



# SQL Server 2016 Admin High Availability and Performance Tuning

## **Course Duration: 40 Hours (5 Days)**

## Overview

The SQL Server 2016 Admin High Availability and Performance tuning course is designed to provide learners with comprehensive knowledge and skills to maintain the high availability and performance of SQL Server 2016 databases. This course covers a range of crucial topics, from Security models and roles to Backup and recovery strategies, Automation, Replication, Log shipping, Database mirroring, Cluster configuration, and Always On availability groups. It dives deep into Performance tuning, including Index management and Understanding locks. Learners will gain expertise in SQL Server 2016 Performance tuning by using tools and techniques to Monitor and improve query performance and Optimize database operations. The course also emphasizes SQL Server high availability training, teaching students how to implement and manage various High availability solutions that ensure the continuous operation of SQL servers. By the end of the course, participants will be equipped to enhance SQL Server stability and speed, ensuring their organizations' data remains secure, accessible, and efficient.

## **Audience Profile**

The SQL Server 2016 Admin High Availability and Performance Tuning course equips IT professionals with essential database management skills.

- Database Administrators
- Systems Engineers
- IT Professionals experienced in database management
- SQL Server Developers aiming to enhance their knowledge in high availability (HA) and performance tuning
- Technical Consultants working in SQL Server environments
- Data Center Support Engineers
- Database Designers exploring SQL Server's HA and disaster recovery (DR) features
- BI Professionals seeking in-depth knowledge of SQL Server backend management
- Server Infrastructure Designers
- Network Administrators managing database servers
- Security Administrators focusing on database security
- Professionals preparing for Microsoft SQL Server certification exams
- Disaster Recovery Specialists
- Data Architects interested in performance tuning with SQL Server
- IT Managers supervising database management teams
- Cloud Database Engineers
- Performance Tuning Consultants
- High Availability and Disaster Recovery Consultants
- Technical Support Staff specializing in SQL Server environments
- Data Management Professionals





- Database Migration Specialists
- Enterprise Systems Administrators managing SQL Server instances

## **Course Syllabus**

### Section A: SQL Server Administration

### Module 1: SQL Server Security

• Introduction to SQL Server security models, logins, and users.

### Module 2: Assigning Server and Database Roles

- Fixed server roles and user-defined server roles.
- Fixed database roles and user-defined database roles.

### Module 3: Authorizing Users to Access Resources

• Overview of permissions and assigning permissions to users.

### Module 4: Backup and Restoration of SQL Server Databases

- SQL Server backup overview and types of backups.
- Restoring SQL Server databases and recovery options.

#### Module 5: Automating SQL Server Management

- Using SQL Server Agent for task automation.
- Benefits of master and target servers for centralized management.

### Module 6: Monitoring SQL Server with Alerts and Notifications

• Configuring database mail, alerts, and notifications for monitoring.

### Module 7: Tracing Access to SQL Server with Extended Events

- Utilizing SQL Profiler and SQL Trace stored procedures.
- Using Distributed Replay for multi-server trace capture and locking audits.

### Section B: High Availability and Performance Tuning (HA & PT)

#### **Replication for High Availability**

- Merge Replication and Merge Agent Job.
- Handling replication conflicts and ROWGUIDCOL.
- Subscription reinitialization and expiry settings.
- Server and client subscriptions.
- Peer-to-peer replication connections and nodes.
- Troubleshooting common errors and solutions.





#### Log Shipping (HA & DR)

- Log shipping topology for high availability and disaster recovery.
- Configuring primary and secondary servers for recovery.
- Managing log shipping monitor, jobs, and alerts.
- Configuration in NORECOVERY and STANDBY modes.
- Log shipping jobs, manual failover, and monitoring delays.
- Troubleshooting broken log shipping chains and errors.

#### Database Mirroring (HA & DR)

- Database mirroring architecture for high availability and disaster recovery.
- Comparing log shipping and database mirroring.
- TCP endpoints, network security, and polling concepts.
- Automatic failover procedures and synchronous/asynchronous modes.
- Monitoring database mirroring with jobs and real-time usage.
- Resolving common errors and issues.

#### **Cluster Configuration**

- Windows clusters for high availability and disaster recovery.
- Configuring domain controllers, active directory, and public/private IPs.
- Setting up MSCS service and RAID levels.
- Managing cluster groups, quorum, and MSDTC disks.
- Introduction to Always-On Availability Groups (AAG).

#### Always-On Availability Groups (AOAG)

- Overview of synchronous and asynchronous modes.
- Policy-based management and facets for AOAG.
- Backup preferences and automated seeding.
- Adding replicas, listeners, and configuring failovers.
- Monitoring health and dashboards for AOAG.

#### **Section C: Performance Tuning**

#### **Tuning Tools and Lock Management**

- Using workload files, trace files, and tuning templates.
- Analyzing execution plans and query costs (IO, CPU, subtree, operator costs).
- NUMA nodes, processor, and IO affinity configuration.
- Managing locks, isolation levels, and auditing with SP\_WHO2 and SP\_LOCK.
- Handling deadlocks with XDL files and prevention strategies.

#### **Index Management**

- Benefits and performance of partitioning tables.
- Partition functions, schemes, and compression techniques.
- Managing and rebuilding indexes (online and resumable options).





- Auditing statistics, fragmentation, and index conditions.
- Setting up database maintenance plans and optimizing parallelism.