SQL Server Module Version 2.6

Installation and User's Guide

STOREWAY DPA

BULL

STOREWAY DPA

SQL Server module
Version 2.6

Installation and User's Guide

Software

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Table of Contents

Chapter 1. The SQL Server

This chapter describes the Microsoft SQL Server (hereafter called SQL Server) architecture, and the different backup mechanisms specific to the SQL Server.

See:

Component overview

SQL Server

The SQL Server is a client/server relational databases (SGDB-R) management system which uses T-SQL (Transact - Structured Query Language) to transmit requests between a client and SQL server.

Instances

An instance is an SQL server comprising a set of executables with its own processes. It is therefore possible to install several instances of an SQL Server on the same machine.

By default, an instance takes the name of the machine where it is installed, but it can have a different name. The user attributes an instance name to the SQL server during installation. The server name becomes **<machine_name>\<instance_name>**.

SQL Server storage structures

See:

Database

SQL server data is stored in databases.

A database has a coherent logical structure comprised of tables. Data is ordered logically in tables based on their type. Tables are linked relationally.

SQL Server databases physically write data in files called SQL *data files*.

The SQL Server database structure can be compared to a filing cabinet.

The figure below represents the different levels of the *SQL server*.

Filing Cabinet	Draw	Folder	Sheet	Text
=	=	=	=	=
SQL Server	Database	Data file	Table	Data
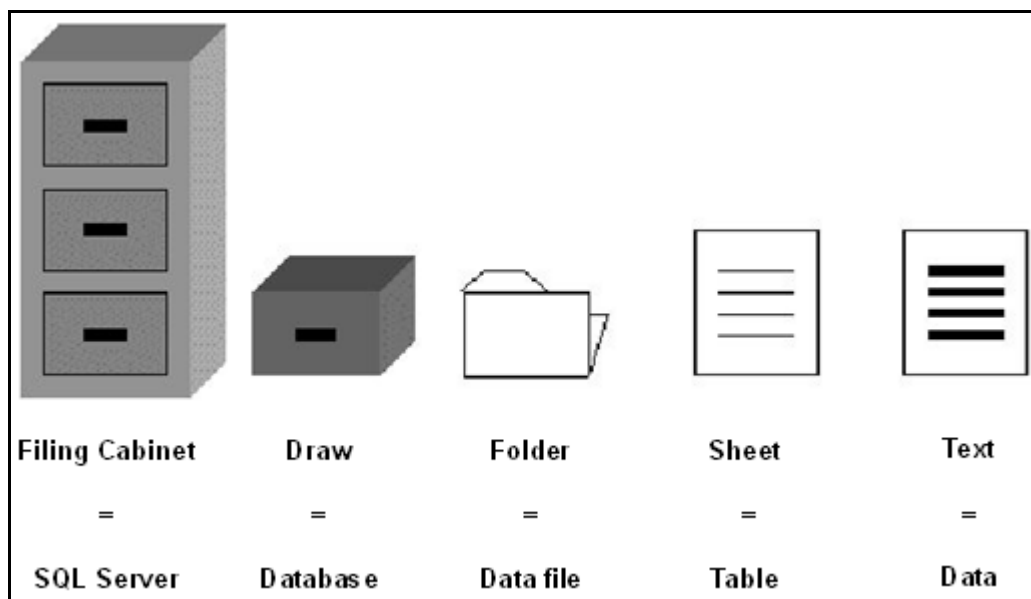
We can distinguish *system databases* and *user databases*.

System databases

System databases are databases used to run the SQL server.

The following table lists the system databases.

Database	Contents
master.mdf	Description of all **SQL server** databases and users.
Tempdb	Temporary storage tables used by the *SQL server*
Model	The template used to create all user *SQL server* databases.
Msdb	Saves all *SQL server* administration operations.

User databases

User databases are available storage spaces for applications connected to the SQL server.

Data files

Data files constitute the physical support physique for all SQL server data. They are divided into several entities, the smallest of which is the page. Each SQL server data page is 8 KB.

