CORE-JAVA Syllabus

Introduction to Java

- *What is Java?*
- *History of Java*
- *Java Development Kit (JDK)*
- *Setting up Java Development Environment*

Object-Oriented Programming (OOPS)

- *Introduction to OOPS*
- *Classes and Objects*
- *Constructors*
- *Inheritance and Polymorphism*
- *Encapsulation*
- *Abstraction*
- *Interfaces and Abstract Classes*

Control Flow

- *Conditional Statements (if, else if, else)*
- *Switch Statements*
- *Loops (for, while, do-while)*
- *Break and Continue Statements*

Arrays

- *One-dimensional Arrays*
- *Multi-dimensional Array*

Collections

- *ArrayList, LinkedList, HashSet, HashMap*
- *Iterators*
- *Sorting and Searching*

String

- *String Class*
- *StringBuilder*
- *StringBuffer*

Exception Handling

- *Introduction to Exceptions*
- *Try, Catch, Finally Blocks*
- *Custom Exception Classes*

File Handling

- *Reading and Writing Files*
- *Streams (FileInputStream, FileOutputStream)*
- *Serialization and Deserialization*

Multithreading and Concurrency

- *Introduction to multithreading*
- *Creating and managing threads*
- *Synchronization and locks*
- *Thread safety and concurrent programming*

Database Connectivity (JDBC)

- *Introduction to JDBC*
- *Connecting to databases*
- *Executing SQL queries*
- *Handling database transactions*

Best Practices and Code Quality

- *Coding standards and style guides*
- *Code refactoring techniques*
- *Code documentation and comments*

DATA BASE - Syllabus

Introduction to Databases and MySQL

- *What are databases?*
- *Relational databases vs. other types*
- *Introduction to MySQL*

- *Installing MySQL*
- *MySQL client tools*

Database Design and Modeling

- *Relational database concepts*
- *Entity-Relationship Diagrams (ERD)*
- *Normalization and denormalization*
- *Creating a database schema*

SQL Fundamentals

- *Structured Query Language (SQL) overview*
- *Basic SQL commands (SELECT, INSERT, UPDATE, DELETE)*
- *Filtering and sorting data*
- *Aggregation functions (COUNT, SUM, AVG, etc.)*

Data Manipulation

- *Modifying data (INSERT, UPDATE, DELETE)*
- *Transactions and ACID properties*
- *Joins (INNER JOIN, LEFT JOIN, RIGHT JOIN)*
- *Subqueries and correlated subqueries*

Data Definition Language (DDL)

- *Creating and altering tables*
- *Defining constraints (PRIMARY KEY, FOREIGN KEY, UNIQUE)*
- *Creating and managing views*
- *Working with stored procedures and triggers*

Advanced MySQL Features

- *Full-text search*
- *Handling binary data (BLOB and CLOB)*
- *Geospatial data and indexing*
- *JSON data types and functions*

Advance Framework

Hibernate (Hibernate 5.X)

Introduction to Hibernate

- *Understanding ORM and its benefits*
- *Introduction to Hibernate framework*
- *Setting up Hibernate environment (dependencies, configuration)*
- *Your first Hibernate application*

Hibernate Configuration

- *Hibernate configuration file (hibernate.cfg.xml)*
- *Database dialect and connection properties*
- *Configuring connection pools*
- *Hibernate properties and settings*
- *Mapping Entities*

Entity classes and their annotations

- *Primary key generation strategies*
- *Mapping entity relationships (One-to-One, One-to-Many, Many-to-One, Many-to-Many)*
- *Composite keys and embedded objects*
- *Inheritance mapping strategies*
- *Session and Transaction Management*

Hibernate Session and SessionFactory

- *CRUD operations with Hibernate*
- *Transaction management with Hibernate*
- *Flush and commit behavior*
- *Hibernate caching (first-level and second-level cache)*
- *HQL (Hibernate Query Language)*

