Web API Design with Spring Boot Week 4 Coding Assignment

Points possible: 70

Category	Criteria	% of Grade
Functionality	Does the code work?	25
Organization	Is the code clean and organized? Proper use of white space, syntax, and consistency are utilized. Names and comments are	25
Creativity	concise and clear. Student solved the problems	25
Cicativity	presented in the assignment using creativity and out of the box thinking.	23
Completeness	All requirements of the assignment are complete.	25

Instructions: In Eclipse, or an IDE of your choice, write the code that accomplishes the objectives listed below. Ensure that the code compiles and runs as directed. Take screenshots of the code and of the running program (make sure to get screenshots of all required functionality) and paste them in this document where instructed below. Create a new repository on GitHub for this week's assignments and push this document, with your Java project code, to the repository. Add the URL for this week's repository to this document where instructed and submit this document to your instructor when complete.

Here's a friendly tip: as you watch the videos, code along with the videos. This will help you with the homework. When a screenshot is required, look for the icon: You will keep adding to this project throughout this part of the course. When it comes time for the final project, use this project as a starter.

Project Resources: https://github.com/promineotech/Spring-Boot-Course-Student-Resources

Coding Steps:

For this week's homework you need to copy source code from the supplied resources.

For this week's homework you need to copy source code from the Source folder in the supplied resources. Wait until the instructions tell you to copy the resources or you will get errors.

- Select some options for a Jeep order:
 - Use the data.sql file or the jeep database tables to select options for a Jeep order. Select any one of each of the following for the order:
 - color
 - customer
 - engine
 - model
 - tire(s)
 - Select one or more options from the options table as well. Keep in mind that some options may work better than others but if you want to put 37-inch tires on your Jeep Renegade, so be it!
- Create a new integration test class to test a Jeep order named CreateOrderTest.java. Create this class in src/test/java in the com.promineotech.jeep.controller package.
 - Add the Spring Boot Test annotations: @SpringBootTest, @ActiveProfiles, and @Sql. They should have the same parameters as the test created in weeks 1 and 2.
 - Create a test method (annotated with @Test) named testCreateOrderReturnsSuccess201.
 - In the test class, create a method named createOrderBody. This method returns a type of String. In this method, return a JSON object with the IDs that you picked in Step 1a and b. For example:

```
{
  "customer":"MORISON_LINA",
  "model":"WRANGLER",
  "trim":"Sport Altitude",
  "doors":4,
  "color":"EXT_NACHO",
  "engine":"2_0_TURBO",
  "tire":"35_TOYO",
  "options":[
```

```
"DOOR QUAD 4",
    "EXT AEV LIFT",
    "EXT_WARN_WINCH",
    "EXT WARN BUMPER FRONT",
    "EXT WARN BUMPER REAR",
    "EXT ARB COMPRESSOR"
 ]
}
```

Make sure that the JSON is correct! If necessary, use a JSON formatter/validator like the one here: https://jsonformatter.curiousconcept.com/.

Produce a screenshot of the createOrderBody() method.



In the test method, assign the return value of the createOrderBody() method to a variable named body.

- In the test class, add an instance variable named serverPort to hold the port that Tomcat is listening on in the test. Annotate the variable with @LocalServerPort.
- Add another instance variable for an injected TestRestTemplate named restTemplate.
- In the test method, assign a value to a local variable named uri as follows:

```
String uri = String.format("http://localhost:%d/orders", serverPort);
```

• In the test method, create an HttpHeaders object and set the content type to "application/json" like this:

```
HttpHeaders headers = new HttpHeaders();
headers.setContentType(MediaType.APPLICATION_JSON);
```

Make sure to import the package org.springframework.http.HttpHeaders.

• Create an HttpEntity object and set the request body and headers:

```
HttpEntity<String> bodyEntity = new HttpEntity<>(body, headers);
```

Send the request body and headers to the server. The Order class should have been copied earlier from the supplied resources. Ensure that you import com.promineotech.jeep.entity.Order and not some other Order class.

```
ResponseEntity<Order> response = restTemplate.exchange(uri,
```

```
HttpMethod.POST, bodyEntity, Order.class);
```

