Spring Framework

… EN DESARROLLO …

Overview

Spring Framework es un poderoso y ampliamente utilizado marco de desarrollo de software para aplicaciones empresariales en Java. Diseñado para simplificar y acelerar el desarrollo de aplicaciones, Spring ofrece un enfoque integral que abarca desde la configuración hasta la implementación, abordando varios aspectos del desarrollo de software como la inversión de control, la inyección de dependencias, la gestión de transacciones, la seguridad y mucho más.

Una de las características distintivas de Spring es su **enfoque modular y extensible**, permitiendo a los desarrolladores elegir los módulos específicos que necesitan para sus proyectos. Además, fomenta las mejores prácticas de programación y sigue el principio de diseño de "Programación Orientada a Aspectos" (AOP), que facilita la separación de preocupaciones y mejora la modularidad del código.

Spring Framework se utiliza comúnmente para construir aplicaciones empresariales robustas y escalables, facilitando la creación de servicios web, aplicaciones basadas en la arquitectura Modelo-Vista-Controlador (MVC), integración con bases de datos, gestión de transacciones y mucho más. Con una comunidad activa y un ecosistema de proyectos relacionados, Spring ha evolucionado para adaptarse a las cambiantes demandas del desarrollo de software, convirtiéndose en una opción popular entre los desarrolladores Java.

Spring Boot es una extensión del popular Spring Framework que se centra en simplificar drásticamente el proceso de desarrollo de aplicaciones Java, especialmente aplicaciones basadas en Spring. Su objetivo principal es facilitar la creación de aplicaciones autónomas, autocontenidas y listas para la producción con la menor cantidad de configuración posible.

La relación entre Spring Boot y Spring Framework es fundamental, ya que Spring Boot se construye sobre la base sólida proporcionada por Spring. Spring Boot utiliza las características clave de Spring, como la inversión de control (IoC) y la inyección de dependencias, pero agrega una capa de convenciones y configuraciones por defecto para acelerar el desarrollo.

Lo más notable de Spring Boot es su enfoque de "opinión sobre la configuración", lo que significa que proporciona configuraciones predeterminadas sensatas para la mayoría de los casos de uso, permitiendo a los desarrolladores empezar rápidamente con sus proyectos sin tener que configurar extensamente. No obstante, sigue siendo altamente personalizable, permitiendo a los desarrolladores anular las configuraciones por defecto según sea necesario.

Con Spring Boot, el proceso de desarrollo se simplifica mediante la inclusión de un servidor embebido, como Tomcat o Jetty, lo que elimina la necesidad de desplegar la aplicación en un servidor externo. También facilita la gestión de dependencias mediante el uso de la herramienta Spring Initializr para generar proyectos con las dependencias necesarias.

En resumen, Spring Boot es una extensión de Spring Framework diseñada para hacer que el desarrollo de aplicaciones Java sea más rápido, sencillo y eficiente al proporcionar configuraciones por defecto y convenciones inteligentes sin sacrificar la flexibilidad y la potencia que ofrece Spring Framework.

> Introducción generada por ChatGPT

Core Spring Framework Annotations

@Autowired (Field, Constructor and Method Level Annotation)

- Field Level Annotation
- It is used to inject the dependency.
- It is used to inject the object.
- It is used to inject the object reference.
- Dependency Injection is a design pattern.

```
public class Brand{
   private int id;
   private String name;

   @Autowired
   public Brand(int id, String name){
     this.id = id;
     this.name = name;
   }
}
```

@Configuration (Class Level Annotation)

@ComponentScan (Class Level Annotation)

@Bean (Method Level Annotation)

@Import (Class Level Annotation)

@PostConstruct & @PreDestroy (Method Level Annotation)

Spring calls the methods annotated with `@PostConstruct` only once, just after the initialization of bean properties. Keep in mind that these methods will run even if there's nothing to initialize.

The method annotated with `@PostConstruct` can have any access level, but it can't be static. Annotated methods can have any visibility but must take no parameters and only return void.

One possible use of @PostConstruct is populating a database:

```
@Component
public class DbInit {

    @Autowired
    private UserRepository userRepository;

    @PostConstruct
    private void postConstruct() {
        User admin = new User("admin", "admin password");
        User normalUser = new User("user", "user password");
```

```
        userRepository.save(admin, normalUser);
    }
}
```

A method annotated with `@PreDestroy` runs only once, just before Spring removes our bean from the application context.

