DEZSYS_GK862_Notes

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1. Requirements for GKü

For the steps that are required for GKü, I'll just follow the following Tutorial:
https://spring.io/guides/gs/accessing-data-mysql

1.1 Run MySQL Container

Before we start, we need to run a MySQL Docker container:

```
$ docker run --name dezsys-gk862-mysql -e MYSQL_ROOT_PASSWORD=password -d
mysql
```

1.2 Setup Database

Now that the MySQL Container is running, we need to set it up:

```
$ docker exec -it dezsys-gk862-mysql bash

bash-4.4# mysql --password
Enter password: password
```

Next, we'll create a new database and a new user, which will both be used in our app.

```
mysql> create database db_example;
mysql> create user 'springuser'@'%' identified by 'ThePassword';
mysql> grant all on db_example.* to 'springuser'@'%';
```

1.3 Create the application.properties File

Create a new file at `src/main/resources/application.properties`:

```
spring.jpa.hibernate.ddl-auto=update
spring.datasource.url=jdbc:mysql://localhost:3306/db_example
spring.datasource.username=springuser
spring.datasource.password=ThePassword
```

```
spring.datasource.driver-class-name=com.mysql.cj.jdbc.Driver
#spring.jpa.show-sql: true
```

1.4 Create the @Entity Model

Create a new file at `src/main/java/com/example/accessingdatamysql/User.java`

- Putting the `@Entity` Notation in front of a class name tells Hibernate that it should make a db table out of this class
- The `@Id` Notation indicates that this attribute is the primary key of the table
- `@GeneratedValue` automatically generates values for the attribute

```
package main.java.com.example.accessingdatamysql;

import jakarta.persistence.Entity;
import jakarta.persistence.GeneratedValue;
import jakarta.persistence.GenerationType;
import jakarta.persistence.Id;

@Entity // This tells Hibernate to make a table out of this class
public class User {
  @Id
  @GeneratedValue(strategy=GenerationType.AUTO)
  private Integer id;

  private String name;

  private String email;

  public Integer getId() {
    return id;
  }

  public void setId(Integer id) {
    this.id = id;
  }

  public String getName() {
    return name;
  }

  public void setName(String name) {
    this.name = name;
  }

  public String getEmail() {
    return email;
  }
```

```
  public void setEmail(String email) {
    this.email = email;
  }
}
```

- Hibernate automatically translates the entity into a table

1.5 Create the Repository

- We need to create a repository that holds user records, as the following listing (in `src/main/java/com/example/accessingdatamysql/Userrepository.java`) shows:

```
package main.java.com.example.accessingdatamysql;

import org.springframework.data.repository.CrudRepository;

import com.example.accessingdatamysql.User;

// This will be AUTO IMPLEMENTED by Spring into a Bean called
userRepository
// CRUD refers Create, Read, Update, Delete

public interface UserRepository extends CrudRepository<User, Integer> {

}
```

1.6 Create a Controller

- Now we'll need to implement the controller that handles all HTTP requests and processes them
- Create new file in `src/main/java/com/example/accessingdatamysql/MainController.java`:

```
package main.java.com.example.accessingdatamysql;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Controller;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.PostMapping;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RequestParam;
import org.springframework.web.bind.annotation.ResponseBody;

@Controller // This means that this class is a Controller
@RequestMapping(path="/demo") // This means URL's start with /demo (after
Application path)
```

```
public class MainController {
  @Autowired // This means to get the bean called userRepository
         // Which is auto-generated by Spring, we will use it to handle
the data
  private UserRepository userRepository;

  @PostMapping(path="/add") // Map ONLY POST Requests
  public @ResponseBody String addNewUser (@RequestParam String name
      , @RequestParam String email) {
    // @ResponseBody means the returned String is the response, not a view
name
    // @RequestParam means it is a parameter from the GET or POST request

    User n = new User();
    n.setName(name);
    n.setEmail(email);
    userRepository.save(n);
    return "Saved";
  }

  @GetMapping(path="/all")
  public @ResponseBody Iterable<User> getAllUsers() {
    // This returns a JSON or XML with the users
    return userRepository.findAll();
  }
}
```

1.7 Create an Application Class

- The Spring Initializr already created a simple class for the Application, as the following `src/main/java/com/example/accessingdatamysql/AccessingDataMysqlApplication.java` shows:

```
package com.example.accessingdatamysql;

import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;

@SpringBootApplication
public class AccessingDataMysqlApplication {

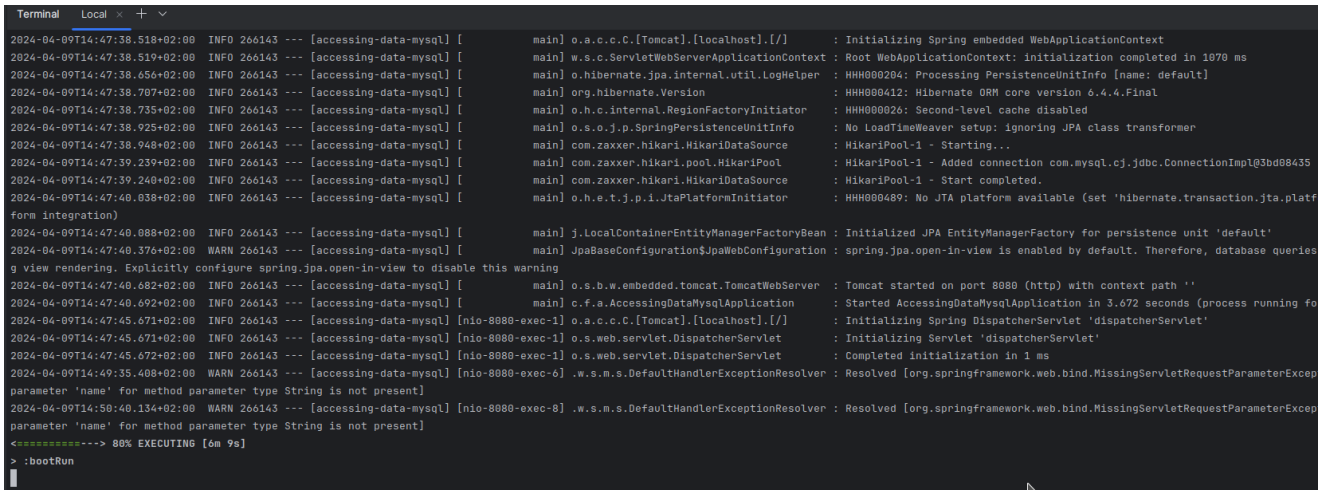
    public static void main(String[] args) {
       SpringApplication.run(AccessingDataMysqlApplication.class, args);
    }

}
```

