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# Spring training: Developing enterprise applications
5 days (35 hours)

## Presentation

Discover our intensive training on Spring, developing enterprise applications to master enterprise Java development in 5 days. This comprehensive training course will enable you to explore the Spring ecosystem in depth, adopt best practices and design robust, secure and scalable applications, thanks in particular to Spring Boot.

Spring  isan open source framework that provides a reliable and efficient development environment that simplifies application development.

Learn how to effectively manage application complexity using inversion of control and dependency injection. Practical workshops will help you easily configure your components and precisely manage their interactions.

Become an expert in data management with Spring Data. Implement high-performance data access services and simplify your interactions with relational and NoSQL databases thanks to practical hands-on workshops.

Optimize your productivity with Spring Boot, by taking advantage of its features, such as autoconfiguration, automated packaging, monitoring with Spring Boot Actuator, and fast, efficient deployment.

Finally, secure your applications with Spring Security, design robust REST APIs, and adopt Cloud-native and responsive architectures with Spring Cloud and WebFlux, to build innovative solutions.

As with all our training courses, this one will introduce you to the latest version of the tool, Spring 6.2 (at the time of writing).

## Objectives

- Understanding Spring mechanisms and its role in Java technologies
- Developing Java applications with Spring
- Set up IDEs and Spring configuration
- How to create GUIs
- Understanding the benefits of Aspect-Oriented Programming (AOP)
- Manage the configuration of application components
- Create a data access service
- Mastering development best practices with Spring

## Target audience

- Java and Java EE developers
- Architects
- Project managers

## Prerequisites

- Have taken our Java training course
- Knowledge of the Java EE ecosystem
- Experience in application development

# Our Spring training program: Developing enterprise applications

## Introduction to the Spring ecosystem

- Spring history and philosophy
- What is a Spring lightweight container?
- Fundamental principles (IoC container, dependency injection, modularity)
- Ecosystem overview (Spring MVC, Boot, Data, Security, Cloud)
- Setting up the development environment (IDE, Maven)
- Practical workshop: Installation and initial configuration of a basic Spring Boot project.

## Control inversion and Dependency injection

- Inversion of control (IoC) principle
- Injection techniques: builder, setter, field
- Advanced management of circular and multiple bean dependencies
- SOLID principles applied to Spring
- Practical workshop: Creation of a modular order management application using dependency injection.

## Defining and managing JavaBeans

- Adding new beans
- Using stereotype annotation to add beans to Spring
- Implementation of relationships between beans defined in the configuration file
- Using the @Autowired annotation to inject beans
  - Use @Autowired to inject values through class fields
  - Use @Autowired to inject values through the constructor
  - Using dependency injection through the setter
- Circular dependency management
- Practical workshop: Development of a simple product catalog management application with linked JavaBeans, injection via annotations.

## Aspect-Oriented Programming (AOP)

- Basic principles and benefits of the PDO
- XML configuration and annotations
- Common use cases (logging, security, transactions)
- Practical workshop: Implementing an advanced centralized logging system with Spring AOP.

## Recent news from the Spring framework

- Major features of recent releases (Spring Framework 6.x, Spring Boot 3.x)
- Native support for GraalVM (native images)
- New safety and observability features
- Migration to Spring Boot 3.x
- Practical workshop: Migrating an existing Spring application to Spring Boot 3.x with native compilation.

## Architecture and key components (Model, View, Controller)

- Forms management, validation and exceptions
- Internationalization and static resource management
- Practical workshop: Development of a complete web interface with centralized validation and error handling.

## REST API development with Spring

- RESTful design principles with Spring
- Building REST controllers, managing requests and responses
- Securing REST APIs
- Practical workshop: Creating and securing a REST API for a task management platform.

## Data access and management with Spring Data

- Spring Data fundamentals

- Using Spring Data JPA, MongoDB and Neo4j
- Advanced custom query and transaction management
- Practical workshop: Developing a multi-database persistence layer with Spring Data JPA and MongoDB.

## Advanced security with Spring Security

- Basic and advanced Spring Security configuration
- Authentication (JWT, OAuth2, SSO)
- Fine-tuned role and authorization management
- Protection against common attacks (CSRF, XSS)
- Practical workshop: Complete application security with multi-level authentication and advanced authorization management.

## Spring Boot: Automation and Deployment

- Benefits and automatic configuration
- Dependency management and packaging (JAR, WAR, OCI)
- Monitoring with Spring Boot Actuator
- CI/CD and deployment on Docker/Kubernetes
- Practical workshop: Automated deployment of a Spring Boot application with Docker, Kubernetes and integrated monitoring Conclusion and best practices

## Spring Cloud: Cloud-native application development

- Spring Cloud fundamental concepts (Service Discovery, Load Balancing, Circuit Breaker)
- Microservices with Spring Cloud and Spring Boot
- Centralized configuration management with Spring Cloud Config
- Inter-service communication with Feign and Ribbon
- Monitoring and observability with Spring Cloud Sleuth and Zipkin
- Hands-on workshop: Developing a complete microservices architecture with service discovery, centralized configuration management and distributed monitoring.

## Testing and software quality with Spring

- Introduction to unit and integration testing in the Spring ecosystem
- Spring Test Framework (JUnit, MockMvc)
- Mocking and testing with Mockito
- Comprehensive integration testing with Testcontainers
- Good testing practices in a Spring project
- Practical workshop: Full implementation of advanced unit and integration tests on an existing Spring application.

## Responsiveness with Spring WebFlux

- Introduction to reactive programming (Reactive Streams)

- Comparison between Spring MVC and Spring WebFlux
- Managing non-blocking requests with WebFlux
- Reactive databases (R2DBC, MongoDB Reactive)
- Advanced reactive programming techniques and performance optimization
- Practical workshop: Converting an existing REST API into a high-performance reactive API with Spring WebFlux.

# Companies concerned

This course is aimed at both individuals and companies, large or small, wishing to train their teams in a new advanced computer technology, or to acquire specific business knowledge or modern methods.

# Positioning on entry to training

Positioning at the start of training complies with Qualiopi quality criteria. As soon as registration is finalized, the learner receives a self-assessment questionnaire enabling us to assess his or her estimated level of proficiency in different types of technology, as well as his or her expectations and personal objectives with regard to the training to come, within the limits imposed by the selected format. This questionnaire also enables us to anticipate any connection or security difficulties within the company (intra-company or virtual classroom) which could be problematic for the follow-up and smooth running of the training session.

# Teaching methods

Practical course: 60% Practical, 40% Theory. Training material distributed in digital format to all participants.

# Organization

The course alternates theoretical input from the trainer, supported by examples, with brainstorming sessions and group work.

# Validation

At the end of the session, a multiple-choice questionnaire verifies the correct acquisition of skills.

# Sanction

A certificate will be issued to each trainee who completes the course.