

# SQL School <sup>TM</sup>

## Quality Training Assured

Complete Practical; Real-time Job Oriented Training

### SQL Server T-SQL Training Plans

	PLAN A	PLAN B	PLAN C	PLAN D
Description	Data Analysts	SQL Dev 0 – 2 Yrs Exp	SQL Dev 2 – 3 Yrs	SQL Dev Above 3 Yrs
<b>Completely Practical, Real-time</b>	✓	✓	✓	✓
Mock Interviews, Case Studies	✓	✓	✓	✓
SQL Basics and Query Writing	✓	✓	✓	✓
SQL DB Design, Table Design	✓	✓	✓	✓
Normal Forms, Joins and Queries	✓	✓	✓	✓
Indexes Basics and Stored Procedures	✓	✓	✓	✓
Excel Integration and Pivot Charts	✓	✓	✓	✓
Advanced Stored Procedures, TVP	X	✓	✓	✓
CTE, XML, Triggers, PIVOT, Cursors	X	✓	✓	✓
<b>Real-time Project [Banking]</b>	X	✓	✓	✓
In-depth Query Tuning, Exec” Plans	X	X	✓	✓
Performance Tools, Locks, Isolations	X	X	✓	✓
Tuning Tools: DTA, Profiler, Perfmon	X	X	✓	✓
XEL Graphs, Resource Governor, DOP	X	X	✓	✓
Complex SProcs, MCSA - 70 761	X	X	✓	✓
Azure SQL Database (Cloud)	X	X	X	✓
Azure SQL Database Migrations	X	X	X	✓
Elastic Query Processing, Shard Maps	X	X	X	✓
DB Deployments, MCSA 70-762	X	X	X	✓
Azure Tuning and Azure Search	X	X	X	✓
<b>TOTAL DURATION</b>	2.5 Weeks	3.5 Weeks	4.5 Weeks	6 Weeks

**Trainer :** Mr. Sai Phanindra T [14+ Yrs of Real-time Exp]. Profile @ [linkedin.com/in/saiphanindra](https://www.linkedin.com/in/saiphanindra)

# SQL Server T-SQL Training

## Course Plan

Training Module		Dur	Plan A	Plan B	Plan C	Plan D
Module 1	SQL Basics, SQL Server Concepts	2.5 W	✓	✓	✓	✓
Module 2	T-SQL Queries, Programming Basics		✓	✓	✓	✓
Module 3	Complex SPs, Real-time Project	1 W	X	✓	✓	✓
Module 4	Performance Tuning, MCSA - 70 761	1.5 W	X	X	✓	✓
Module 5	Azure SQL Development, MCSA-70 762	1.5 W	X	X	X	✓
<b>Total Duration</b>			<b>2.5 W</b>	<b>3.5 W</b>	<b>4.5 W</b>	<b>6 W</b>

### Module 1: SQL Basics, SQL Server Concepts

Applicable for T-SQL Plans A, B, C, D

#### **Day 1: INTRODUCTION, INSTALLATION**

Data, Databases and RDBMS Software; Microsoft SQL Server Advantages, Use; Database Engine Component and OLTP; BI Components & Data Science Components; SQL : Purpose, Real-time Usage Options; SQL Versus Microsoft T-SQL [MSSQL]; Microsoft SQL Server - Career Options; Real-time Projects & Job Responsibilities; Versions and Editions of SQL Server; SQL Server and SSMS Installation Plan; SQL Server Pre-requisites : S/W, H/W; SQL Server 2019 / 2017 Installation; Instance Name and Server Name; Features, Collation, Admin Users;

#### **Day 2: SSMS Tool, SQL BASICS**

SQL Server Management Studio; Local and Remote Connections; System Databases: Master and Model; MSDB, TempDB, Resource Databases; Creating Databases : Files [MDF, LDF]; Creating Tables in User Interface; Data Insertion & Storage. Limitations; SQL : Purpose and Real-time Usage; DDL, DML, SELECT, DCL and TCL Statements; Creating Tables using SQL Scripts; Data Storage, Inserts - Basic Level; SELECT; Table Data Retrieval, Table Scan;

