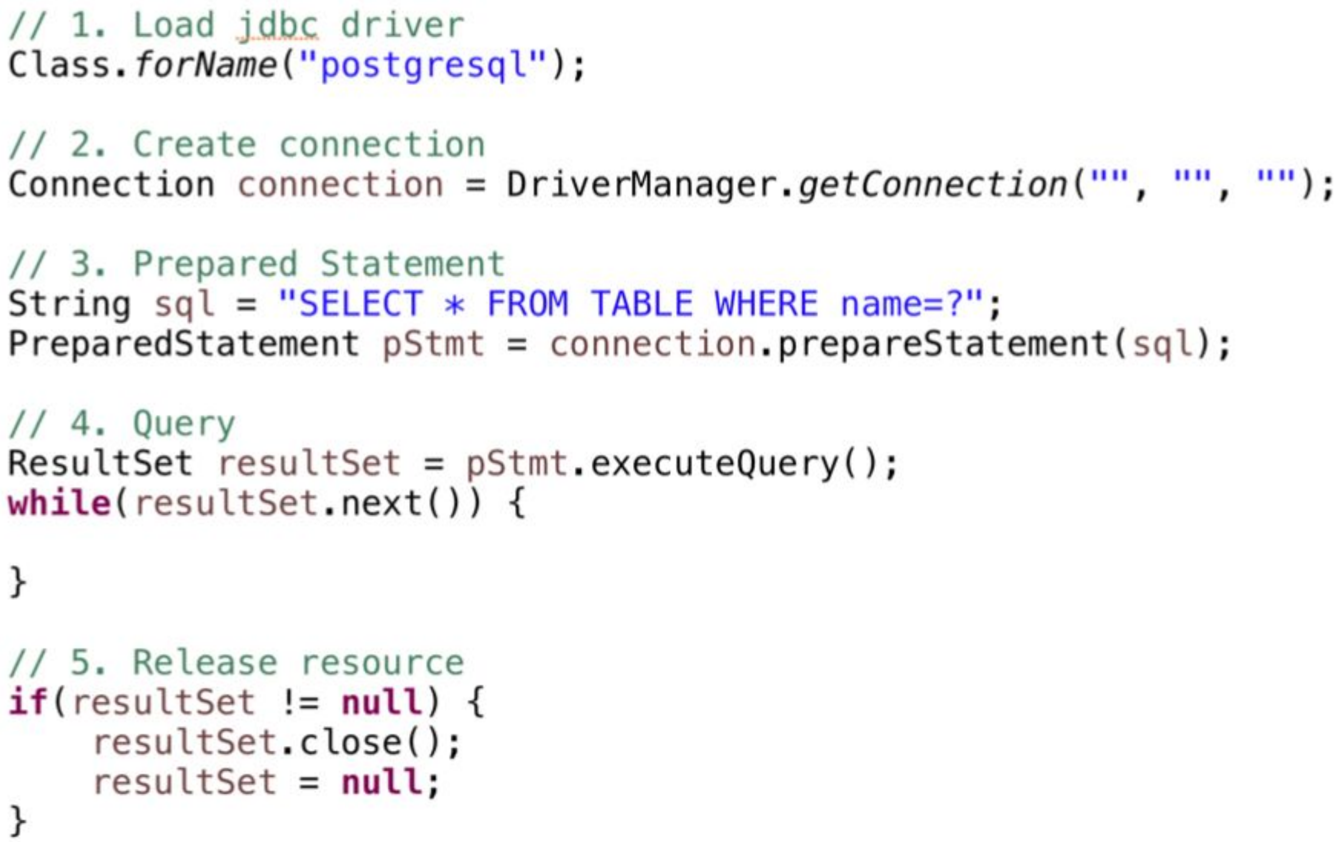
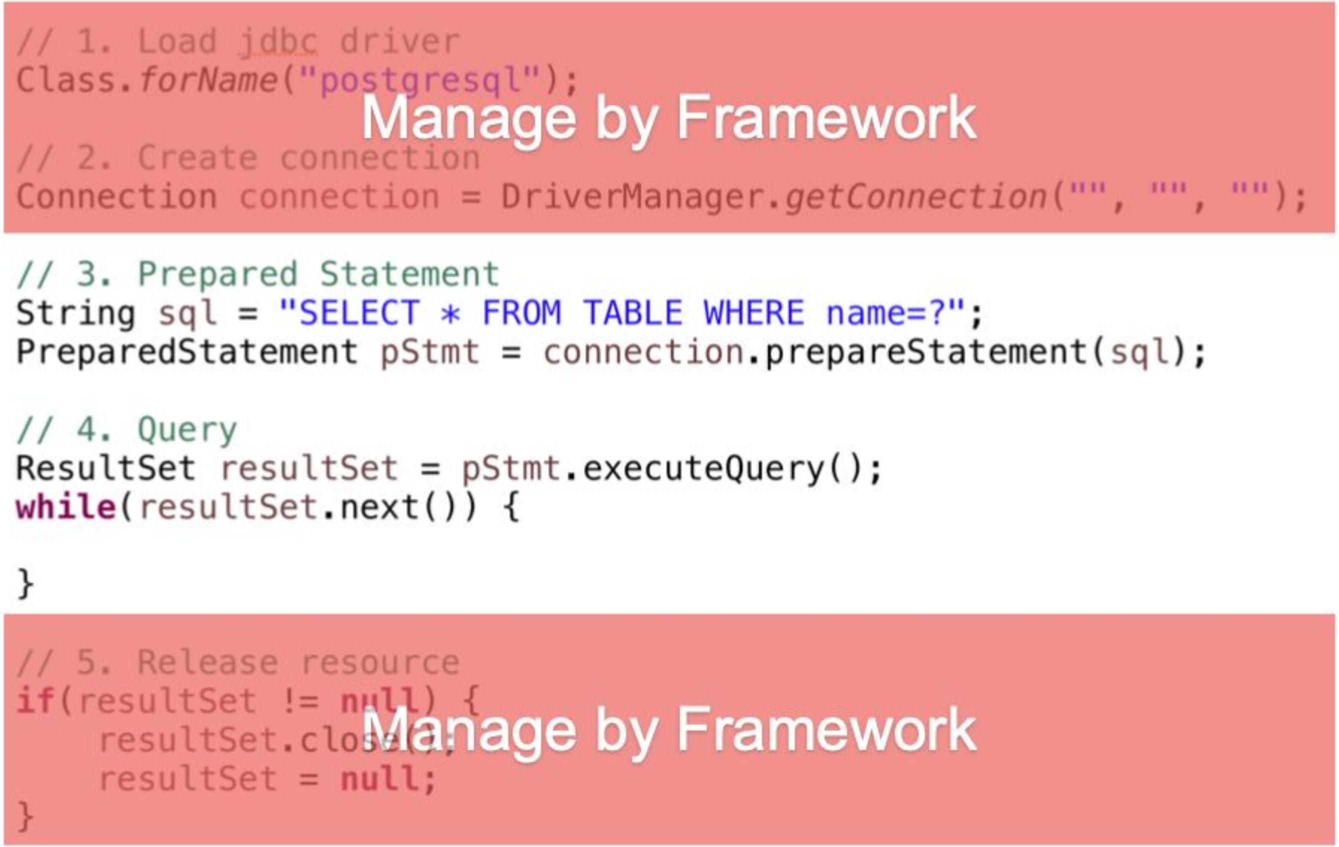
Repository

Basic of JDBC



```java
// 1. Load jdbc driver
Class.forName("postgresql");

// 2. Create connection
Connection connection = DriverManager.getConnection("", "", "");

// 3. Prepared Statement
String sql = "SELECT * FROM TABLE WHERE name=?";
PreparedStatement pStmt = connection.prepareStatement(sql);

// 4. Query
ResultSet resultSet = pStmt.executeQuery();
while(resultSet.next()) {

}

// 5. Release resource
if(resultSet != null) {
    resultSet.close();
    resultSet = null;
}
```

Framework !!



```
// 1. Load jdbc driver
Class.forName("postgresql");

// 2. Create connection
Connection connection = DriverManager.getConnection("", "", "");
```

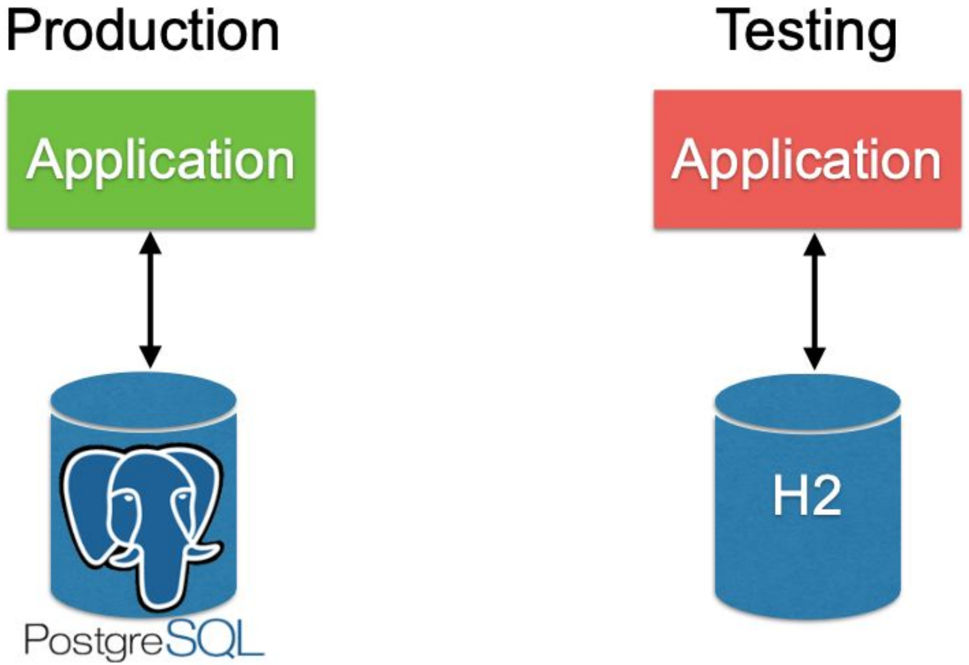
Manage by Framework

```
// 3. Prepared Statement
String sql = "SELECT * FROM TABLE WHERE name=?";
PreparedStatement pStmt = connection.prepareStatement(sql);

// 4. Query
ResultSet resultSet = pStmt.executeQuery();
while(resultSet.next()) {

}
```

```
// 5. Release resource
if(resultSet != null) {
    resultSet.close();
    resultSet = null;
}
```

Manage by Framework

Working with Database ?



Production

Application

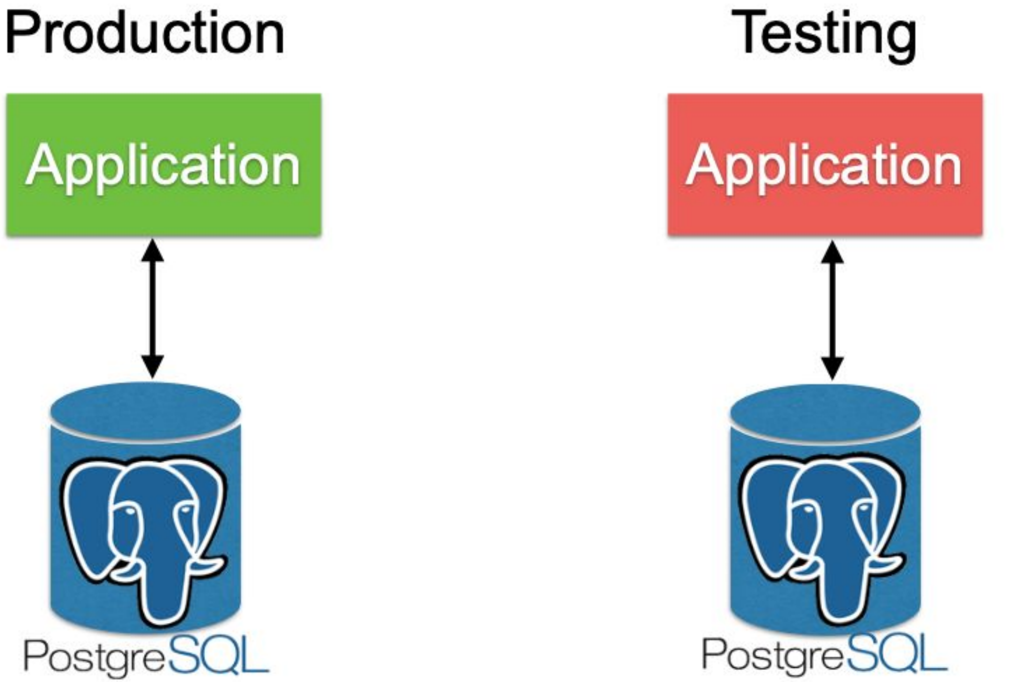
PostgreSQL

Testing

Application

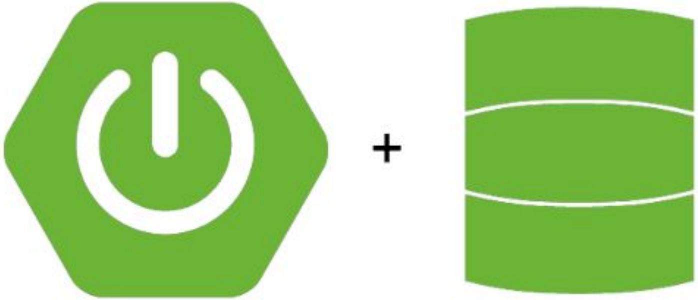
H2

Working with Database ?



