

# MariaDB Database Administration

**Course Duration: 32 Hours (4 Days)**

## Overview

The MariaDB Database Administration course is designed to provide learners with a comprehensive understanding of MariaDB, one of the most popular open-source relational database management systems. This course covers a wide range of topics that are crucial for effective database administration, including server setup, client tools, performance tuning, security, backup strategies, user management, and advanced features like replication and high availability. By engaging with the course content, learners will gain practical knowledge on how to manage and optimize MariaDB databases to ensure efficiency, reliability, and security. The course begins with an introduction to MariaDB and its architecture, followed by deep dives into specific areas such as configuring servers, understanding storage engines, and mastering SQL modes and log files. With modules on backup and recovery, user management, and replication, participants will learn how to safeguard data, control database access, and establish robust database infrastructures capable of handling failover and maintaining data integrity across distributed systems. The course also imparts skills on performance tuning, transaction management, and using tools like MySQL Workbench for database administration tasks. Upon completion, learners will be well-equipped with the skills needed to administer, optimize, and troubleshoot MariaDB databases, making them valuable assets in a variety of professional settings.

## Audience Profile

The MariaDB Database Administration course is designed for professionals seeking to master database management and optimization.

- Database Administrators
- System Administrators
- IT Managers
- Data Analysts
- Database Developers
- DevOps Engineers
- Technical Consultants
- Data Architects
- Infrastructure Architects
- Security Analysts managing database security
- Software Engineers looking to understand database administration
- Technical Support Specialists
- Professionals preparing for MariaDB Certification

## Course Syllabus

## **Session 1: The Server, Clients, and Tools**

- Introduction
- Versions of MariaDB
- Overview of MariaDB Architecture
- MySQL Server
- MySQL Client Connections
- MySQL Client Programs
- MySQL Command Line
- mysqladmin

## **Session 2: MySQL Workbench**

- Installing MySQL Workbench
- Connecting to MySQL Workbench
- MySQL Workbench Screens

## **Session 3: Obtaining Metadata**

- What is Metadata?
- The mysqlshow Client Program
- The SHOW and DESCRIBE Commands
- The Information\_Schema
- Differences Between SHOW Command and Information\_Schema
- Exercise: Obtaining Information About MariaDB

## **Session 4: Configuring the Server**

- Starting and Stopping the Server
- Status Files
- Time Zone Tables
- Overview of MySQL Storage Engines
- MariaDB Server Options and Variables
- MariaDB Status Variables
- Configuring MariaDB Enterprise Audit

## **Session 5: SQL Modes, Log Files, and Binary Logging**

- Error Messages
- The SHOW Errors Statement
- The SHOW Warnings Statement
- SQL Modes

- Note Messages
- The perror Utility
- The General Log
- The Error Log
- The Slow Query Log
- The Binary Logs

## **Session 6: MariaDB Architecture**

- Communication Protocols Used to Connect a Client to the Server
- The SQL Parser and Storage Engine Tiers
- Installing and Uninstalling Plugins
- How MariaDB Uses Disk Space
- How MariaDB Uses Memory
- Exercise: Examining the Architecture

## **Session 7: The InnoDB Storage Engine**

- Features of InnoDB
- Transactions and Referential Integrity
- Physical Characteristics of InnoDB Tables
- System Tablespace Configuration
- File per Table Tablespace
- Log File and Buffer Configuration
- Undo Logs and Undo Tablespaces
- Temporary Table Tablespaces
- InnoDB Shutdown Options
- InnoDB Status

## **Session 8: Other Storage Engines**

- Checking Engine Usage
- The MyISAM Engine
- The Merge Engine
- Other Engines: Archive, Aria, Memory, Blackhole, CSV
- Mixing Storage Engines
- Overview of ColumnStore, MyRocks, and Spider Engines

## **Session 9: Table Maintenance**

- Table Maintenance Operations
- CHECK TABLE

- REPAIR TABLE
- ANALYZE TABLE
- OPTIMIZE TABLE
- mysqlcheck
- MyISAM Table Maintenance and Repair Utilities

## **Session 10: Backup and Recovery**

- Advantages and Disadvantages of Different Backup Methods
- Overview of Backup Tools
- Binary Backups of MyISAM Tables
- Binary Backups of InnoDB Tables
- Performing Hot Backups
- Performing Recovery
- Import and Export Operations
- Exporting and Importing Using SQL
- Exporting from the Command Line Using mysqldump
- Importing from the Command Line Using mysqlimport
- Additional Backup Tools

## **Session 11: User Management**

- Introduction
- User Accounts
- Creating Users
- Renaming Users
- Changing a User Password
- Dropping Users
- Granting Privileges
- The User Table
- Connection Validation
- Password Validation Plugins

## **Session 12: Privileges**

- Types of Privileges
- Granting Privileges
- Revoking Privileges
- Resource Limits
- Resource Management
- Role Management

- The mysql Database
- The SHOW GRANTS Command

## **Session 13: Transactions and Locking**

- Locking Concepts
- Levels of Locking
- Implicit Table Locking with MyISAM and InnoDB
- Explicit Table Locking
- Advisory Locking
- Monitoring Locks
- Turning Autocommit On and Off
- Using Transaction Blocks
- Handling Concurrency Problems and Deadlocks

## **Session 14: Tuning and Tables**

- General Table Optimizations
- MyISAM-Specific Optimizations
- InnoDB-Specific Optimizations
- Other Engine-Specific Optimizations

## **Session 15: Tuning the Server**

- Status Variables
- Server Variables
- System Variables
- Per-Client Variables
- Performance Schema Overview
- The Query Cache

## **Session 16: The Event Scheduler**

- Event Scheduler Concepts
- Event Scheduler Configuration
- Creating, Altering, and Dropping Events
- Event Scheduler Monitoring
- Events and Privileges

## **Session 17: MariaDB Server Installation and Upgrade**

- Installing MariaDB on Linux and UNIX
- Upgrading the MariaDB Server

- Deployment Security
- Database Server Access

## **Session 18: Overview of High Availability**

- High Availability Goals
- High Availability Concepts
- Designing for High Availability
- Definition of Availability
- High Availability Terminology

## **Session 19: Configuring Master-Slave Replication**

- Replication Overview
- When to Use Replication
- Disadvantages of Replication
- Replication Architecture
- Complex Replication Topologies
- Testing Replication
- Excluding Databases or Tables from Replication
- Example: Setting Up Master-Slave Replication
- Replication Using GTIDs
- Controlled Switchover

## **Session 20: Administering a Replication Topology**

- Replication Files and Threads
- Lagging Slave
- Monitoring Replication
- Troubleshooting Replication
- Semi-Synchronous Replication
- Failover
- Replication and Failover Utilities