОТЫ

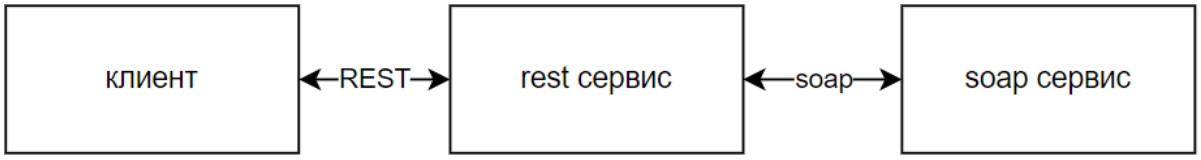
Разработка интеграционного взаимодействия используя Apache Camel.

ВЫПОЛНЕНИЕ РАБОТЫ

Ссылка на документацию: https://www.baeldung.com/camel-integration-patterns

Разработанное приложение: https://github.com/arranay/Integration_of_cross_platform_software_systems/tree/main/lab9/camel-soap-rest-master

В данной работе было разработано два сервиса (soap и rest), которые взаимодействуют между собой используя фреймворк Apache Camel и используют SOAP в качестве протокола передачи данных. В качестве клиента в данной лабораторной работе будет выступать Postman.



SOAP сервис

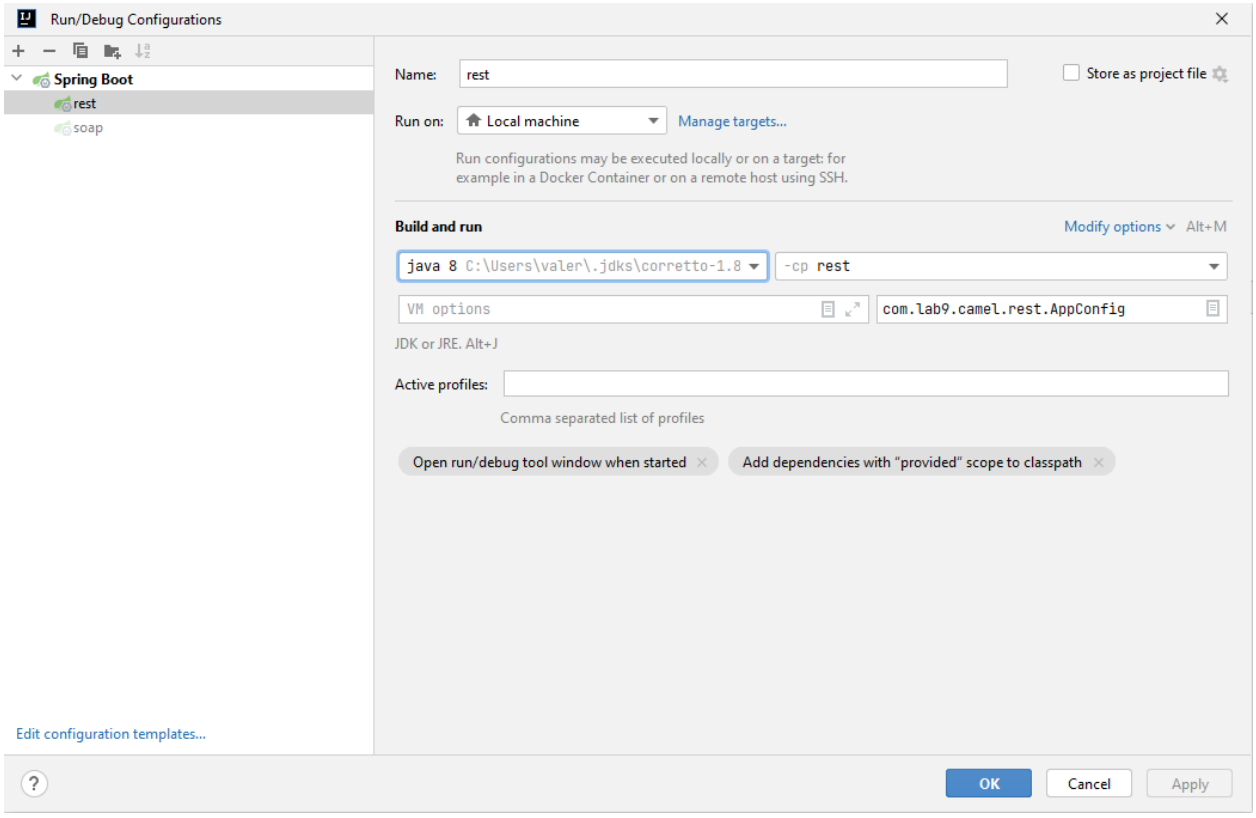
Инструкция по развертыванию

1. В корне проекта запустить: mvn install

```
[INFO]
[INFO] camel-soap-rest ..................................... SUCCESS [  0.793 s]
[INFO] model ............................................... SUCCESS [  2.838 s]
[INFO] rest ................................................ SUCCESS [  2.650 s]
[INFO] soap ................................................ SUCCESS [  0.954 s]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  7.858 s
[INFO] Finished at: 2023-01-11T19:21:53+03:00
```

2. Перейти в папку rest и запустить: mvn spring-boot:run

3. Открыть новый терминал, перейти в папку soap и запустить: mvn spring-boot:run
4. Я запускала в ide, используя Java 8 (на последних версиях выдавало ошибку: Unable to make protected final java.lang.Class java.lang.ClassLoader.defineClass(java.lang.String,byte[],int,int,java.security.ProtectionDomain) throws java.lang.ClascsFormatError accessible: module java.base does not "opens java.lang" to unnamed module @5a5b547f)



RouteBuilder класс:

```
package com.lab9.camel.soap;

import com.lab9.camel.model.TrackService;
import org.apache.camel.builder.RouteBuilder;
import org.springframework.stereotype.Component;

@Component
public class SoapRouter extends RouteBuilder {

    private String url = "cxf:track?serviceClass=" +
TrackService.class.getName();
```

```
    @Override
    public void configure() throws Exception {
        from(url).routeId("track-soap")
                .to("log:input")
                .recipientList(simple("direct:${header.operationName}"));

       from("direct:getTrack")
                .bean(GetTrackProcessor.class)