• Add the AssertJ assertions to ensure that the response is correct. Replace the expected values to match the JSON in step 2c.

```
assertThat(response.getStatusCode()).isEqualTo(HttpStatus.CREATED);
assertThat(response.getBody()).isNotNull();

Order order = response.getBody();
assertThat(order.getCustomer().getCustomerId()).isEqualTo("MORISON_LINA");
assertThat(order.getModel().getModelId()).isEqualTo(JeepModel.WRANGLER);
assertThat(order.getModel().getTrimLevel()).isEqualTo("Sport Altitude");
assertThat(order.getModel().getNumDoors()).isEqualTo(4);
assertThat(order.getColor().getColorId()).isEqualTo("EXT_NACHO");
assertThat(order.getEngine().getEngineId()).isEqualTo("2_0_TURBO");
assertThat(order.getTire().getTireId()).isEqualTo("35_TOYO");
assertThat(order.getOptions()).hasSize(6);
```

- Produce a screenshot of the test method.
- In the controller sub-package in src/main/java, create an interface named JeepOrderController. Add @RequestMapping("/orders") as a class-level annotation.
 - Create a method in the interface to create an order (createOrder). It should return an object of type Order (see below). It should accept a single parameter of type OrderRequest as described in the video. Make sure it accepts an HTTP POST request and returns a status code of 201 (created).
 - Add the @RequestBody annotation to the orderRequest parameter. Make sure to add the RequestBody annotation from the org.springframework.web.bind.annotation package.
 - Produce a screenshot of the finished JeepOrderController interface showing no compile errors.
- Create a class that implements JeepOrderController named DefaultJeepOrderController.

- Add @RestController as a class-level annotation.
- Add a log line to the implementing controller method showing the input request body (orderRequest)
- Run the test to show a red status bar. Produce a screenshot that shows the test method, the log line, and the red JUnit status bar.
- Find the Maven dependency spring-boot-starter-validation by looking it up at https://mvnrepository.com/. Add this repository to the project POM file (pom.xml).
- Add the class-level annotation @Validated to the JeepOrderController interface.
- Add Bean Validation annotations to the OrderRequest class as shown in the video.
 - Use these annotations for String types:
 - @NotNull
 - @Length(max = 30)
 - @Pattern(regexp = "[\\w\\s]*")
 - Use these annotations for integer types:
 - @Positive
 - @Min(2)
 - @Max(4)
 - Add @NotNull to the enum type.
 - Add validation to the list element (type String) by adding the validation annotations inside the generic definition. So, to add the String validation to the options, you would do this:

```
private List<@NotNull @Length(max = 30) @Pattern(regexp = "[\\w\\s]*")</pre>
String> options;
```

Do not apply a @NotNull annotation to the List because if you have no options the List may be null.

Produce a screenshot of this class with the annotations.



In the jeep. service sub-package, create the empty (no methods yet) order service interface (named JeepOrderService) and implementation (named DefaultJeepOrderService).

- Inject the interface into the order controller implementation class.
- Add the @Service annotation to the service implementation class.
- Create the createOrder method in the interface and implementing service. The method signature should look like this:
 - Order createOrder(OrderRequest orderRequest);
- Call the createOrder method from the controller and return the value returned by the service.
- Add a log line in the createOrder method and log the orderRequest parameter.
- Run the test CreateOrderTest again. Produce a screenshot showing that the createOrder method in the service was called in the service class.
- In the jeep.dao sub-package, create the empty (no methods yet) DAO interface (named JeepOrderDao) and implementation (named DefaultJeepOrderDao).
 - Inject the DAO interface into the order service implementation class.
 - Add the @Component annotation to the DAO implementation class.
- Replace the entire content of JeepOrderDao.java with the source found in JeepOrderDao.source. The source file is found in the Source folder of the supplied project resources.
- *** The next steps require you to copy source code from the Source directory in the supplied resources. Please follow the instructions EXACTLY. Some steps require you to replace ALL the source in a file. Some steps require you to ADD source to a file.
- Replace the entire contents of DefaultJeepOrderDao.java with the source found in DefaultJeepOrderDao.source. The source file is found in the Source folder of the supplied project resources. After this step you will see errors in DefaultJeepOrderDao. This will be fixed shortly.
- Copy the *contents* of the file DefaultJeepOrderDao.source *into*DefaultJeepOrderDao.java. The source file is found in the Source folder of the supplied project resources.
 - In Eclipse, click the "Source" menu and select "Organize Imports". Pick packages from your project where applicable. Make sure you pick the import java.util.Optional, java.util.List, and org.springframework.jdbc.core.RowMapper.
- Copy the *contents* of the file DefaultJeepOrderService.source *into*

DefaultJeepOrderService.java. Add the source after the createOrder() method, but *inside* the class body. The source file is found in the Source folder of the supplied project resources.