In the SQL Server, each database has its own specific data files which are not shared with the other databases. There are two types of data files:

> **Primary data files** constitute the entry point for each database. They contain the description of the database. Each database has a unique primary file. Microsoft recommends you use the file extension ".mdf" for these files.

> **Secondary data files** are all data files which are not primary data files. They extend a database's storage capacity. A database does not necessarily have secondary units. Microsoft recommends you use the file extension ".ndf" for these files.

File groups

Data files are assembled into **groups**. This allows us to create a link between the *tables* and their physical support. A table is created in a **group** which contains one or more data files.

A **primary group** is the group which contains the primary data unit. Secondary data files can be spread over user-defined groups. A database does not necessarily have user-defined groups.

Transaction logs

Transaction log files are files which store all database update operations. A database has at least one transaction log. Transactions logs do not belong to any one specific group of files.

Microsoft recommends you use the file extension ".ldf" for these files.

Transaction logs must be purged on a regular basis. To purge them you can:

> Back them up regularly,

> Truncate them regularly,

> Truncate them systematically after each data file update. A data file update is called a **"checkpoint"**.

Full-text index

A full-text index enables you to perform sophisticated text searches in data character strings. The full-text index stores information on significant character strings and on their location in a specific column. This information is used to rapidly complete searches on full-text containing words or combinations of words.

Full-text indexes are found in full-text catalogs. Neither these indexes nor catalogs are stored in the database they reference. They are handled separately from the Microsoft Search service.

SQL Server administration

See:

SQL server services

On Microsoft Windows, services are processes which are awaiting events in order to be able to respond. This is the equivalent of a daemon on Unix platforms.

The SQL Server uses four services, two instance-specific services and two generic services:

Service name	Description
SQLServer$<instance name>	SQL server engine handles access to data.
SQLServerAgent$<instance name>	Plans administrative tasks.
MSDTC	Coordinates distributed transactions
Microsoft Search	Full text search.

Starting the SQL server also starts these four services in the same way as using the MS-DOS **netstart** command or the Microsoft Windows Service Manager.

Registry database parameters

On Microsoft Windows, the registry database is a storage space in which system applications keep their own parameters. The installation of the SQL server notably writes SQL Server service start up parameters.

SQL server interfaces

The two most frequently used SQL server interfaces are the Enterprise Manager and the Query Analyzer. The Enterprise Manager is the SQL server administration interface. The Query Analyzer interprets T-SQL requests. Both interfaces are accessible from the Windows task bar (**Start/All Programs/SQL Server**).

Connections & roles

A login is the definition of a user and comprises a user name and password.

A user can have a role which corresponds to one or several administrative tasks. The role defines the rights required to perform specific administrative tasks. The role with the highest privileges is system administrator. It authorizes all database operations.

A user can also be defined via a Windows identity. The user has access to an SQL Server thanks to Windows authentication.

Stored procedures

Stored Procedures are pre-complied T-SQL programmes. Microsoft provides a set of ready-to-use stored procedures in the Query Analyzer to assist with SQL Server administration. The stored procedure sp_helptext **<stored procedure name>** allows you to visualize the source code of a stored procedure.

Trace files

To analyze internal problems, the SQL Server creates text trace files called error log. Trace files are located in the sub-directory log of the SQL server installation directory.

Windows Events observer

To complement trace files, the SQL server records messages in the Windows *Event Viewer* accessible via the menu **Start/All Programs/Administration tools** in the task bar.

Chapter 2. Installation Prerequisites

This chapter details the installation prerequisites for the StoreWay DPA for SQL Server Module and describes the steps to follow to configure the SQL type application.

See:

Operating system and versions

For all information concerning operating systems and supported versions, see the StoreWay DPA compatibility guide.

Disk space

The necessary disk space for the installation of the StoreWay DPA agent is approximately 100 MB of temporary disk space, which will only be used during the installation process. When the installation is over, the product itself occupies less than 10 MB of disk space.

Architecture

Each SQL server backed up by the StoreWay DPA must have StoreWay DPA for SQL Server Module installed. The SQL server and the StoreWay DPA client communicate via T-SQL requests. Data is transferred by named pipe between the SQL server and the StoreWay DPA client.

