Administering a SQL Database Infrastructure (MS-20764)

ID MS-20764   **Preis** 2.490,– € (exkl. MwSt.)   **Dauer** 5 Tage

Dieser Kurs ist ab dem 31.12.2021 offiziell von Microsoft abgekündigt und wird ab dem 01.01.2022 als Fast Lane Workshop mit identischen Inhalten angeboten. Als begleitende Unterlage erhalten Sie ein Fachbuch.

Kursüberblick

This five-day instructor-led course provides students who administer and maintain SQL Server databases with the knowledge and skills to administer a SQL server database infrastructure. Additionally, it will be of use to individuals who develop applications that deliver content from SQL Server databases.

Zielgruppe

The primary audience for this course is individuals who administer and maintain SQL Server databases. These individuals perform database administration and maintenance as their primary area of responsibility, or work in environments where databases play a key role in their primary job.

The secondary audiences for this course are individuals who develop applications that deliver content from SQL Server databases.

Voraussetzungen

In addition to their professional experience, students who attend this training should already have the following technical knowledge:

- Basic knowledge of the Microsoft Windows operating system and its core functionality.
- Working knowledge of Transact-SQL.
- Working knowledge of relational databases.
- Some experience with database design.

The required knowledge can be gained from the course Querying Data with Transact-SQL (MS-20761).

Kursziele

After completing this course, students will be able to:

- Authenticate and authorize users
- Assign server and database roles
- Authorize users to access resources
- Protect data with encryption and auditing
- Describe recovery models and backup strategies
- Backup SQL Server databases
- Restore SQL Server databases
- Automate database management
- Configure security for the SQL Server agent
- Manage alerts and notifications
- Managing SQL Server using PowerShell
- Trace access to SQL Server
- Monitor a SQL Server infrastructure
- Troubleshoot a SQL Server infrastructure
- Import and export data

Kursinhalt

- SQL Server Security
- Assigning Server and Database Roles
- Authorizing Users to Access Resources
- Protecting Data with Encryption and Auditing
- Recovery Models and Backup Strategies
- Backing Up SQL Server Databases
- Restoring SQL Server 2016 Databases
- Automating SQL Server Management
- Configuring Security for SQL Server Agent
- Monitoring SQL Server with Alerts and Notifications
- Introduction to Managing SQL Server by using PowerShell
- Tracing Access to SQL Server with Extended events
- Monitoring SQL Server
- Troubleshooting SQL Server
- Importing and Exporting Data

Detaillierter Kursinhalt

Module 1: SQL Server Security

Protection of data within your Microsoft SQL Server databases is

essential and requires a working knowledge of the issues and SQL Server security features. This module describes SQL Server security models, logins, users, partially contained databases, and cross-server authorization.

Lessons

- Authenticating Connections to SQL Server
- Authorizing Logins to Connect to databases
- Authorization Across Servers
- Partially Contained Databases

Lab: Authenticating Users

- Create Logins
- Create Database Users
- Correct Application Login Issues
- Configure Security for Restored Databases

After completing this module, you will be able to:

- SQL Server basic concepts.
- SQL Server connection authentication.
- User login authorization to databases.
- Partially contained databases.
- Authorization across servers.

Module 2: Assigning Server and Database Roles

Using roles simplifies the management of user permissions. With roles, you can control authenticated users' access to system resources based on each user's job function—rather than assigning permissions user-by-user, you can grant permissions to a role, then make users members of roles. Microsoft SQL Server includes support for security roles defined at server level and at database level.

Lessons

- Working with server roles
- Working with Fixed Database Roles
- Assigning User-Defined Database Roles

Lab: Assigning server and database roles

- Assigning Server Roles
- Assigning Fixed Database Roles
- Assigning User-Defined Database Roles
- Verifying Security

After completing this module, you will be able to:

- Describe and use server roles to manage server-level security.
- Describe and use fixed database roles.
- Use custom database roles and application roles to manage database-level security.

Module 3: Authorizing Users to Access Resources

In the previous modules, you have seen how Microsoft SQL Server security is organized and how sets of permissions can be assigned at the server and database level by using fixed server roles, user-defined server roles, fixed database roles, and application roles. The final step in authorizing users to access SQL Server resources is the authorization of users and roles to access server and database objects. In this module, you will see how these object permissions are managed. In addition to access permissions on database objects, SQL Server provides the ability to determine which users are allowed to execute code, such as stored procedures and functions. In many cases, these permissions and the permissions on the database objects are best configured at the schema level rather than at the level of the individual object. Schema-based permission grants can simplify your security architecture. You will explore the granting of permissions at the schema level in the final lesson of this module.

