



Lesson Plans

Administering SQL Server 2000

(Exam 70-228)

Version 2.0

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Course Overview

This course prepares students for the Installing, Configuring, and Administering Microsoft SQL Server 2000 Enterprise Edition Certification Exam 70-228. It focuses on how to configure, implement, manage and troubleshoot the SQL Server 2000 database management system environment.

You should have the following skills before studying for the Installing, Configuring, and Administering Microsoft SQL Server 2000 Enterprise Edition certification:

- Knowledge of basic concepts of Relational databases
- Knowledge of Transact-SQL

Module 1 - SQL Server Overview

Module 1 introduces the student to the SQL Server 2000 certification and covers the prerequisites for the course. Also included is an overview of Relational databases components and the tools used to access and administer SQL Server databases. This section contains basic foundational knowledge about SQL Server that the students must know to complete the course.

Module 2 - Installation

Module 2 focuses on installing SQL Server 2000. Included are facts about the components and services required, hardware requirements, and the methods to install SQL Server 2000.

Module 3 – Server Management

Module 3 discusses how to manage SQL Server 2000. Included are discussions on the managing the status of services, configuring SQL Server 2000 properties, and using Net-Libraries to enable communication between the SQL Server and the client.

Module 4 – Databases and Objects

Module 4 covers the details of databases. Students will learn how to create a database and the objects in a database. Views and stored procedures can be used to simplify data access. Also they will learn how to optimize performance by managing datafiles and logfiles.

Module 5 - Security

Module 5 describes the security mechanisms SQL Server uses to control access to the server and databases. These include: authentication modes, user logins, database users, roles, and permissions.

Module 6 – Data Access

Module 6 discusses tools and configurations used to access data in SQL Server. Included are discussions on allowing access through linked servers and XML support through IIS. Also discussed is data import and export, and replication.

Module 7 – Protection and Availability

Module 7 discusses the planning and implementation of backup and recovery to ensure protection and availability of data. Standby servers and clustering can also be used to provide additional availability and fault tolerance of network servers.

Module 8 – Performance and Management

Module 8 discusses how to manage and troubleshoot SQL Server. Topics include: optimizing performance through system monitoring and database design. This module also teaches student how to configure email support and automate administrative tasks through the use of jobs and alerts. Also discussed are the effects of transactions on system performance and the functions of locking.

Section 1.1: SQL Server Overview

Preparation

This section introduces the video instructor, the basic concepts and common components of relational databases. Included in this section, are the various SQL Server 2000 editions that are available.

Lecture Focus Questions:

- What are the components involved when the client communicates with SQL Server?
- What are tables, rows, and columns?
- What is the purpose of keys?
- What is the difference between a primary key and a foreign key?
- How do users retrieve information from a database?
- How do indexes improve database performance?
- How does locking affect a database?
- What are transactions?

Time

About 15 minutes

Section 1.2: Management Tools

Preparation

This section discusses the management tools that are available to access and administer databases. Students will learn how to manually register a server in Enterprise Manager.

Lecture Focus Questions:

- Which tool do you use to construct queries?
- What is Enterprise Manager?
- What is the Server Network Utility?
- What does SQL Server Service Manager allow you to do?
- Which tool allows you to manage client Net-libraries?

Time

About 20 minutes

Lab/Activity

- Manually Register a Server

Section 1.3: SQL Databases and Objects

Preparation

In this section students will learn to identify the two types databases that will run on a SQL 2000 database. These include *system* databases used to manage the system and *user* databases created by users to store their data. Also discussed are the different datatypes available to identify the type of data and any limitations placed on the data.

Lecture Focus Questions:

- Which database holds system-level data?
- What is the purpose of the **tempdb** database?
- How does a user database differ from a system database?
- What is an object?
- What is a stored procedure?
- What is a trigger?
- What does the data type identify?
- How is the Money class represented?
- How can dates be represented?