                .to("log:output");

       from("direct:addTrack")
               .bean(AddTrackProcessor.class)
               .to("log:output");
    }
}
```

GetTrackProcessor:

```
public class GetTrackProcessor implements Processor {

    @Autowired
    TrackServiceImplementation trackService;

    private final Logger log = LoggerFactory.getLogger(this.getClass());

    @Override
    public void process(Exchange exchange) throws Exception {
        GetTrackResponse trackResponse = new GetTrackResponse();
        trackResponse.setTracks(trackService.getTrack());
        exchange.getOut().setBody(trackResponse);
    }
}
```

AddTrackProcessor:

```
public class AddTrackProcessor implements Processor {


    @Autowired
    TrackServiceImplementation trackService;


    private final Logger log = LoggerFactory.getLogger(this.getClass());


    @Override
    public void process(Exchange exchange) throws Exception {
        Track track = exchange.getIn().getBody(Track.class);
        trackService.addTrack(track);


        exchange.getOut().setBody(track);
    }
}
```

REST сервис

TrackManager сервис:

```
import com.lab9.camel.model.GetTrackResponse;
import com.lab9.camel.model.Track;
import com.lab9.camel.model.TrackService;
import org.apache.cxf.frontend.ClientProxyFactoryBean;
import org.apache.cxf.interceptor.LoggingInInterceptor;
import org.apache.cxf.interceptor.LoggingOutInterceptor;
import org.springframework.beans.factory.annotation.Value;
import org.springframework.stereotype.Service;

import javax.annotation.PostConstruct;

@Service
public class TrackManager {

    @Value("${user.soap.address}")
    private String address;

    private TrackService trackService;

    @PostConstruct
    private void setUp(){
        ClientProxyFactoryBean factoryBean = new ClientProxyFactoryBean();
        factoryBean.setAddress(address);
        factoryBean.setServiceClass(TrackService.class);
        factoryBean.getInInterceptors().add(new LoggingInInterceptor());
        factoryBean.getOutInterceptors().add(new LoggingOutInterceptor());

        trackService = factoryBean.create(TrackService.class);
    }

    public GetTrackResponse getTrack() {
        return trackService.getTrack();
    }

    public Track addTrack(Track track) {
        return trackService.addTrack(track);
    }
}
```

