

Java Application Development with Agentic AI Foundations

Duration: 5 days/40 hours

Prerequisites: Basic programming knowledge, logical thinking, and familiarity with databases is helpful.

Day 1: Java Programming Fundamentals and OOP

Topics

- Java ecosystem and application development workflow
- JDK, JVM, JRE, IDE setup
- Java syntax, variables, data types, operators
- Control statements and loops
- Methods and modular programming
- Object-Oriented Programming concepts
- Classes, objects, constructors
- Encapsulation, inheritance, polymorphism, abstraction

Labs

- Create a Java console-based employee management program
- Implement OOP concepts using real-world entities such as Employee, Department, and Project

Outcome

Participants will be able to write basic Java programs and apply OOP principles.

Day 2: Collections, Exception Handling, File Handling, and Java 8 Features

Topics

- Arrays and String handling
- Collections Framework
- List, Set, Map, Queue
- Generics
- Exception handling
- Custom exceptions
- File handling using Java I/O and NIO
- Java 8 features
- Lambda expressions
- Streams API
- Functional interfaces

Labs

- Build a student record processing application using Collections
- Read and write records from files

- Use Streams API for filtering, sorting, and grouping data

Outcome

Participants will be able to manage data using collections, handle errors, and process data using modern Java features.

Day 3: Database Connectivity, REST API Basics, and Spring Boot Introduction

Topics

- JDBC architecture
- Connecting Java applications with databases
- CRUD operations using JDBC
- Introduction to REST APIs
- HTTP methods: GET, POST, PUT, DELETE
- JSON basics
- Introduction to Spring Boot
- Spring Boot project structure
- Controllers, services, repositories
- Dependency Injection basics

Labs

- Create a Java application connected to MySQL/PostgreSQL
- Build a simple Spring Boot REST API for employee management
- Test APIs using Postman

Outcome

Participants will be able to create database-driven Java applications and basic REST APIs.

Day 4: Spring Boot Application Development with Security and Testing

Topics

- Spring Boot layered architecture
- Entity, DTO, Repository, Service, Controller
- Spring Data JPA
- CRUD API development
- Validation and exception handling
- Logging using SLF4J / Logback
- Introduction to Spring Security
- Basic authentication and role-based access
- Unit testing with JUnit
- API testing basics

Labs

- Develop a Spring Boot CRUD application using JPA

- Add validation, logging, and global exception handling
- Secure selected APIs using Spring Security
- Write basic unit tests

Outcome

Participants will be able to build structured Spring Boot applications with validation, logging, security, and testing.

Day 5: Agentic AI for Java Developers and Capstone Project

Topics

- Introduction to AI-assisted development
- What is Agentic AI?
- Difference between chatbot, workflow automation, and AI agent
- Agent components:
 - Goal
 - Tools
 - Memory
 - Planning
 - Reasoning
 - Action execution
- Using AI tools for code generation, debugging, and documentation
- Prompting for Java developers
- Creating AI-assisted API documentation
- Concept of tool-calling agents
- Integrating Java applications with AI APIs
- Responsible AI basics

Labs

- Use AI to generate test cases and documentation for Java APIs
- Create a basic AI-assisted Java utility
- Build a mini capstone: Employee Helpdesk / Ticket Management API with AI-generated response suggestions

Outcome

Participants will understand how Agentic AI can support Java development and will complete a mini Java application project.
