

Durgesh Kumar Tiwari

LIVE BATCH**Spring Boot and Microservices****Prerequisite**

- Laptop with Good Internet Connection.
- Good Command on Core Java
- Specially
 - OOPS
 - Collection Framework
 - Java 8 Features
 - Exception. Handling
 - String Handling

Week 1: Introduction to Spring Boot

- Introduction to Spring Boot
- Feature and benefits of Spring Boot
- Comparison with Spring Framework.
- Development Environment Setup.
 - Installing Java, IntelliJ, STS, NetBeans as per requirements.
 - Creating Spring Boot Application
 - Using Spring Initializer
 - Using IntelliJ
 - Using STS
 - Understanding Project Structure
 - Running Application
 - Using IntelliJ
 - Running Jar files

Week 2: Spring Boot Core Concepts

- **Inversion of Control (IoC):** Understanding IoC and the role of the Spring Container.
- **Dependency Injection (DI):** Constructor injection, setter injection, and field injection.
- Loose and Tight Coupling with Example
- **Bean Lifecycle:** Bean creation, initialization, destruction.
- **Bean Scopes:** Singleton, prototype, request, session, application.
- **@Component, @Service, @Bean, @Configurations, @ComponentScan:** Stereotype annotations.
- **Java-based Configuration:** @Configuration and @Bean.

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- **XML-based Configuration:** Basics of configuring beans using XML (less common in Spring Boot).
- **Introduction to AOP:** Concepts of cross-cutting concerns.
- **AspectJ Annotations:** @Aspect, @Before, @After, @Around.
- **Pointcuts and Advices:** Defining and applying aspects.
- How Spring Boot solves problems.

Week 3: Spring Data Access

- Introduction to Spring Data JDBC
- Working with Spring Data JDBC
- **Introduction to Spring Data JPA**
 - Setting Up spring data jpa
 - Configurations
 - Entity Mapping
 - One to One
 - One to many
 - Many to Many

Week 3: Spring Data Access

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- **Introduction to Spring Data JPA**
 - Setting Up spring data jpa
 - Configurations
 - Entity Mapping
 - One to One
 - One to many
 - Many to Many
 - Repositories
 - JPQL and Native Queries
 - Working with parameterize queries.
 - Pagination and Sorting
 - Criteria API
 - Transactions
 - Advance Operations like Entity Lifecycle events.

Week 4: Spring MVC/ API Building Section

- Introduction to Spring MVC/ MVC Architecture
- Role of Dispatcher Servlet
- Setting up spring mvc
- Controllers
- Handling request with
 - @Controller, @RestController
 - @RequestMapping, @GetMapping, @PostMapping, @PutMapping, @DeleteMapping
- Using @PathVariable and @RequestParam
- Returning Data[JSON] and View
- Data Binding and Validation
 - Validating Data using @Valid and Bean Validator
 - How we can use Regular Expression for validation
 - Writing Custom Validators
- Exception Handling

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- Handling controller level exceptions
- Handling Global Exceptions
- Returning Custom Error Response.
- Interceptors
- File Upload
- **Project : We learn all above concepts using Project like**
 - To-do Applications
 - Student Management System
 - Simple E-Commerce Product CatLog.

Week 5: Spring Security in Detail

- Introduction to Security
- Authentication & Authorization
- Understanding Spring Security Flow using Debugging
- Implementing Spring Security @SecurityFilterChain
- Formbased and Basic authentication
- Managing Users
- Token based authentication [JWT authentication]
- Implementing in Project
- OAuth using Keycloak

Week 6: Microservices

- Introduction to Microservices
- Understanding Microservices Architecture

Week 6: Microservices

- Introduction to Microservices
- Understanding Microservices Architecture
- Benefits and Challenges
- Setting up spring boot microservices
- Breaking Existing Project into microspecies / Creating different micorservcies.
- Understanding Spring Cloud Projects
- Interservice Communication
 - Rest Template
 - Sync Commutation using RestTemplate
 - Web Client
 - Feign Client
 - Declarative REST client for simplifying HTTP API calls
- Service Registration and Discovery
 - Eureka Server and Client
 - Service Discovery and load balancing with Eureka .
- API Gateway
 - Setting up spring cloud gateway
 - Routing and filtering

- About Zuul

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Week 7: Config Servers and Flatulence

- Config Server
 - Externalizing Configurations of Each Services.
 - Managing configuration across environments.
- Resilience4j
 - Setting up Resilience4j for fault tolerance
 - Configuring circuit breakers, retries, and rate limiters
 - Hystrix

Week 7: Distributed Tracing and Monitoring

- Spring Boot Actuator
 - Exposing operational information about the running application
 - Customizing Actuator endpoints
- Zipkin/Jaeger
 - Exposing operational information about the running application
 - Customizing Actuator endpoints

Week 8: Message and Event-Driven Architecture

- Introduction to Event Driven Architecture
- Event Driven Microservices using Apache Kafka
- Setting up message brokers (RabbitMQ, Kafka)
- Implementing Event Driven Microspecies in Project.

Week 9: Securing Microservices

- OAuth2 for securing microservices
- Securing inter-service communication using Spring Cloud Security.

Week 10: Deployment and Containerization

- Docker
 - Containerizing Spring Boot applications
 - Creating Docker images and containers
 - Docker Compose
 - Pushing to Docker hub

Week 11: Kubernetes

- Kubernetes
 - Introduction to Kubernetes & Core Concepts
 - Managing Applications with Deployments & Services
 - Configuration Management with ConfigMaps and Secrets
 - Scaling & Autoscaling in Kubernetes

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Week 12: CI/CD for Microservices

- Understanding Continuous Integration, Continuous Delivery, and Continuous Deployment.
- Setting up a **Git repository** for Spring Boot microservices project.
- Continuous Integration (CI) Pipeline with Jenkins
- Configuring Jenkins pipeline for code builds, automated testing, and static code analysis.
- **Containerization and Continuous Delivery (CD)**
- **Deployment Automation with Kubernetes**

Project:

- While learning the concepts we will create projects
- **Mini projects**
 - Simple Inventory Management System
 - User Management System
 - Store Management.
- **Major Project**
 - **Food Delivery app with Best Practices**
 - Complete Food Delivery app ;
 - Multiple microservices for different functionalities
 - Spring Cloud Gateway for API Gateway
 - Circuit breaker with Resilience4j
 - Distributed tracing with Zipkin
 - Event-driven communication with Kafka
 - Centralized configuration with Spring Cloud Config
 - Security with OAuth2 and JWT
 - Containerization with Docker and Kubernetes deployments.