



Testing Spring

Beginner to Guru

Overview of Testing with Spring Boot



Features of Spring Boot

- Spring Boot is an opinionated framework used to create Spring Framework applications quickly
- Provides curated dependencies with version management
- Provides starter dependencies for common features
 - ie: Spring Data JPA starter includes:
 - Spring Data JPA, Hibernate, HikariCP, Spring JDBC, etc
- Provides opinionated auto-configuration of included features.
 - ie: - when H2 database is included, Spring Boot will auto-configure a H2 in-memory database.



Spring Boot Testing

- Spring Boot Test features are enabled through the inclusion of the starter:
 - `spring-boot-starter-test`
- This starter provides:
 - Common testing dependencies
 - Spring Boot Testing Dependencies - (ie Testing annotations and support)
 - Spring Boot Testing Auto-Configuration



Spring Boot Test Scope Dependencies

- The Spring Boot Test (as of version 2.1.x) starter brings in the following Testing Libraries:
 - **JUnit** (Spring Boot 2.1 and earlier is JUnit 4, Spring Boot 2.2 will support JUnit 5)
 - **Spring Test** - Spring Framework Testing features
 - **AssertJ** - Fluent assertions
 - **Hamcrest** - Matchers for testing
 - **Mockito** - Mocking framework
 - **JSONAssert** - Assertions for JSON
 - **JsonPath** - XPath for JSON



Spring Testing Context with Spring Boot

- **@SpringBootTest** - will enable Spring Context
 - If using JUnit 4 the following class level annotation is also required:
 - @RunWith(SpringRunner.class)
 - Annotation includes @ExtendWith(SpringExtension.class), thus is not needed
 - By default searches for @SpringBootConfiguration
 - Included with @SpringBootApplication
 - By default, Spring Boot will not start a web server



```
com
+- example
  +- myapplication
    +- Application.java
    |
  +- customer
    | +- Customer.java
    | +- CustomerController.java
    | +- CustomerService.java
    | +- CustomerRepository.java
    |
  +- order
    +- Order.java
    +- OrderController.java
    +- OrderService.java
    +- OrderRepository.java
```





Web Environment

- To enable the web environment - `@SpringBootTest(webEnvironment= <option>)`
- Web Environment Options:
 - **MOCK** - Default - loads mock web environment
 - **RANDOM_PORT** - Provides embedded web server listening on a random port. (useful to avoid port conflicts)
 - **DEFINED_PORT** - Provides embedded web server listening on a 8080 (default) or server.port defined in application.properties
 - **NONE** - No Web Environment



Spring Boot Test Annotations

- **@TestComponent** - Stereotype for test components
- **@TestConfiguration** - Java Configuration for tests
- **@LocalServerPort** - Inject port of running server
- **@MockBean** - Inject Mockito Mock
- **@SpyBean** - Inject Mockito Spy



Spring Boot Test Slices

- **@SpringBootTest** - will by default scan your project and bring up a full context using all available (enabled) auto configurations
 - This can be heavy and costly on more complex applications
- Spring Boot Test **Slices** - targeted light weight configurations which do not enable the complete defined auto configuration
- Example: **@JsonTest** - Creates a Spring Boot configured JSON environment for Jackson (default) or Gson.
- Use @...Test on test class instead of @SpringBootTest



Test slice

Imported auto-configuration

@DataJdbcTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.data.jdbc.JdbcRepositoriesAutoConfiguration

org.springframework.boot.autoconfigure.flyway.FlywayAutoConfiguration

org.springframework.boot.autoconfigure.jdbc.DataSourceAutoConfiguration

org.springframework.boot.autoconfigure.jdbc.DataSourceTransactionManagerAutoConfiguration

