Spring Data REST in Spring Boot

Spring Data JPA

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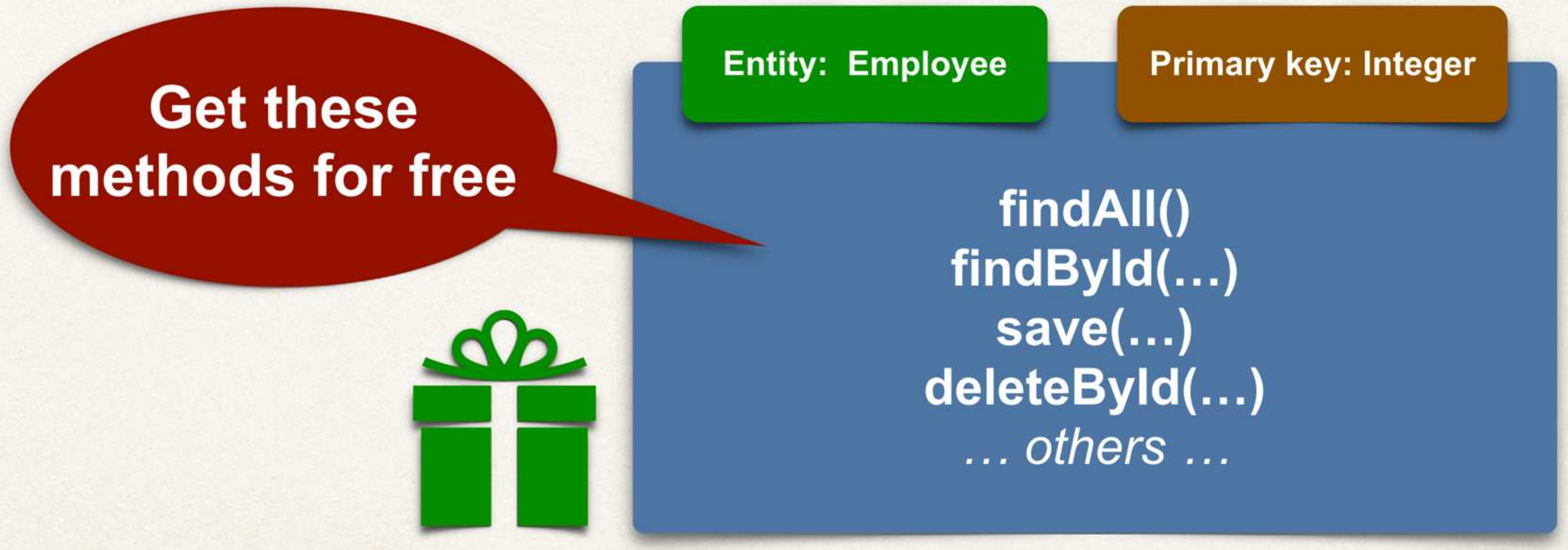

Get these methods for free

Entity: Employee

Primary key: Integer

findAll()
findById(…)
save(…)
deleteById(…)
… others …

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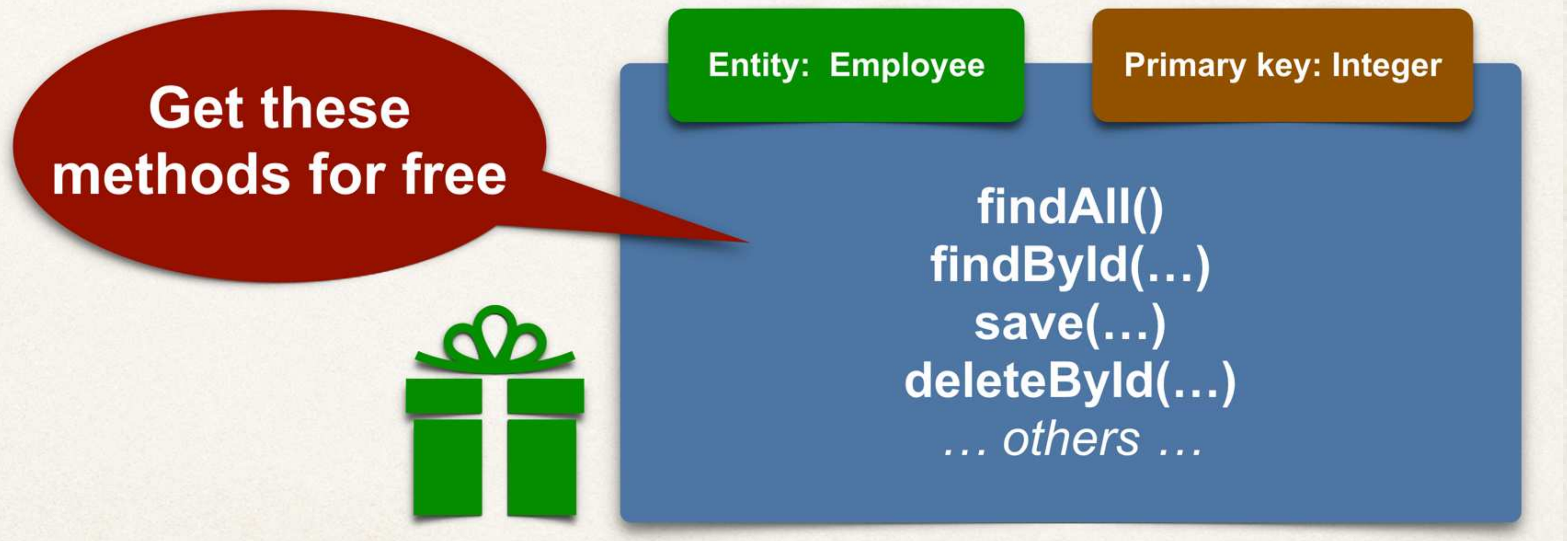

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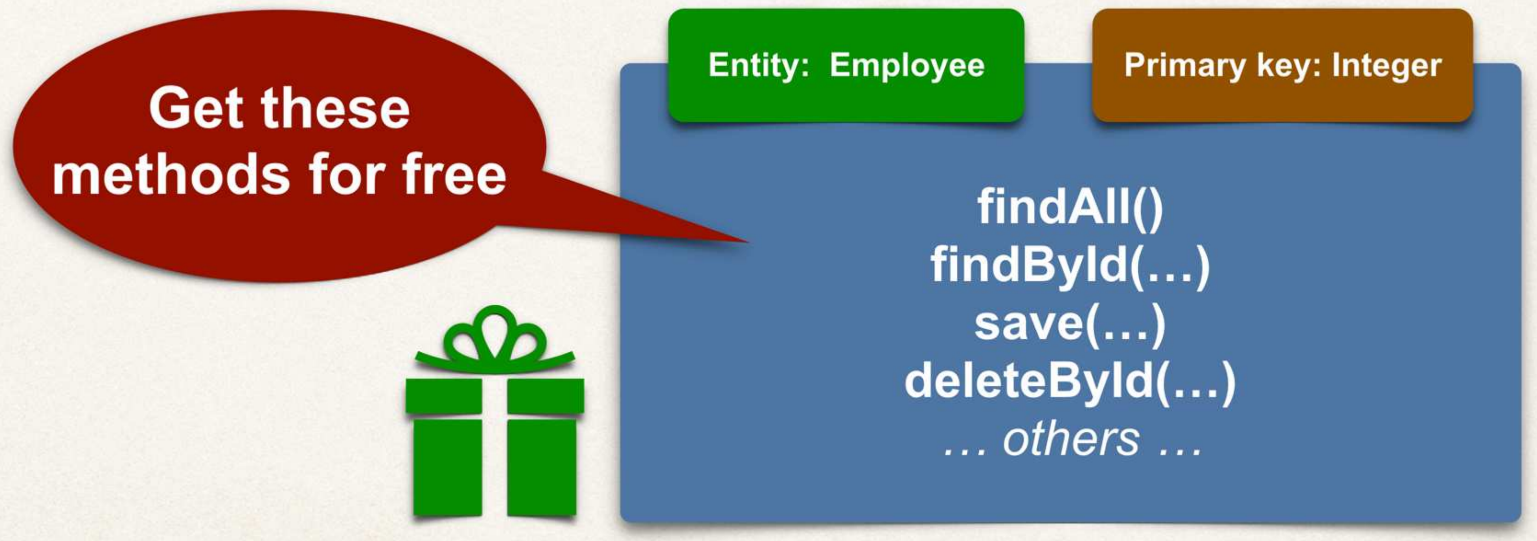

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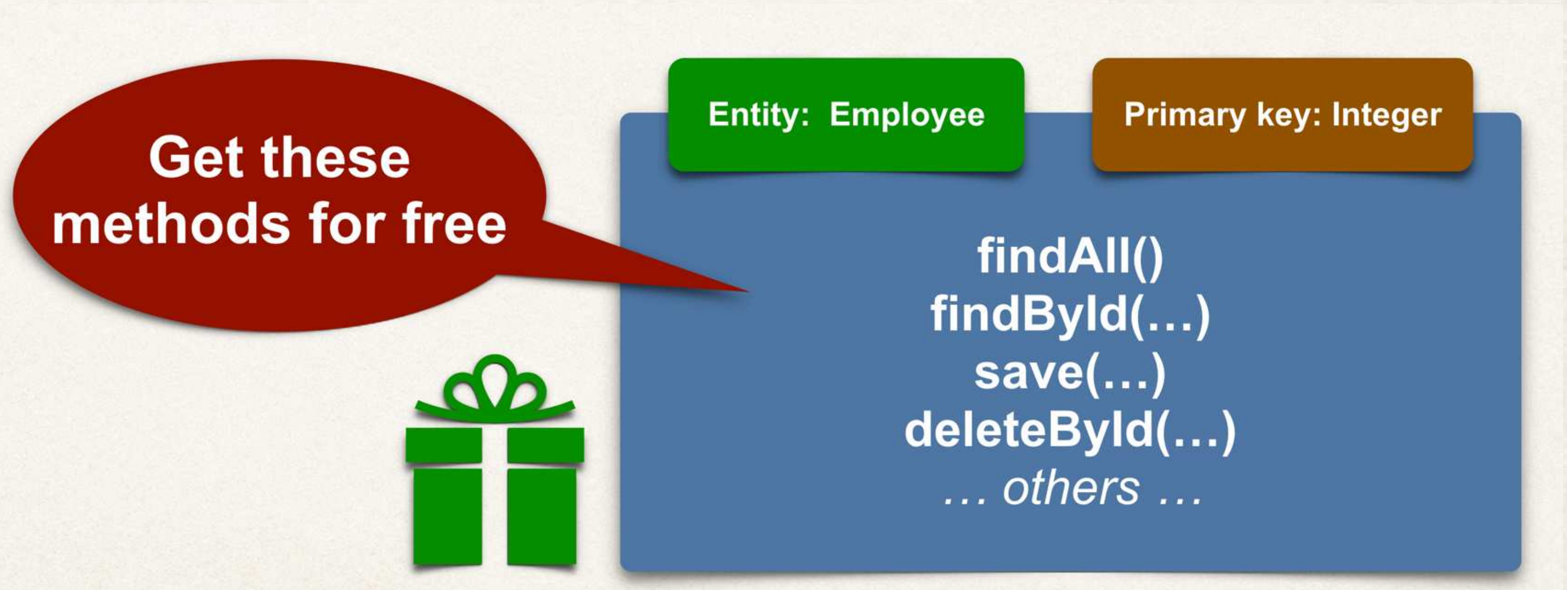

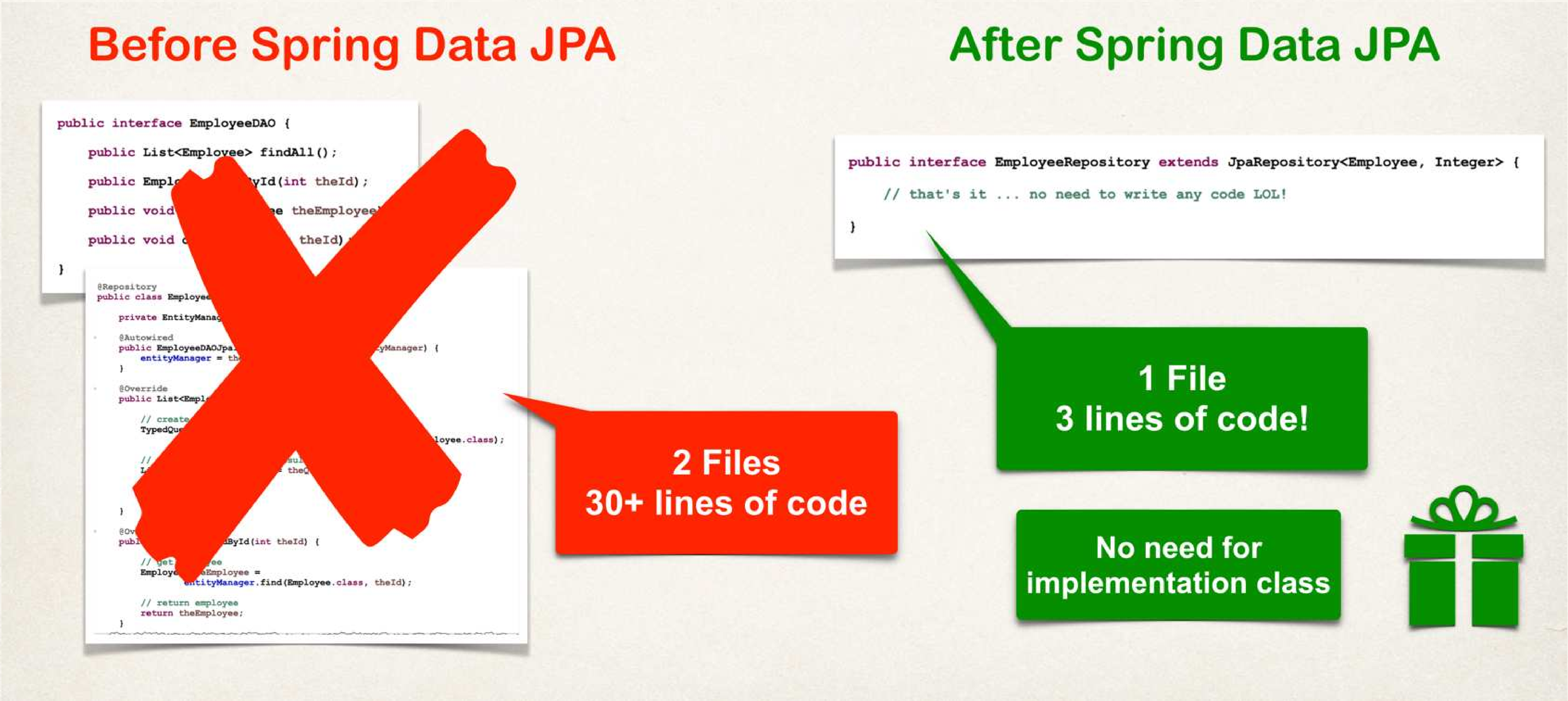

```java
public interface EmployeeRepository extends JpaRepository<Employee, Integer> {

    // that's it ... no need to write any code LOL!

}
```

Hmmm …

Can this apply to REST APIs?

