Difference Between @Component, @Repository, @Service, and @Controller Annotations in Spring

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Spring Annotations are a form of metadata that provides data about a program. Annotations are used to provide supplemental information about a program. It does not have a direct effect on the operation of the code they annotate. It does not change the action of the compiled program. Here, we are going to discuss the difference between the 4 most important annotations in Spring, @Component, @Repository, @Service, and @Controller.

@Component Annotation

@Component is a class-level annotation. It is used to denote a class as a Component. We can use @Component across the application to mark the beans as Spring's managed components. A component is responsible for some operations. Spring framework provides three other specific annotations to be used when marking a class as a Component.

1. @Service
2. @Repository

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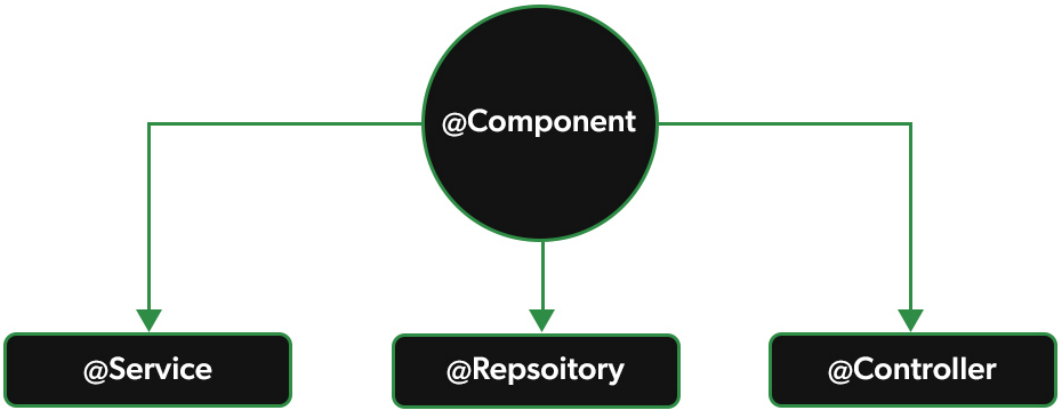

To read more about @Component Annotation refer to the article Spring @Component Annotation

A. @Service Annotation

In an application, the business logic resides within the service layer so we use the **@Service Annotation** to indicate that a class belongs to that layer. It is a specialization of **@Component Annotation**. One most important thing about the @Service Annotation is it can be applied only to classes. It is used to mark the class as a service provider. So overall @Service annotation is used with classes that provide some business functionalities. Spring context will autodetect these classes when annotation-based configuration and classpath scanning is used.

To read more about @Service Annotation refer to the article Spring @Service Annotation

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@Repository Annotation is also a specialization of **@Component** annotation which is used to indicate that the class provides the mechanism for storage, retrieval, update, delete and search operation on objects. Though it is a specialization of @Component annotation, so Spring Repository classes are autodetected by the spring framework through classpath scanning. This annotation is a general-purpose stereotype annotation which very close to the DAO pattern where DAO classes are responsible for providing CRUD operations on database tables.

> *To read more about **@Repository Annotation** refer to the article Spring @Repository Annotation*

C. @Controller Annotation

Spring @Controller annotation is also a specialization of **@Component** annotation. The @Controller annotation indicates that a particular class serves the role of a **controller**. Spring Controller annotation is typically used in combination with annotated handler methods based on the @RequestMapping annotation. It can be applied to classes only. It's used to mark a class as a web request handler. It's mostly used with Spring MVC applications. This annotation acts as a stereotype for the annotated class, indicating its role. The dispatcher scans such annotated classes for mapped methods and detects **@RequestMapping** annotations.

> *To read more about **@Controller Annotation** refer to the article Spring @Controller Annotation*

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One of the interesting queries that arise in front of a developer is, can @Component, @Repository, @Service, and @Controller annotations be used interchangeably in Spring or do they provide any particular functionality? In other words, if we have a Service class and we change the annotation from @Service to @Component, will it still behave the same way?

So in order to answer the same, it is with respect to scan-auto-detection and dependency injection for BeanDefinition, all these annotations (@Component, @Repository, @Service, and @Controller) are the same. We could use one in place of another and can still get our way around.

By now it is made clear that @Component is a general-purpose stereotype annotation indicating that the class is a spring component and @Repository, @Service, and @Controller annotations are special types of @Component annotation. Now let us finally conclude via plotting the ***difference table between all annotation types*** to grasp a better understanding that is as follows:

@Service Annotation	@Repository Annotation	@Controller Annotation
@Service annotation is used with classes that provide some business functionalities.	@Repository Annotation is used to indicate that the class provides the mechanism for storage, retrieval, update, delete and search operation on objects.	@Controller annotation indicates that a particular class serves the role of a controller.

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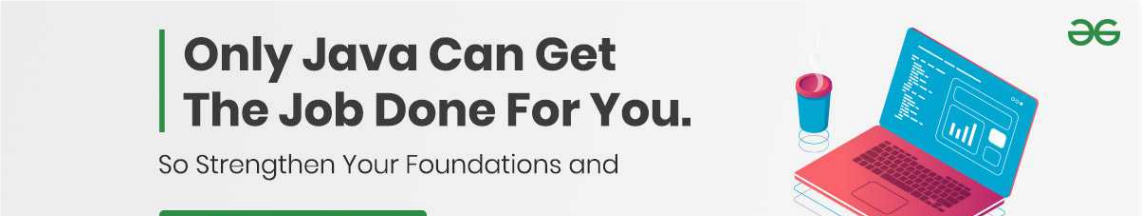
@Service Annotation	@Repository Annotation	@Controller Annotation
@Service Annotation is a specialization of @Component Annotation.	@Repository Annotation is also a specialization of @Component Annotation.	@Controller annotation is also a specialization of @Component annotation.
It is used to mark the class as a service provider.	It is used to mark the interface as DAO (Data Access Object) provider.	It's used to mark a class as a web request handler.
It is a stereotype for the service layer.	It is also a stereotype for the DAO layer.	It is also a stereotype for the presentation layer (spring-MVC).
Switch can be possible. But it is not recommended.	Switch can be possible. But it is not recommended.	We cannot switch this annotation with any other like @Service or @Repository.
It is a Stereotype Annotation.	It is also a Stereotype Annotation.	It is also a Stereotype Annotation.



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Article Contributed By :

AmiyaRanjanRout
@AmiyaRanjanRout

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