

## MongoDB Course Content

### **Introduction to MongoDB - Architecture and Installation**

- In this module, you will get an understanding of NoSQL databases, design goals, requirement of NoSQL database/ MongoDB, MongoDB® architecture and introduction to JSON and BSON among others. This module will also cover the installation of MongoDB® and associated tools.
- Understand NoSQL databases and their advantages
- Learn JSON and BSON
- Install MongoDB
- After completing this module, you should be able to:
  - Differentiate database categories
  - Learn MongoDB design goals
  - List MongoDB tools
  - Describe JSON and BSON
  - Install MongoDB on Windows, Linux, MAC OS etc.
  - Setup MongoDB environment
  - Understanding the basic concepts of a Database
  - Database categories: What is NoSQL? Why NoSQL? Benefit over RDBMS
  - Types of NoSQL Database, and NoSQL vs. SQL Comparison, ACID & Base Property
  - CAP Theorem, implementing NoSQL and what is MongoDB?
  - Overview of MongoDB, Design Goals for MongoDB Server and Database, MongoDB tools
  - Understanding the following: Collection, Documents and Key/ Values, etc.,
  - Introduction to JSON and BSON documents
  - Environment setup (live Hands-on) and using various MongoDB tools available in the MongoDB Package
- Case study discussion

### **Schema Design and Data Modelling**

- In this module, you will learn Schema Design and Data Modelling in MongoDB®, various data structure and tools available to manage Data Model in MongoDB.
- Understand Data Modelling Schemas
- Design Data Model relationships and tree structures
- Apply Data Modelling in various real-time contexts
- After completing this module, you should be able to:
  - Understand different concepts of data modeling in MongoDB®
  - Understand different types of data model
  - Understand the challenges of designing a data model in MongoDB®
  - Apply the knowledge of a real-world use case
- Data Modelling Concepts
- Why Data Modelling? Data Modelling Approach

- Analogy between RDBMS & MongoDB Data Model, MongoDB Data Model (Embedding & Linking)



- Challenges for Data Modelling in MongoDB
- Data Model Examples and Patterns
- Model Relationships between Documents
- Model Tree Structures
- Model Specific Application Contexts
- Use Case discussion of Data modeling

## **CRUD Operations**

- In this module, you will get an understanding of CRUD Operations and their functional usage. You will learn how to perform read/write operations with CRUD.
- Insert, query, update, and delete documents
- Perform distributed read/write operations
- Perform query optimization
- After completing this module, you should be able to:
- Understand MongoDB's development and production architecture
- Understand read and write concepts of MongoDB
- Understand how Journaling works
- Use Mongo shell for CRUD operations
- Understand different MongoDB® data types
- MongoDB Development Architecture
- MongoDB Production Architecture
- MongoDB CRUD Introduction, MongoDB CRUD Concepts
- MongoDB CRUD Concerns (Read & Write Operations) –
  - Concern Levels, Journaling, etc.,
- Cursor Query Optimizations, Query Behavior in MongoDB
- Distributed Read & Write Queries
- MongoDB Datatypes
- MongoDB CRUD Syntax & Queries (Live Hands on)

## **Indexing and Aggregation Framework**

- In this module, you will learn the Indexing and Aggregation Framework in MongoDB®.
- Create multiple types of Indexes
- Manage indexes and indexing strategies
- Work with Geospatial indexes
- Use MapReduce framework
- After completing this module, you should be able to:
- Use various type of indexes in MongoDB®
- Use hint, explain plan of a query
- Work with Geospatial indexes
- Work with Aggregation Pipeline in MongoDB®

- Use MapReduce framework
- Index Introduction, Index Concepts, Index Types, Index Properties
- Index Creation and Indexing Reference
- Introduction to Aggregation
- Approach to Aggregation
- Types of Aggregation (Pipeline, MapReduce & Single Purpose)
- Performance Tuning.