The Problem

The Problem

- We saw how to create a REST API for `Employee`

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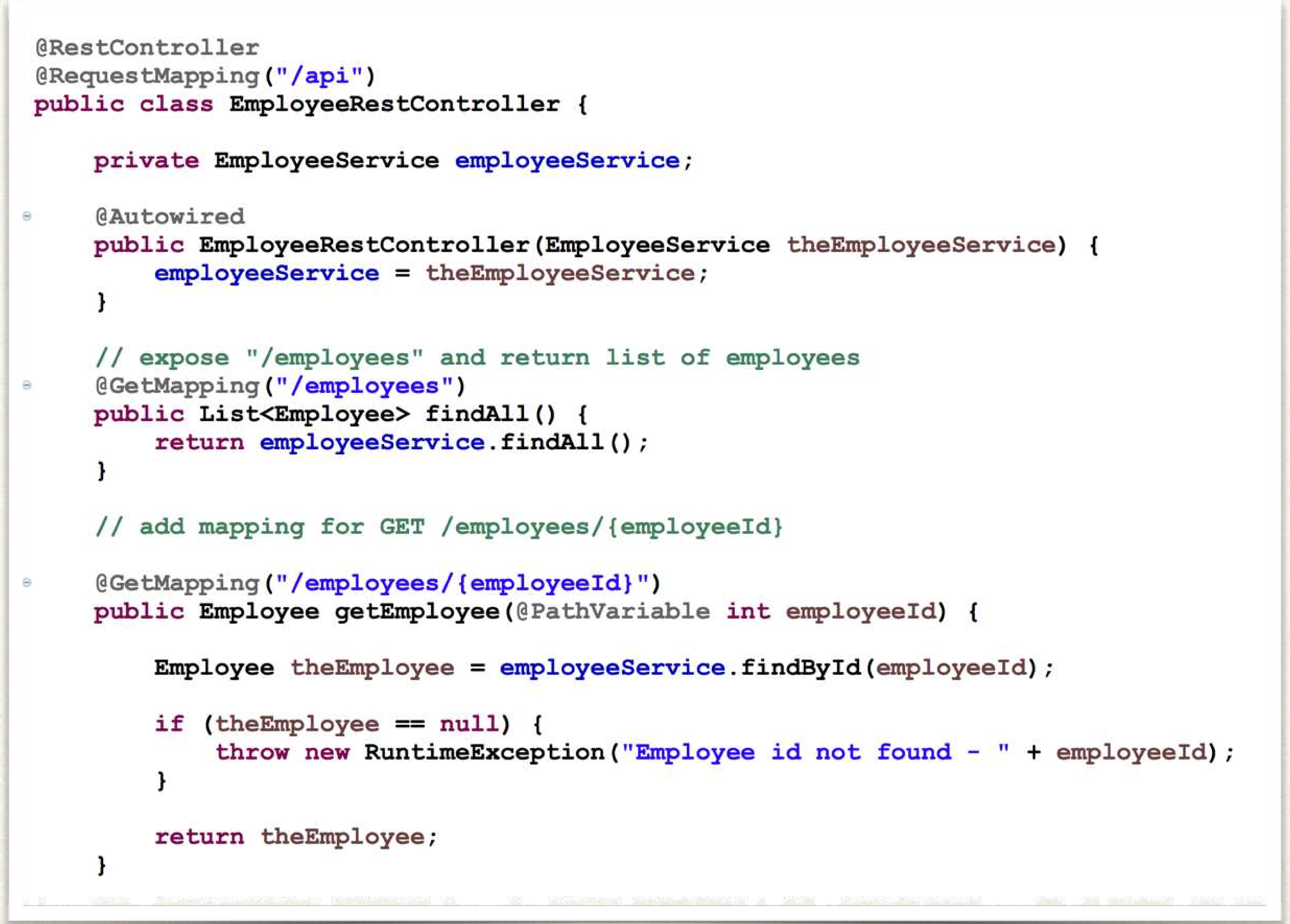

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@RequestMapping("/api")
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    private EmployeeService employeeService;

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    public EmployeeRestController(EmployeeService theEmployeeService) {
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        Employee theEmployee = employeeService.findById(employeeId);

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        return theEmployee;
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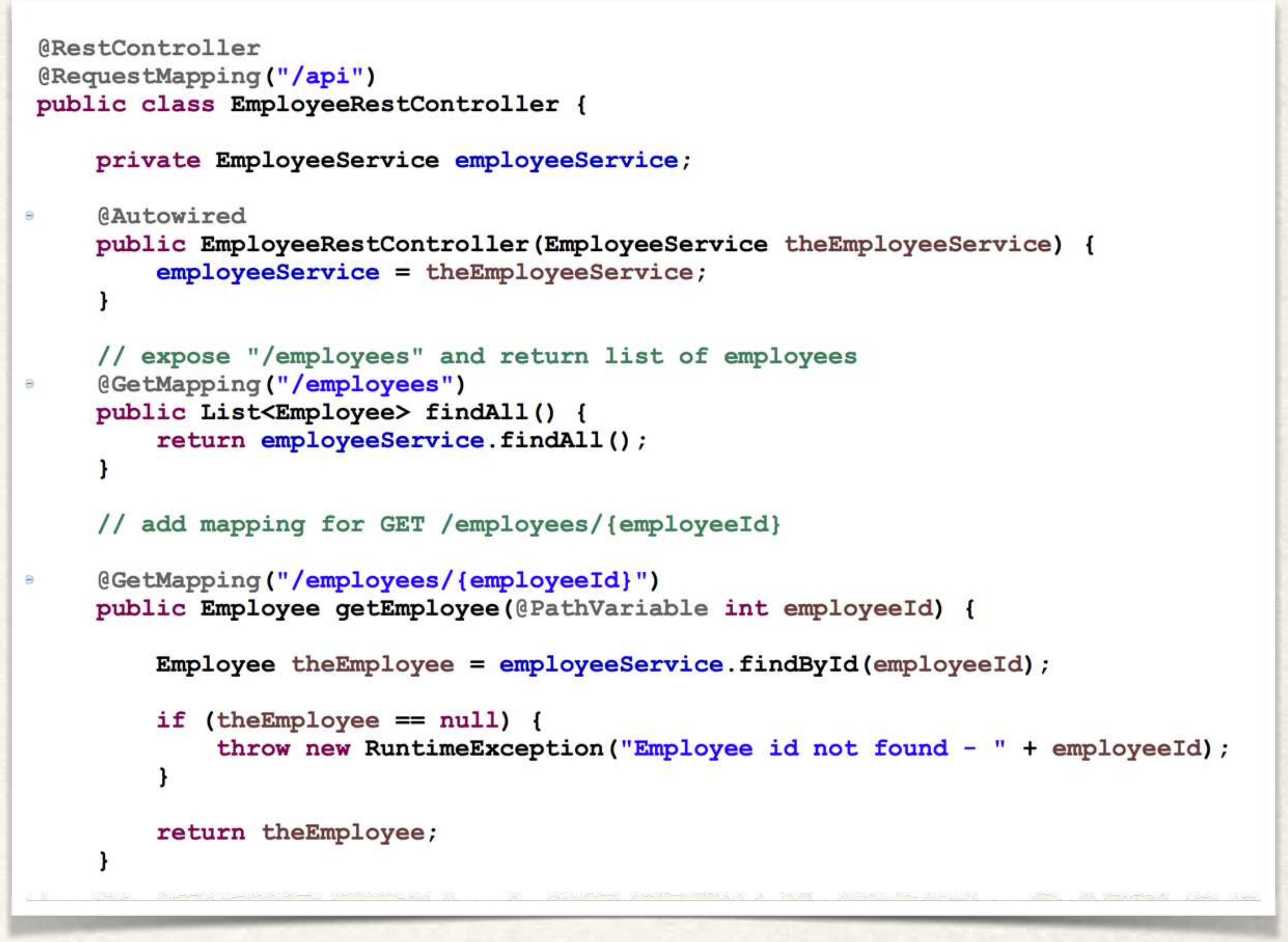

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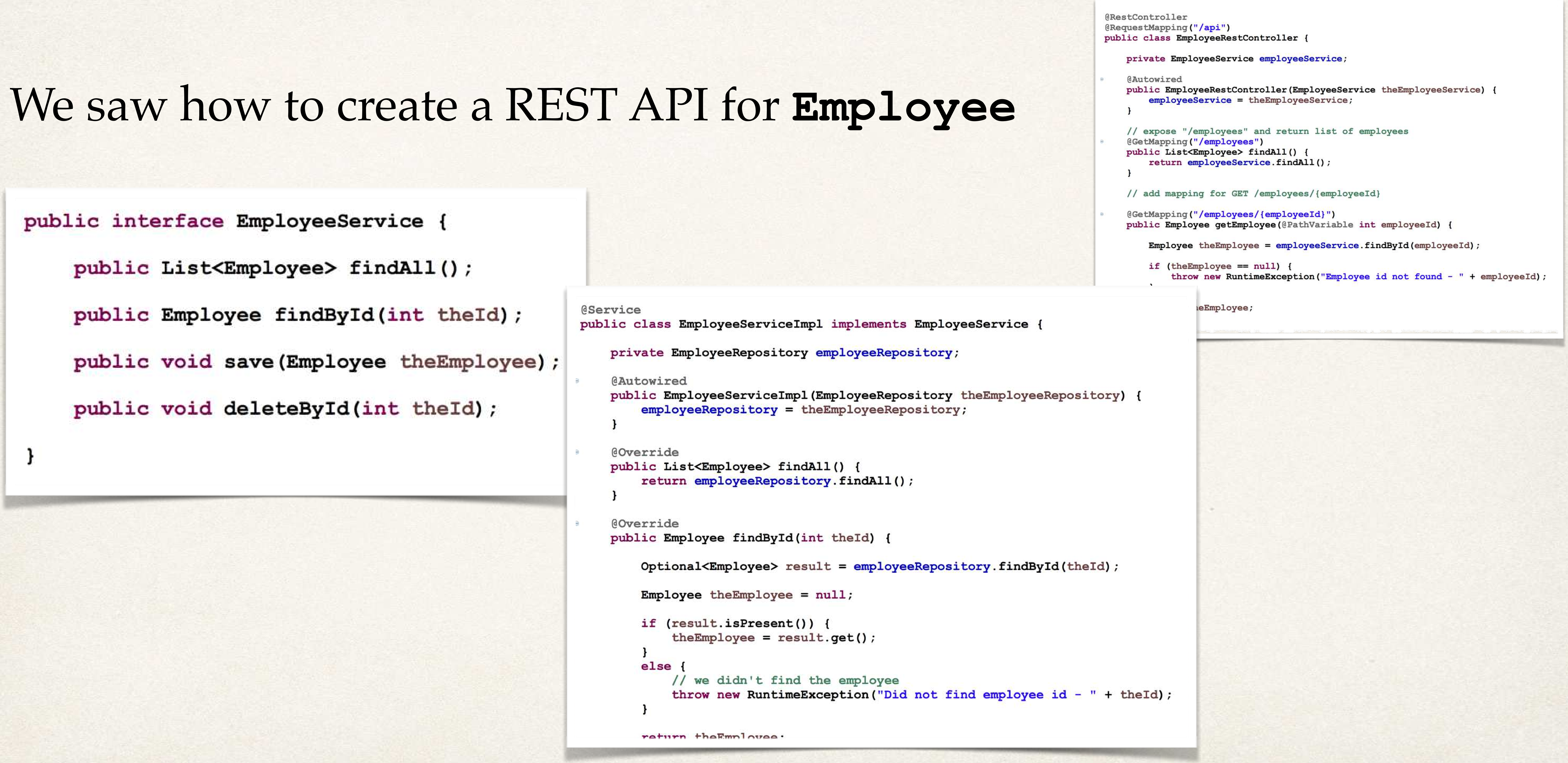

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public interface EmployeeService {

    public List<Employee> findAll();

    public Employee findById(int theId);

    public void save(Employee theEmployee);

    public void deleteById(int theId);

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@Service
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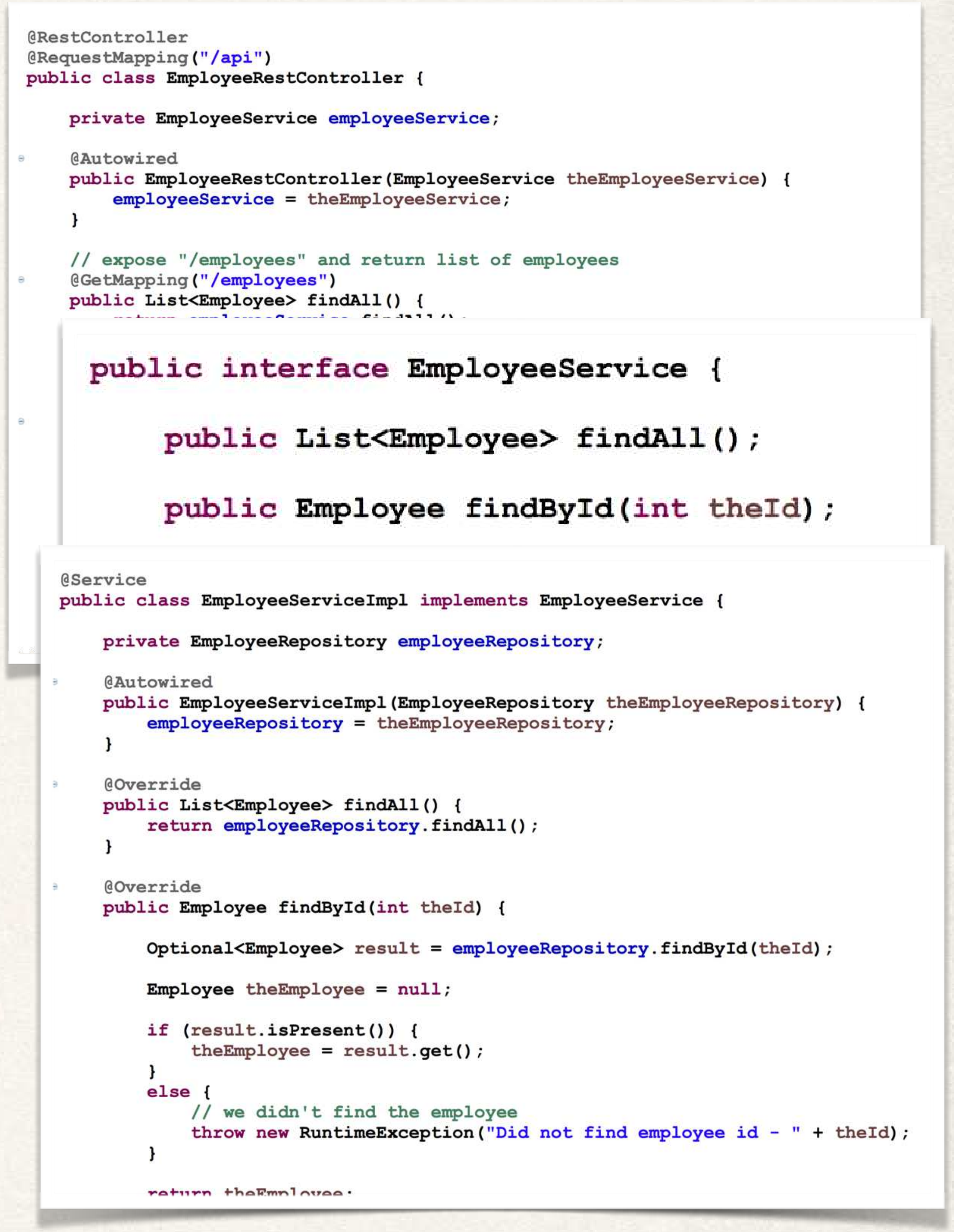

