Explore how SQL Server's system databases work

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A fundamental skill for DBAs is to have a firm understanding of the SQL Server database engine's system databases. It's also useful for database developers to be up on system databases packaged with SQL Server. Here's a rundown of the system databases. (**Note:** If you decide to explore these system databases, make sure you do so on a development server.)

Master

The Master database holds information for all databases located on the SQL Server instance and is the glue that holds the engine together. Because SQL Server cannot start without a functioning master database, you must administer this database with care. For this reason, it is vital to make regular backups of this database.

This database includes information such as system logins, configuration settings, linked servers, and general information regarding the other system and user databases for the instance. The master database also holds extended stored procedures, which access external processes, allowing you to interact with features such as the disk subsystem and system API calls. These procedures are typically written in a modern programming language such as C++.

If you run into a situation where you encounter system failure and must recover your master database, review this TechRepublic article by Steven Warren MCSE, MCDBA. It is very thorough, and explains some of the special steps needed to restore this crucial database.

Model

Model is essentially a template database used in the creation of any new user database created in the instance. You can place any stored procedures, views, users, etc. in the model database so that when a new database is created, the database will contain the objects you have placed in the model database.

Tempdb

As its name implies, tempdb holds temporary objects such as global and local temporary tables and stored procedures.

This database is recreated every time SQL Server starts, and the objects contained in it will be based upon the objects defined in the model database. In addition to these objects, tempdb also houses other objects such as table variables, results sets from table-valued functions, and temporary table indexes. Because tempdb will hold these types of objects for all of the databases on the SQL Server instance, it is important that the database is configured for optimal performance.

In SQL Server 2005, the tempdb database has taken on an additional workload; it is used as the version store for features such as the new snapshot isolation levels and online indexing operations. For a brief overview about the new isolation levels, refer to my article about SQL Server 2005's advanced features.

Distribution

When your SQL Server instance is configured as a distributor for replication, this database is added to your system. By default, the name of the database is distribution, but you can rename it. This database holds history and metadata for snapshot, merge, and transactional replication.

Msdb

The msdb database stores information regarding database backups, SQL Agent information, DTS packages, SQL Server jobs, and some replication information such as for log shipping.

Conclusion

Over the years, I have found that the best way to learn the underpinnings of SQL Server is to explore how things work in the system databases. As a general rule, it is not recommended to directly query the system tables in SQL Server; however, you can learn a lot about how SQL Server works by exploring the tables in these system databases.