- For this example, we don't need to modify the `AccessingDataMysqlApplication` class

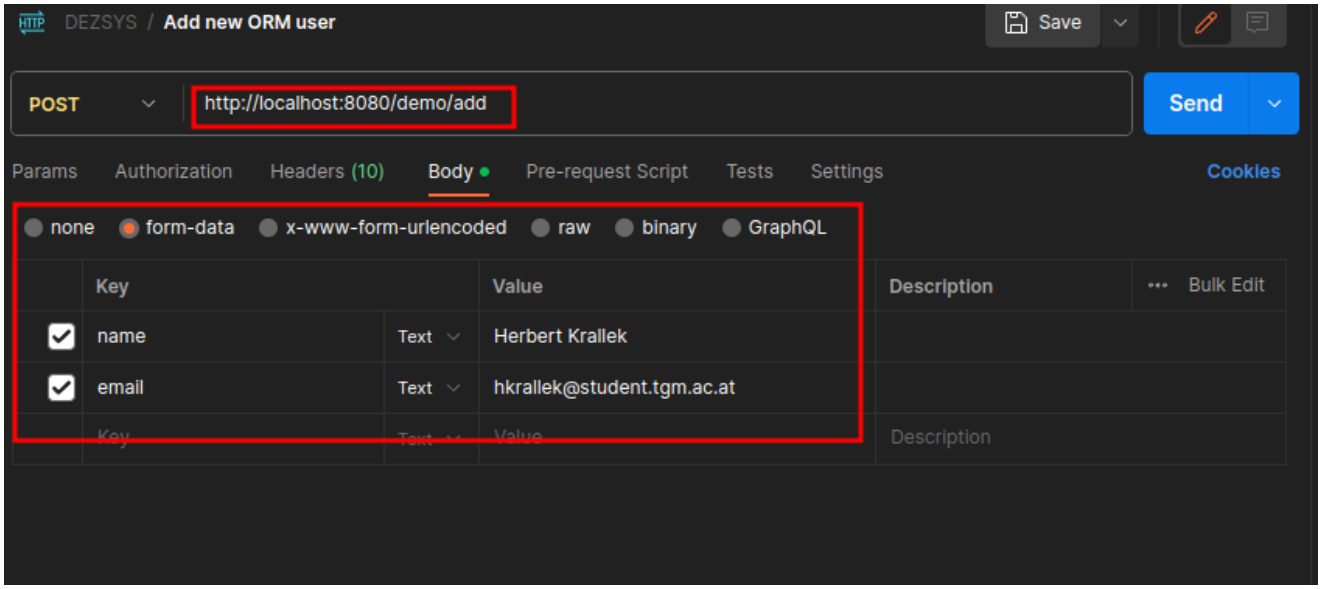
1.8 Start & test the App

So, now we are just going to start the app with the `./gradlew bootRun` command:

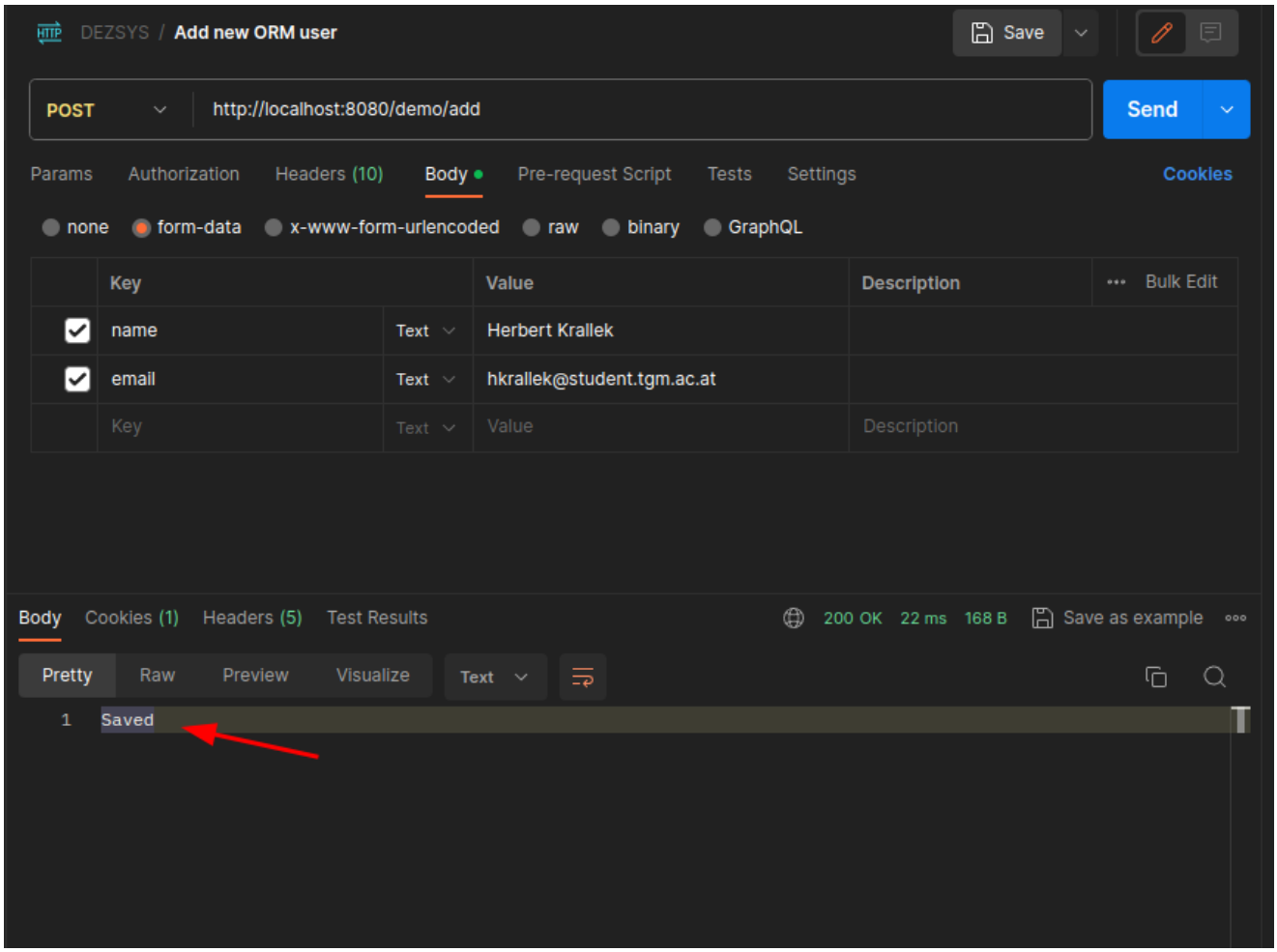


After that, we are going to add a new user to the database.

For that, we can use `Postman` to send a `POST` Request to the `/demo/add` endpoint:

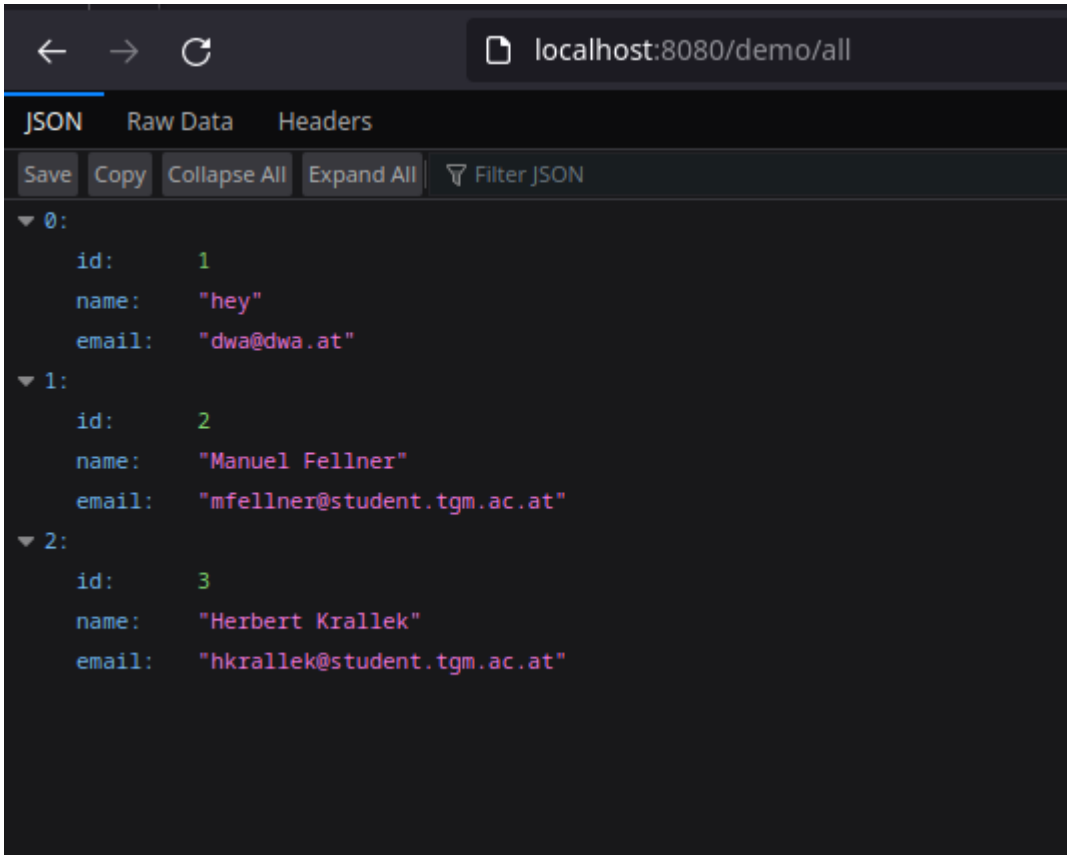


As you can see, the needed parameters for the data is already there. With this request, we'll create a new User called `Herbert Krallek` with the email `hkrallek@student.tgm.ac.at`. This should get saved into the database - Let's execute it!



We got our expected response!

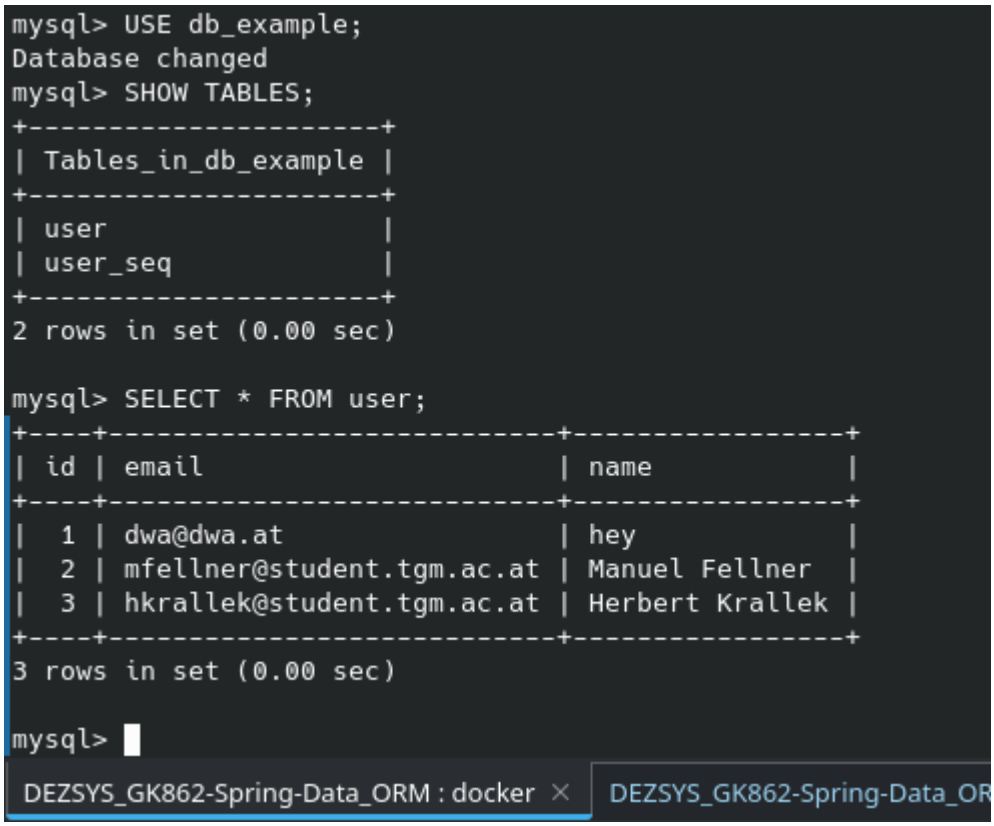
Then, let's navigate to the `demo/all` endpoint in our browser to verify if it worked:



Yup, also correct!

And now, to be 100 % sure, we can also check the database itself with the following commands:

```
mysql> USE db_example;
mysql> SHOW TABLES;
+----------------------+
| Tables_in_db_example |
+----------------------+
| user                 |
| user_seq             |
+----------------------+
2 rows in set (0.00 sec)
mysql> SELECT * FROM user;
+----+----------------------------+-----------------+
| id | email                      | name            |
+----+----------------------------+-----------------+
|  1 | dwa@dwa.at                 | hey             |
|  2 | mfellner@student.tgm.ac.at | Manuel Fellner  |
|  3 | hkrallek@student.tgm.ac.at | Herbert Krallek |
+----+----------------------------+-----------------+
3 rows in set (0.00 sec)
```



2. Requirements for GKv

Next, we'll need to customize this ORM experience for our Warehouse application!

2.1 Setup database

For this customization, we'll need a new Database:

```
$ docker exec -it dezsys-gk862-mysql bash

bash-4.4# mysql --password
Enter password: password
```

Then, after logging in, we'll create a new db and grant the springuser access to it:

```
mysql> create database warehouse;
mysql> create user 'springuser'@'%' identified by 'ThePassword';
mysql> grant all on warehouse.* to 'springuser'@'%';
```

2.2 Create the Entity Models

2.2.1 Product Entity

First, let's create an Entity that is fitting for our Products.

```
package com.fellner.warehouse.orm.entities;

import com.fasterxml.jackson.annotation.JsonIgnore;
import jakarta.persistence.*;

import java.util.UUID;

/**
 * Product Entity * * @author Manuel Fellner
 * @version 2024-04-09
 */
@Entity
public class Product {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int id;

    private String name;

    private String productCategory;

    private int productQuantity;

    private String productUnit;

    @ManyToOne(fetch = FetchType.LAZY)
```

```
    @JoinColumn(name = "warehouse_id")
    @JsonIgnore
    private Warehouse warehouse;

    public int getId() {
        return id;
    }

    public void setId(int id) {
        this.id = id;
    }

        // ... setter and getter for all attributes
}
```

- It is important that we add the `@JsonIgnore` Annotation here at our warehouse field!
- This ignores the typical JSON serialization, which would destroy our output when we'd try to render this at an API endpoint.

2.2.2 Warehouse Entity

Next, we'll create the Warehouse entity.
It has one "special" Attribute: the `products` attribute. This variable will have to contain one or more `Product` entities.
Therefore, we need to define a relation for that.

```
package com.fellner.warehouse.orm.entities;
import jakarta.persistence.*;

import java.time.LocalDateTime;
import java.util.List;

/**
 * Warehouse Entity * * @author Manuel Fellner
 * @version 2024-04-09
 */
@Entity
public class Warehouse {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int id;

    private String name;

    private String address;

    private int postalCode;
```

```
    private String city;

    private String country;

    private LocalDateTime timestamp;

    @OneToMany(mappedBy = "warehouse", cascade = CascadeType.ALL)
    private List<Product> products;

    public void addProduct (Product product)    {
        if (product != null)    {
            this.products.add(product);
        }
    }

    public int getId() {
        return id;
    }

    public void setId(int id) {
        this.id = id;
    }

        // ... setter and getter for all attributes
}
```

So, we chose the following relation:
`@OneToMany(mappedBy = "warehouse", cascade = CascadeType.ALL)`

This represents a One-To-Many relationship which basically means, that `One` Warehouse can have `Many` Products.

2.3 Create the Repositories

We don't need any fancy repository for the Repositories of our Entities: Just two Files named `ProductRepository.java` and `WarehouseRepository.java`.

2.3.1 Product Repository

```
package com.fellner.warehouse.orm.repositories;

import com.fellner.warehouse.orm.entities.Product;
import org.springframework.data.repository.CrudRepository;


// This will be AUTO IMPLEMENTED by Spring into a Bean called
userRepository
// CRUD refers Create, Read, Update, Delete
```

```
/**
 * Product repository * * @author Manuel Fellner
 * @version 2024-04-09
 */public interface ProductRepository extends CrudRepository<Product,
Integer> {
}```

#### 2.3.1 Warehouse Repository

```java
package com.fellner.warehouse.orm.repositories;

import com.fellner.warehouse.orm.entities.Warehouse;
import org.springframework.data.repository.CrudRepository;

// This will be AUTO IMPLEMENTED by Spring into a Bean called
userRepository
// CRUD refers Create, Read, Update, Delete

/**
 * Warehouse repository * * @author Manuel Fellner
 * @version 2024-04-09
 */public interface WarehouseRepository extends CrudRepository<Warehouse,
Integer> {
}
```

2.4 Create a Controller

Now, we need a Controller to manage all HTTP requests:

2.4.1 Warehouse Controller

The Controller that manages everything related to the Warehouse entity (adding a new Warehouse, getting all warehouses, getting a specific warehouse with id):