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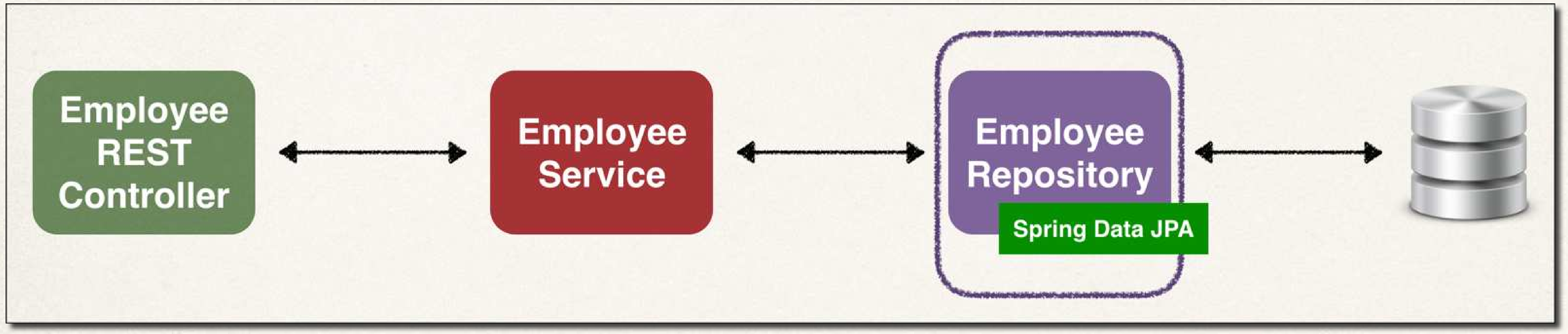

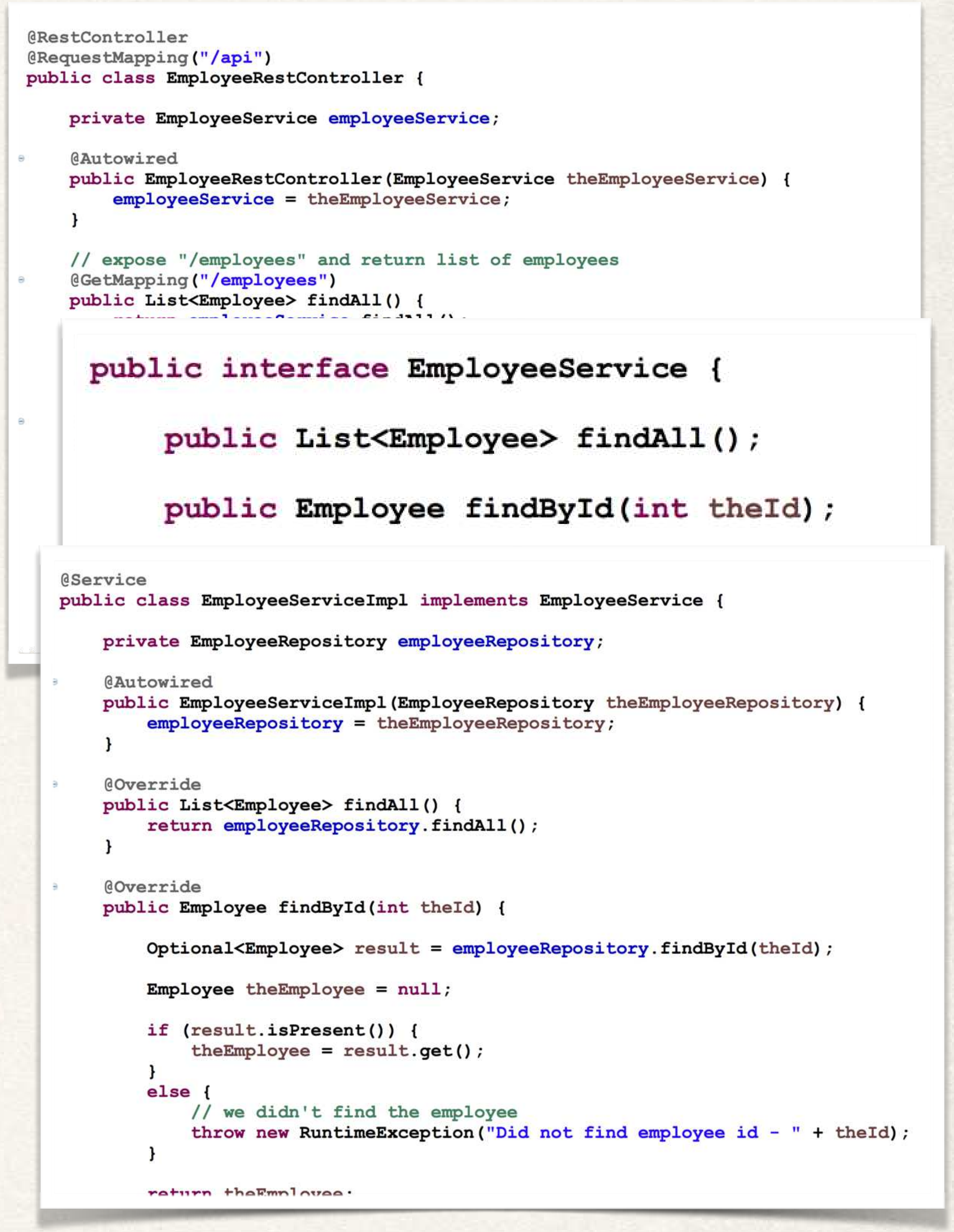

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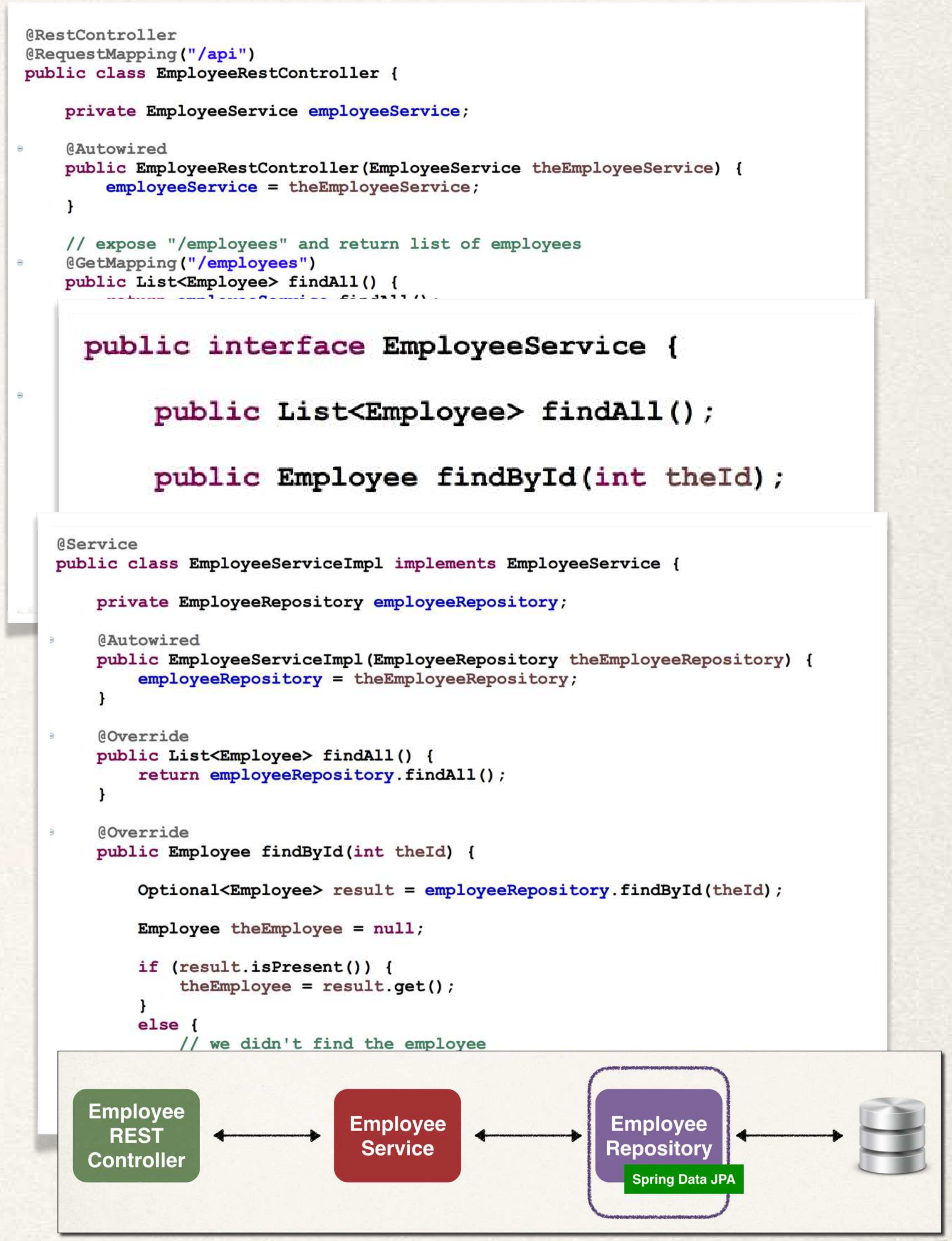

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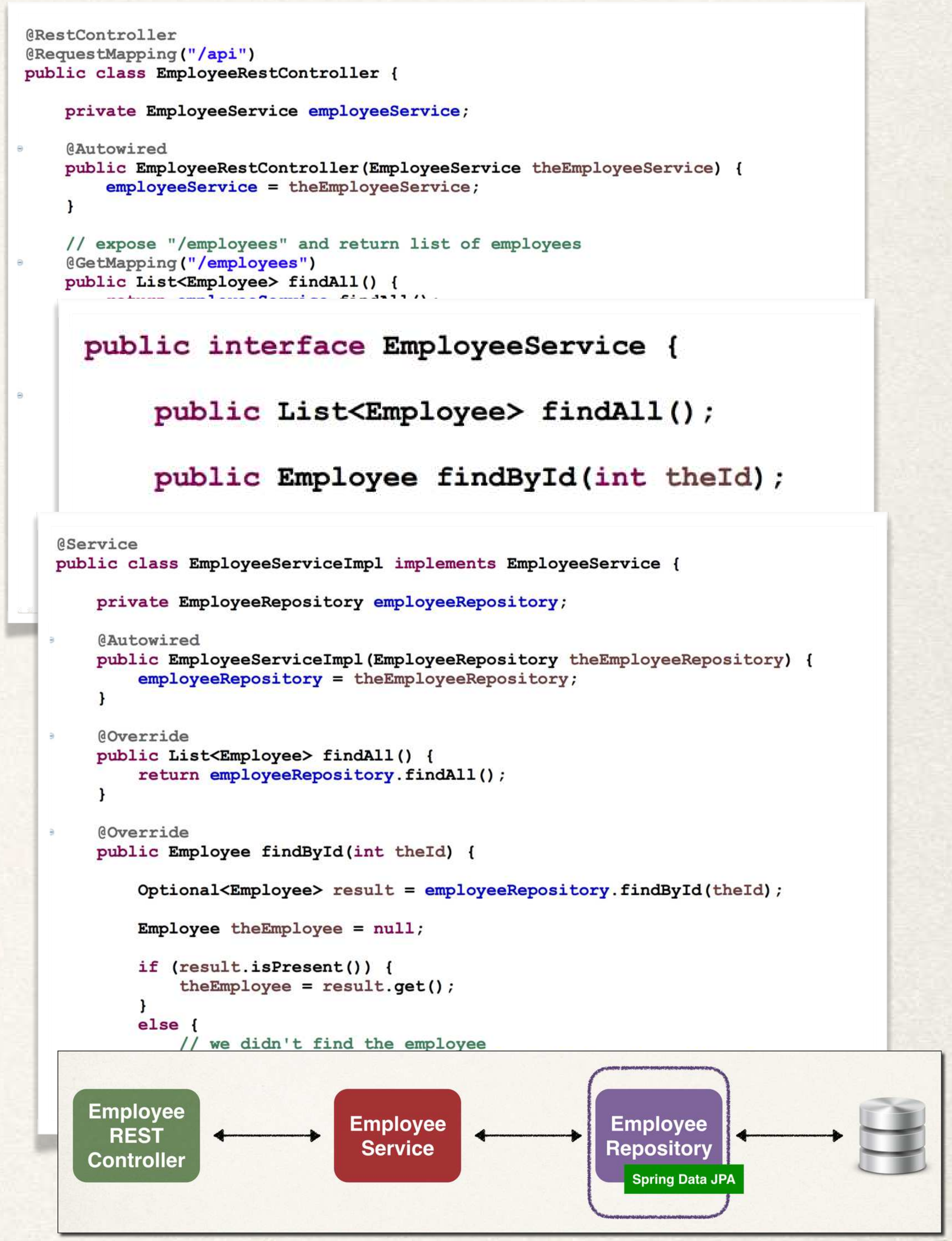

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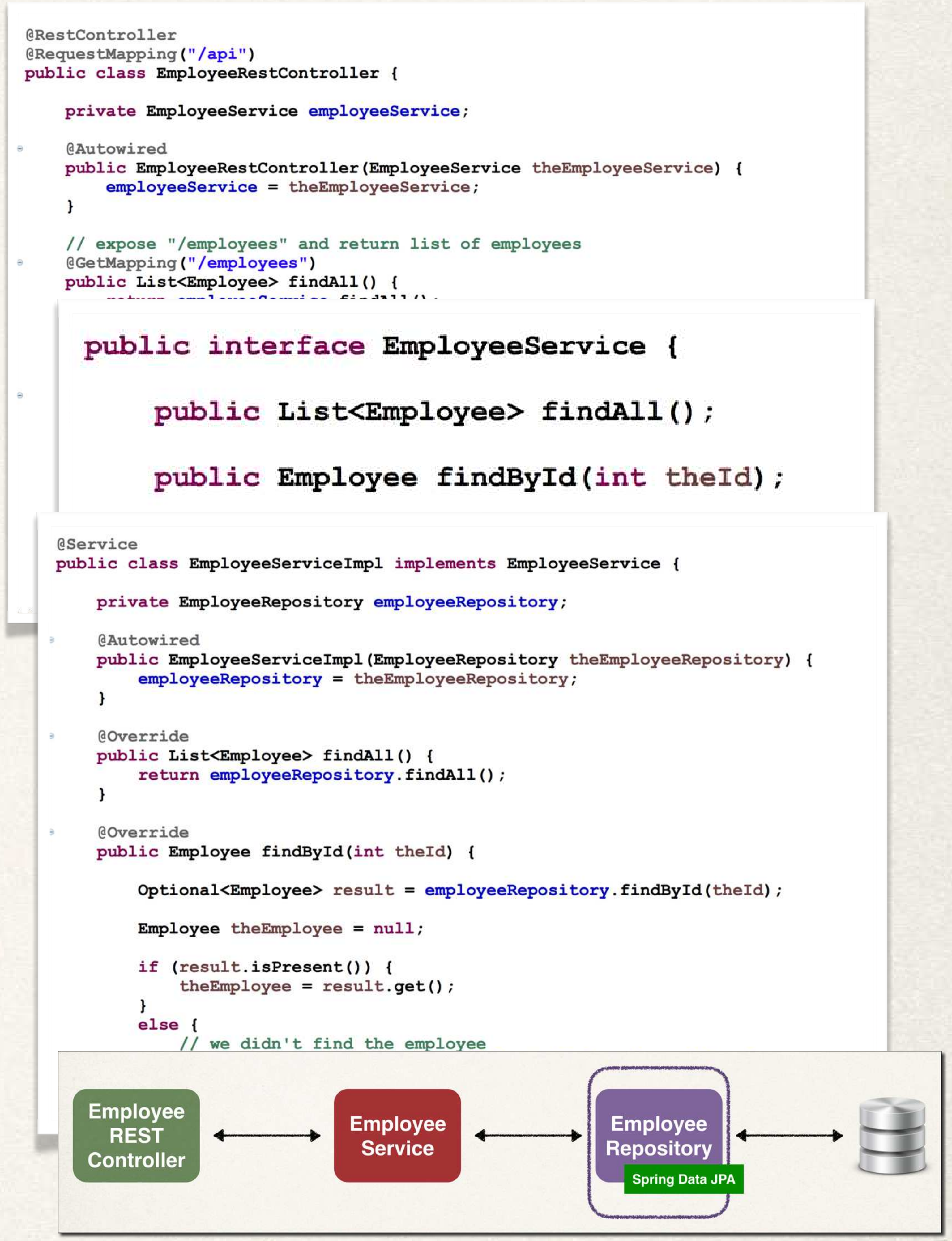
  - **`Customer`**, **`Student`**, **`Product`**, **`Book`** …



