Faysal Aziz

Advanced SQL Architecture and Optimization Workshop

From design to migration in a single day

FA-0040 · one-day

Data & Analytics

Introduction

In the modern data landscape, database professionals must bridge the gap between design elegance and runtime performance. Poor table design or unchecked normalization can degrade even the best business logic. This intensive one-day course focuses on translating customer requirements into efficient table structures, applying normalization intelligently, identifying and resolving performance bottlenecks, and executing seamless migrations. Delivered by an instructor with over **30 years of industry experience**, the training emphasizes **real-world, production-proven practices** instead of academic formalities.

Learning outcomes

Participants will learn to:

- Translate business requirements into sound relational table designs.
- Apply normalization principles effectively and recognize practical exceptions.
- Detect performance bottlenecks using SQL tracing and execution diagnostics.
- Resolve issues through structural and query-level optimizations.
- Plan and perform reliable data and schema migrations.

Prerequisites

- Working knowledge of SQL and relational database concepts.
- Familiarity with primary and foreign keys, indexes, and joins.

- Basic experience using SQL Server, PostgreSQL, MySQL, or similar platforms.

Training outline

1. Table Design According to Customer Requirements

Requirement analysis and data modeling fundamentals

- Identifying entities and relationships
- Mapping business processes to data structures

Logical and physical design considerations

- Column naming conventions and datatype selection
- Nullability, constraints, and referential integrity

Relationship modeling

- One-to-one, one-to-many, and many-to-many structures
- Handling optional and mandatory relationships

Scalability and maintainability factors

- Anticipating schema evolution
- Versioning and documentation of table structures

2. Normalization of Tables

Principles of normalization

- Purpose and goals of normalization
- Normal forms (1NF, 2NF, 3NF, BCNF)

Advantages and trade-offs

- Redundancy reduction vs. query performance
- Controlled denormalization for performance tuning

Structural assessment

- Detecting normalization violations
- Planning schema adjustments for balance

3. Identification of Performance Bottlenecks

Query performance fundamentals

- Query execution plans and their interpretation
- Identifying high-cost operations and excessive joins

Database tracing and profiling

- SQL trace, extended events, and performance monitors
- Detecting blocking, deadlocks, and I/O saturation

Schema-related performance impacts

- Over-indexed or under-indexed tables
- Poor key design and table fragmentation

Holistic diagnosis

- Correlating application behavior with SQL metrics
- Prioritizing performance issues

4. Proposal and Resolution from Both SQL and Table Perspectives

Formulating optimization strategies

- Combining query tuning and schema redesign
- Choosing between index, materialized view, or schema change

SQL-level optimization

- Query rewriting and plan stabilization
- Adjusting joins, filters, and aggregation strategies

Table-level optimization

- Schema refinement and partitioning
- Index restructuring and statistics maintenance

Validation and verification

- Performance benchmarking
- Regression and impact testing

5. Migration

Migration strategy and planning

- Scope definition and dependency mapping
- Downtime minimization and rollback planning

Data preparation and transformation

- Data quality assessment and cleansing
- Schema version control and migration sequencing

Execution and verification

- Bulk transfer vs. incremental migration

- Post-migration validation and performance monitoring

Governance and documentation

- Change logs and audit trails
- Communication and stakeholder reporting

This one-day workshop delivers concentrated expertise in SQL design and optimization — equipping participants to make informed, performance-conscious architectural decisions in real enterprise environments.

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