Introduction to Spring 5, Spring Boot, and Spring REST

Course ID #: 7000-378-ZZ-Z
Hours: 35

Course Content

Course Description:

Spring 5 provides an evolutionary advance of Spring's powerful capabilities. This course introduces the many Spring Core capabilities, as well as providing guidelines on when and how to use them. It also goes into considerable depth on Spring Boot for dependency management and auto-configuration, as well as Spring REST for creating RESTful resources.

This course is hands on with labs to reinforce all the important concepts. It will enable you to build working Spring applications and give you an understanding of the important concepts and technology in a very short time.

At Course Completion:

After competing this course, student will be able to:

- 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
- Understand and use Boot's auto-configuration
- Customize Boot's behavior with properties and in other ways
- Work with the ORM (Object-Relational Mapping) module to integrate Spring with technologies such as 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
- Understand REST, and use Spring REST to build RESTful services
- Use Ajax-based front ends with Spring REST
- Use RestTemplate to create Java REST clients

Prerequisites:

Working knowledge of Java programming, including use of inheritance, interfaces, and exceptions.

Topics:

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Session 1: Introduction to Spring

- Overview of Spring Technology
  - Motivation for Spring, Spring Architecture
  - The Spring Framework
  - maven and Spring
- Spring Introduction
  - Declaring and Managing Beans
  - ApplicationContexts - The Spring Container
  - XML and @Component/@Named Config
- Dependencies and Dependency Injection (DI)
  - Examining Dependencies
  - Dependency Inversion / Dependency Injection (DI)
  - DI in Spring - XML and @Autowired

Session 2: Configuration in Depth

- Java Based Configuration (@Configuration)
  - Overview, @Configuration, @Bean
  - Dependency Injection
  - Resolving Dependencies
- Integrating Configuration Types
  - XML and @Component Pros/Cons
  - @Configuration Pros/Cons
  - Choosing a Configuration Style
  - Integrating with @Import and <import>
- 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

Session 3: Spring Boot Overview

- Spring Boot Structure
- Spring POMs with Boot Parents
- Spring Boot Starters
- Other Capabilities

Session 4: 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

Session 5: Spring and Spring Data with JPA

- Overview of Spring database support
- Configuring a DataSource
- 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 Overview
  - Overview and Architecture
  - Configuring Spring Data
  - Repositories and JPA Repositories
  - Using CrudRepository
- Using Spring Data
  - Naming Conventions for Querying
  - Creating more Complex Queries

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- Query Configuration

Session 6: Spring Transaction (TX) Management

- Overview
- Declarative TX Management (REQUIRED, etc.)
- TX Scope and Propagation
- Pointcut-based Configuration of Transactions

Session 7: RESTful Services with Spring

- REST Overview and Principles
- REST and Spring MVC
  - Spring support for REST
  - @RequestMapping/ @PathVariable, @RequestBody, @ResponseBody
  - URI Templates and @PathVariable
  - Controllers with @RestController
- Requests and Responses
- Ajax Overview

Session 8: 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

Session 9: Java Clients for RESTful Services

- Client Requirements and Spring's RestTemplate
- getForObject() / getForEntity()
- Other RestTemplate Methods
- Accessing Headers / exchange()

Session 10: Common REST Patterns

- GET: Read
- POST: Create
- PUT: Update
- DELETE: Delete
- Programming on server side, and client side (with RestTemplate)

Session 11: Boot and its Configuration/Customization

- SpringBootApplication / CommandLineRunner / ApplicationRunner
- Working with Properties - YAML and .properties
- Logging and its Configuration
- Spring TestContext Framework
- Auto-configuration and Customization

Session 12: Boot Database Support

- Overview and JDBC Support
- JPA Support

Session 13: Spring Boot Web/Security

- Spring Boot Web
- Spring Boot Security
- Spring Boot Data REST

Session 14: Additional Spring 5 Features

- Updates to Spring Core
- WebFlux / Reactive Web Framework