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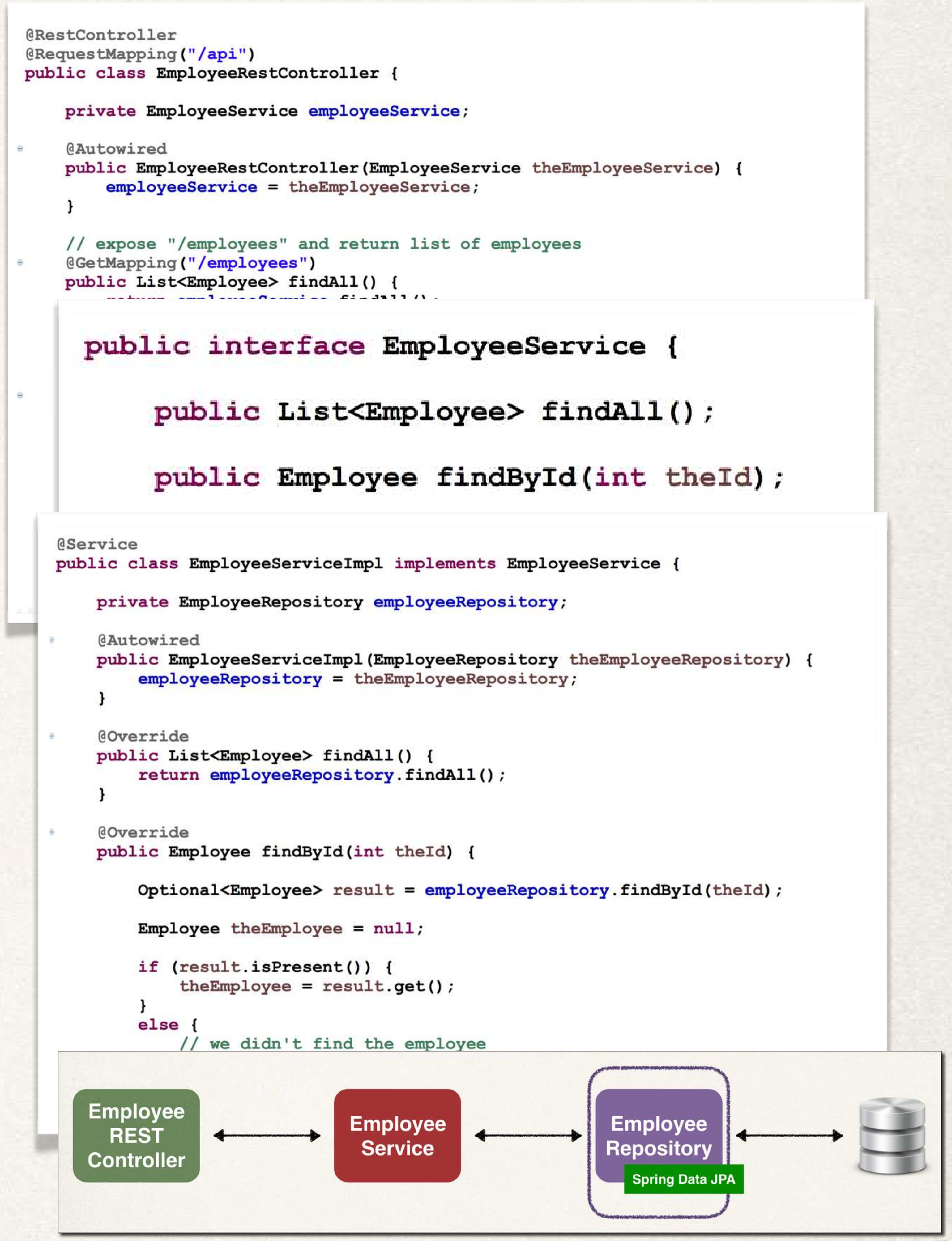
- Do we have to repeat all of the same code again???



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Give me all of the basic REST API CRUD features for free

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  - Helps to minimize boiler-plate REST code!!!
  - No new coding required!!!

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POST	/employees	Create a new employee
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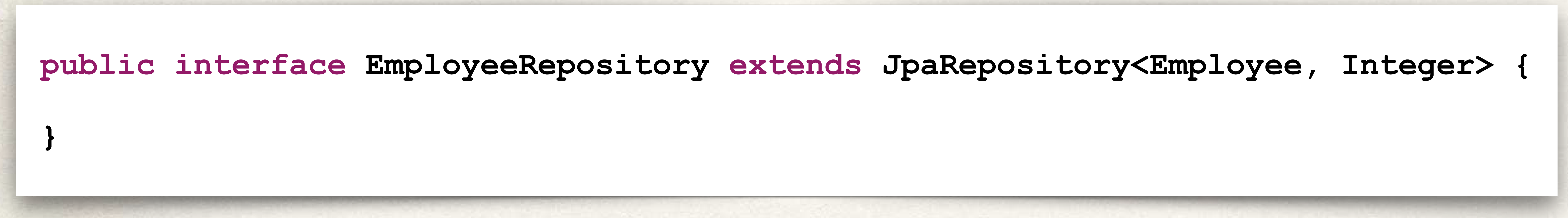

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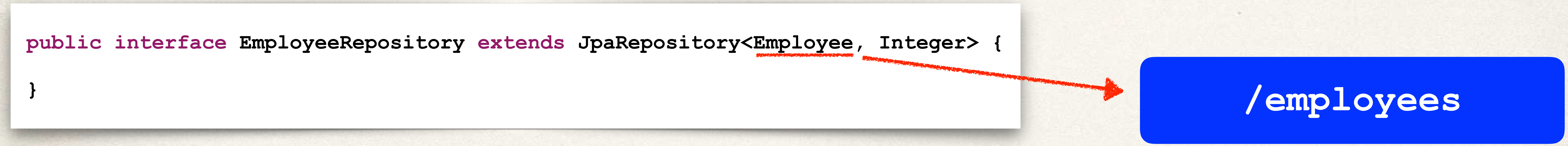

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/employees

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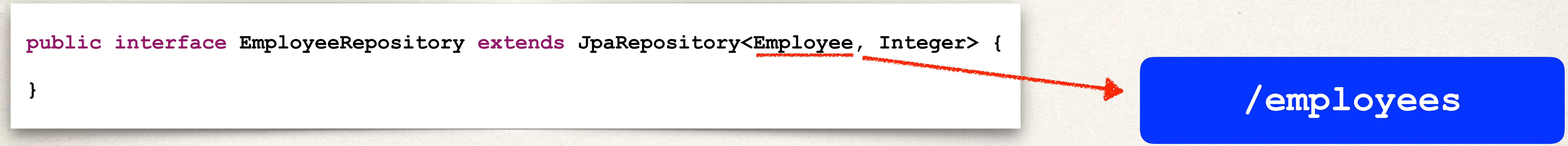
More on plural forms in later video



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Development Process

Step-By-Step

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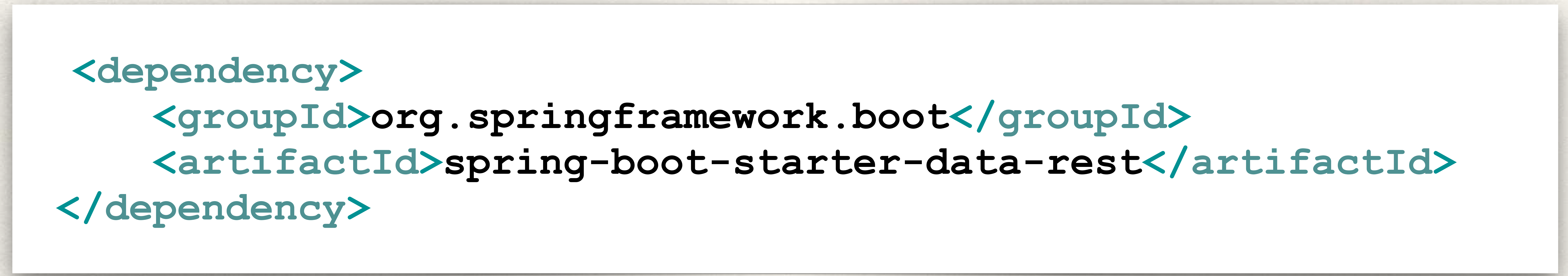

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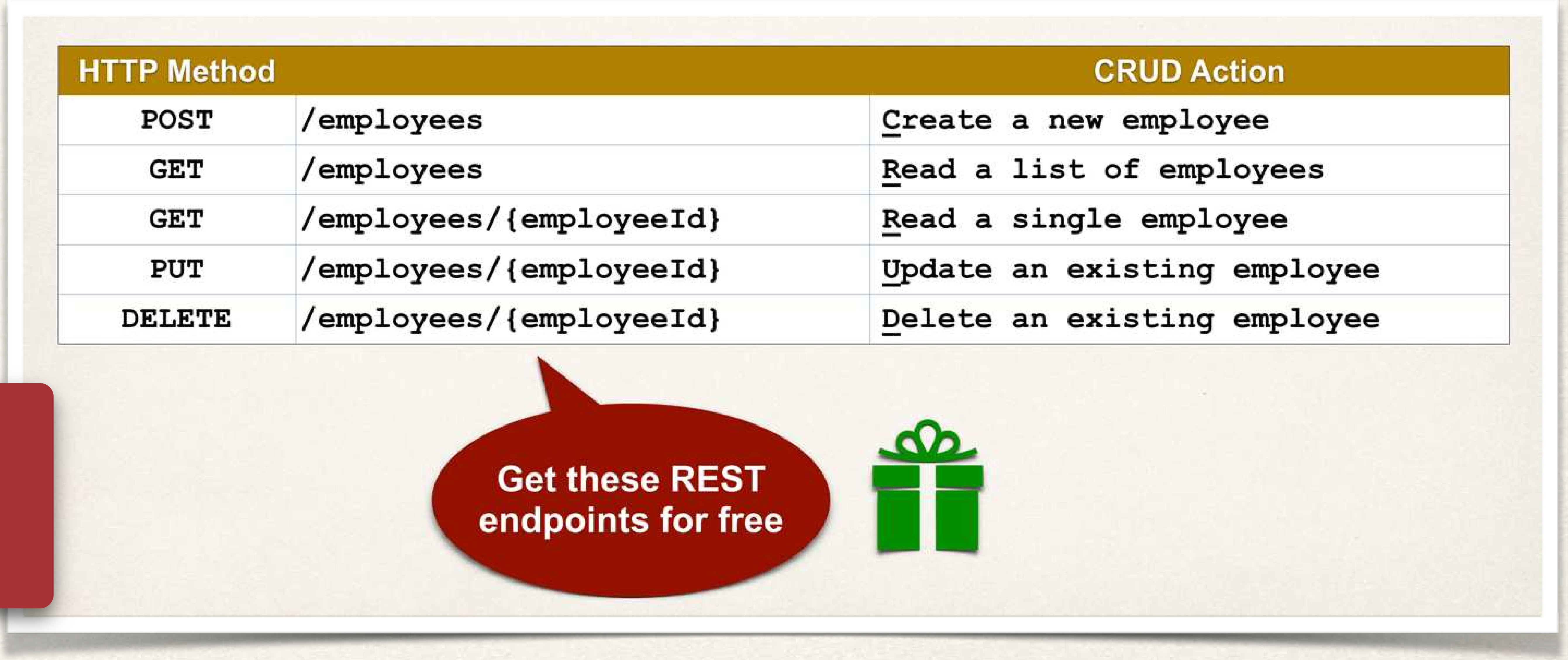

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We already have these two

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Only item that is new

Application Architecture

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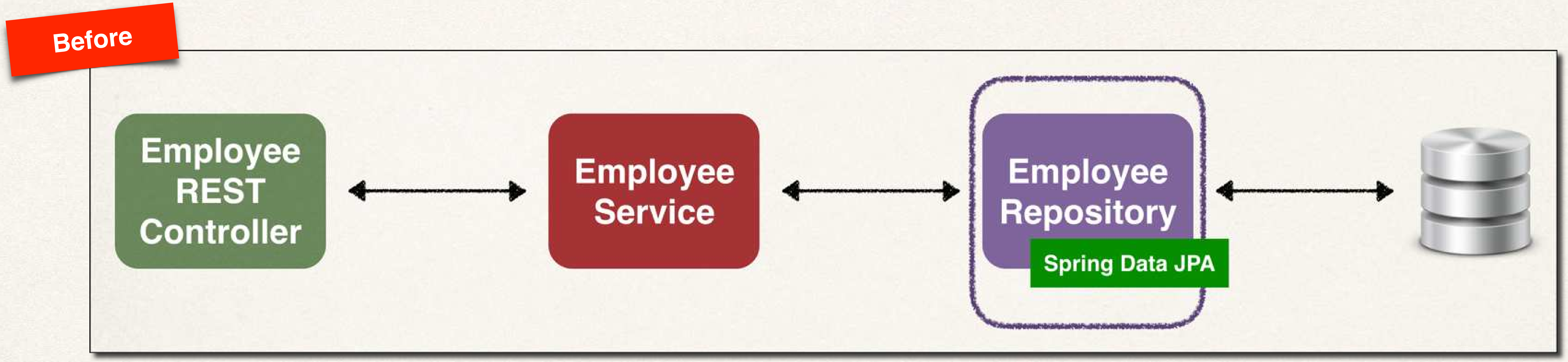

