Java + Spring Boot Complete Training Course (For Absolute Beginners)

Beginner Level

Introduction to Programming & Java Basics

Topics:

- **What is Programming?**

  - Definition

  - Importance in today's world

- **Introduction to Java:**

  - Java History and Evolution

  - Java SE, EE, ME

  - Java Ecosystem: JDK, JRE, JVM

- **Setting up the Environment:**

  - Install JDK

  - Configure Environment Variables

  - Installing IntelliJ IDEA / Eclipse

- **First Java Program:**

  - Structure of a Java Program (Class, Method, Main)

- ○ Compilation vs Interpretation

- ○ Writing "Hello World"

- **Variables and Data Types:**

  - ○ Primitive and Non-Primitive Data Types

  - ○ Variable Naming Rules

  - ○ Type Casting (Widening and Narrowing)

- **Operators:**

  - ○ Arithmetic, Relational, Logical, Bitwise

- **Input/Output Handling:**

  - ○ Scanner Class Basics

  - ○ System.out and System.in

Java Flow Control and Methods

Topics:

- **Conditional Statements:**

  - ○ if, if-else, if-else-if ladder

  - ○ switch-case

- **Loops:**

  - ○ for, while, do-while

  - ○ Nested Loops

  - ○ Loop Control (break, continue, return)

- **Methods:**

- ○ Method Declaration and Usage

  - ○ Method Overloading

  - ○ Parameters and Return Values

  - ○ Scope of Variables (local, instance, class)

- **Best Practices:**

  - ○ Clean Code Basics

Mini-Project : Contact Manager (Console Application)

- **Description:** Create a simple CLI app to manage contacts using methods and conditional statements.

- **Skills:** I/O, Conditional Logic, Method Structuring

Arrays, Strings, and Collections (Introduction)

Topics:

- **Arrays:**

  - ○ One-Dimensional Arrays

  - ○ Two-Dimensional Arrays

  - ○ Basic Array Operations (CRUD)

- **Strings:**

  - ○ String Methods (`length()`, `charAt()`, `substring()`, `indexOf()`, etc.)

  - ○ StringBuilder and StringBuffer

- **Collections:**

- ○ Introduction to List and Map

- ○ Using ArrayList and HashMap Basics

Introduction to Object-Oriented Programming

Topics:

- **OOP Concepts:**

  - ○ Encapsulation

  - ○ Inheritance

  - ○ Polymorphism (compile-time and runtime)

  - ○ Abstraction

- **Classes and Objects:**

  - ○ Defining and Instantiating

  - ○ Fields, Methods, and Constructors

  - ○ "this" Keyword

- **Access Modifiers:**

  - ○ public, private, protected, default

- **Interfaces and Abstract Classes**

Mini-Project : Student Management System

- **Description:** Manage student records using classes, inheritance, and interfaces.

- **Skills:** OOP Principles, Class Relationships, Basic CRUD Operations

Intermediate

Exception Handling and Debugging

Topics:

- **Exception Types:**

    - Checked and Unchecked Exceptions

- **Handling Exceptions:**

    - try-catch-finally

    - Multiple catch blocks

- **Throw and Throws Keyword**

- **Custom Exception Creation**

- **Debugging with IDE:**

    - Breakpoints

    - Watch Expressions

    - Stack Trace Analysis

File I/O and JSON Handling

Topics:

- **File Streams:**

    - Reading Files (FileReader, BufferedReader)

    - Writing Files (FileWriter, BufferedWriter)

- **Serialization and Deserialization**

- **Working with JSON:**

  - Gson or Jackson library

  - Converting Java Objects to JSON and vice-versa

Mini-Project : Payroll Manager (File-Based Storage)

- **Description:** Create a payroll system that saves employee records to a file and retrieves them.

- **Skills:** File Handling, Data Persistence

Java Collections Deep Dive

Topics:

- **List Interface:**

  - ArrayList vs LinkedList

- **Set Interface:**

  - HashSet and TreeSet

- **Map Interface:**

  - HashMap and TreeMap

- **Iterators and Loops**

- **Stream API:**

  - filter(), map(), sorted(), collect()

Database Basics and JDBC

Topics:

- **Introduction to Relational Databases**

- **MySQL Basics:**

    - Creating Databases and Tables

    - CRUD Operations with SQL

- **JDBC:**

    - JDBC API

    - Connecting Java Applications to Databases

    - CRUD using JDBC

    - Handling SQL Exceptions

Basic Web Development (Servlets and JSP)

Topics:

- **Web Basics:**

    - HTTP Protocol

    - Client-Server Model

- **Servlet Lifecycle:**

    - init(), service(), destroy()

- **Handling Forms with Servlets**

- **Introduction to JSP:**

    - Syntax and Directives

- JavaBeans in JSP

Mini-Project : Task Tracker Web Application (Servlet + JDBC)

- **Description:** Build a simple web app to manage tasks using forms and database storage.

- **Skills:** Web Forms, Servlet Handling, Database Integration

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Advanced

Spring Boot Introduction and REST API Development

Topics:

- **What is Spring? What is Spring Boot?**

- **Setting up Spring Boot Project (Maven)**

- **Auto Configuration and Starters**

- **Building REST Controllers**

- **Creating REST APIs (GET, POST, PUT, DELETE)**

- **Path Variables and Query Parameters**

- **Validating Input Requests**

- **Postman API Testing Basics**

Persistence with Spring Data JPA and Hibernate

Topics:

- **JPA Basics**

- **Hibernate Introduction**

- **Entity Creation and Mapping**

- **Repositories and CRUD Operations**

- **JPQL Basics**

- **Entity Relationships:**

  - One-to-One, One-to-Many, Many-to-Many

Mini-Project : Book Management REST API (Spring Boot + JPA)

- **Description:** Build RESTful APIs to manage a collection of books and authors.

- **Skills:** Spring Boot, JPA, Database Interaction

Spring Boot Advanced Topics

Topics:

- **Exception Handling (Global)**

- **Custom Error Responses**

- **DTOs and Mappers**

- **Pagination and Sorting in APIs**

- **Spring Profiles for Environment Handling**

Spring Security Basics

Topics:

- **Introduction to Security Concepts**

- **Securing REST APIs**

- **User Authentication and Authorization**

- **Role-Based Access Control (RBAC)**

- **Password Encoding**

Cloud Deployment Basics

Topics:

- **Deploying Spring Boot App Locally**

- **Introduction to Docker:**

  - Dockerizing a Spring Boot App

- **Introduction to AWS:**

  - Deploying Spring Boot App on AWS Elastic Beanstalk

- **Understanding CI/CD Overview**

Capstone Projects

Project 1: Online Course Registration System (Spring Boot + MySQL)

- Students register and enroll into courses

- Admin Panel to manage courses

- REST APIs secured with Spring Security

Project 2: E-Commerce Backend System (Spring Boot Full Stack)

- Product Catalog

- Cart Management

- Checkout Flow

- Role-based Authentication

Project 3: Hospital Appointment Booking System (Spring Boot Microservice Style)

- Microservices for Patient, Doctor, Appointment

- API Gateway Concept (basic simulation)

- Database integration for each microservice