

Java Spring Boot with Oracle Database for Automated Excel Reporting

Duration: 10days

Prerequisites: Knowledge of Any Programming Language.

Java Essentials for Spring Development

Modules / Topics Expanded

1. Java OOP Foundations

- Classes vs Objects
- Access Modifiers, this & super
- Method overloading & overriding
- Constructor chaining

2. Java Exception Handling

- try, catch, finally
- Checked vs Unchecked exceptions
- Custom exception creation
- Importance in enterprise apps

3. Collections & Data Structures

- List, Set, Map, Queue overview
- Sorting & Comparator usage
- Iterators & Streams introduction

4. Java Project Build & Maven

- pom.xml structure
- Dependencies & plugins
- Build lifecycle
- JAR generation

Lab

- Build Maven project
- Implement CRUD operations using List & Map
- Create custom exceptions
- Generate JAR file and run application

Day 2 – Spring Framework Fundamentals

Modules / Topics Expanded

1. **Spring Architecture Deep Dive**
 - IoC container, application context
 - Advantages of DI
2. **Spring Beans**
 - Bean scopes: singleton, prototype
 - Bean lifecycle methods
 - @Component, @Service, @Repository
3. **Dependency Injection Techniques**
 - Constructor-based DI
 - Setter-based DI
 - Field injection (not recommended)
4. **Spring Configuration Approaches**
 - XML config (overview only)
 - Java-based config
 - Annotation-based config
5. **Utility Concepts**
 - Environment variables handling
 - Externalized configuration (.properties, .yaml)

Lab

- Create beans using annotations
 - Configure multiple beans
 - Demonstrate DI using constructor & setter injection
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Day 3 – Spring Boot Essentials

Modules / Topics Expanded

1. **Spring Boot Internal Architecture**
 - How auto-configuration works
 - Starter dependencies
2. **REST API Design Principles**
 - HTTP verbs, status codes

- RequestBody, PathVariable, Query Params
- 3. **Spring Boot Layered Architecture**
 - Controller → Service → Repository
- 4. **Validation & Data Binding**
 - @Valid, @NotNull, @Size
 - Global exception handling with @ControllerAdvice
- 5. **Testing REST APIs**
 - Postman usage
 - JSON payloads

Lab

- Build employee CRUD REST APIs
 - Implement validation
 - Test using Postman (GET/POST/PUT/DELETE)
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Day 4 – Oracle Database Fundamentals

Modules / Topics Expanded

1. **Oracle Database Architecture**
 - Tablespaces
 - Datafiles
 - Schema vs User
2. **SQL Essentials**
 - SELECT, INSERT, UPDATE, DELETE
 - WHERE, LIKE, BETWEEN, IN
3. **Joins & Aggregations**
 - INNER, LEFT, RIGHT joins
 - SUM, COUNT, AVG, GROUP BY
4. **Database Constraints**
 - Primary key, foreign key
 - Unique, check, not null
5. **Schema Planning for Reporting App**
 - Table relation design

- Primary & foreign key structure

Lab

- Create Employee, Department & Salary tables
 - Run complex SELECT queries with joins
 - Write queries used later for Excel reporting
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Day 5 – Spring Boot + Oracle Integration

Modules / Topics Expanded

1. **Oracle JDBC Configuration**
 - Oracle Driver
 - Connection pooling (HikariCP)
2. **Spring Data JPA Deep Dive**
 - Entities & mapping
 - @Id, @GeneratedValue
 - One-To-Many, Many-To-One
3. **Repository Pattern**
 - JpaRepository methods
 - Custom query methods
4. **Query Techniques**
 - @Query JPQL
 - Native queries
(useful for Oracle functions)

Lab

- Connect Spring Boot to Oracle
 - Build repository & CRUD operations
 - Write custom JPA queries for reporting data
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Day 6 – Business Logic & Data Preparation

Modules / Topics Expanded

1. **Service Layer Best Practices**
 - Clean code structure

- Reusability & single responsibility
- 2. **Transaction Management**
 - @Transactional
 - Rollback conditions
- 3. **Advanced Query Handling**
 - Pagination & Sorting
 - Filtering data for reports
- 4. **DTOs & Transformation Layer**
 - Mapping entities → DTOs
 - Converting DB rows to report-friendly structure

Lab

- Implement business service for salary summary
 - Apply pagination/sorting
 - Prepare DTO model used for Excel generation
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Day 7 – Excel Generation Using Apache POI

Modules / Topics Expanded

1. **Apache POI Overview**
 - HSSF vs XSSF
 - Workbook, Sheet, Row, Cell
2. **Excel Styling Techniques**
 - Cell formats (currency, date, number)
 - Fonts, colors, borders
 - Auto-size & merged cells
3. **Writing Data Dynamically**
 - Writing headers
 - Writing list of objects row-by-row
4. **Handling Large Datasets**
 - SXSSFWorkbook streaming

Lab

- Create Excel file with styled headers

- Export DB data into Excel
 - Format numeric values properly
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Day 8 – Excel Calculations & Advanced Reporting

Modules / Topics Expanded

1. **Adding Excel Formulas Programmatically**
 - SUM, AVERAGE, COUNT, IF
 - Formula evaluation
2. **Multi-Sheet Reporting**
 - Summary sheet
 - Data sheet
3. **Conditional Formatting**
 - Highlight high salary
 - Color-coding performance
4. **Pivot Tables (If supported)**

Lab

- Build Excel with calculated totals
 - Add department-wise formulas
 - Create summary sheet + formula links
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Day 9 – Exporting Excel via Spring Boot REST APIs

Modules / Topics Expanded

1. **File Download Implementation**
 - MIME type for XLSX
 - StreamingResponseBody
2. **Error Handling in Report Module**
 - Custom errors
 - Logging strategy
3. **Automation & Scheduling**
 - Spring Scheduler
 - Auto-email or auto-export (concept demo)

4. **Security Basics (Optional)**

- Adding Spring Security (intro only)

Lab

- Build export API endpoint /report/export
 - Download Excel from browser/Postman
 - Add scheduler to auto-generate report daily
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Day 10 – End-to-End Reporting Application

Modules / Topics Expanded

1. **Combining All Layers**
 - DB → Service → Excel generator → REST
2. **Performance Optimization**
 - Query optimization
 - Reducing Excel generation time
3. **Packaging & Deployment**
 - Creating executable JAR
 - Deploying on Tomcat/Standalone
4. **Best Practices & Architecture Review**

Final Capstone Lab

Build the complete application:

- Oracle DB schema
- Spring Boot backend
- Apache POI report generator
- Summary sheet with formulas & formatting
- REST endpoint to download Excel