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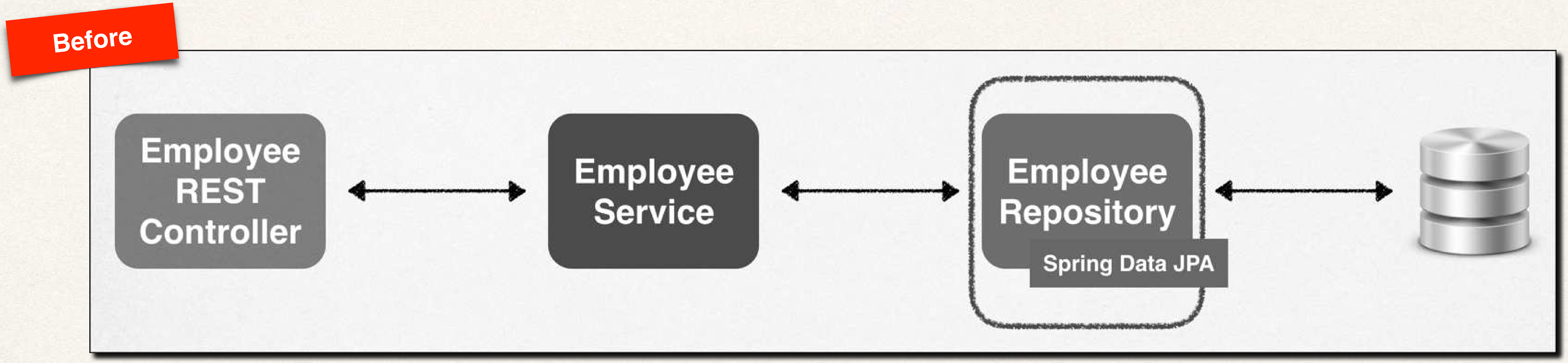
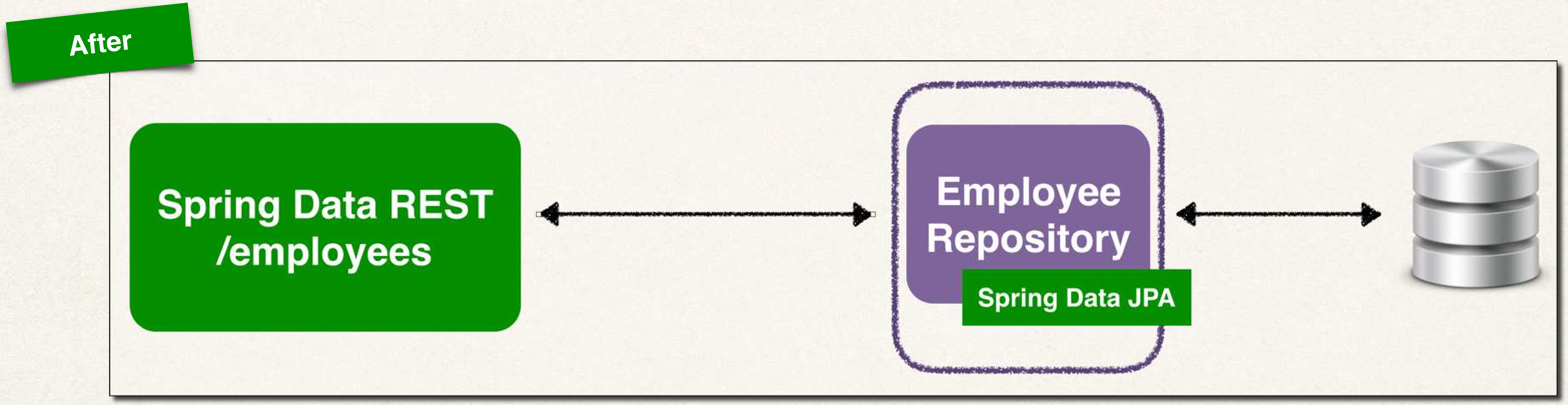
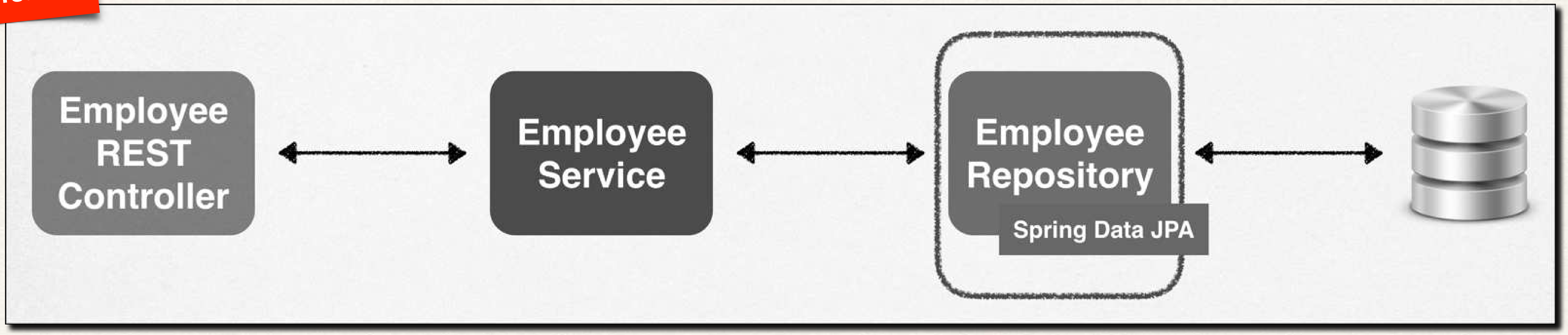


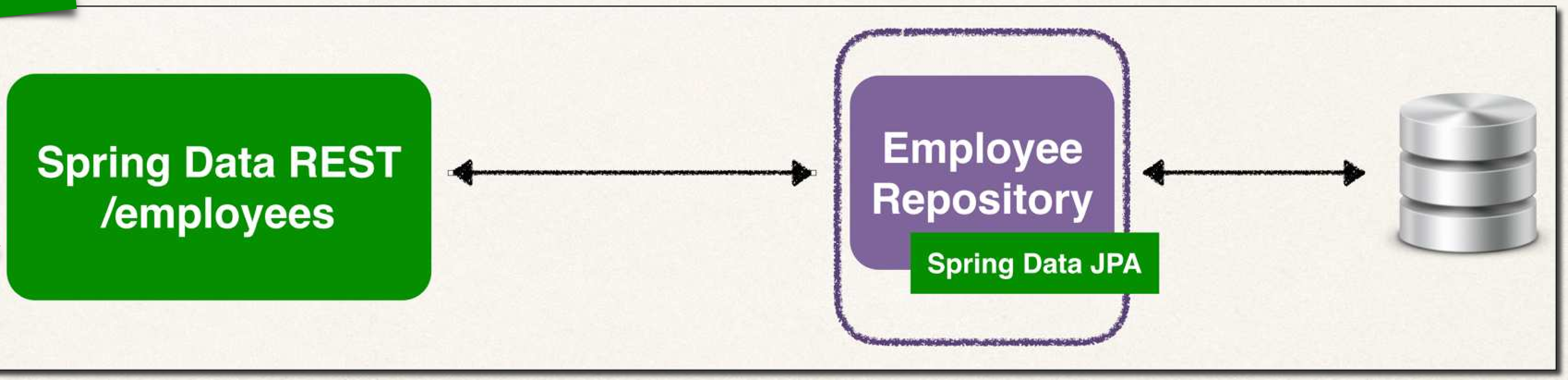


Application Architecture

Before

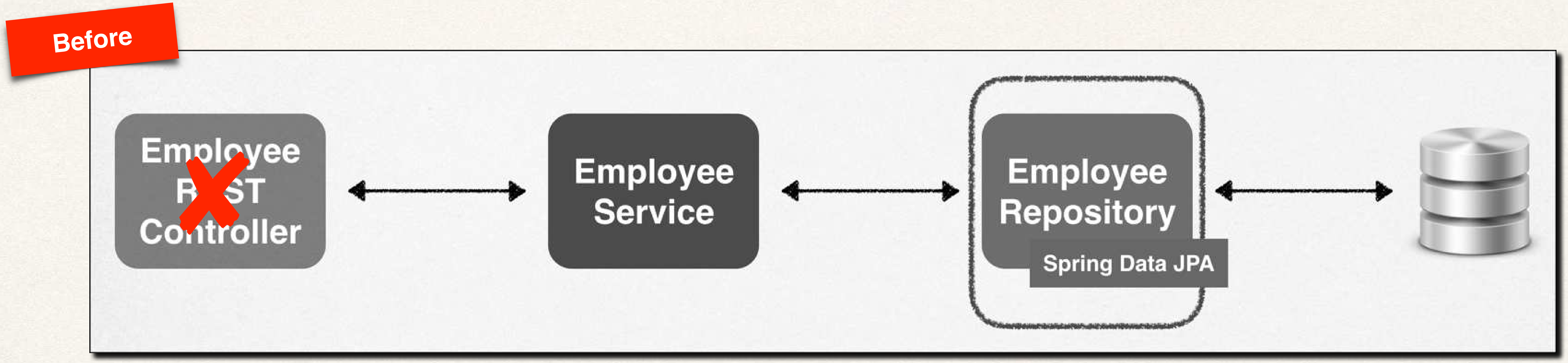


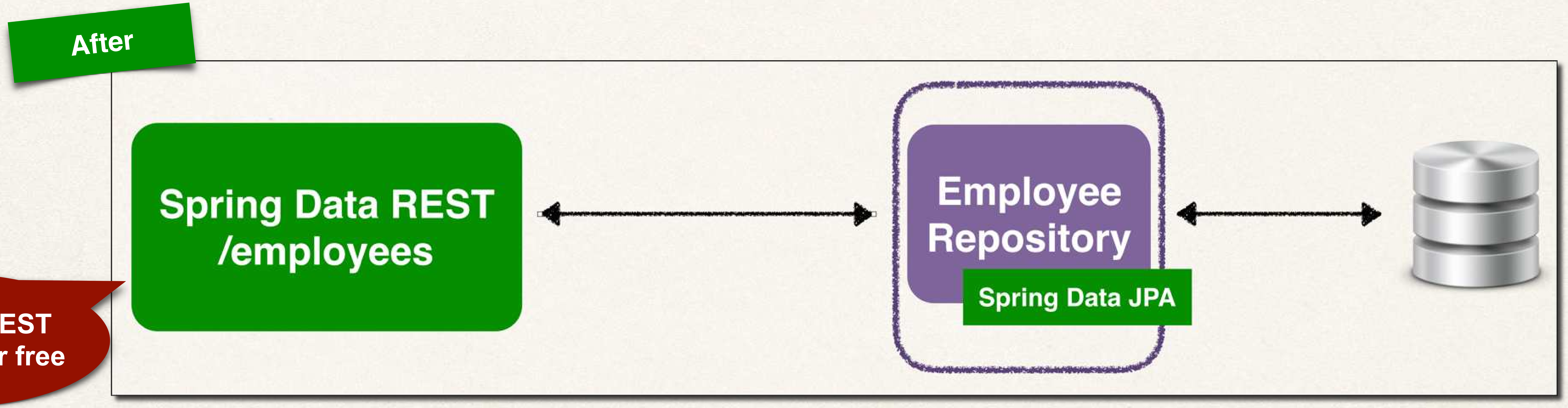
After



Get these REST endpoints for free

Application Architecture





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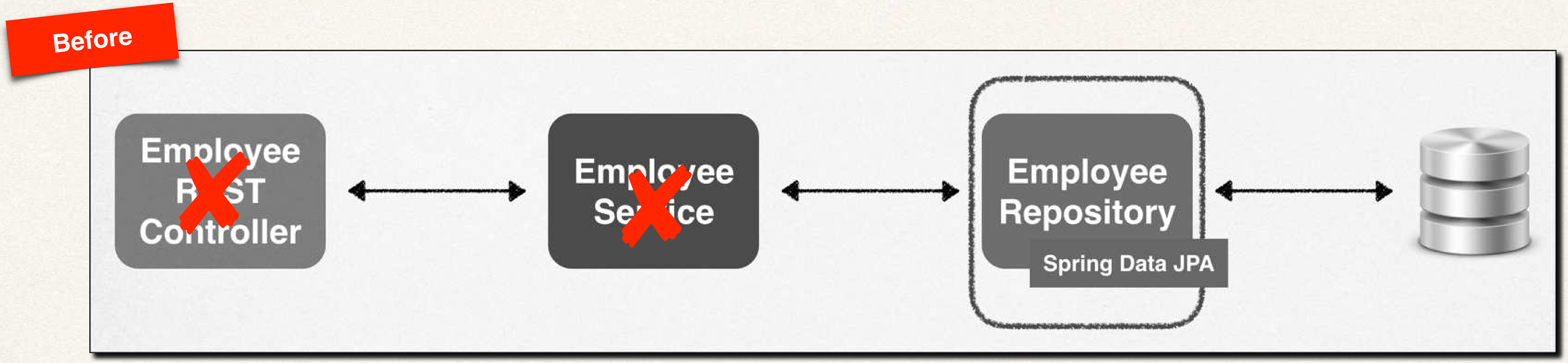