Introduction to HQL

- *Querying entities using HQL*
- *Named queries and query parameters*
- *Criteria queries and dynamic queries*
- *Native SQL queries with Hibernate*
- *Fetching Strategies*

Lazy loading vs. Eager loading

- *Fetching strategies (select, join, subselect, batch)*
- *N+1 select problem and solutions*

- *Caching in Hibernate*

Hibernate caching mechanisms

- *Configuring and using second-level cache*
- *Cache providers (Ehcache, Infinispan, etc.)*
- *Cache regions and cache strategies*
- *Spring Integration (Optional)*

Integrating Hibernate with Spring

- *Using Spring's HibernateTemplate*
- *Managing transactions with Spring*
- *Validation and Error Handling*

Data validation with Hibernate Validator

- *Handling validation errors and exceptions*
- *Listeners and Events*

Hibernate entity lifecycle events

- *Creating and using event listeners*
- *Custom event listeners*
- *Advanced Mapping Concepts*

Component mapping

- *Collection mapping (Lists, Sets, Maps)*
- *Formula-based properties*
- *Dynamic and runtime mapping*
- *Query Optimization and Performance Tuning*

Profiling Hibernate applications

- *Optimizing database queries*
- *Batch processing with Hibernate*

Batch Processing

- *Bulk insert and update operation*
- *Efficient batch processing techniques*

Crud Operations

- *Create, Read, Update, Delete Queries*
- *Crud Operations*

Inheritance in Hibernate

- *IS-A Relation*
- *Hibernate Mapping (Has - A)*

Hibernate Files

- *Hibernate with Java Based (Zero XML File)*
- *Hibernate Utility File*

Spring IOC Syllabus

Introduction to Spring IoC

- *Understanding the concept of Inversion of Control (IoC)*
- *Benefits of using Spring IoC container*
- *Introduction to the Spring Framework*

Setting Up the Development Environment

- *Installing Spring Framework and required dependencies*
- *Configuring a Java development environment (IDE)*

Spring IoC Container

- *Overview of the Spring IoC container*
- *Configuring the container (XML, Java annotations, Java-based configuration)*
- *Creating and managing Spring beans*

Bean Scopes and Lifecycle

- *Understanding bean scopes (singleton, prototype, request, session, etc.)*
- *Bean lifecycle and initialization methods*
- *Bean destruction and cleanup methods*

Dependency Injection (DI)

- *Dependency Injection in Spring*
- *Types of dependency injection (constructor, setter, and field injection)*
- *Using @Autowired and @Qualifier annotations*

Java Configuration (Java-based IoC)

- *Using Java configuration classes to define Spring beans*
- *Component scanning and stereotype annotations*
- *Importing and mixing XML and Java configurations*

Autowiring and Qualifiers

- *Understanding autowiring in Spring*
- *Using qualifiers to specify bean dependencies*
- *Primary beans and @Primary annotation*

XML-Based Configuration

- *Defining beans in XML configuration files*
- *Injecting dependencies in XML*
- *Importing XML configuration files*

Bean Lifecycle Callbacks

- *Initializing and destroying beans with annotations*
- *Implementing BeanPostProcessor and BeanFactoryPostProcessor*

Resource Management

- *Loading resources (files, properties, etc.) with Spring*
- *Using PropertyPlaceholderConfigurer for property values*

Profiles and Environment Abstraction

- *Creating and activating profiles*
- *Using Environment abstraction for property management*

Based

- *Setter Based Xml & Java Based*
- *Constructor Based Xml & Java Based*

Spring Web MVC

Module 1: Introduction to Spring MVC

- *Understanding the MVC architectural pattern*
- *Introduction to the Spring Framework*
- *Setting up the development environment*

Module 2: Configuring Spring MVC

- *Creating a Spring MVC project*
- *Configuring the Spring MVC DispatcherServlet*
- *Defining controller classes and handler methods*

