

SQL Server 2022 Programming

Start learning Microsoft SQL Server from the ground up and become a professional SQL Developer and Database Programmer from a beginner/novice level.

About the Course & Importance of SQL Server

Microsoft SQL Server is one of the world's leading Relational Database Management Systems (RDBMS), used by organizations to store, manage, and analyze important business data. It is widely used in enterprise applications, banking, healthcare, retail, e-commerce, manufacturing, government, and cloud-based solutions. Whether you are a beginner or an experienced professional, learning SQL Server is an essential skill for building reliable and high-performance data-driven applications.

This course is designed for students, fresh graduates, working professionals, software developers, database administrators, testers, and data enthusiasts who want to build a strong foundation in Microsoft SQL Server 2022. It starts with database fundamentals and gradually moves into advanced topics such as Database Design, Normalization, SQL Queries, Joins, Functions, Stored Procedures, Views, Indexes, Transactions, Triggers, CTEs, Window Functions, Error Handling, Performance Tuning, Query Optimization, and SQL Server Security through practical examples.

By the end of this course, you will have the confidence and practical knowledge needed to design relational databases, write optimized SQL queries, develop database objects, improve performance, and work effectively with real-world enterprise systems.

Learning SQL Server 2022 :

There are 4 phases to learn SQL Server 2022.

1. Phase I - Introduction to Databases
2. Phase II – Querying Data with Transact-SQL
3. Phase III (Developing SQL Databases)
4. Phase IV (Updating Your Skills to SQL Server 2022)

Pre-Requisites:
NA
Duration : 45 days
Course Materials & Textbooks : 1. Running Notes in class, 2. Pdfs, 3. HandOuts, 4. Certification Material in Pdfs will be provided for this course.
Reference Websites: www.dotnetgurukul.com
Instructor: Praveen Kumar M Learning from Praveen Sir, is always different and you will experience it within few sessions – you attend and work regularly as per given guidance then you will be best in any team that you work in any company – assured.

Phase I - Introduction to Databases - Available Free on YouTube

Topic	Key Concepts Covered
Data & Information Fundamentals	What is Data, Forms of Data, Measurement of Data, Structured vs Unstructured Data, What is Information, What are Databases, Why Companies Need Databases, Flat File Database Disadvantages, Evolution of Databases, ACID Properties
Database Types	Relational Databases (RDBMS), Hierarchical Databases, Network Databases, NoSQL Databases (Document & Object-Oriented), Column Store Databases, Cloud Databases
RDBMS Fundamentals & Relationships	RDBMS Concepts, Primary Keys & Foreign Keys, RDBMS Characteristics, SQL (T-SQL) Overview, Relationship Types (One-to-One, One-to-Many, Many-to-One, Many-to-Many, Self-Referencing)
Normalization & Database Models	Database Normalization, Normal Forms, Denormalization, OLTP vs OLAP Database Models
SQL Server 2022 Installation & Architecture	SQL Server Installation (Basic & Custom), Editions & Versions, Default vs Named Instances, Windows & SQL Authentication, SQL Server Components (Database Engine, SQL Agent, SSRS, SSAS, SSIS, DQS), SQL Server Management Studio (SSMS), SQL Server Tools
Datatypes, Constraints & Type Conversions	SQL Server Data Types, Primary Key, Foreign Key, UNIQUE, CHECK, DEFAULT, NOT NULL Constraints, Type Conversion Functions (CAST, CONVERT, TRY_CAST, TRY_CONVERT)

Phase II – Querying Data with Transact-SQL - Premium Phase

Topic	Key Concepts Covered
T-SQL Fundamentals & Control Flow	Data Type Functions (String, Date/Time, Mathematical, System), T-SQL Elements (Predicates, Operators, Expressions), Control Flow Statements (IF...ELSE, WHILE, CASE, GOTO, BEGIN...END, TRY...CATCH, RETURN), Variables (Declaration, Assignment, Variable Types)
Set Theory & SQL Query Processing	Set Theory Concepts (Union, Intersection, Difference, Cartesian Product, Subsets), Applying Set Theory in SQL Server, SELECT Statement Structure, SQL Query Processing, Logical Order of Execution
Writing SELECT Queries & CASE Expressions	SELECT Statements, Coding Standards & Best Practices, Scalar Expressions, DISTINCT, CASE Expressions (Simple, Searched, Nested), Column & Table Aliases, Alias Scope
Joins & Join Types	Querying Multiple Tables, Join Fundamentals, Inner Join, Left Join, Right Join, Full Outer Join, Cross Join, Self Join, Join Processing, CustomerOrderDB Schema & ER Diagrams
Multi-Table Joins & Row Count Analysis	Multi-Table Joins, Join Syntax & Best Practices, Primary Key & Foreign Key Relationships, Row Count Analysis, Inner/Outer Join Scenarios, Working with Large Databases
Advanced Join Concepts	Conditional Joins using CASE, Joins with Subqueries, Derived Tables, Joins vs Subqueries, Choosing the Appropriate Query Technique

Sorting Data	ORDER BY Clause, ASC & DESC Sorting, Sorting by Multiple Columns, Sorting by Expressions, NULL Handling, Aliases in ORDER BY
Filtering & Pagination	WHERE Clause, Comparison Operators, AND/OR Conditions, Logical Evaluation, OFFSET/FETCH Pagination, GROUP BY, HAVING, Filtering with Functions, COLLATE, Filtering using Subqueries
Aggregate Functions	Aggregate Functions (SUM, AVG, COUNT, MIN, MAX), NULL Handling, DISTINCT with Aggregates, COALESCE, Aggregate Function Errors
GROUP BY & HAVING in Depth	GROUP BY Fundamentals, Single & Multiple Column Grouping, NULL Handling, Multiple Aggregate Functions, HAVING vs WHERE, Logical Query Processing, GROUP BY Errors
Subqueries – Fundamentals	Introduction to Subqueries, Logical Execution Flow, Self-Contained & Correlated Subqueries, Scalar, Multi-Row & Multi-Column Subqueries, Using Subqueries in SELECT, FROM & WHERE Clauses, Common Error Scenarios
Subqueries – Advanced & CRUD Operations	Correlated Subqueries, Scalar, Multi-Row & Multi-Column Correlated Subqueries, CRUD Operations using Subqueries, Joins vs Subqueries, Performance Considerations

