Core Spring
Course Summary

Description
This course covers the basics of programming the Spring framework.

Objectives
By the end of this course, students will be able to:

- Understand and program the fundamentals of Spring, including dependency injection and how to wire beans together using annotations and XML.
- Program Web applications using Spring MVC.
- Understand the concepts of Spring Aspect Oriented Programming (AOP)
- Create reliable programs that execute units of work using Spring’s transaction support.
- Use Spring AOP
- Secure applications with Spring Security
- Use Spring’s facilities for remote computing

Topics

- Introduction to the Course
- Introduction to the Spring Framework
- XML Dependency Injection
- Spring Beans
- Additional Configuration and Annotations
- Introduction to Spring MVC
- Spring and JDBC
- Introduction to Spring AOP
- Transactions in Spring
- Testing Spring Applications
- Spring Remoting with RMI, HttpInvoker and JMS
- Introduction to Spring Boot
- Introduction to REST
- RESTful CRUD Services
- Spring and REST

Audience
Business analysts, developers, managers and other people interested in learning how to program Spring

Prerequisites
Basic Java programming experience is required.

Duration
Three days

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Core Spring
Course Outline

Day 1

I. Chapter 1. Introduction to the Course
   A. Core Spring Framework Workshop
   B. Legal Information
   C. Core Spring Framework Workshop
   D. Introductions
   E. Course Description
   F. Course Objectives
   G. Sample Agenda
   H. Sample Agenda, cont'd
   I. Sample Agenda, cont'd
   J. Course Logistics

Lab 1: Introduction to Spring
   • Part 1: A Simple Spring Application
   • Part 2: Using XML Configuration

II. Chapter 2. Introduction to the Spring Framework
   A. Introduction to the Spring Framework
   B. What is the Spring Framework?
   C. History of Spring
   D. Spring Fundamentals
   E. Spring Modules
   F. What is a Spring Bean?
   G. Programming To Interfaces
   H. Dependent Objects Without Spring
   I. The Spring Container
   J. Introduction to Dependency Injection
   K. Configuring Injection with Annotations
   L. Configuring Injection with XML
   M. Injecting Simple Values
   N. Configuring Spring
   O. Creating the Container
   P. Steps for a Simple Spring Application
   Q. Hello World From Spring
   R. Chapter Summary

Lab 2: Spring Containers
   • Part 1: Closing the Application Context
   • Part 2: Working with Multiple XML Files

III. Chapter 3. XML Dependency Injection
    A. XML Dependency Injection
    B. Introduction to Dependency Injection
    C. Configuring Dependency Injection
    D. Inversion of Control
    E. Sample Application for this Chapter
    F. Setter Injection
    G. Property Conversions
    H. Constructor Injection
    I. Constructor Injection Resolution
    J. Constructor Injection Resolution, cont'd
    K. Mixing Injection Types
    L. Setter vs Constructor Injection
    M. Chapter Summary

Lab 3: XML Dependency Injection
    • Part 1: XML Dependency Injection
    • Part 2: The @Required Annotation
    • Part 3: Experimenting

IV. Chapter 4. Spring Beans
    A. Spring Beans
    B. Configuring Spring Beans
    C. XML Bean IDs, Names and Aliases
    D. Inheriting an XML Definition
    E. XML Abstract Parent Beans
    F. Bean Scopes
    G. Singleton Scope
    H. Prototype Scope
    I. XML Inner Beans
    J. XML Compound Scope
    K. Bean Lifecycle
    L. Lifecycle Annotations
    M. Creation Lifecycle
    N. Creation Lifecycle Example
    O. Destruction Lifecycle
    P. Destruction Lifecycle Example
    Q. BeanPostProcessors
    R. Coding A BeanPostProcessor
    S. BeanPostProcessor Example
    T. Factory Methods
    U. Factory Classes
    V. Factory Classes, cont'd
    W. Chapter Summary

Lab 4: Spring Beans
    • Part 1: Spring Beans
    • Part 2: Bean Lifecycle
    • Part 3: Writing a Bean Post Processor
    • Optional Part 4: Using a Factory Class

V. Chapter 5. Additional Configuration and Annotations
    A. Additional Configuration and Annotations
    B. Configuring Spring Beans
    C. Spring XML Namespaces
    D. Spring XML Namespaces, cont'd
    E. Java Collection Framework Review

