FuseSource

Hands on with Apache ActiveMQ, ServiceMix, Camel and CXF

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FuseSource

FuseSource, a wholly owned subsidiary of Progress Software, is a community of open source experts that provide software, support, training, and consulting for the most popular Apache-licensed open source integration projects including Apache ServiceMix, ActiveMQ, Camel and CXF. The FuseSource team includes key committers and the leaders at Apache who know the code the best to help FuseSource customers build reliable and scalable software integration infrastructure.

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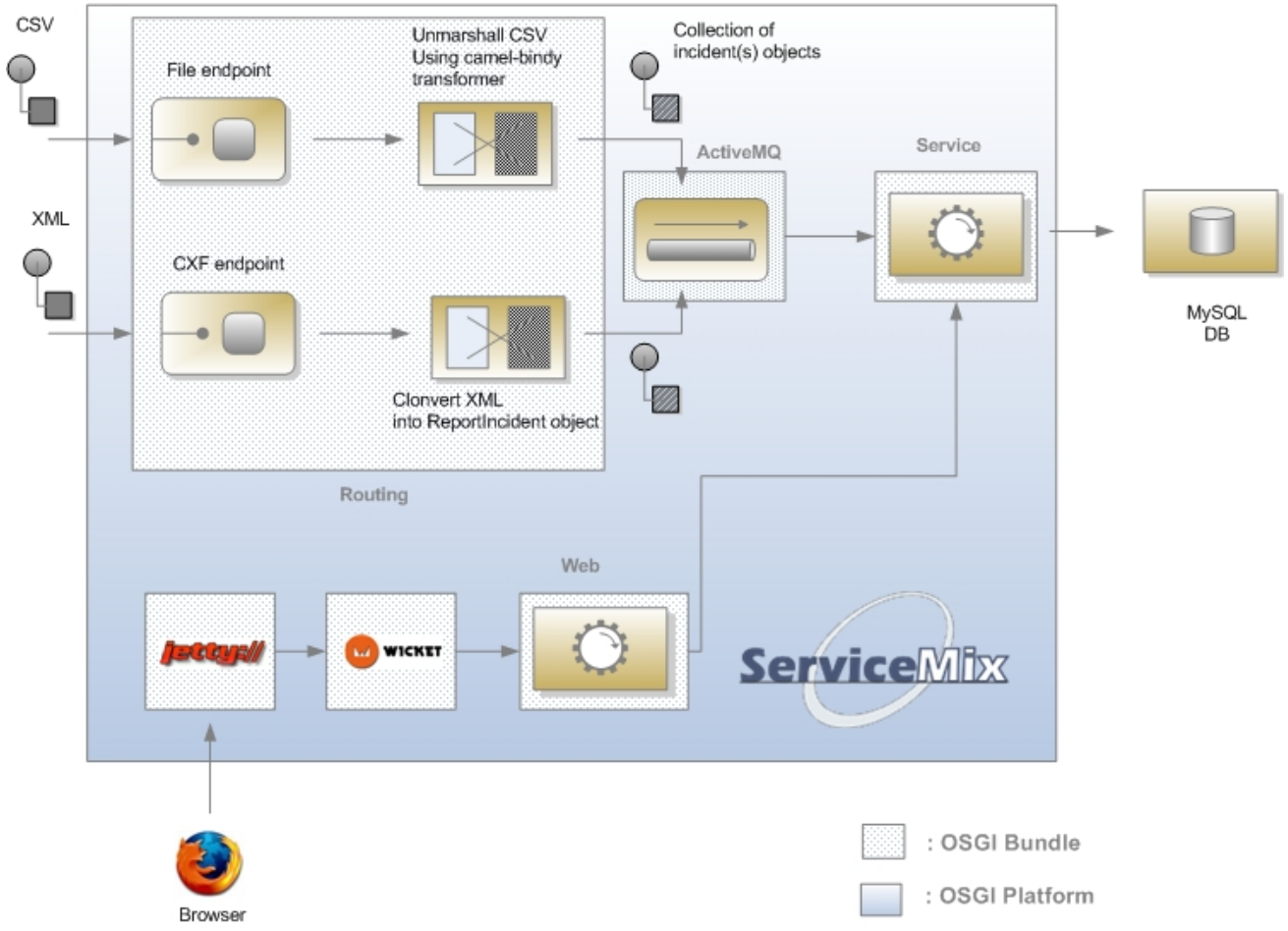
Introduction

The goal of this Devoxx "Hands-On Lab"is to show how you can develop a Java Integration project using Apache technologies such as Apache Camel, ActiveMQ, CXF and ServiceMix. The project that we will develop is a simple application containing a persistence layer, a web interface, a web service and Camel to provide the glue that connects all these components together.