Time

About 20 minutes

Section 1.4: Transact-SQL Overview

Preparation

This section presents an overview of how to use the Transact-SQL language to build and execute queries on SQL Server 2000 databases. Discussed is how to reference a SQL Server object using either a Fully Qualified Name (FQN) or a Partially Specified Name. Also discussed are the components to build query statements such as commands, keywords, identifiers, and functions.

Lecture Focus Questions:

- What is Transact-SQL?
- What is the structure of a query?
- What is the difference between commands and functions?
- What is the purpose of identifiers? What is a delimited identifier?
- What must an identifier contain to be considered complete?
- What is an execution plan?

Time

About 20 minutes

Section 1.5: SQL Server Components

Preparation

This section outlines the SQL Server components used to store and retrieve information from databases. Topics include SQL Server Services, datafiles, transactions, file groups, data pages, and index pages.

Lecture Focus Questions:

- What does the SQL Server Agent service do?
- Which service runs the database engine?
- If you have three SQL Server instances, how many occurrences of MS DTC do you have to manage?
- What is the maximum size of a data page?
- Why would you use filegroups?
- How can you identify a system table?
- How do you query a system table?

Time

About 20 minutes

Section 2.1: Preparation

Preparation

This section discusses the information you will need to consider before installing SQL Server 2000. These include hardware requirements, supported Windows versions, installation methods available, installation steps and the decisions that need to be made at each step.

SQL Server 2000 Objectives:

101. Install SQL Server 2000. Considerations include clustering, default collation, file locations, number of instances, and service accounts.

Lecture Focus Questions:

- How do you identify a named instance of SQL Server?
- How many default instances of SQL Server are possible on a single machine?
- How many named instances can you have on a machine?
- Why is the service user account important?
- What must you do to change the collation after you've installed SQL Server?
- Which authentication type would you use to allow users to connect to your database across a non-secure network like the Internet?
- What factors do you consider when choosing a licensing mode?

Time

About 20 minutes

Section 2.2: Installation

Preparation

This section provides detailed information about installation. The students will learn how to install SQL Server, install a named instance, verify a SQL Server installation, and troubleshoot a failed installation.

SQL Server 2000 Objectives:

101. Install SQL Server 2000. Considerations include clustering, default collation, file locations, number of instances, and service accounts.
106. Troubleshoot failed installations.

Lecture Focus Questions:

- What can you do to verify your SQL Server installation?
- Which log file do you check to troubleshoot configuration errors?
- What does the setup.log file record?

Time

About 30 minutes

Section 2.3: Upgrade and Coexistence

Preparation

This section focuses on the upgrade and coexistence strategies available for SQL Server 2000. SQL Server 2000 provides methods to maintain previous SQL Server databases through upgrading, version switching and multiple instances.

SQL Server 2000 Objectives:

- 102 Upgrade to SQL Server 2000.
- Perform a custom upgrade.
 - Upgrade to SQL Server 2000 from SQL Server 6.5.
 - Upgrade to SQL Server 2000 from SQL Server 7.0.

Lecture Focus Questions:

- What does Vswitch.exe allow you to do?
- Why would you establish coexistence rather than perform an upgrade?
- Which SQL Server upgrade requires a service pack as part of the upgrade path?
- Which SQL Server versions can run with named instances of SQL Server 2000?

Time

About 10 minutes

Section 3.1: Services

Preparation

This section discusses facts about services and the tools used to manage the status of services. Also discussed is how to start and stop SQL Server services, configure services to autostart, and configure user accounts for a SQL Server service.

Lecture Focus Questions:

- When would you configure the SQL Server and SQL Server Agent services to start with a local user account?
- Why would you enable the **Password never expires** setting for the services domain user account?
- Which tools can you use to manage services?

Time

About 10 minutes

Lab/Activity

- Manage Services

Section 3.2: Server Options

Preparation

This section focuses on understanding the server settings that can be configured using SQL Server Enterprise Manager at the time of installation, after an installation, or when changes need to be made to the SQL Server configuration. Students will learn how to configure SQL Server 2000 properties.

Lecture Focus Questions:

- Which server property tab allows you to set service startup options?
- What is the difference between configured and running values?
- Where do you set the default language?
- Where can you change the locations of data and log files?

