Club Coder

Java Syllabus

1. Language Fundamentals

- Introduction to Java and JVM
- Data Types, Variables, and Constants
- Operators and Expressions
- Type Casting and Type Promotion
- Command-Line Arguments

2. Flow Control

- Decision-Making Statements (if, if-else, switch)
- Looping Constructs (for, while, do-while)
- Jump Statements (break, continue, return)

3. Object Orientation

- Classes and Objects
- Constructors and Initialization Blocks
- Static and Instance Members
- Method Overloading and Method Overriding

4. Arrays

- One-Dimensional and Multi-Dimensional Arrays
- Array Operations (Sorting, Searching, Copying)
- Working with the `Arrays` Class

5. Strings

- String Manipulation using `String`, `StringBuffer`, and `StringBuilder`

- String Comparison and Formatting
- String Tokenization

6. OOP's Features

- Encapsulation and Data Hiding
- Inheritance and Method Overriding
- Polymorphism (Compile-time & Runtime)
- Abstraction and Interfaces

7. Exception Handling

- Types of Exceptions (Checked & Unchecked)
- Handling Exceptions using `try`, `catch`, `finally`, `throw`, and `throws`
- Custom Exceptions

8. File Handling

- Reading and Writing Files using `FileReader`, `FileWriter`, `BufferedReader`, and `BufferedWriter`
- Working with `Serializable` Interface
- File Operations using `File` Class

9. Multi-Threading & Enhancements

- Creating Threads using `Thread` Class and `Runnable` Interface
- Thread Synchronization and Inter-Thread Communication
- Executor Framework and Callable Interface

10. Collection & Concurrency

- List, Set, and Map Interfaces
- Implementations: `ArrayList`, `LinkedList`, `HashSet`, `TreeSet`, `HashMap`, `TreeMap`
- Concurrent Collections (`CopyOnWriteArrayList`, `ConcurrentHashMap`)

- Stream API and Functional Programming Concepts

Java Frameworks

1. Spring Framework

1.1 Spring Core

- Introduction to Spring and Inversion of Control (IoC)
- Dependency Injection (Constructor & Setter Injection)
- Spring Beans and Bean Scopes
- Spring Configuration (XML & Java-Based)

1.2 Spring AOP (Aspect-Oriented Programming)

- Concepts of AOP and Cross-Cutting Concerns
- Defining Aspects, Advice, Pointcuts, and Join Points
- Spring AOP Annotations (`@Aspect`, `@Before`, `@After`, etc.)

1.3 Spring JDBC & ORM

- JDBC Template for Database Operations
- Spring with Hibernate Integration
- Spring Transaction Management

1.4 Spring MVC

- Introduction to Spring MVC Architecture
- Dispatcher Servlet, Controllers, and View Resolvers
- Form Handling and Data Binding
- Exception Handling in Spring MVC

15 Spring Boot

- Introduction to Spring Boot and Its Features
- Spring Boot Auto-Configuration & Starter Dependencies
- Creating RESTful APIs with Spring Boot
- Embedded Servers (Tomcat, Jetty)

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2. Hibernate Framework

21 Hibernate Basics

- Introduction to Hibernate ORM
- Hibernate Architecture and Configuration
- Hibernate Annotations (`@Entity`, `@Table`, `@Id`, etc.)

22 Hibernate CRUD Operations

- SessionFactory and Session Management
- Performing Create, Read, Update, and Delete (CRUD) Operations
- Named Queries and Native SQL Queries

23 Hibernate Relationships & Mappings

- One-to-One, One-to-Many, Many-to-Many Mappings
- Fetch Types (Lazy & Eager Loading)
- Cascade Types and Hibernate Inheritance Mapping

24 Hibernate Query Language (HQL) & Criteria API

- Writing Queries using HQL
- Query Parameters and Joins
- Criteria API for Dynamic Queries

25 Hibernate Caching & Performance Optimization

- First-Level and Second-Level Caching
- EHCache and Query Caching
- Batch Processing and Connection Pooling

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3. RESTful Web Services

3.1 Introduction to RESTful Web Services

- Basics of REST Architecture
- REST vs. SOAP Web Services
- Understanding HTTP Methods (GET, POST, PUT, DELETE)

3.2 Creating REST APIs using Spring Boot

- Building RESTful Endpoints with `@RestController`
- Handling JSON/XML Responses using Jackson
- Exception Handling in REST APIs

3.3 Consuming REST APIs

- Using RestTemplate for API Consumption
- Consuming REST APIs with Postman
- Handling Authentication & Authorization

3.4 Security in RESTful Web Services

- Implementing Basic Authentication & JWT Authentication
- Securing APIs using OAuth2
- Cross-Origin Resource Sharing (CORS)

3.5 Advanced REST API Features

- API Versioning, Pagination, and Filtering
- HATEOAS (Hypermedia as the Engine of Application State)
- Rate Limiting and API Monitoring