
M.Sc.(IT&CA) SEMESTER-1 SYLLABUS
Saurashtra University Effective from June-2022

Unit 1 — Introduction to NoSQL Database & MongoDB

1.1 Introduction to NoSQL Database

- Definition of NoSQL
- Characteristics of NoSQL databases
- History and evolution of NoSQL
- Need for NoSQL databases
- Primary benefits of NoSQL databases
- NoSQL vs traditional database concepts

1.2 Types of NoSQL Databases

- Major types of NoSQL databases
- Document-oriented databases
- Key-value databases
- Column-oriented databases
- Graph databases
- Use cases of different NoSQL database types
- Advantages and disadvantages of different NoSQL database types

1.3 Return on Investment for NoSQL

- Factors affecting ROI
- Locally hosted databases
- Database-as-a-Service
- Comparison of locally hosted database and Database-as-a-Service
- Cost considerations for database deployment

1.4 Introduction to MongoDB

- What is MongoDB?
- MongoDB as a NoSQL database
- MongoDB architecture and basic concepts
- Features of MongoDB

- Applications and use cases of MongoDB

1.5 MongoDB Database Concepts

- MongoDB databases
- MongoDB collections
- MongoDB documents
- Fields and values
- Relationship between databases, collections and documents

1.6 Installing and Running MongoDB

- Downloading MongoDB
- Installing MongoDB
- Running MongoDB
- Basic MongoDB environment
- Verifying MongoDB installation

1.7 Installing PHP Driver for MongoDB

- Introduction to MongoDB PHP Driver
- Installing PHP Driver for MongoDB
- Driver installation on different operating systems
- Connecting PHP applications with MongoDB

1.8 MongoDB Data Model

- MongoDB document-based data model
- Documents and fields
- Collections
- Data organization in MongoDB
- Working with MongoDB data

Approx. Lectures: 12

Weightage: 20%

Unit 2 — Learning MongoDB by Implementing Web Application

2.1 Inserting Documents

- Creating documents
- Inserting documents into MongoDB
- Inserting documents into collections
- Working with inserted data

2.2 Querying Documents

- Querying documents in a collection
- Retrieving documents
- Filtering documents
- Working with query results

2.3 Advanced Queries

- Advanced querying concepts
- Query conditions
- Working with multiple conditions
- Practical advanced query operations

2.4 Updating Documents

- Updating MongoDB documents
- Modifying document data
- Updating selected documents
- Practical update operations

2.5 Deleting Documents

- Deleting documents
- Deleting selected documents
- Managing deleted data

2.6 Relationships Between Documents

- Understanding relationships between documents
- Managing related documents

- Working with relationships in MongoDB

2.7 Session Management

- Understanding HTTP sessions
- Session concepts in web applications
- Understanding PHP native session handling
- Implementing session handling with MongoDB
- Putting a Session Manager into practice

2.8 User Authentication

- Building a user authentication module
- Creating login functionality
- Creating logout functionality
- Creating user profile functionality
- Using MongoDB for authentication-related data

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Unit 3 — Queries & Aggregation Queries

3.1 Querying Documents

- find()
- Querying collections
- Retrieving specific documents

3.2 Sorting Query Results

- sort()
- Sorting documents
- Ascending and descending sorting

3.3 Skipping Documents

- skip()

- Skipping documents from query results
- Practical use of skip

3.4 Limiting Results

- limit()
- Limiting query results
- Combining sort(), skip() and limit()

3.5 Update and Delete Operations

- Updating documents
- Deleting documents
- Practical query operations

3.6 Generating Sample Data

- Creating sample documents
- Generating sample datasets
- Using sample data for queries and analytics

3.7 Aggregation

- Introduction to aggregation
- Aggregation queries
- Aggregating MongoDB data
- Grouping and analyzing data

3.8 MapReduce

- Understanding MapReduce
- MapReduce concepts
- Performing MapReduce in MongoDB
- Performing MapReduce using PHP

3.9 Group Aggregation

- Aggregation using group()
- Grouping documents
- Analyzing grouped data

3.10 Distinct Values

- Listing distinct values for a field
- Working with unique field values

3.11 Counting Documents

- Counting documents
- Using count()
- Practical document-counting operations

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Unit 4 — Web Analytics Using MongoDB & MongoDB with Relational Databases

4.1 Logging with MongoDB

- Introduction to application logging
- Logging data using MongoDB
- Storing log information
- Working with application logs

4.2 Web Analytics Using MongoDB

- Introduction to web analytics
- Collecting analytics data
- Storing analytics data in MongoDB

4.3 Analytics Using MapReduce

- Extracting analytics data
- Using MapReduce for analytics
- Processing analytics data

4.4 Real-Time Analytics

- Understanding real-time analytics
- MongoDB for real-time data analysis
- Working with real-time analytics data

4.5 MongoDB and Relational Databases

- MongoDB and RDBMS together
- Need for using MongoDB with relational databases
- Combining MongoDB and relational database systems

4.6 Relational Database Model

- Definition of relational model
- Basic concepts of relational databases
- Relationship between relational databases and MongoDB
- Comparing MongoDB data model with relational model

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Unit 5 — Handling Files with GridFS & Database Management

5.1 Introduction to GridFS

- What is GridFS?
- Purpose of GridFS
- GridFS concepts
- Working with files in MongoDB

5.2 Storing Files in GridFS

- Storing files using GridFS
- Managing stored files
- Working with file data

5.3 Serving Files from GridFS

- Retrieving files
- Serving files from GridFS
- Accessing stored files through applications

5.4 Reading Files in Chunks

- Understanding file chunks
- Reading files in chunks
- Working with large files

5.5 MongoDB Database Administration

- Introduction to database administration
- Database administration tasks
- Managing MongoDB databases

5.6 MongoDB Optimization

- Database optimization
- Improving database performance
- Optimization considerations

5.7 MongoDB Replication

- Introduction to replication
- MongoDB replication
- Purpose and benefits of replication

5.8 MongoDB Sharding

- Introduction to sharding
- MongoDB sharding
- Distributed data management
- Purpose and benefits of sharding

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