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 concise and clear.	25
Creativity	Student solved the problems presented in the assignment using creativity and out of the box thinking.	25
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.

1) Select some options for a Jeep order:

   a) 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:

    i)   color

    ii) customer

    iii) engine

    iv) model

    v) tire(s)

  b) 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!

2) Create a new integration test class to test a Jeep order named `CreateOrderTest.java`. Create this class in `src/`<mark>`test`</mark>`/java` in the `com.promineotech.jeep.controller` package.

  a) 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.

  b) Create a test method (annotated with `@Test`) named `testCreateOrderReturnsSuccess201`.

  c) 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`.

  d) 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`.

e) Add another instance variable for an injected `TestRestTemplate` named `restTemplate`.

f) In the test method, assign a value to a local variable named uri as follows:

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

g) 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`.

h) Create an HttpEntity object and set the request body and headers:

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

i) 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);
```

j) 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);
```

k) Produce a screenshot of the test method.

3) In the `controller` sub-package in `src/`==`main`==`/java`, create an interface named `JeepOrderController`. Add `@RequestMapping("/orders")` as a class-level annotation.

a) 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).

b) Add the `@RequestBody` annotation to the orderRequest parameter. Make sure to add the `RequestBody` annotation from the `org.springframework.web.bind.annotation` package.

c) Produce a screenshot of the finished `JeepOrderController` interface showing no compile errors. 🖥️

4) Create a class that implements `JeepOrderController` named `DefaultJeepOrderController`.

   a) Add `@RestController` as a class-level annotation.

   b) Add a log line to the implementing controller method showing the input request body (orderRequest)

   c) 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. 🖥️

5) 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).

6) Add the class-level annotation `@Validated` to the `JeepOrderController` interface.

7) Add Bean Validation annotations to the `OrderRequest` class as shown in the video.

   a) Use these annotations for String types:

      i)   `@NotNull`
      ii) `@Length(max = 30)`
      iii) `@Pattern(regexp = "[\\w\\s]*")`

   b) Use these annotations for integer types:

      i)   `@Positive`
      ii) `@Min(2)`
      iii) `@Max(4)`

   c) Add `@NotNull` to the enum type.

   d) 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]*") String>
   options;
   ```

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

   e) Produce a screenshot of this class with the annotations. 🖥️

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

   a) Inject the interface into the order controller implementation class.
   b) Add the `@Service` annotation to the service implementation class.

c) Create the `createOrder` method in the interface and implementing service. The method signature should look like this:

```
Order createOrder(OrderRequest orderRequest);
```

d) Call the `createOrder` method from the controller and return the value returned by the service.

e) Add a log line in the createOrder method and log the `orderRequest` parameter.

f) Run the test CreateOrderTest again. Produce a screenshot showing that the service layer createOrder method correctly prints the log line in the console. (e.g. prints out the OrderRequest in the console from within the Service Layer).

9) In the `jeep.dao` sub-package, create the empty (no methods yet) DAO interface (named `JeepOrderDao`) and implementation (named `DefaultJeepOrderDao`).

a) Inject the DAO interface into the order service implementation class.
b) Add the `@Component` annotation to the DAO implementation class.

10) 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.

11) ***** 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.**

12) 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`.

13) 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.

14) In `DefaultJeepOrderService.java`, work with the method `createOrder`.

a) Add the `@Transactional` annotation to the createOrder method.

b) 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.

c) Calculate the price, including all options.

15) 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);
```

a) Call the jeepOrder.Dao.saveOrder method from the jeepOrderSalesService.createOrder service. Produce a screenshot of the jeepOrderSalesService.createOrder method. 🖥️

b) Write the implementation of the `saveOrder` method in the DAO.

   i) Call the supplied `generateInsertSql` method, passing in the customer, jeep, color, engine, tire and price. Assign the return value of the method to a `SqlParams` object.

   ii) 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`.

   iii) 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.

   iv) 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.

   v) Produce a screenshot of the saveOrder method. 🖥️

c) 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. 🖥️

URL to GitHub Repository:

https://github.com/ladymanj/Week16CodingAssignment.git

Screenshots of Code:

2c) createOrderBody() method:

```
75⊖   protected String createOrderBody() {
76       // @formatter:off
77       return "{\n"
78           + "   \"customer\":\"MAYNARD_TORBJORG\",\n"
79           + "   \"model\":\"COMPASS\",\n"
80           + "   \"trim\":\"Trailhawk\",\n"
81           + "   \"doors\":4,\n"
82           + "   \"color\":\"EXT_HELLAYELLA\",\n"
83           + "   \"engine\":\"2_0_HYBRID\",\n"
84           + "   \"tire\":\"275_BFGOODRICH\",\n"
85           + "   \"options\":[\n"
86           + "      \"DOOR_QUAD_4\",\n"
87           + "      \"EXT_AEV_LIFT\",\n"
88           + "      \"EXT_WARN_WINCH\",\n"
89           + "      \"EXT_WARN_BUMPER_FRONT\",\n"
90           + "      \"EXT_WARN_BUMPER_REAR\",\n"
91           + "      \"EXT_ARB_COMPRESSOR\"\n"
92           + "   ]\n"
93           + "}";
94       // @formatter:on
95   }
```

2k) Test method:

```
44⊖   @Test
45    void testCreateOrderReturnsSuccess201() {
46       // Given: an order as JSON
47       String body = createOrderBody();
48       String uri = String.format("http://localhost:%d/orders", serverPort);
49
50       HttpHeaders headers = new HttpHeaders();
51       headers.setContentType(MediaType.APPLICATION_JSON);
52
53       HttpEntity<String> bodyEntity = new HttpEntity<>(body, headers);
54
55       // When: the order is sent
56       ResponseEntity<Order> response = restTemplate.exchange(uri, HttpMethod.POST, bodyEntity, Order.class);
57
58       // Then: a 201 status is returned
59       assertThat(response.getStatusCode()).isEqualTo(HttpStatus.CREATED);
60       assertThat(response.getBody()).isNotNull();
61
62       Order order = response.getBody();
63       assertThat(order.getCustomer().getCustomerId()).isEqualTo("MAYNARD_TORBJORG");
64       assertThat(order.getModel().getModelId()).isEqualTo(JeepModel.COMPASS);
65       assertThat(order.getModel().getTrimLevel()).isEqualTo("Trailhawk");
66       assertThat(order.getModel().getNumDoors()).isEqualTo(4);
67       assertThat(order.getColor().getColorId()).isEqualTo("EXT_HELLAYELLA");
68       assertThat(order.getEngine().getEngineId()).isEqualTo("2_0_HYBRID");
69       assertThat(order.getTire().getTireId()).isEqualTo("275_BFGOODRICH");
70       assertThat(order.getOptions()).hasSize(6);
71
72       // And: the returned order is correct
73   }
```
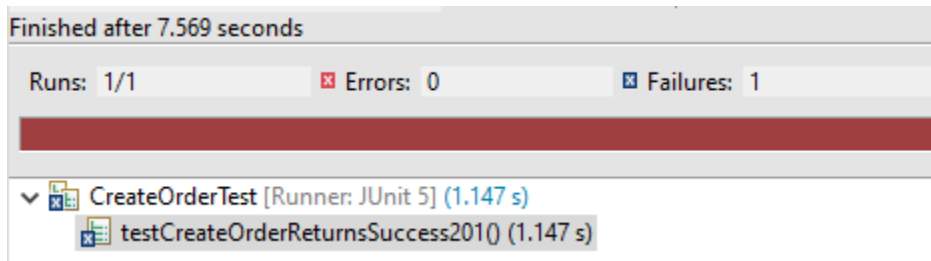
3c) JeepOrderController interface:

```java
 1⊕ /**⬜
 4  package com.promineotech.jeep.controller;
 5
 6⊕ import org.springframework.http.HttpStatus;⬜
18
19⊖ /**
20   * @author Jordan
21   *
22   */
23  @RequestMapping("/orders")
24  public interface JeepOrderController {
25
26    //@formatter:off
27⊖   @Operation(
28        summary = "Create an order for a Jeep",
29        description = "Returns the created Jeep",
30        responses = {
31            @ApiResponse(
32                responseCode = "201",
33                description = "The created Jeep is returned",
34                content = @Content(
35                    mediaType = "application/json",
36                    schema = @Schema(implementation = Order.class))),
37            @ApiResponse(
38                responseCode = "400",
39                description = "The request parameters are invalid",
40                content = @Content(mediaType = "application/json")),
41            @ApiResponse(
42                responseCode = "404",
43                description = "A Jeep component was not found with the input criteria",
44                content = @Content(mediaType = "application/json")),
45            @ApiResponse(
46                responseCode = "500",
47                description = "An unplanned error occurred.",
48                content = @Content(mediaType = "application/json"))
49        },
50        parameters = {
51            @Parameter(name = "orderRequest",
52                required = true,
53                description = "The order as JSON")
54        }
55    )
56    @PostMapping
57    @ResponseStatus(code = HttpStatus.CREATED)
58    Order createOrder(@RequestBody OrderRequest orderRequest);
59  }
```