Time

About 15 minutes

Lab/Activity

- Configure Server Properties
- Set Login and Query Timeout

Section 3.3: Net-Libraries

Preparation

This section discusses how Net-Libraries are used to enable communications between the SQL Server, the client, and the Net-Libraries that are available with SQL Server 2000. Students will learn how to add and remove server protocols and enable protocol encryption.

SQL Server 2000 Objectives:

105. Configure network libraries.

Lecture Focus Questions:

- Which Net-Libraries do named instances support?
- What is the TCP/IP port of a default SQL Server instance?
- When would using the Multiprotocol Net-Library be a good choice?
- Which Net-Library allows you to use encryption without using certificates?

Time

About 40 minutes

Lab/Activity

- Manage Server Protocols
- Configure Protocol Encryption

Section 4.1: Databases

Preparation

This section explains the methods that can be used to create a database and the settings you can define for a database. Students will learn how to create a database using Enterprise Manager and also TSQL statements. No *Lecture Focus Questions* have been assigned to this section.

SQL Server 2000 Objectives:

203. Create and alter databases.
 - Set database options by using the ALTER DATABASE or CREATE DATABASE statements.
 - Size and place the transaction log.

Time

About 30 minutes

Lab/Activity

- Create A Database

Section 4.2: Tables

Preparation

This section discusses how to create tables in a database. Students will learn how to create and modify tables using Enterprise Manager and how to add columns and select column data types and lengths.

SQL Server 2000 Objectives:

204. Create and manage objects. Objects include constraints, indexes, stored procedures, triggers, and views.
303. Modify the database schema.

Lecture Focus Questions:

- What properties make up the column definition?
- What information do you need to supply to create a table?
- Which property would you set to allow a table to accept blank values?

Time

About 30 minutes

Section 4.3: Constraints and Triggers

Preparation

This section focuses on constraints and triggers. Constraints are used to prevent invalid data from being inputted into columns by enforcing rules on the type of data that can be entered. Triggers are stored procedures that execute when a UPDATE, INSERT, or DELETE statement runs against a table or a view.

SQL Server 2000 Objectives:

204. Create and manage objects. Objects include constraints, indexes, stored procedures, triggers, and views.

Lecture Focus Questions:

- Why do you use constraints?
- How do constraints work?
- What are the possible consequences of disabling a constraint?
- What does entity integrity tell you that domain integrity does not?
- How do you manage the relations between tables?
- What happens to data with an AFTER trigger? How does data altered with an INSTEAD OF trigger differ from data altered with an AFTER trigger?
- Under what circumstances would you choose to use a trigger over a constraint?

Time

About 90 minutes

Section 4.4: Indexes

Preparation

This section explains what indexes are and how they are used to locate data within a table. Indexes are used to improve the response of queries. Two types of indexes are discussed: clustered and nonclustered. Students will learn the following: how to analyze a query execution plan to determine index usage, select columns for index creation, use the Index Tuning Wizard to create indexes, and view query statistics.

SQL Server 2000 Objectives:

204. Create and manage objects. Objects include constraints, indexes, stored procedures, triggers, and views.
301. Optimize database performance. Considerations include indexing, locking, and recompiling.

Lecture Focus Questions:

- How can an index optimize a database?
- How does a nonclustered index identify where data is located as opposed to a clustered index?
- What is the relationship between a primary key and a clustered index?
- When do indexes begin to decrease database performance?

Time

About 35 minutes

Section 4.5: Views and Stored Procedures

Preparation

This section discusses views and stored procedures. A *view* works like a virtual table and can simplify data access. It can also be used to secure the database by granting permissions to a view rather than table objects. *Stored procedures* can be used to improve performance, reduce network traffic, and simplify data access and security implementation. Three different types of stored procedures available for SQL 2000 are presented. Students will learn how to create views and stored procedures.