The application is listening for incidents coming from web service or files. Depending on the origin, the message contents is transformed into the corresponding `Incident` object instances using a data formatter engine called camel-bindy (for the CSV file) and `camel-cxf` for the Web Service. Each message is then placed in a queue handled by ActiveMQ broker. Subsequently, all the messages (containing the objects) will be processed by a bean service that will (with the help of injection of dependency provided by Spring) save the incidents in a H2 Database using Spring and OpenJPA frameworks.

A small Apache Wicket web application running in Jetty Web server provides to the users a screen to consult the incidents created.

Project structure

The project has been cut into the following components (maven modules) :

Maven project name	Description
`db`	Contain script to create Schema and database for H2
`features`	features provisioning file containing the bundles
`model`	model layer
`persistence-jpa`	JPA persistence layer
`routing`	camel routes
`service`	spring service layer
`web`	Apache wicket module
`webservice`	Apache CXF web service

Each layer of our application will be deployed as separate OSGi bundles into Fuse ESB container.

An OSGi bundle is a simple JAR file, where the `META-INF/MANIFEST.MF` file has been modified to include the OSGi meta-data (packages to be imported, exported, ...)

Prerequisites

- JDK 6.x or 7.x
- Apache Maven 3.0.3 must be installed and configured
- Eclipse Indigo 3.7.1 or Fuse IDE
- Fuse ESB
- H2 Database
- soapUI

Except for Apache Maven and JDK, all other products and tools are available here : https://s3-eu-west-1.amazonaws.com/devoxx/Software/software-list.html

Download and install the project skeleton

To simplify the setup of the project, we provide you with a maven project. It is available here : https://s3-eu-west-1.amazonaws.com/devoxx/Software/software-list.html

STEP 1 : Unzip it under `~/devoxx/` or `C:\devoxx`

STEP 2 : Start a Dos / Unix console

STEP 3 : `cd ~/devoxx/fuse-camel-integration` or `D:\devoxx\fuse-camel-integration`

STEP 4 : execute `mvn clean install` to verify that maven works

> At this point, the Maven build will fail while building the `persistence-jpa` module - we will fix this in a few minutes ...

MODEL LAYER

As our application receive incident reports, we will create a java model class to hold the information that we will receive. We will also use this class to persist info into the database using the JPA specification.

The reportincident model is really simple because it only contains one class that we will use :

- to map information with the database and the CSV file
- to transport information to web screen.

STEP 1 : Move to to the directory/maven module `persistence-jpa`

STEP 2 : In the `src/main/java/org/fusesource/devoxx/reportincident/model` directory, edit the `Abstract` and `Incident` class and add the fields that will map the info that we receive

Remark : The `pom.xml` file of each module already contains all the dependencies required.

```
package org.fusesource.devoxx.reportincident.model;

import java.util.Date;

public class Incident extends Abstract implements Serializable {

    private static final long serialVersionUID = 1L;

    private String incidentRef;
    private Date incidentDate;
    private String givenName;
    private String familyName;
    private String summary;
    private String details;
    private String email;
    private String phone;
    private long incidentId;
    private String creationUser;
    private Date creationDate;

}
```

STEP 2 : Generate the Getter and Setter fields
STEP 3 : Add camel–bindy annotations
Bindy (http://camel.apache.org/bindy.html) is one of the data format supported by Camel (http://camel.apache.org/data-format.html). Other examples of supported data formates are JAXB, SOAP, CSV, SMOOKS, Dozer, JSON, Castor, XStream, XmlBeans, Google Protobuf, ... Bindy will allow mapping CSV record fields with the java properties using Java @annotations (similar to e.g. as we do with JAXB).

Add the following annotations in the `Incident` class

```
import org.apache.camel.dataformat.bindy.annotation.CsvRecord;
import org.apache.camel.dataformat.bindy.annotation.DataField;

@CsvRecord(separator = ",")
public class Incident extends Abstract implements Serializable {

    private static final long serialVersionUID = 1L;

    @DataField(pos = 1)
    private String incidentRef;

    @DataField(pos = 2, pattern = "dd-mm-yyyy")
    private Date incidentDate;

    @DataField(pos = 3)
    private String givenName;

    @DataField(pos = 4)
    private String familyName;

    @DataField(pos = 5)
    private String summary;

    @DataField(pos = 6)
    private String details;

    @DataField(pos = 7)
    private String email;

    @DataField(pos = 8)
    private String phone;

    /* SNIP */
}
```

Extend model layer to support JPA

Our `Incident` model class will also be used as an entity class to insert report incidents in the database. We will use the JPA specification for that purpose (Apache OpenJPA implementation, cfr. http://openjpa.apache.org/builds/2.1.1/apache-openjpa/docs/manual.html).

Our entity class will be mapped with the `T_INCIDENT` table, the definition of the different columns, their name and fields length are provided in the code snippet below.

