

# Microsoft SQL Server DBA + Azure ZERO TO HERO CURRICULUM

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## SQL Server DBA + Azure Cloud

SQL Server DBA + Azure + Windows + Storage + Linux

## KDSSG Center for Excellence

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## Details:

Thank you for showing interest in KDSSG Center for Excellence for your training requirements. This training program on SQL Server DBA + Azure Zero To Hero Training is designed to cover SQL Server Database Administration from basics to advanced level. There are 3 levels in the course Level-1 (Basic), Level-2 (Intermediate) and Level-3 (Advanced).

### **Fees is Rs 46020**

Level1 - Rs15340, Level2 - Rs15340, Level3 - Rs15340

(Fees to be paid level wise)

Interested attendees can listen to 15 days of demo classes and will have to enroll for the course. Each Level of the training will last for 60 days. All levels (L1 + L2 + L3 = 60+60+60) put together course would last for 180 days (6 months). Training days will be from Monday to Friday in morning hours. Exact batch timings will be confirmed by Admin team on enquiry.

## Terms of Service:

- After 15 days of demos, Level-1 fees has to be paid immediately and ONLY after which classes will be allowed and respective training material will be provided.
- KDSSG always holds the ownership of its technical content (soft copy).
- Once payment is received there will be NO refund whatsoever.

## Training Prospect Plan:

- KDSSG Center for Excellence will deliver **Online Training ONLY**.
- Initial counselling discussion is compulsory between attendee and KDSSG Admin Team (or) the trainer.
- Questions asked during session are given highest priority and will be addressed during the session (or) after the session depending on the intensity of the question and the time it takes to answer it.
- At the end of training plan, participants will have obtained a sound understanding of SQL Server DBA and Azure concepts.
- KDSSG team will guide and assist with resume preparation.
- All the required softwares (mostly freeware/developer editions) would be given to trainees during the sessions after enrolling for the course.

## **Level-1 (7 Modules)**

### **Module 1: History of SQL Server?**

Evolution of database and its Ancient History

What is DBMS/RDBMS

Different RDBMS available in Market History of SQL Server

Versions of SQL Server Editions of SQL Server

Hardware and Software requirements

Licensing and Pricing

Introduction to SQL Server Architecture (Basic Version)

### **Module 2: SQL Server Installations (Part-1)**

SQL Server 2005/2008R2/2012/2014/2016/2017/2019/2022

Installations Prerequisites of SQL Server Installation

Default Instance and Named Instance Service Accounts

Collation Settings

Authentication Modes

### **Realtime SQL Server Installation Demos**

### **Module 3: SQL Server Databases**

SQL Server Databases and its Importance (System, User & Sample DBs) Types of Database Files and their classifications

Data file Architecture

- Pages and Extents

- File groups

- Auto growth

- Log file Architecture

- Virtual Log Files (VLF's)

- Log Record/Log Block/LSN

Database Creation (GUI Screens and Commands)

### **Realtime Database Internal Demos**

## **Module 4: SQL Server Installations (Part-2)**

SQL Server Installation & troubleshooting

Service Pack, Cumulative Update, Hotfix, GDR, QFE, OD, COD

Unattended Installations and Parameters

Slipstream Installations

SQL Server installation through PowerShell

### **Realtime Installation Demos**

## **Module 5: Security in SQL Server**

Principals and Securables

Instance Level Security (Logins & Server Roles, Permissions)

Database Level Security (Users & Database/Application Roles, Permissions)

Object Level Security (Database Objects, Permissions)

### **Realtime Security Scenarios & Demos**

## **Module 6: Backup & Recovery in SQL Server**

Recovery Models in SQL Server

Backups Types & Strategies

- Full, Differential, Transaction Log, File and Filegroup
- Split, Mirror, Tail-log, Copy-Only, Partial, Partial Differential
- Backup Compression & Encryption Third Party Backup Tools Demo
- Taking backups to Azure Cloud Storage account
- Restore Scenarios (Restoring all types of backups)
- Point of Failure, Point in Time, Filegroup & Piecemeal, Page