Installation of the StoreWay DPA for SQL Server Module client

> The StoreWay DPA for SQL Server Module client requires no other specific installation than the StoreWay DPA for Windows agent.

> You need to have the administrator log on details to access the SQL Server instance to back up.

Configuration

The configuration consists of defining an SQL Server-type application in the StoreWay DPA web interface.

NOTE: The system hosting the application must have been declared on the StoreWay DPA. To do this, log on to the StoreWay DPA as an administrator and go to **settings/Systems**.

Chapter 3. Installation

This chapter explains how to install the StoreWay DPA for SQL Server Module and describes the steps to follow to configure the SQL Server-type application.

1 Installation initialization process.

- Insert the CD-ROM **StoreWay DPA Initial Setup (Windows) – Agents (Windows, Linux, Netware) Graphical User Interface Setup – ASM & Disaster Recovery Agents** into the Windows server you want to protect. The following web page is displayed.

2 Select the language.

3 Select the suitable options for each of the following steps:

- Select the installation directory.
- Select the StoreWay DPA.
- Choose the application to hot back up: MS SQL Server.

4 Start the **Password Manager**.

- In order to log onto to the SQL server, the StoreWay DPA uses a login and therefore needs to know the associated password. You enter this login and password on the SQL Server using the Password Manager program which is located in the list of your programs in the StoreWay DPA directory.

- The programme asks you to enter the instance name. Set the login and the password: in the case of an SQL identification, the login will often be the user "sa" for a Windows identification, you can enter **trusted** in both login and password fields. Entering the password is invisible on screen but you are requested to confirm the password. You can test the information entered by using the **Test** button. A message appears if the log on was successful.

  WARNING: If the SQL Server is installed with named instances, each instance has an independent user administration. You must enter the required instance name and create as many new instances as there are installed instances. For default instances, the name remains SQL.

  WARNING: This situation does not exist for MS-SQL Server 7 (no instances).

5 Starting the StoreWay DPA backup service

- In the Service Manager, the StoreWay DPA backup service starts automatically and is associated by default in the **Log On** tab with the local system account (local account).

- In certain cases, and depending on the SQL Server configuration, it is possible that, by default, this account has insufficient privileges to allow it to communicate with the SQL instance. You need to associate this service with the account administrator or an administrator who has sufficient privileges.

- In the **Log On** tab, check that the **This Account** option is selected and that **Administrator** is indicated in the field value.

  WARNING: If the administrator or administrator password changes, you must modify the password of the associated account when the service starts up. If you do not, you run the risk of the backup being ineffective.

Creating an SQL server application

The StoreWay DPA application creation is performed in the **systems** and **applications** configuration page, via the menu **settings/Systems**. This menu is only accessible to users with StoreWay DPA administrator rights. If you are not authorized to access this account, ask your administrator to declare the application.

1 In the **settings** menu, click **Systems**.

2 Click the **Create a new application** icon .

3 Select "MS SQL Server 7" or "MS SQL Server 2000/2005" (depending on your configuration) in the **Application: Mode Creation** list.

4 Click **create**.

> **Description**:
>
> • Enter the application name.
>
> • Choose the system which hosts this application from the drop-down list.
>
> • Enter a comment (optional).
>
> **Backup**:
>
> • **Data to back up:** Specify the data to back up on this application. Enter, **",/,"** for example in the **Data path** field to back up all data.
>
> **Activated profiles on this application:**
>
> • Select the application profile you want the application to be associated with.

> When you have entered all the parameters, click the **create** button. The application appears in **Edit** mode.

NOTE: You can also configure data to back up after creating the application (in both cases, leave the **Data to back up** field empty for now).

5 Validate this configuration.

- To validate the access to an SQL Server instance (parameters and connection to the application), Click the **Browse** button in **Edit** mode to visualize the instance's file tree structure:

- To choose the data, select the relevant checkbox and click the **add to cart** button then the **commit** button.