Module 3: Request Handling

- *Handling HTTP requests and responses*
- *Mapping URLs to controller methods*
- *Using @RequestMapping annotations*
- *Request parameters and path variables*

Module 4: Views and Templates

- *Working with view resolvers*
- *Thymeleaf and JSP as view technologies*
- *Creating reusable templates*
- *Model attributes and data binding*

Module 5: Form Handling

- *Processing HTML forms in Spring MVC*
- *Form validation using annotations*
- *Custom validation logic*
- *Form tags and data binding*

Module 6: Interceptors and Filters

- *Implementing request/response interceptors*
- *Global exception handling*
- *Custom filters for pre-processing requests*

Module 7: Spring Security Integration (Optional)

- *Securing web applications with Spring Security*
- *User authentication and authorization*
- *Configuring security filters and access control*

Module 8: RESTful Web Services with Spring MVC

- *Building RESTful controllers*
- *Handling JSON and XML responses*
- *Consuming RESTful services*

Module 9: File Upload and Download

- *Handling file uploads*
- *Serving files for download*
- *Implementing multipart requests*

Spring Boot JPA

Module 1: Introduction to Spring Data JPA

- *Understanding the role of JPA in data access*
- *Introduction to Spring Data JPA*
- *Setting up the development environment*

Module 2: Repository and CRUD Operations

- *Defining JPA repositories*
- *Common CRUD operations (Create, Read, Update, Delete)*
- *Query methods and dynamic queries*

Module 3: Spring Boot and Spring Data JPA

- *Integrating Spring Boot with Spring Data JPA*
- *Auto-configuration and starters*
- *Building a Spring Boot-based JPA application*

Module 4: Criteria API

- *Overview of the JPA Criteria API*
- *Creating dynamic queries using CriteriaBuilder*
- *Query predicates and expressions*

Module 5: Entity Relationships

- *Mapping entity relationships (One-to-One, One-to-Many, Many-to-One, Many-to-Many)*
- *Cascading operations*
- *Fetch types and performance considerations*

Spring Boot JPA

Module 1: Introduction to Spring Boot

- *Overview of Spring Boot*
- *Benefits of using Spring Boot*
- *Setting up the development environment*

Module 2: Creating a Spring Boot Project

- *Generating a Spring Boot project using Spring Initializr*
- *Project structure and dependencies*
- *Building and running the initial application*

Module 3: Spring Boot Auto-Configuration

- *Understanding auto-configuration*
- *Customizing auto-configuration*
- *External configuration with application properties*

Module 4: Building Web Applications with Spring Boot

- *Building web controllers*
- *Handling HTTP requests and responses*
- *Thymeleaf and JSP for web views*
- *Form handling and validation*

Module 5: RESTful APIs with Spring Boot

- *Creating RESTful endpoints*
- *Request mapping and HTTP methods*
- *Consuming and producing JSON data*
- *Error handling in RESTful APIs*

Module 6: Data Access with Spring Boot

- *Connecting to databases (JDBC, JPA)*
- *Spring Data JPA for data access*

- *Spring Data repositories*
- *NoSQL data stores (if applicable)*

Module 7: Security with Spring Boot

- *Securing web applications and APIs*
- *Authentication and authorization*
- *Using Spring Security*

Module 8: Testing Spring Boot Applications

- *Writing unit tests for Spring Boot components*
- *Integration testing with Spring Boot*
- *Using testing frameworks (JUnit, Mockito)*

Module 9: Spring Boot and Microservices

- *Introduction to microservices architecture*
- *Building microservices with Spring Boot*
- *Communication between microservices (REST, messaging)*

Module 10: Spring Boot Actuator

- *Monitoring and managing Spring Boot applications*
- *Metrics, health checks, and endpoints*
- *Customizing and securing actuator endpoints*

Module 11: Final Project

- *Applying Spring Boot knowledge to a real-world project*
- *Designing and implementing a Spring Boot-based application*