org.springframework.boot.autoconfigure.jdbc.JdbcTemplateAutoConfiguration

org.springframework.boot.autoconfigure.liquibase.LiquibaseAutoConfiguration

org.springframework.boot.autoconfigure.transaction.TransactionAutoConfiguration

org.springframework.boot.test.autoconfigure.jdbc.TestDatabaseAutoConfiguration





@DataJpaTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.data.jpa.JpaRepositoriesAutoConfiguration

org.springframework.boot.autoconfigure.flyway.FlywayAutoConfiguration

org.springframework.boot.autoconfigure.jdbc.DataSourceAutoConfiguration

org.springframework.boot.autoconfigure.jdbc.DataSourceTransactionManagerAutoConfiguration

org.springframework.boot.autoconfigure.jdbc.JdbcTemplateAutoConfiguration

org.springframework.boot.autoconfigure.liquibase.LiquibaseAutoConfiguration

org.springframework.boot.autoconfigure.orm.jpa.HibernateJpaAutoConfiguration

org.springframework.boot.autoconfigure.transaction.TransactionAutoConfiguration

org.springframework.boot.test.autoconfigure.jdbc.TestDatabaseAutoConfiguration

org.springframework.boot.test.autoconfigure.orm.jpa.TestEntityManagerAutoConfiguration





@DataLdapTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.data.ldap.LdapRepositoriesAutoConfiguration

org.springframework.boot.autoconfigure.ldap.LdapAutoConfiguration

org.springframework.boot.autoconfigure.ldap.embedded.EmbeddedLdapAutoConfiguration





@DataMongoTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.data.mongo.MongoDataAutoConfiguration

org.springframework.boot.autoconfigure.data.mongo.MongoReactiveDataAutoConfiguration

org.springframework.boot.autoconfigure.data.mongo.MongoReactiveRepositoriesAutoConfiguration

org.springframework.boot.autoconfigure.data.mongo.MongoRepositoriesAutoConfiguration

org.springframework.boot.autoconfigure.mongo.MongoAutoConfiguration

org.springframework.boot.autoconfigure.mongo.MongoReactiveAutoConfiguration

org.springframework.boot.autoconfigure.mongo.embedded.EmbeddedMongoAutoConfiguration





@DataNeo4jTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.data.neo4j.Neo4jDataAutoConfiguration

org.springframework.boot.autoconfigure.data.neo4j.Neo4jRepositoriesAutoConfiguration

org.springframework.boot.autoconfigure.transaction.TransactionAutoConfiguration





@DataRedisTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.data.redis.RedisAutoConfiguration

org.springframework.boot.autoconfigure.data.redis.RedisRepositoriesAutoConfiguration





@JdbcTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.flyway.FlywayAutoConfiguration

org.springframework.boot.autoconfigure.jdbc.DataSourceAutoConfiguration

org.springframework.boot.autoconfigure.jdbc.DataSourceTransactionManagerAutoConfiguration

org.springframework.boot.autoconfigure.jdbc.JdbcTemplateAutoConfiguration

org.springframework.boot.autoconfigure.liquibase.LiquibaseAutoConfiguration

org.springframework.boot.autoconfigure.transaction.TransactionAutoConfiguration

org.springframework.boot.test.autoconfigure.jdbc.TestDatabaseAutoConfiguration





@JooqTest

`org.springframework.boot.autoconfigure.flyway.FlywayAutoConfiguration`

`org.springframework.boot.autoconfigure.jdbc.DataSourceAutoConfiguration`

`org.springframework.boot.autoconfigure.jdbc.DataSourceTransactionManagerAutoConfiguration`

`org.springframework.boot.autoconfigure.jooq.JooqAutoConfiguration`

`org.springframework.boot.autoconfigure.liquibase.LiquibaseAutoConfiguration`

`org.springframework.boot.autoconfigure.transaction.TransactionAutoConfiguration`





@JsonTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.gson.GsonAutoConfiguration

org.springframework.boot.autoconfigure.jackson.JacksonAutoConfiguration

org.springframework.boot.autoconfigure.jsonb.JsonbAutoConfiguration

org.springframework.boot.test.autoconfigure.json.JsonTestersAutoConfiguration





@RestClientTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.gson.GsonAutoConfiguration

org.springframework.boot.autoconfigure.http.HttpMessageConvertersAutoConfiguration

org.springframework.boot.autoconfigure.http.codec.CodecsAutoConfiguration

org.springframework.boot.autoconfigure.jackson.JacksonAutoConfiguration

org.springframework.boot.autoconfigure.jsonb.JsonbAutoConfiguration

org.springframework.boot.autoconfigure.web.client.RestTemplateAutoConfiguration

org.springframework.boot.autoconfigure.web.reactive.function.client.WebClientAutoConfiguration

org.springframework.boot.test.autoconfigure.web.client.MockRestServiceServerAutoConfiguration

org.springframework.boot.test.autoconfigure.web.client.WebClientRestTemplateAutoConfiguration





@WebFluxTest

org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration

org.springframework.boot.autoconfigure.context.MessageSourceAutoConfiguration

org.springframework.boot.autoconfigure.gson.GsonAutoConfiguration

org.springframework.boot.autoconfigure.http.codec.CodecsAutoConfiguration

org.springframework.boot.autoconfigure.jackson.JacksonAutoConfiguration

org.springframework.boot.autoconfigure.jsonb.JsonbAutoConfiguration

org.springframework.boot.autoconfigure.security.reactive.ReactiveSecurityAutoConfiguration

org.springframework.boot.autoconfigure.security.reactive.ReactiveUserDetailsServiceAutoConfiguration

org.springframework.boot.autoconfigure.validation.ValidationAutoConfiguration

org.springframework.boot.autoconfigure.web.reactive.WebFluxAutoConfiguration

org.springframework.boot.test.autoconfigure.web.reactive.WebTestClientAutoConfiguration





@WebMvcTest

```
org.springframework.boot.autoconfigure.cache.CacheAutoConfiguration
org.springframework.boot.autoconfigure.context.MessageSourceAutoConfiguration
org.springframework.boot.autoconfigure.data.web.SpringDataWebAutoConfiguration
org.springframework.boot.autoconfigure.freemarker.FreeMarkerAutoConfiguration
org.springframework.boot.autoconfigure.groovy.template.GroovyTemplateAutoConfiguration
org.springframework.boot.autoconfigure.gson.GsonAutoConfiguration
org.springframework.boot.autoconfigure.hateoas.HypermediaAutoConfiguration
org.springframework.boot.autoconfigure.http.HttpMessageConvertersAutoConfiguration
org.springframework.boot.autoconfigure.jackson.JacksonAutoConfiguration
org.springframework.boot.autoconfigure.jsonb.JsonbAutoConfiguration
org.springframework.boot.autoconfigure.mustache.MustacheAutoConfiguration
org.springframework.boot.autoconfigure.task.TaskExecutionAutoConfiguration
org.springframework.boot.autoconfigure.thymeleaf.ThymeleafAutoConfiguration
org.springframework.boot.autoconfigure.validation.ValidationAutoConfiguration
org.springframework.boot.autoconfigure.web.servlet.WebMvcAutoConfiguration
org.springframework.boot.autoconfigure.web.servlet.error.ErrorMvcAutoConfiguration
org.springframework.boot.test.autoconfigure.web.servlet.MockMvcAutoConfiguration
org.springframework.boot.test.autoconfigure.web.servlet.MockMvcSecurityAutoConfiguration
org.springframework.boot.test.autoconfigure.web.servlet.MockMvcWebClientAutoConfiguration
org.springframework.boot.test.autoconfigure.web.servlet.MockMvcWebDriverAutoConfiguration
```



Test Auto Configuration

- Spring Boot Test Auto Configuration is evolving and growing
- Configuration options listed here are as of Spring Boot 2.1.3
- See Appendix D of the official Spring Boot documentation for updates