SQL Server 2000 Objectives:

204. Create and manage objects. Objects include constraints, indexes, stored procedures, triggers, and views.

Lecture Focus Questions:

- How does a view differ from a table?
- Under what circumstances do you use views?
- What security advantages do views offer?
- How can you identify a system stored procedure?
- What is the advantage of modifying a stored procedure rather than creating a new one?
- What is the difference between extended stored procedures and system stored procedures?
- Why should you avoid using sp_ as the prefix for a local stored procedure?

Time

About 55 minutes

Section 4.6: Database File Management

Preparation

This section discusses the commands and utilities used to manage datafiles and logfiles to optimize performance, by either expanding or shrinking a database. Students will learn how to modify database data and log files in Enterprise Manager. Also discussed are the guidelines for using filegroups to assign objects to specific files. Students will learn how to modify database data and log files in Enterprise Manager, and create filegroups and add files to filegroups.

SQL Server 2000 Objectives:

202. Attach and detach databases.
203. Create and alter databases.
 - Add filegroups.
 - Configure filegroup usage.
 - Expand and shrink a database.
302. Optimize data storage.
 - Optimize files and filegroups.
 - Manage database fragmentation.

Lecture Focus Questions:

- When is it advantageous to allow a database to grow automatically?
- What happens to a data file when you shrink it?
- What is the best way to shrink a file?
- What advantages do filegroups give when planning backups?
- How can filegroups help you to optimize system performance?
- If you put a table on one disk and its index on another, what backup requirements must you meet?

Time

About 75 minutes

Lab/Activity

- Modify Database Properties
- Create a Filegroup

Section 4.7: Database and Table Modifications

Preparation

This section discusses what database properties can be modified and the methods used. It also discusses using table schemas to modify the definition of tables and collations to control how Unicode and non-Unicode data is stored and sorted within a database.

SQL Server 2000 Objectives:

101. Install SQL Server 2000. Considerations include clustering, default collation, file locations, number of instances, and service accounts.
303. Modify the database schema.

Lecture Focus Questions:

- What does a torn page result from?
- When is it advantageous to use the auto close property?
- What conditions prevent you from dropping a column?
- How does changing the collation on the server affect the collations for existing databases?
- What happens to a database that is created without a collation specification?

Time

About 20 minutes

Section 5.1: SQL Security Concepts

Preparation

This section describes how SQL Server controls access to the server and databases. The components and the functions of SQL Server security are outlined with the guidelines to consider when working with SQL security.

Lecture Focus Questions:

- How does a SQL Authentication login differ from a Windows Authentication login?
- What is the difference between permissions assigned to a login and permissions assigned to a database user?
- How do roles simplify permission assignments?
- What is the difference between access and permissions?

Time

About 10 minutes

Section 5.2: Authentication Modes

Preparation

This section discusses the authentication modes that can be configured to validate login credentials. In this section, students will learn how to modify the authentication mode using Enterprise Manager and enable auditing for failed login attempts.

SQL Server 2000 Objectives:

501. Configure mixed security modes or Windows Authentication. Considerations include client connectivity, client operating system, and security infrastructure.

Lecture Focus Questions:

- How does authentication differ from authorization?
- What are the requirements for using Windows Authentication mode?
- How is Windows Authentication different from SQL Server authentication?
- What information does **sysxlogins** hold?
- Which authentication mode should you use if you have users accessing a database from a Windows domain and from the Internet?

Time

About 15 minutes

Lab/Activity

- Change the Authentication Mode

Section 5.3: Logins and Users

Preparation

This section discusses how to control access to SQL Server and SQL data through user logins and database users. These can be managed using Enterprise Manager or stored procedures. Students will learn how to create Windows and SQL Server login accounts and how to grant and revoke database access using Enterprise Manager and TSQL statements.

SQL Server 2000 Objectives:

502. Create and manage logons.
503. Create and manage database users.

Lecture Focus Questions:

- When should you use **sp_grantlogin** to grant login privileges?
- Which stored procedure can you use to prevent a user from accessing a database?
- What is the difference between **sp_denylogin** and **sp_droplogin**?
- When do you use the **guest** account?

