GeeksforGeeks

JAVA

Backend Development

Live

Detailed
Course Syllabus

CONTENTS

Week 1

Session 1: Java Architecture and Basics of OOP

- Introduction to Java architecture: JDK, JRE, and JVM.
- Basics of Object-Oriented Programming (OOP): Objects, Classes, Inheritance.
- Understanding Polymorphism, Abstraction, and Encapsulation in OOP.
- Practical examples illustrating Object-Oriented Programming concepts.

Session 2: Abstract Classes vs. Interfaces and Exception Handling

- Comparison between Abstract Classes and Interfaces with examples and use cases.
- Exception Hierarchy in Java: understanding types and relationships.
- Overview of Finally Block for cleanup operations.
- Throwing Exceptions explicitly using the throw keyword.
- Exception Propagation: how exceptions propagate up the call stack.

Week 2

Session 3: Lambda Expressions, Functional Interfaces, and Collections

- Exploring Lambda Expressions and Functional Interfaces in Java 8.
- Practical usage of built-in functional interfaces: Predicate, Consumer, Function.
- Overview of Java Collections framework: Lists, Sets, Maps.
- Introduction to Queues in Java Collections.
- Using Lambdas for concise and functional programming.

Session 4: Generics, Streams and HashMap

- Understanding Generics in Java: generic classes and methods.
- Working with Streams API for functional-style operations on collections.
- Delving into the workings of HashMap and its usage.
- Exploring different hashing algorithms used by HashMap.
- Applying Generics to enhance type safety and code reusability.

- Leveraging Streams for efficient data processing and manipulation.

Week 3

Session 5: Multithreading Basics and Advanced Concepts

- Introduction to Multithreading: Creating and managing threads in Java
- Exploring thread groups and thread join operations.
- Synchronization Mechanisms
- Exploring thread pools for efficient thread management.
- Executor Service: Overview and Benefits
- Differences between Sequential and Parallel Streams

Session 6: Maven Project Management

- Understanding the Need for Maven
- Working with POM.xml and Maven Repositories
- Maven Lifecycle Management
- Introduction to Maven plugins
- Creating a new Maven project using archetypes

Week 4

Session 7: Introduction to Spring Framework

- Overview of the Spring Framework and its Need.
- Dependency Injection (DI) and Inversion of Control (IoC) principles.
- Types of Dependency Injection (constructor and setter)
- Configuring Beans using XML and annotations.
- Differentiates between ApplicationContext and BeanFactory in Spring.
- Bean Lifecycle and Scopes

Session 8: Spring Boot Basics

- Advantages of Spring Boot over Traditional Spring Framework and its Purpose
- Setting up a Spring Boot project using Spring Initializr.
- Understanding Spring Boot auto-configuration.
- Creating and running a Spring Boot application.
- Spring Boot Annotations.
- Packaging and deploying Spring Boot applications

Week 5

Session 9: Spring MVC Basics & REST API Implementation

- Overview of Spring MVC architecture and its role in web development.
- Understanding the Model, View, and Controller components.
- Setting up a Spring MVC project
- Handling requests and responses using Spring MVC.
- Principles and benefits of RESTful architecture.
- Overview of HTTP methods: GET, POST, DELETE, PUT, PATCH.
- Designing and implementing RESTful APIs using Spring MVC.

Session 10: Spring AOP, Lombok API , and Spring Logger

- Introduction to Aspect-Oriented Programming (AOP).
- Implementing cross-cutting concerns using Spring AOP.
- Using Lombok for Simplified Java Code
- Integrating Lombok in a Spring Boot Project
- Overview of logging in Spring Boot applications.

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Week 6

Session 11: Java Database Connectivity (JDBC)

- Overview of JDBC and its role in database connectivity.
- Learn DDL and DML commands.
- Setting up Database Configuration
- Introduction to Spring JDBC Template for database operations.
- Implementing some operations using the JDBC Template.
- Mapping database rows to Java objects using RowMapper.
- Understand how connection pooling works.

Session 12: Hibernate and Spring Data JPA

- Understanding the Need for Abstraction
- Introduction to JPA (Java Persistence API)
- Introduction to Hibernate
- Entity Classes and Annotations
- JPA Repository and Performing CRUD Operations
- Implementing transactional behavior in Spring Boot applications.
- Learn about relationships in JPA (One-to-One, One-to-Many, Many-to-One, Many-to-Many)

Week 7

Session 13: Minor Project - Digital Library

- Work on a Digital Library [Minor Project]
- Setting Up the Project Environment
- Design the technical architecture of an application
- Design a project flowchart to visualize the overall architecture and workflow.

Session 14: Digital Library [Minor Project] (Continued)

- Continue working on the Digital Library [Minor Project]
- Add Features to the Project
- Understand project HLSD
- Data Modeling concepts

Week 8

Session 15: Unit Testing with JUnit & Mockito

- Describe JUnit5 testing
- Implement repository layer testing
- Explore the Mockito framework
- Implement service layer testing
- Explore Mockmvc
- Implement controller layer testing

Session 16: Redis & Caching

- Learn the differences between Cache and Cookie.
- Understand Server Cache vs. Browser Cache.
- Get introduced to Redis.
- Work with Local Redis Server.
- Online Centralized Redis Server for efficient caching.

Week -9

Session 17: Spring Security & Authentication

- Learn about Spring Security and its terminologies.
- Setting Up Spring Security
- Authentication and Authorization
- Understand Authorization with In-Memory.
- Database user Authentication.

Session 18: Digital Library [Minor Project] (Continued)

- Integration of J-unit and Redis caching in a Minor project.
- Add Spring Security in a Minor project.
- Improvement and feature addition for Digital Library [Minor Project].
- Gain insights into project overview, project HLSD, and project Data Modeling.

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Week 10

Session 19: OAuth 2 & Github Integration

- Introduction to OAuth2.
- OAuth 2 Providers
- Learn the workflow of OAuth 2.0.
- Explore Scopes and Consent.
- Implement Github OAuth2 integration with Spring Boot.
- Implementation Steps.

Session 20: Microservices

- Difference between Monolith Architecture and Microservices Architecture.
- Develop microservices using Spring Boot.
- Intercommunication between Microservices using Feign client.
- Load Balancing Algorithms and Introduction to Eureka Server
- Learn about the Consumers and Producers Model.

Week 11

Session 21: Kafka Integration with Microservices and Spring Cloud

- Learn about Message Queues and their types.
- Integrate Kafka with Spring Boot.
- Introduced to Kafka Message Queue for efficient messaging systems.
- Introduction to Spring Cloud and its configuration & Hystrix circuit breaker.

Session 22: E-Wallet App like Paytm Pay [Major Project Part 1]

- Start working on an E-Wallet App like Paytm Pay.
- Project Overview.
- Project HLSD.
- Project Data Modeling.
- Building Microservice Architecture.

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Week 12

Session 23: E-Wallet App like Paytm Pay [Major Project Part 2]

- Major Project Continued.
- Design the technical architecture of an application
- Set up Spring Cloud Gateway to route requests to the appropriate microservices.
- Project Queries.

Session 24: Deployment Java Application

- Introduction to the deployment process and its workflow.
- CI/CD: Setting up CI/CD pipelines using Jenkins or GitHub Actions.
- Building and packaging Java applications.
- Deploying our projects to the cloud.
- Monitoring and logging using tools like Prometheus, Grafana, and the ELK stack (Elasticsearch, Logstash, Kibana).