STEP 1 : Add JPA annotations `@Entity`, `@Table`, `@Column`

```
import javax.persistence.*;

@Entity
@Table(name = "T_INCIDENT")
public class Incident extends Abstract implements Serializable {

    @Column(name = "INCIDENT_REF", length = 55)
    private String incidentRef;

    @Column(name = "INCIDENT_DATE")
    private Date incidentDate;

    @Column(name = "GIVEN_NAME", length = 35)
    private String givenName;

    @Column(name = "FAMILY_NAME", length = 35)
    private String familyName;

    @Column(name = "SUMMARY", length = 35)
    private String summary;

    @Column(name = "DETAILS")
    private String details;

    @Column(name = "EMAIL", length = 60)
    private String email;

    @Column(name = "PHONE", length = 35)
    private String phone;

    @Id
    @GeneratedValue(strategy=GenerationType.AUTO)
    @Column(name = "INCIDENT_ID")
    private long incidentId;

    @Column(name = "CREATION_USER")
    private String creationUser;

    @Column(name = "CREATION_DATE")
    private Date creationDate;

    /* SNIP */
}
```

As the Entity model is defined, we will now configure the persistence file that the JPA container will use

STEP 2 : Edit the `persistence.xml` file in the directory `src/main/resources/META-INF` and define the persistence unit name, the class to be persisted and the properties used by the JPA provider.

```
<?xml version="1.0" encoding="UTF-8"?>
<persistence xmlns="http://java.sun.com/xml/ns/persistence"
             xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:schemaLocation=
               "http://java.sun.com/xml/ns/persistence
                 http://java.sun.com/xml/ns/persistence/persistence_2_0.xsd"
            version="2.0">

  <persistence-unit name="reportIncident" transaction-type="RESOURCE_LOCAL">
        <provider>org.apache.openjpa.persistence.PersistenceProviderImpl</provider>
        <class>org.fusesource.devoxx.reportincident.model.Incident</class>
        <exclude-unlisted-classes>true</exclude-unlisted-classes>
        <properties>
            <property name="openjpa.jdbc.SynchronizeMappings"
                      value="buildSchema(SchemaAction='add,deleteTableContents')"/>
            <property name="openjpa.Log"
                      value="DefaultLevel=TRACE, Runtime=TRACE, Tool=TRACE,
                             SQL=TRACE"/>
            <property name="openjpa.jdbc.DBDictionary"
                      value="h2(useSchemaName=true)"/>
            <property name="openjpa.jdbc.Schema"
                      value="REPORT"/>
        </properties>
    </persistence-unit>

</persistence>
```

DEFINE PERSISTENCE LAYER (DAO)

Now that the model exists, we will create the persistence and services layers. The projects have been designed using the *Data Access Object* pattern because it allows changing the implementation from one database or ORM tool to the other very easily.
Moreover, the same interfaces are also used as the 'contract' between the services and the DAO. This offers the advantage to decouple objects in the application and, as you will see later on, it will allow us to deploy services and persistence as separate bundles into the OSGi container.

First we create the DAO Interface and its implementation

STEP 1 : Create the Interface `IncidentDAO` in the directory `src/main/java/org/fusesource/devoxx/reportincident/dao`

```
package org.fusesource.devoxx.reportincident.dao;

import java.util.List;
import org.fusesource.devoxx.reportincident.model.Incident;

public interface IncidentDAO {

  public Incident getIncident(long paramLong);
  public List<Incident> findIncident();
  public List<Incident> findIncident(String paramString);
  public void saveIncident(Incident paramIncident);
  public void removeIncident(long paramLong);

}
```

STEP 2 : Its implementation `IncidentDAOImpl`

```
package org.fusesource.devoxx.reportincident.dao.impl;

import java.util.List;
import javax.persistence.EntityManager;
import javax.persistence.PersistenceContext;
import javax.persistence.Query;

import org.fusesource.devoxx.reportincident.dao.IncidentDAO;
import org.fusesource.devoxx.reportincident.model.Incident;
import org.apache.commons.logging.Log;
import org.apache.commons.logging.LogFactory;

public class IncidentDAOImpl implements IncidentDAO {

  private static final transient Log LOG = LogFactory.getLog(IncidentDAOImpl.class);

  @PersistenceContext
  private EntityManager em;
  private static final String findIncidentByReference =
          "select i from Incident as i where i.incidentRef = :ref";
  private static final String findIncident = "select i from Incident as i";

  public List<Incident> findIncident()
  {
    Query q = this.em.createQuery("select i from Incident as i");
    List list = q.getResultList();
    return list;
  }

  public List<Incident> findIncident(String key) {
    Query q =
            this.em.createQuery("select i from Incident as i where i.incidentRef = :ref");
    q.setParameter("ref", key);
    List list = q.getResultList();
    return list;
  }

  public Incident getIncident(long id) {
    return (Incident)this.em.find(Incident.class, Long.valueOf(id));
  }

  public void removeIncident(long id)  {
    Object record = this.em.find(Incident.class, Long.valueOf(id));
    this.em.remove(record);
    this.em.flush();
  }

  public void saveIncident(Incident incident) {
    this.em.persist(incident);
    this.em.flush();
  }
}
```

To create the Local JPA Container, we will use Spring to simplify our life and also to setup the DataSource and the Transaction Manager required by JPA.