RouteBuilder класс:

```
import com.lab9.camel.model.Track;
import org.apache.camel.builder.RouteBuilder;
import org.apache.camel.model.rest.RestBindingMode;
import org.springframework.stereotype.Component;

import java.util.ArrayList;

@Component
public class RestRouter extends RouteBuilder{
    @Override
    public void configure() throws Exception {
        restConfiguration()
                .apiProperty("api.title", "Camel REST API")
                .apiProperty("api.version", "1.0")
                .apiProperty("cors", "true")
                .bindingMode(RestBindingMode.json);

        rest("/track")
```

```
                .produces("application/json")
                .consumes("application/json")
                .get("/").route().routeId("get-track-route")
                .outputType(ArrayList.class)
                .bean(GetTrackProcessor.class);

        rest("/track")
                .produces("application/json")
                .consumes("application/json")
                .post("/").route().routeId("post-track-route")
                .inputType(Object.class)
                .outputType(Track.class)
                .bean(AddTrackProcessor.class);
    }
}
```

GetTrackProcessor:

```
import com.lab9.camel.model.GetTrackResponse;
import org.apache.camel.Exchange;
import org.apache.camel.Processor;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.beans.factory.annotation.Autowired;

public class GetTrackProcessor implements Processor {

    private final Logger log = LoggerFactory.getLogger(this.getClass());

    @Autowired
    private TrackManager trackManager;

    @Override
    public void process(Exchange exchange) throws Exception {
        GetTrackResponse track = trackManager.getTrack();
        exchange.getOut().setBody(track);
    }
}
```

AddTrackProcessor:

```
import com.fasterxml.jackson.databind.ObjectMapper;
import com.lab9.camel.model.Track;
import org.apache.camel.Exchange;
import org.apache.camel.Processor;
import org.apache.camel.http.common.HttpMessage;
import org.springframework.beans.factory.annotation.Autowired;

public class AddTrackProcessor implements Processor {

    @Autowired
    private TrackManager trackManager;

    @Override
    public void process(Exchange exchange) throws Exception {
        Object body = exchange.getIn(HttpMessage.class).getBody();

        ObjectMapper mapper = new ObjectMapper();
        Track track = mapper.convertValue(body, Track.class);
        Track created_track = trackManager.addTrack(track);

        exchange.getOut().setBody(created_track);
```

```
    }
}
```