Time

About 45 minutes

Lab/Activity

- Create Login Accounts
- Deny Database Access

Section 5.4: Roles

Preparation

This section focuses in on roles. Rather than assigning permissions to a individual users, you can assign permissions to a role and then assign people to the role. SQL Server offers different types of roles. Students will learn how to assign logins to server and database roles, and create database roles and assign members.

SQL Server 2000 Objectives:

504. Create and manage security roles. Roles include application, database, and server.
 - Add and remove users from roles.
 - Create roles to manage database security.

Lecture Focus Questions:

- Which group should you remove from the **sysadmin** role to make your system more secure?
- To which role must users belong to manage linked servers?
- If you want to delegate object management to a user, which role do you give the user?
- What database roles could you assign to a person who backs up the database but should not be able to see the data?
- How does the **public** role affect permissions assignments?
- What kind of application role login would you use if you wanted to track user actions?

Time

About 50 minutes

Lab/Activity

- Assign Server Roles
- Assign Database Roles

Section 5.5: Permissions

Preparation

This section discusses how permissions are used to define user privileges on a server, a database, or data objects within a database. Students will learn how to grant permissions on databases, views, and stored procedures.

SQL Server 2000 Objectives:

101. Install SQL Server 2000. Considerations include clustering, default collation, file locations, number of instances, and service accounts.
505. Enforce and manage security by using stored procedures, triggers, views, and user-defined functions.
506. Set permissions in a database. Considerations include object permissions, object ownership, and statement permissions.

Lecture Focus Questions:

- If you want to delegate the job of adding tables to databases, what permissions do you give?
- Which permission allows a user to run a stored procedure?
- How does a user get implied permissions?
- What happens if a permission is revoked?
- What is the difference between revoked permissions and denied permissions?
- Why do you set permissions on stored procedures and views rather than tables?
- When you want to know exactly what actions a user can take, which combination of permissions must you examine?

Time

About 45 minutes

Lab/Activity

- Set Database Permissions
- Set Permissions on a View
- Set Permissions on a Stored Procedure
- Deny Server Access
- Configure Database Access

Section 6.1: Linked Servers

Preparation

This section explains how linked servers allow you to issue distributed queries, updates, commands and transactions on remote servers. A linked server definition identifies the OLE DB data provider types and points the linked server definition to a remote server. In this section, students will learn how to create linked server definitions and security mappings.

SQL Server 2000 Objectives:

- 103. Create a linked server.
- 404. Manage linked servers.
 - Manage OLE DB Providers.
 - Configure security mapping.

Lecture Focus Questions:

- Why do you create linked servers?
- What conditions must a target server meet to support the **Impersonate** setting?
- What determines your permissions after you've connected to a remote server?
- What are the special considerations for creating a linked server to a SQL cluster?

Time

About 60 minutes

Lab/Activity

- Create a Linked Server 1
- Create a Linked Server 2
- Create a Linked Server 3
- Create a Linked Server 4

Section 6.2: IIS Integration

Preparation

This section explains how to configure Internet access to SQL Server and provide XML support through IIS. Students will learn how to create a virtual directory in IIS for SQL integration, configure IIS security for SQL integration, and configure virtual names in IIS to support HTTP, template, and Xpath queries.

SQL Server 2000 Objectives:

401. Set up IIS virtual directories to support XML.

Lecture Focus Questions:

- What is the purpose of a virtual directory?
- Which authentication method would you use if you wanted to allow users to authenticate through Windows user accounts?
- How do template queries differ from URL queries?
- Which query type must you enable to allow users to submit data to a database?
- How does a virtual name simplify a URL?

Time

About 20 minutes

Section 6.3: Data Import and Export

Preparation

This section discusses the tools used to transfer data from a source to a destination. SQL Server Data Transformation Services (DTS) is the most common tool used. Four different DTS tools can be used to organize transfer components into DTS packages. Another tool, BCP Utility, is a command-line utility also used to transfer data.