STEP 3 : Edit the file under `src/main/resources/META-INF/spring/persistence-dao.xml`

STEP 4: Add Spring beans to scan `@Persistencecontext` annotation under `<beans>`

```
<context:annotation-config/>
<bean class="org.springframework.orm.jpa.support.PersistenceAnnotationBeanPostProcessor"/>
```

STEP 5 : Define the bean `LocalContainerEntityManagerFactoryBean`

```
<bean id="entityManagerFactory"
      class="org.springframework.orm.jpa.LocalContainerEntityManagerFactoryBean">
  <property name="persistenceUnitName" value="reportIncident"/>
  <property name="jpaVendorAdapter" ref="jpaAdapterH2"/>
  <property name="dataSource" ref="dataSourceH2"/>
</bean>
```

STEP 6 : Define the `OpenJPAVendorAdapter` with H2 properties

```
<bean id="jpaAdapterH2" class="org.springframework.orm.jpa.vendor.OpenJpaVendorAdapter">
  <property name="databasePlatform" value="org.apache.openjpa.jdbc.sql.H2Dictionary"/>
  <property name="database" value="H2"/>
  <property name="showSql" value="true"/>
</bean>
```

STEP 7 : Define the datasource using Apache Commons DBCP

```
<bean id="dataSourceH2" destroy-method="close"
      class="org.apache.commons.dbcp.BasicDataSource" >
  <property name="driverClassName" value="org.h2.Driver"/>
  <property name="url" value="jdbc:h2:tcp://localhost/~/reportdb"/>
  <property name="username" value="sa"/>
  <property name="password" value=""/>
</bean>
```

STEP 8 : As JPA and EntityManager will work with Transactions, a Transaction Manager must be created

```
<!-- TransactionManager is required -->
<bean id="txManager" class="org.springframework.orm.jpa.JpaTransactionManager">
  <property name="entityManagerFactory" ref="entityManagerFactory"/>
  <property name="dataSource" ref="dataSourceH2"/>
</bean>
```

STEP 9 : The Transaction manager created previously will be exported as an OSGI service. By default, an OSGi platform is not JNDI compliant but Spring DM makes it very easy to expose beans as services into the OSGi Service Registry. In our example we will also using a key define a filter to make sure we retrieve this particular instance when looking at the list of the interfaces registered under `org.springframework.transaction.PlatformTransactionManager`.

```
<!--  Expose Transaction Manager -->
<osgi:service ref="txManager"
              interface="org.springframework.transaction.PlatformTransactionManager">
  <osgi:service-properties>
    <entry key="tx" value="JPA"/>
  </osgi:service-properties>
</osgi:service>
```

STEP 10: Finally, create the DAO bean and also register it under its interface with as an OSGi service. This service will then be used by the Service layer (up next).

```
<!-- DAO Declarations -->
<bean id="incidentDAO"
      class="org.fusesource.devoxx.reportincident.dao.impl.IncidentDAOImpl"/>

<!-- Expose DAO interface as OSGI Service -->
<osgi:service ref="incidentDAO"
              interface="org.fusesource.devoxx.reportincident.dao.IncidentDAO"/>
```

SERVICE LAYER

In term of design, the service project is very similar to the persistence because we will create an interface and its implementation. Why are we repeating the interface? The answer is evident: it is for decoupling the service from the DAO implementation to allow you to switch easily from one ORM to another. This design will also allow us to upgrade the service bundle afterwards without having to bring down the rest of the application.

STEP 1 : Edit the following file `src/main/java/org/fusesource/devoxx/reportincident/service/IncidentService.java` in the module `service`

```
package org.fusesource.devoxx.reportincident.service;

import java.util.List;
import org.fusesource.devoxx.reportincident.model.Incident;

public interface IncidentService {

  public Incident getIncident( long id );
  public List<Incident> findIncident();
  public List<Incident> findIncident( String key );
  public void saveIncident( Incident incident );
  public void removeIncident( long id );

}
```

STEP 2 : Edit its implementation in the sub-directory `impl/IncidentServiceImpl.java`

```
package org.fusesource.devoxx.reportincident.service.impl;

import java.util.List;

import org.fusesource.devoxx.reportincident.model.Incident;
import org.fusesource.devoxx.reportincident.dao.IncidentDAO;
import org.apache.commons.logging.Log;
import org.apache.commons.logging.LogFactory;
import org.fusesource.devoxx.reportincident.service.IncidentService;

public class IncidentServiceImpl implements IncidentService {

    private static final transient Log LOG = LogFactory.getLog(IncidentServiceImpl.class);

    private IncidentDAO incidentDAO;

    public void saveIncident(Incident incident) {
        try {
            getIncidentDAO().saveIncident(incident);
        } catch (RuntimeException e) {

            e.printStackTrace();
        }
    }

    public void removeIncident(long id) {
        getIncidentDAO().removeIncident(id);
    }

    public Incident getIncident(long id) {
        return getIncidentDAO().getIncident(id);
    }

    public List<Incident> findIncident() {
        return getIncidentDAO().findIncident();
    }

    public List<Incident> findIncident(String key) {
        return getIncidentDAO().findIncident(key);
    }

    public IncidentDAO getIncidentDAO() {
        return incidentDAO;
    }

    public void setIncidentDAO(IncidentDAO incidentDAO) {
        this.incidentDAO = incidentDAO;
    }
}
```