Working with repository

We’re using Spring Data



https://spring.io/projects/spring-data

Spring Data

JDBC

JPA

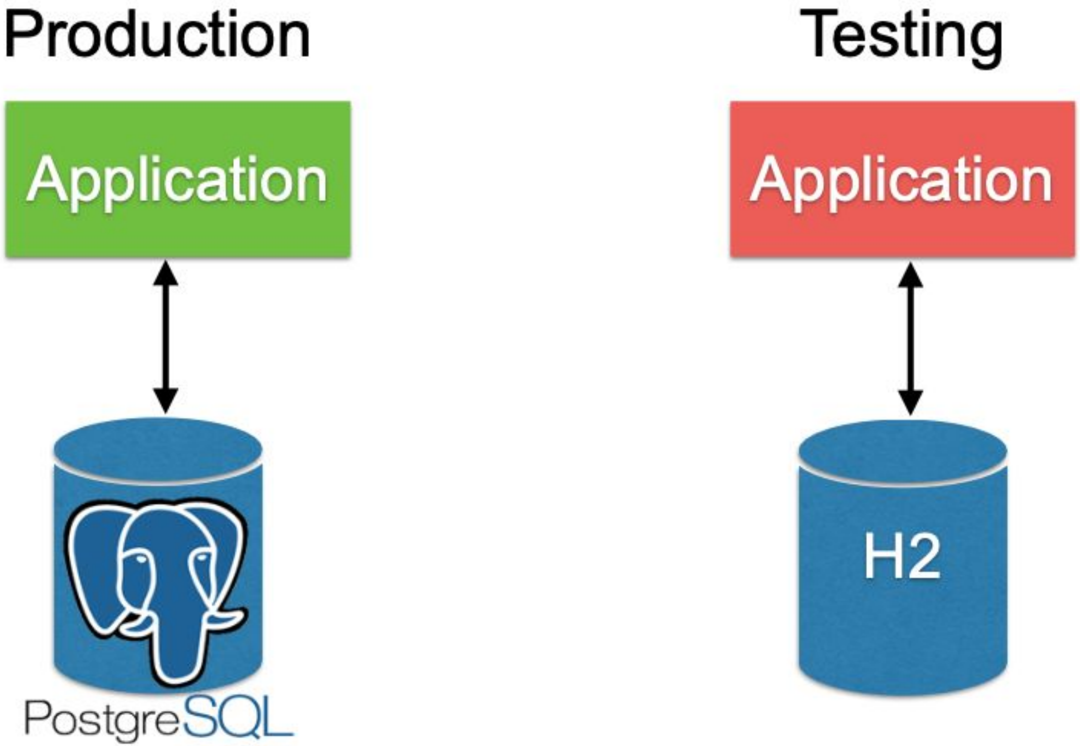
MongoDB

Redis

more …

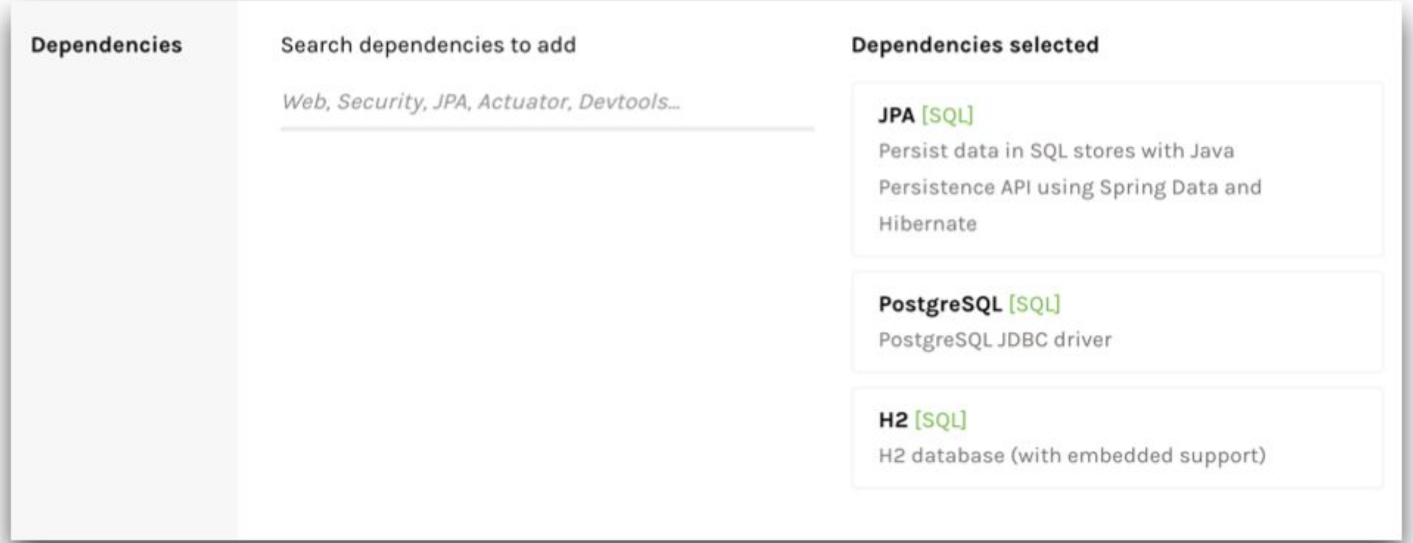
Working with Spring Data JPA

Working with Database



Modify pom.xml

Add library of Spring Data JPA, PostgreSQL, H2



Dependencies

Search dependencies to add

Web, Security, JPA, Actuator, Devtools...

Dependencies selected

JPA [SQL]
Persist data in SQL stores with Java Persistence API using Spring Data and Hibernate

PostgreSQL [SQL]
PostgreSQL JDBC driver

H2 [SQL]
H2 database (with embedded support)

https://start.spring.io/

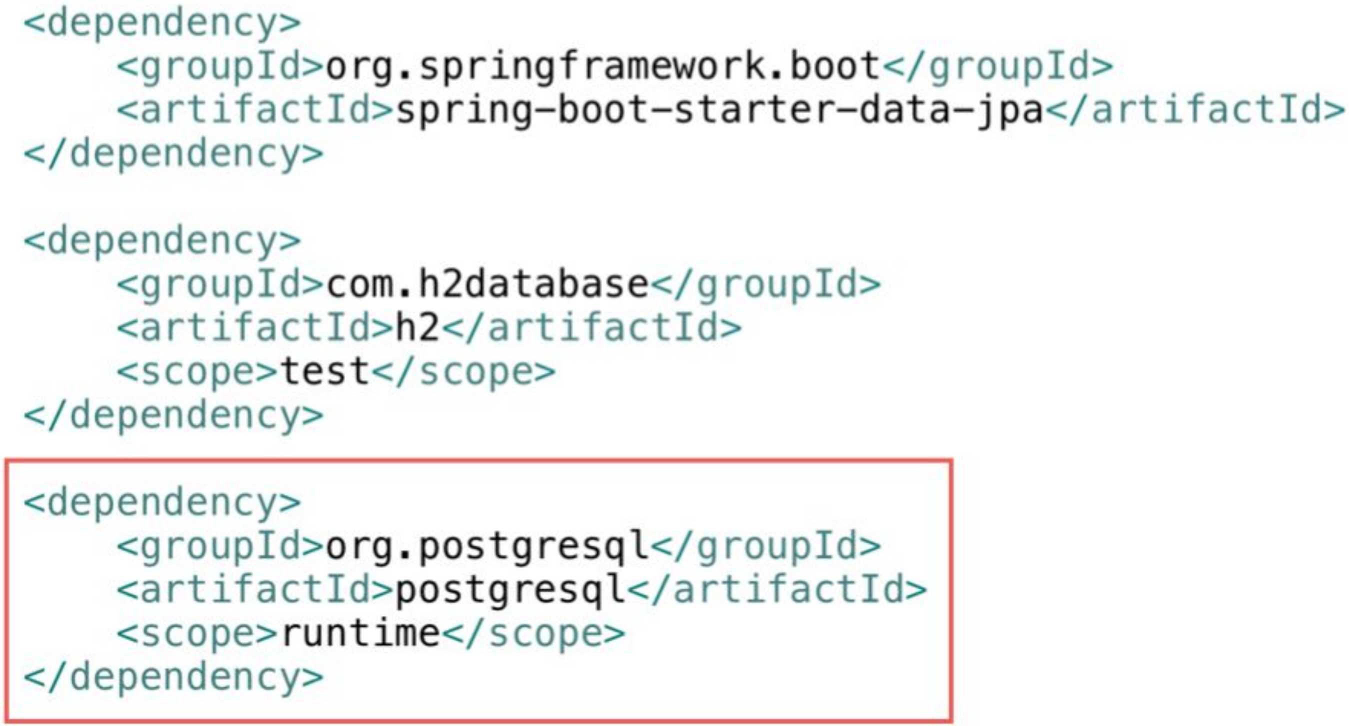
Modify pom.xml

H2 for testing

```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-data-jpa</artifactId>
</dependency>

<dependency>
    <groupId>com.h2database</groupId>
    <artifactId>h2</artifactId>
    <scope>test</scope>
</dependency>

<dependency>
    <groupId>org.postgresql</groupId>
    <artifactId>postgresql</artifactId>
    <scope>runtime</scope>
</dependency>
```

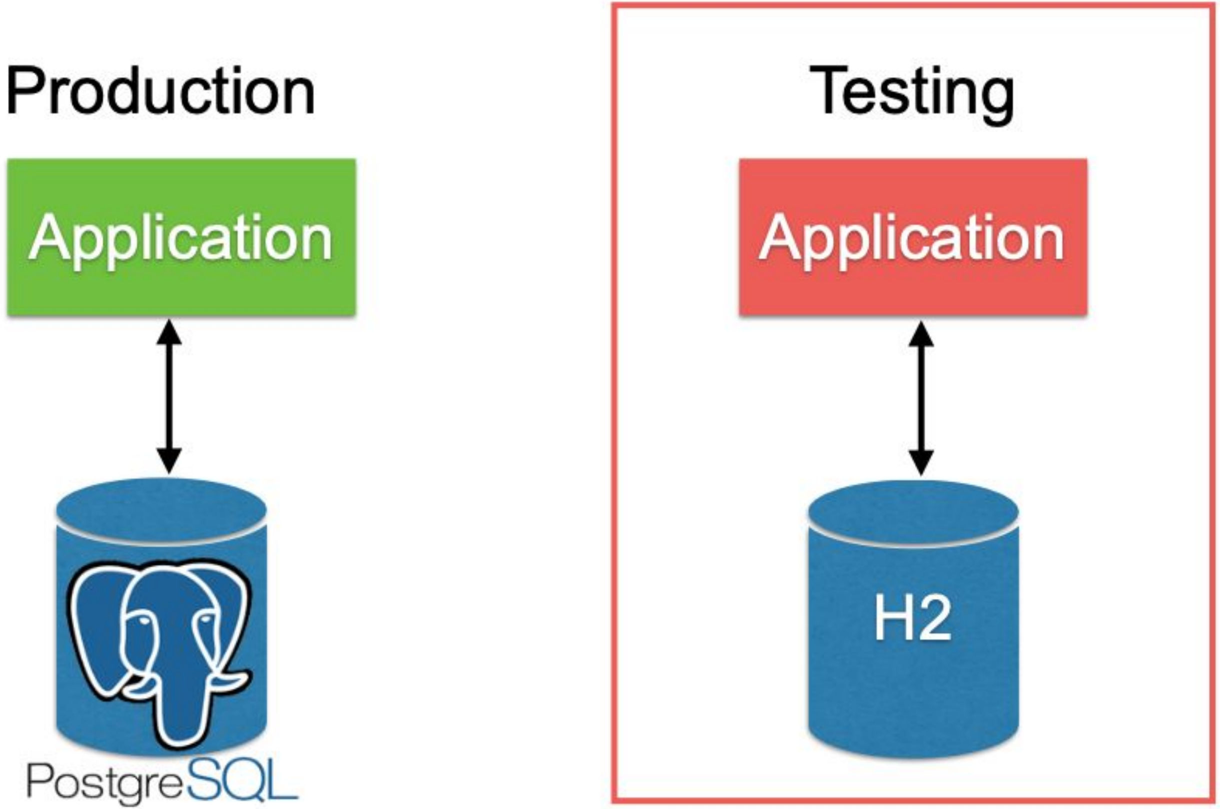
Modify pom.xml

PostgreSQL for production

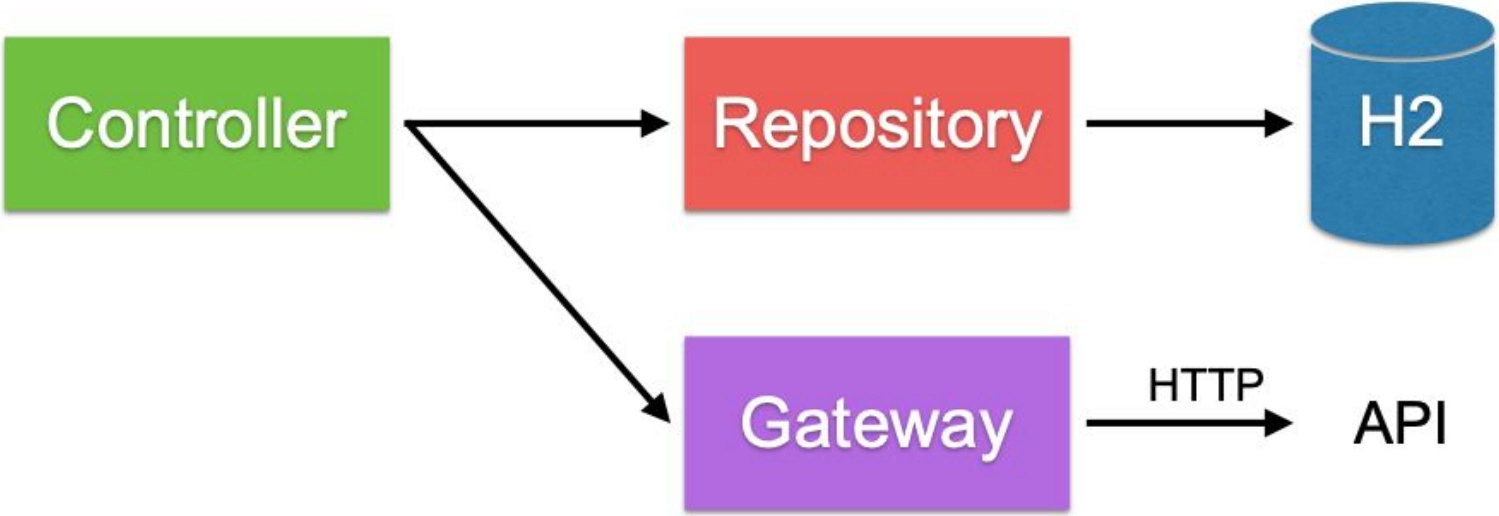


```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-data-jpa</artifactId>
</dependency>

<dependency>
    <groupId>com.h2database</groupId>
    <artifactId>h2</artifactId>
    <scope>test</scope>
</dependency>

<dependency>
    <groupId>org.postgresql</groupId>
    <artifactId>postgresql</artifactId>
    <scope>runtime</scope>
</dependency>
```