SQL Server 2000 Objectives:

402. Import and export data. Methods include the Bulk Insert task, the bulk copy program, Data Transformation Services (DTS), and heterogeneous queries.
403. Develop and manage DTS packages.
405. Convert data types.

Lecture Focus Questions:

- What is the difference between a *step* and a *task*?
- What is the purpose of *transformations*?
- What does the workflow tell you about a package?
- On a password protected package, who can edit the package?
- When would you choose to use BCP over DTS?

Time

About 45 minutes

Section 6.4: Replication

Preparation

This section explains the methods used to copy or duplicate data between multiple servers. Replication is the relationship between servers with three roles available: publisher, subscriber, and distributor. SQL Server uses three types of replications: snapshot, transactional and merge. Students will learn how to configure a server as a publisher and local distributor, create a publication and configure a push subscription and merger replication, and add and remove subscribers.

SQL Server 2000 Objectives:

406. Configure, maintain, and troubleshoot replication services.

Lecture Focus Questions:

- What is the relationship between articles and subscribers?
- What is the difference between a local distributor and a remote distributor?
- If you have data on multiple servers that you want to replicate across all the servers, what type of replication should you configure?
- What does the snapshot agent do?
- When should you configure a pull subscription instead of a push subscription?
- Why would you configure an anonymous subscription?

Time

About 70 minutes

Lab/Activity

- Configure a Publisher
- Create a Push Subscription
- Configure Merge Replication
- Remove a Subscriber

Section 6.5: Data Access Methods

Preparation

This section discusses the tools used to access data in SQL Server. Also discussed is how to move a database, either to another location on the same server or even to a different server.

SQL Server 2000 Objectives:

- 202. Attach and detach databases.
- 402. Import and export data. Methods include the Bulk Insert task, the bulk copy program, Data Transformation Services (DTS), and heterogeneous queries.

Lecture Focus Questions:

- What privileges must you have to move a database?
- What are the conditions that must exist before attaching a database that does not have a log file?
- When moving the **master** database, what does the **-d** parameter identify?
- Which database must you attach before moving the **msdb** database?

Time

About 15 minutes

Section 7.1: Planning

Preparation

This section discusses planning of backup and recovery to ensure adequate recovery from data loss. Students will learn how to select the recovery model for each database, identify the backup types to perform, and create a backup strategy that identifies the combination and frequency of backup types used.

SQL Server 2000 Objectives:

304. Perform disaster recovery operations.
 - Perform backups.
 - Recover the system state and restore data.

Lecture Focus Questions:

- Which recovery model works best for a test environment?
- Which recovery model allows point-in-time recovery?
- How does the transaction log affect backup strategies?
- When would you back up files or filegroups as part of your backup strategy?
- How do differential backups affect the restore process?
- When should you back up the **msdb** database?

Time

About 25 minutes

Section 7.2: Backup

Preparation

This section discusses the backup utilities available to backup SQL data. SQL Server backup only backs up the databases and can be used while the SQL Server is running, allowing access and modification of data during the backup. The Windows backup utility, NTBackup, can also be used to backup SQL data if the instance of SQL Server is not running. Students will learn how to configure backup devices, perform backup to files and devices, implement backup strategies by creating backup jobs, and change database recovery models.

SQL Server 2000 Objectives:

304. Perform disaster recovery operations.
 - Perform backups.
 - Recover the system state and restore data.

Lecture Focus Questions:

- What happens if a user runs a query during a backup operation?
- What happens if you truncate a transaction log file during a backup operation?
- What happens if you run out of tape during a backup operation?
- Which roles have default permissions to perform backups?
- What are the advantages of performing frequent transaction log file backups?
- When you create a new database, what controls the default setting for the recovery model?
- If you switch from the simple to the full recovery model, when should you back up the database?
- What is the backup utility for backing up system state data?

Time

About 75 minutes

Lab/Activity

- Create Backup Devices
- Perform an Immediate Backup
- Implement a Backup Strategy 1
- Implement a Backup Strategy 2
- Implement a Filegroup Backup
- Change the Recovery Model 1
- Change the Recovery Model 2

Section 7.3: Recovery

Preparation

This section focuses on database recovery, which is done after the database or log file is restored. During recovery, all incomplete transactions are rolled back, placing the database in a consistent state. In this section, students will learn how to perform database recovery operations, and restore a database to a specific point-in-time.