As you see, we will use `IncidentDAO` class within the `IncidentServiceImpl` class. The injection of this bean will be done by Spring. As Spring will be used as Transaction Manager, the service layer will be configured to define which classes/methods are transactional and which propagation option (in our case: `PROPAGATION_REQUIRED`) will be used to check / retrieve the transaction from the transaction manager. We are not using the Spring @Transactional annotations, but this example could be easily transformed to use Spring's annotation-based transactions instead.

STEP 3 : Edit the file `src/main/resources/META-INF/spring/spring-service-beans-dao.xml`

```
<bean id="incidentServiceTarget"
      class="org.fusesource.devoxx.reportincident.service.impl.IncidentServiceImpl">
  <property name="incidentDAO">
    <osgi:reference interface="org.fusesource.devoxx.reportincident.dao.IncidentDAO"/>
  </property>
</bean>

<bean id="abstractService" abstract="true"
      class="org.springframework.transaction.interceptor.TransactionProxyFactoryBean">
  <property name="transactionManager">
    <osgi:reference id="txManager" filter="(tx=JPA)"
                    interface="org.springframework.transaction.PlatformTransactionManager"/>
  </property>
</bean>

<bean id="incidentService"
      parent="abstractService"
      class="org.springframework.transaction.interceptor.TransactionProxyFactoryBean">

  <property name="target">
    <ref bean="incidentServiceTarget" />
  </property>

  <property name="proxyInterfaces">
    <list>
      <value>org.fusesource.devoxx.reportincident.service.IncidentService</value>
    </list>
  </property>

  <property name="transactionAttributes">
    <props>
      <prop key="*">PROPAGATION_REQUIRED</prop>
    </props>
  </property>
</bean>
```

Also note how we are referring to the OSGi Service Registry for retrieving the transaction manager we registered before when building the `persistence-jpa` module.

STEP 4 : The last step requires that we expose our Service on the OSGi container to allow the Apache Camel route as well as the Apache Wicket web application to use it

```
<!-- Expose Service as OSGI -->
<osgi:service ref="incidentService"
              interface="org.fusesource.devoxx.reportincident.service.IncidentService"/>
```

By now, we have to put in place the DAO / services layers, we added transaction management and registered the services into the OSGi Service Registry that will allow us to do CRUD operations on our `Incident` class. It is time now to design the web service, create the camel routes and install the Web project.

WEB SERVICES

To generate the code that we need to expose the WebService from the Apache Camel route, we will simply register the Apache CXF Maven plugin in the pom.xml file and place the contract (= wsdl) file under the directory src/main/resources/META-INF of webservice mavem module (already done)

STEP 1 : Check what we have added in the `pom.xml` file to generate the code from the wsdl

```
<plugin>
  <groupId>org.apache.cxf</groupId>
  <artifactId>cxf-codegen-plugin</artifactId>
  <version>${cxf-version}</version>
  <executions>
    <execution>
      <id>generate-sources</id>
      <phase>generate-sources</phase>
      <configuration>
        <sourceRoot>${basedir}/target/generated/src/main/java</sourceRoot>
        <wsdlOptions>
          <wsdlOption>
            <wsdl>${basedir}/src/main/resources/META-INF/wsdl/report_incident.wsdl</wsdl>
          </wsdlOption>
        </wsdlOptions>
      </configuration>
      <goals>
        <goal>wsdl2java</goal>
      </goals>
    </execution>
  </executions>
</plugin>
```

STEP 2 : The code generated contains JAXB model classes (`InputReportIncident` and `OutputReportIncident`), an interface using `@WebService` annotations to expose the web service and a java class which acts a factory to access the web service. You can take a look at the generated code in the `target/generated/src/main/java` directory.

