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Introduction to Backup and Restore Strategies in SQL Server

The purpose of creating SQL Server backups is to enable you to recover a damaged database. However, backing up and restoring data must be customized to a particular environment and must work with the available resources. Therefore, a reliable use of backup and restore for recovery requires a backup and restore strategy. A well-designed backup and restore strategy maximizes data availability and minimizes data loss, while considering your particular business requirements.

Important

Place the database and backups on separate devices. Otherwise, if the device containing the database fails, your backups will be unavailable. Placing the data and backups on separate devices also enhances the I/O performance for both writing backups and the production use of the database.

A backup and restore strategy contains a backup portion and a restore portion. The backup part of the strategy defines the type and frequency of backups, the nature and speed of the hardware that is required for them, how backups are to be tested, and where and how backup media is to be stored (including security considerations). The restore part of the strategy defines who is responsible for performing restores and how restores should be performed to meet your goals for availability of the database and for minimizing data loss. We recommend that you document your backup and restore procedures and keep a copy of the documentation in your run book.

Designing an effective backup and restore strategy requires careful planning, implementation, and testing. Testing is required. You do not have a backup strategy until you have successfully restored backups in all the combinations that are included in your restore strategy. You must consider a variety of factors. These include the following:

- The production goals of your organization for the databases, especially the requirements for availability and protection of data from loss.
- The nature of each of your databases: its size, its usage patterns, the nature of its content, the requirements for its data, and so on.
- Constraints on resources, such as: hardware, personnel, space for storing backup media, the physical security of the stored media, and so on.

Note

The SQL Server on-disk storage format is the same in the 64-bit and 32-bit environments. Therefore, backup and restore work across 32-bit and 64-bit environments. A backup created on a server instance running in one environment

can be restored on a server instance that runs in the other environment.

Impact of the Recovery Model on Backup and Restore

Backup and restore operations occur within the context of a recovery model. A recovery model is a database property that controls how the transaction log is managed. Also, the recovery model of a database determines what types of backups and what restore scenarios are supported for the database. Typically a database uses either the simple recovery model or the full recovery model. The full recovery model can be supplemented by switching to the bulk-logged recovery model before bulk operations. For an introduction to these recovery models and how they affect transaction log management, see Recovery Models and Transaction Log Management.

The best choice of recovery model for the database depends on your business requirements. To avoid transaction log management and simplify backup and restore, use the simple recovery model. To minimize work-loss exposure, at the cost of administrative overhead, use the full recovery model. For information about the effect of recovery models on backup and restore, see the following topics:

- Backup Under the Simple Recovery Model
- Backup Under the Full Recovery Model
- Backup Under the Bulk-Logged Recovery Model

Designing the Backup Strategy

After you have selected a recovery model that meets your business requirements for a specific database, you have to plan and implement a corresponding backup strategy. The optimal backup strategy depends on a variety of factors, of which the following are especially significant:

- How many hours a day do applications have to access the database?

  If there is a predictable off-peak period, we recommend that you schedule full database backups for that period.

- How frequently are changes and updates likely to occur?

  If changes are frequent, consider the following:

  - Under the simple recovery model, consider scheduling differential backups between full database backups. A differential backup captures only the changes since the last full database backup.
  - Under the full recovery model, you should schedule frequent log backups. Scheduling differential backups between full backups can reduce restore time by reducing the number of log backups you have to restore after restoring the data.

- Are changes likely to occur in only a small part of the database or in a large part of the database?

  For a large database in which changes are concentrated in a part of the files or filegroups, partial backups and or file backups can be useful. For more information, see Partial Backups and Full File Backups.

- How much disk space will a full database backup require?

  For more information, see "Estimating the Size of a Full Database Backup," later in this topic.

Estimating the Size of a Full Database Backup

Before you implement a backup and restore strategy, you should estimate how much disk space a full database backup will use

Before you implement a backup and restore strategy, you should estimate how much disk space a full database backup will use. The backup operation copies the data in the database to the backup file. The backup contains only the actual data in the database and not any unused space. Therefore, the backup is usually smaller than the database itself. You can estimate the size of a full database backup by using the **sp_spaceused** system stored procedure. For more information, see sp_spaceused (Transact-SQL).

Scheduling Backups

After you decide what types of backups you require and how frequently you have to perform each type, we recommend that you schedule regular backups as part of a database maintenance plan for the database. For information about maintenance plans and how to create them for database backups and log backups, see Maintaining Databases (Database Engine) and Maintenance Plan Wizard.

To create a maintenance plan

- How to: Create a Maintenance Plan

To create and schedule jobs

- How to: Create a Job (SQL Server Management Studio)
- How to: Schedule a Job (SQL Server Management Studio)

Testing Your Backups

You do not have a restore strategy until you have tested your backups. It is very important to thoroughly test your backup strategy for each of your databases by restoring a copy of the database onto a test system. You must test restoring every type of backup that you intend to use.

We recommend that you maintain an operations manual for each database. This operations manual should document the location of the backups, backup device names (if any), and the amount of time that is required to restore the test backups.

See Also

Concepts
Backing Up and Restoring Federated Database Servers
Choosing the Recovery Model for a Database
Backup Overview (SQL Server)
Restore and Recovery Overview (SQL Server)
Recovery Model Overview
Recovery Model Overview
Other Resources
Disaster Recovery Planning (Database Engine)

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