SQL Server 2000 Objectives:

304. Perform disaster recovery operations.
 - Perform backups.
 - Recover the system state and restore data.

Lecture Focus Questions:

- What is the difference between restoring a database and recovering a database?
- What types of backups do you need in order to recover from a full system failure?
- Why should you wait until after the last restore operation to recover a database?
- What safety checks does SQL Server perform as part of the restore process?
- What permissions do you need to restore a database?
- Why should you perform a transaction log backup before you begin the restore process?
- In addition to point-in-time recovery, what other type of specific recovery can you perform using the transaction log?

Time

About 60 minutes

Lab/Activity

- Perform a Simple Recovery
- Perform a Full Recovery
- Restore to a Point-in-Time

Section 7.4: Standby Servers

Preparation

In this section students will learn about standby servers. A standby server is a server that holds a copy of the database on another server. The advantages of a standby server are discussed as well as the process of creating a standby server. The *log shipping* feature in SQL Server can be used to automate the process of setting up and maintaining a standby server.

SQL Server 2000 Objectives:

304. Perform disaster recovery operations.
- Perform backups.
 - Recover the system state and restore data.

Lecture Focus Questions:

- What are the advantages of maintaining a standby server?
- How does log shipping facilitate standby server implementation?
- What roles can destination servers fulfill when you use log shipping?
- What permissions does a user need to implement log shipping?
- Why do you need a monitor server?
- Where do log backups occur when using log shipping?

Time

About 10 minutes

Section 7.5: Clustering

Preparation

This section discusses how Windows Clustering is used to increase the availability and fault tolerance of network servers. Servers are grouped together into a cluster and share storage resources. If a server fails the services can migrate to other available servers in the cluster. Students will learn the objects that control the clustering configuration and operations, and the basic process to install and configure a SQL Server cluster.

SQL Server 2000 Objectives:

101. Install SQL Server 2000. Considerations include clustering, default collation, file locations, number of instances, and service accounts.
304. Perform disaster recovery operations.
 - o Configure, maintain, and troubleshoot log shipping.

Lecture Focus Questions:

- Why is clustering the fastest method for server failure recovery?
- What happens when a node fails in a single-instance cluster?
- In a clustered environment, what protocol must you run to resolve NetBIOS names for virtual resources?
- Why should you leave the **BUILTIN\Administrator** account on a clustered system?
- What is the role of virtual servers in clustering configurations?

Time

About 20 minutes

Section 8.1: System Monitoring

Preparation

In this section students will learn how to optimize the system through system monitoring. Recommendations are presented to help the student design the system and monitor server activity in order to improve performance and troubleshoot problems should they arise. To help with troubleshooting, key server statistics that can help identify the source of a problem are discussed. Three methods to monitor SQL server for security auditing are also presented.

SQL Server 2000 Objectives:

- 507. Manage security auditing. Methods include SQL Profiler and C2 auditing.
- 603. Optimize hardware resource usage. Resources include CPU, disk I/O, and memory.
 - Monitor hardware resource usage by using System Monitor.
 - Resolve system bottlenecks by using System Monitor.
- 604. Optimize and troubleshoot SQL Server system activity. Activities include cache hits, connections, locks, memory allocation, recompilation, and transactional throughput.
 - Monitor SQL Server system activity by using traces.
 - Monitor SQL Server system activity by using System Monitor.

Lecture Focus Questions:

- What does the **Display Estimated Execution Plan** option do?
- Which tool would you use to save a trace to a log file?
- When you examine the page faults per second for a process, what does a high value indicate?
- What action can you take if your percentage of privileged time for a processor is high?
- What is SQL Server's optimal value range for the **Buffer Cache Hit Ratio**?
- Which tool would you use to examine changes to logins?
- Which server role must you have to enable auditing?
- What can you do to find users who are starting and stopping services?