Interface

```
@WebService(targetNamespace = "http://reportincident.devoxx.fusesource.org",
            name = "ReportIncidentEndpoint")
@XmlSeeAlso({ObjectFactory.class})
@SOAPBinding(parameterStyle = SOAPBinding.ParameterStyle.BARE)
public interface ReportIncidentEndpoint {

    @WebResult(name = "outputReportIncident",
               targetNamespace = "http://reportincident.devoxx.fusesource.org",
               partName = "out")
    @WebMethod(operationName = "ReportIncident",
               action = "http://reportincident.devoxx.fusesource.org/ReportIncident")
    public OutputReportIncident reportIncident(
        @WebParam(partName = "in", name = "inputReportIncident",
                  targetNamespace = "http://reportincident.devoxx.fusesource.org")
        InputReportIncident in
    );

}
```

Service

```
@WebServiceClient(name = "ReportIncidentEndpointService",
                  wsdlLocation = "file:full/path/to/report_incident.wsdl",
                  targetNamespace = "http://reportincident.devoxx.fusesource.org")
public class ReportIncidentEndpointService extends Service {

    public final static URL WSDL_LOCATION;

    public final static QName SERVICE =
            new QName("http://reportincident.devoxx.fusesource.org",
                      "ReportIncidentEndpointService");
    public final static QName ReportIncidentPort =
            new QName("http://reportincident.devoxx.fusesource.org", "ReportIncidentPort");

    public ReportIncidentEndpointService(URL wsdlLocation) {
        super(wsdlLocation, SERVICE);
    }

    public ReportIncidentEndpointService(URL wsdlLocation, QName serviceName) {
        super(wsdlLocation, serviceName);
    }

    public ReportIncidentEndpointService() {
        super(WSDL_LOCATION, SERVICE);
    }


    /**
     *
     * @return
     *     returns ReportIncidentEndpoint
     */
    @WebEndpoint(name = "ReportIncidentPort")
    public ReportIncidentEndpoint getReportIncidentPort() {
        return super.getPort(ReportIncidentPort, ReportIncidentEndpoint.class);
    }

    /**
     *
     * @param features
     *     A list of {@link javax.xml.ws.WebServiceFeature} to configure on the proxy.
     *     Supported features not in the <code>features</code> parameter will have their
     *     default values.
     * @return
     *     returns ReportIncidentEndpoint
     */
    @WebEndpoint(name = "ReportIncidentPort")
    public ReportIncidentEndpoint getReportIncidentPort(WebServiceFeature... features) {
        return super.getPort(ReportIncidentPort, ReportIncidentEndpoint.class, features);
    }

}
```

ROUTING

The routing/mediation between "services" will be created using Camel Spring DSL language. We will describe its creation/genesis step by step

- Define ActiveMQ component
- Define Beans that Apache Camel will use to insert records in DB (IncidentSaver), extract info from the webservice (WebService.java) and prepare the response for the Web Service (Feedback.java)
- Configure CXF endpoint
- Camel routes and DataFormats

STEP 1 : Edit the file `src/main/resources/META-INF/spring/camel-context.xml` file in the `routing` module and add the following bean for the ActiveMQ component

```
<!-- ActiveMQ component -->
<bean id="activemq" class="org.apache.activemq.camel.component.ActiveMQComponent">
  <property name="connectionFactory">
    <osgi:reference interface="javax.jms.ConnectionFactory"/>
  </property>
  <property name="transacted" value="true"/>
  <property name="transactionManager">
    <osgi:reference
        interface="org.springframework.transaction.PlatformTransactionManager"/>
  </property>
</bean>
```

Remarks :
We retrieve the JMS `ConnectionFactory` (similar to a `DataSource` in the JDBC realm) from the OSGI Service Registry. The component is transactional and can participate in a transaction if we configure a `org.springframework.transaction.PlatformTransactionManager`. Once again, we are retrieving a suitable instance from the OSGi Service Registry.

STEP 2 : Add beans definitions. Camel has excellent support for using Java beans in your routes (cfr. http://camel.apache.org/bean-integration.html) and our example routes will be using these 3 beans.

```
<bean id="incidentSaver"
      class="org.fusesource.devoxx.reportincident.internal.IncidentSaver">
  <property name="incidentService">
    <osgi:reference
        interface="org.fusesource.devoxx.reportincident.service.IncidentService"/>
  </property>
</bean>

<bean id="webservice" class="org.fusesource.devoxx.reportincident.internal.WebService"/>

<bean id="feedback" class="org.fusesource.devoxx.reportincident.internal.Feedback"/>
```

Remark : The `IncidentSaver` class has a property `incidentService`. Once again, we will retrieve and inject this bean proxy using Spring DM.

STEP 3 : Configure the CXF endpoint

```
<import resource="classpath:META-INF/cxf/cxf.xml"/>
<!-- webservice endpoint -->
<cxf:cxfEndpoint id="reportIncident"
    address="http://localhost:8282/cxf/camel-example/incident"
    serviceClass="org.fusesource.devoxx.reportincident.ReportIncidentEndpoint"
    xmlns:s="http://reportincident.devoxx.fusesource.org">
</cxf:cxfEndpoint>
```

Remark :
CXF uses Jetty (Web Application Server project managed by Eclipse community) to expose the Web Service. In this case, we will create a web server instance running on the port 8282.

The webservice uses the `ReportIncidentEndpoint` interface created in the project `webservice`. This is this service that will receive the SOAP envelope and extract the body. Afterwards, when the Apache Camel route is done creating the response, it will prepare the SOAP response message for the HTTP client.