```
package com.fellner.warehouse.orm.Controller;

import com.fellner.warehouse.orm.entities.Product;
import com.fellner.warehouse.orm.entities.Warehouse;
import com.fellner.warehouse.orm.repositories.ProductRepository;
import com.fellner.warehouse.orm.repositories.WarehouseRepository;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Controller;
import org.springframework.web.bind.annotation.*;

import java.time.LocalDateTime;
import java.util.Optional;
```
```

```java
/**
 * WarehouseController - Manages all HTTP requests * * @author Manuel
Fellner
 * @version 2024-04-09
 */
@Controller
@RequestMapping(path = "/warehouse")
public class WarehouseController {

    @Autowired
    private WarehouseRepository warehouseRepository;
    @Autowired
    private ProductRepository productRepository;

    @PostMapping(path = "/add")
    public @ResponseBody String addNewWarehouse(@RequestParam String name,
@RequestParam String address, @RequestParam int postalCode, @RequestParam
String city, @RequestParam String country) {
        Warehouse warehouse = new Warehouse();
        warehouse.setName(name);
        warehouse.setAddress(address);
        warehouse.setPostalCode(postalCode);
        warehouse.setCity(city);
        warehouse.setCountry(country);
        warehouse.setTimestamp(LocalDateTime.now());

        warehouseRepository.save(warehouse);
        return "Warehouse with the name " + name + " saved!";
    }

    @PostMapping (path = "{id}/addProduct")
    public @ResponseBody String addProductToWarehouse (@PathVariable int
id, @RequestParam String name, @RequestParam String productCategory,
@RequestParam int productQuantity, @RequestParam String productUnit) {
        Product product = new Product();
        product.setName(name);
        product.setProductCategory(productCategory);
        product.setProductQuantity(productQuantity);
        product.setProductUnit(productUnit);

        Optional<Warehouse> warehouseOptional =
warehouseRepository.findById(id);

        if (warehouseOptional.isPresent()) {
            Warehouse warehouse = warehouseOptional.get();
            warehouse.addProduct(product);
            product.setWarehouse(warehouse);
            warehouseRepository.save(warehouse);
```

```
            return "Product " + name + " added to warehouse " +
warehouse.getName();
        } else {
            return "Warehouse with ID " + id + " not found!";
        }
    }

    @GetMapping(path = "/all")
    public @ResponseBody Iterable<Warehouse> getAllWarehouses() {
        return warehouseRepository.findAll();
    }

    @GetMapping(path = "/{id}")
    public @ResponseBody Optional<Warehouse>
getSpecificWarehouse(@PathVariable int id) {
        return warehouseRepository.findById(id);
    }
}```

#### 2.4.2 Product Controller

The Controller for everything related for the Product entity (adding a new
Product, getting all products or getting a specific product with id):

```java
package com.fellner.warehouse.orm.Controller;
import com.fellner.warehouse.orm.entities.Product;
import com.fellner.warehouse.orm.repositories.ProductRepository;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Controller;
import org.springframework.web.bind.annotation.*;

import java.util.Optional;
import java.util.UUID;

/**
 * Product - Manages all HTTP requests * * @author Manuel Fellner
 * @version 2024-04-09
 */
@Controller
@RequestMapping(path = "/products")
public class ProductController {
    @Autowired
    private ProductRepository productRepository;

    @PostMapping(path = "/add")
    public @ResponseBody String addNewProduct (@RequestParam String name,
@RequestParam String productCategory, @RequestParam int productQuantity,
@RequestParam String productUnit)    {
```
```

```
        Product product = new Product();
        product.setName(name);
        product.setProductCategory(productCategory);
        product.setProductQuantity(productQuantity);
        product.setProductUnit(productUnit);

        productRepository.save(product);
        return "Product with the name " + name + " saved!";
    }

    @GetMapping(path = "/all")
    public @ResponseBody Iterable<Product> getAllProducts ()  {
        return productRepository.findAll();
    }

    @GetMapping(path = "/{id}")
    public @ResponseBody Optional<Product>
getSpecificProduct(@PathVariable int id) {
        return productRepository.findById(id);
    }


}
```

2.5 Create an Application Class

Now, the last thing to do is just creating an Application Class so that our app can run normally.
We can just "paste" the template here into `WarehouseORMApplication.java`:

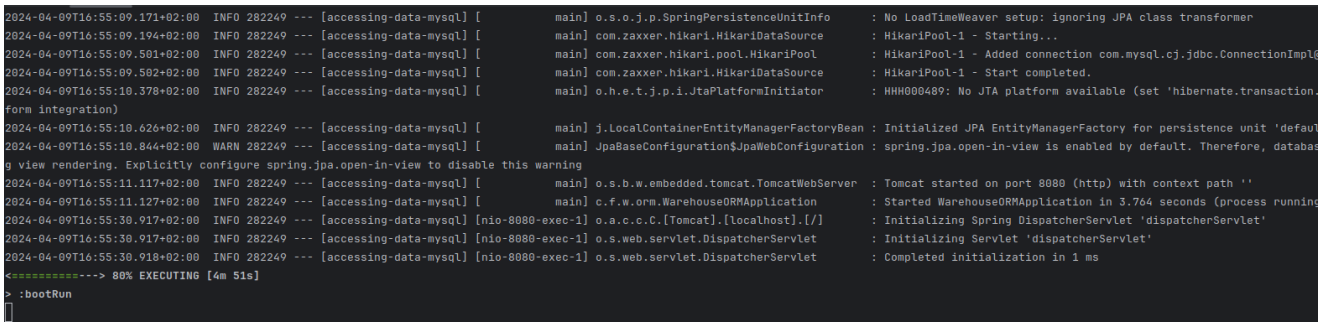
```
package com.fellner.warehouse.orm;

import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;

/**
 * Warehouse App class that starts the application * * @author Manuel
Fellner
 * @version 2024-04-09
 */@SpringBootApplication
public class WarehouseORMApplication {
    public static void main(String[] args) {
        SpringApplication.run(WarehouseORMApplication.class, args);
    }
}
```

2.6 Start & Test the app

It is finally time to test our app! With the `./gradlew bootRun` command, the app gets startet:



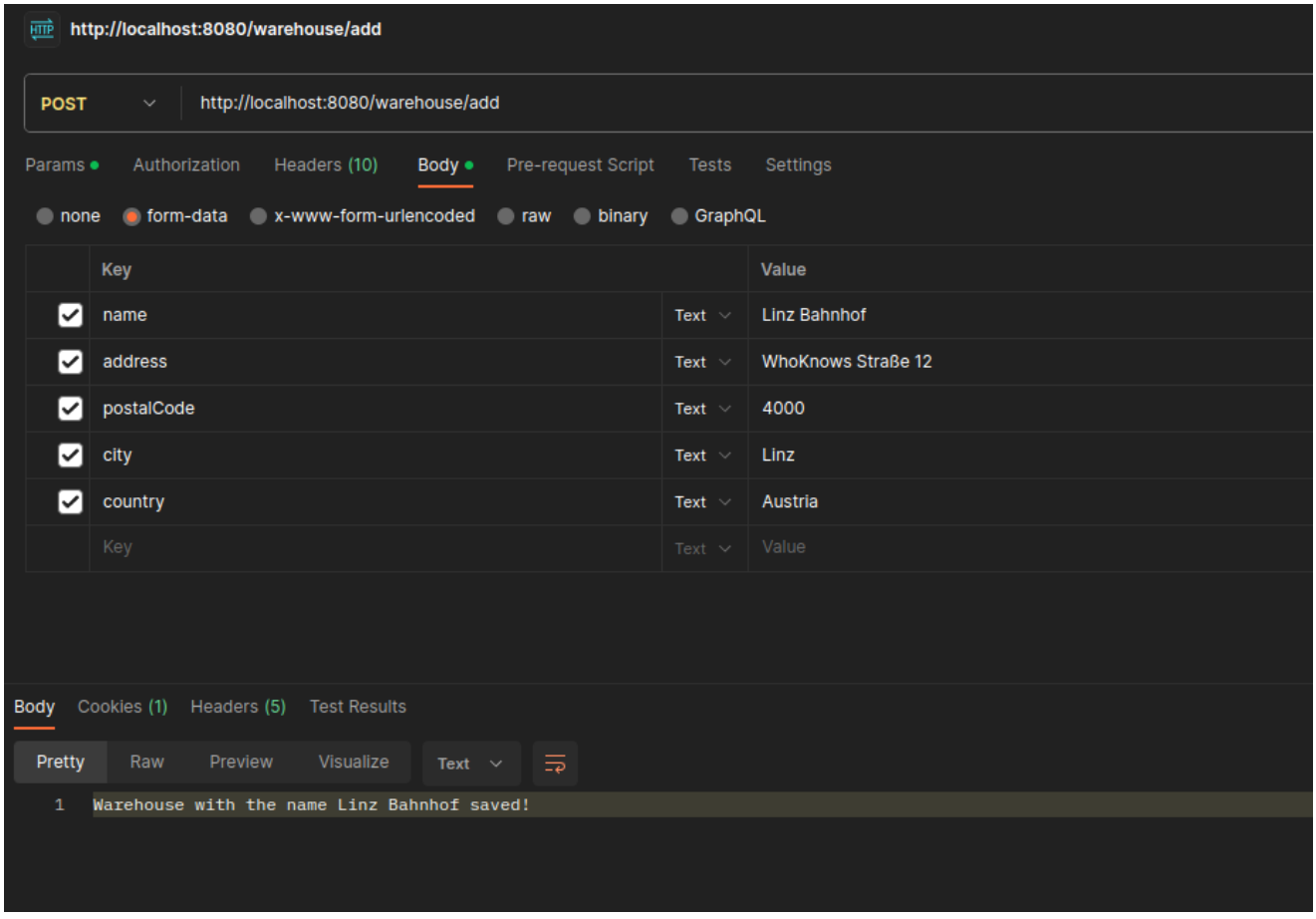
2.6.1 Add Warehouse records

The task description states that we'll need to add two Warehouse records:

- LINZ
- WIEN

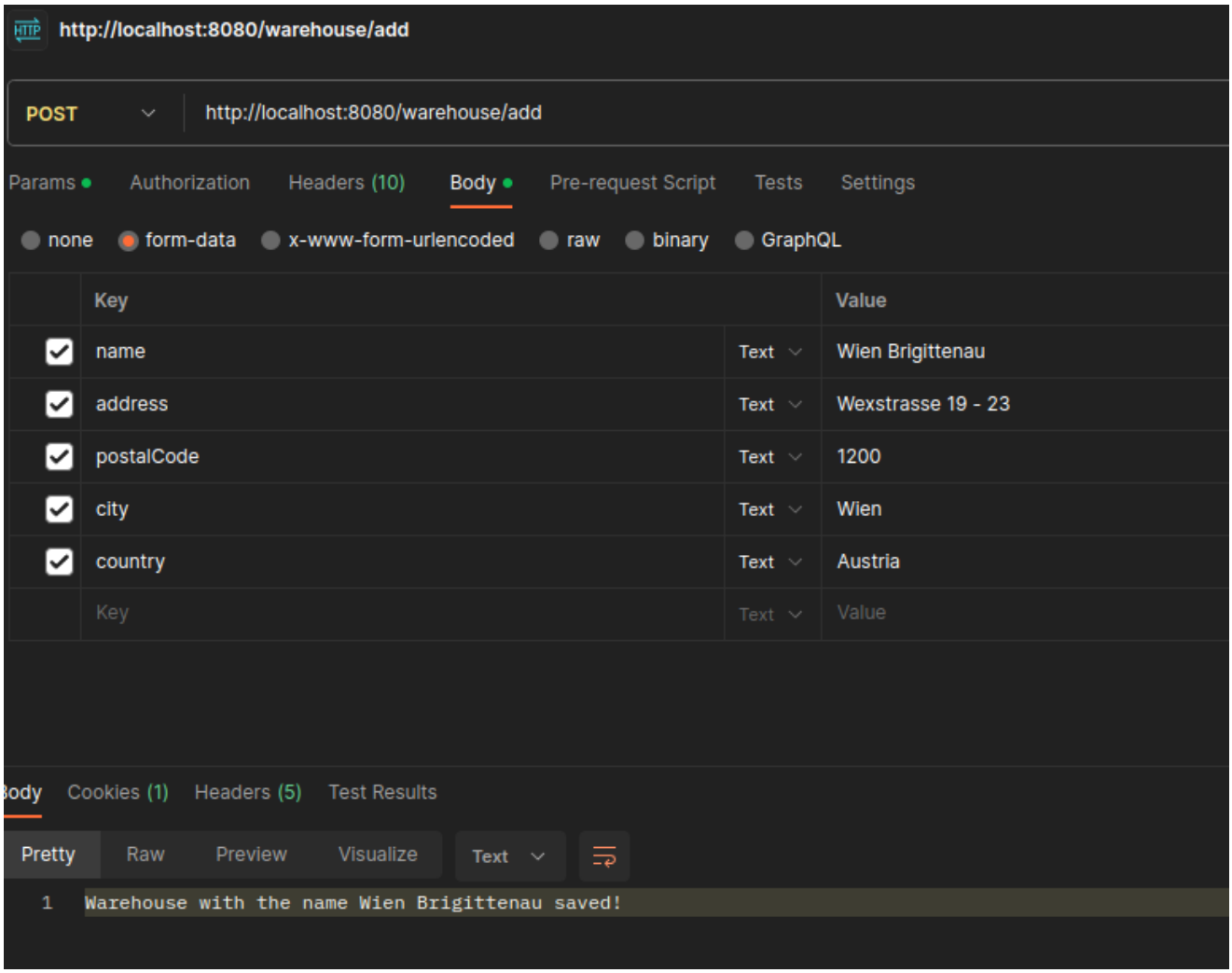
The other part of the information are just random values, so e.g. the address, postal code, etc.