#### **Day 3: SQL BASICS, SELECT STATEMENT**

Creating Databases in SQL Server; Creating Tables in SQL Databases; Using Basic Data Types: Int, Char; Single Row Inserts, Multi Row Inserts; Rules for Data Insertion Statements; SELECT Statement For Data Retrieval; SELECT with WHERE Conditions; AND and OR Operators Usage; IN Operator and NOT IN Operator; BETWEEN, NOT BETWEEN Operators; LIKE and NOT LIKE Operators; Wild Card Characters; IS and IS NOT Operator, NULLs; DISTINCT, TOP Keywords;

#### **Day 4: SQL BASICS, DDL & DML**

UPDATE Statement & Conditions; DELETE Statement & Conditions; TRUNCATE & DELETE Differences; Table Data / Content Modification; Table Structure Modifications (DDL); ALTER, ADD and DROP Statements; Removing Tables and Databases; Schemas : Real-time Usage,

Creation; Table Transfer and 2P, 3P Naming; Table Migrations across Schemas; Import / Export Wizard From SSMS; GO Statement, SQL BATCH Concept; CHAR Versus VARCHAR Data Types; VARCHAR & NVARCHAR Data Types;

### **Day 5: CONSTRAINTS BASICS**

Constraints and Keys - Data Integrity; NULL, NOT NULL Property on Tables; UNIQUE KEY Constraints: Importance; PRIMARY KEY Constraint: Importance; FOREIGN KEY Constraint: Importance; REFERENCES For Foreign Keys; CHECK Constraints and Conditions; Database Diagrams (E R) Diagrams; Table Key Relations with ER Diagrams; Relationships Verification and Links; Identity Property : Sequence Generation; Identity Property : Seed & Increment; DEFAULT Constraints, Insert Rules; Candidate Keys, Real-time Advantages;

### **DAY 6: VIEWS, FUNCTIONS, PROCEDURES : BASIC OVERVIEW**

Views : Types, Usage in Real-time; Creating, Executing Views in Database; Important System Views For Metadata; Functions : Types, Usage in Real-time; Using Parameters in Functions (UDF); Create, Execute Functions in Database; Parameters in SQL Server Database; Procedures : Types, Usage in Real-time; Using Parameters in Stored Procedures; User & System Predefined Procedures; Sp\_help, Sp\_helpdb and Sp\_recompile; sp\_rename, sp\_depends System SPs; Compare Views, SPs and Functions; SProcs : Performance Advantages;

### **Real-time Case Study (Sales & Retail)**

Objective : DB Design, Table Design, Relations - Involves Purchases, Products, Customers and Time Data with Various Data Types. Solution Explanation in **Day 12**

## **Module 2: T-SQL Queries & Normal Forms**

Applicable for T-SQL Plans A, B, C, D

### **Day 7: JOINS, T-SQL Queries : Level 1**

JOINS - Table Comparisons Queries; INNER JOIN - Examples, WHERE, ON; OUTER JOIN - Examples, WHERE, ON; Left Outer Joins with Example Queries; Right Outer Joins with Example Queries; FULL Outer Joins - Real-time Scenarios; Join Queries with "ON" Conditions; MERGE Join Options with Examples; LOOP Join Options with Examples; HASH Join Options with Examples; Big Table Versus Small Table Joins; Join Type Versus Join Option in T-SQL; CROSS JOIN Versus CROSS APPLY; Understand When to Use Which Join;

### **Day 8: Group By, T-SQL Queries : Level 1**

GROUP BY Queries and Aggregations; DISTINCT Vs GROUP BY Comparisons; Unique Value Identification Options; Group By Queries - Design Rules; GROUP BY Queries with Having Clause; GROUP BY Queries with Where Clause; Using WHERE and HAVING in T-SQL; Rollup : Usage and T-SQL Queries; Cube : Usage and T-SQL Queries; Generate Sub Totals & Grand Totals; Comparing Rollup & Cube Functions; GROUPING() Function for Row Status; Query Results : UNION Operator; Query Results : UNION ALL Operator;