Chapter 4. Backup

See:

Backup overview and conditions

This chapter explains the different types of backups and backup profiles you can use with the StoreWay DPA.

The StoreWay DPA allows you to back up the entire SQL application, specific instances or databases. Because it is a hot backup, the Windows SQL Server service must be started and certain operations are not allowed during a backup operation:

> Creation and removal of files or ALTER DATABASE.

> Compacting.

> Index creation (Note: this remains possible during the backup of transaction logs).

If a backup and one of these operations were to take place at the same time, the operation which started first continues and the other fails.

The different types of authorized backups for the StoreWay DPA are the total backup or the differential backup (called incremental backup in the StoreWay DPA).

NOTE: Transaction logs are truncated before each total backup.

See:

Total backup

During a total backup, the StoreWay DPA regroups database objects in a unique file name. In the restoration interface, this is called Database.

Incremental backup

The MS SQL application incremental backup regroups the transactions logs since the last total backup in a file called **Logs**. The database **master.mdf** is always backed up whatever the backup type (total or incremental), This file is not backed up in its totality because it contains all the databases and SQL Server users. The **tempdb** database is not backed up at all.

Adding a new database

When a new database is added, a total backup must be started for the reasons given above. The total backup enables the creation of a Database file. This procedure is mandatory because if no total backup is performed, the database cannot be restored.

Chapter 5. Restoration

The StoreWay DPA for SQL Server Module allows simple and rapid restoration of all data contained in each SQL database.

In this chapter, we examine the different possible restoration and recovery (or retrieval) scenarios. These scenarios are presented in the form of necessary corrective action faced with the losses suffered from the most serious situations to less severe examples.

By training administrators to deal with these scenarios, you are sure they perfectly understand the product and that their actions will work satisfactorily in emergency situations when the emphasis is on reducing downtime or lost transactions. There are several restoration scenarios.

See:

Selecting objects for the restoration

To select an object from the file tree structure in the restoration interface, select the checkbox to the left of this object.

Databaseb file

To restore a database, you must work from a total backup. As such, you must restore at least the Database file.

Logsb objects

To recover the database from a specific moment in the past, you will probably have to select incremental objects contained in the "Logs" object.

Restoring the master.mdf database

If your SQL server refuses to start and if SQL server trace files do not contain the message **Recovery finished**, this means that the database "master.mdf" is corrupted. You need to restore it.

WARNING: The SQL server installation CD-ROM is required to perform this operation. This CD erases msdb database data which you will then need to restore as a user database. The StoreWay DPA uses the msdb database for backups.

The "master.mdf" database is at the heart of the SQL server. Restoring it correctly is crucial and requires these three steps to be respected:

1   First delete all data contained in the directory where SQL databases are stored.

2   Reconstruct the "master.mdf" database with the aid of the Microsoft rebuildm.exe utility.

3   Reload the "master.mdf" database data as follows:

4   Start the restoration interface. Open the SQL application SQL to restore.

5   Place the date in the past (time navigation).

6   Navigate through your instance to the "master.mdf" database.

7   Select the database to restore. By default, the StoreWay DPA proposes the latest backed up version. To restore a previous version, click **Databaseb** and all back up instances are displayed.

8   Click **restore** until the restoration options screen.

9   Stop the SQL server via the MS SQL Server Manager.

10 In an MS-DOS window, start the server in mono-user mode using this command (if c:\ is the relevant partition):

```
C:\ SQLservr.exe -m -c
```

11 Start the restoration in the StoreWay DPA interface.

   • Once the "master.mdf" database is restored, the SQL server stops the mono user session mode. You cannot restore other databases during the same restoration session.

   • Start the SQL server by starting the SQL Server service.

   • During the reconstruction of the "master.mdf" data file, the **msdb** and **model** databases are reinitialized. You need to restore them in the same way as for user databases.

   • All databases in "master.mdf" reappear. All those whose data is not in the directory are labelled "Suspect" in the Enterprise Manager interface.