4c) Test method:

```
43⊖    @Test
44     void testCreateOrderReturnsSuccess201() {
45        // Given: an order as JSON
46        String body = createOrderBody();
47        String uri = String.format("http://localhost:%d/orders", serverPort);
48
49        HttpHeaders headers = new HttpHeaders();
50        headers.setContentType(MediaType.APPLICATION_JSON);
51
52        HttpEntity<String> bodyEntity = new HttpEntity<>(body, headers);
53
54        // When: the order is sent
55        ResponseEntity<Order> response = restTemplate.exchange(uri, HttpMethod.POST, bodyEntity, Order.class);
56
57        // Then: a 201 status is returned
58        assertThat(response.getStatusCode()).isEqualTo(HttpStatus.CREATED);
59        assertThat(response.getBody()).isNotNull();
60
61        Order order = response.getBody();
62        assertThat(order.getCustomer().getCustomerId()).isEqualTo("MAYNARD_TORBJORG");
63        assertThat(order.getModel().getModelId()).isEqualTo(JeepModel.COMPASS);
64        assertThat(order.getModel().getTrimLevel()).isEqualTo("Trailhawk");
65        assertThat(order.getModel().getNumDoors()).isEqualTo(4);
66        assertThat(order.getColor().getColorId()).isEqualTo("EXT_HELLAYELLA");
67        assertThat(order.getEngine().getEngineId()).isEqualTo("2_0_HYBRID");
68        assertThat(order.getTire().getTireId()).isEqualTo("275_BFGOODRICH");
69        assertThat(order.getOptions()).hasSize(6);
70
71        // And: the returned order is correct
72     }
```

4c) Red status bar:

Finished after 7.569 seconds

Runs: 1/1	☒ Errors: 0	☒ Failures: 1

✓ 🔳 CreateOrderTest [Runner: JUnit 5] (1.147 s)
    🔳 testCreateOrderReturnsSuccess201() (1.147 s)

4c) Log line:

```
[o-auto-1-exec-1] o.s.web.servlet.DispatcherServlet          : Completed initialization in 1 ms
[o-auto-1-exec-1] c.p.j.c.DefaultJeepOrderController          : Order=OrderRequest(customer=null, model=null, trim=null, doors=0,
[ionShutdownHook] com.zaxxer.hikari.HikariDataSource          : HikariPool-1 - Shutdown initiated...
[ionShutdownHook] com.zaxxer.hikari.HikariDataSource          : HikariPool-1 - Shutdown completed.
```

7e) OrderRequest.java with annotations:

```java
1   package com.promineotech.jeep.entity;
2
3   import java.util.List;
4   import javax.validation.constraints.Max;
5   import javax.validation.constraints.Min;
6   import javax.validation.constraints.NotNull;
7   import javax.validation.constraints.Pattern;
8   import javax.validation.constraints.Positive;
9   import org.hibernate.validator.constraints.Length;
10  import lombok.Data;
11
12  @Data
13  public class OrderRequest {
14      @NotNull
15      @Length(max = 30)
16      @Pattern(regexp = "[\\w\\s]*")
17      private String customer;
18
19      @NotNull
20      private JeepModel model;
21
22      @NotNull
23      @Length(max = 30)
24      @Pattern(regexp = "[\\w\\s]*")
25      private String trim;
26
27      @Positive
28      @Min(2)
29      @Max(4)
30      private int doors;
31
32      @NotNull
33      @Length(max = 30)
34      @Pattern(regexp = "[\\w\\s]*")
35      private String color;
36
37      @NotNull
38      @Length(max = 30)
39      @Pattern(regexp = "[\\w\\s]*")
40      private String engine;
41
42      @NotNull
43      @Length(max = 30)
44      @Pattern(regexp = "[\\w\\s]*")
45      private String tire;
46
47      private List<@NotNull @Length(max = 30) @Pattern(regexp = "[\\w\\s]*") String> options;
48  }
```