Выполнение

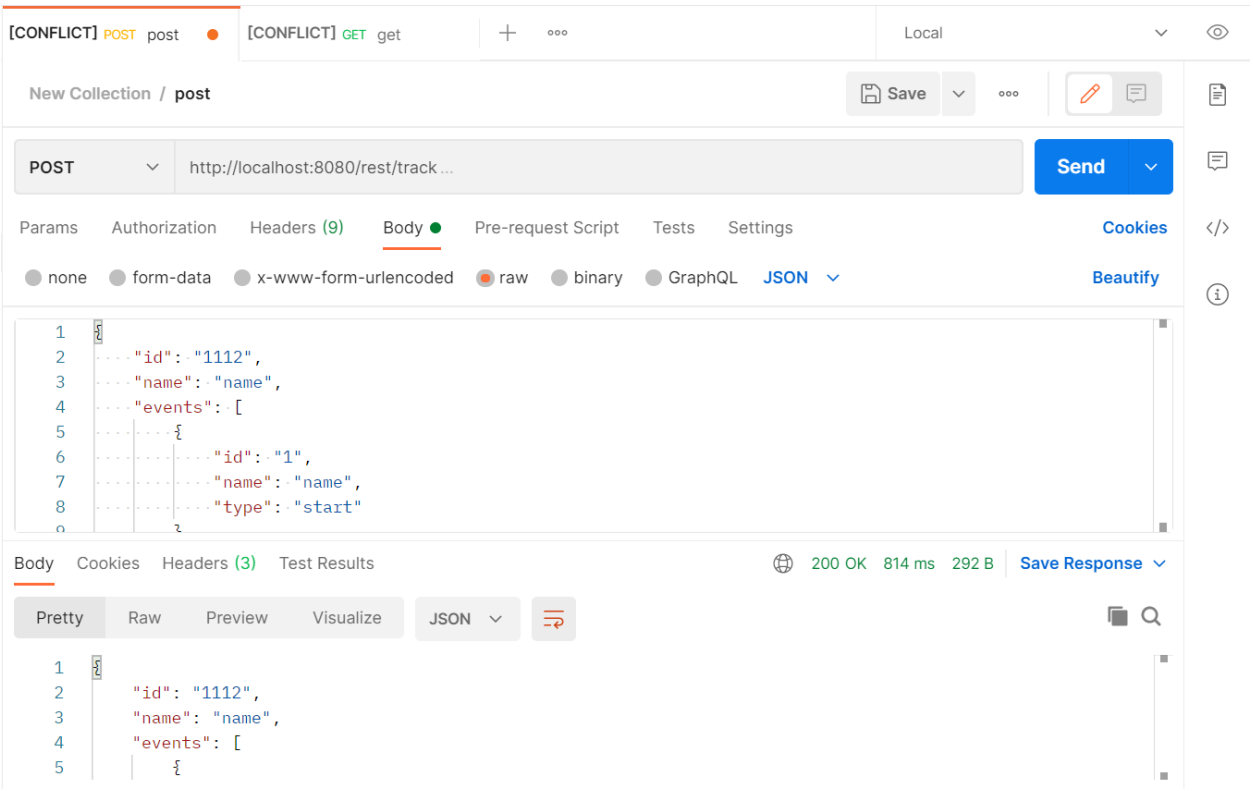


Рисунок 1 - Выполнение POST запроса.

Логирование:

```
ID: 1
Address: http://localhost:8094/webservices/track?wsdl
Encoding: UTF-8
Http-Method: POST
Content-Type: text/xml
Headers: {Accept=[*/*], SOAPAction=[""]}
Payload: <soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"><soap:Body><ns1:addTra
ck xmlns:ns1="http://model.camel.lab9.com/"><ns2:arg0
xmlns:ns2="http://model.camel.lab9.com/"><actions><id>2</id><operation>start<
/operation><time>12</time></actions><events><id>1</id><name>name</name><type>
start</type></events><forks><condition>condition</condition><id>3</id></forks
><id>1112</id><name>name</name></ns2:arg0></ns1:addTrack></soap:Body></soap:E
nvelope>
--------------------------------------
2023-01-09 07:38:44 [http-nio-8080-exec-1] INFO
o.a.c.s.T.T.TrackServicePortType line[274] - Inbound Message
----------------------------
ID: 1
Response-Code: 200
Encoding: UTF-8
Content-Type: text/xml;charset=UTF-8
```

```
Headers: {Content-Length=[482], content-type=[text/xml;charset=UTF-8],
Date=[Mon, 09 Jan 2023 04:38:44 GMT]}
Payload: <soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"><soap:Body><ns1:addTra
ckResponse xmlns:ns1="http://model.camel.lab9.com/"><ns2:return
xmlns:ns2="http://model.camel.lab9.com/"><actions><id>2</id><operation>start<
/operation><time>12</time></actions><events><id>1</id><name>name</name><type>
start</type></events><forks><condition>condition</condition><id>3</id></forks
><id>1112</id><name>name</name></ns2:return></ns1:addTrackResponse></soap:Bod
y></soap:Envelope>
```