In Eclipse, click the "Source" menu and select "Organize Imports". Pick packages from your project where applicable.

- In DefaultJeepOrderService.java, work with the method createOrder.
 - Add the @Transactional annotation to the createOrder method.
 - In the createOrder method call the copied methods: getCustomer, getModel, getColor, getEngine, getTire and getOption, assigning the return values of these methods to variables of the appropriate types.
 - Calculate the price, including all options.
- In JeepOrderDao.java and DefaultJeepOrderDao.java, add the method:
 - Order saveOrder(Customer customer, Jeep jeep, Color color, Engine engine, Tire tire, BigDecimal price, List<Option> options);
 - Call the method from the order service. Produce a screenshot of the service method.
 - Write the implementation of the saveOrder method in the DAO.
 - Call the supplied generateInsertSq1 method, passing in the customer, jeep, color, engine, tire and price. Assign the return value of the method to a Sq1Params object.
 - Call the update method on the NamedParameterJdbcTemplate object, passing in a KeyHolder object as shown in the video. Create the KeyHolder like this:
 - KeyHolder keyHolder = new GeneratedKeyHolder();
 - Be sure to extract the order primary key from the KeyHolder object into a variable of type Long named orderPK.
 - Write a method named saveOptions as shown in the video. This method should have the following method signature:
 - private void saveOptions(List<Option> options, Long orderPK)
 - For each option in the Options list, call the supplied generateInsertSql method passing the parameters option and order primary key (orderPK). Call the update method on the NamedParameterJdbcTemplate object.
 - In the saveOrder method in the DAO implementation, return an Order object

using the Order.builder. The Order should include orderPK, customer, jeep (model), color, engine, tire, options and price.

Produce a screenshot of the saveOrder method.



Run the integration test in CreateOrderTest. Produce a screenshot of the test method that shows the green JUnit status bar, the console output, and the test class.