Recovery Phases and Explanation Correlation

between Restore & Recovery

Resolving corruptions of User/System Databases

- TEMPDB Corruption
- MSDB Corruption
- Model Corruption
- Master & Resource Corruption
- Resolving Database Suspect State

### **Real time Backup, Restore & Recovery Scenarios & DB Corruptions Demos**

## **Module 7: Automation in SQL Server**

SQL Server Agent

MSDB and its importance

- Jobs and troubleshooting
- Alerts (SQL Server Event, Performance Condition & WMI)
- Operators

Maintenance Plans and troubleshooting Configuring Database Mail

**Real time Alerts Project**

# **Level-2 High Availability Disaster Recovery**

## **(7 Modules)**

### **Module 1: Azure (Cloud Computing) & Active Directory**

Introduction to Cloud Computing

Types of Clouds (Public, Private and Hybrid)

Types of Public Clouds (IaaS, PaaS & SaaS)

Cloud Deployment Models

Azure Portal & Pricing

Provisioning SQL Server on Azure VMs (Windows/Linux)

**Demos on Setting up Azure Free Trial Account**

### **Module 2: Log Shipping**

Log Shipping Introduction

Terminologies in Log Shipping Merits and

Demerits of Log Shipping

Log Shipping Architecture and workflow

**Real time Scenarios on Log Shipping (On Job Scenarios - Labs)**

- Implementing Log Shipping (Implementation in Active Directory)
- Configuring Standby Mode (with TUF file)
- Troubleshooting Log Shipping Jobs (14420, 14421 etc.)

### **Module 3: Database Mirroring**

Database Mirroring Introduction

Terminologies in Mirroring

Merits and Demerits of DB Mirroring

Mirroring Components (Endpoints, Quorum, Transaction Safety)

Mirroring Architecture and Operating Modes

**Real time Scenarios in Mirroring (On Job Scenarios - Labs)**

- Implementing Database Mirroring (Active Directory Level)
- Creating Database Snapshots for querying Mirror database
- Troubleshooting Mirroring Issues (1412, 1418 etc.)



## **Module 4: Always On - Failover Cluster Instances (FCI)**

Windows Clustering Types (NLB, CLB & Failover Cluster)

Architecture of Windows Clustering & Terminologies

Implementing Windows Clustering (Windows 2012R2, 2016 and 2019)

### **Realtime Windows Cluster Scenarios (On Job Scenarios – Labs)**

- Configuring Windows Cluster
- Configuring Quorum (Disk, File Share and Cloud Witness)
- Performing Windows Cluster Failover
- Adding a new Node to existing cluster

### **Realtime SQL Server Cluster Scenarios (On Job Scenarios – Labs)**

- Implementing SQL Server Clustering (SQL 2012/2014/2016/2019)
- Patching Clustered Instances (SQL 2005 & greater)
- SQL Server Failover, Adding Disks and configuring Disk Dependency
- Cluster Properties (Look Alive, IsAlive, Failure Condition Levels)
- Troubleshooting Cluster Issues (both Windows and SQL)

## **Module 5: High Availability & Disaster Recovery**

Terminologies

Data Availability, High Availability & Disaster Recovery Difference between HA & DR

Cold, Hot and Warm Standby RTO & RPO

understanding BCP (Business Continuity Plan)

## **Module 6: Always On Availability Groups (AOAG)**

Always On Availability Group Introduction

Terminologies in Always on Availability Groups

Merits and Demerits of AOAG

AOAG Architecture and Internals

### **Scenarios in AOAG (On Job Scenarios - Labs)**

- Implementing AOAG
- Modes in AOAG

- AOAG listener creation and configuration
- Configuring Read Only/Read Intent Secondary Replicas
- Configuring Read Only Routing
- Understanding of Auto Seeding, Join Only Options
- Configuring Multi Subnet Failover Cluster with AOAG
- Configuring Distributed AG (DAG)
- Troubleshooting AOAG Issues (35250, Resolving state etc.)