We do that by making a `POST` request via `Postman` to the `/warehouse/add` endpoint:



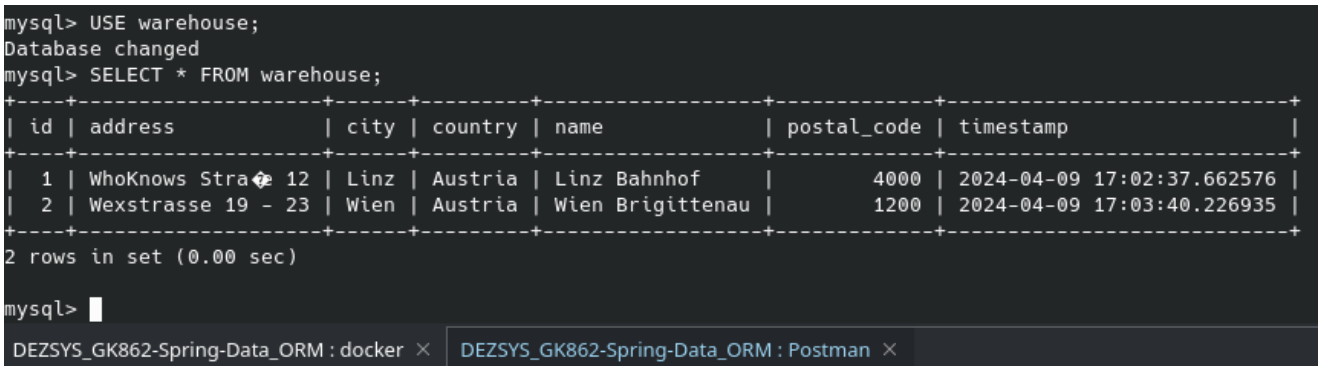
Worked!

Now the WIEN Warehouse:



If we go into the `mysql` console and check the entries ourselves, we can see the following:

```
mysql> USE warehouse;
mysql> SELECT * FROM warehouse;
+----+--------------------+------+---------+------------------+-----------
--+----------------------------+
| id | address            | city | country | name             |
postal_code | timestamp                  |
+----+--------------------+------+---------+------------------+-----------
--+----------------------------+
|  1 | WhoKnows Straße 12 | Linz | Austria | Linz Bahnhof     |
4000 | 2024-04-09 17:02:37.662576 |
|  2 | Wexstrasse 19 - 23 | Wien | Austria | Wien Brigittenau |
1200 | 2024-04-09 17:03:40.226935 |
+----+--------------------+------+---------+------------------+-----------
--+----------------------------+
2 rows in set (0.00 sec)
```



Now we know that our two Warehouses are existing and saved in the database.

2.6.2 Add Product records to Warehouses

Next it is time to add a few Products to the warehouses.

We'll split the Products 3:7;

- Warehouse LINZ has 3 Products:
  - Bier
  - Brot
  - Wein
- Warehouse WIEN has 7 Products:
  - MacBook Pro 14"
  - Gurken
  - Wasserflaschen
  - Mehl
  - Milka Schokolade
  - iPhone 14 Pro
  - Apple Watch ULTRA