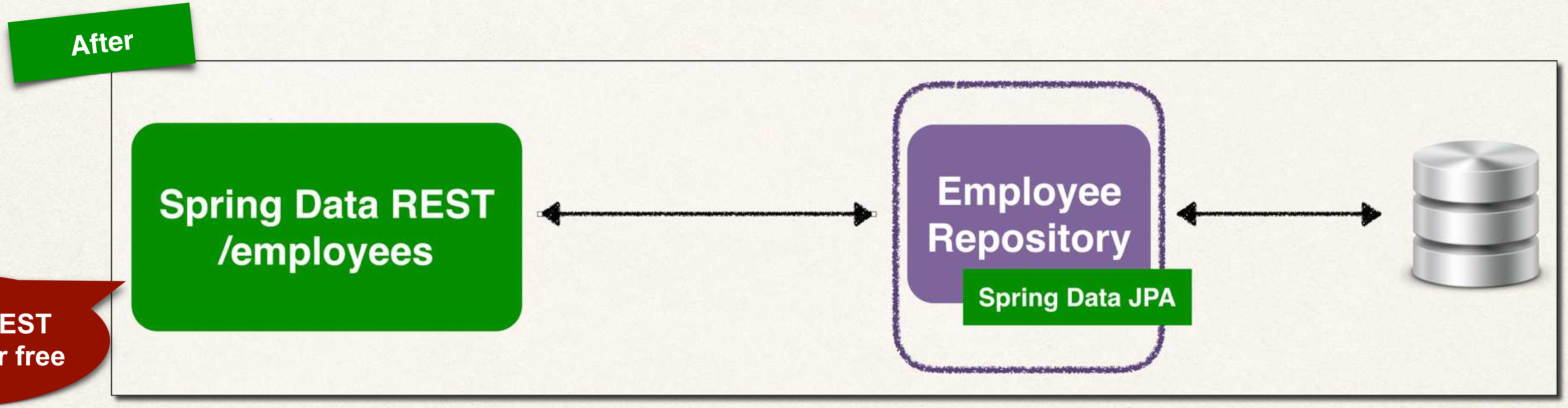

Get these REST endpoints for free

Minimized Boilerplate Code

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Before Spring Data REST

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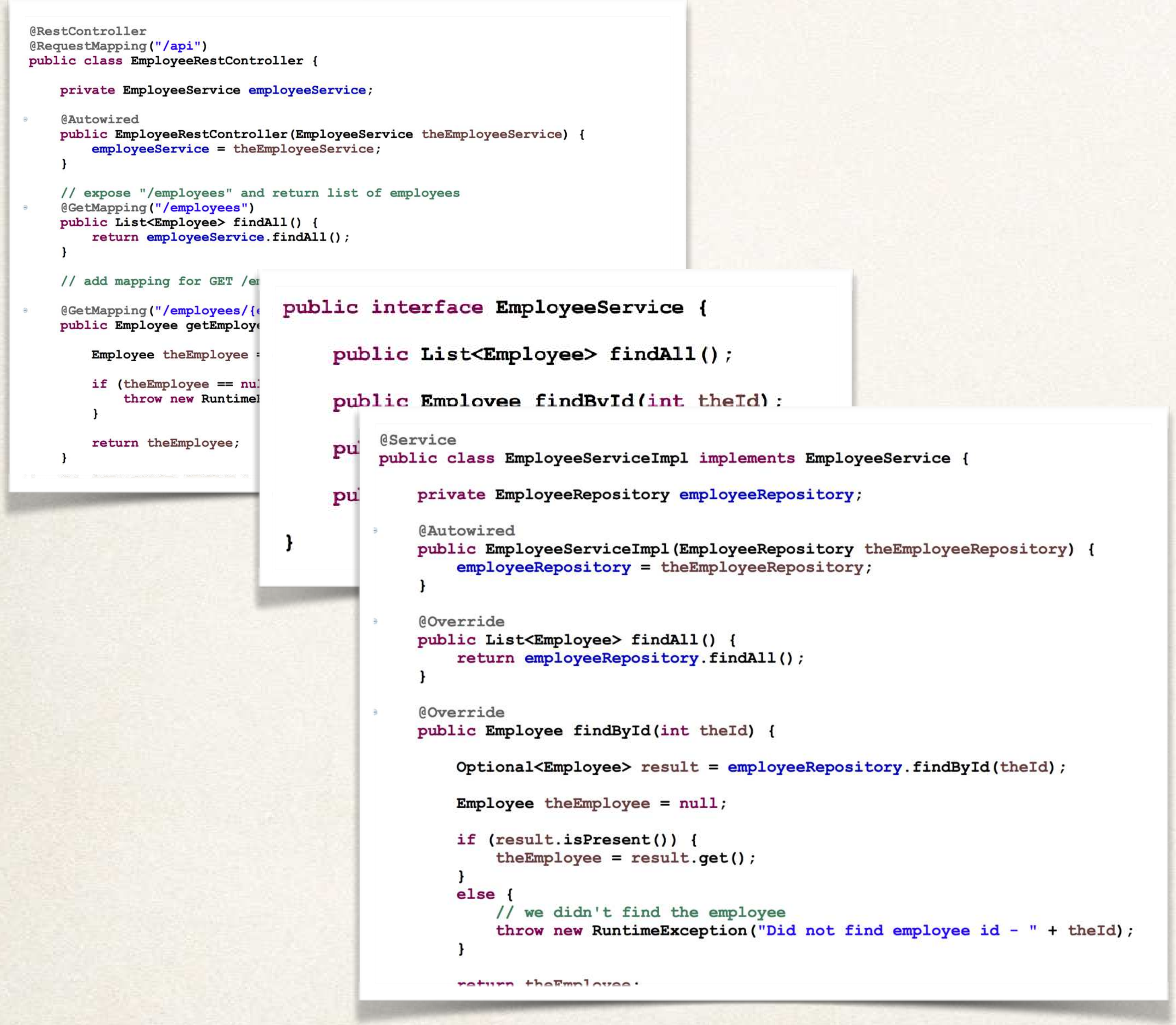

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@RestController
@RequestMapping("/api")
public class EmployeeRestController {

    private EmployeeService employeeService;

    @Autowired
    public EmployeeRestController(EmployeeService theEmployeeService) {
        employeeService = theEmployeeService;
    }

    // expose "/employees" and return list of employees
    @GetMapping("/employees")
    public List<Employee> findAll() {
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    }

    // add mapping for GET /er

    @GetMapping("/employees/{
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        Employee theEmployee =

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        }

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    }
```

```
public interface EmployeeService {

    public List<Employee> findAll();

    public Employee findById(int theId);

    pu

    pu

}
```

```
@Service
public class EmployeeServiceImpl implements EmployeeService {

    private EmployeeRepository employeeRepository;

    @Autowired
    public EmployeeServiceImpl(EmployeeRepository theEmployeeRepository) {
        employeeRepository = theEmployeeRepository;
    }

    @Override
    public List<Employee> findAll() {
        return employeeRepository.findAll();
    }

    @Override
    public Employee findById(int theId) {

        Optional<Employee> result = employeeRepository.findById(theId);

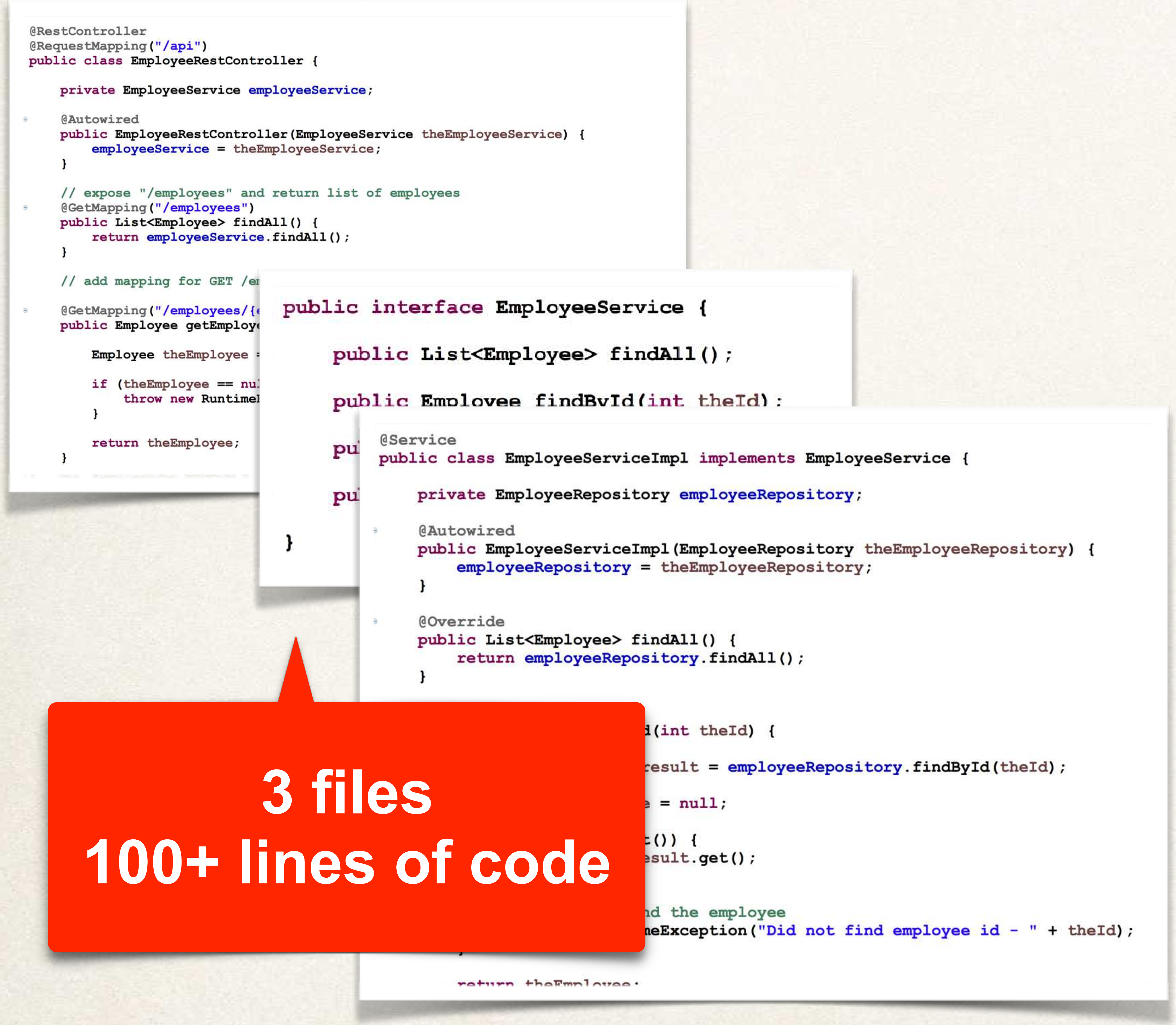
        Employee theEmployee = null;

        if (result.isPresent()) {
            theEmployee = result.get();
        }
        else {
            // we didn't find the employee
            throw new RuntimeException("Did not find employee id - " + theId);
        }

        return theEmployee;
```

Minimized Boilerplate Code

Before Spring Data REST



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3 files
100+ lines of code

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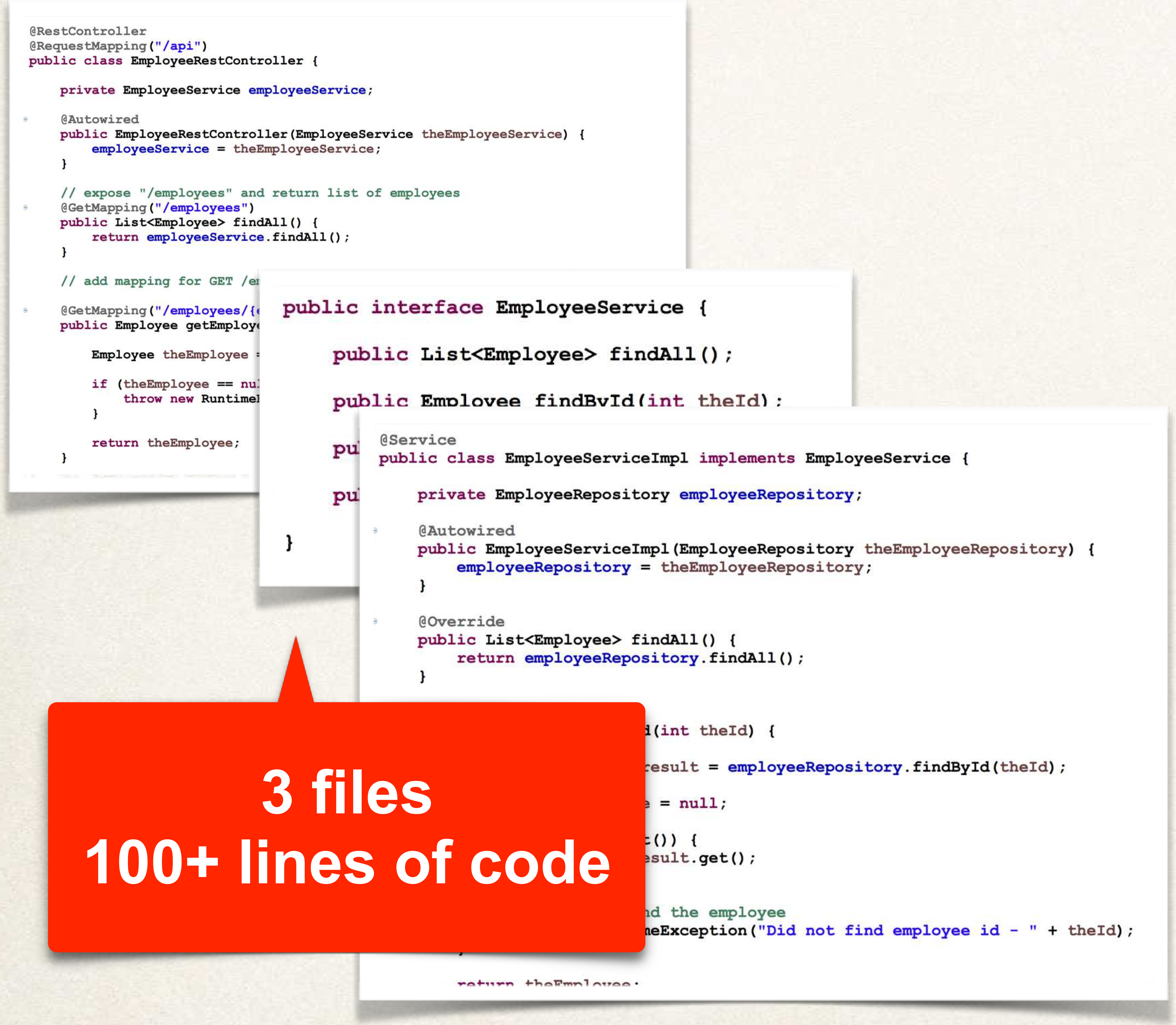

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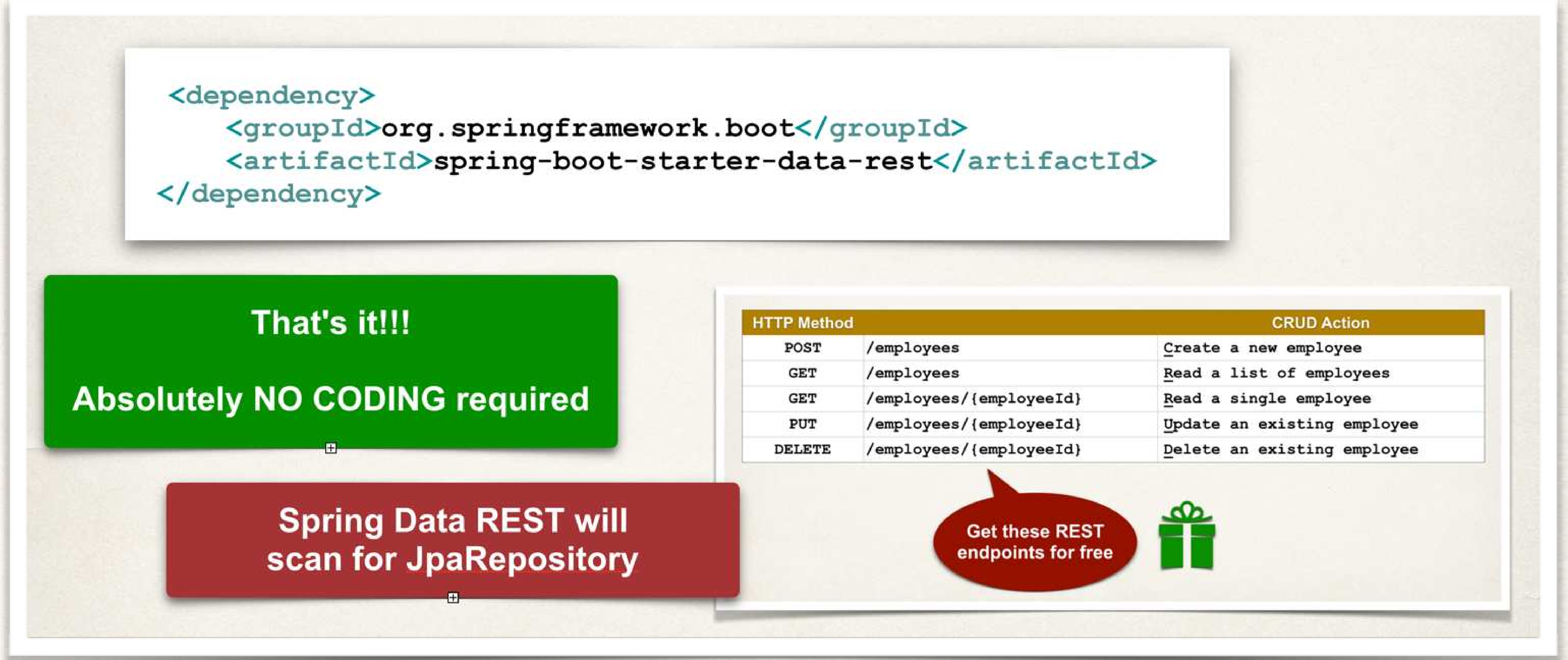

