Spring Boot Framework – Enterprise Application Development

Duration: 5 Days | 8 Hours / Day | 40 Hours
Target Audience: Java Developers, Backend / Full-Stack Developers
Prerequisites: Working knowledge of Java Programming / Database/ API

Day 1 – Spring Boot Fundamentals & Core Concepts

Session 1: Java & Spring Ecosystem Overview

- Java features used in Spring Boot
- Evolution of Spring Framework
- Why Spring Boot for enterprise applications
- Overview of layered architecture

Session 2: Spring Boot Project Setup

- Spring Initializr usage
- Project structure & conventions
- application.properties vs application.yml
- Embedded server configuration

Session 3: Core Spring Concepts

- Inversion of Control (IoC)
- Dependency Injection (DI)
- Bean lifecycle
- @Component, @Service, @Repository
- Constructor vs field injection

Hands-On Labs (Day 1)

- Create Spring Boot project
- Develop REST controller
- Externalize configuration
- Run application using Maven & IDE

Day 2 – REST API Development & Data Access

Session 4: RESTful Web Services

- REST principles & HTTP methods
- @RestController & mappings
- Request parameters & path variables
- Request/Response body handling
- Exception handling using @ControllerAdvice

Session 5: Spring Data JPA

- ORM concepts & Hibernate overview

- Entity mapping & annotations
- Repository pattern
- CrudRepository & JpaRepository
- Pagination & sorting

Session 6: Database Integration

- Oracle Database integration (preferred)
- JDBC vs JPA
- Connection pooling (HikariCP)
- Schema generation & DDL options

Hands-On Labs (Day 2)

- Build CRUD REST APIs
- Integrate Spring Boot with Oracle DB
- Use Spring Data JPA repositories
- Global exception handling

Day 3 – Advanced Data Handling & Transactions

Session 7: JPA & Hibernate Deep Dive

- Entity relationships
- Lazy vs eager fetching
- JPQL queries
- Native SQL queries
- Projections

Session 8: Transaction Management

- ACID principles
- @Transactional annotation
- Rollback scenarios
- Isolation & propagation

Session 9: Validation & Object Mapping

- Bean Validation (JSR-380)
- Custom validations
- DTO design
- Entity–DTO mapping (ModelMapper / MapStruct)

Hands-On Labs (Day 3)

- Implement relationships between entities
- Write JPQL & native queries
- Transaction rollback testing
- Add request validations

Day 4 – Security, Logging & Monitoring

Session 10: Spring Security Fundamentals

- Authentication vs Authorization
- Spring Security architecture
- In-memory authentication
- Database-based authentication
- Password encoding

Session 11: JWT & API Security

- JWT concepts
- Securing REST APIs using JWT
- Role-based access control
- Method-level security

Session 12: Logging & Monitoring

- Logging using SLF4J & Logback
- Log levels & profiles
- Spring Boot Actuator
- Health & metrics endpoints

Hands-On Labs (Day 4)

- Secure APIs with Spring Security
- Implement JWT authentication
- Role-based authorization
- Enable Actuator & custom endpoints

Day 5 – Testing, Configuration & Enterprise Readiness

Session 13: Application Configuration & Profiles

- Spring profiles
- Environment-specific configurations
- External configuration management
- Application performance considerations

Session 14: Testing Spring Boot Applications

- Unit testing with JUnit 5
- Mockito for mocking
- Integration testing
- Database testing strategies

Session 15: Capstone Project & Best Practices

- Layered architecture best practices
- Exception & validation strategy
- Security best practices

- Code quality & maintainability

Capstone Hands-On Project

- Build an **Enterprise REST Application**
    - Spring Boot + JPA
    - Oracle DB (or alternative DB)
    - Secure APIs (JWT)
    - Validation, logging & testing
    - Environment-based configuration