8f) Log line from Service Layer:

```
INFO 7256 --- [o-auto-1-exec-1] c.p.j.c.DefaultJeepOrderController    : Order=OrderRequest(customer=null, model=null, trim=null, doors=0, color=null,
INFO 7256 --- [o-auto-1-exec-1] c.p.j.service.DefaultJeepOrderService  : Order=OrderRequest(customer=null, model=null, trim=null, doors=0, color=null,
```

15a) DefaultJeepOrderService.createOrder method:

```
  36    public Order createOrder(OrderRequest orderRequest) {
  37        log.info("Order={}", orderRequest);
  38
  39        Customer customer = getCustomer(orderRequest);
  40        Jeep jeep = getModel(orderRequest);
  41        Color color = getColor(orderRequest);
  42        Engine engine = getEngine(orderRequest);
  43        Tire tire = getTire(orderRequest);
  44        List<Option> options = getOption(orderRequest);
  45
  46        BigDecimal price = jeep.getBasePrice().add(color.getPrice()).add(engine.getPrice()).add(tire.getPrice());
  47
  48        for(Option option : options) {
  49          price = price.add(option.getPrice());
  50        }
  51
  52        return jeepOrderDao.saveOrder(customer, jeep, color, engine, tire, price, options);
  53    }
```

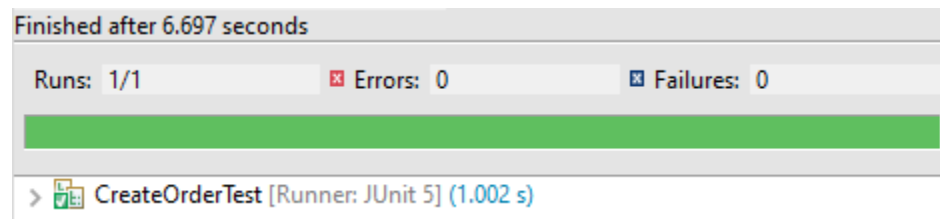### 15bv) saveOrder method:

```
@Override
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);

  // @formatter:off
  return Order.builder()
      .orderPK(orderPK)
      .customer(customer)
      .model(jeep)
      .color(color)
      .engine(engine)
      .tire(tire)
      .options(options)
      .price(price)
      .build();
  // @formatter:on
}
```

15c) Green status bar:

Finished after 6.697 seconds

Runs: 1/1   ☒ Errors: 0   ☒ Failures: 0

> ▦ CreateOrderTest [Runner: JUnit 5] (1.002 s)

15c) Console output:

```
2022-06-17 22:18:50.178  INFO 4884 --- [o-auto-1-exec-1] o.a.c.c.C.[Tomcat].[localhost].[/]    : Initializing Spring DispatcherServlet 'dispatcherServlet'
2022-06-17 22:18:50.179  INFO 4884 --- [o-auto-1-exec-1] o.s.web.servlet.DispatcherServlet     : Initializing Servlet 'dispatcherServlet'
2022-06-17 22:18:50.179  INFO 4884 --- [o-auto-1-exec-1] o.s.web.servlet.DispatcherServlet     : Completed initialization in 0 ms
2022-06-17 22:18:50.263  INFO 4884 --- [o-auto-1-exec-1] c.p.j.c.DefaultJeepOrderController    : Order=OrderRequest(customer=MAYNARD_TORBJORG, model=COMPASS, trim=Trailhawk, doors=4,
2022-06-17 22:18:50.270  INFO 4884 --- [o-auto-1-exec-1] c.p.j.service.DefaultJeepOrderService : Order=OrderRequest(customer=MAYNARD_TORBJORG, model=COMPASS, trim=Trailhawk, doors=4,
2022-06-17 22:18:50.432  INFO 4884 --- [ionShutdownHook] com.zaxxer.hikari.HikariDataSource   : HikariPool-1 - Shutdown initiated...
2022-06-17 22:18:50.437  INFO 4884 --- [ionShutdownHook] com.zaxxer.hikari.HikariDataSource   : HikariPool-1 - Shutdown completed.
```