### **Day 9: T-SQL Queries - Level 2**

Joining 2 and 3 Tables in T-SQL; Using Aliasing in Join Queries; Using WHERE and ON Conditions; Using GROUP BY with WHERE, ON; Joins with GROUP BY and HAVING; Joins with Sub Queries; IS NULL; TOP, FETCH, OFFSET, NEXT ROWS; Date and Time Functions: Getdate(); Cast and Convert with Getdate(); Date & Time Styles, Data Formatting; DateAdd and DateDiff Functions; String Functions: Left and Right; SubString, Replace, CharIndex; Reverse, Len, LTrim and RTrim;

### **Day 10: T-SQL Queries - Level 3**

Joining 3 and 4 Tables in T-SQL; Using Joins with Sub Queries; Using Joins with Nested Sub Queries; IIF ( ) and CASE Statement Usage; Using IIF and CASE in Joins; Joins in Group By, Rollup, Cube; Replacing Nulls: Isnull, Coalesce; MERGE Statement For DML, Joins; WHEN MATCHED & NOT MATCHED; DML Operations : MERGE Statement; Sequence Number Generation in T-SQL; ROW\_NUMBER() and RANK() Queries; DENSE\_RANK, Sequence Identification; PARTITION BY and RowNumber ( );

### **Day 11: Transactions, Normal Forms**

Transactions : Types, ACID Properties; Transaction Types and Auto Commit; EXPLICIT & IMPLICIT Transactions; COMMIT and ROLLBACK Statements; Open Transaction Scenarios & Cause; Query Blocking Scenarios @ Real-time; NOLOCK and READPAST Lock Hints; Normal Forms, Entity Relation Diagram; First, Second, Third Normal Forms; Boycee-Codd Normal Form : BNCF; Functional Dependency, Candidate Keys; Multi-Valued & Transitive Dependencies; 4 NF and ETNF Differences, Usage; 1:1, 1:M, M:1, M:M Relationships;

### **DAY 12 : Real-time Case Study On Query Writing (Sales & Retail)**

Writing Queries with Joins; Writing Sub Queries with Joins; Queries with Date/Time Formatting; Queries with String Formatting; Rollup and Cube with Aggregates; Writing Views For Query Store; Accessing / Testing Views; Excel Integration with SQL DB; SQL Database Access in Excel; Generate Excel Pivot Tables; Excel Pivot Charts & Labels; Data Formatting with Excel; ODC Connections with T-SQL; SQL Server Architecture;

## **Module 3: Complex SPs, Real-time Projects**

Applicable for T-SQL Plans B, C, D

### **Day 13: STORED PROCEDURES - Level 2**

Table Valued Parameters (TVP); SQL Injection Attacks - Precautions; READONLY Parameters - Stored Procs; OUTPUT Parameters - Stored Procedures; User Data Types & Real-time Use; Dynamic Data Insertions with SPs; Table Cloning, Inserts @ Table Variables; CTE : Common Table Expressions; Real-time Scenarios with CTEs - Usage; ROW\_NUMBER() with CTE Queries; Using CTEs for Avoiding Self Joins; Using CTEs for Avoiding Sub Queries; Recursive CTEs and ANCHOR Element; Termination Checks in Recursive CTEs;

### **Day 14: STORED PROCEDURES - Level 3**

DML Triggers and DDL Triggers; FOR and INSTEAD OF Triggers; Magic Tables : Inserted, Deleted; Views on Tables - SCHEMABINDING; ENCRYPTION and CHECK OPTION; Cascaded Views, Encrypted Views; Updatable Views, Joins with Triggers; Cursors - Benefits, Cursors in SProcs; ForwardOnly, Scroll & Local Cursors; Static, Dynamic & Global Cursors; Keyset Cursors and @@FetchStatus; Nesting of Stored Procedures - Dynamic; Data Formatting and WHILE Loops; Using Temporary Tables for Formatting;

### **Day 15: FUNCTIONS - Level 2**

Functions : Types, Real-world Usage; Inline Functions, Multi Line Functions; WHILE Loops, Pivot Function Usage; Using Table Variables in Functions; Self Referencing Keys and Self Joins; Cascades : ON UPDATE & ON DELETE; Composite Keys, Computed Columns; Using BULK INSERT & BULKCOLUMN; OPENROWSET For Data Import, CAST; OPENJSON For JSON Data Formats; JSON Files - Data Import into SQL DB; XML AUTO, XML RAW and XML PATH; Temporary Tables : Real-time Use; DIFFERENCE, SOUNDEX, STRINGSPPLIT;