Lessons

- Authorizing User Access to Objects
- Authorizing Users to Execute Code
- Configuring Permissions at the Schema Level

Lab: Authorizing users to access resources

- Granting, Denying, and Revoking Permissions on Objects
- Granting EXECUTE Permissions on Code
- Granting Permissions at the Schema Level

After completing this module, you will be able to:

- Authorize user access to objects.
- Authorize users to execute code.
- Configure permissions at the schema level.

Module 4: Protecting Data with Encryption and Auditing

When configuring security for your Microsoft SQL Server systems, you should ensure that you meet any of your organization's compliance requirements for data protection. Organizations often need to adhere to industry-specific compliance policies, which mandate auditing of all data access. To address this requirement,

SQL Server provides a range of options for implementing auditing. Another common compliance requirement is the encryption of data to protect against unauthorized access in the event that access to the database files is compromised. SQL Server supports this requirement by providing transparent data encryption (TDE). To reduce the risk of information leakage by users with administrative access to a database, columns containing sensitive data—such as credit card numbers or national identity numbers—can be encrypted using the Always Encrypted feature. This module describes the available options for auditing in SQL Server, how to use and manage the SQL Server Audit feature, and how to implement encryption.

Lessons

- Options for auditing data access in SQL Server
- Implementing SQL Server Audit
- Managing SQL Server Audit
- Protecting Data with Encryption

Lab: Using Auditing and Encryption

- Working with SQL Server Audit
- Encrypt a Column as Always Encrypted
- Encrypt a Database using TDE

After completing this module, you will be able to:

- Describe the options for auditing data access.
- Implement SQL Server Audit.
- Manage SQL Server Audit.
- Describe and implement methods of encrypting data in SQL Server.
- Implement encryption

Module 5: Recovery Models and Backup Strategies

One of the most important aspects of a database administrator's role is ensuring that organizational data is reliably backed up so that, if a failure occurs, you can recover the data. Even though the computing industry has known about the need for reliable backup strategies for decades—and discussed this at great length—unfortunate stories regarding data loss are still commonplace. A further problem is that, even when the strategies in place work as they were designed, the outcomes still regularly fail to meet an organization's operational requirements. In this module, you will consider how to create a strategy that is aligned with organizational needs, based on the available backup models, and the role of the transaction logs in maintaining database consistency.

Lessons

- Understanding Backup Strategies
- SQL Server Transaction Logs
- Planning Backup Strategies

Lab: Understanding SQL Server recovery models

- Plan a Backup Strategy
- Configure Database Recovery Models

After completing this module, you will be able to:

- Describe various backup strategies.
- Describe how database transaction logs function.
- Plan SQL Server backup strategies.

Module 6: Backing Up SQL Server Databases

In the previous module, you learned how to plan a backup strategy for a SQL Server system. You can now learn how to perform SQL Server backups, including full and differential database backups, transaction log backups, and partial backups. In this module, you will learn how to apply various backup strategies.

Lessons

- Backing Up Databases and Transaction Logs
- Managing Database Backups
- Advanced Database Options

Lab: Backing Up Databases

- Backing Up Databases
- Performing Database, Differential, and Transaction Log Backups
- Performing a Partial Backup

After completing this module, you will be able to:

- Perform backups of SQL Server databases and transaction logs.
- Manage database backups.
- Describe advanced backup options.

Module 7: Restoring SQL Server 2016 Databases

In the previous module, you learned how to create backups of Microsoft SQL Server 2016 databases. A backup strategy might involve many different types of backup, so it is essential that you can effectively restore them. You will often be restoring a database

in an urgent situation. You must, however, ensure that you have a clear plan of how to proceed and successfully recover the database to the required state. A good plan and understanding of the restore process can help avoid making the situation worse. Some database restores are related to system failure. In these cases, you will want to return the system as close as possible to the state it was in before the failure. Some failures, though, are related to human error and you might wish to recover the system to a point before that error. The point-in-time recovery features of SQL Server 2016 can help you to achieve this. Because they are typically much larger, user databases are more likely to be affected by system failures than system databases. However, system databases can be affected by failures, and special care should be taken when recovering them. In particular, you need to understand how to recover each system database because you cannot use the same process for all system databases. In this module, you will see how to restore user and system databases and how to implement point-in-time recovery.

Lessons

- Understanding the Restore Process
- Restoring Databases
- Advanced Restore Scenarios
- Point-in-Time Recovery

Lab: Restoring SQL Server Databases

- Restoring a Database Backup
- Restring Database, Differential, and Transaction Log Backups
- Performing a Piecemeal Restore

After completing this module, you will be able to:

- Explain the restore process.
- Restore databases.
- Perform advanced restore operations.
- Perform a point-in-time recovery.

Module 8: Automating SQL Server Management

The tools provided by Microsoft SQL Server make administration easy when compared to some other database engines. However, even when tasks are easy to perform, it is common to have to repeat a task many times. Efficient database administrators learn to automate repetitive tasks. This can help to avoid situations where an administrator forgets to execute a task at the required time. Perhaps more importantly, the automation of tasks helps to

ensure that they are performed consistently, each time they are executed. This module describes how to use SQL Server Agent to automate jobs, how to configure security contexts for jobs, and how to implement multiserver jobs.