Start in testing scope

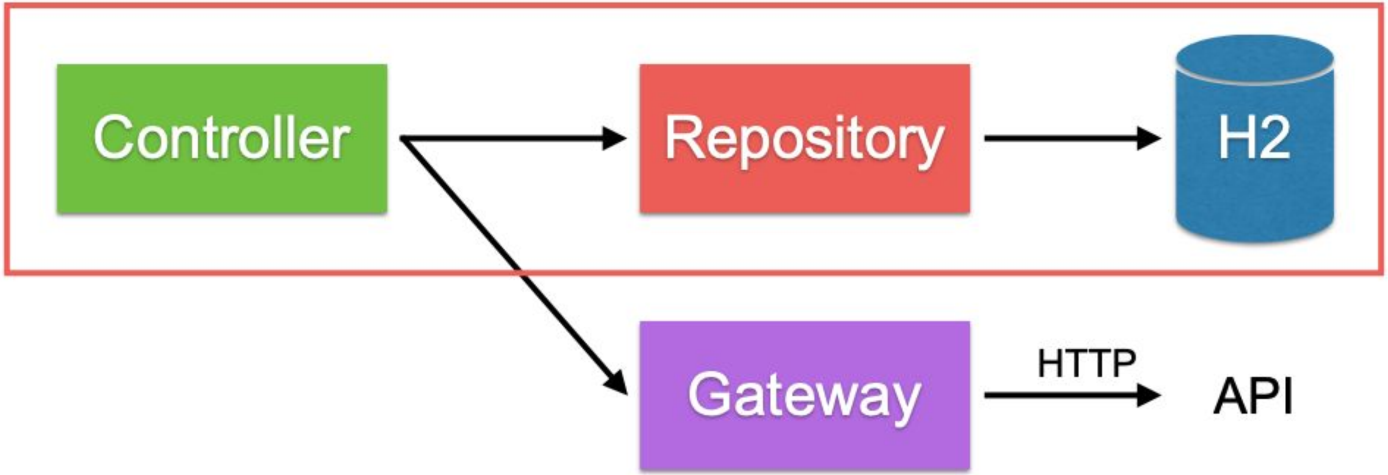


Use cases



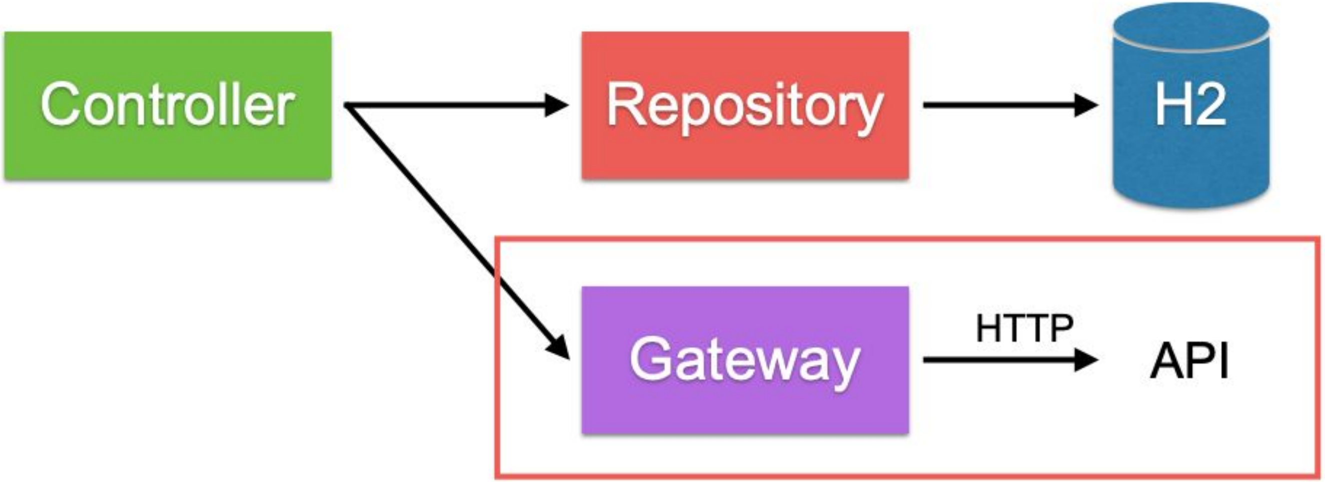
Use case 1

Working with repository



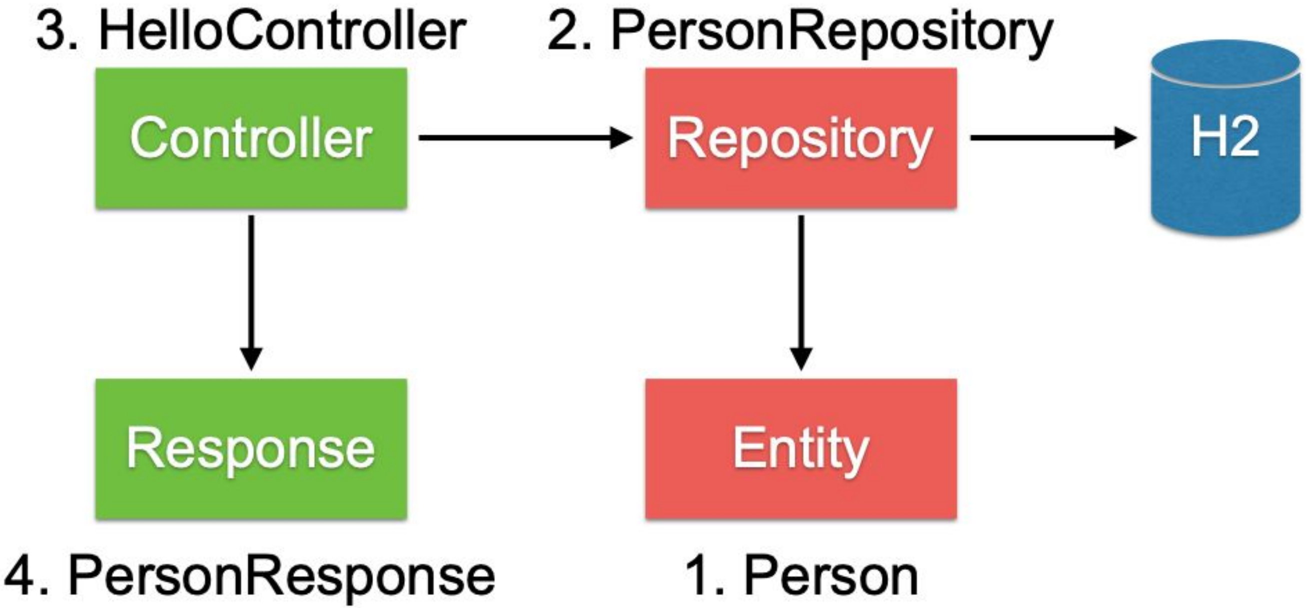
Use case 2

Working with API



Use case 1

Working with repository



3. HelloController

2. PersonRepository

Controller

Repository

H2

Response

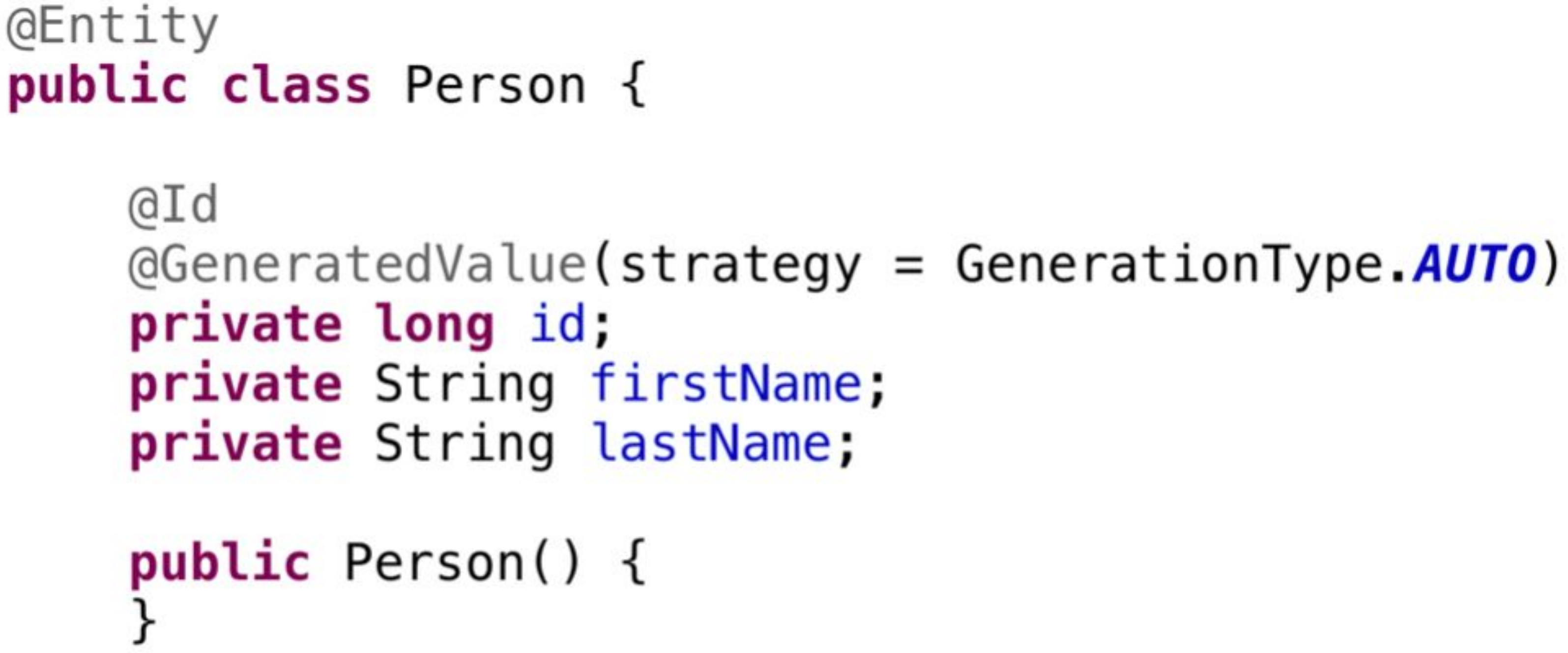
Entity

4. PersonResponse

1. Person

1. Create Entity class

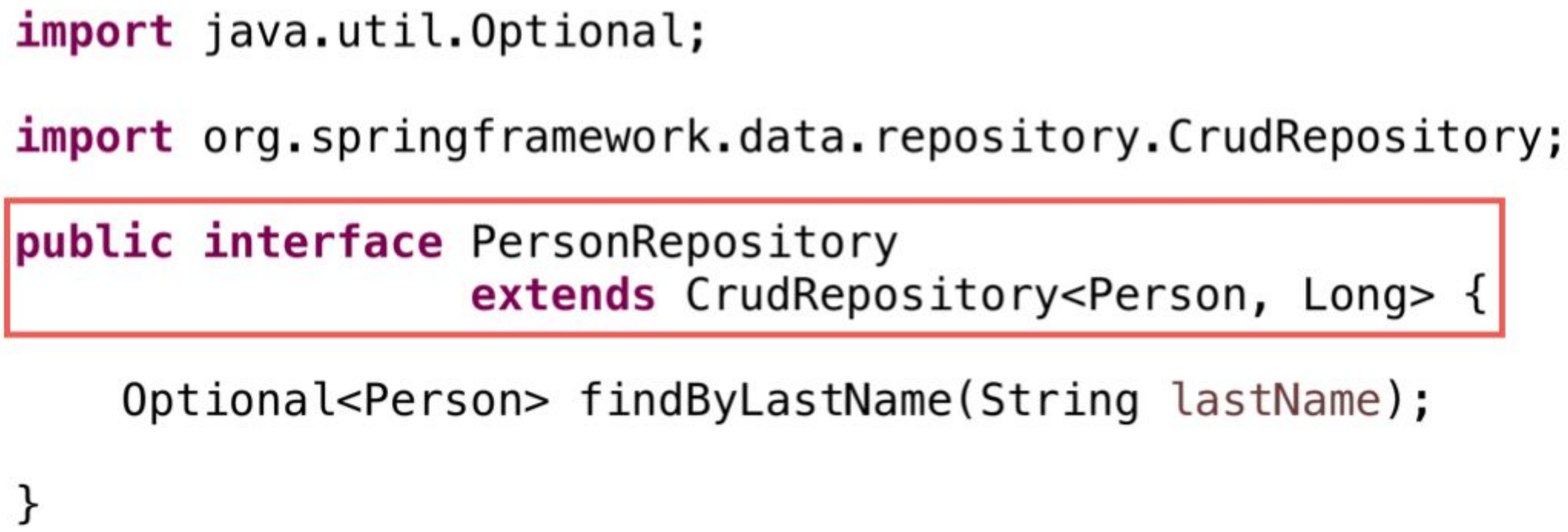
In package **person**



```
@Entity
public class Person {

    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private long id;
    private String firstName;
    private String lastName;

    public Person() {
    }
```

