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Microsoft SQL Server 2022 Essential Training

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Top skills covered

Microsoft SQL Server

Head of Content Strategy, Learning

COURSE COMPLETION

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Setting up SQL Server: Microsoft SQL Server is a relational database management system (RDBMS) that stores and retrieves data. To set up SQL Server, you typically download the installation package from Microsoft's website and run the installer. During installation, you specify configurations such as instance name, authentication mode, and collation settings.

Installing Management Studio: SQL Server Management Studio (SSMS) is a graphical user interface tool provided by Microsoft for managing SQL Server databases. It allows users to perform various tasks such as writing and executing queries, designing databases, configuring server properties, and managing security settings. You can download SSMS separately from SQL Server installation media or as a standalone installer.

Basics of SQL Server:

Understanding Editions: Microsoft offers various editions of SQL Server, including Enterprise, Standard, and Express editions, each with different features and pricing. Enterprise edition provides the most comprehensive feature set and scalability options, while Express edition is a lightweight version suitable for small-scale applications with limitations on database size and resource usage.

Configuration with Configuration Manager: SQL Server Configuration Manager is a tool used to manage SQL Server services and network configurations. It allows you to start, stop, pause, and configure SQL Server services, manage network protocols and client connectivity settings, and view event logs for troubleshooting purposes.

Deploying SQL Server on Azure and Docker: SQL Server can be deployed on Microsoft Azure cloud platform using Azure SQL Database or SQL Server on Azure Virtual Machines. SQL Server can be containerized using Docker for easy deployment and management across different environments. Docker containers provide a lightweight and portable way to run SQL Server instances without the overhead of traditional virtual machines.

User Management:

Logging in and Permissions: In SQL Server, authentication can be performed using Windows authentication or SQL Server authentication. Windows authentication relies on Windows user accounts and groups, while SQL Server authentication requires a username and password stored in SQL Server's security system. Once authenticated, users can be assigned permissions to perform specific actions on databases, such as reading, writing, modifying, or deleting data.

Using Management Studio: SQL Server Management Studio (SSMS) provides a user-friendly interface for managing SQL Server instances, databases, and objects. It allows administrators to create and manage user accounts, assign permissions, configure security settings, and monitor server activity through graphical tools and wizards.

System Administrator Privileges: System administrators, also known as sysadmins, have full control over SQL Server instances and databases. They can perform administrative tasks such as creating and dropping databases, managing server settings, configuring security, and assigning roles and permissions to other users. Sysadmin privileges should be granted judiciously to trusted individuals to ensure the security and integrity of SQL Server environments.

Database Creation and Management:

Creating Databases: To create a database in SQL Server, you can use SSMS or Transact-SQL (T-SQL) commands. When creating a database, you specify its name, file locations, initial size, growth options, and collation settings. Once created, you can manage the database properties, such as setting compatibility level, recovery model, and encryption options.

Table Structures and Relationships: Tables are the fundamental objects used to store data in a SQL Server database. You define table structures by specifying column names, data types, constraints, and relationships between tables using primary and foreign keys. Properly designing table structures and relationships is crucial for organizing data efficiently and maintaining data integrity.

Importing Data: SQL Server provides various methods for importing data from external sources such as CSV files, Excel spreadsheets, and other databases. You can use tools like SQL Server Integration Services (SSIS) or bulk import utilities to transfer data into SQL Server tables while preserving data integrity and consistency.

Sample Databases: Microsoft provides sample databases such as AdventureWorks and WideWorldImporters for learning and practicing SQL Server concepts. These sample databases contain realistic data sets and schema structures that allow users to explore database features, write queries, and develop applications in a sandbox environment.

Database Design and Optimization:

Data Types and Constraints: SQL Server supports a wide range of data types, including numeric, character, date and time, binary, and spatial data types. Choosing appropriate data types based on the nature of data and application requirements is essential for efficient storage and retrieval. Constraints such as primary keys, foreign keys, defaults, unique constraints, and check constraints enforce data integrity rules and prevent invalid data from being entered into tables.

Efficient Queries and Indexes: Writing efficient queries is essential for optimizing database performance and reducing response times. SQL Server provides indexing mechanisms such as clustered, non-clustered, and filtered indexes to improve query performance by allowing faster data retrieval and reducing the need for full table scans. Proper index design, maintenance, and usage are critical for maximizing query performance and minimizing resource utilization.

Transact-SQL (T-SQL): Transact-SQL (T-SQL) is Microsoft's proprietary extension of the SQL language used for querying, modifying, and managing SQL Server databases. T-SQL provides additional features such as procedural programming constructs, error handling mechanisms, and system functions for performing complex data manipulation tasks. Knowledge of T-SQL syntax and best practices is essential for effective database development and administration in SQL Server environments.

Advanced Features:

Views and Stored Procedures: Views are virtual tables that represent subsets of data from one or more underlying tables. They allow users to query and manipulate data without directly accessing the underlying tables. Stored procedures are precompiled sets of SQL statements that are stored in the database and can be executed repeatedly with different parameters. Views and stored procedures help improve performance, enhance security, and promote code reusability in SQL Server applications.

Backup and Restore: Backup and restore operations are critical for protecting data against loss, corruption, and disasters. SQL Server provides built-in tools such as SQL Server Management Studio (SSMS) and Transact-SQL (T-SQL) commands for creating full, differential, and transaction log backups of databases. These backups can be restored to the same or different SQL Server instances to recover data in case of hardware failures, software errors, or user mistakes.

Security and Compliance:

User Accounts and Permissions: SQL Server implements security features such as logins, users, roles, and permissions to control access to databases and resources. Logins represent authentication credentials used to connect to SQL Server instances, while users are database-level principals associated with specific permissions and roles. Roles are groups of permissions that can be assigned to users to simplify access management and enforce security policies.

Security Features: SQL Server offers various security features such as encryption, auditing, authentication, and authorization to protect sensitive data and ensure compliance with regulatory requirements. Dynamic Data Masking (DDM) and Always Encrypted are encryption features that help prevent unauthorized access to sensitive data by masking or encrypting it at the column level. Auditing features allow administrators to track and monitor user activities, database changes, and security events for compliance auditing and forensic analysis.

Business Continuity: SQL Server provides high availability and disaster recovery solutions such as Always On Availability Groups, Failover Cluster Instances, and Database Mirroring to ensure business continuity and minimize downtime in case of server failures.