Same as with @PostConstruct, the methods annotated with @PreDestroy can have any access level, but can't be static.

```
@Component
public class UserRepository {

    private DbConnection dbConnection;
    @PreDestroy
    public void preDestroy() {
        dbConnection.close();
    }
}
```

NOTE: PreDestroy methods called if application shuts down normally. Not if the process dies or is killed.

```
ConfigurableApplicationContext context = SpringApplication.run(...);

// Trigger call of all @PreDestroy annotated methods
context.close();
```

Alternatively, `@Bean` has options to define these life-cycle methods:

```
@Bean(initMethod="populateCache", destroyMethod="flushCache")
public AccountRepository accountRepository () {
  //...
}
```

So, which scheme to use?

- Use `@PostConstruct` and/or `@PreDestroy` for your own classes
- Use Lifecycle Method attributes of `@Bean` annotation for classes you didn't write and can't annotate, like third-party libraries.

Note that both the `@PostConstruct` and `@PreDestroy` annotations are part of Java EE. Since Java EE was deprecated in Java 9, and removed in Java 11, we have to add an additional dependency to use these annotations:

```
<dependency>
    <groupId>javax.annotation</groupId>
    <artifactId>javax.annotation-api</artifactId>
    <version>1.3.2</version>
</dependency>
```

- Más información
- Más información

@DependsOn (Class Level Annotation)

Spring, by default, manages beans' lifecycle and arranges their initialization order.

But, we can still customize it based on our needs. We can choose either the SmartLifeCycle interface or the `@DependsOn` annotation for managing initialization order.

We can use the `@DependsOn` annotation and its behavior in case of a missing bean or circular dependency. Or in case of simply needing one bean initialized before another.

```
@Configuration
@ComponentScan("com.baeldung.dependson")
public class Config {

    @Bean
    @DependsOn({"fileReader","fileWriter"})
    public FileProcessor fileProcessor(){
        return new FileProcessor();
    }

    @Bean("fileReader")
    public FileReader fileReader() {
        return new FileReader();
    }

    @Bean("fileWriter")
    public FileWriter fileWriter() {
        return new FileWriter();
    }
}
```

Using `@DependsOn` at the class level has no effect unless component-scanning is being used. If a DependsOn-annotated class is declared via XML, `@DependsOn` annotation metadata is ignored, and `<bean depends-on="..."/>` is respected instead.

Más información

@Required (deprecated)

The `@Required` annotation is method-level annotation. It applies to the **bean setter method**. It indicates that the annotated bean must be populated at configuration time with the required property, else it throws an exception `BeanInitilizationException`.

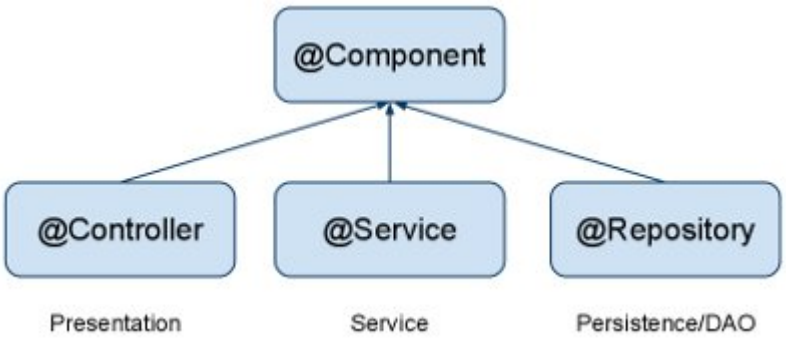
```
public class Machine {
  private Integer cost;

  @Required
  public void setCost(Integer cost) {
    this.cost = cost;
  }

  public Integer getCost() {
    return cost;
  }
}
```

Spring Framework Stereotype Annotations

@Component (Class Level Annotation)

It is a class-level annotation. It is used to mark a Java class as a bean. A Java class annotated with `@Component` is found during the classpath. The Spring Framework pick it up and configure it in the application context as a Spring Bean.

`@Component` is a **generic** stereotype for any Spring-managed component. `@Repository`, `@Service`, and `@Controller` are specializations of `@Component` for more specific use cases, for example, in the persistence, service, and presentation layers, respectively.




```
@Component
public class ContactResource {
  //...
}
```

@Controller (Class Level Annotation)

The `@Controller` annotation is used to indicate the class is a Spring controller. This annotation is simply a specialization of the `@Component` class and allows implementation classes to be auto-detected through the class path scanning.

```
@Controller
@RequestMapping("/api/brands")
public class BrandsController{
   @GetMapping("/getall")
   public Employee getAll(){
       return brandService.getAll();
   }
}
```

@Service (Class Level Annotation)

`@Service` marks a Java class that performs some service, such as executing business logic, performing calculations, and calling external APIs. This annotation is a specialized form of the `@Component` annotation intended to be used in the service layer.

```
@Service
public class TestService{
   public void service1(){
      //business code
   }
}
```

@Repository (Class Level Annotation)

This annotation is used on Java classes that directly access the database. The `@Repository` annotation works as a marker for any class that fulfills the role of repository or Data Access Object.