```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-data-rest</artifactId>
</dependency>
```

That's it!!!

Absolutely NO CODING required

Spring Data REST will scan for JpaRepository

HTTP Method		CRUD Action
POST	/employees	Create a new employee
GET	/employees	Read a list of employees
GET	/employees/{employeeId}	Read a single employee
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Get these REST endpoints for free

Minimized Boilerplate Code

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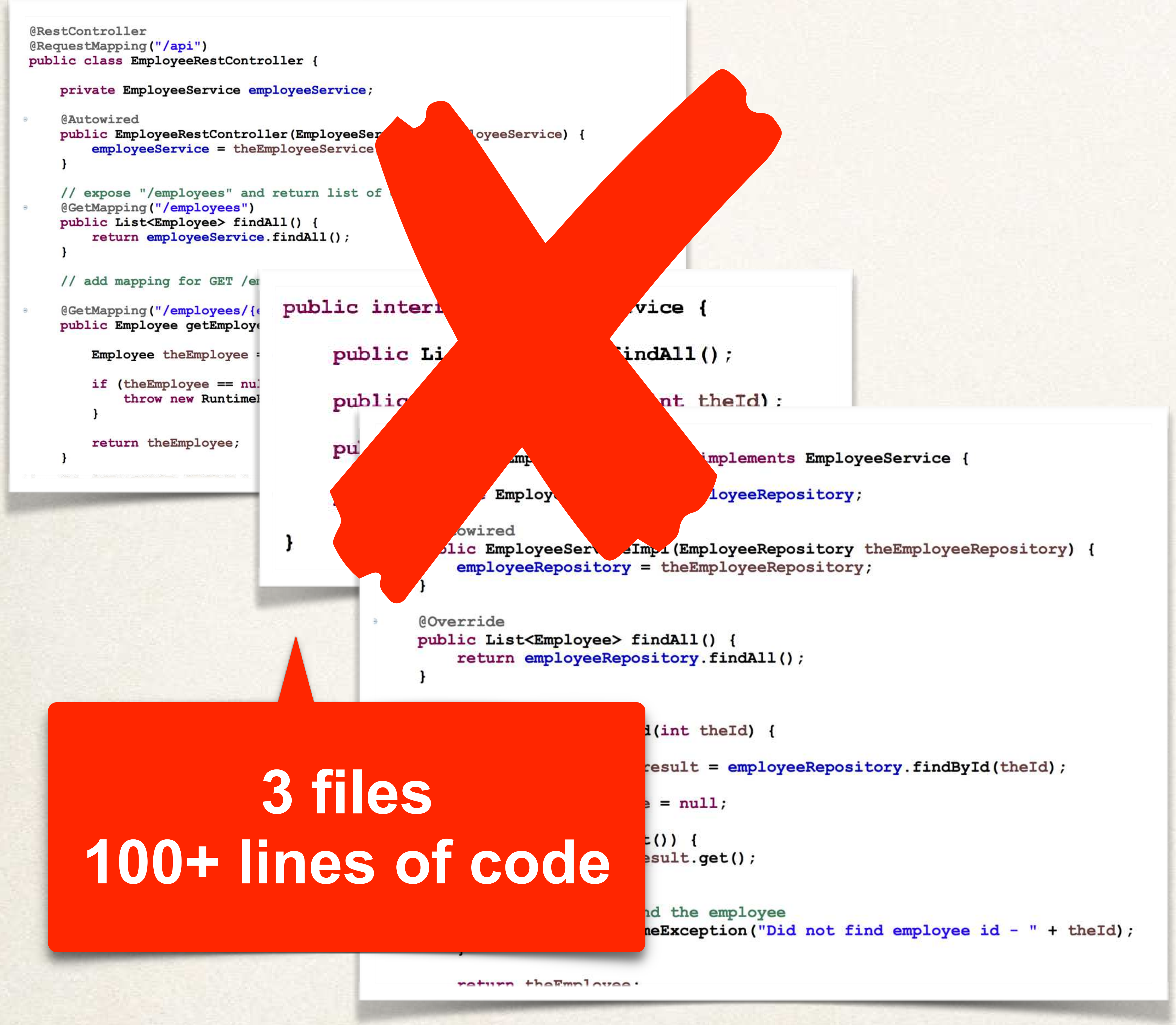

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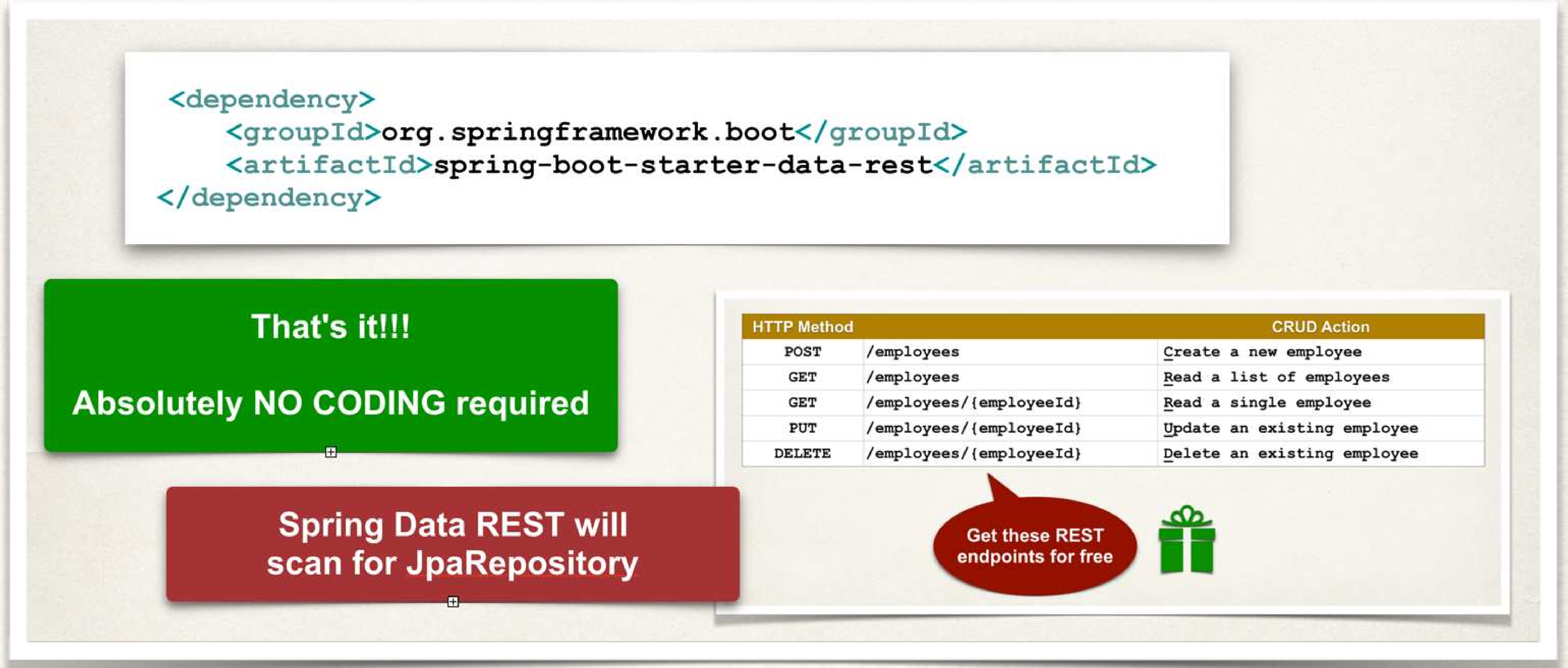

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HATEOAS

HATEOAS

- Spring Data REST endpoints are HATEOAS compliant

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  - **HATEOAS**: Hypermedia as the Engine of Application State

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  - Think of it as meta-data for REST data

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    - **HATEOAS**: Hypermedia as the Engine of Application State

- Hypermedia-driven sites provide information to access REST interfaces
    - Think of it as meta-data for REST data

https://spring.io/understanding/HATEOAS

HATEOAS

HATEOAS

- Spring Data REST response using HATEOAS

HATEOAS

Get single employee

- Spring Data REST response using HATEOAS
- For example REST response from: **`GET /employees/3`**

HATEOAS

Get single employee

- Spring Data REST response using HATEOAS
- For example REST response from: **`GET /employees/3`**

Response

```
{
    "firstName": "Avani",
    "lastName": "Gupta",
    "email": "avani@luv2code.com",
    "_links": {
        "self": {
            "href": "http://localhost:8080/employees/3"
        },
        "employee": {
            "href": "http://localhost:8080/employees/3"
        }
    }
}
```

HATEOAS

Get single employee

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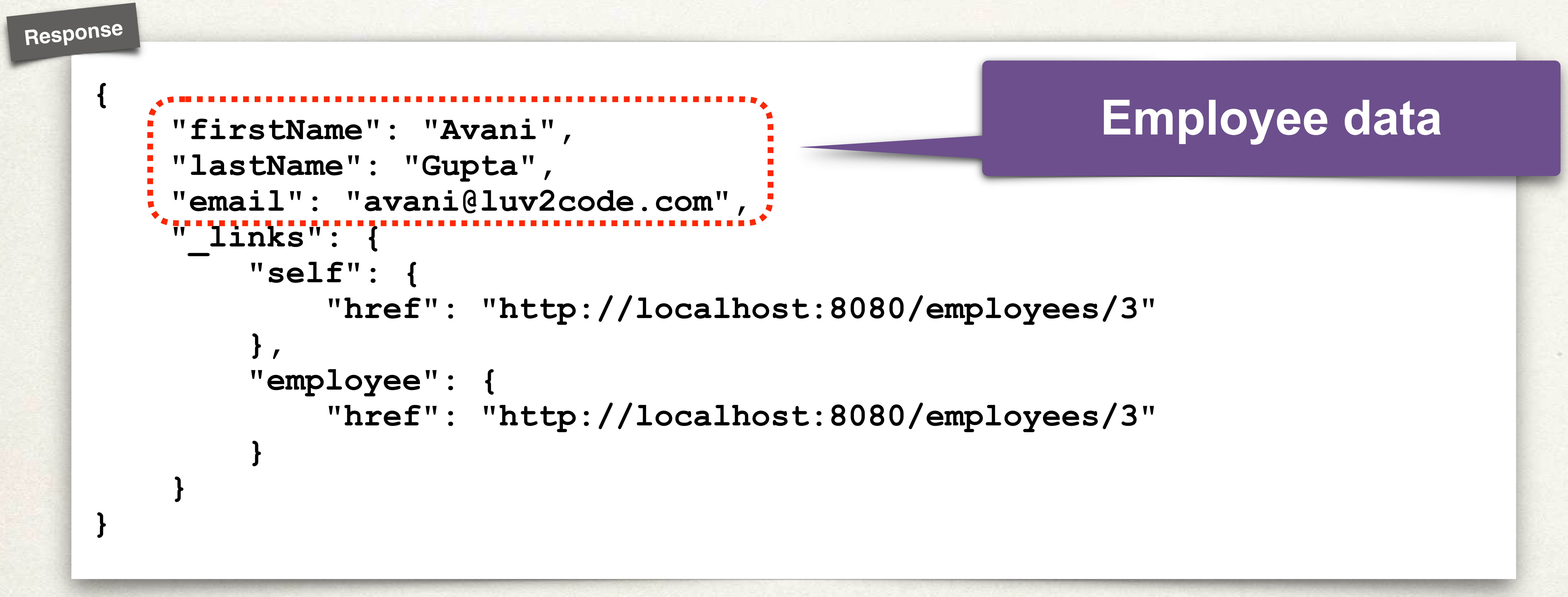

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```
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    "firstName": "Avani",
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    "email": "avani@luv2code.com",
    "_links": {
        "self": {
            "href": "http://localhost:8080/employees/3"
        },
        "employee": {
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    }
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```

Employee data

HATEOAS

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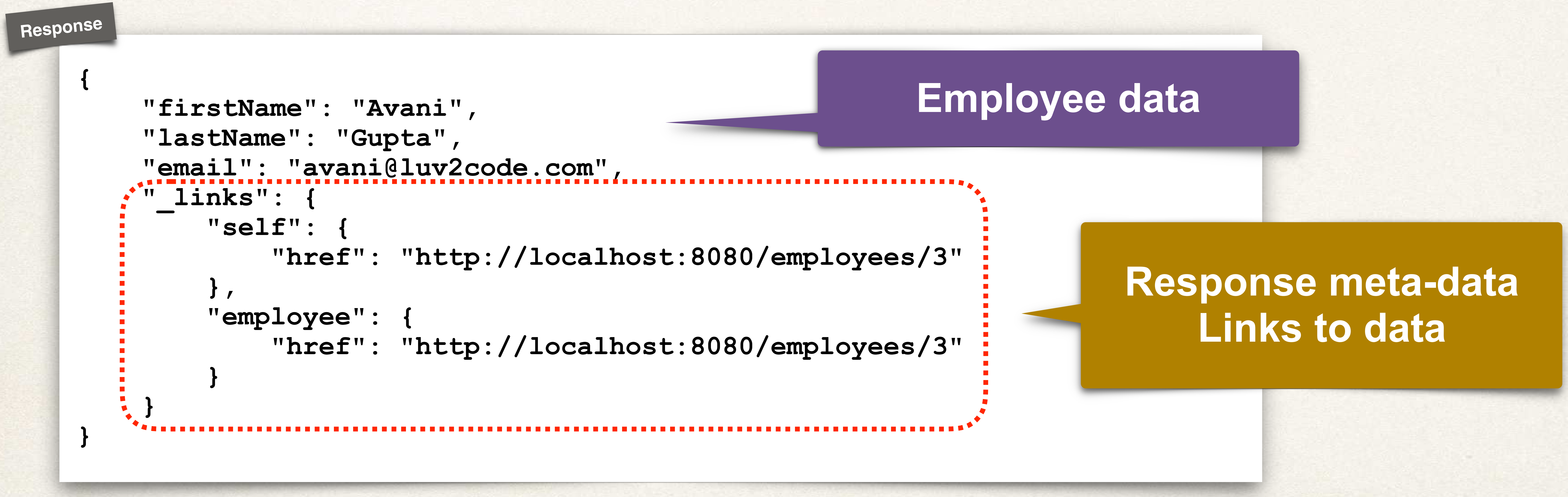

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Employee data

Response meta-data
Links to data

HATEOAS

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Get list of employees

Response

