

Spring Boot with Microservices



Module 1 – Spring Framework with React JS

Objective: Master backend with Spring Boot and frontend with React JS.

Topics:

Spring Core & Boot:

- Learn Design Patterns like Factory, Singleton, ORM, MVC, DAO etc.
- Maven / Gradle Build Tools
- Inversion of Control (IoC) and Dependency Injection (DI)
- Spring Boot Setup and Configuration
- Spring Data JPA and Hibernate ORM
- Spring MVC
- Spring Boot REST APIs
- Validation, Exception Handling, and Logging
- JSON and XML Handling
- Unit Testing (JUnit, Mockito)
- Spring Boot Properties – profiling
- Spring Security – Authentication & Authorization using JWT, OAuth2
- OAuth2
- Consuming 3rd party Rest APIs, Working with Rest Template
- Building, Deploying and Running Spring Boot App in Tomcat

React JS (Frontend):

- React Components, Props, and State
- JSX and Virtual DOM
- React Hooks
- Event Handling and Conditional Rendering
- API Integration using Axios / Fetch
- React Router for Navigation
- Form Handling and Validation
- Integration with Spring Boot REST APIs

Project: Digital Lending System [Personal Loan App] (React + Spring Boot + MySQL)

Module 2 – Microservices with Spring Cloud & AI

Objective: Build scalable enterprise applications using a microservices architecture.

Part A - Microservices

- Monolithic vs Microservices Architecture
- Microservices Design Principles & Patterns
- Creating Sample Microservices App
- Service Registry and Discovery with Eureka Server
- API Gateway setup using Spring Cloud Gateway
- Config Server and Centralized Configuration using Spring Cloud Config
- Feign Client in the place of REST Template
- Distributed Tracing with Zipkin
- Health Monitoring using Admin Server
- Circuit Breaker with Resilience4j
- Asynchronous Communication using RabbitMQ
- Working with Streams using Kafka & Spring Cloud Streams
- Understanding CQRS and SAGA
- Best Practices of Caching Techniques
- Implementing Log aggregation

Part B – Artificial Intelligence Integration using Spring AI:

- Introduction to Artificial Intelligence and Machine Learning
- AI Libraries in Java (Deeplearning4j, Tribuo)
- Using Python-based AI Models via REST APIs
- ML Basics: Regression, Classification, Clustering
- Neural Network Fundamentals
- NLP (Text Classification, Sentiment Analysis)
- AI API Integrations (OpenAI, Hugging Face)
- **Spring AI Framework:**
 - Introduction to Spring AI

- Prompt Engineering Basics
 - Integrating LLMs via OpenAI API
 - Building a Spring Boot Chatbot using Spring AI
 - Connecting AI to Databases and REST APIs
- **Enterprise Project:** AI-Powered Job portal with Support Chatbot to build the resume

Module 3 – Cloud, DevOps, Project Development Practices

Objective: Prepare students for real-world deployment and CI/CD pipelines.

Topics:

- Git and GitHub
- Docker Basics
- Kubernetes Basics
- Deploying to AWS
- Learning Project Development Practices
 - Understand BRD, FSD
 - Understand Work Estimations
 - Understand Sprint Planning
 - Learning Preparing Use case, Flow diagrams, DB diagrams
 - Create Epic, Story, Task & Assing using JIRA

 **Suggested Duration: 3–4 Months**