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Course Outline (cont’d)

F. Java Collection Framework Review, cont’d
G. XML: Injecting Collections as Properties
H. Spring XML Collection Configuration
I. XML: Injecting a List
J. XML: Injecting a Set
K. XML: Injecting a Map
L. XML: Injecting java.util.Properties
M. Introduction to XML Autowiring
N. XML Autowiring By Name
O. XML Autowiring By Type
P. Should You Autowire using XML?
Q. Introduction to Annotations
R. Annotations and Spring
T. The @Value Annotation
U. The @Required Annotation
V. The @Resource Annotation
W. The @Component Annotation
Y. The @Component Annotation, cont’d
Z. Autowiring with Annotations
AA. The @Qualifier Annotation
BB. Other Annotations
CC. Spring and JSR-330
DD. Annotations vs XML Configuration
EE. Introduction to Java-Based Configuration
FF. Java-Based Configuration Example
GG. Chapter Summary

Lab 5: Spring Wiring - Part 1: Injecting Collections

Day 2

VII. Chapter 6. Introduction to Spring MVC
A. Introduction to Spring MVC
B. Spring and the Web
C. The Spring WebApplicationContext
D. The Spring WebApplicationContext, cont’d
E. Introduction to Spring MVC
F. What is the MVC Design Pattern?
G. Spring MVC Architecture
H. Spring MVC Controllers
I. Form Processing Flow: Phase 1
J. Form Processing Flow: Phase 2
K. Spring MVC Development Steps
L. Configuring the Web Application

M. A Service Bean
N. A Spring MVC Input Form
O. A Spring MVC Result Page
P. Configuring Controller Annotation Processing
Q. What is a ViewResolver?
R. A Spring MVC Command Controller
S. The Spring Configuration File
T. Chapter Summary

Lab 6: Spring and the Web
- Part 1: Spring and the Web
- Part 2: Spring MVC

VIII. Chapter 7. Spring and JDBC
A. Spring and JDBC
B. The DAO Design Pattern
C. What's Wrong with JDBC?
D. Introducing the Spring JDBC Module
E. The JdbcTemplate Class
F. The SimpleJdbcTemplate Class
G. The JdbcDaoSupport Classes
H. Spring JDBC Exceptions
I. JDBC Connection Review
J. Working with Data Sources in Spring
K. Configuring a DriverManager Source
L. Configuring a JNDI-Based DataSource
M. Writing a DAO
N. JdbcTemplate Query Methods
O. Example: Querying Row Count
P. Mapping Rows to Objects
Q. Example: Query All
R. Example: Find Student By ID
S. SimpleJdbcTemplate Insert, Update and Delete
T. Example: Insert
U. Complete DAO Example
V. Chapter Summary

Lab 7: Spring and JDBC - Part 1: Setting Up the Environment
- Part 2: Setting Up the Web Project
- Part 3: Spring JdbcTemplate DAO
- Part 4: Web Front End for the DAO
- Part 5: Completing the Application

IX. Chapter 8. Introduction to Spring AOP
A. Introduction to AOP
B. What is Aspect-Oriented Programming?
C. AOP Terminology
D. Spring Support for AOP
Core Spring

Course Outline (cont’d)

E. Steps for Using Spring AOP
F. Defining a Pointcut
G. Basic Pointcut Syntax
H. Applying Advice
I. Configuring Spring AOP
J. Spring AOP Behind the Scenes
K. Complete Hello, World Example
L. Chapter Summary

X. Chapter 9. Transactions in Spring
A. Transactions in Spring
B. Introduction to Transactions
C. A Program with No Transactions
D. A Program with Transactions
E. ACID Transactions
F. Global and Local Transactions
G. Distributed Transactions
H. Spring and Transactions
I. Spring Transaction Managers
J. Configuring a DataSource Transaction Manager
K. Configuring a Hibernate Transaction Manager
L. Configuring a JTA Transaction Manager
M. Using a Vendor-Specific Transaction Manager
N. Transaction Demarcation and Management
O. Using Declarative Transaction Management
P. Spring Transaction Exception Handling
Q. Transaction Propagation
R. Transaction Propagation Attributes
S. Transaction Propagation Example
T. A Typical Architecture
U. Exceptions and Rolling Back
V. Transaction Timeouts
W. Transaction Isolation
X. Transaction Isolation Levels
Y. Read Only Transactions
Z. Specifying Transaction Attributes
AA. Transaction Annotations
BB. The @Transactional Annotation
CC. Complete Declarative Transaction Example
DD. Chapter Summary

