

# Script: NVS 4

Version: 1.0

## 1. General

### 1.1. Create Project

Create **Maven** Project with IntelliJ. For Example:

```
<groupId>at.htl</groupId>  
<artifactId>PersonRest</artifactId>
```

### 1.2. Configure Data Source & and Drivers

Option	Input
Driver	Apache Derby (Remote)
Host	localhost
Port	1527
User	app
Password	app
Database	db
URL	jdbc:derby://localhost:1527/db

Good Source: [https://www.tutorialspoint.com/intellij\\_idea/index.htm](https://www.tutorialspoint.com/intellij_idea/index.htm)

### 1.3. Start DerbyDB

*Start DB:*

```
demoTest101/db$ /opt/db-derby-10.14.2.0-bin/bin/startNetworkServer -noSecurityManager
```

### 1.4. Project Structure



- The source code is usually in 3 subfolders of the main folder **at.html.project\_Name** Folder. The subfolders are **business**, **model**, **rest**.
- In the **business folder** is the **InitBean.java** which contains the init method for the Application server.
- In the **model folder** are the **Entities**.
- In the **rest folder** is the **Endpoints.java** and the **RestConfig.java** which configures the rest service.
- For testing the REST service a **request.http** can be created this file should be placed in the **requests folder** which is a subfolder of the project's root directory.
- The **resources folder** which is also a subfolder of the project's root directory is for resources. Like: **csv files** or the folder **META-INF** which contains the **persistance.xml**.

## 1.5. XML

For xml we have to declare the entity as:

*Example for Entity with XML*

```
import javax.xml.bind.annotation.XmlRootElement;

@XmlRootElement
public class Vehicle {}
```

## 1.6. Pom.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <groupId>at.htl</groupId>
  <artifactId>vehicle</artifactId>
  <version>1.0-SNAPSHOT</version>
  <packaging>war</packaging>

  <properties>
    <maven.compiler.source>11</maven.compiler.source>
    <maven.compiler.target>11</maven.compiler.target>
  </properties>

  <dependencies>
    <dependency>
      <groupId>jakarta.platform</groupId>
      <artifactId>jakarta.jakartaee-api</artifactId>
      <version>8.0.0</version>
      <scope>provided</scope>
    </dependency>
    <dependency>
      <groupId>jakarta.xml.bind</groupId>
      <artifactId>jakarta.xml.bind-api</artifactId>
      <version>2.3.2</version>
      <scope>provided</scope>
    </dependency>
  </dependencies>

  <build>
    <finalName>vehicle</finalName>
  </build>

</project>
```

```
        <!-- Useful Sources -->
    <!-- https://mvnrepository.com/artifact/junit/junit -->
    <!-- https://mvnrepository.com/artifact/org.glassfish.jersey.core/jersey-client
-->
    <!-- https://mvnrepository.com/artifact/org.glassfish.jersey.media/jersey-media-
json-processing -->
    <!-- https://mvnrepository.com/artifact/org.glassfish/javax.json -->
    <!-- https://mvnrepository.com/artifact/org.glassfish.jersey.inject/jersey-hk2 -->
    <!-- https://mvnrepository.com/artifact/org.hamcrest/hamcrest -->
```

## 1.7. Request

*Examples for request.http*

```
###

POST http://localhost:8080/person/api/person
Content-Type: application/json

[
{
  "dob": "2001-10-07",
  "name": "Chiara"
},
{
  "dob": "2002-03-23",
  "name": "Christoph"
}
]

###

GET http://localhost:8080/person/api/person/demo
Accept: application/xml

###

GET http://localhost:8080/person/api/person?name=Susi
```

## 1.8. Rest Config

```
package at.htl.vehicle.rest;

import javax.ws.rs.ApplicationPath;
import javax.ws.rs.core.Application;

@ApplicationPath("api")
public class RestConfig extends Application {

}
```

## 1.9. Read data from csv

Good Source:

<https://stuetzpunkt.wordpress.com/2016/12/28/how-to-access-file-in-resources-folder-javaee/>

*Example for read csv in InitBean*

```
private void init(
    @Observes
    @Initialized(ApplicationScoped.class) Object object) {
    readCsv(FILE_NAME);
}

private void readCsv(String fileName) {
    URL url = Thread.currentThread().getContextClassLoader()
        .getResource(fileName);
    try (Stream<String> stream = Files.lines(Paths.get(url.getPath())
        , StandardCharsets.UTF_8)) {
        stream
            .skip(1)
            ...
            .forEach(em::merge);
    } catch (IOException e) {
        e.printStackTrace();
    }
}
```

## 2. JPA

JPA is a concept that can be implemented like a interface, the current reference implementation is EclipseLink.

### 2.1. Entity

### Example Person

```
package at.htl.person.model;
import javax.persistence.*;