15c) Test class:

```java
1⊕ /**⬚
4  package com.promineotech.jeep.controller;
5
6⊕ import static org.assertj.core.api.Assertions.assertThat;⬚
24
25⊖ /**
26   * @author Jordan
27   *
28   */
29  @SpringBootTest(webEnvironment = WebEnvironment.RANDOM_PORT)
30  @ActiveProfiles("test")
31  @Sql(scripts = {
32      "classpath:flyway/migrations/V1.0__Jeep_Schema.sql",
33      "classpath:flyway/migrations/V1.1__Jeep_Data.sql"},
34      config = @SqlConfig(encoding = "utf-8"))
35  class CreateOrderTest {
36
37⊖   @LocalServerPort
38     private int serverPort;
39
40⊖   @Autowired
41     private TestRestTemplate restTemplate;
42
43⊖   @Test
44     void testCreateOrderReturnsSuccess201() {
45       // Given: an order as JSON
46       String body = createOrderBody();
47       String uri = String.format("http://localhost:%d/orders", serverPort);
48
49       HttpHeaders headers = new HttpHeaders();
50       headers.setContentType(MediaType.APPLICATION_JSON);
51
52       HttpEntity<String> bodyEntity = new HttpEntity<>(body, headers);
53
54       // When: the order is sent
55       ResponseEntity<Order> response = restTemplate.exchange(uri, HttpMethod.POST, bodyEntity, Order.class);
56
57       // Then: a 201 status is returned
58       assertThat(response.getStatusCode()).isEqualTo(HttpStatus.CREATED);
59
60       // And: the returned order is correct
61       assertThat(response.getBody()).isNotNull();
62
63       Order order = response.getBody();
64       assertThat(order.getCustomer().getCustomerId()).isEqualTo("MAYNARD_TORBJORG");
65       assertThat(order.getModel().getModelId()).isEqualTo(JeepModel.COMPASS);
66       assertThat(order.getModel().getTrimLevel()).isEqualTo("Trailhawk");
67       assertThat(order.getModel().getNumDoors()).isEqualTo(4);
68       assertThat(order.getColor().getColorId()).isEqualTo("EXT_HELLAYELLA");
69       assertThat(order.getEngine().getEngineId()).isEqualTo("2_0_HYBRID");
70       assertThat(order.getTire().getTireId()).isEqualTo("275_BFGOODRICH");
71       assertThat(order.getOptions()).hasSize(6);
72     }
```

15c) Test class continued:

```java
73
74⊖   protected String createOrderBody() {
75         // @formatter:off
76         return "{\n"
77             + "   \"customer\":\"MAYNARD_TORBJORG\",\n"
78             + "   \"model\":\"COMPASS\",\n"
79             + "   \"trim\":\"Trailhawk\",\n"
80             + "   \"doors\":4,\n"
81             + "   \"color\":\"EXT_HELLAYELLA\",\n"
82             + "   \"engine\":\"2_0_HYBRID\",\n"
83             + "   \"tire\":\"275_BFGOODRICH\",\n"
84             + "   \"options\":[\n"
85             + "      \"DOOR_QUAD_4\",\n"
86             + "      \"EXT_AEV_LIFT\",\n"
87             + "      \"EXT_WARN_WINCH\",\n"
88             + "      \"EXT_WARN_BUMPER_FRONT\",\n"
89             + "      \"EXT_WARN_BUMPER_REAR\",\n"
90             + "      \"EXT_ARB_COMPRESSOR\"\n"
91             + "   ]\n"
92             + "}";
93         // @formatter:on
94     }
95
96 }
```