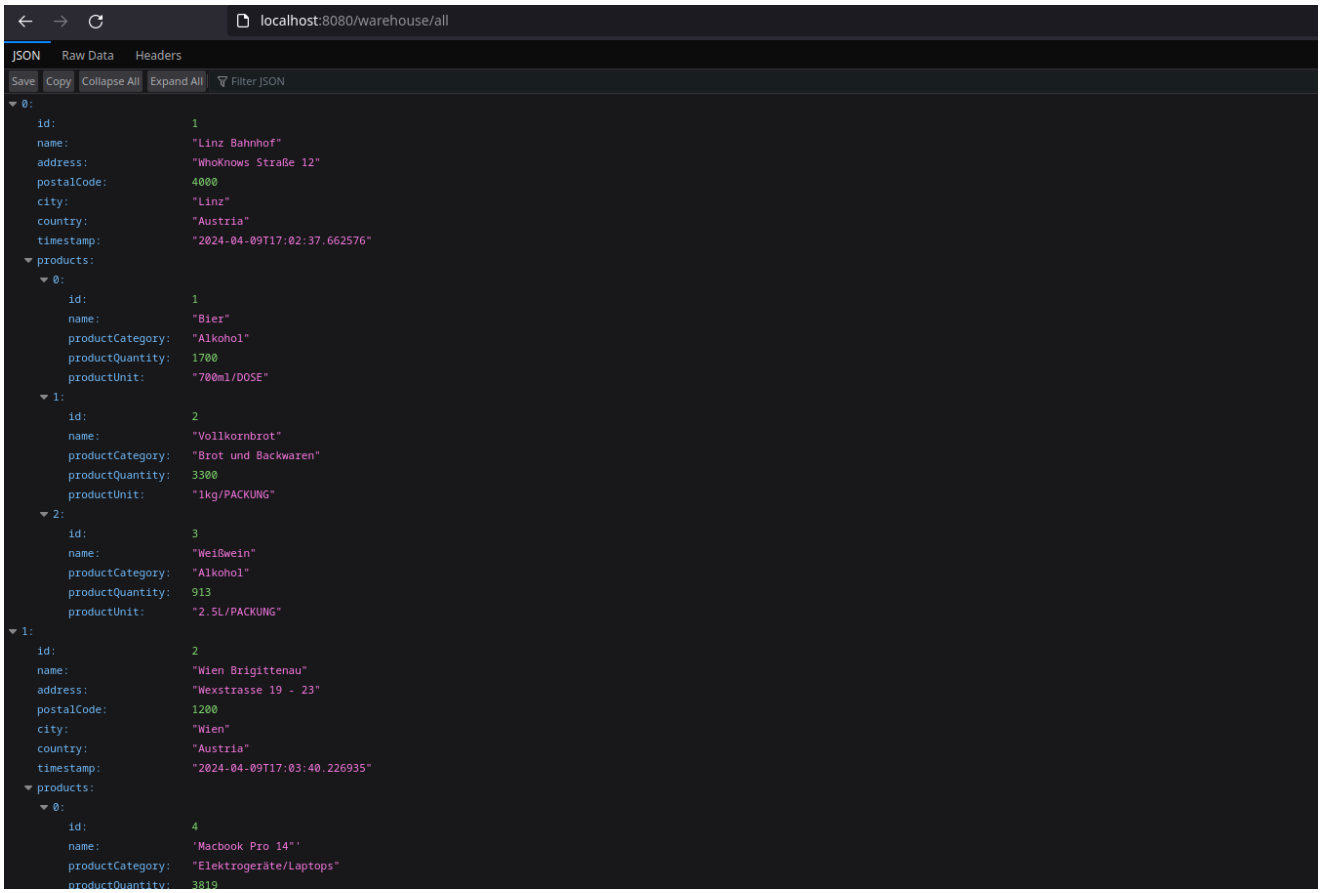
For this, we also just need to send `POST` Requests to the `/warehouse/{id}/addProduct` endpoint with the Product data.
I won't show every Postman configuration because they are all really similar.

Now, if we go to `localhost:8080/warehouse/all` we'll see the following:


```
[
  {
    "id": 1,
    "name": "Linz Bahnhof",
    "address": "WhoKnows Straße 12",
    "postalCode": 4000,
    "city": "Linz",
    "country": "Austria",
    "timestamp": "2024-04-09T17:02:37.662576",
```

```
    "products": [
      {
        "id": 1,
        "name": "Bier",
        "productCategory": "Alkohol",
        "productQuantity": 1700,
        "productUnit": "700ml/DOSE"
      },
      {
        "id": 2,
        "name": "Vollkornbrot",
        "productCategory": "Brot und Backwaren",
        "productQuantity": 3300,
        "productUnit": "1kg/PACKUNG"
      },
      {
        "id": 3,
        "name": "Weißwein",
        "productCategory": "Alkohol",
        "productQuantity": 913,
        "productUnit": "2.5L/PACKUNG"
      }
    ]
  },
  {
    "id": 2,
    "name": "Wien Brigittenau",
    "address": "Wexstrasse 19 - 23",
    "postalCode": 1200,
    "city": "Wien",
    "country": "Austria",
    "timestamp": "2024-04-09T17:03:40.226935",
    "products": [
      {
        "id": 4,
        "name": "Macbook Pro 14\"",
        "productCategory": "Elektrogeräte/Laptops",
        "productQuantity": 3819,
        "productUnit": "1/PACKUNG"
      },
      {
        "id": 5,
        "name": "Gurken",
        "productCategory": "Gemüse",
        "productQuantity": 11000,
        "productUnit": "1/PACKUNG"
      },
      {
        "id": 6,
```

```
        "name": "Vöslauer Wasserflaschen",
        "productCategory": "Getränke/Grundnahrungsmittel",
        "productQuantity": 13000,
        "productUnit": "500ml/FLASCHE"
      },
      {
        "id": 7,
        "name": "Weizenmehl",
        "productCategory": "Brot und Backwaren",
        "productQuantity": 7319,
        "productUnit": "750g/PACKUNG"
      },
      {
        "id": 8,
        "name": "iPhone 14 Pro",
        "productCategory": "Elektrogeräte/Smartphones",
        "productQuantity": 1293,
        "productUnit": "1/PACKUNG"
      },
      {
        "id": 9,
        "name": "APPLE WATCH ULTRA",
        "productCategory": "Elektrogeräte/Smartwatches",
        "productQuantity": 370,
        "productUnit": "1/PACKUNG"
      },
      {
        "id": 10,
        "name": "Milka Schokolade",
        "productCategory": "Süßigkeiten",
        "productQuantity": 748,
        "productUnit": "100g/PACKUNG"
      }
    ]
  }
]
```


localhost:8080/warehouse/all
JSON
Raw Data
Headers
Save
Copy
Collapse All
Expand All
Filter JSON
0:
id: 1
name: "Linz Bahnhof"
address: "WhoKnows Straße 12"
postalCode: 4000
city: "Linz"
country: "Austria"
timestamp: "2024-04-09T17:02:37.662576"
products:
0:
id: 1
name: "Bier"
productCategory: "Alkohol"
productQuantity: 1700
productUnit: "700ml/DOSE"
1:
id: 2
name: "Vollkornbrot"
productCategory: "Brot und Backwaren"
productQuantity: 3300
productUnit: "1kg/PACKUNG"
2:
id: 3
name: "Weißwein"
productCategory: "Alkohol"
productQuantity: 913
productUnit: "2.5L/PACKUNG"
1:
id: 2
name: "Wien Brigittenau"
address: "Wexstrasse 19 - 23"
postalCode: 1200
city: "Wien"
country: "Austria"
timestamp: "2024-04-09T17:03:40.226935"
products:
0:
id: 4
name: 'Macbook Pro 14"'
productCategory: "Elektrogeräte/Laptops"
productQuantity: 3819

It works!