2. Create repository with JPA

PersonRepository.java



```
import java.util.Optional;

import org.springframework.data.repository.CrudRepository;

public interface PersonRepository
                 extends CrudRepository<Person, Long> {

    Optional<Person> findByLastName(String lastName);

}
```

2. Create repository with JPA

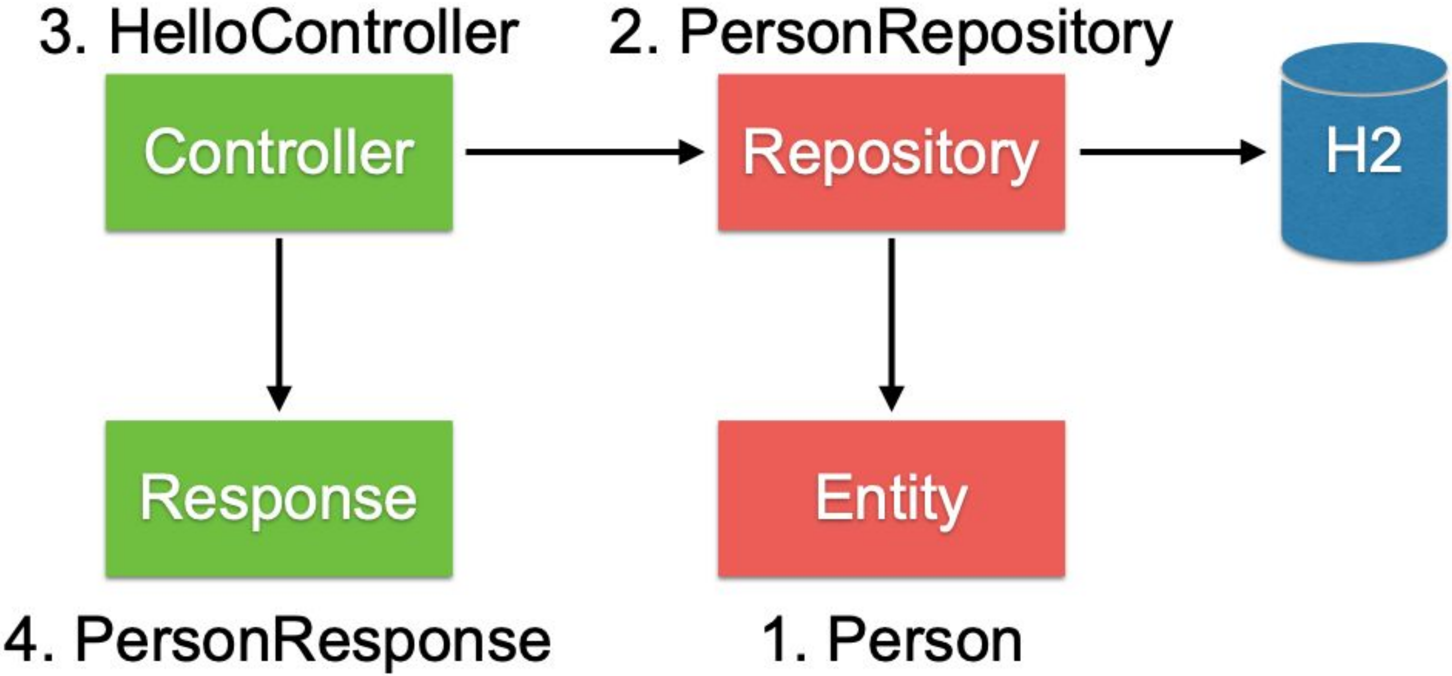
PersonRepository.java

```
import java.util.Optional;

import org.springframework.data.repository.CrudRepository

public interface PersonRepository
                 extends CrudRepository<Person, Long> {

    Optional<Person> findByLastName(String lastName);

}
```

*SELECT * FROM Person WHERE LastName=?*

Use case 1

Integrate repository with controller



3. HelloController

2. PersonRepository

Controller

Repository

H2

Response

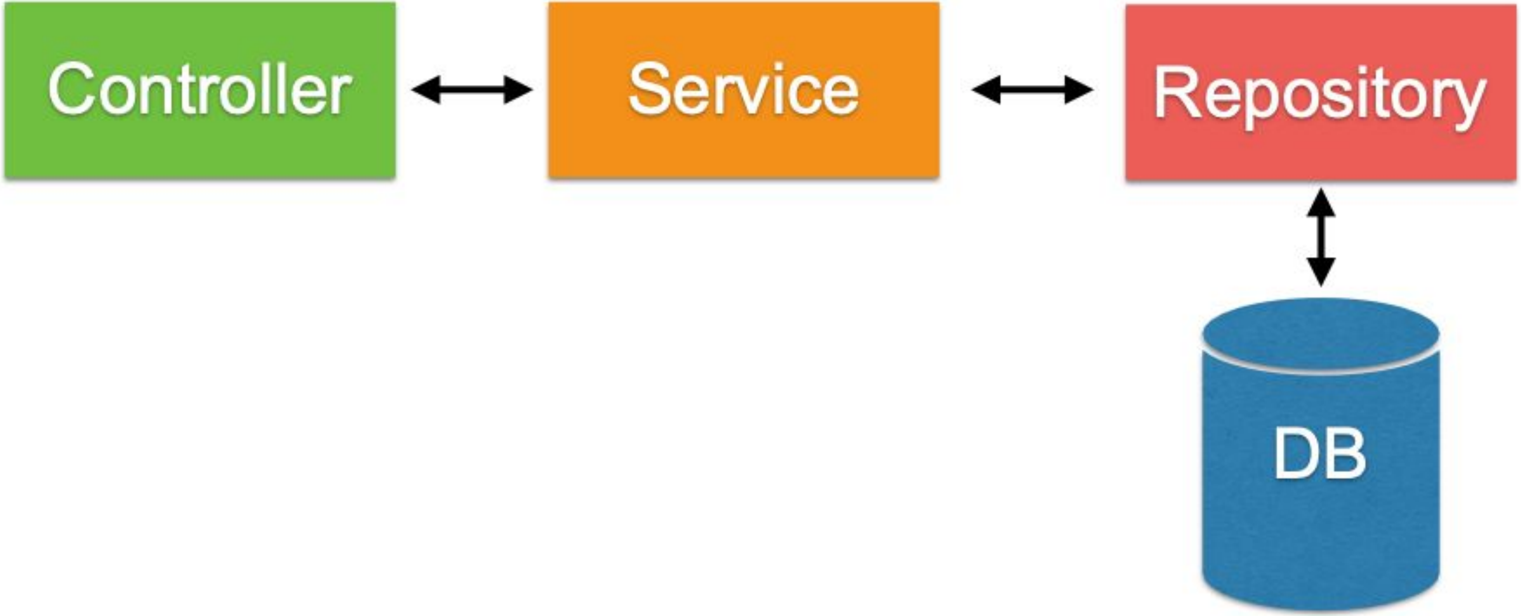
Entity

4. PersonResponse

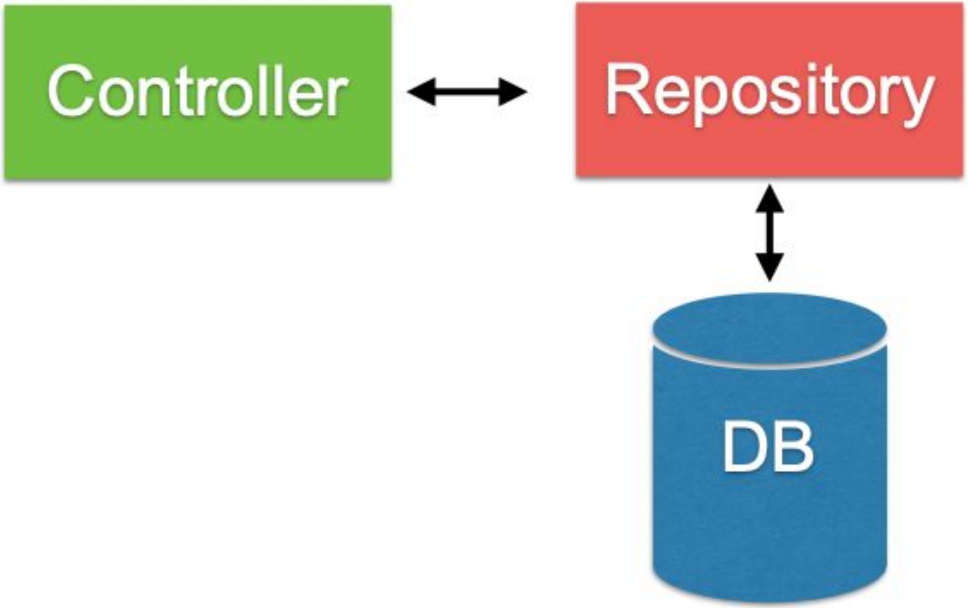
1. Person

Integrate repository with service/controller

Service use repository ?

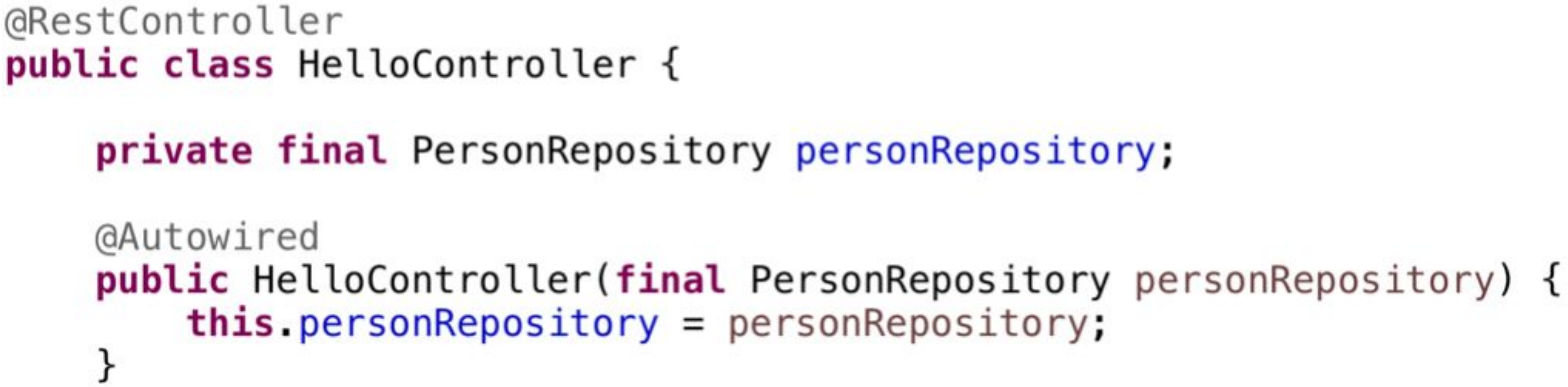


Controller use repository ?



