MSSQL Roadmap for .NET Developers

# Phase 1: SQL Basics & Core Queries

* • SQL Syntax & Basic Commands
* - SELECT, FROM, WHERE, ORDER BY, DISTINCT
* - TOP, BETWEEN, LIKE, IN, IS NULL
* • Filtering & Sorting
* - WHERE, AND, OR, NOT
* - ORDER BY ascending and descending
* • Joins
* - INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL OUTER JOIN
* - SELF JOIN, CROSS JOIN
* • Grouping & Aggregation
* - GROUP BY, HAVING
* - Aggregate functions: SUM, AVG, MAX, MIN, COUNT
* • Aliases & Subqueries
* - Column and table aliases using AS
* - Correlated and non-correlated subqueries

# Phase 2: Intermediate SQL (Real-World Development Needs)

* • Data Types
* - int, varchar, nvarchar, datetime, bit, decimal, varbinary, etc.
* • Set Operations
* - UNION, INTERSECT, EXCEPT
* • Views
* - Create, Update, Drop Views
* - Indexed Views and their limitations
* • Stored Procedures
* - Input/Output parameters
* - Use of EXEC, sp\_executesql, and dynamic SQL
* - Transactions inside SPs
* • Functions
* - Scalar-valued functions
* - Table-valued functions
* - Built-in functions (string, date, math)

# Phase 3: Advanced SQL (Enterprise-Level Concepts)

* • Indexes
* - Clustered vs Non-clustered
* - Covering Indexes
* - INCLUDE Columns
* - Filtered Index
* • Performance Tuning
* - Execution Plan Analysis
* - Missing Indexes
* - Query Optimization Techniques
* - Index Fragmentation
* • Transactions & Locks
* - ACID Properties
* - BEGIN TRAN, COMMIT, ROLLBACK
* - Deadlocks, Blocking, Isolation Levels
* • Triggers
* - AFTER and INSTEAD OF Triggers
* - Recursive triggers

# Phase 4: Database Design Concepts

* • Normalization
* - 1NF, 2NF, 3NF, BCNF – with examples
* - De-normalization
* • ER Diagrams
* - Entities, Attributes, Relationships
* - Primary Key, Foreign Key, Composite Key

# Phase 5: MSSQL Administration (for Developers)

* • Security
* - Logins vs Users
* - Permissions: GRANT, REVOKE, DENY
* - Roles and Schemas
* • Backups and Restore
* - .bak file restore
* - Differential and Log Backups
* - Point-in-Time Restore
* • Linked Servers & Cross DB Queries
* - Setup and security
* - Queries across servers/databases
* • Jobs, Schedules, and Alerts
* - SQL Agent jobs
* - Error handling with TRY...CATCH

# Phase 6: Modern SQL Topics (Optional but Powerful)

* • CTEs and Window Functions
* - ROW\_NUMBER(), RANK(), DENSE\_RANK(), LEAD(), LAG()
* - Recursive CTEs
* • JSON in SQL Server
* - Store and parse JSON data
* - OPENJSON, FOR JSON
* • Always Encrypted
* - Column Encryption Key (CEK), Column Master Key (CMK)
* - Deterministic vs Randomized Encryption
* • Temporal Tables
* - System-versioned tables
* - Data auditing via time-travel queries

# Phase 7: Practice & Integration With .NET

* • ADO.NET & Entity Framework Integration
* - Parameterized queries
* - Stored procedure execution
* - Handling SqlException and transactions
* • Real-world Projects / Practice Ideas
* - Build a mini Banking or Inventory Management system
* - Implement full data auditing
* - Write complex SPs with business logic and error handling

# Resources

* • Practice
* - LeetCode SQL
* - HackerRank SQL
* • Docs
* - Microsoft SQL Server Documentation
* • DB Tool
* - SQL Server Management Studio (SSMS)