### **Day 16, 17: SQL Server, Database and Index Architectures**

Server Architecture & Protocols; Database Engine and Query Processor; Parser, Optimizer, SQL & DB Manager; Storage Engine Components, SQL OS; Database Architecture - Data Files; Primary, Secondary Files, File Groups; Transaction Log File [LDF], LSN, VLF; Indexes: Architecture and Types; Clustered and Non Clustered Indexes; Included and ColumnStore Indexes; FILTERED and COVERING Indexes; UNIQUE Indexes, Online Indexes; B Tree Structure, IAM; Indexed Views / Materialized Views; Fill Factor, Pat\_Index, SortInTempDB;

### **DAYS 18 - 20: REAL-TIME PROJECT (BANKING) [Includes 2000 Lines of Code]**

#### **Phase 1: DATABASE DESIGN**

Understanding Project Requirements; End to End Project Work Flow; Naming Conventions in Real-time; Implementing Normal Forms (OLTP); Computed Columns and Data Types; SQL\_Variant, Bit, sysname; Email & Phone Number Validations;

#### **Phase 2: QUERY DESIGN**

Joining Tables for Reports; Views with JOIN Options; Implementing Indexed Views; Using PIVOT Tables in Queries; Using PIVOT and UNPIVOT in T-SQL Queries; Dynamic Conditions in Queries; Parameterized Queries in T-SQL;

#### **Phase 3: PROGRAMMING**

Event Handling , Error Handling; Stored Procedures with Transactions; Error Handling, Event Handling Options; Transaction Nesting, Save Points; Stored Procedures with Tables; Stored Procedures with Views; Stored Procedures with Functions; Automating DML with Triggers; Project Deployments, Project FAQ;

# Module 4: Performance Tuning & MCSA - 70 761

Applicable for T-SQL Plans C, D

## Day 21: Tuning 1 - QUERY AUDITS, PARTITIONS

Audit Long Running Queries using DMVs and DMFs; Activity Monitor Tool and Query Statistics Reports; Logical I/O, Physical I/O and Database I/O, Wait Time; Recent Expensive Queries & Active Expensive Queries; Plan Handle and Execution Time - Query Usage Audits; Server Dashboards and Memory Consumption Reports; Factors Impacting the Query Executions, Performance; Query Store - Settings and Advantages. Options; PARTITIONS Mechanism : Advantages, Performance; Partition Functions and Partition Schemes - Usage; Partitioning Un-partitioned Tables using GUI; Partition Compression Techniques : ROW, PAGE; Auditing / Verifying Partitioned Structures;

## Day 22: Tuning 2 - INDEX MANAGEMENT

Statistics : Purpose, Auto Creation and Updates; Index Management : Internal, External Fragmentation; Fragmentation Audits : DMFs and Threshold Values; Index Reorganization and Index Rebuild Options; Database Maintenance Plans (DMP) For Index Reorg; Page Count, Last Used. Fast, Sampled / Detailed Scan; Statistics Management : Column Level, Index Level; Index Management - DOP : Degree Of Parallelism; Index Rebuilding Process and Fragmentation Audits; Index Page Count and Index Condition Checks; Resumable Indexes: ONLINE and RESUME Options; PAUSE and RESUME Options in Index Rebuilds; Fast, Detailed Scans and Stats NoRecompute; Statistics : Index and Column Statistics;

