Full Stack Application Development with Spring Boot & React

DURATION : 4 MONTHS (1 ½ to 2 HOURS CLASS EVERY DAY)

Objective:

This course is intended for learning both front end and backend of the application.

Spring Boot is used for preparing the backend of the application (API's)

React is used to create the front end of the application which accesses the Spring Boot API's

Course Curriculum in glance

Course is being taught in the following order.

1. Core Java
   Learn OOPS and other core java related concepts.

2. DBMS & JDBC
   Learn MySQL database installation and SQL/PLSQL usage ,JDBC

3. Advanced Java
   Learn Servlets, JSP and Hibernate framework

4. Spring framework and its various modules
   - Spring core
   - Spring MVC
   - Spring Boot

5. HTML
   Learn to create static web pages using various html tags

6. CSS
   Learn to design web pages using various css elements.

7. JavaScript

   Learn client side validation and event handling using javascript

8. ReactJS
   Learn to build user interfaces using React

9. Real time application development
   With the skills learnt above, create a real time web application using Spring Boot and React frameworks.

During this learning process the student will be familier with the usage of tools like

- Java 17 version (Installation and Usage)
- Eclipse IDE
- Maven
- Lombok
- MySQL
- VSCode
- NodeJS

Course Curriculum in detail

SECTION -1

Core Java

1. Introduction to JAVA
- o What is JAVA?
- o Features of JAVA
- o JAVA Applications
- o JAVA Editions

2. Setting up Java
- o Understand the difference between the JDK and JRE
- o Understand the difference between .java and .class files
- o Describe the purpose of an integrated development environment (IDE)
- o Download and install the JDK, JRE, and Eclilpse IDE
- o Java program syntax
- o Java output statement
- o Compile and execute java program

3. Java Basics
- o What is identifier?
- o What is variable?
- o What is constant?

- o Understand the benefits of variables
- o Identify four main types of variables: (boolean, int, double, String)
- o Declare and assign values to variables
- o Name variables according to conventions
- o Java keywords

4. Data Types

- o What is a data? Types of data
- o What is data type?
- o Different types of data types
- o Differentiate integer data types (byte, short, int, long)
- o Differentiate floating point data types (float, double)
- o Use the char data type
- o Use Strings
- o Converting Between Data Types
- o Cast variables to other data types

5. Read data using Scanner

- o Introduction to Scanner class
- o Introduction to java.util package
- o Introduction to method
- o Types of methods
- o Scanner class methods

6. Operators

- o Introduction to operators
- o Types of operators
- o Unary operators
- o Binary operators
- o Ternary operator
- o Working with Increment operator
- o Working with Decrement operator
- o Working with Arithmetic operators
- o Working Math class

7. Control Structures

Decision Making

- o Boolean Expressions
- o if/else Constructs
- o Compare boolean expressions using relational operators
- o Create an if statement
- o Create if/else constructs
- o Understanding Conditional Execution
- o Build chained if constructs
- o Nested if
- o Switch statement
- o Understand the purpose of break keyword

8. Loops

- o Introduction
- o Types of loops
- o while loop
- o do..while loop
- o for loop
- o Nested loops

- Use of break keyword inside loops
- Use of continue keyword inside loops
- Infinite loops

9. Arrays

- Introduction to arrays
- Need of arrays
- Types of arrays
- Working with one-dimensional arrays
- Working with two-dimensional arrays

10. Functions

- Introduction to functions
- Types of functions
- User defined functions
- Create a user defined function
- Calling a user defined function
- Use of static keyword
- Different categories of functions
- Actual parameters
- Formal parameters
- Call by value
- Call by reference
- Recursion

11. OOP

- Introduction to OOP
- Main pillars of OOP
- Class
- Object
- Create a class
- Create an object
- Data members (Fields)
- Member Functions (Methods)
- Data Abstraction
- Data Encapsulation
- Access Modifiers (public, private, protected, default)
- Difference between Stack and Heap memory
- Static method vs Non-static method
- Static field vs Non-static filed
- Method overloading
- Constructor
- Use of constructors
- Types of constructors
- Constructor overloading
- Inheritance
- Types of inheritance
- Constructors in inheritance
- Method overriding
- super keyword
- final keyword
- this keyword
- Abstract method
- Abstract class
- Interface
- Use of getter methods
- User of setter methods