STEP 4 : Define the transaction policy that Apache Camel will use

```
<!-- Tx Manager -->
<osgi:reference id="txManager" filter="(tx=JPA)"
                interface="org.springframework.transaction.PlatformTransactionManager"/>

<!-- PROPAGATION used for Transactions-->
<bean id="PROPAGATION_REQUIRED"
      class="org.apache.camel.spring.spi.SpringTransactionPolicy">
  <property name="transactionManager" ref="txManager"/>
  <property name="propagationBehaviorName" value="PROPAGATION_REQUIRED"/>
</bean>
```

Remark : we will reuse the JPA transaction manager created in the `persistence-jpa` module and exposed as an OSGi Service

STEP 5 : Create the Camel Context

```
<camelContext trace="true" xmlns="http://camel.apache.org/schema/spring">
  <!-- add <route/>s, <dataFormat/>s, ... here -->
</camelContext>
```

STEP 6 : Add the data format definition that Apache Camel will use to transform CSV record into objects (or objects into CSV)

```
<camelContext trace="true" xmlns="http://camel.apache.org/schema/spring">
 <dataFormats>
   <bindy type="Csv" id="bindyDataFormat"
          packages="org.fusesource.devoxx.reportincident.model"/>
  </dataFormats>
</camelContext>
```

STEP 7 : Create the route which will poll files from a directory, transform the content into a ReportIncident and place it into a queue

```
<route id="fileToQueueIn">
  <from uri="file://data/reportincident/?move=done/${date:now:yyyyMMdd}/${file:name}.bak"/>
  <setHeader headerName="origin">
    <constant>file</constant>
  </setHeader>
  <unmarshal ref="bindyDataFormat"/>
  <to uri="activemq:queue:in"/>
</route>
```

STEP 8 : Expose a webservice, send the response to the caller and place ReportIncident object into the queue

```
<route id="webServiceToQueueIn">
  <from uri="cxf:bean:reportIncident"/>
  <setHeader headerName="origin">
    <constant>webservice</constant>
  </setHeader>
  <convertBodyTo type="org.fusesource.devoxx.reportincident.InputReportIncident"/>
  <to uri="bean:webservice"/>
  <inOnly uri="activemq:queue:in"/>
  <transform>
    <method bean="feedback" method="setOk"/>
  </transform>
</route>
```

STEP 9 Create the camel transactional route which will insert records into the h2 DB

```
<route id="queueIntoIncidentSaver">
  <from uri="activemq:queue:in"/>
  <transacted ref="PROPAGATION_REQUIRED"/>
  <to uri="bean:incidentSaver?method=process"/>
</route>
```

STEP 10 : Create the following classes in the directory `src/main/java/org/fusesource/devoxx/reportingincident/internal`

WebService

```
package org.fusesource.devoxx.reportincident.internal;

/* SNIP */

public class WebService {

    public void process(Exchange exchange) throws ParseException {

        InputReportIncident webincident = (InputReportIncident)exchange.getIn().getBody();

        List<Map<String, Incident>> models = new ArrayList<Map<String, Incident>>();
        Map<String, Incident> model = new HashMap<String, Incident>();

        // Convert the InputReportIncident into
        // an org.apache.camel.example.reportincident.model.Incident instance
        Incident incident = new Incident();

        DateFormat format = new SimpleDateFormat( "dd-MM-yyyy" );
        incident.setIncidentDate(format.parse(webincident.getIncidentDate()));

        incident.setDetails(webincident.getDetails());
        incident.setEmail(webincident.getEmail());
        incident.setFamilyName(webincident.getFamilyName());
        incident.setGivenName(webincident.getGivenName());
        incident.setIncidentRef(webincident.getIncidentId());
        incident.setPhone(webincident.getPhone());
        incident.setSummary(webincident.getSummary());

        // Get Header origin from message
        String origin = (String) exchange.getIn().getHeader("origin");

        // Specify current Date
        format = new SimpleDateFormat( "dd/MM/yyyy HH:mm:ss" );
        String currentDate = format.format( new Date() );
        Date creationDate = format.parse( currentDate );

        incident.setCreationDate(creationDate);
        incident.setCreationUser(origin);

        // and place it in a model (cfr camel-bindy)
        model.put(Incident.class.getName(), incident);
        models.add(model);

        // replace with our input
        exchange.getOut().setBody(models);

        // propagate the header
        exchange.getOut().setHeader("origin", origin);

    }
}
```