```
{
    "_embedded": {
        "employees": [
            {
                "firstName": "Leslie",
                ...
            },
            ...
        ]
    },
    "page": {
        "size": 20,
        "totalElements": 5,
        "totalPages": 1,
        "number": 0
    }
}
```

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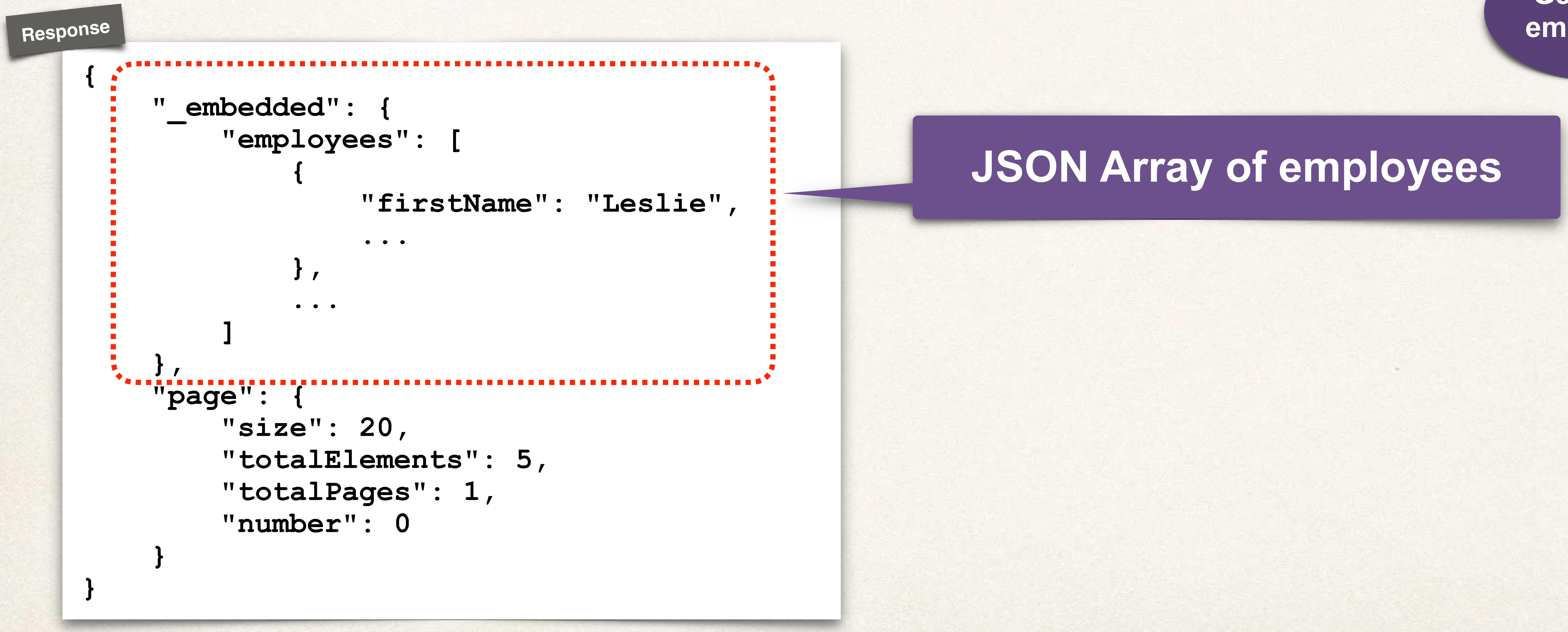

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JSON Array of employees

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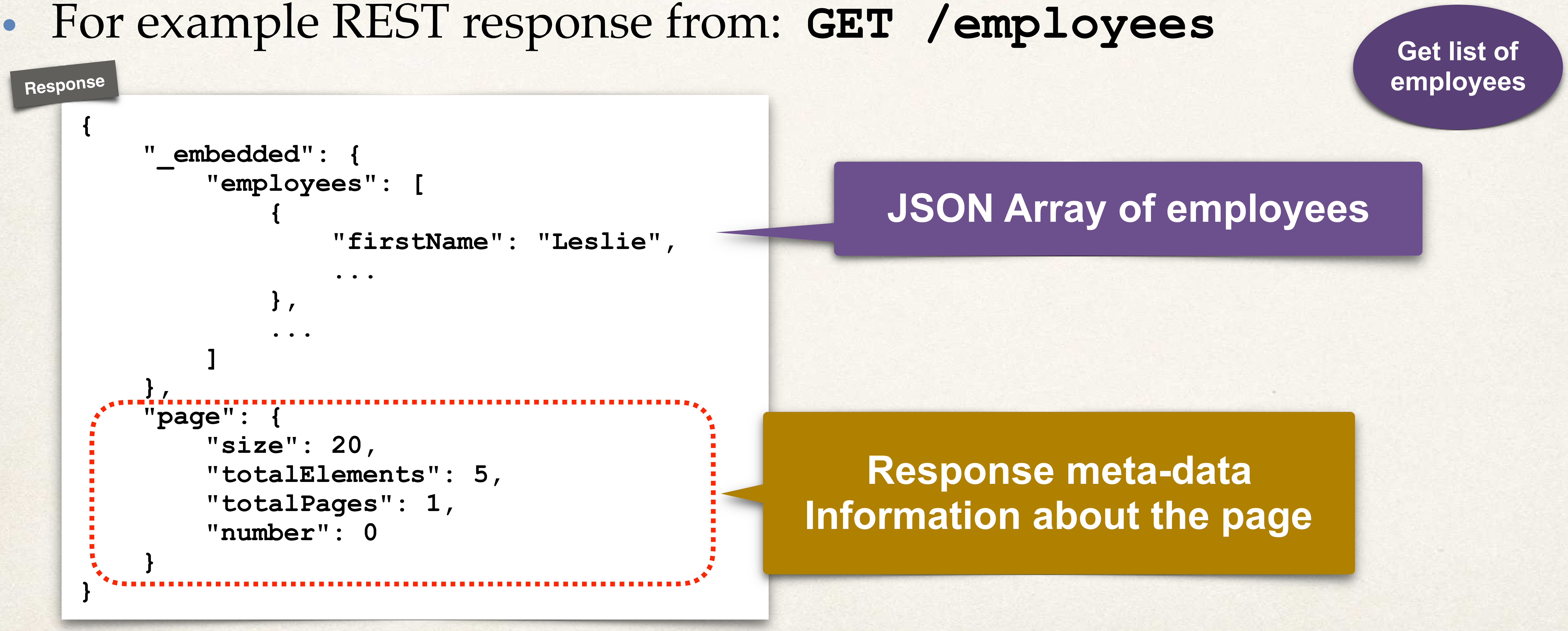

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Get list of employees

JSON Array of employees

Response meta-data
Information about the page

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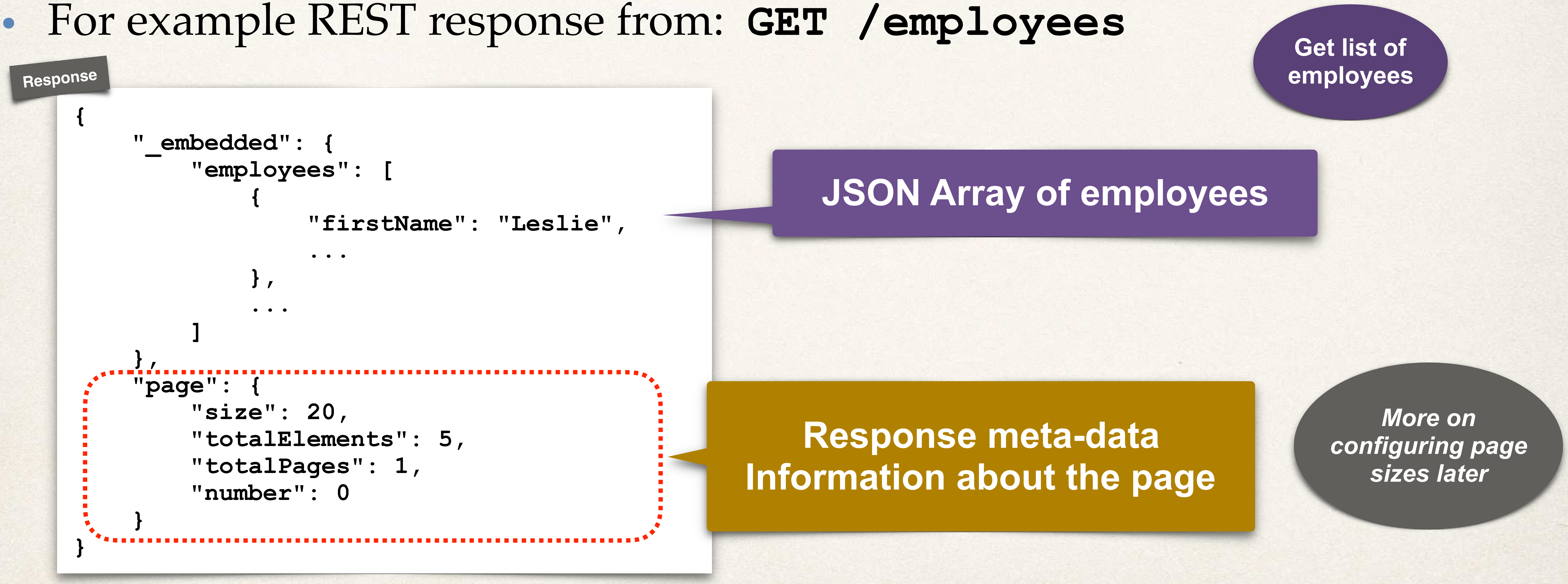

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JSON Array of employees

Response meta-data
Information about the page

More on configuring page sizes later

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Advanced Features

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  - Pagination, sorting and searching

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

Spring Data REST
Configuration, Pagination and Sorting

REST Endpoints

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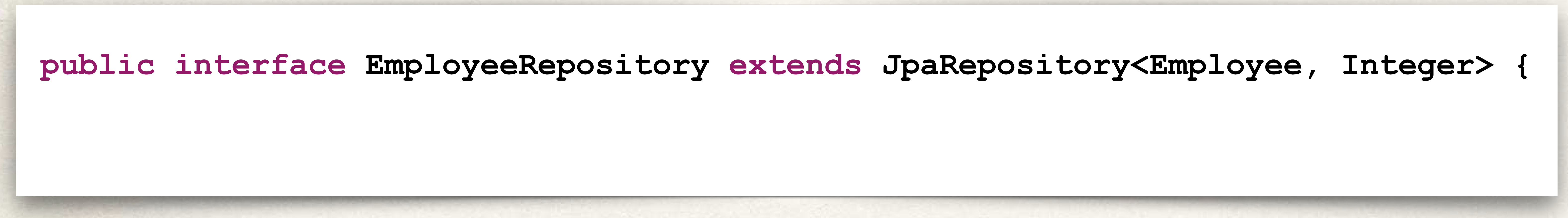

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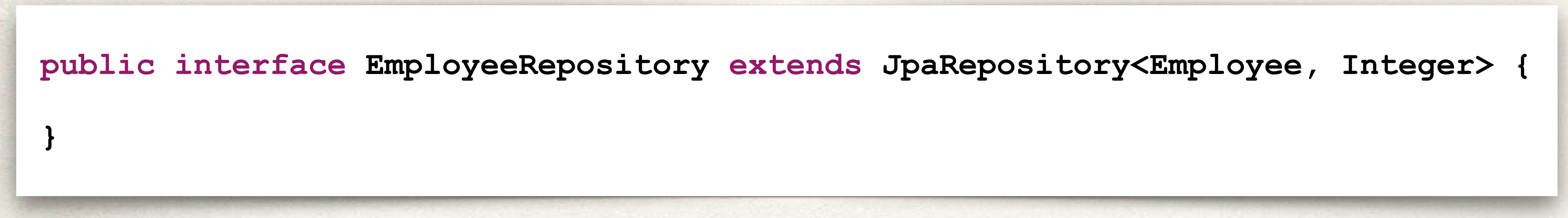

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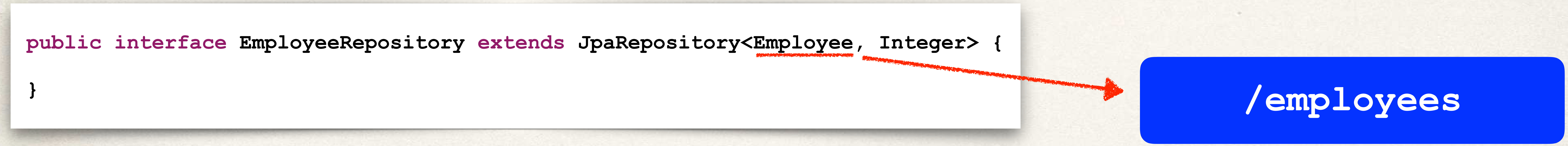

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Singular	Plural
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Person	People
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…	…

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- What if we want to expose a different resource name?

Problem

- Spring Data REST does not handle complex pluralized forms
  - In this case, you need to specify plural name
- What if we want to expose a different resource name?
  - Instead of **`/employees`** … use **`/members`**

Solution

Solution

- Specify plural name / path with an annotation

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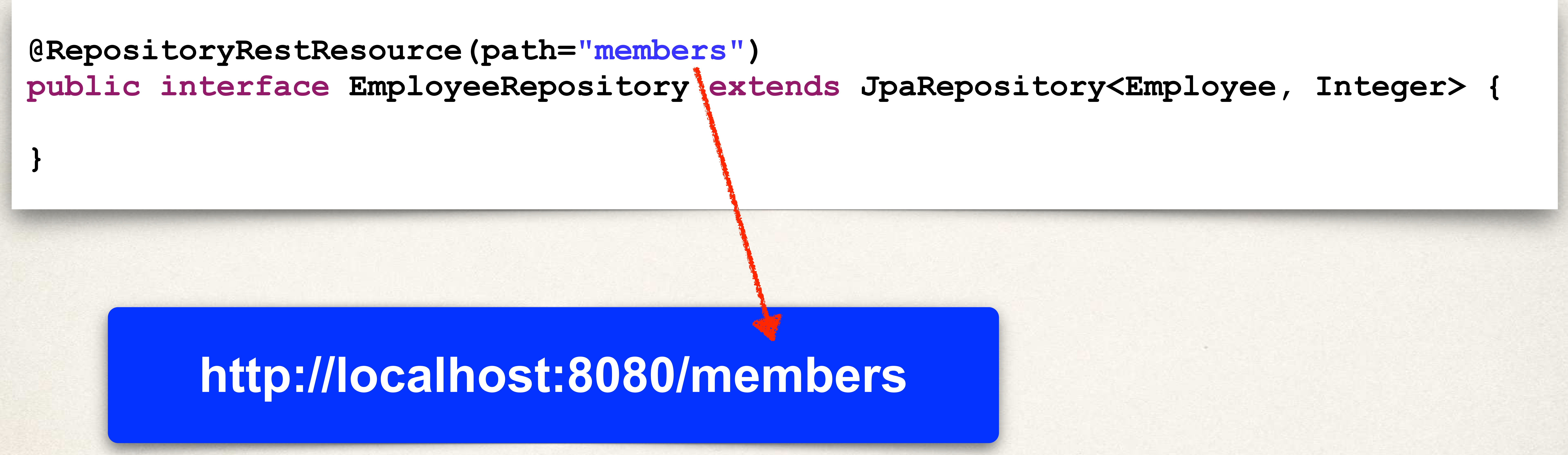
```
@RepositoryRestResource(path="members")
public interface EmployeeRepository extends JpaRepository<Employee, Integer> {

}
```

Solution

- Specify plural name / path with an annotation



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```

http://localhost:8080/members

Pagination

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```
http://localhost:8080/employees?page=0

http://localhost:8080/employees?page=1

...
```

Pagination

- By default, Spring Data REST will return the first 20 elements
  - Page size = 20

- You can navigate to the different pages of data using query param

```
http://localhost:8080/employees?page=0

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...
```

Pages are zero-based

Spring Data REST Configuration

- Following properties available: application.properties

Name	Description
`spring.data.rest.base-path`	Base path used to expose repository resources
`spring.data.rest.default-page-size`	Default size of pages
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More properties available

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`spring.data.rest.*`

Sample Configuration

Sample Configuration

File: application.properties

```
spring.data.rest.base-path=/magic-api

spring.data.rest.default-page-size=50
```

Sample Configuration

http://localhost:8080/magic-api/employees

File: application.properties

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```

Sample Configuration

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```

Returns 50 elements per page

Sorting

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- You can sort by the property names of your entity
  - In our Employee example, we have: **`firstName`**, **`lastName`** and **`email`**

- Sort by last name (ascending is default)

```
http://localhost:8080/employees?sort=lastName
```

Sorting

- You can sort by the property names of your entity
    - In our Employee example, we have: **`firstName`**, **`lastName`** and **`email`**

- Sort by last name (ascending is default)

```
http://localhost:8080/employees?sort=lastName
```

- Sort by first name, descending

```
http://localhost:8080/employees?sort=firstName,desc
```

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  - In our Employee example, we have: **`firstName`**, **`lastName`** and **`email`**

- Sort by last name (ascending is default)

```
http://localhost:8080/employees?sort=lastName
```

- Sort by first name, descending

```
http://localhost:8080/employees?sort=firstName,desc
```

- Sort by last name, then first name, ascending

```
http://localhost:8080/employees?sort=lastName,firstName,asc
```