Screenshots of Code:

```
🧾 *CreateOrderTest.java 🗶 🚺 FetchJeepTest.java
                                                                                     🧾 *CreateOrderTestSupport.java 🗶 🗾 BaseTest.java
       package com.promineotech.jeep.controller.support;
                  @return
            protected String createOrderBody() {
               + " \"trim\":\"Sport Altitude\",\n"
+ " \"doors\":4,\n"
+ " \"color\":\"EXT_NACHO\",\n"
+ " \"engine\":\"2_0_TURBO\",\n"
+ " \"tire\":\"35_TOYO\",\n"
+ " \"Options\":[\n"
+ " \"DOOR_QUAD_4\",\n"
+ " \"EXT_AEV_LIFT\",\n"
+ " \"EXT_WARN_WINCH\",\n"
+ " \"EXT_WARN_BUMPER_FRONT\",\n"
+ " \"EXT_WARN_BUMPER_REAR\",\n"
                                      \"EXT_WARN_BUMPER_REAR\",\n"
\"EXT_ARB_COMPRESSOR\"\n"
```

```
🚺 CreateOrder... 🗶 🚺 FetchJeepTe...
                                               JeepOrderCon... X J Order.java
                                                                                                                    J BasicJeepOr...
 package com.promineotech.jeep.controller;
 ∃⊕ import org.springframework.http.HttpStatus;
 4 import org.springframework.validation.annotation.Validated;
 5 import org.springframework.web.bind.annotation.PostMapping;
     import org.springframework.web.bind.annotation.RequestBody;
 7 import org.springframework.web.bind.annotation.RequestMapping;
 8 import org.springframework.web.bind.annotation.ResponseStatus;
9 import com.promineotech.jeep.entity.Order;10 import com.promineotech.jeep.entity.OrderRequest;
import io.swagger.v3.oas.annotations.OpenAPIDefinition;
12 import io.swagger.v3.oas.annotations.Operation;
13 import io.swagger.v3.oas.annotations.Parameter;
15 import io.swagger.v3.oas.annotations.info.Info;
16 import io.swagger.v3.oas.annotations.media.Content;
14 import io.swagger.v3.oas.annotations.info.Info;
import io.swagger.v3.oas.annotations.media.Schema;
import io.swagger.v3.oas.annotations.responses.ApiResponse;
18 import io.swagger.v3.oas.annotations.servers.Server;
20 @Validated
21 @RequestMapping("/orders")
22 @OpenAPIDefinition(info = @Info(title = "Jeep Order Service"), servers = {
23 @Server(url = "http://localhost:8080", description = "Local server.")})
25 public interface JeepOrderController {
260
310
            summary = "Create an order for a Jeep",
description = "Returns the created Jeep",
responses = {
                  @ApiResponse(
    responseCode = "201",
    description = "The created Jeep is returned",
                       content = @Content(mediaType = "application/json",
schema = @Schema(implementation = Order.class))),
                  @ApiResponse(
                        content = @Content(mediaType = "application/json")),
                  @ApiResponse(
                       responseCode = "404",
description = "A Jeep component was not found with the input criteria",
content = @Content(mediaType = "application/json")),
                  @ApiResponse(
                        content = @Content(mediaType = "application/json"))
53
54
                  MParameter(
56
57
                       required = true,
description = "The order as JSON"),
       2
       @PostMapping
       @ResponseStatus(code = HttpStatus.CREATED)
       Order createOrder(@RequestBody OrderRequest orderRequest);
```

```
DefaultJeepOrderService.java
                                         *DefaultJeepOrderDao.java

↓ JeepOrderDao.java

☑ CreateOrderTest.java

   1 package com.promineotech.jeep.entity;
   30 import java.util.List;
4 import javax.validation.constraints.Max;
   5 import javax.validation.constraints.Min;
   import javax.validation.constraints.NotNull;
import javax.validation.constraints.Pattern;
import javax.validation.constraints.Positive;
  9 import org.hibernate.validator.constraints.Length;
10 import lombok.Data;
△12 @Data
 13 public class OrderRequest {
14● @NotNull
      @Length(max = 30)
@Pattern(regexp = "[\\w\\s]*")
private String customer;
  19⊜ @NotNull
        private JeepModel model;
  220 @NotNull
       @Length(max = 30)
@Pattern(regexp = "[\\w\\s]*")
private String trim;
  270 @Positive
          @Min(2)
         @lax(4)
         private int doors;
  320 @NotNull
         @Length(max = 30)
@Pattern(regexp = "[\\w\\s]*")
private String color;
  37⊜ @NotNull
        @Length(max = 30)
@Pattern(regexp = "[\\w\\s]*")
private String engine;
  420 @NotNull
        @Length(max = 30)
         @Pattern(regexp = "[A\\w\\s]*")
private String tire;
         private List<@NotNull @Length(max = 30) @Pattern(regexp = "[\\w\\s]*") String> options;
  49 }
```

```
*DefaultJeepOrder... 🗶 🗾 JeepOrderDao.java
                                                 BasicJeepOrderCon...
                                                                            *DefaultJeepOrder...
                                                                                                        Order.java
   package com.promineotech.jeep.service;
30 import java.math.BigDecimal;
20 public class DefaultJeepOrderService implements JeepOrderService {
220
     @Autowired
      private JeepOrderDao jeepOrderDao;
250
      @Override
      public Order createOrder(OrderRequest orderRequest) {
        Customer customer = getCustomer(orderRequest);
        Jeep jeep = getModel(orderRequest);
Color color = getColor(orderRequest);
        Engine engine = getEngine(orderRequest);
        Tire tire = getTire(orderRequest);

BigDecimal price = jeep.getBasePrice().add(color.getPrice())

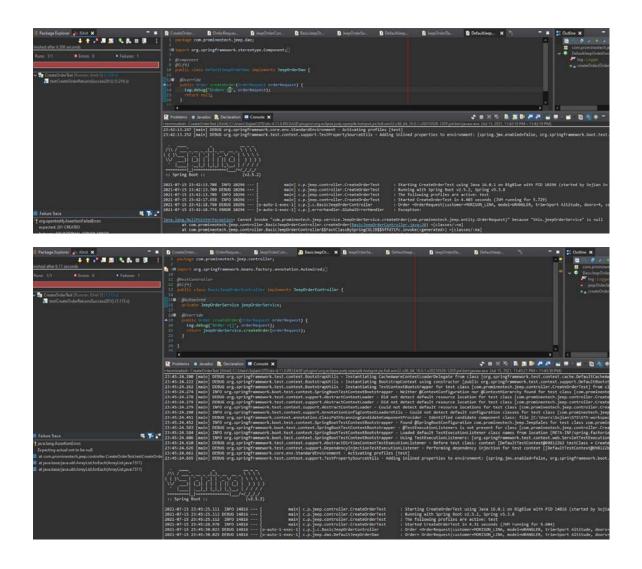
.add(engine.getPrice()).add(tire.getPrice());
        List<Option> options = getOption(orderRequest);
        return jeepOrderDao.saveOrder(customer, jeep, color, engine, tire, price);
400
       * @param orderRequest
       * @return
450
      private List<Option> getOption(OrderRequest orderRequest) {
        return jeepOrderDao.fetchOptions(orderRequest.getOptions());
490
         @param orderRequest
         Oreturn
40
      private Tire getTire(OrderRequest orderRequest) {
        return jeepOrderDao.fetchTire(orderRequest.getTire())
            .orElseThrow(() -> new NoSuchElementException(
"Tire with ID=" + orderRequest.getTire() + " was not found"));
500
         @param orderRequest
         @return
50
      private Engine getEngine(OrderRequest orderRequest) {
        return jeepOrderDao.fetchEngine(orderRequest.getEngine())
            .orElseThrow(() -> new NoSuchElementException(
    "Engine with ID=" + orderRequest.getEngine() + " was not found"));
```

