📘Stereotype Annotations in Spring Boot

🔗What is a Stereotype Annotation?

In Spring Framework (and Spring Boot), a **stereotype annotation** is used to:

- **Mark a class as a Spring-managed component (bean)**.
- **Define its role or layer** in the application architecture (like service, controller, etc.).
- Enable **automatic detection and registration** during **component scanning**.

Spring internally uses these annotations to identify and manage components across different layers of an application — **without requiring XML configurations**.

All stereotype annotations are built on top of `@Component`, and thus inherit its behavior of being picked up during component scanning.

🧹Why Use Stereotype Annotations?

- ✅Improves **readability** and **maintainability**
- ✅Follows the **layered architecture** pattern
- ✅Helps Spring apply **specific behaviors or features** (like exception handling in `@Repository`)
- ✅Reduces boilerplate and manual configuration

📚Common Stereotype Annotations in Spring Boot

Annotation	Description	Purpose / Layer
`@Component`	Generic annotation to mark any Spring-managed component.	Generic Bean
`@Service`	Indicates a **service class** that holds business logic.	Service Layer
`@Repository`	Indicates a **DAO (Data Access Object)** class.	Repository / Persistence
`@Controller`	Marks a class as a **Spring MVC controller**.	Web Layer (MVC)
`@RestController`	A convenience annotation for REST APIs.	Web Layer (REST API)

🔎Special Behavior

- `@Repository` enables **automatic exception translation** for JPA, JDBC, etc.

- `@RestController` is a **shortcut** for `@Controller + @ResponseBody` (used for JSON responses).
- `@Component` is the **base annotation** that all others build upon.

👜Example Usage

```
@Component
public class UtilityService {
    // Generic Spring bean
}

@Service
public class OrderService {
    // Business logic
}

@Repository
public interface OrderRepository extends JpaRepository<Order, Long> {
    // Data access layer
}

@Controller
public class ViewController {
    // Handles web pages (Thymeleaf/JSP)
}

@RestController
public class ApiController {
    @GetMapping("/status")
    public String status() {
        return "Running";
    }
}
```

🔩Not a Stereotype: `@ControllerAdvice`

- `@ControllerAdvice` is often confused as a stereotype.
- While it **registers a bean** in the Spring context, it is **not a stereotype**.
- It is used for **global exception handling**, model attribute configuration, and data binding logic.

🔗Summary

- **Stereotype annotations** simplify bean declaration and application structure.
- They make your code **cleaner**, **more readable**, and **aligned to architectural layers**.
- Use the right stereotype to give **semantic meaning** and allow Spring to provide **extra capabilities**.