

## Course duration

- 2 days

## Course Benefits

- Obtain an overview of the NoSQL landscape.
- Learn about MongoDB value proposition.
- MongoDB architecture.
- Learn to install and configure MongoDB.
- Learn essential system administration.
- Learn to develop solutions in Java.

## Course Outline

1. Introduction to MongoDB
  1. MongoDB
  2. MongoDB Features
  3. MongoDB on the Web
  4. Positioning of MongoDB
  5. MongoDB Applications
  6. MongoDB Data Model
  7. MongoDB Limitations
  8. MongoDB Use Cases
  9. MongoDB Query Language (QL)
  10. The CRUD Operations
  11. The
  12. find
  13. Method
  14. The
  15. findOne
  16. Method
  17. A MongoDB Query Language (QL) Example
  18. Inserts
  19. MongoDB vs Apache CouchDB
  20. Summary
2. MongoDB Data Model
  1. The BSON Data Format
  2. Database Terminology
  3. MongoDB Data Model
  4. The \_id Primary Key Field Considerations
  5. Indexes

6. (Traditional) Data Modeling in RDBMS
7. Data Modeling in MongoDB
8. An Example of a Data Model in MongoDB
9. MongoDB Data Modeling
10. A Sample JSON Document Matching the Schema
11. To Normalize or Denormalize?
12. MongoDB Limitations
13. Data Lifecycle Management
14. Data Lifecycle Management: TTL
15. Data Lifecycle Management: Capped Collections
16. Summary
3. MongoDB Architecture
  1. MongoDB Nexus Architecture
  2. Blending the Best of Both Worlds
  3. What Makes MongoDB Fast?
  4. Pluggable Storage Engines
  5. Data Sharding
  6. Sharding in MongoDB
  7. Data Replication
  8. A Sample Sharded Cluster Diagram
  9. GridFS
  10. Getting a File from GridFS
  11. MongoDB Security
  12. Authentication
  13. Data and Network Encryption
  14. Summary
4. MongoDB Administration
  1. The Admin Shell
  2. Getting Help
  3. Admin Commands
  4. Starting MongoDB
  5. The mongod Web UI
  6. Running MongoDB JavaScript Scripts
  7. Shell Helper to JavaScript Equivalent Map
  8. A MongoDB Script Example
  9. Connecting to MongoDB
  10. User Authentication
  11. Authentication Options
  12. Import / Export Operations
  13. MongoDB Extended JSON and Strict Mode
  14. Examples of Strict Mode Encoding
  15. Examples of Data Import / Export
  16. The Robo3T (formerly RoboMongo) Tool
  17. Robo3T Connections
  18. Connection Manager
  19. Viewing Databases, Collections and Documents
  20. Edit Capabilities

- 21. Admin Shell
- 22. Summary
- 5. Working with Data in MongoDB
  - 1. Reading Data in MongoDB
  - 2. The Query Interface
  - 3. Query Syntax is Driver-Specific
  - 4. Projections
  - 5. Query and Projection Operators
  - 6. MongoDB Query to SQL Select Comparison
  - 7. Cursors
  - 8. Cursor Expiration
  - 9. Writing Data in MongoDB
  - 10. An Insert Operation Example
  - 11. The Update Operation
  - 12. An Update Operation Example
  - 13. A Remove Operation Example
  - 14. Limiting Return Data
  - 15. Data Sorting
  - 16. Aggregating Data
  - 17. Aggregation Stages
  - 18. Accumulators
  - 19. An Example of an Aggregation Pipe-line
  - 20. Map-Reduce
  - 21. Summary
- 6. Indexes in MongoDB
  - 1. Indexes in MongoDB
  - 2. Creating an Index
  - 3. Listing Existing Indexes
  - 4. The Sort Order
  - 5. Using the Explain() Method
  - 6. Main Index Types
  - 7. The \_id Field
  - 8. Single and Compound Indexes
  - 9. Multikey Indexes
  - 10. Other Index Types
  - 11. Index Properties
  - 12. Examples of Creating Indexes with Index Properties
  - 13. Summary
- 7. Accessing MongoDB from Node.js
  - 1. Getting Started
  - 2. The Connection URL
  - 3. Obtaining a Collection
  - 4. Inserting Documents
  - 5. Updating a Document
  - 6. Querying for Documents
  - 7. Deleting a Document
  - 8. Connection Pooling

- 9. Summary
- 8. MongoDB Java Client
  - 1. Accessing MongoDB from a Java Client
  - 2. The MongoDB Java Driver
  - 3. Using the Synchronous Driver in a Java Application
  - 4. Connecting to MongoDB
  - 5. Connecting to a Standalone Instance
  - 6. Connection Options and the MongoClientURI
  - 7. Using MongoClientURI
  - 8. Connecting to a Replica Set
  - 9. Connecting to a Sharded Cluster
  - 10. Connection Configuration
  - 11. Connecting and Accessing a Collection
  - 12. Create a Collection
  - 13. Insert a Document
  - 14. Update
  - 15. Update Operators
  - 16. Read (Find)
  - 17. Read (Find) Multiple Documents
  - 18. Delete
  - 19. BSON Library
  - 20. Impedance Mismatch
  - 21. Morphia Object Mapper
  - 22. Setup
  - 23. Connecting
  - 24. Mapping
  - 25. Simple Mapping
  - 26. Saving Data
  - 27. Queries
  - 28. Summary
- 9. Securing MongoDB
  - 1. Security Overview
  - 2. Your Mileage May Vary
  - 3. Security is Your Responsibility
  - 4. First Things First
  - 5. MongoDB Security
  - 6. A MongoDB Security Checklist
  - 7. Enable Access Control and Enforce Authentication
  - 8. Configure Role-Based Access Control
  - 9. Create an Admin User
  - 10. Create a Database User
  - 11. Enable Authentication
  - 12. Encrypt Communication
  - 13. Encrypt and Protect Data
  - 14. Limit Network Exposure
  - 15. Audit System Activity
  - 16. Run MongoDB with a Dedicated User

17. Run MongoDB with Secure Configuration Options
18. Compliance
19. Summary
10. MongoDB Ops Manager APIs
  1. Ops Manager Introduction
  2. Features
  3. Architecture
  4. Architecture Diagram
  5. The Public API
  6. Configure Public API Access
  7. Generating a Public API Key
  8. Managing Public API Keys
  9. API Whitelisting
  10. Quick Review of RESTful Services
  11. Supported HTTP Methods
  12. Response Codes
  13. Optional Query Parameters
  14. Resource Categories
  15. Root
  16. Making a Request
  17. Root Example
  18. Pretty Print Example
  19. User (by name) Example
  20. Summary

## Class Materials

Each student will receive a comprehensive set of materials, including course notes and all the class examples.

### Class Prerequisites

Experience in the following *is required* for this MongoDB class:

- Familiarity with Java programming and using Eclipse environment.