MongoDB, Express, React, and Node.js (MERN)

Course Number: WA3236

Duration: 3 days

Course Description

This MERN training course teaches learners how to build web applications using the MERN (MongoDB, Express, React, Node.js) stack. The course covers concepts from front-end development with React, including components, state management, and hooks, to back-end development with Node.js and Express. Learners also gain practical experience with database interactions using MongoDB.

Skills Gained

- Develop modern front-end applications with React, covering components, state, and hooks.
- Utilize React Router for navigation and manage application state.
- Perform unit testing for React applications using React Testing Library.
- Master MongoDB for data modeling, CRUD operations, and advanced queries.
- Build scalable server-side applications with Node.js and Express.
- Create robust web services using Express middleware and routing.
- Access and manage MongoDB data programmatically from Node.js applications.

Prerequisites

All students should have experience with HTML5, CSS3, and JavaScript.

Course Details

React Overview

- What is React?
- React Component Model
- Motivation for Creating React
- One-Way Data Flow
- JSX and the Virtual DOM
- Creating React Projects
- React Application Frameworks

Introduction to TypeScript

- About TypeScript
- The Type System and Defining Variables
- Defining Classes and Inheritance
- Variable Scope and Const Declarations
- Arrow Functions and Template Strings
- Working with ES6 Modules

Basic Components and JSX

- What is JSX?
- React Components and Functional Component Examples
- CSS Styles using Classes and Attributes
- Creating Attributes with Spread Operator
- Fragments and Expressions

React Functional Component Concepts

- Functional Components and JSX Nesting
- Props vs. State and State Hierarchy
- Event Handling and Lifecycle
- App Development Workflow

React Router v7.x

- Routing and Navigation
- Types of Routing with react-router
- A Basic Routed Component and Route Parameters
- Nested Routes and Private Routes
- The Outlet and Login Components

Using React Hooks

- Functional Component Shortcomings and Hooks Overview
- The useState and useEffect Hooks
- Additional Hooks: useContext, useReducer, useMemo
- The useCallback and useRef Hooks
- useLayoutEffect and useImperativeHandle

State Management for React

- React State Basics and Managing State with Hooks
- Redux State Library and its Advantages
- Types of State and State Management Rules

Unit Testing React with React Testing Library

- React Testing Environment and Vitest Setup
- Snapshot Testing and Code Coverage
- Unit Tests and @testing-library/react
- Simulating Events and Testing Results

Introduction to MongoDB

- MongoDB Features and Data Model
- MongoDB Query Language and CRUD Operations

Working with Data in MongoDB

- Reading and Writing Data in MongoDB
- Query and Projection Operators
- Aggregating Data and Map-Reduce

Introduction to Node.js

- What Is Node.js and its Applications
- Installing Node.js and NPM
- Event-Driven, Non-Blocking I/O
- Using Node Package Manager (NPM)
- The Express Server Framework

Introduction to Express

- What is Express?
- Request Routing and Route Path

- The Response Object and URL Parameters
- Catching All Routes and a Full Example

Express Middleware

- Introduction to Express Middleware
- Writing and Binding Middleware Functions
- Order of Execution and Error Handling
- Serving Static Files and POST Request Handling

Accessing MongoDB from Node.js

- Create a Node Project and Install MongoDB Node Driver
- Setup Code for MongoDB and Connection URL
- Retrieving and Modifying MongoDB Data