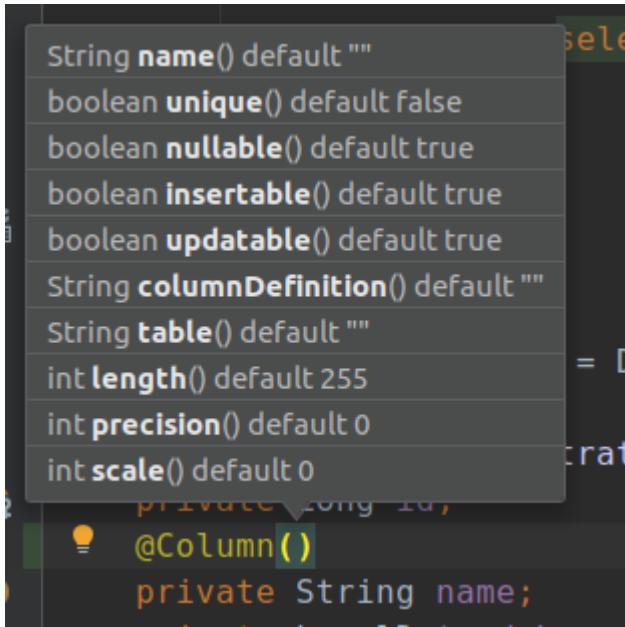
@Entity
//@Entity(name = "Person")
public class Person {
    @Transient
    DateTimeFormatter dtf = DateTimeFormatter.ofPattern("dd.MM.yyyy");

    @Id @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;
    @Column(name = "customer_name")
    private String name;
}
```

**Source Package:** `import javax.persistence.*;`

Table 1. Annotations:

Annotation	Description
@Entity	makes a class a entity
@Entity(name = "Person")	defines the table name of the entity
@Id	defines the Pk of a table entity
@GeneratedValue(strategy = GenerationType.IDENTITY)	defines a auto generated key

Annotation	Description
 <pre>String name() default "" boolean unique() default false boolean nullable() default true boolean insertable() default true boolean updatable() default true String columnDefinition() default "" String table() default "" int length() default 255 int precision() default 0 int scale() default 0  @Column() private String name;</pre>	options for fields / columns
<pre>@GeneratedValue(strategy = GenerationType.IDENTITY)</pre>	defines a auto generated key
<pre>@Transient</pre>	defines fields that should not be part of the entity
<pre>/* Bestellung */ @OneToMany(mappedBy="bestellung", cascade = CascadeType.Persist, orphanRemoval=true) private List&lt;Bestellungsposition&gt; bestellungspositionListe;</pre>	delete dependent children, when the parent is going to be deleted (child-entites are orphans (=Waisen) then)
<pre>/* Bestelposition */ @ManyToOne private Bestellung bestellung;</pre>	the inverse part of the relationship



Annotation	Description
<pre> /* Person */ @ManyToOne() @JoinColumns({     @JoinColumn(name = "Address_No"),     @JoinColumn(name = "ssn") }) private Address address;  /* Address */ @OneToMany(mappedBy = "id.person", cascade = CascadeType.PERSIST) private List&lt;Address&gt; addresses = new ArrayList&lt;&gt;(); </pre>	when address has a composition key
<pre> /* Person */ @OneToOne @JoinColumn(unique = true) private Address address; </pre>	defines a OneToOne relationship and adds a Fk to the Address in the Person
<pre> @OneToOne(cascade = {CascadeType.PERSIST, CascadeType.REMOVE}) private Address address; </pre>	the Address would get added the same moment as the parent object and removed

## 2.2. JPQL

Java Persistence Query Language

Query:

*Example for More Advanced Example*

```

public void getStuff(){
    System.out.println("\n JPA_1 | Query2:");
    Query query2 = em.createQuery(
        "SELECT NEW demo.AwesomePeopleDetail(p.isAwesome, count(p.SSN)) from
Person p group by p.isAwesome");
    List<AwesomePeopleDetail> result2 = query2.getResultList();
    for (AwesomePeopleDetail apc : result2) {
        System.out.println(apc.isAwesome() + ": " + apc.getCount());
    }
}

```

Exmple for a Responde Oobject:

*Example for Query Responde Class*

```
public class AwesomePeopleDetail {

    private boolean isAwesome;
    private long count;

    public AwesomePeopleDetail(boolean isAwesome, long count) {
        this.isAwesome = isAwesome;
        this.count = count;
    }
    //region Properties
    ...
    //endregion
}
```

Exmple for saving Responde in a Tuple:

*Example for a Tuple Responde*

```
private static void secondQuery(EntityManager em) {
    TypedQuery<Tuple> query = em.createQuery("select o.id, p.firstName || ' ' || p.lastName, a.country || ' ' || a.city || ' ' || a.street || ' ' || a.streetNo as name, sum(oi.amount * p2.price) as totalCost, sum(oi.amount) as pieces " + "from Person p join p.addresses a join Order o on o.customer = p join o.orderItems oi " + "join oi.id.product p2 where a.id.addressNo = o.shipmentAddress.id.addressNo group by o, p, a", Tuple.class);
    Tuple result = query.getResultList().get(0);
    var shipment = new OrderShipment((int) result.get(0), (String) result.get(1), (String) result.get(2), (BigDecimal) result.get(3), Math.toIntExact((long) result.get(4)));
    printShipmentInfo(shipment);
}
```

## 2.3. Named Query

### Example for NamedQueries