Time

About 45 minutes

Section 8.2: Database Optimization

Preparation

This section explains that the design of the database is the most efficient method of optimizing database performance. Both physical (hardware and software features) and logical design (business requirements) should be taken into consider when designing the database. Specific methods that can be implemented to optimize both the database and queries are discussed. In this section students will also learn how to use TSQL to analyze and correct database fragmentation.

SQL Server 2000 Objectives:

201. Configure database options for performance. Considerations include capacity, network connectivity, physical drive configurations, and storage locations.
301. Optimize database performance. Considerations include indexing, locking, and recompiling.
302. Optimize data storage.
 - o Optimize files and filegroups.
 - o Manage database fragmentation.
305. Perform integrity checks. Methods include configuring the Database Maintenance Plan Wizard and using the Database Consistency Checker (DBCC).

Lecture Focus Questions:

- What is the recommended RAID configuration for databases and transaction logs?
- Which tool allows you to optimize your indexes?
- How does table partitioning optimize database performance?
- Which type of partitioning splits data by columns?
- What does DBCC TABLEALLOC check for?

Time

About 30 minutes

Section 8.3: Mail Support

Preparation

This section discusses how to configure email support for SQL Server. Two methods are available for SQL Server 2000: SQL Mail and SQLAgentMail. Students will learn how to configure SQL Mail and SQLAgentMail support in Enterprise Manager.

SQL Server 2000 Objectives:

104. Configure SQL Mail and SQLAgentMail.
601. Create, manage, and troubleshoot SQL Server Agent jobs.
602. Configure alerts and operators by using SQL Server Agent.

Lecture Focus Questions:

- Which extended stored procedure reads e-mail?
- What does **xp_startmail** do?
- What is the difference between SQL Mail and SQLAgentMail?
- Which e-mail method do you configure if you want to send a notification of a system event?
- What is the relationship between the mail profile and the e-mail method for the service?

Time

About 25 minutes

Lab/Activity

- Configure Mail Support

Section 8.4: Jobs and Alerts

Preparation

This section discusses how to automate administrative tasks through the use of jobs and alerts. This allows you to schedule jobs to occur on a recurring basis or configure tasks to execute in response to an action or condition that triggers an alert. SQL Server automation uses the SQL Server Agent service. Students will learn how to create operators, alerts, and jobs in Enterprise Manager.

SQL Server 2000 Objectives:

601. Create, manage, and troubleshoot SQL Server Agent jobs.
602. Configure alerts and operators by using SQL Server Agent.

Lecture Focus Questions:

- What is the relationship between steps and jobs?
- What is the purpose of an operator?
- Which service must be running to execute a job?
- How can you get a job to run only during low-load periods?
- Where do alerts that run as part of a job get logged?
- Which database holds job, alert, and operator configurations?

Time

About 85 minutes

Lab/Activity

- Create an Operator
- Create and Start Jobs
- Create an Alert

Section 8.5: Transactions and Locking

Preparation

In this section students will learn about transactions and locking. *Transactions* are written by programmers and are a collection of Transact-SQL statements that are treated as a single unit of work. A SQL server administrator needs to be aware of the effects that using transactions have on system performance. When a transaction runs SQL places locks on database objects to control access. *Locking* is the mechanism that SQL server uses to control access to data and to prevent simultaneous access or modification by multiple processes. Students will learn how to troubleshoot locking using TSQL and Enterprise Manager.

SQL Server 2000 Objectives:

306. Troubleshoot transactions and locking by using SQL Profiler, SQL Server Enterprise Manager, or Transact-SQL.

Lecture Focus Questions:

- Which statement ends a transaction and returns the system to its state prior to the transaction?
- What prevents users from reading data that is being modified?
- What determines the type of lock applied to an object?
- When can an application use a shared lock?
- What is the difference between an intent shared (IS) and shared with intent exclusive (SIX) lock?
- What does SQL Server do when it finds a deadlocked condition?
- What are solutions to excessive blocking?

Time

About 35 minutes