Java + React Track-B outline

Prerequisites: Basics of IT fundamentals, knowledge on working with windows OS, good to have understanding of SDLC and modern websites.

Course outline (18 days,8 hours per day)

Week 1: React JS

Day 1: HTML & CSS

- Web Programming Introduction
- HTML & CSS Introduction
- Core HTML tags and elements
- HTML forms
- HTML grouping and div span
- Working with multi medias
- HTML Tables
- How to use CSS
- Core CSS properties
- CSS box models
- CSS padding & margin properties

Hands on:

- Creating Resume website to understand HTML tags and use of CSS.
- Creating Feedback form understand working of forms in HTML.

Day 2: JavaScript

- Introduction
- Environment Set up.
- Language Syntax
- Variables and Operators
- Control Statements
- Functions
- Arrays and Objects

Hands on:

- Creating mini modules like (authentication, age verification, Course enrollment)

Day 3: JavaScript

- DOM Manipulation
- Form Handling
- Event handling
- Synchronous vs Asynchronous.

Hands on:

- Creating a mini calculator using JavaScript
- Creating a student result system with authentication

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Week 2: React JS

Day 4: JavaScript

- ES6 features
- Arrow, rest and spread operator.
- API and error handling
- Array methods (map, filter, reduce)

Hands on:

- Labs on understanding of ES6 features and array functions.
- Making use of fetch API to Create Random User's information.

Day 5: ReactJS

- Introduction to React
- React render HTML
- React JSX
- Using CSS in React
- Understanding of NPM packages
- Components

Hands on:

- Creating Resume website to understand HTML and CSS in JSX syntax

Day 6: ReactJS

- Functional components
- Props
- useContext
- useState Hook
- React Routing

Hands on:

- Creating Product feature like Flipkart using Prop Components
- Passing information through useContext
- Creating a counter App to understand useState
- Linking All the Applications in one SPA.

Day 7: ReactJS

- React Forms
- useEffect hook
- Working with APIs
- Axios and Fetch APIs

Hands on:

- Creating Signup Page using react-hook-form
- Fetching Sample Blog's API with axios/fetch and printing them in proper field.

Day 8: ReactJS + API handling

- Working with APIs
- Performing CRUD operation with backend APIs
- Making use of best practice to use APIs
- Security practices

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Hands on:

- Creating end to end Product App including login, signup, CRUD operation by following best practice.

Week 3: Java Programming

Day 9: Advanced OOPs and Design Patterns

- Review of core OOPs concepts (classes, objects, inheritance, polymorphism, encapsulation)
- Advanced OOPs topics: interfaces, abstract classes, packages, access modifiers
- Design patterns: introduction to design patterns, creational patterns (singleton, factory, builder)

Lab: Implement a design pattern (e.g., singleton) in a practical scenario.
Lab: Create a class hierarchy with interfaces and abstract classes.

Day 10: Exception Handling and Collections

- Exception handling: try-catch-finally blocks, custom exceptions
- Java Collections Framework: ArrayList, LinkedList, HashSet, HashMap, TreeSet, TreeMap

Lab: Implement custom exceptions in a program.
Lab: Use collections to store and manipulate data in various scenarios (e.g., sorting, searching, filtering).

Day 11: Multithreading and Concurrency

- Introduction to multithreading: threads, processes, thread lifecycle
- Synchronization and concurrency: synchronized keyword, volatile keyword, atomic classes

Lab: Create a multithreaded program to perform concurrent tasks.
Lab: Implement synchronization mechanisms to avoid race conditions and deadlocks.

Day 12: Functional Programming and Streams

- Functional programming concepts: lambda expressions, method references
- Java Streams: stream operations (filter, map, reduce, etc.), parallel streams

Lab: Use streams to process data efficiently.
Lab: Write a program using lambda expressions and method references.

Day 13: File I/O, Serialization, and Testing

- File I/O: reading and writing files, file streams
- Serialization and deserialization: object serialization and deserialization

Lab: Create a program to read and write data to a file.
Lab: Serialize and deserialize objects.
Optional: Introduction to unit testing frameworks (JUnit, TestNG) and writing test cases.

Week 4: Backend API Development using Spring

Day 14: Spring Boot Basics and REST APIs

- Introduction to Spring Boot: Overview, benefits, and setup

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- Spring Boot Starter POMs and dependencies
- Spring Boot application structure and configuration
- Spring Boot application run and packaging

Lab: Create a basic Spring Boot application with a simple controller.
Lab: Configure Spring Boot application properties and profiles.

- Building REST APIs with Spring Boot:
- @RestController and @RequestMapping annotations
- Handling HTTP requests (GET, POST, PUT, DELETE)
- Request and response handling with @RequestBody and @ResponseBody
- Error handling and exception handling

Lab: Develop a REST API to expose CRUD operations on a simple entity.

Day 15: Spring Boot Data and Security

- Spring Data JPA:
- Repository interface and CRUD operations
- JPQL and native queries
- Spring Data REST
- Spring Security:
- Basic authentication and authorization
- Role-based access control
- Custom authentication and authorization

Lab: Implement data access layer using Spring Data JPA.
Lab: Secure a Spring Boot application with basic authentication and authorization.

Day 16: Spring Boot Actuator and Testing

- Spring Boot Actuator:
- Monitoring application health and metrics
- Exposing endpoints for debugging and troubleshooting
- Testing Spring Boot applications:
- Unit testing with JUnit and Mockito
- Integration testing with Spring TestContext Framework

Lab: Enable Spring Boot Actuator and explore its endpoints.
Lab: Write unit and integration tests for a Spring Boot application.

Day 17: Spring Boot Advanced Topics

- Spring Boot Profiles:
- Configuring different environments (dev, prod, test)
- Using profiles to activate specific configurations
- Spring Boot Starter Security:
- OAuth2 and OpenID Connect
- Securing REST APIs with Spring Security
- Spring Boot Starter AOP:
- Aspect-oriented programming with Spring AOP
- Implementing custom aspects

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Lab: Configure Spring Boot application for different environments.
Lab: Secure a REST API with OAuth2.
Lab: Implement a custom aspect for logging or performance monitoring.

Day 18: Spring Boot Best Practices and Capstone Project

- Spring Boot best practices:
- Code organization and modularization
- Configuration management
- Logging and debugging
- Performance optimization

Capstone project: Build a complete Spring Boot application with REST APIs, data access, security, and testing.

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