Professional Mongo DB Course Outline

Module 1: Introduction to MongoDB

- What is MongoDB? (NoSQL vs. SQL Databases)
- Key Features and Advantages of MongoDB
- Installing and Setting Up MongoDB (Windows, macOS, Linux)
- Understanding MongoDB Architecture

Module 2: MongoDB Fundamentals

- Understanding Databases, Collections, and Documents
- Data Types in MongoDB
- CRUD Operations:
    - Create (`insertOne`, `insertMany`)
    - Read (`find`, `findOne`)
    - Update (`updateOne`, `updateMany`, `$set`, `$unset`)
    - Delete (`deleteOne`, `deleteMany`)

Module 3: Querying and Indexing in MongoDB

- Filtering and Query Operators (`$eq`, `$gt`, `$lt`, `$in`, `$regex`)
- Sorting, Limiting, and Projection
- Working with Indexes (`createIndex`, `compound indexes`)
- Performance Optimization Using Indexes

Module 4: Data Modeling in MongoDB

- Embedded Documents vs. Referenced Documents
- Schema Design Best Practices
- One-to-One, One-to-Many, and Many-to-Many Relationships
- Handling Large Data and Partitioning Strategies

Module 5: Aggregation Framework & Advanced Queries

- Understanding Aggregation Pipeline
- Using `$match`, `$group`, `$sort`, `$project`, `$lookup`, `$unwind`
- Performing Data Transformations and Analytics
- Performance Optimization in Aggregation

Module 6: MongoDB Security & Administration

- User Authentication and Role-Based Access Control
- Data Encryption and Backup Strategies
- Monitoring and Profiling MongoDB Performance
- Setting Up Logging and Alerts

Module 7: Working with MongoDB in Applications

- Connecting MongoDB with Node.js, Python, or Java
- Performing CRUD Operations with Mongoose (Node.js)
- Using MongoDB with RESTful APIs
- Integrating MongoDB with GraphQL

Module 8: Scaling and High Availability

- Introduction to Replication (`replica sets`)
- Setting Up and Managing Sharding
- Backup and Restore Strategies
- Optimizing Query Performance for Large Datasets

Final Module: Capstone Project & Certification

- Designing a Full-Scale MongoDB Database
- Implementing CRUD and Aggregation Queries
- Performance Optimization Techniques
- Final Presentation and Certification