12. Exception Handling

- Introduction
- Types of Exceptions

- o Keywords used in Exception Handling (try, catch, finally, throw, throws)
- o Arithmetic Exception
- o ArrayIndexOutofBoundsException
- o Working with multiple catch blocks
- o Custom Exceptions

13. Strings

- o Introduction
- o String literal
- o String constant pool
- o StringBuffer
- o StringBuilder
- o String vs StringBuilder
- o String functions

14. JAVA Collections

- o Introduction to collections
- o Collection interface
- o Stack
- o Queue
- o List
- o ArryaList
- o LinkedList
- o Set
- o Vector

15. Packages

- o Introduction
- o Types of packages
- o Create a user defined package
- o Compile and execute package program
- o Calling a method of one package from another package program
- o Understand the behaviour of Access Modifiers in different packages

16. Working with Files

- o What is a file?
- o Create a file using JAVA program
- o Read data from a file using JAVA program
- o Update file data
- o Delete the file
- o Limitations of File handling

17. DBMS

- o Introduction to database
- o Introduction to DBMS
- o RDBMS
- o Create Table command
- o Insert records into a table
- o Update table records
- o Delete table records
- o Retrieve table records

18. JDBC

- o Introduction to JDBC
- o JDBC API
- o Interfaces and classes of java,sql package
- o Steps to communicate with database using JDBC
- o Programs

Advanced Java

1. SERVLET

Introduction

- What is web browser?
- What is web resources?
- Types of web resources
- What is web server?
- Installing of apache tomcat web server

2. About servlet

- Servlet introduction
- Creating the first servlet in web app
- Steps to create WAR file
- Build & Deployment process

3. Web URL

- Web url structure.
- Query string.
- HTTP & HTTPS protocols.
- Key elements of HTTP request and HTTP response
- HTTP methods.
- Difference between GET and POST.

4. Servlet Container

- About servlet containers & its advantages
- Request and response objects
- GetParameter() and getParameters() methods
- About XML
- About deployment descriptor(web.xml)

5. Servlet Hierarchy

- Generic servlet
- HTTP Servlet
- Difference between Generic servlet and HTTP Servlet
- Servlet life cycle
- Servlet context and servlet config
- Redirect,Forward and Include

6. Attributes

- What is an attribute?
- Need of attributes
- Types of attributes

7. Cookies

- Introduction
- Steps to create a cookie in the servlet
- Types of cookies
- Life cycle of cookies
- Application of cookies

8. Session

- Introduction
- Steps to create a session in the webapp
- Types of session
- Life cycle of session
- Application of session

JavaServerPages

1. Introduction

- How to create JSP
- Difference between Servlet and JSP

2. JSP Scripting Elements

- Scriptlet tag
- Expression tag
- Declaration tag

3. JSP implicit objects

- Request object
- Response object
- Config object
- Application object
- Session object

4. Exception handling in JSP

- About isErrorPage and errorPage

5. Jstl

- Introduction
- JSTL core tags
- JSTL function tags

Hibernate

1: Introduction to Hibernate

- Drawbacks of direct JDBC
- Plain Old Java Object (POJO)
- What is O-R Mapping
- Simple Database Application

2: Hibernate Configuration

- Required JAR Files
- Hibernate configuration File
- Hibernate properties File
- Hibernate XML File
- SQL Dialects

3: Hibernate Concepts

- Id and Primary Key
- Id Generation Methods
- SessionFactory
- Session
- Transaction
- Developing CRUD Application

4: Hibernate O-R Mapping

- Mapping Declarations
- Modeling Composition with Relationship
- Modeling Composition with Components
- One-to-One Association
- One-to-Many Association
- Many-to-Many Association
- Uni and Bidirectional Associations

Spring Framework

Spring Basics

- What is Spring Framework
- Inversion of Control
- Dependency Injection
- Bean Factory
- Developing First Spring Application

2: Spring Container

- Built-in Bean Factories
- Application Context
- Wiring Beans
- Bean Lifecycle in Container
- Spring Events

3: Spring Data Access

- JDBC Abstraction Layer

- Data Access Exceptions
- DAO Support

4: Spring O-R /mapping

- What is O-R Mapping
- O-R Mapping support in Spring
- Hibernate Support / Mapping

5: Spring Web MVC Framework

- Web MVC Architecture
- Role of DispatcherServlet
- Role of Controller
- Handler
- View Resolving
- Data Binding
- File Upload Support

6: Spring Boot

- Introduction to spring boot
- Building Spring Boot Application
- Rest Annotation with In Memory Database & CRUD Operations
- Rest Annotation with Relation DB
- JPA Repository Concepts

Section 2 : FrontEnd programming using REACT

This section focuses on learning HTML, CSS, javascript, understanding React Framework, its components and some third party libraries

Also we will also learn about how to access api using React libraries.

