

Career Enabler Program with React JS

Day 1-2: JavaScript and TypeScript

Day 1: JavaScript Basics

- **Lecture Topics:**
 - Introduction to JavaScript: History, Uses, and Applications
 - Variables, Data Types, and Operators
 - Control Structures: Loops and Conditional Statements
 - Functions and Scope
 - Arrays and Objects
 - ES6+ Features: Arrow Functions, Template Literals, Destructuring, Spread Operator
- **Lab Session:**
 - Practice with loops and conditional statements
 - Write a function to manipulate arrays and objects
 - Implement a simple calculator using functions and operators

Day 2: TypeScript Basics

- **Lecture Topics:**
 - Introduction to TypeScript: Why TypeScript?
 - Type Annotations and Interfaces
 - Classes and Object-Oriented Programming in TypeScript
 - Modules and Namespaces
 - TypeScript Compiler and Configurations
 - Introduction to TypeScript with JavaScript Libraries
- **Lab Session:**
 - TypeScript setup and configuration
 - Convert a small JavaScript project into TypeScript
 - Use interfaces and types in functions and classes
 - Build a small app using TypeScript classes

Day 3-7: SQL with Query Optimization

Day 3: SQL Basics

- **Lecture Topics:**
 - Introduction to Databases and SQL
 - Creating Databases and Tables
 - Basic SQL Queries: SELECT, INSERT, UPDATE, DELETE
 - Data Types in SQL
 - Filtering Data: WHERE, ORDER BY, GROUP BY
- **Lab Session:**
 - Create a database and tables
 - Perform basic CRUD operations
 - Write queries with filtering and sorting options

Day 4: Joins and Subqueries

- **Lecture Topics:**
 - Understanding Joins: INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN
 - Using Subqueries in SQL
 - Set Operations: UNION, INTERSECT, EXCEPT
- **Lab Session:**
 - Write queries involving multiple tables using joins
 - Practice using subqueries within SELECT, FROM, and WHERE clauses
 - Perform set operations on multiple datasets

Day 5: Advanced SQL Functions

- **Lecture Topics:**
 - Aggregation Functions: COUNT, SUM, AVG, MIN, MAX
 - String Functions: CONCAT, SUBSTRING, REPLACE, LENGTH
 - Date and Time Functions
 - Window Functions: ROW_NUMBER, RANK, PARTITION BY
- **Lab Session:**
 - Write queries with aggregation functions
 - Use string and date manipulation functions in SQL queries

- Apply window functions for ranking and partitioning data

Day 6: Query Optimization - Part 1

- **Lecture Topics:**

- Introduction to Query Optimization
- Indexing: Types and Best Practices
- Understanding Query Execution Plans
- Importance of Proper Table Design (Normalization vs Denormalization)

- **Lab Session:**

- Analyze query performance using execution plans
- Create indexes and observe performance improvements
- Optimize queries with better table design and indexing

Day 7: Query Optimization - Part 2

- **Lecture Topics:**

- Query Optimization Techniques: Caching, Indexes, Partitioning
- Avoiding Costly Operations: SELECT *, Unnecessary Joins
- SQL Profiling and Query Tuning Tools
- Understanding Database Locks and Deadlocks

- **Lab Session:**

- Optimize poorly written queries
- Use database profiling tools to analyze performance bottlenecks
- Experiment with avoiding locks and reducing deadlock potential

Day 8-14: React JS with Performance Optimization and Testing

Day 8: React Basics

- **Lecture Topics:**

- Introduction to React: Components, JSX, and Virtual DOM
- Functional Components vs Class Components
- Props and State in React
- Event Handling in React

- **Lab Session:**
 - Set up a simple React app using create-react-app
 - Create functional and class components
 - Build a form component and handle user inputs

Day 9: Advanced React Concepts

- **Lecture Topics:**
 - Lifecycle Methods in Class Components
 - Hooks in Functional Components: useState, useEffect, useContext
 - Component Composition and Reusability
 - Lifting State Up
- **Lab Session:**
 - Build an app with components utilizing state and hooks
 - Refactor a class component to use hooks
 - Practice state lifting with multiple components

Day 10: Routing and State Management

- **Lecture Topics:**
 - React Router: Single Page Applications (SPA) and Routing
 - Dynamic Routing and URL Parameters
 - Introduction to State Management in React: Context API and Redux
- **Lab Session:**
 - Implement routing in a multi-page React application
 - Create a simple global state using Context API
 - Manage component state using Redux

Day 11: Performance Optimization in React

- **Lecture Topics:**
 - React Performance Bottlenecks
 - Code Splitting and Lazy Loading
 - Memoization with React.memo and useMemo
 - Optimizing Re-rendering with useCallback and shouldComponentUpdate

- **Lab Session:**
 - Identify performance bottlenecks in a React app
 - Implement code splitting using React.lazy and Suspense
 - Use React.memo and useMemo to improve performance

Day 12: Testing in React

- **Lecture Topics:**
 - Introduction to Testing in React: Jest and React Testing Library
 - Unit Testing React Components
 - Testing Props, State, and Events
 - Snapshot Testing in React
- **Lab Session:**
 - Set up Jest and React Testing Library in a React project
 - Write unit tests for components and hooks
 - Implement snapshot testing for component rendering

Day 13: End-to-End (E2E) Testing

- **Lecture Topics:**
 - Introduction to E2E Testing with Cypress
 - Setting Up Cypress for React Applications
 - Writing E2E Tests: Navigation, Forms, and UI Interactions
 - Best Practices for E2E Testing
- **Lab Session:**
 - Set up Cypress in a React project
 - Write E2E tests for a multi-page React app
 - Perform automated tests for form submission, routing, and component interaction

Day 14: Project and Wrap-Up

- **Project Work:**
 - Build a fully functional React application with optimized performance and routing.
 - Implement SQL query optimizations for a backend database.
 - Include proper testing for React components and E2E tests.