Phase III – Developing SQL Server Databases - Premium Phase

Topic	Key Concepts Covered
Working with Tables	Temporary Tables (Local #, Global ##), Table Variables vs Scalar Variables, Common Table Expressions (CTEs), Recursive CTEs, Identity Columns, Unique Constraints, IDENTITY_INSERT, SCOPE_IDENTITY(), @@IDENTITY, IDENT_CURRENT()
Working with Views – Fundamentals & Security	Introduction to Views, Tables vs Views, Internal vs External Users, Security & Data Abstraction, Simple & Complex Views, Updatable vs Non-Updatable Views, View Options (SCHEMABINDING, ENCRYPTION, CHECK OPTION, VIEW_METADATA), View Permissions
Working with Views – Advanced & Performance	Indexed (Materialized) Views, Partitioned Views, Performance Impact, View Optimization, When to Avoid Views, Real-World Use Cases
Stored Procedures – Basics	Introduction to Stored Procedures, Benefits over Ad-hoc Queries, Parameterized Stored Procedures, Input & Output Parameters, Creating, Executing, Modifying & Dropping Stored Procedures
Stored Procedures – Best Practices & Debugging	Coding Best Practices, SET NOCOUNT ON, Avoiding SELECT *, Schema Usage, Cursors vs WHILE Loops, Error Handling with TRY...CATCH, ERROR_MESSAGE(), ERROR_NUMBER(), ERROR_SEVERITY(), ERROR_STATE(), ERROR_LINE(), Debugging using PRINT, RAISERROR, SSMS Debugger, SQL Profiler, Transaction Management
Transactions & Transaction Management	Transactions, BEGIN TRANSACTION, COMMIT, ROLLBACK, TRY...CATCH, @@ERROR, @@TRANCOUNT, Savepoints (SAVE TRANSACTION), Nested Transactions, Transaction Count Handling
Functions – Scalar & System Functions	Introduction to Functions, Built-in vs User-Defined Functions, Scalar UDFs, System Functions (String, Date, Math, Aggregate), Creating & Executing Scalar Functions

Functions – Table-Valued Functions & Comparisons	Inline TVFs, Multi-Statement TVFs, Inline vs Multi-Statement Functions, Functions vs Stored Procedures, Functions vs Views, Performance Considerations, Best Practices
Triggers – Fundamentals	Introduction to Triggers, DML Triggers (AFTER, INSTEAD OF), DDL Triggers, Trigger Execution Order, INSERTED & DELETED Tables, Triggers vs Stored Procedures
Triggers – Advanced & Best Practices	Auditing & Logging, Cascading Updates & Deletes, Error Handling & Rollbacks, Triggers vs Constraints, Best Practices, Trigger Limitations, ALTER TRIGGER, DROP TRIGGER
Indexes – Fundamentals	Introduction to Indexes, Clustered Indexes, Non-Clustered Indexes, Clustered vs Non-Clustered, Benefits & Drawbacks, Heap vs B-Tree Storage
Indexes – Performance & Maintenance	Primary Key vs Clustered Index, Unique Key vs Non-Clustered Index, Index Impact on SELECT, INSERT, UPDATE & DELETE Operations, Index Fragmentation, Fill Factor, Pad Index
Indexes – Advanced Types	Covering Indexes, Filtered Indexes, Full-Text Indexes, Advanced Indexing Strategies

Phase IV (Updating Your Skills to SQL Server 2022) - Premium Phase

Topic	Key Concepts Covered
T-SQL Enhancements in SQL Server 2022	Enhanced STRING_SPLIT with Ordinal Positions, LEAST() & GREATEST() Functions, Date & Time Enhancements (DATE_BUCKET, DATETRUNC, GENERATE_SERIES), Approximate Query Processing (APPROX_COUNT_DISTINCT), JSON Enhancements (JSON_PATH_EXISTS, Improved ISJSON, JSON_QUERY, JSON_MODIFY)
Enhancing Data Security and Flexibility in SQL Server 2022	Dynamic SQL, EXEC vs sp_executesql, Preventing SQL Injection, Performance Considerations, Static vs Dynamic SQL, Dynamic Data Masking (DDM), Granular Masking Rules, Role-Based Masking, SQL Server Auditing, Server & Database Audits, Audit Enhancements, Compliance (GDPR, HIPAA)
Intelligent Query Processing (IQP) for Performance in SQL Server 2022	Batch Mode on Rowstore, Approximate Query Processing, Scalar UDF Inlining, Table Variable Deferred Compilation, Adaptive Joins
Backup and Recovery Enhancements in SQL Server 2022	Backup & Restore Architecture, Snapshot Backups, Accelerated Database Recovery (ADR), Backup Compression, Backup Encryption, Restore Performance Improvements, System Database Backup Strategies
CLR Integration & Azure SQL Database in SQL Server 2022	SQL CLR Integration, CLR Stored Procedures & Functions, CLR Security, SQL Server vs Azure SQL Database, Deployment Models (Single Database, Elastic Pool, Managed Instance), Hybrid Connectivity, Cloud Migration Basics