Bright Star Institute

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Microsoft Transact-SQL Programming

Duration: 90 hours

Prerequisites: General computer knowledge.

Description: This Transact-SQL programming course teaches students relational database fundamentals and SQL programming skills in the Microsoft SQL Server environment. Topics covered include relational database architecture, database design techniques, and simple and complex query skills. The course also covers Microsoft-specific T-SQL programming constructs, creation and use of stored procedures and user-defined functions, use of cursors and updateable views.

This class is intended for analysts, developers, designers, administrators, and managers who need to exploit the power of the SQL programming language. Upon completion, participants will understand SQL functions, join techniques, database objects and constraints, and will be able to write useful stored procedures and views as well as complex queries and updates. Comprehensive hands on exercises are integrated throughout to reinforce learning and develop real competency.

Course Overview

Relational Database Fundamentals

- Overview of Relational Database Concepts
- Relational Databases and Relational Database Management Systems
- Data Normalization
- DDL Syntax

Creating a Database

- Database Development Methodology Overview

Writing Basic SQL Queries

- Displaying Table Structures
- Retrieving Column Data From a Table or View
- Selecting Unique Values
- Filtering Rows Using the `WHERE` Clause
- Sorting Results Using `ORDER BY`
- Joining Multiple Tables
- Using Column and Table Aliases

Manipulating Query Results

- Using Row Functions

- Building a Logical Data Model
  - Identifying Entities and Attributes
  - Isolating Keys
  - Relationships Between Entities
  - Creating Entity-Relationship Diagrams
- Transforming to Physical Design
  - Migrating Entities to Tables
  - Selecting Primary Keys
  - Defining Columns
  - Enforcing Relationships with Foreign Keys
- Constructing the Database Using DDL
  - Creating Tables, Indexes, Constraints and Views
  - Dropping Tables, Indexes, Constraints and Views
  - Modifying Tables, Indexes, Constraints and Views

Advanced Query Techniques

- Inner Joins
- Outer Joins (Left, Right, Full)
- Performing Self-Joins
- Subqueries
  - Simple
  - Correlated
- Using the `EXISTS` Operator
- Tips for Developing Complex SQL Queries
- Using Aggregate Functions
  - `AVG`
  - `COUNT`
  - `SUM`
  - `MIN`
  - `MAX`
- Performing Set Operations
  - `UNION`
  - `INTERSECT`
  - `EXCEPT/MINUS`
  - Character
  - Numeric
  - Date and Time
  - Data Conversion (`CAST` and `CONVERT`)
- Using the `CASE` Function
- Handling Null Values

Manipulating Table Data Using SQL's Data Manipulation Language (DML)

- Inserting Data into Tables
- Updating Existing Data
- Deleting Records
- Truncating Tables
- Performing Bulk Inserts
- Using the `OUTPUT` Clause
- Merging Data
- Working with Identity Columns and Sequences

- Aggregating Results Using `GROUP BY`
- Restricting Groups with the `HAVING` Clause
- Creating Temporary Tables

User-Defined Functions

- Definition and Benefits of Use
- `CREATE FUNCTION`
  - Syntax
  - `RETURN` Clause and the `RETURNS` Statement
  - Scalar vs. Table Functions
- Comparison with Stored Procedures
- Returning Scalar Values and Tables
- `ALTER` and `DROP FUNCTION`

Stored Procedures

- Definition and Benefits of Use
- `CREATE PROCEDURE`
  - Syntax
  - Defining Input Parameters
  - Defining Output Parameters
  - Defining Optional Parameters
- `ALTER` and `DROP PROCEDURE`
- Implementation Differences

Triggers

- Definition and Benefits of Use
- Alternatives (e.g., Constraints)
- `CREATE TRIGGER`
  - Syntax
  - Trigger Types
- "Inserted" (or "NEW") and "Deleted" (or "OLD") Tables
- Event Handling and Trigger Execution
- `ALTER` and `DROP TRIGGER`

Complex Queries

- Using Wildcard Characters with `Like`
- Allowing Users to Build SQL Queries Dynamically
- Pivoting Data
- Summarizing Data with `ROLLUP` and `CUBE`
- Using Partitioned Aggregates

T-SQL Code Constructs

- Exploiting the Programming Features of T-SQL
  - Conditional Constructs
  - Looping Constructs
- Building Multi-Batch Scripts
- Invoking System Functions
- Using Variables in Scripts
- Using Temporary Tables in Scripts
- Handling Errors
  - Using `TRY...CATCH` Blocks
  - Using System Variables and Functions

Working with Data Types and Functions

- Effective Use of Data Types in SQL
  - String
  - Numeric
  - Time/Date
  - Other
- Substitution of Non-null Values with the `COALESCE` and `ISNULL` Functions
- Analyzing Data Points Using Ranking Functions

Using T-SQL Cursors

Working with Table Expressions

Overview of Cursors

- Declaring a Cursor
- Using `OPEN CURSOR`, `CLOSE CURSOR`, `DEALLOCATE CURSOR` Statements
- FETCHing Results
- Testing `@@FETCH_STATUS` and `@@CURSOR_ROWS`
- Updating Records with Cursors

Overview of Table Expressions

- Working with Views
- Using Derived Tables
- Common Table Expressions
- Table-Valued Functions

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