1. Setting up the environment and tools (4 Hours)

· 1.1 Installing Node.js

· 1.2 Installing VSCode

HTML & CSS Content

HTML/CSS	Subject Title	Subject Details
HTML	Introduction to web programming	It talks about the architecture of a website and the different technologies used to design a

		website.
HTML	Introduction to HTML	HTML tags versus HTML elements, history of HTML, how to design a first HTML page, HTML attributes, etc. are discussed in this subject.
HTML	HTML Basic Formatting Tags	HTML colour coding, HTML basic tags, and formatting tags are covered here.
HTML	HTML-Grouping Using Div Span	The span and DIV tags used to format HTML web pages are introduced in this subject.
HTML	HTML Lists	The definition of HTML lists, their significance, types of HTML lists like ordered and unordered lists, etc. are discussed here.
HTML	HTML Images	The use of image mapping in embedding images into HTML pages are explained in this module.
HTML	HTML Hyperlink	This subject focuses on Uniform Resource Locator (URL) and related concepts. It also talks about URL encoding and the importance of hyperlinks in web pages.
HTML	HTML Tables	This module teaches how to represent tables in a webpage.
HTML	HTML iFrame	How to use iFrame tag and attributes to embed one web page into another via nested browsing context is covered in this module.
HTML	HTML Form	It discusses the syntax used in HTML to integrate forms in web pages and also talks about their importance in websites.
HTML	HTML Headers	Scrip, Title, Base, and other elements of HTML headers are explained in this subject.
HTML	HTML Miscellaneous	HTML Meta tag, XHTML, and HTML deprecated tags and attributes are covered in this module.
CSS	CSS2 Introduction	It gives the basic introduction to CSS and its importance in HTML web page designing.
CSS	CSS2 Syntax	The CSS syntax, single style sheets, multiple style sheets, and value lengths and percentages

		are covered in this subject.
CSS	CSS2 Selectors	It explains different types of CSS2 selectors and discusses their significance and rules.
CSS	CSS2 Colour Background Cursor	Background image, background repeat, position, and CSS2 cursor are covered in this subject.
CSS	CSS2 Text Fonts	The various elements of text like font size, colour, style, height, indent, alignment, position, etc. are discussed in this module.
CSS	CSS2 List Tables	CSS Tables, including their border, padding, colour, text, height and width, etc., and CSS lists, including their position, style, image, etc., are discussed here.
CSS	CSS2 Box Model	The border, outline, margin, padding, CSS dimensions, etc. are included in this subject.
CSS	CSS Display Positioning	CSS visibility, CSS display, CSS scrollbars, CSS positioning, CSS layers, etc. are included in the module.
CSS	CSS Floats	The float CSS property and its role in the position of an element in a container are explained via this subject.

JavaScript

1. Basic JavaScript Introduction

Chapter 1 contains the basic introduction to the JavaScript language, such as

- What is JavaScript?
- Evolution of JavaScript
- Features of JavaScript
- Advantages and Disadvantages of JavaScript
- How does JavaScript works?
- Structure of a JavaScript program
- How to write JavaScript in Notepad++, Visual Studio Code, and Eclipse IDE?
- How to add JavaScript in HTML?
- How to include External JavaScript in HTML?

2. JavaScript Data Types and Variables

Chapter 2 deals with the most important and basic concepts of JavaScript. They are:

- JavaScript Comments
- JavaScript Keywords
- Data Types in JavaScript
- JavaScript Variables
- Types of Variables in JavaScript
- Key Difference between Var, Let, and Const

3. JavaScript Operators

Chapter 3 deals with operators in JavaScript. In this chapter, we will learn the following topics:

- What are Operators in JavaScript?
- Assignment Operator
- Comparison Operators
- Logical Operators
- Conditional Operators
- Bitwise Operators
- Unary Operators
- TypeOf Operator
- Operator Precedence

4. JavaScript Statement

This chapter deals with the following topics that are as:

- Conditional Statement
  - If statement
  - If else statement
  - Switch statement
- Loop statements
  - While Loop
  - Do while Loop
  - For loop
  - Nested for loops
  - For In loop
  - For Of loop
  - Break statement
  - Continue statement

5. JavaScript Function

This chapter deals with the following topics that are as follows:

- What is a function in JavaScript?
- How to call a function in JavaScript using arguments?
- Pass By Value in JavaScript
- Function return (or return statement)
- Nested functions
- Rest parameter
- Anonymous functions
- Recursion
- Arrow Function

6. Objects in JavaScript

Chapter 6 in this JavaScript syllabus deals with the following important topics that are as:

- What is an Object?
- Types of Objects
- Array Object
  - Properties of Array Object
  - Methods of Array Object
- String Object
  - Properties of String Object
  - Methods of String Object
- Math Object
  - Properties of Math Object
  - Methods of Math Object
- Date Object
  - Methods of Date Object
- Global Object
  - Properties of Global Object
  - Methods of Global Object

- Number Object
  - Properties of Number Object
  - Methods of Number Object
- Creating your own Objects
  - Defining methods

7. JavaScript Window and Frame Objects

Chapter 7 in this JavaScript syllabus, deals with the following key topics that are as:

- Top-level Objects
- Window Object
  - Creating a Window
  - Communicating with the user
  - Working with Timeouts
  - Some properties of Window Object
  - Some other useful methods of Window Object
- Location Object
  - Properties of Location Object
  - Methods of Location Object
- Document Object
  - Properties of Document Object
  - Methods of Document Object
- The Navigator Object
  - Properties of Navigator Object
  - Methods of Navigator Object
- History Object
  - Properties of History Object
  - Methods of History Object
- Screen Object
- Working with Frames
  - Creating frames
  - The frame tree
  - Accessing frames
  - Nested frames
  - Frame object model
  - Frame element object

8. JavaScript Event Handling

Chapter 8 in this JavaScript syllabus covers the following significant topics that are as:

- Events
  - How does it work?
- Objects and Events
  - Creating an Event handler
  - Changing Event handlers
- Managing JavaScript Events
  - Mouse Events
  - Keyboard Events
  - The onLoad and onUnload Events
- Event Simulation
- The Event object
- Event capturing
  - Turning off Event capturing
- Event bubbling
  - Preventing Event bubbling

9. JavaScript Exception Handling

The following topics come under this chapter that are as:

- Exceptions and Errors
- Exception mechanism
- "try-catch-finally" constructions
- Throwing exceptions
- Error Object
  - Properties of Error Object
  - Methods of Error Object

10. Form

In this module, we will learn the following important topics that are as:

- The Form Object
  - Accessing Forms within JavaScript
  - Accessing Form elements

- About <input> element objects
- Properties of Form Object
- Methods of Form Object
- Fieldset and Legend Element Objects
- Label Element Object
- Text Input Object
  - Properties of Text Input Object
  - Methods of Text Input Object
- Password Input Object
- Hidden Input Object
- Textarea Element Object
  - Properties of Textarea Element Object
- Button Element Object
- Checkbox Input Object
  - Properties of Checkbox Input Object
  - Method of Checkbox Input Object
- Radio Input Object
  - Properties of Radio Input Object
  - Methods of Radio Input Object
- Image Input Object
  - Properties of Image Input Object
- Select Element Object
  - Properties of Select Element Object
  - Methods of Select Element Object
- Option Element Object
- File Input Element Object

11. Document Object Model (DOM)

Chapter 11 contains the following topics under this JavaScript syllabus that are as:

- Document Object Model (DOM) and W3C
  - DOM Levels
    DOM and JavaScript
- New DOM Concepts
  - Element Referencing
    Hierarchy of nodes
    Node properties
    Node methods
    Generating new node content
    Replacing node content

React JS

Setting up the environment and tools

- Installing Node.js
- Installing VSCode
- Creating and running a React application

Getting Started with REACT

- Basic React components
- Basics of ES6
- Understanding constants
- Template literals
- Classes and Inheritance
- JSX and Styling

- Props and the state
- Component life cycle methods
- Stateless Components
- React Hooks
- Handling lists with React
- Handling events with React
- Handling forms with React

Consuming the REST API with REACT

- Using Promises
- Using the fetch API
- Using the axios library
- Practical Examples

Third part components for REACT

- Using third party React Components
- React Table
- Material-UI component library
- Routing