IncidentSaver

```
package org.fusesource.devoxx.reportincident.internal;

import org.apache.camel.Exchange;
import org.fusesource.devoxx.reportincident.model.Incident;
import org.fusesource.devoxx.reportincident.service.IncidentService;

import java.text.DateFormat;
import java.text.ParseException;
import java.text.SimpleDateFormat;
import java.util.*;

public class IncidentSaver {

    private IncidentService incidentService = null;

    public void process(Exchange exchange) throws ParseException {

        List<Map<String, Object>> models = new ArrayList<Map<String, Object>>();
        Map<String, Object> model = new HashMap<String, Object>();

        // Get models from message
        models = (List<Map<String, Object>>) exchange.getIn().getBody();

        // Get Header origin from message
        String origin = (String) exchange.getIn().getHeader("origin");

        Iterator<Map<String, Object>> it = models.iterator();

        // Specify current Date
        DateFormat format = new SimpleDateFormat( "dd/MM/yyyy HH:mm:ss" );
        String currentDate = format.format( new Date() );
        Date creationDate = format.parse( currentDate );

        while (it.hasNext()) {

            model = it.next();

            for (String key : model.keySet()) {

                // Retrieve incident from model
                Incident incident = (Incident) model.get(key);
                incident.setCreationDate(creationDate);
                incident.setCreationUser(origin);

                // Save org.fusesource.devoxx.reportincident.model.Incident
                incidentService.saveIncident(incident);
            }

        }

    }

    // Property used to inject service implementation
    public void setIncidentService(IncidentService incidentService) {
        this.incidentService = incidentService;
    }
}
```

Feedback

```
package org.fusesource.devoxx.reportincident.internal;

import org.fusesource.devoxx.reportincident.OutputReportIncident;

public class Feedback {

    public OutputReportIncident setOk() {
        OutputReportIncident outputReportIncident = new OutputReportIncident();
        outputReportIncident.setCode("0");
        return outputReportIncident;
    }

}
```

BUILDING AND RUNNING

Build the code

At the root of the project, execute the command

```
mvn clean install
```

Setup the Database

STEP 1 : Open a DOS/UNIX console in the folder persistence/database

STEP 2 : Download H2 Database (http://www.h2database.com/html/download.html) and install it

STEP 3 : Start H2 Server using the bat or shell script

```
./h2.sh &
```

The H2 server is started and to manage the databases from your web browser, simply click on the following url http://localhost:8082/

STEP 4 : Next create the report database

In the login.jsp screen, select Generic (H2) - Server
Add as settings name : Generic H2 (Server) - Webinar
and modify the JDBC url as such : `jdbc:h2:tcp://localhost/~/reportdb`

Next click on "connect" and the screen to manage the reportdb appears

STEP 5 : Create Schema and Tables using the script located in the file `db/src/main/config/h2-script.sql`

Execute the scripts 1), 2) and 3) defined in this file

Check that the records are well created using the command : `SELECT * FROM REPORT.T_INCIDENT;`

Deploy and test

STEP 1 : Unzip `apache-servicemix-4.4.1-fuse-01-06.zip` or tar.gz in the directory `~/devoxx/servers/` or `D:\devoxx\servers`

STEP 2 : In a DOC/Unix console, change to the directory `apache-servicemix-4.4.1-fuse-01-06/bin`

STEP 3 : Edit the file `apache-servicemix-4.4.1-fuse-01-06/etc/org.apache.karaf.features.cfg` and replace the featuresBoot line by this one :

```
featuresBoot=karaf-framework,config,war,activemq-broker,activemq-spring,camel,camel-cxf,camel-activemq,camel-jaxb,camel-bindy,jpa
```

Setting this property allows you to configure just those the container features that your application requires.

STEP 5 : Start ServiceMix `servicemix.bat` or `./servicemix`

You can use the ServiceMix shell command `osgi:list` to see how the default container bundles are being started.

STEP 6 : In the servicemix console, launch the commands to install features of reportincident demo

```
features:addUrl mvn:org.fusesource.devoxx.reportincident/features/1.0-SNAPSHOT/xml/features
features:install reportincident-jpa
```

STEP 7 : Check if the project works fine and connect to the following url in your browser

http://localhost:8282/cxf/camel-example/incident?wsdl

STEP 8 : Verify that you have records in the table screen

http://localhost:8181/reportincidentweb/

STEP 9 : Copy incident file from the directory `~/devoxx/` or `D:\devoxx`

```
cp ~/devoxx/routing/src/data/csv-one-record.txt ~/devoxx/servers/apache-servicemix-4.4.1-fuse-01-06/data/reportincident/
```

STEP 10 : Use soapUI client and send this envelope to the server

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
                  xmlns:rep="http://reportincident.devoxx.fusesource.org">
  <soapenv:Header/>
  <soapenv:Body>
    <rep:inputReportIncident>
       <incidentId>999</incidentId>
       <incidentDate>10-05-2011</incidentDate>
       <givenName>Charles</givenName>
       <familyName>Moulliard</familyName>
       <summary>Issue at the DevoXX</summary>
       <details>Room is burning !</details>
       <email>cmoulliard@fusesource.com</email>
       <phone>+32473604014</phone>
    </rep:inputReportIncident>
  </soapenv:Body>
</soapenv:Envelope>
```

THANKS FOR ATTENDING!