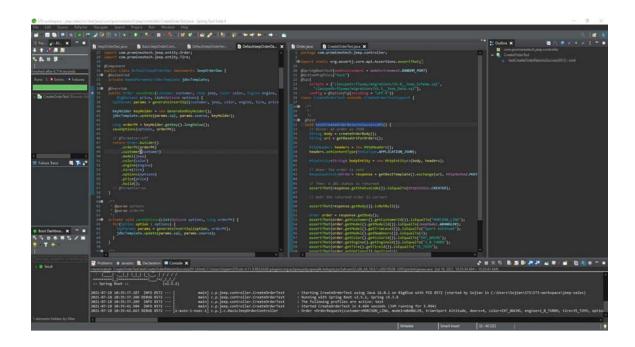
```
710
      * @param orderRequest
      * @return
760
     private Color getColor(OrderRequest orderRequest) {
       return jeepOrderDao.fetchColor(orderRequest.getColor())
           .orElseThrow(() -> new NoSuchElementException(
   "Color with ID=" + orderRequest.getColor() + " was not found"));
820
      * @param orderRequest
      * @return
87€
     private Jeep getModel(OrderRequest orderRequest) {
      return jeepOrderDao
           .fetchModel(orderRequest.getModel(), orderRequest.getTrim(),
              orderRequest.getDoors())
           960
      * @return
010
     private Customer getCustomer(OrderRequest orderRequest) {
       return jeepOrderDao.fetchCustomer(orderRequest.getCustomer())
           .orElseThrow(() -> new NoSuchElementException("Customer with ID="
               + orderRequest.getCustomer() + " was not found"));
     }
```

```
JeepOrderDao.java
                                                                  DefaultJeepOrderService.java

    □ DefaultJeepOrderDao.java X
                           BasicJeepOrderController.java
 27 import com.promineotech.jeep.entity.Order;
28 import com.promineotech.jeep.entity.Tire;
 31 public class DefaultJeepOrderDao implements JeepOrderDao {
 32⊖ @Autowired
        private NamedParameterJdbcTemplate jdbcTemplate;
        public Order saveOrder(Customer customer, Jeep jeep, Color color, Engine engine, Tire tire,
   BigDecimal price, List<Option> options) {
   SqlParams params = generateInsertSql(customer, jeep, color, engine, tire, price);
           KeyHolder keyHolder = new GeneratedKeyHolder();
           jdbcTemplate.update(params.sql, params.source, keyHolder);
           Long orderPK = keyHolder.getKey().longValue();
          saveOptions(options, orderPK);
          return Order.builder()
           .orderPK(orderPK)
.customer(customer)
             .customer(gcustome
.model(jeep)
.color(color)
.engine(engine)
.tire(tire)
.options(options)
               .price(price)
                .build();
 600
 640
        private void saveOptions(List<Option> options, Long orderPK) {
           for(Option option : options) {
   SqlParams params = generateInsertSql(option, orderPK);
              jdbcTemplate.update(params.sql, params.source);
 70
710
          * @param orderPK
          * @return
 770
        private SqlParams generateInsertSql(Option option, Long orderPK) {
           SqlParams params = new SqlParams();
```

Screenshots of Running Application:





URL to GitHub Repository:

https://github.com/sojians/Week-16-Spring