

**Introduction to the Spring 5 Framework**

**Course Number:** SPRG-204  
**Duration:** 5 days

**Overview**

Accelebrate's Spring 5 training teaches attendees how to build Spring applications and RESTful services using the Spring framework.

**Prerequisites**

All attendees must have at least one year of full-time Java and JSP development experience. Prior experience with servlets and JSP is recommended but not required.

**Materials**

All attendees receive comprehensive courseware covering all subjects in the course.

**Software Needed on Each Student PC**

* JDK 8 or later (required for Spring 5)
* IntelliJ IDEA, Eclipse with Spring Tools, or another IDE of your choice
* Tomcat 8 or later (or another servlet container, upon request)
* Related lab files that Accelebrate provides
* Other free software - please contact us if you have purchased this class.

**Objectives**

* Understand the core principles of Spring, and of Dependency Injection (DI) / Inversion of Control
* Use the Spring Core module and DI to configure and wire application objects (beans) together
* Know the different types of metadata (XML, annotations/@Component, and Java Configuration/@Configuration), and how and when to use them
* Understand and use the complete capabilities of the Core module, such as lifecycle events, bean scopes, and the Spring API
* Use Spring Boot to simplify dependency management and configuration
* Work with the ORM (Object-Relational Mapping) module to integrate Spring with technologies such as Hibernate or JPA.
* Use Spring Data to automatically generate JPA-based repository classes
* Understand and use Spring’s transaction support, including the easy-to-use Java annotation support, as well as the tx/aop XML configuration elements
* Integrate Spring with Java EE Web applications
* Build Web applications with Spring MVC, including configuration using Java config and Servlet 3 capabilities
* Understand and use the core capabilities of Spring’s Reactive programming support
* Understand REST, and use Spring MVC to build RESTful services
* Use Ajax-based front ends with Spring MVC / Spring REST

**Outline**

* Introduction to Spring
  + Overview of Spring Technology
    - The Motivation for Spring, Spring Architecture
    - The Spring Framework
  + Spring Introduction
    - Declaring and Managing Beans
    - ApplicationContexts
    - Using @Component/@Named
  + Dependencies and Dependency Injection (DI)
    - Examining Dependencies
    - Dependency Inversion / Dependency Injection (DI)
    - XML Configuration of DI
    - Injection with @Autowire
* Configuration in Depth
  + Java Based Configuration (@Configuration)
    - Overview, @Configuration, @Bean
    - Dependency Injection
    - Resolving Dependencies
  + Integrating Configuration Types
    - XML vs. @Component
    - @Configuration Pros and Cons
    - Choosing a Configuration Style
    - Integrating Configuration Styles
  + Bean Scope and Lifecycle
    - Singleton, Prototype, and Other Scopes
    - Configuring Scope
    - Bean Lifecycle / Callbacks
  + Externalizing Properties
    - Properties Files
    - @PropertySource, property-placeholder
    - Using @Value
    - SpEL
  + Profiles
    - Overview and Configuration
    - Activating Profiles
* Spring Boot Overview
  + maven and Spring
  + Spring Boot Structure
  + Spring POMs with Boot Parents
  + Spring Boot Starters
  + Other Capabilities
* Spring Testing
  + Testing and JUnit Overview
    - Writing Tests - Test Classes, asserts, Naming Conventions
    - Running Tests - IDE, maven, ...
    - Test Fixtures - setup and teardown
  + Spring TestContext Framework
    - Overview
    - Configuration
    - Running Tests
* Spring and Spring Data with Hibernate/JPA
  + Overview of Spring database support
  + Configuring a DataSource
  + Using Spring with Hibernate
    - High-Level Hibernate Overview
    - SessionFactory configuration, LocalSessionFactoryBean
    - Contextual Sessions and Spring Integration
  + Using Spring with JPA
    - Managing the EntityManager (EM)
    - LocalContainerEntityManagerFactoryBean and Container-managed EMs
    - JEE and JNDI Lookup of the EM
    - Configuration and Vendor Adaptors
    - Creating a JPA Repository/DAO Bean - @PersistenceUnit, @PersistenceContext
  + Spring Data Introduction
    - Overview and Architecture
    - Configuring Spring Data
    - Repositories and JPA Repositories
    - Using CrudRepository
  + Spring Data Querying
    - Naming Conventions for Querying
    - Creating more Complex Queries
    - Query Configuration
* Spring Transaction (TX) Management
  + Overview
  + Declarative TX Management (REQUIRED, etc.)
  + TX Scope and Propagation
  + XML Configuration of Transactions
    - Specifying Advice, TX Attributes, and Methods
    - Linking Advice with Pointcuts
    - Benefits of XML Configuration of TX Behavior
* Spring Web Integration and Intro to Spring MVC
  + Java EE Web App Integration
  + ContextLoaderListener and WebApplicationContext
  + Web MVC Overview
  + Spring MVC Basics
    - Configuration and the DispatcherServlet
    - @Controller, @RequestMapping (Handlers)
    - @RequestParam and Parameter Binding
    - View Resolvers
    - Controller Details - @RequestParam, @PathVariable
    - Model Data and @ModelAttribute
* Additional Spring MVC Capabilities
  + @ModelAttribute and Reference Data
  + Forms and Binding, Spring Form Tags
  + Sessions and @SessionAttributes
  + Validation / JSR-303
* RESTful Services with Spring
  + REST Overview, URI Templates
  + REST and Spring MVC
  + Spring support for REST
  + @RequestMapping/@PathVariable, @RequestBody, @ResponseBody
  + URI Templates and @PathVariable
  + Controllers with @RestController
  + Generating JSON
    - JSON Overview
    - JSON Representations for Resources
    - Message Converters
  + Generating XML
    - JAXB and Jackson Message Converters for XML
    - JAXB / @XmlRootElement
  + Content Negotiation
* Working with JSON and XML
  + Generating JSON
    - JSON Overview
    - JSON Representations for Resources
    - Message Converters
  + Generating XML
    - JAXB and Jackson Message Converters for XML
    - JAXB / @XmlRootElement
  + Content Negotiation
* Java Clients for RESTful Services
  + Client Requirements and Spring's RestTemplate
  + getForObject() / getForEntity()
  + Other RestTemplate Methods
  + Accessing Headers / exchange()
* Common REST Patterns
  + GET: Read
  + POST: Create
  + PUT: Update
  + DELETE: Delete
  + Programming on server side, and client side (with RestTemplate)
* Additional New Features in Spring 5
  + Updates to Spring Core
  + WebFlux / Reactive Web Framework
* XML-Specific Configuration (Optional)
  + Collections - lists, sets, etc.
  + Additional Capabilities
    - Factory Classes and Factory Methods
    - Definition Inheritance (Parent Beans)
    - AutoWiring with XML
    - Inner Beans, Compound Names
* Conclusion