## Day 23: QUERY TUNING 3 - TUNING TOOLS

Tuning Tools : Creating Workload Files and Trace Files; SQL Profiler Tool - Tuning Template and TSQL / SP Events; DTA Tool with Profiler Trace Files: Tuning Recommendations; DTA with Query Cache (Procedure Cache) & .SQL File Inputs; Perfmon Counters and Real-time Tracking Of Resources; Processor, Disk, Memory, Transactions, Database Counters; Using Perfmon for Big Query Audits. Free & Total Memory; Longest Running Transactions & Transactions Per Second; Execution Plans - Internals. Actual, LIVE Execution Plans; Plan Types : Index Scan, Index Seek, Tables Scan, Spooling; Query Costs : IO, CPU Cost, SubTree Cost, Operator Cost; NUMA Nodes, Boost SQL Priority, Thread Count, IO Affinity; Parameter Sniffing : Real-time Scenarios, Issues; Execution Plan Issues with Parameter Sniffing; Spooling Mechanism and Spool Types for Query Loads;

## Day 24: Tuning 4 - LOCKS, ISOLATION LEVELS

LOCKS : Mechanism, Types, Concurrency Control; Lock Types: Shared Lock (S), Intent Shared (IS); Exclusive Lock (X), Intent Exclusive (IX); Update Lock (U) and Metadata Lock (MD); Schema Stability Lock and Schema Modify Lock; Query Blocking Scenarios and Lock Monitors; Lock Audits : SP\_WHO2, SP\_LOCK, sysprocesses; Isolation Levels - ReadCommitted, Read Uncommitted; Serializable, Snapshot, Repeatable Read Isolations; Read Committed Snapshot Isolation Level in Real-time; Deadlock Simulation, Deadlock Prevention Scenarios; Deadlock Audits and Lock Events in Profiler Tool; Preventing Query Blocking and Deadlocks Avoidance; Choosing the Correct Isolation Level in T-SQL;

### **Day 25: QUERY TUNING 5 - FTS, MEMORY TABLES**

Full Text Search (FTS) Mechanism - Architecture, Tuning; Stop Words, Stemmer and Thesaurus For FullText Indexes; Indexer Program, Query Processor & FT Query Compilation; Database Catalogs (FTC) and FDHost.exe. Daemon Threads; Full Text (FT) Indexes : Query Tuning. Filter Daemon Host; CONTAINS() Queries and FREETEXT() Queries with SELECT; Resumable Indexes, Usage in SQL Server 2017 & 2019; ONLINE, RESUME, PAUSE, MAX\_DURATION Options; In-Memory Tables : Creation and Practical Usage for Tuning; Memory Snapshots at Database Level and Table Level; FileStream Files and Memory Snapshot Filegroups for MOT; MEMORY\_OPTIMIZED\_ELEVATE\_TO\_SNAPSHOT; Temporal Tables : for DML Audits, System Versioning;

### **Case Study on Performance Tuning: This Real-time Case Study includes:**

Query Tuning : Basic to Advanced Level; Parameter Sniffing and OPTIMIZE Options; Implementing Partitions, Data Archives; Implementing Compressions for Read Only Data; Statistics Creation and Updates; Histograms and Event Handling Options; SQL Traces and XEL Profiler Charts; Index Management Techniques; Statics Management Techniques; Using SQL Profiler Tool; Using DTA : DB Engine Tuning Advisor; Using Perfmon Tool and AM Tool

## **Module 5: Azure SQL Database Development & MCSA - 70 762**

Applicable for T-SQL Plan D

### **Day 26: AZURE CLOUD INTRO, CONFIGURATION**

Introduction to Cloud. Need for Cloud, Advantages; Cloud Architecture Basics - IaaS, PaaS and SaaS; Advantages of Microsoft Cloud - Azure Platform; Azure Products and Azure Services - Marketplace; Comparing Azure with Google Cloud, AWS Cloud; SQL Database Implementations in Azure Platform; Logical Servers, Virtual Machines, Managed Instance; Creating Azure Account and Subscription Types; Installing SSMS Tool, Azure Component Verification; Installing Azure Data Studio (ADS) Tool; Linking ADS Tool with Microsoft Azure Cloud; Differences between SSMS Tool and ADS Tool; Understanding Azure Market Place & Storage;