Lessons

- Automating SQL Server management
- Working with SQL Server Agent
- Managing SQL Server Agent Jobs
- Multi-server Management

Lab: Automating SQL Server Management

- Create a SQL Server Agent Job
- Test a Job
- Schedule a Job
- Configure Master and Target Servers

After completing this module, you will be able to:

- Describe methods for automating SQL Server Management.
- Configure jobs, job step types, and schedules.
- Manage SQL Server Agent jobs.
- Configure master and target servers.

Module 9: Configuring Security for SQL Server Agent

Other modules in this course have demonstrated the need to minimize the permissions that are granted to users, following the principle of "least privilege." This means that users have only the permissions that they need to perform their tasks. The same logic applies to the granting of permissions to SQL Server Agent. Although it is easy to execute all jobs in the context of the SQL Server Agent service account, and to configure that account as an administrative account, a poor security environment would result from doing this. It is important to understand how to create a minimal privilege security environment for jobs that run in SQL Server Agent.

Lessons

- Understanding SQL Server Agent Security
- Configuring Credentials
- Configuring Proxy Accounts

Lab: Configuring Security for SQL Server Agent

- Analyzing Problems in SQL Server Agent
- Configuring a Credential

- Configuring a Proxy Account
- Configuring and testing the Security Context of a Job

After completing this module, you will be able to:

- Explain SQL Server Agent security.
- Configure credentials.
- Configure proxy accounts.

Module 10: Monitoring SQL Server with Alerts and Notifications

One key aspect of managing Microsoft SQL Server in a proactive manner is to make sure you are aware of problems and events that occur in the server, as they happen. SQL Server logs a wealth of information about issues. You can configure it to advise you automatically when these issues occur, by using alerts and notifications. The most common way that SQL Server database administrators receive details of events of interest is by email message. This module covers the configuration of Database Mail, alerts, and notifications for a SQL Server instance, and the configuration of alerts for Microsoft Azure SQL Database.

Lessons

- Monitoring SQL Server Errors
- Configuring Database Mail
- Operators, Alerts, and Notifications
- Alerts in Azure SQL Database

Lab: Monitoring SQL Server with Alerts and Notifications

- Configuring Database Mail
- Configuring Operators
- Configuring Alerts and Notifications
- Testing Alerts and Notifications

After completing this module, you will be able to:

- Monitor SQL Server errors.
- Configure database mail.
- Configure operators, alerts, and notifications.
- Work with alerts in Azure SQL Database.

Module 11: Introduction to Managing SQL Server by using PowerShell

This module looks at how to use Windows PowerShell with Microsoft SQL Server. Businesses are constantly having to increase the efficiency and reliability of maintaining their IT infrastructure; with PowerShell, you can improve this efficiency and

reliability by creating scripts to carry out tasks. PowerShell scripts can be tested and applied multiple times to multiple servers, saving your organization both time and money.

Lessons

- Getting Started with Windows PowerShell
- Configure SQL Server using PowerShell
- Administer and Maintain SQL Server with PowerShell
- Managing Azure SQL Databases using PowerShell

Lab: Using PowerShell to Manage SQL Server

- Getting Started with PowerShell
- Using PowerShell to Change SQL Server settings

After completing this module, you will be able to:

- Describe the benefits of PowerShell and its fundamental concepts.
- Configure SQL Server by using PowerShell.
- Administer and maintain SQL Server by using PowerShell.
- Manage an Azure SQL Database by using PowerShell.

Module 12: Tracing Access to SQL Server with Extended events

Monitoring performance metrics provides a great way to assess the overall performance of a database solution. However, there are occasions when you need to perform more detailed analysis of the activity occurring within a Microsoft SQL Server instance—to troubleshoot problems and identify ways to optimize workload performance. SQL Server Extended Events is a flexible, lightweight event-handling system built into the Microsoft SQL Server Database Engine. This module focuses on the architectural concepts, troubleshooting strategies and usage scenarios of Extended Events.

Lessons

- Extended Events Core Concepts
- Working with Extended Events

Lab: Extended Events

- Using the System_Health Extended Events Session
- Tracking Page Splits Using Extended Events

After completing this module, you will be able to:

- Describe Extended Events core concepts.

- Create and query Extended Events sessions.

Module 13: Monitoring SQL Server

The Microsoft SQL Server Database Engine can run for long periods without the need for administrative attention. However, if you regularly monitor the activity that occurs on the database server, you can deal with potential issues before they arise. SQL Server provides a number of tools that you can use to monitor current activity and record details of previous activity. You need to become familiar with what each of the tools does and how to use them. It is easy to become overwhelmed by the volume of output that monitoring tools can provide, so you also need to learn techniques for analyzing their output.

