

Java Spring Framework

Course Report

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A. COURSE DESCRIPTION

In this course, students learned in-depth knowledge of the Java Spring Framework to build RESTful Web service with Microservice Architecture. In the first part, students learned about Spring Framework Core Features such as Spring Boot, Spring MVC, Spring Project Structure, Spring IoC Container & Dependency Injection, Data Access Layer using MyBatis and Spring Data JPA, and Spring RESTful Web service. In the second part, learners learned about securing web application using Spring Security, securing RESTful Web Service with Basic Authentication, JWT, and OAuth2. In the third part, they learned about Microservice Architecture using Spring Boot, pushing notification, sending email, and deploying spring boot using Apache Tomcat.

B. COURSE LEARNING OUTCOMES (LO)

After completion of the course, the student will be able to:

- LO1: Understand Java OOP and Practice with JDBC CRUD Operations. And This is the starting point of spring framework, students will understand about what is Spring Framework, spring projects, spring architecture, and MVC Architecture. This section also let student to know about Spring Boot and how to use it with Maven Project and application.yml or properties configuration file.
- LO2: Understand the structure of spring project and spring core technologies.
- LO3: Know how to use MyBatis to access data from database with Spring Boot.
- LO4: Learning about Spring Data JPA, JPA & Hibernate. What is ORM components, how use Spring Data Association Mapping and CRUD Operation with Spring Data JPA.
- LO5: Practice with Spring Data JPA complex mapping with E-Banking for an example.
- LO6: Know how to create dynamic repository and customize JPA Selection with Projection.
- LO7: Understand how to use auditing to create log data automatically and using database migration with flyway and liquibase.
- LO8: Understand what is Web Service, Type of Web Service, how to Create Web Service with CRUP Operations with exception handling, and apply Swagger web service document
- LO9: Understand how to create multiple module projects in maven and Microservice architecture.

- LO10: Learn to use spring security basic authentication to secure RESTful Web service.
- LO11: Learn to use spring security with JWT to secure RESTful Web service.
- LO12: Understand about OAuth2 and how to use OAuth2 and JWT to secure RESTful Web service
- LO13: Learn to use firebase to push notification to mobile and web application and learn to send email from spring boot.
- LO14: Learn to deploy Spring Boot application to Apache Tomcat.

C. COURSE OUTLINE

<i>Topic</i>	<i>Learning Outcomes</i>	<i>Number of Hour</i>
<ul style="list-style-type: none"> • Introduction to the course • Course syllabus • Java Basic • Java OOP • Java Data Access with CRUD Operations <p>Spring Framework Overview</p> <ul style="list-style-type: none"> • Introduction to Spring Framework • Spring Projects • Spring Architecture • Spring Web MVC Architecture <p>Getting Started with Spring Boot</p> <ul style="list-style-type: none"> • Introduction to Spring Boot • Spring Boot Features • Basic of Maven Project • Spring Boot Annotation • First Spring Boot Application with Maven Project • Configuration with YML or Properties file 	LO1	57
<p>Spring Project Structure</p> <ul style="list-style-type: none"> • Repository • Service • Controller • View <p>Spring Core Technologies</p> <ul style="list-style-type: none"> • Spring IoC Container and Beans • Dependency Injection <ul style="list-style-type: none"> - Constructor Injection - Setter Injection - Property Injection 	LO2	
<p>MyBatis Data Access with Spring</p> <ul style="list-style-type: none"> • Introduction to MyBatis • MyBatis Java API • Configuration Mapper Annotation • CRUP Operation 	LO3	
<p>Spring Data JPA</p> <ul style="list-style-type: none"> • Introduction to JPA & Hibernate • JPA ORM Components 	LO4	

<ul style="list-style-type: none"> • Spring Data JPA Association Mapping • CRUD Operations with Spring Data JPA 		
Spring Data JPA - Practice with Complex Association Mapping <ul style="list-style-type: none"> • Example with E-Banking Use-case 	LO5	
Spring Data JPA – Custom Repositories <ul style="list-style-type: none"> • Customize JPA Selections with Projection 	LO6	
Spring Data JPA – Auditing and DB Migrations <ul style="list-style-type: none"> • Auditing • DB Migration with Flyway • DB Migration with Liquibase 	LO7	
Spring RESTful Web Service <ul style="list-style-type: none"> • Introduction to web service • Soap Web Service • RESTful Web Service • Building APIs CRUD Operations • Exception Handling using Controller Advice • Web Service Developer Document with Swagger 	LO8	
Spring Boot Multi Module Project Spring Boot Microservice Architecture	L9	
Securing RESTful Web Service with Spring Security Basic Authentication <ul style="list-style-type: none"> • Introduction to Spring Security • Configuring HTTP Security • Authentication 	LO10	
Securing RESTful Web Service with JWT <ul style="list-style-type: none"> • Introduction to JWT • JWT Configuration with Spring Boot • Implementing JWT Authentication 	LO11	
Securing RESTful Web Service with JWT + OAuth <ul style="list-style-type: none"> - Introduction - Create a centralized authentication server, authorization server, and a demo resource server with spring boot 	LO12	
Spring Boot Notifications <ul style="list-style-type: none"> • Pushing Notification with Firebase • Sending Email 	LO13	

Deployment Spring Boot to Apache Tomcat	LO14	
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D. RESOURCES AND REQUIRED SUPPLIES

References:

1. Mert Caliskan, “Beginning Spring”
2. Nicholas S. Williams, “Professional Java for Web Application”
3. Felipe Gutierrez, “Pro Spring Boot 2”
4. Dinesh Rajput, “Building Microservices with Spring”
5. Ranga Rao Karanam , “Mastering Spring 5”
6. John Carnell Spring Microservices in Action