### **Day 27: AZURE SERVER & DATABASE CONFIGURATION**

Azure SQL Database Architecture Components; Creating Azure SQL Server (Logical Server); Firewall Settings for Azure SQL Server (Logical Server); Firewall Settings for Azure SQL Database with T-SQL; Adding Firewall Rules - IP for Remote Access; Server Properties and Status Check. Server Name Format; Password Resets and Azure SQL Server Name Format; Creating Azure SQL Databases and Pricing Tiers; Basic, Standard and Premium Plans For SQL DB; vCore Based Purchasing Options and Data Size; General Purpose and Business Critical Plans; Computer Tier : Provisioned and Serverless; Compute Generation : Gen 4 and Gen 5; DTUs Allocation for Database Size, Cost Models;

### **Day 28 : DTU ARCHITECTURE, ELASTIC QUERIES**

DTU : Data Transaction Units : Architecture, Pools; DTU - Memory and IO Resources for Reads &

Writes; Bounding Box Model for Optimal Performance; Static Pools (DTU) and Elastic Pools (eDTU); eDTUs and Elastic Pool, per Database Settings; EDTU Cost, eDTU max/min Limits and Performance; Configuring Elastic Pools for Azure SQL Databases; Elastic Pools & Tier Selection - Recommendations; Elastic Scale for Azure SQL Database - Strategies; Vertical Partitioning and Horizontal Partitioning; Elastic Database Tool Libraries for Elastic Queries; Split-Merge Service for SaaS Software Applications; Elastic Database Features - ShardMap, ShardKey; LOOKUP, HASH and RANGE Strategies for Sharding;

### **Day 29: AZURE SQL DB MIGRATIONS, COMPARISONS**

Data Migration Assistant (DMA) Tool; On-premise to Azure SQL Database Migration; Logical Server, Virtual Machine, Managed Instance; Schema Generation and Compatibility For Migration; Generating Data Scripts and Assessment; Migration Scopes : Schema, Data, Schema & Data; Compatibility Checks and Assessment Checks; Azure SQL Server Architecture Differences; Network Protocols and DB Engine Differences; File Structure and Filegroup Allocations; Secondary Files and FileStream Differences; Query Processing Differences with TDS Packets; Query Monitoring and Resources - Dashboards; Unsupported Commands with T-SQL Queries;

### **Day 30: AZURE SQL DATABASE TUNING**

Azure SQL Server Level Tuning Options; Azure SQL Database Level Tuning Options; Automated Tuning Options and Peak-Loads; Force Plan, Create Index and Drop Index; Query Performance Insight, Recommendations; IO Metrics, CPU Metrics & Query Statistics; Data File IO, Log File IO, Custom Reports; Query Level Recommendations and Query Costs; Azure Search Service - Configuration, Pricing Tiers; Azure Search for Data Import and Indexer Options; Suggester and Analyzer Index Modes for Tuning; Retrievable, Facetable, Filterable Indexes; Facetable and Searchable Indexes for Tuning; Change Tracking Options, Watermark Columns;

### **DAY 31: AZURE STORAGE, XEL GRAPHS**

Azure Storage : Purpose, Azure BLOB Data; Azure Storage Account Types and Creation; LRS, GRS and RA-GRS Azure Storage Accounts; Azure Resource Manager (ARM) Storage Instances; Classic Deployment Model Instances in Azure; SQL Storage Management (SMB), Azure Storage; BLOB Data Storage: LRS, GRS, and "RA - GRS"; SQL Traces : Creation and Audits; SQL Traces : Event Class, Category, Filter, Conditions; Extended Events Package, Target, Action, Session; TSQL & SP Debug Events; Global Fields; Dynamic Management Views; XE Profiler - Templates;

### **DAY 32: STRETCH DATABASES, DATABASE EXPORTS**

Stretch Databases in Azure SQL Databases; Stretch Databases - Tuning Benefits, Cautions; Table Level Migrations with Azure SQL Databases; Compute Performance Levels and DSU Pricing; Data Storage and Azure Database Snapshots; Geo Backup Of Tables and Hybrid Cloud Settings; Remote Data Archive Configuration in Azure; Database Master Key [DMK], Cold Data Migration; Database Exports From SSMS, Azure Portal; Database Imports From SSMS, Azure Portal; DB Migrations to Azure; Database Exports and Limitations in SSMS;

## **Resume Preparation & Project Interview FAQs**



For Registrations and Free Demo, please reach our team : 24 x 7

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