## **Module 7: SQL Server Replication**

Replication Metaphor (Publisher, Distributor & Subscriber)

Replication Terminologies

Merits and Demerits of Replication

Types of Replications and Replication Agents

### **Scenarios in Replication (On Job Scenarios – Labs)**

- Snapshot Replication Architecture & Implementation
- Transactional Replication Architecture & Implementation
- Adding Articles, Primary Key Violation Errors, Tracer Tokens
- Validating Subscriptions, Why Primary Key is mandatory?
- Latency Checks, Critical tables of replication
- Merge Replication Architecture & Implementation
- Peer To Peer Replication Architecture & Implementation
- Monitoring using Replication Monitor



# **Level-3 Performance Monitoring/Tuning**

## **(7 Modules)**

### **Module 1: Upgradation & Migration**

Difference between Upgradation & Migration

Pros and Cons of Upgradation & Migration

When to choose Upgradation over Migration

Database Migration Assistant (formerly Upgrade Advisor)

### **Scenarios in Upgradation/Migration (On Job Scenarios – Labs)**

- Upgrading from Older version to newer
- Migrating from Older version to newer
- Detailed Discussion on Post Implementation Steps
- Rollback Plan for Upgradation and Migration
- Creating Azure SQL Databases & Azure Managed Instances
- Connecting to Azure SQL DB's and Managed Instances
- Cloud Migration from On-Premises to Azure SQL DB/Managed Instance.

### **Module 2: SQL Server Architecture (Engine, CPU, Memory, IO, SQL OS)**

SQL Server Advanced Architecture

SNI Layer, Relational Engine, Storage Engine Checkpoints (Types), Lazy & Eager Writer

Understanding of SQL OS

Memory Architecture (Buffer Pool - MTL, NUMA, Memory Nodes, Allocators & Clerks)

Processor Architecture (Schedulers, Cooperative Approach, Tasks, Worker Threads)

SQL Server IO Architecture

### **Module 3: SQL Server Indexes**

Indexes History

Traditional Table Storage (HEAP) Vs Index Storage Structures (B+ Tree)

Types of Indexes (Clustered and Non-Clustered), Positives/Negatives of Indexes

Table/Index Fragmentation and Types of Fragmentation

Column Store Indexes & Evolution of different types of Indexes

### **Scenarios on Indexes (On Job Scenarios – Labs)**

- Demos on Implementing Clustered and Non-Clustered Indexes
- Demos on Page Split, Index Rebuild/Reorg, Column Store Indexes Demo
- Index Scan and Index Seek Demo, Covering Index, Included Columns Demo

## **Module 4: Lock Block & Deadlocks**

ACID Properties

Isolation Levels

Locking & Types of Locks Lock Escalation & its rules

### **Scenarios on Locks, Blocks and Deadlocks (On Job Scenarios – Labs)**

- Demos on identifying locks (using DMVs)
- Blockings & how to analysis, troubleshooting and recommendations
- Deadlocks & how to do analysis, troubleshooting and recommendations
- Demo on Pessimistic Isolation Levels (Read Uncommitted, Read Committed, Repeatable Read, Serializable)
- Demo on Optimistic Isolation Levels (Snapshot Isolation)
- Demo on Read Committed Snapshot Isolation Level

## **Module 5: Real World – Real time Performance Troubleshooting**

100% CPU, 100% Memory and High IO troubleshooting

Monitoring using Profiler, Perfmon and Extended Events

Wait Types in SQL Server and Identifying Waiting Tasks

TEMPDB Contention, Usage Issues & Best Practices

Troubleshooting slow running Application, slow running queries Using Query Store

Using SQL Nexus and PSS-Diag Tools for troubleshooting

## **Module 6: Real World - Real Time Scenarios**

Log File Full, Data File Full, TEMPDB Full Issues

Instance Connectivity Issues (18456 Errors) & SSPI Context/Handshake Errors

Negative SPID troubleshooting, MSI-MSP Missing

## **Module 7: SQL Server Add-On New Features**

Policy Management (SQL 2008)

Centralized Management Servers (SQL 2008)

Resource Governor (2008)

In Memory OLTP (2014)

SQL Server on Linux Installations and Architecture of SQL OS v2 (2017)

Accelerated Database Recovery & SQL Server Containers & Big Data Clusters (2019)

Distributed AG, Contained AG, Link to Azure Managed Instance, IQP (2022)