Lab 8: Spring Transactions
- Part 1: Setup
- Part 2: Writing the DAOs
- Part 3: Configuring Spring
- Part 4: Testing

Day 3

XI. Chapter 10. Testing Spring Applications
A. Testing Spring Applications
B. Spring Testing Issues
C. Unit Testing Spring Beans
D. Example: Simple Unit Test with JUnit4
E. Integration Testing Spring Beans
F. Integration Test Example
G. Injecting Spring Beans
H. Using Tests with Transactions and Database
I. Transaction Test Example
J. Chapter Summary

Optional Lab 9: Testing
- Part 1: Introduction to JUnit
- Part 2: Integration Testing with Spring

XII. Chapter 11. Spring Remoting with RMI, HttpInvoker and JMS
A. Spring Remoting with RMI, HttpInvoker and JMS
B. Introduction to Remote Objects
C. Introduction to RMI
D. RMI Shortcomings
E. Spring RMI Support
F. Spring RMI Example
G. Client/Server Firewall Issues
H. Spring HTTP Invoker Support
I. Spring HttpInvoker Example
J. What is the Java Message Service?
K. Point to Point Messaging
L. Publish and Subscribe Messaging
M. JMS Message Types
N. JMS Shortcomings
O. Spring and JMS
P. The JmsTemplate Type
Q. Accessing JNDI Resources
R. Configuring the JmsTemplate
S. JmsTemplate Examples
T. Converting Messages
U. Subclassing JmsGatewaySupport
V. Receiving Messages
W. The MessageListener Interface

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Course Outline (cont’d)

X. Configuring a Message Listener Container
Y. POJO Listener Example
Z. Chapter Summary

XIII. Chapter 12. Introduction to Spring Boot
A. Introduction to Spring Boot
B. What is Spring Boot?
C. Building Spring Boot Projects
D. Generating a Starter Project
E. Gradle Project Structure
F. The Generated Build Script
G. Generating an Eclipse Project
H. The 'main' Program
I. Spring Boot Autoconfiguration
J. Configuring SpringMVC JSP Views
K. Running the Project
L. Complete Example
M. Chapter Summary

XIV. Chapter 13. Introduction to REST
A. Introduction to REST
B. What is REST?
C. REST vs SOAP
D. Principles of REST
E. Resource IDs
F. Resources With Multiple Representations
G. Use Links to Connect Resources
H. Use Standard HTTP Methods
I. Stateless Communication
J. REST in Java
K. What is Restlet?
L. Restlet Framework Features
M. A Simple Restlet Resource
N. The Restlet Application
O. The Restlet on a Servlet Container
P. JAX-WS and REST
Q. JAX-RS
R. A JAX-RS Service
S. Configuring a JAX-RS Web App
T. Spring MVC REST
U. Chapter Summary

Lab 10: Simple RESTful Service - Part 1:
Creating the Service

XV. Chapter 14. RESTful CRUD Services
A. RESTful CRUD Services
B. The Richardson Maturity Model
C. RESTful CRUD Service Overview
D. HTTP Review
E. Media Types
F. Implementing Create
G. Implementing Retrieve
H. Implementing Update
I. Implementing Delete
J. Complete JAX-RS CRUD Example
K. Chapter Summary

XVI. Chapter 15. Spring and REST
A. Spring and REST
B. Spring Support for REST
C. Message Converters
D. Content Negotiation
E. Negotiation via HTTP Accept Header
F. Spring REST Annotations
G. A Simple RESTful Controller
H. Responding to POST Requests
I. Responding to PUT Requests
J. Configuring a Spring REST Application
K. Chapter Summary

Lab 11: Spring MVC RESTful Service
- Part 1: Creating the Service
- Optional Challenge Part 2: Implementing CRUD and
- Using a jQuery AJAX Client