

Spring Boot

Spring Boot is a project that is built on the top of the Spring Framework. It provides an easier and faster way to set up, configure, and run both simple and web-based applications.

Goals

The main goal of Spring Boot is to reduce **development**, **unit test**, and **integration test** time.

- Provides Opinionated Development approach
- Avoids defining more Annotation Configuration
- Avoids writing lots of import statements
- Avoids XML Configuration.

Spring vs Spring Boot vs Spring MVC

Spring: Spring Framework is the most popular application development framework of Java. The main feature of the Spring Framework is **dependency Injection** or **Inversion of Control** (IoC). With the help of Spring Framework, we can develop a **loosely** coupled application. It is better to use if application type or characteristics are purely defined.

Spring Boot: Spring Boot is a module of Spring Framework. It allows us to build a stand-alone application with minimal or zero configurations. It is better to use if we want to develop a simple Spring-based application or RESTful services. Spring Boot makes it easy to quickly bootstrap and start developing a Spring-based application. It avoids a lot of boilerplate code. It hides a lot of complexity behind the scene so that the developer can quickly get started and develop Spring-based applications easily.

Spring MVC: Spring MVC is a Web MVC Framework for building web applications. It contains a lot of configuration files for various capabilities. It is an HTTP oriented web application development framework.

Spring Boot Configuration

Auto Configuration will attempt to automatically try to set up our application with default behaviour based on the jars in the classpath. For example, if Spring Boot finds HSQLDB in our classpath, it will automatically configure an in-memory database for us.

Spring Boot Actuator

Spring Boot Actuator is a sub-project of the Spring Boot Framework. It includes a number of additional features that help us to monitor and manage the Spring Boot application. It contains the actuator endpoints (the place where the resources live). We can use **HTTP** and **JMX** endpoints to manage and monitor the Spring Boot application. If we want to get production-ready features in an application, we should use the **Spring Boot actuator**.

Spring Boot Actuator Features

- Endpoints
- Metrics
- Audit

Spring Boot Developer Tools

- Property Defaults
- Automatic Restart
- LiveReload
- Remote Debug Tunneling
- Remote Update and Restart

What is JUnit

JUnit is a unit testing framework for Java programming language. JUnit has been important in the development of test-driven development, and is one of a family of unit testing frameworks collectively known as xUnit, that originated with JUnit.

Testing

Testing is the process of checking an application that it is working as expected. Working as expected means for a known input it must give the expected output. In other words testing is a process of verification and validation.

Unit testing

Unit testing is the testing of an individual unit (class/method) or group of related units.

Types of unit testing

1. Manual testing
2. Automated testing

Manual testing

Manual testing is the process of executing a test case without any tool support.

Automated testing

Automated testing is the process of executing a test case with any tool support.

Annotations for Junit testing

1. **@Test**: It is used to specify the test method.
2. **@BeforeClass**: It is used to specify that method will be called only once, before starting all the test cases.
3. **@AfterClass**: It is used to specify that method will be called only once, after finishing all the test cases.
4. **@Before**: It is used to specify that method will be called before each test case.
5. **@After**: It is used to specify that method will be called after each test case.
6. **@Ignore**: It is used to ignore the test case.

Assert class

JUnit provides the Assert class to check the certain conditions. Assert class methods compare the output value to the expected value.

Commonly used methods of Assert class

1. **assertTrue(boolean condition)**: It assert that the specified boolean condition is true.
2. **assertFalse(boolean condition)**: It assert that the specified boolean condition is false.
3. **assertNull(Object obj)**: It assert that the specified object is null.
4. **assertNotNull(Object obj)**: It assert that the specified object is not null.
5. **assertEquals(Object expected, Object actual)**: It assert that two objects are equal.
6. **assertSame(Object expected, Object actual)**: It assert that two objects refer to the same object.

JPA

A JPA (Java Persistence API) is a specification of Java which is used to access, manage, and persist data between Java object and relational database. It is considered as a standard approach for Object Relational Mapping.

Hibernate

A Hibernate is a Java framework which is used to store the Java objects in the relational database system. It is an open-source, lightweight, ORM (Object Relational Mapping) tool.

Hibernate is an implementation of JPA. So, it follows the common standards provided by the JPA.

JPA Entity Manager

- The entity manager implements the API and encapsulates all of them within a single interface.
- Entity manager is used to read, delete and write an entity.
- An object referenced by an entity is managed by entity manager.

JPQL

The JPQL (Java Persistence Query Language) is an object-oriented query language which is used to perform database operations on persistent entities. Instead of database table, JPQL uses entity object model to operate the SQL queries. Here, the role of JPA is to transform JPQL into SQL. Thus, it provides an easy platform for developers to handle SQL tasks.

Features

- It is a platform-independent query language.
- It is simple and robust.
- It can be used with any type of database such as MySQL, Oracle.
- JPQL queries can be declared statically into metadata or can also be dynamically built in code.

JPA One-To-One Mapping

The One-To-One mapping represents a single-valued association where an instance of one entity is associated with an instance of another entity. In this type of association one instance of source entity can be mapped atmost one instance of target entity.

JPA One-To-Many Mapping

The One-To-Many mapping comes into the category of collection-valued association where an entity is associated with a collection of other entities. Hence, in this type of association the instance of one entity can be mapped with any number of instances of another entity.

JPA Many-To-One Mapping

The Many-To-One mapping represents a single-valued association where a collection of entities can be associated with the similar entity. Hence, in relational database any more than one row of an entity can refer to the similar rows of another entity.

JPA Many-To-Many Mapping

The Many-To-Many mapping represents a collection-valued association where any number of entities can be associated with a collection of other entities. In relational database any number of rows of one entity can be referred to any number of rows of another entity.

Hibernate Criteria Queries

The Hibernate Criteria Query Language (HCQL) is used to fetch the records based on the specific criteria. The Criteria interface provides methods to apply criteria such as retrieving all the records of table whose salary is greater than 50000 etc.

Advantages

The HCQL provides methods to add criteria, so it is **easy** for the java programmer to add criteria. The java programmer is able to add many criteria on a query.

Transaction Management

A transaction is a sequence of operation which works as an atomic unit. A transaction only completes if all the operations completed successfully. A transaction has the Atomicity, Consistency, Isolation and Durability properties (ACID).

Spring Data JPA

Spring Data JPA API provides JpaTemplate class to integrate spring application with JPA.

JPA (Java Persistent API) is the sun specification for persisting objects in the enterprise application. It is currently used as the replacement for complex entity beans.

The implementation of JPA specification are provided by many vendors such as:

- Hibernate
- Toplink
- iBatis
- OpenJPA etc.