Controller call repository

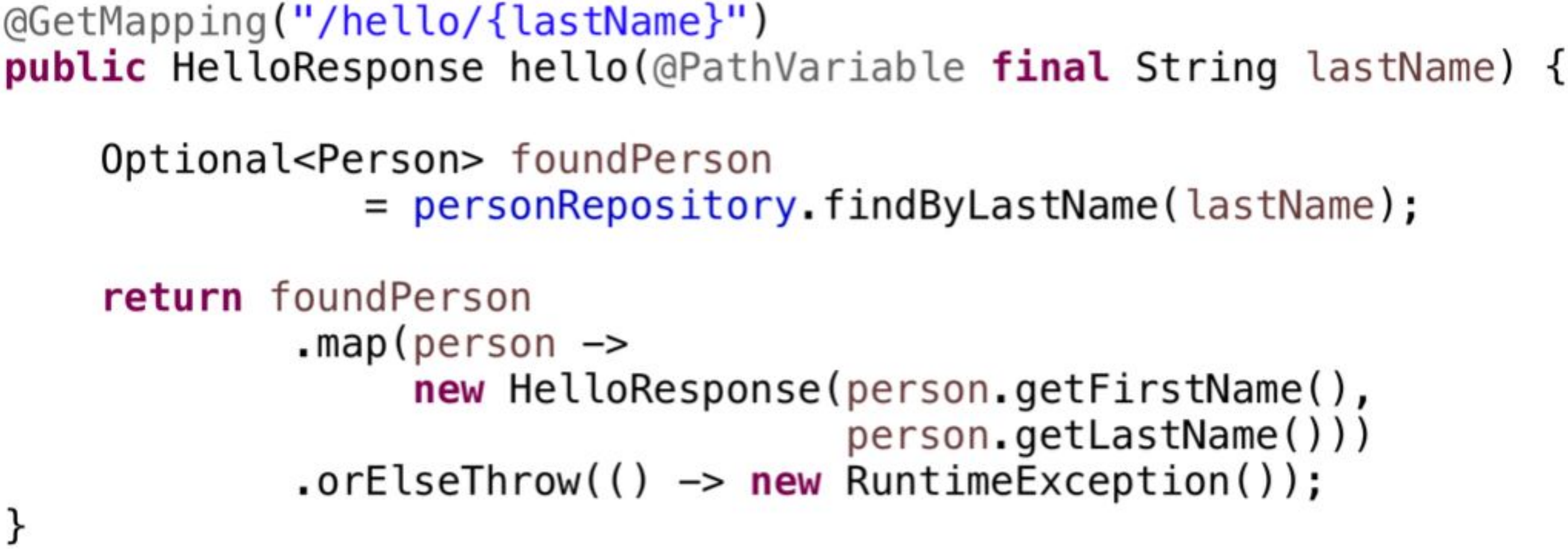
Create HelloController.java



```
@RestController
public class HelloController {

    private final PersonRepository personRepository;

    @Autowired
    public HelloController(final PersonRepository personRepository) {
        this.personRepository = personRepository;
    }
```

Controller call repository

Create HelloController.java



```
@GetMapping("/hello/{lastName}")
public HelloResponse hello(@PathVariable final String lastName) {

    Optional<Person> foundPerson
              = personRepository.findByLastName(lastName);

    return foundPerson
            .map(person ->
                 new HelloResponse(person.getFirstName(),
                                   person.getLastName()))
            .orElseThrow(() -> new RuntimeException());
}
```

Run spring boot

```
$mvnw spring-boot:run
```

Fix !!!

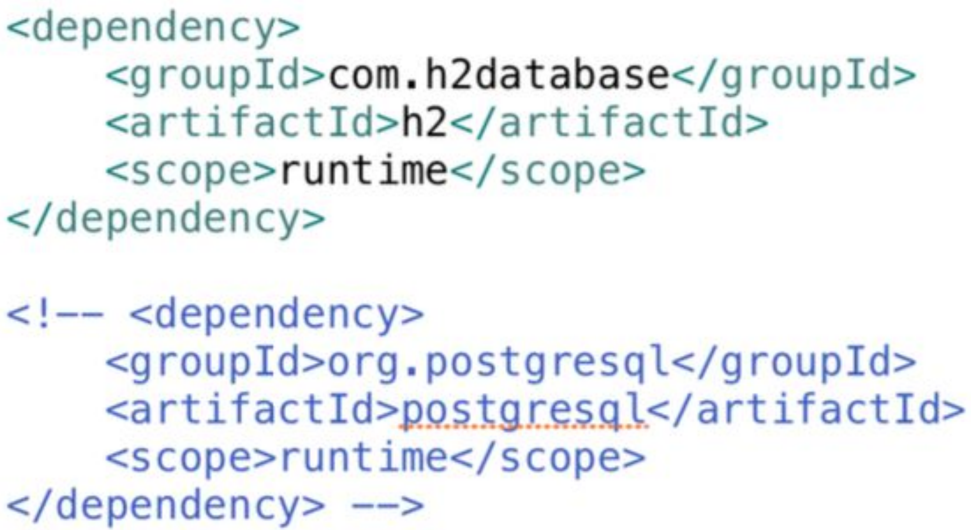
Modify src/main/resources/**application.properties**

```
server.port=8088

spring.datasource.url=jdbc:postgresql://127.0.0.1:15432/postgres
spring.datasource.username=testuser
spring.datasource.password=password
spring.datasource.platform=POSTGRESQL

spring.jpa.show-sql=true
spring.jpa.hibernate.ddl-auto=create-drop
spring.jpa.database-platform=org.hibernate.dialect.PostgreSQLDialect
```

Start database server !!

Fix !!!

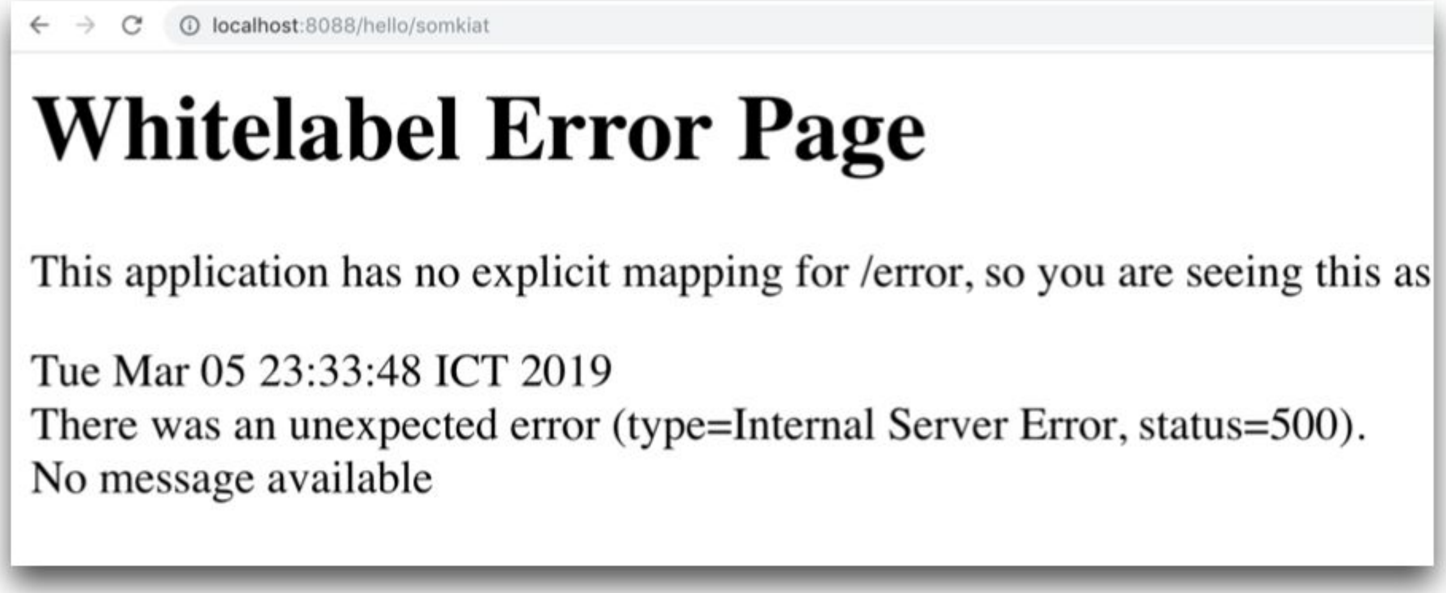
Modify pom.xml
Delete or comment postgresql dependency



```
<dependency>
    <groupId>com.h2database</groupId>
    <artifactId>h2</artifactId>
    <scope>runtime</scope>
</dependency>

<!-- <dependency>
    <groupId>org.postgresql</groupId>
    <artifactId>postgresql</artifactId>
    <scope>runtime</scope>
</dependency> -->
```

Run spring boot

```
$mvnw spring-boot:run
```



Whitelabel Error Page

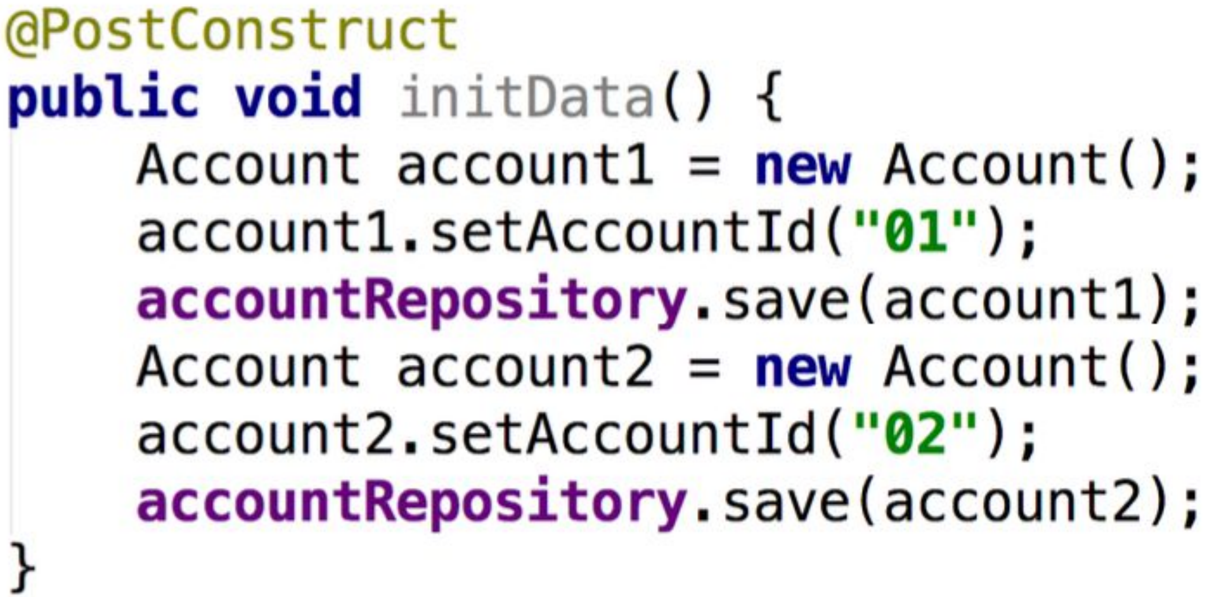
This application has no explicit mapping for /error, so you are seeing this as

Tue Mar 05 23:33:48 ICT 2019
There was an unexpected error (type=Internal Server Error, status=500).
No message available

Initial data in database

Initial database

Using @PostConstruct



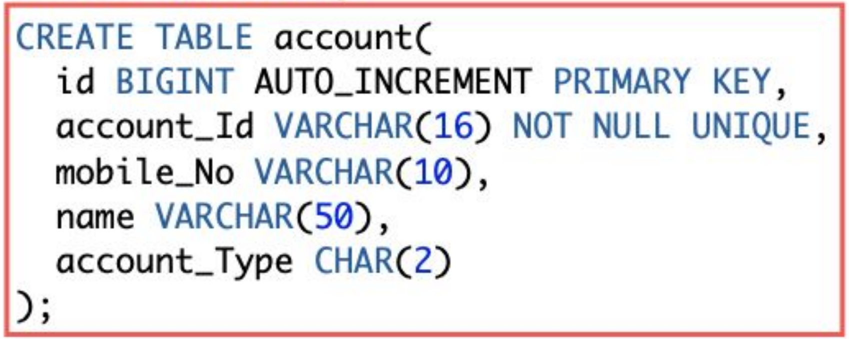
```
@PostConstruct
public void initData() {
    Account account1 = new Account();
    account1.setAccountId("01");
    accountRepository.save(account1);
    Account account2 = new Account();
    account2.setAccountId("02");
    accountRepository.save(account2);
}
```

Initial database

Schema (resources/schema.sql)

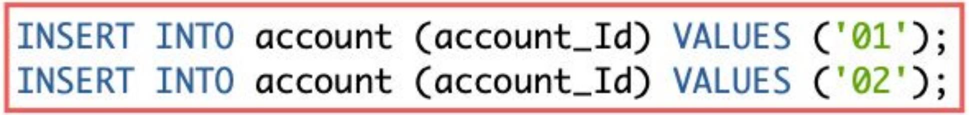
Data (resources/data.sql)

Schema.sql



```sql
CREATE TABLE account(
  id BIGINT AUTO_INCREMENT PRIMARY KEY,
  account_Id VARCHAR(16) NOT NULL UNIQUE,
  mobile_No VARCHAR(10),
  name VARCHAR(50),
  account_Type CHAR(2)
);
```

Data.sql



```sql
INSERT INTO account (account_Id) VALUES ('01');
INSERT INTO account (account_Id) VALUES ('02');
```

Initial database

Disable auto generate DDL from JPA in file application.yml

```
spring:
  jpa:
    show-sql: true
    hibernate:
        ddl-auto: none
```

Initial database

Problem with naming strategy !!

```yaml
spring:
  jpa:
    show-sql: true
    hibernate:
        ddl-auto: none
        naming:
          physical-strategy:
org.springframework.boot.orm.jpa.hibernate.SpringPhysicalNamingStrategy
          implicit-strategy:
org.springframework.boot.orm.jpa.hibernate.SpringImplicitNamingStrategy
```