This annotation has an automatic translation feature. For example, when an exception occurs in the `@Repository`, there is a handler for that exception and there is no need to add a try-catch block.

This annotation is a specialized form of the `@Component` annotation.

```
@Repository
public class TestRepo{
   public void add(){
      System.out.println("Added");
   }
}
```

Spring Boot Annotations

@EnableAutoConfiguration (Class Level Annotation)

@SpringBootApplication (Class Level Annotation)

@SpringBootApplication is a convenience annotation that adds all of the following:

- @Configuration: Tags the class as a source of bean definitions for the application context.
- @EnableAutoConfiguration: Tells Spring Boot to start adding beans based on classpath settings, other beans, and various property settings. For example, if spring-webmvc is on the classpath, this annotation flags the application as a web application and activates key behaviors, such as setting up a DispatcherServlet.
- @ComponentScan: Tells Spring to look for other components, configurations, and services in the com/example package, letting it find the controllers.

Spring MVC and REST Annotations

@RequestMapping (Method Level Annotation)

- Method Level Annotation
- It is used to map the HTTP request with specific method.

```
@Controller
@RequestMapping("/api/brands")
public class BrandsController{
   @GetMapping("/getall")
   public Employee getAll(){
       return brandService.getAll();
   }
}
```

@GetMapping (Method Level Annotation)

- Method Level Annotation
- It is used to map the HTTP GET request with specific method.
- It is used to get the data.
- It is used to read the data.

```
@GetMapping("/getall")
public Employee getAll(){
```

```
  return brandService.getAll();
}
```

@PostMapping (Method Level Annotation)

- Method Level Annotation
- It is used to map the HTTP POST request with specific method.
- It is used to add the data.
- It is used to create the data.

```
@PostMapping("/add")
public void add(@RequestBody Brand brand){
  brandService.add(brand);
}
```

@PutMapping (Method Level Annotation)

- Method Level Annotation
- It is used to map the HTTP PUT request with specific method.
- It is used to update the data.

```
@PutMapping("/update")
public void update(@RequestBody Brand brand){
  brandService.update(brand);
}
```

@DeleteMapping (Method Level Annotation)

- Method Level Annotation
- It is used to map the HTTP DELETE request with specific method.
- It is used to delete the data.

```
@DeleteMapping("/delete")
public void delete(@RequestBody Brand brand){
  brandService.delete(brand);
}
```

@PatchMapping

@RequestBody

- It is used to get the data from the request body.
- It is used to get the data from the HTTP request.
- It is used to get the data from the HTTP request body.

```
@PostMapping("/add")
public void add(@RequestBody Brand brand){
  brandService.add(brand);
}
```

@ResponseBody

@PathVariable (Method Level Annotation)

- Method Level Annotation
- It is used to get the data from the URL.
- It is the most suitable for RESTful web service that contains a path variable.

```
@GetMapping("/getbyid/{id}")
public Brand getById(@PathVariable int id){
  return brandService.getById(id);
}
```

@RequestParam

- It is used to get the data from the URL.
- It is used to get the data from the URL query parameters.
- It is also known as query parameter.

```
@GetMapping("/getbyid")
public Brand getById(@RequestParam int id){
    return brandService.getById(id);
}
```

@RequestHeader

@RestController (Class Level Annotation)

- Class Level Annotation
- It is a marker interface.
- It is a controller layer.
- It is used to create a controller layer.
- It use with @RequestMapping annotation.
- It is a combination of @Controller and @ResponseBody annotations.
- @RestController annotation is explained with @ResponseBody annotation.
- @ResponseBody eliminates the need to add a comment to every method.

```
@RestController
@RequestMapping("/api/brands")
public class BrandsController{
   @GetMapping("/getall")
   public Employee getAll(){
       return brandService.getAll();
   }
}
```

@RequestAttribute

TODO

Configuración de Spring

El contenedor de Spring se encarga de crear los beans de la aplicación y de coordinar la relación entre beans a través de la Inyección de Dependencias (DI).

Spring ofrece tres mecanismos principales:

- **Configuración explícita en XML**
- **Configuración explícita en Java**
- **Detección implícita y conexión automática de bean**

La **detección implícita y conexión automática** es el método recomendable

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Enlaces de interés

- https://spring.io/
- https://docs.spring.io/spring-framework/reference/
- https://docs.spring.io/spring-boot/docs/current/reference/html

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