Lessons

- Monitoring activity
- Capturing and Managing Performance Data
- Analyzing Collected Performance Data
- SQL Server Utility

Lab: Monitoring SQL Server

After completing this module, you will be able to:

- Monitor current activity.
- Capture and manage performance data.
- Analyze collected performance data.
- Configure SQL Server Utility.

Module 14: Troubleshooting SQL Server

Database administrators working with Microsoft SQL Server need to adopt the important role of troubleshooter when issues arise—particularly if users of business-critical applications that rely on SQL Server databases are being prevented from working. It is important to have a solid methodology for resolving issues in general, and to be familiar with the most common issues that can arise when working with SQL Server systems.

Lessons

- A Trouble Shooting Methodology for SQL Server
- Resolving Service Related Issues
- Resolving Connectivity and Log-in issues

Lab: Troubleshooting Common Issues

- Troubleshoot and Resolve a SQL Login Issue
- Troubleshoot and Resolve a Service Issue
- Troubleshoot and Resolve a Windows Login Issue
- Troubleshoot and Resolve a Job Execution Issue
- Troubleshoot and Resolve a Performance Issue

After completing this module, you will be able to:

- Describe a troubleshooting methodology for SQL Server.
- Resolve service-related issues.
- Resolve login and connectivity issues.

Module 15: Importing and Exporting Data

While a great deal of data residing in a Microsoft SQL Server system is entered directly by users who are running application programs, there is often a need to move data in other locations, to and from SQL Server. SQL Server provides a set of tools you can use to transfer data in and out. Some of these tools, such as the bcp (Bulk Copy Program) utility and SQL Server Integration Services, are external to the database engine. Other tools, such as the BULK INSERT statement and the OPENROWSET function, are implemented in the database engine. With SQL Server, you can also create data-tier applications that package all the tables, views, and instance objects associated with a user database into a single unit of deployment. In this module, you will explore these tools and techniques so that you can import and export data to and from SQL Server.

Lessons

- Transferring Data to and from SQL Server
- Importing and Exporting Table Data
- Using bcp and BULK INSERT to Import Data
- Deploying and Upgrading Data-Tier Application

Lab: Importing and Exporting Data

- Import and Excel Data Using the Import Wizard
- Import a Delimited Text File Using bcp
- Import a Delimited Text File using BULK INSERT
- Create and Test an SSIS Package to Extract Data
- Deploy a Data-Tier Application

After completing this module, you will be able to:

- Describe tools and techniques for transferring data.
- Import and export table data.
- Use bcp and BULK INSERT to import data.
- Use data-tier applications to import and export database applications.

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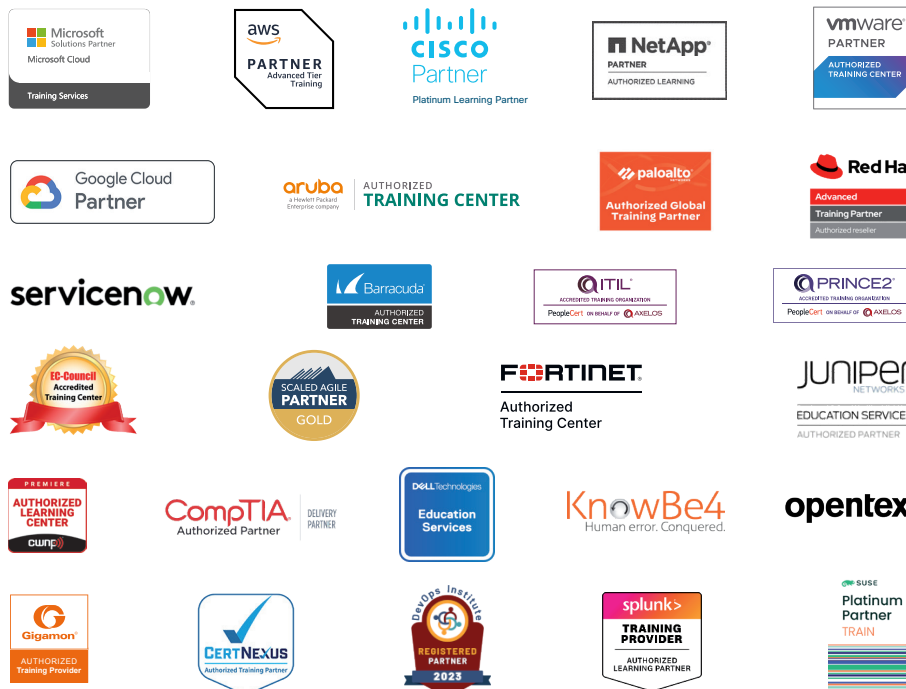
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