Run and see from logging

Execute file schema.sql and data.sql

Run spring boot

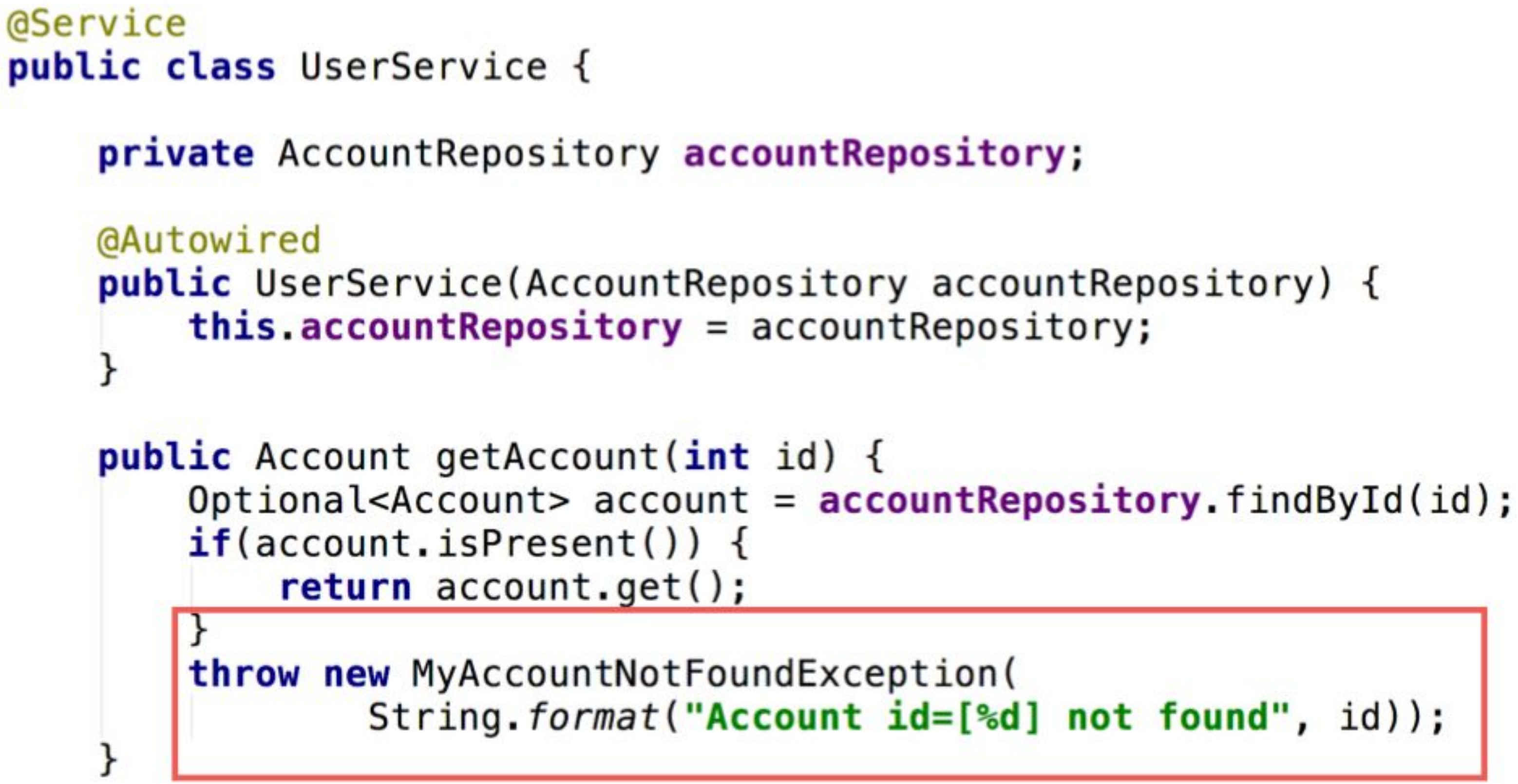
```
$mvnw spring-boot:run
```

10 minutes

Break

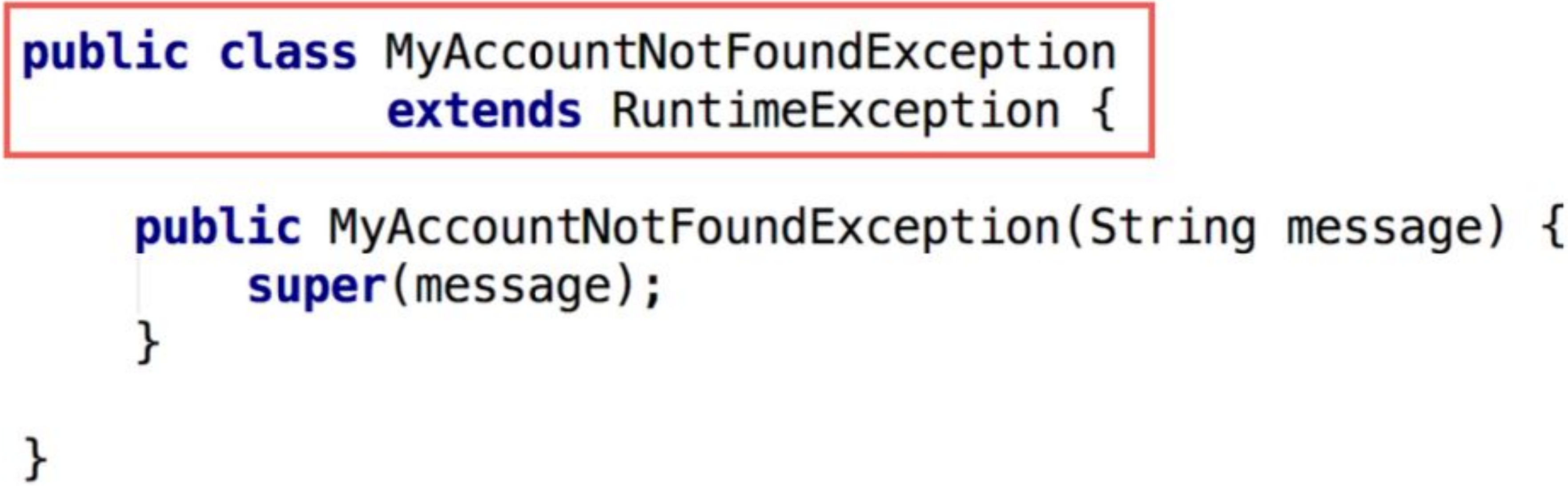
Error handling

Error handling



```java
@Service
public class UserService {

    private AccountRepository accountRepository;

    @Autowired
    public UserService(AccountRepository accountRepository) {
        this.accountRepository = accountRepository;
    }

    public Account getAccount(int id) {
        Optional<Account> account = accountRepository.findById(id);
        if(account.isPresent()) {
            return account.get();
        }
        throw new MyAccountNotFoundException(
                String.format("Account id=[%d] not found", id));
    }
```

MyAccountNotFoundException



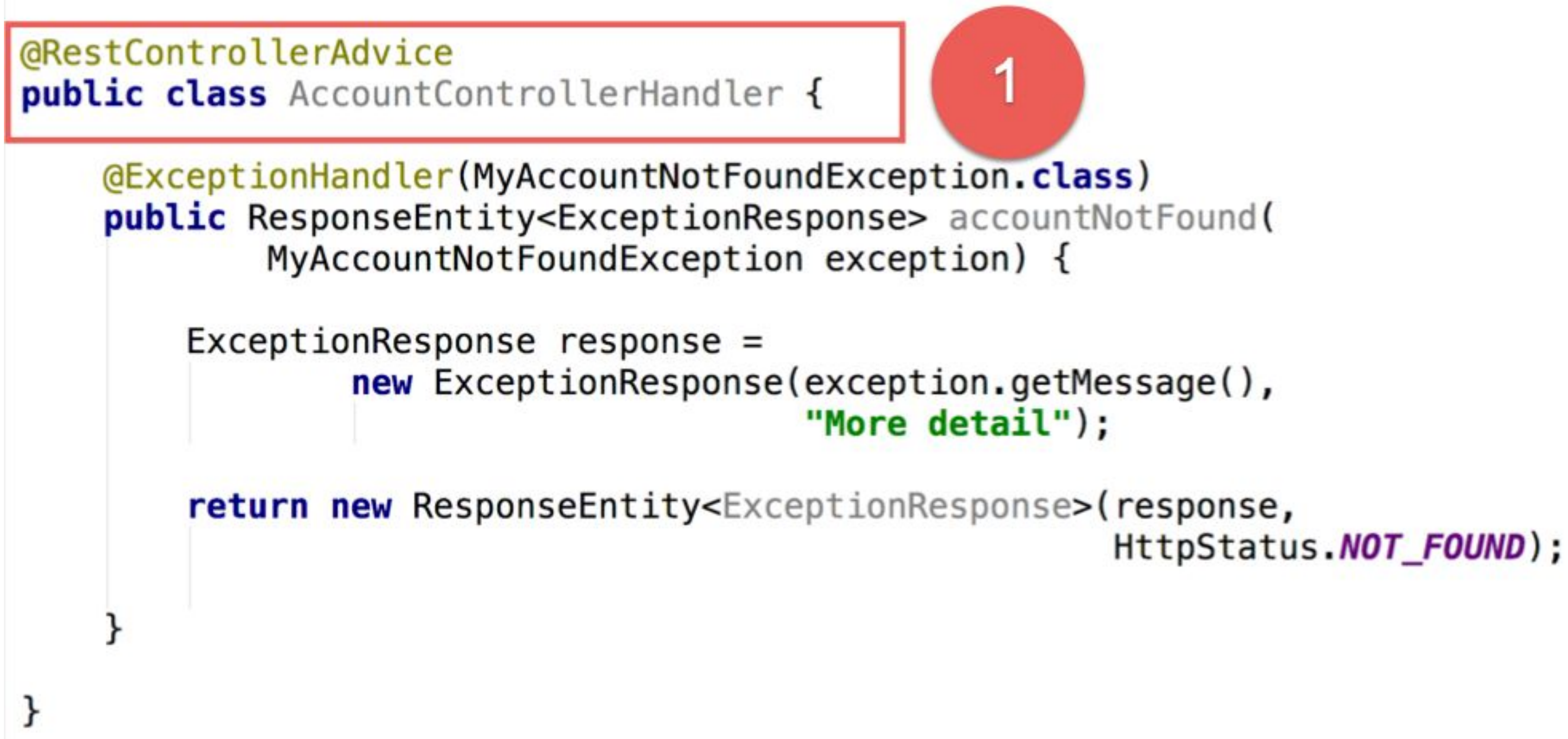
```java
public class MyAccountNotFoundException
                extends RuntimeException {

    public MyAccountNotFoundException(String message) {
        super(message);
    }

}
```

Response Status

404 = Not Found

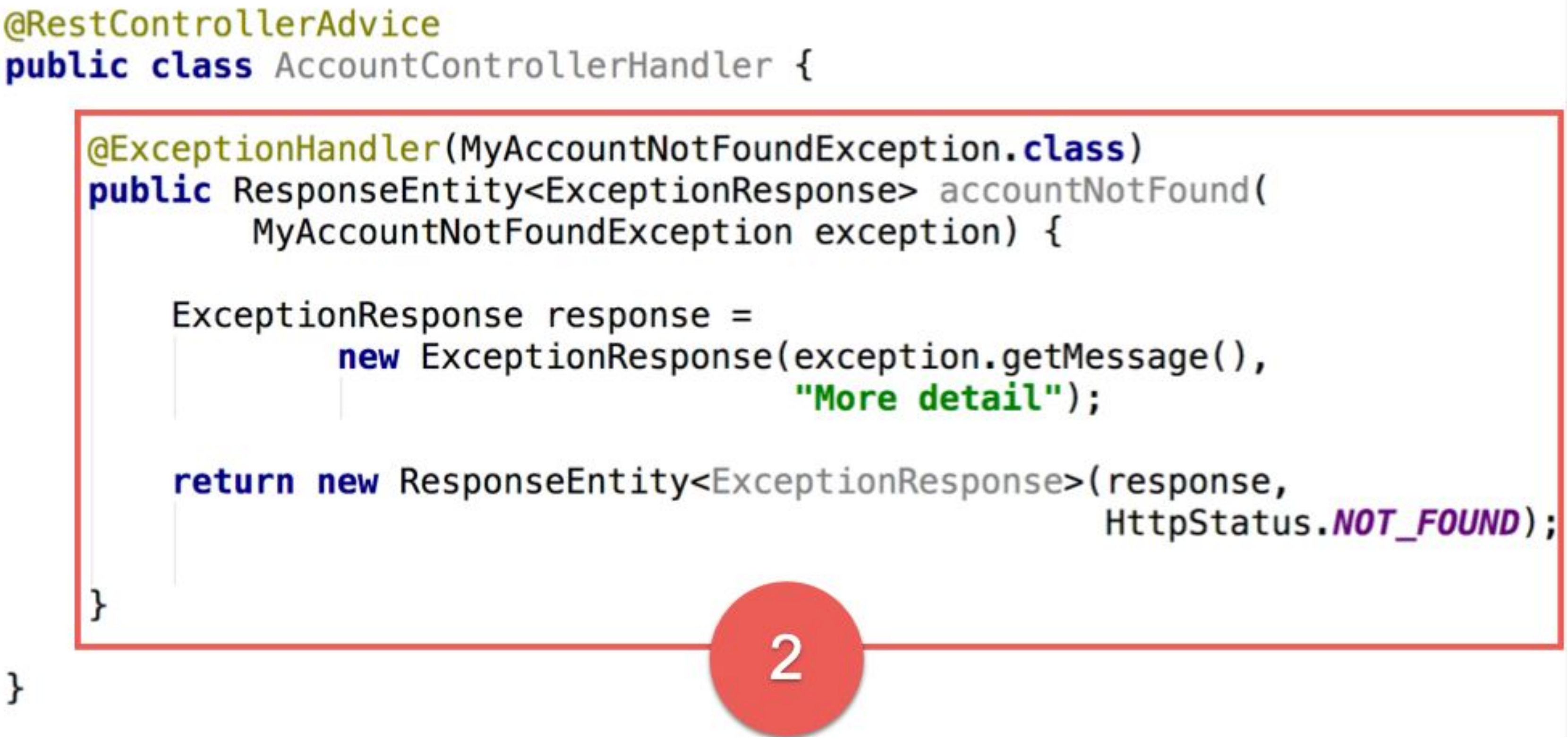
Status	Description
400	Request body doesn’t meet API spec
401	Authentication/Authorization fail
403	User can’t perform the operation
404	Resource does not exist
405	Unsupported operation
500	Error on server

