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Course

Date

Model View Controller (MVC) with Spring Boot

Model view controller (MVC) is a software architectural pattern for building web applications. Spring is a powerful, feature-rich, and enterprise-grade Java web and application development framework (Kaplan). MVC architecture separates an application into three parts: model, view, and controller (Patel). It also separates the functionality, logic, and interface of a web application into an organized structure. This paper focuses on implementing a simple MVC in Spring Boot, and explains the model and controller parts, only.

Spring Boot, being an evolution of the Spring Framework, creates stand-alone, production-grade Spring-based applications easily without a lot of boilerplate code. In MVC, the model represents a POJO (plain old Java object) carrying data. The view visualizes the data the model contains. The controller manages the data flow into the model and updates the view whenever the data changes.

To create a simple MVC in Spring Boot, a minimum of five classes are required: *Hello*, *HelloRepository*, *HelloService*, *HelloController*, and *SimpleMvcApplication*, as shown by figures 1 to 5, respectively. In this case, Figure 1 shows a model and Figure 4 shows a controller in MVC architecture. Figure 6 shows the output and sample queries.

MVC architecture organizes code in a simplified and understandable way. It also separates business logic, app functionality and the user interface (UI). Therefore, when building web applications, it is highly preferable to use MVC architecture.

Figure 1

Hello Model class

```
04-mvc-spring-boot > simple-mvc > src > main > java > com > example > simplemvc > model > Hello.java > ...
1  package com.example.simplemvc.model;
2
3  import javax.persistence.Entity;
4  import javax.persistence.GeneratedValue;
5  import javax.persistence.GenerationType;
6  import javax.persistence.Id;
7
8  import lombok.Getter;
9  import lombok.Setter;
10
11 @Entity(name = "hello")
12 @Getter
13 @Setter
14 public class Hello {
15     @Id
16     @GeneratedValue(strategy = GenerationType.AUTO)
17     private int id;
18     private String message;
19 }
20
```

Note. The class saves the message and the id to the database named *hello*.

Figure 2

HelloRepository class acting between the database and the model

```
04-mvc-spring-boot > simple-mvc > src > main > java > com > example > simplemvc > model > HelloRepository.java > ...
1  package com.example.simplemvc.model;
2
3  import org.springframework.data.jpa.repository.JpaRepository;
4
5  public interface HelloRepository extends JpaRepository<Hello, Integer> {
6
7  }
8
```

Note. The JpaRepository is an interface that provides useful abstractions to interact with the database.

Figure 3

HelloService class containing business logic

```
04-mvc-spring-boot > simple-mvc > src > main > java > com > example > simplemvc > service > HelloService.java >
1  package com.example.simplemvc.service;
2
3  import java.util.List;
4
5  import com.example.simplemvc.model.Hello;
6  import com.example.simplemvc.model.HelloRepository;
7
8  import org.springframework.stereotype.Service;
9
10 import lombok.RequiredArgsConstructor;
11
12 @Service
13 @RequiredArgsConstructor
14 public class HelloService {
15     private final HelloRepository helloRepository;
16
17     public Hello getMessage(int id) {
18         return helloRepository.findById(id).get();
19     }
20
21     public List<Hello> getAll() {
22         return helloRepository.findAll();
23     }
24
25     public Hello saveHello(Hello hello) {
26         return helloRepository.save(hello);
27     }
28
29 }
30
```

Note. This class contains the business logic of the application and acts as an interface between the model and the database due to the annotation, `@Service`.

Figure 4

HelloController containing interfaces to web endpoints

```
04-mvc-spring-boot > simple-mvc > src > main > java > com > example > simplemvc > controller > HelloController.java
1  package com.example.simplemvc.controller;
2
3  import java.util.List;
4
5  import com.example.simplemvc.model.Hello;
6  import com.example.simplemvc.service.HelloService;
7
8  import org.springframework.http.HttpStatus;
9  import org.springframework.http.ResponseEntity;
10 import org.springframework.stereotype.Controller;
11 import org.springframework.web.bind.annotation.PathVariable;
12 import org.springframework.web.bind.annotation.PostMapping;
13 import org.springframework.web.bind.annotation.RequestBody;
14 import org.springframework.web.bind.annotation.RequestMapping;
15
16 import lombok.RequiredArgsConstructor;
17
18 @Controller
19 @RequestMapping("/hello")
20 @RequiredArgsConstructor
21 public class HelloController {
22
23     private final HelloService helloService;
24
25     @RequestMapping("/")
26     public ResponseEntity<List<Hello>> getHello() {
27         return new ResponseEntity<>(helloService.getAll(), HttpStatus.OK);
28     }
29
30     @RequestMapping("/{id}")
31     public ResponseEntity<Hello> getHello(@PathVariable("id") int id) {
32         return new ResponseEntity<>(helloService.getMessage(id), HttpStatus.OK);
33     }
34
35     @PostMapping("/")
36     public ResponseEntity<Hello> saveHello(@RequestBody Hello hello) {
37         return new ResponseEntity<>(helloService.saveHello(hello), HttpStatus.OK);
38     }
39 }
40
```

Note. This is the class that serves HTTP requests due to the annotation, `@RestController`.

Figure 5

SimpleMvcApplication, the main entrypoint of the application

```

04-mvc-spring-boot > simple-mvc > src > main > java > com > example > simplemvc > SimpleMvcApplication.java
 1  package com.example.simplemvc;
 2
 3  import org.springframework.boot.SpringApplication;
 4  import org.springframework.boot.autoconfigure.SpringBootApplication;
 5
 6  @SpringBootApplication
 7  public class SimpleMvcApplication {
 8
 9      Run | Debug
10      public static void main(String[] args) {
11          SpringApplication.run(SimpleMvcApplication.class, args);
12      }
13

```

Note. This class is the main entrypoint of the spring boot application, the annotation `@SpringBootApplication` declares it the main entrypoint.

Figure 6

Output of HTTP Requests Using curl Command

```

12 }
PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL SQL CONSOLE
+ 04-mvc-spring-boot git:(main) x curl -s -d '{"message":"Hi, there!}' -H 'Content-Type: application/json' -X POST http://localhost:8080/hello/ | jq
{
  "id": 5,
  "message": "Hi, there!"
}
+ 04-mvc-spring-boot git:(main) x curl -s http://localhost:8080/hello/ | jq
[
  {
    "id": 1,
    "message": "Hi, there!"
  },
  {
    "id": 2,
    "message": "Hi, there!"
  },
  {
    "id": 3,
    "message": "Hi, there!"
  },
  {
    "id": 4,
    "message": "Hi, there!"
  },
  {
    "id": 5,
    "message": "Hi, there!"
  }
]
+ 04-mvc-spring-boot git:(main) x curl -s http://localhost:8080/hello/2 | jq
{
  "id": 2,
  "message": "Hi, there!"
}
+ 04-mvc-spring-boot git:(main) x

```

Note. The Spring Boot application creates a web server and exposes it on port 8080. Using the curl command, HTTP requests are made to the server; the first is a POST request to create a new message, the second retrieves all messages, and the last one gets the message with id 2.

Works Cited

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