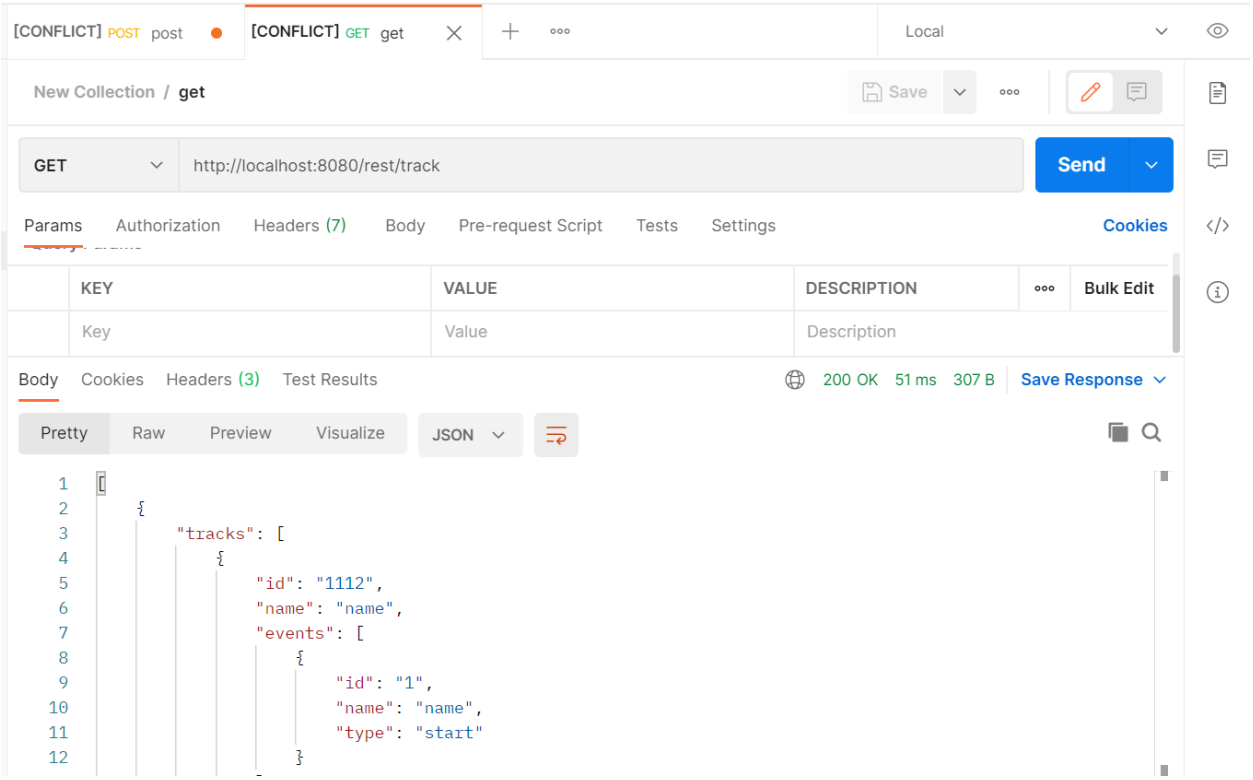


Рисунок 2 - Выполнение GET запроса.

Логирование:

```
ID: 2
Address: http://localhost:8094/webservices/track?wsdl
Encoding: UTF-8
Http-Method: POST
Content-Type: text/xml
Headers: {Accept=[*/*], SOAPAction=[""]}
Payload: <soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"><soap:Body><ns1:getTra
ck xmlns:ns1="http://model.camel.lab9.com/"/></soap:Body></soap:Envelope>
--------------------------------------
2023-01-09 07:39:09 [http-nio-8080-exec-3] INFO
o.a.c.s.T.T.TrackServicePortType line[274] - Inbound Message
----------------------------
ID: 2
Response-Code: 200
Encoding: UTF-8
Content-Type: text/xml;charset=UTF-8
Headers: {Content-Length=[499], content-type=[text/xml;charset=UTF-8],
Date=[Mon, 09 Jan 2023 04:39:09 GMT]}
Payload: <soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"><soap:Body><ns1:getTra
```

ckResponse xmlns:ns1="http://model.camel.lab9.com/"><ns2:return
xmlns:ns2="http://model.camel.lab9.com/"><tracks><actions><id>2</id><operatio
n>start</operation><time>12</time></actions><events><id>1</id><name>name</nam
e><type>start</type></events><forks><condition>condition</condition><id>3</id
></forks><id>1112</id><name>name</name></tracks></ns2:return></ns1:getTrackRe
sponse></soap:Body></soap:Envelope>

ВЫВОДЫ

В процессе выполнения работы было разработано интеграционное взаимодействия используя Apache Camel.