Handling error in Spring Boot



```
@RestControllerAdvice
public class AccountControllerHandler {

    @ExceptionHandler(MyAccountNotFoundException.class)
    public ResponseEntity<ExceptionResponse> accountNotFound(
            MyAccountNotFoundException exception) {

        ExceptionResponse response =
                new ExceptionResponse(exception.getMessage(),
                                      "More detail");

        return new ResponseEntity<ExceptionResponse>(response,
                                                     HttpStatus.NOT_FOUND);

    }

}
```

Handling error in Spring Boot

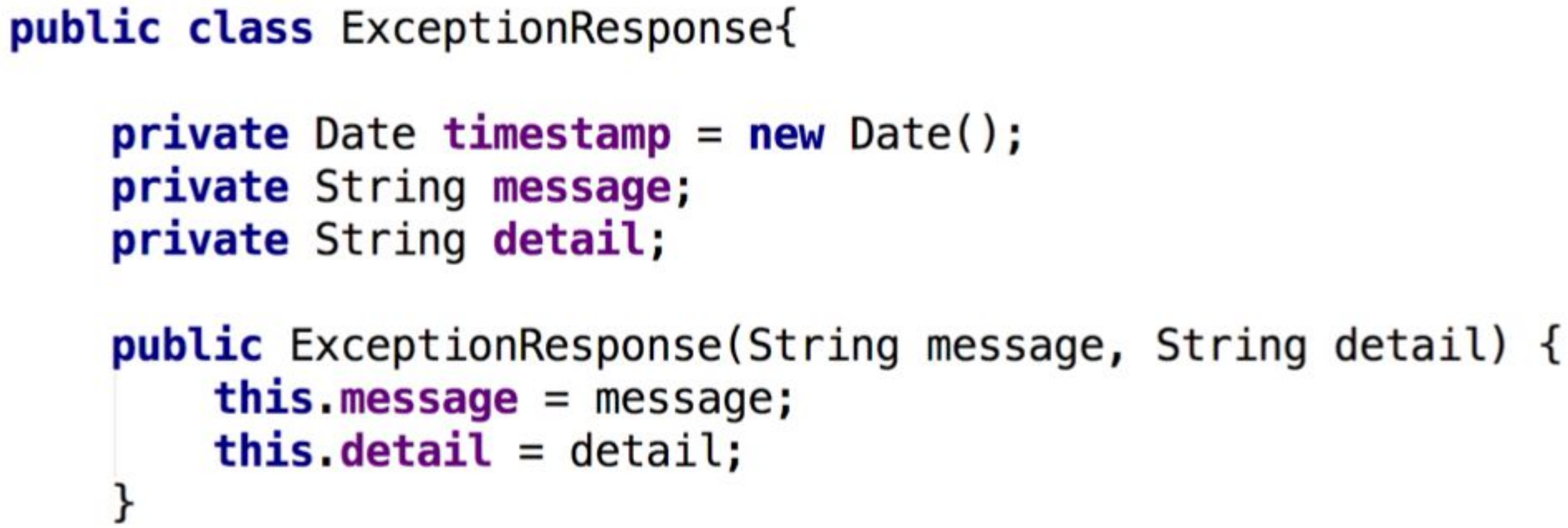


```
@RestControllerAdvice
public class AccountControllerHandler {

    @ExceptionHandler(MyAccountNotFoundException.class)
    public ResponseEntity<ExceptionResponse> accountNotFound(
            MyAccountNotFoundException exception) {

        ExceptionResponse response =
                new ExceptionResponse(exception.getMessage(),
                                      "More detail");

        return new ResponseEntity<ExceptionResponse>(response,
                                                     HttpStatus.NOT_FOUND);

    }

}
```

2

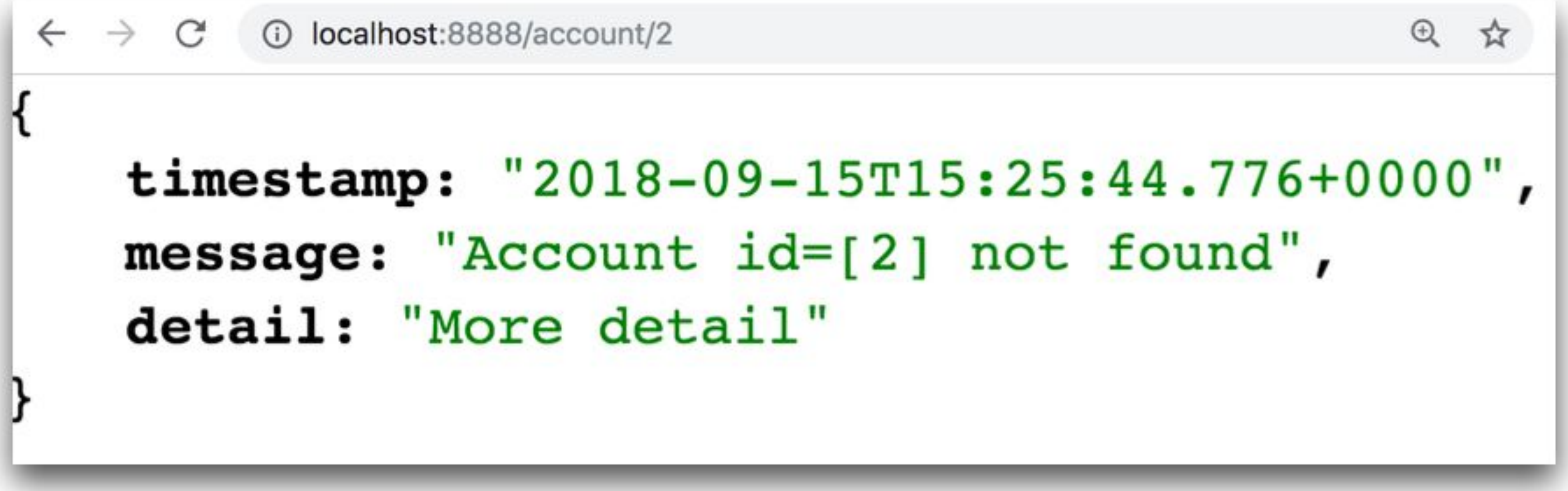
ExceptionReponse

Response format of error



```
public class ExceptionResponse{

    private Date timestamp = new Date();
    private String message;
    private String detail;

    public ExceptionResponse(String message, String detail) {
        this.message = message;
        this.detail = detail;
    }
```

Result of API

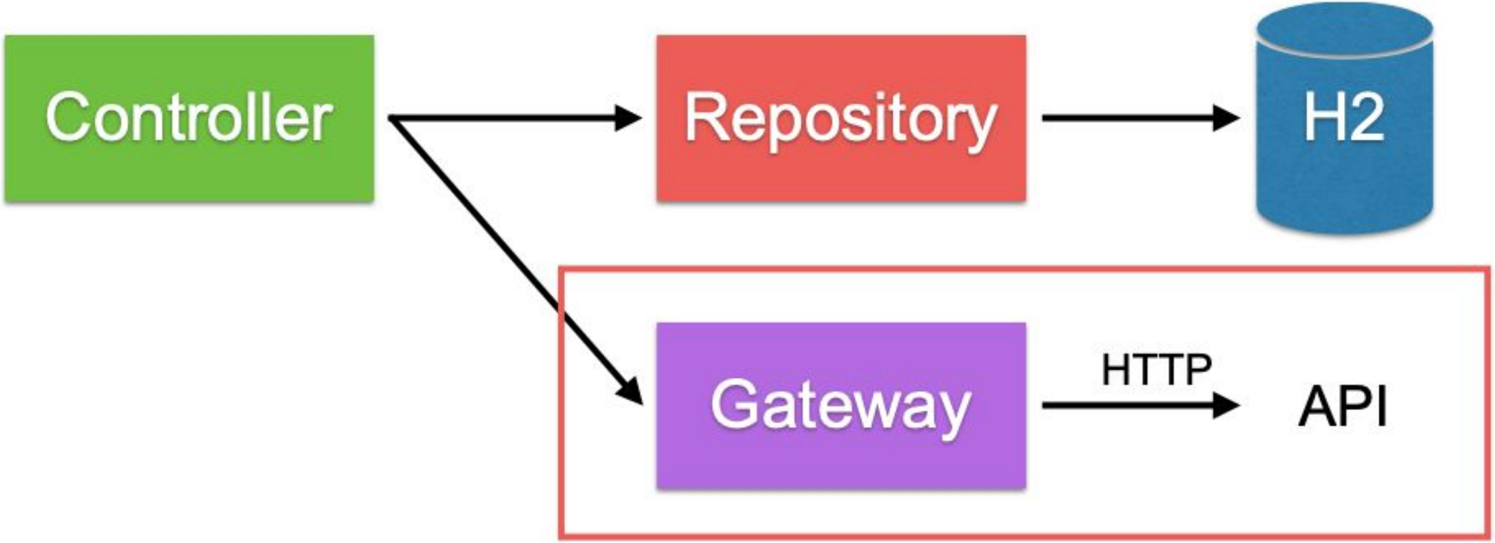


```
{
   timestamp: "2018-09-15T15:25:44.776+0000",
   message: "Account id=[2] not found",
   detail: "More detail"
}
```