## **MongoDB Administration**

- In this module you will learn MongoDB® administrative activities such as Health Check, Backup, Recovery, Data Import/Export, Performance tuning, etc.
- Administer database health, query volume, recovery goals
- Determine performance characteristics
- After completing this module, you should be able to:
  - Take database backup and restore MongoDB®
  - Export and import data from/ to a MongoDB® instance
  - Check server status and DB status
  - Monitor various resource utilization of a mongod instance
  - Understand various optimization strategies
  - Create capped collection
  - Use TTL in MongoDB®
- Administration concepts in MongoDB
- Monitoring issues related to Database
- Monitoring at Server, Database, Collection level, and various Monitoring tools related to MongoDB
- Database Profiling, Locks, Memory Usage, No of connections, page fault etc.,
- Backup and Recovery Methods for MongoDB
- Export and Import of Data to and from MongoDB
- Run time configuration of MongoDB
- Production notes/ best practices

## **Scalability and Availability**

- In this module, you will understand the setup and configuration of MongoDB® High Availability, Disaster Recovery, and Load Balancing.
- Create, deploy, and manage Replica sets
- Create and administer Sharded clusters
- Perform Data Partitioning with chunks
- After completing this module, you should be able to:
  - Understand the concepts of replica set
  - Understand the concept of sharding in MongoDB®
  - Create a production like Sharded cluster
  - Introduction to Replication (High Availability)
  - Concepts around Replication

- What is Replica Set and Master Slave Replication?
- Type of Replication in MongoDB
- How to setup a replicated cluster & managing replica sets etc.,
- Introduction to Sharding (Horizontal Scaling),
- Concepts around Sharding, what is shards, Key,
- Config Server, Query Router etc.
- How to setup a Sharding,
- Type of Sharding (Hash Based, Range Based etc.), and Managing Shards

## **MongoDB Security**

- In this module, you will learn security related with MongoDB, Integration with various tools and technology. Also, you will learn to integrate it with various reporting and Analytical tools like Pentaho, Jaspersoft etc.
- Setup authentication and encryption
- Integrate MongoDB with various tools and applications
- After completing this module, you should be able to:
- Know security concepts in MongoDB®
- Understand how Authentication and Authorization works
- Integrate MongoDB® with Java
- Integrate MongoDB® with Hadoop, Hive, & Pentaho
- Integrate MongoDB® with Jaspersoft & Robomongo
- Security Introduction
- Security Concepts
- Integration of MongoDB with Jaspersoft
- Integration of MongoDB with Pentaho
- Integration of MongoDB with Hadoop/Hive
- Integration of MongoDB with Java
- Integration of MongoDB with GUI Tool Robomongo
- Case Study MongoDB and Java

## **Application Engineering and MongoDB Tools**

- In this module, you will learn MongoDB® tools to develop and deploy your applications. This module will also help you understand the multiple package components and advance concepts related to MongoDB integration, Hadoop and MongoDB integration.
- Perform MongoDB packaging
- Setup limits and thresholds
- Integrate with R
- After completing this module, you should be able to:
- Use MongoDB® tools
- Understand Jaspersoft integration with MongoDB®
- Know other popular use case of MongoDB®
- Know various API drivers available for MongoDB®
- Run few query operators through http interface
- MongoDB Package Components
- Configuration File Options



- MongoDB Limits and Thresholds
- Connection String URI Format/ Integration of any compatible tool with MongoDB API and Drivers for MongoDB
- MMS (MongoDB Monitoring Service)
- HTTP and Rest Interface
- Integration of MongoDB with Hadoop and Data Migration MongoDB with Hadoop (MongoDB to Hive)
- Integration with R

### **MongoDB on the Cloud**

- In this module, you will learn about various cloud products offered by MongoDB and how they can be used to host or manage your MongoDB deployments.
- Know MongoDB Cloud products
- Use Cloud products in MongoDB deployments
- After completing this module, you should be able to:
- Understand MongoDB Stitch
- Learn MongoDB Atlas
- Explore MongoDB Cloud Manager
- Setup MongoDB Ops Manager
- Overview of MongoDB Cloud products
- Using Cloud Manager to monitor MongoDB deployments
- Introduction to MongoDB Stitch
- MongoDB Cloud Atlas
- MongoDB Cloud Manager
- Working with MongoDB Ops Manager

### **Diagnostics and Fixes**

- In this module, you will learn some of the common real-time scenarios you might find in production and how they can be fixed, once identified.
- Troubleshoot slow queries
- Diagnose connectivity problems
- After completing this module, you should be able to:
- Understand diagnostic tools
- Learn common production issues
- Learn fixes and solutions
- Overview of tools
- MongoDB Diagnostic Tools
- Diagnostics Commands
- MongoDB Deployment
- Setup & Configuration, Scalability, Management & Security
- Slow Queries
- Connectivity