```
@Entity
@NamedQueries({
    @NamedQuery(
        name = "Person.findAll",
        query = "select p from Person p"
    ),
    @NamedQuery(
        name = "Person.findByName",
        query = "select p from Person p where p.name = :NAME"
    )
})
```

### Example for a Rest using a NamedQuery

```
@GET
@Produces(MediaType.APPLICATION_JSON)
public Person findByName(@QueryParam("name") String name) {
    return em
        .createNamedQuery("Person.findByName", Person.class)
        .setParameter("NAME", name)
        .getSingleResult();
}
```

Good Sources:

[https://www.tutorialspoint.com/de/jpa/jpa\\_jpql.htm](https://www.tutorialspoint.com/de/jpa/jpa_jpql.htm)

## 2.4. Entity Manager

Example for creating a Entity Manager

### Example for Creating a EntityManager

```
EntityManagerFactory emf =
Persistence.createEntityManagerFactory("my_persistence_unit");
EntityManager em = emf.createEntityManager();

em.getTransaction().begin();
// perform insert/update/delete/query
em.getTransaction().commit();
// or em.getTransaction().rollback();
em.close();
```

## 3. CRUD

- Create: persist entity

```
em.persist(person);
```

- Read: find entity by id

```
Person person = em.find(Person.class, "1234010190");
```

- Update: update entity fields

```
Person person = em.find(Person.class, "1234010190");
person.setName("Jane Doe");
// optional: other operations
em.merge();
//em.getTransaction().commit();
// executes update for the name of the person
```

- Delete: remove entity

```
Person person = em.find(Person.class, "1234010190");
em.remove(person);
// optional: other operations
em.getTransaction().commit();
// executes delete for the person
```

## 4. REST

### 4.1. Http Methods

- Get (Read: all or a specific resource)
- Post (Create or Update: without a specific ID)
- HEAD
- PUT (Create or Update: with a specific ID)
- DELETE (delete a specific resource)
- TRACE
- OPTIONS
- CONNECT

Good Source:

<https://wiki.selfhtml.org/wiki/HTTP/Anfragemethoden>

## 4.2. Examples a RestEndpoint

### *Common Imports for a RestEndpoint*

```
import javax.annotation.PostConstruct;
import javax.json.*;
import javax.persistence.*;
import javax.transaction.Transactional;
import javax.ws.rs.*;
import javax.ws.rs.core.*;
import java.net.URI;
import java.time.LocalDate;
import java.time.format.DateTimeFormatter;
import java.util.List;
```

### *Example for a Endpoint*

```
@Path("person")
public class PersonEndpoint {

    public PersonEndpoint() {
    }

    @PersistenceContext
    EntityManager em;

    @GET
    @Produces({MediaType.APPLICATION_JSON, MediaType.APPLICATION_XML})
    public List<Person> findAll() {
        return em
            .createNamedQuery("Person.findAll", Person.class)
            .getResultList();
    }
}
```

### Example for a Post

```
@POST
@Consumes(MediaType.APPLICATION_JSON)
@Transactional
public Response createPerson(
    final @Context UriInfo uriInfo,
    JsonValue jsonValue) {

    if (jsonValue.getValueType() == JsonValue.ValueType.ARRAY) {
        JsonArray jsonArray = jsonValue.asJsonArray();
        for (JsonValue value : jsonArray) {
            String name = value.asJsonObject().getString("name");
            ...
            p = em.merge(p);
        }
    } else {
        System.out.println("Ich bin ein Object");
    }
    return Response.ok().build();
}
```

## 4.3. Examples for a RestClient

### Exmaple for a get in a Java SE client

```
//import javax.ws.rs.* //core or client;

Client client = ClientBuilder.newClient();
WebTarget tut = client.target("http://localhost:8080/restprimer/api/time");

Response response = tut.request(MediaType.TEXT_PLAIN).get();
String payload = response.readEntity(String.class);
System.out.println("Request: " + payload);
```

## 5. Technologies

### 5.1. Jakarta EE

Good Source:

<https://eclipse-ee4j.github.io/jakartaee-tutorial/>

### 5.2. Junit

Table 2. Method Anotations

tag	Description
-----	-------------

@Test	Turns a public method into a JUnit test case.
@Before	Method to run before every test case
@After	Method to run after every test case
@BeforeClass	Method to run once, before any test cases have run
@AfterClass	Method to run once, after all test cases have run

Table 3. Assert Methods

Method	Description
assertTrue(test)	fails if the Boolean test is false
assertFalse(test)	fails if the Boolean test is true
assertEquals(expected, actual)	fails if the values are not equal
assertSame(expected, actual)	fails if the values are not the same (by ==) have run
assertNotSame(expected, actual)	fails if the values are the same (by ==)
assertNull(value)	fails if the given value is not null
assertNotNull(value)	fails if the given value is null
fail()	causes current test to immediately fail
assertEquals("message", expected, actual)	Each method can also be passed a string to display if it fails

Good Source:

<https://www.javatpoint.com/>

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