Use case 2

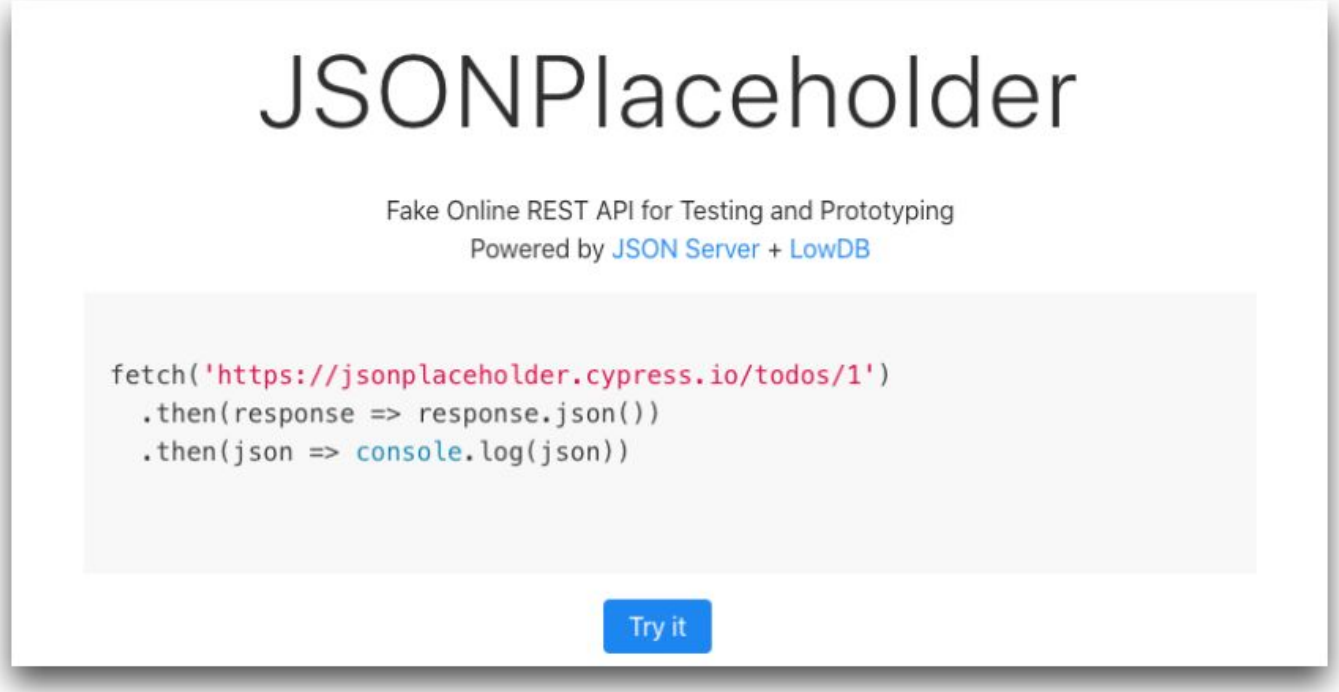
Use case 2

Working with API



JSON Place Holder

https://jsonplaceholder.cypress.io/posts/1

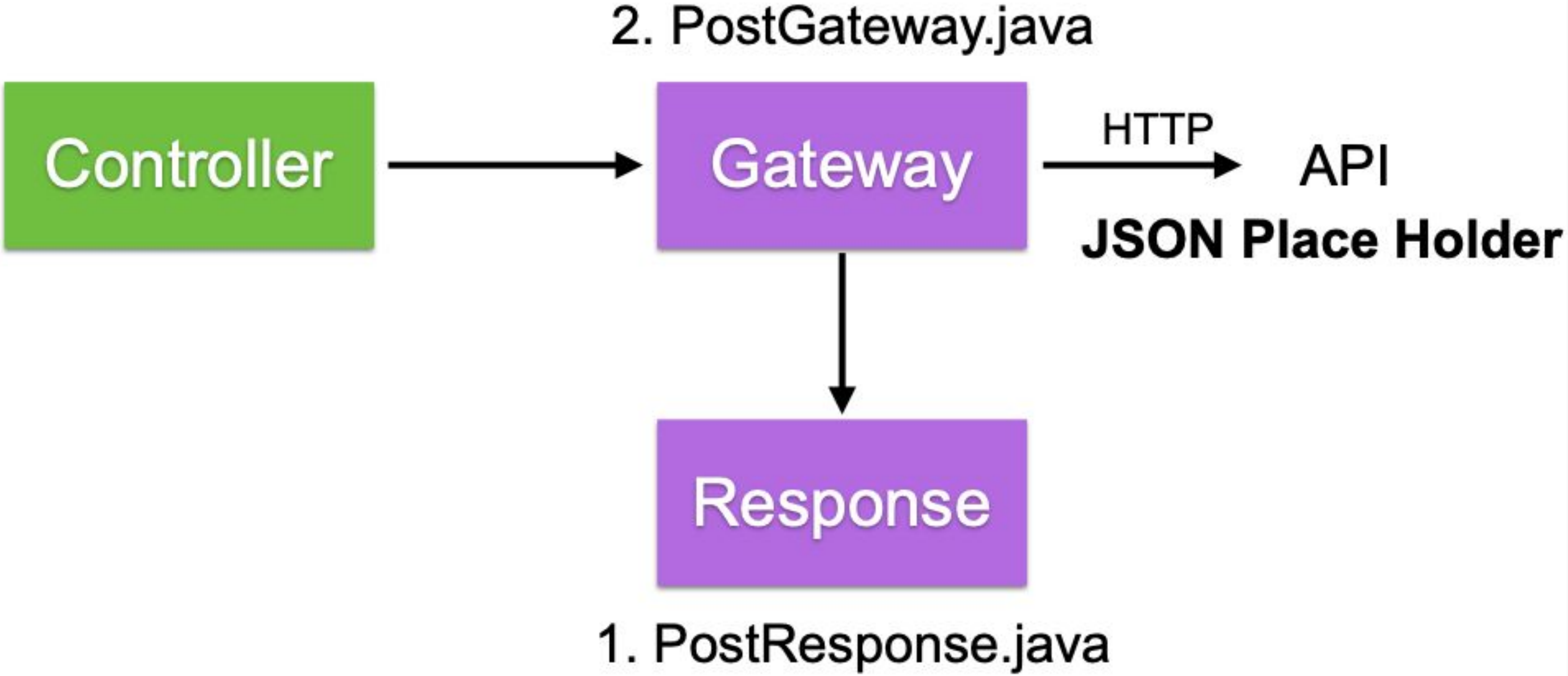


JSONPlaceholder

Fake Online REST API for Testing and Prototyping
Powered by JSON Server + LowDB

```
fetch('https://jsonplaceholder.cypress.io/todos/1')
  .then(response => response.json())
  .then(json => console.log(json))
```

Working with API



2. PostGateway.java

Controller

Gateway

HTTP

API

JSON Place Holder

Response

1. PostResponse.java

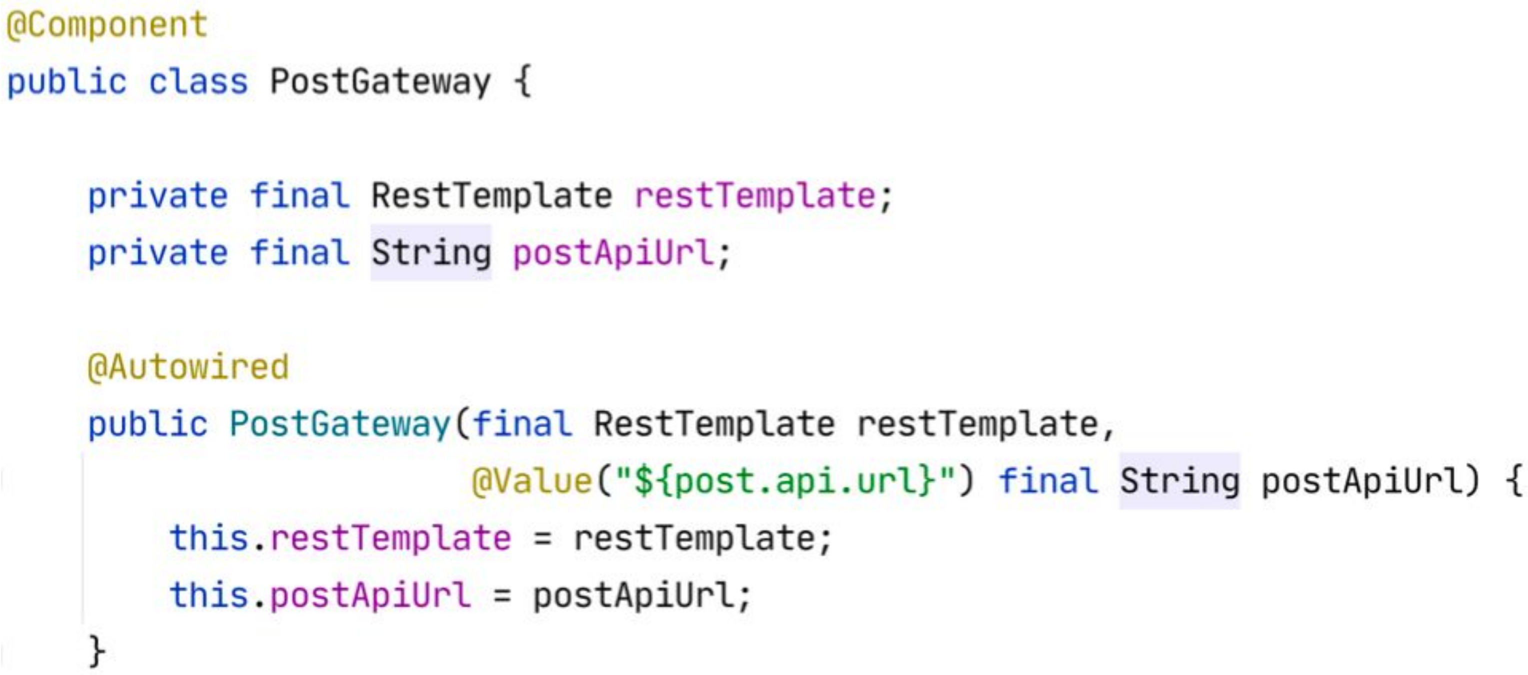
1. Create Response class

In package **post**

```
public class PostResponse {
    private int id;
    private int userId;
    private String title;
    private String body;
```

2. Create PostGateway class #1

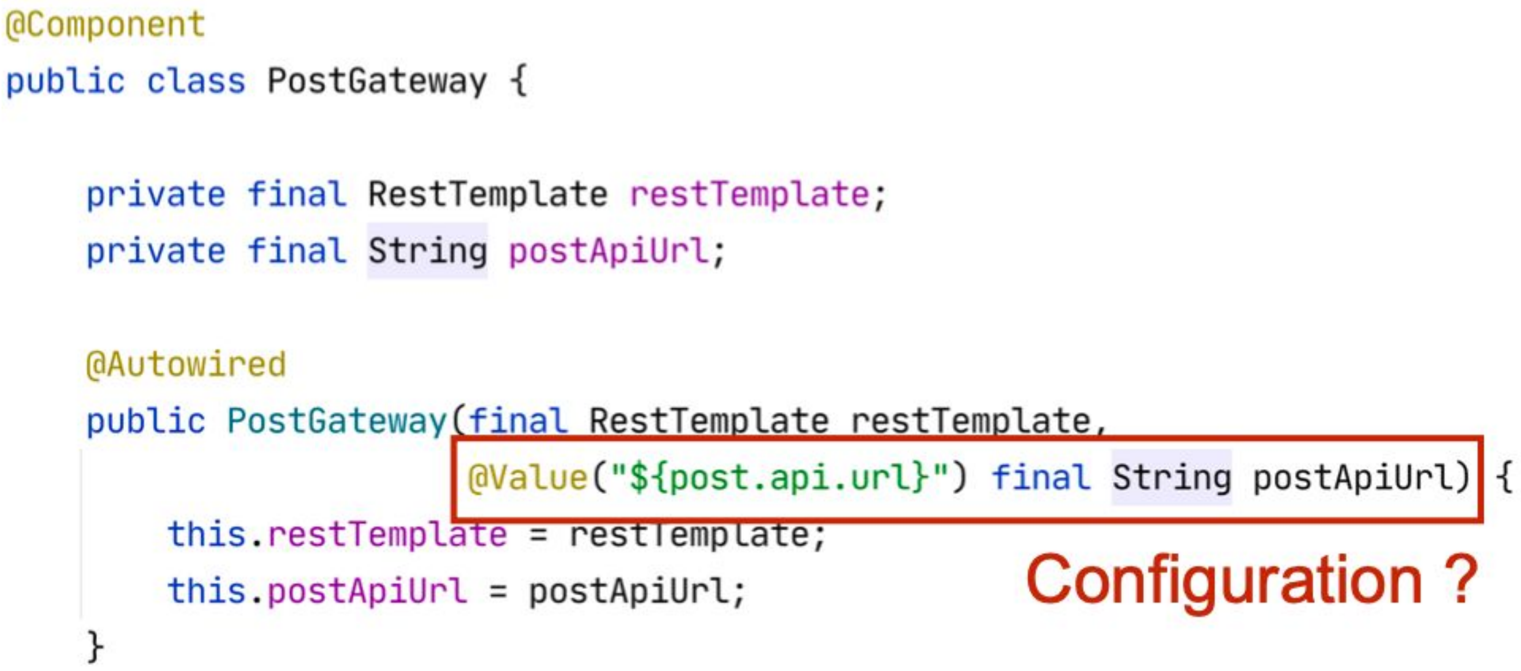
In package **post**



```
@Component
public class PostGateway {

    private final RestTemplate restTemplate;
    private final String postApiUrl;

    @Autowired
    public PostGateway(final RestTemplate restTemplate,
                       @Value("${post.api.url}") final String postApiUrl) {
        this.restTemplate = restTemplate;
        this.postApiUrl = postApiUrl;
    }
```

2. Create PostGateway class #1

In package **post**



```
@Component
public class PostGateway {

    private final RestTemplate restTemplate;
    private final String postApiUrl;

    @Autowired
    public PostGateway(final RestTemplate restTemplate,
                       @Value("${post.api.url}") final String postApiUrl) {
        this.restTemplate = restTemplate;
        this.postApiUrl = postApiUrl;
    }
```

Configuration ?

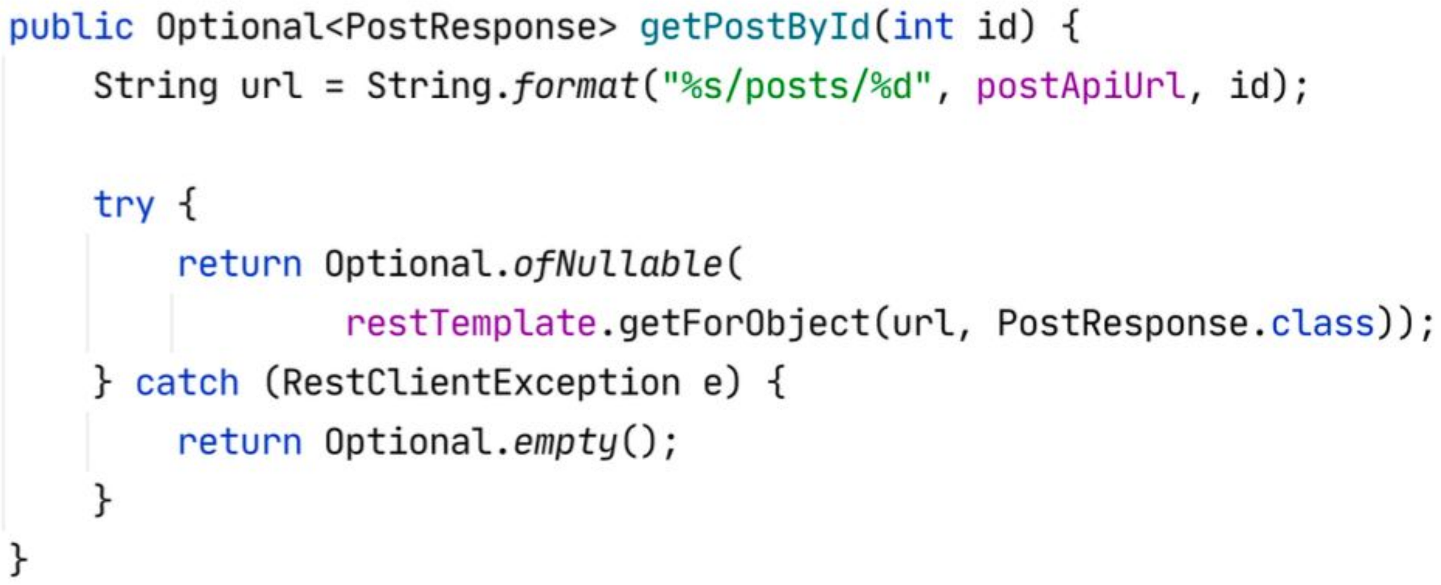
Configuration

Configuration in file application.properties

```
post.api.url=https://jsonplaceholder.cypress.io
```

2. Create PostGateway class #2

Get data from API



```
public Optional<PostResponse> getPostById(int id) {
    String url = String.format("%s/posts/%d", postApiUrl, id);

    try {
        return Optional.ofNullable(
                restTemplate.getForObject(url, PostResponse.class));
    } catch (RestClientException e) {
        return Optional.empty();
    }
}
```

Take a Group Shooting Photo