   NOTE: Database restoration is described in the following chapter.
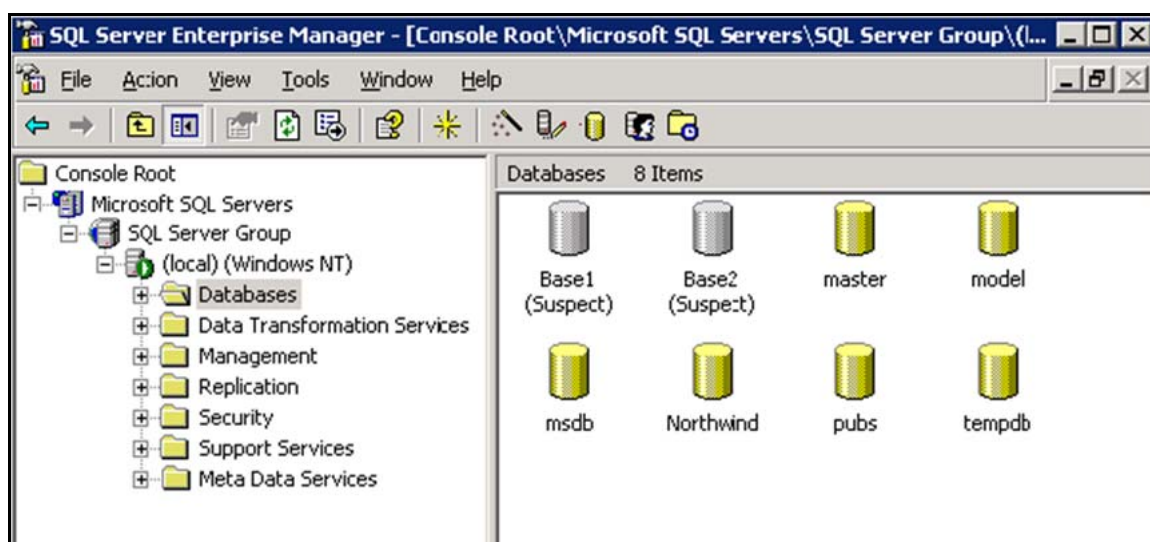
NOTE: If you have a copy of the master.mdf data file which was backed up when the SQL server was stopped, you can replace the corrupted version from its copy without performing the first step.

Restoring a user database

Overview

To restore a user database, the SQL Server service must be restarted. There are two possible cases:

> It may be necessary to only restore a single total backup: "Database".

> Or you can restore transaction logs or incremental backups: "Logs".

Repairing a user database requires two steps: restoration and recovery.

> **Restoration** is the process by which you search for all backed up objects and restore them to disk. The StoreWay DPA optimizes the restoration order depending on the availability of backup media. Objects are only restored based on their historic order. During the restoration, the StoreWay DPA for SQL Server Module stocks incremental objects (normally those prior to the full backup) and reloads the full backup directly into the database.

> **Recovery** is the process by which replayed information is applied to data files to obtain a consistent database. The **StoreWay DPA for SQL Server** applies incremental objects on the database and reconstructs full text database catalogs.

WARNING: It is not possible to restore several databases simultaneously. You must restore them one by one.

The StoreWay DPA interface

The StoreWay DPA restoration interface has two options:

> **Restoration destination**: this option moves a database to a new instance or renames the database. The renaming is only possible if no other database uses the same file storage names as the originals. In the event of a restoration in the same instance, the original database must have disappeared.

The syntax is as follows: **/<instance_name>/<database_name>**. If the MS SQL instance is the default one, you must write (Default Inst.). If the user wishes to rename the database or move it to another instance, you do not need to create an empty database which has the destination name in the MS SQL Enterprise Manager.

> **Specific application parameters**: The automatic recovery option enables you to retrieve restored databases after their restoration. In most restoration cases, it is advisable to choose this option.

Restoration of a total backup

This restoration scenario is used if you only perform full backups of your database or if the last backup was full or if you wish to return to the date of the last full backup.

The restoration is performed as follows:

1   Select the database file, and click **restore**.

2   The cart must only contain this database file. Click **restore**.

3   Choose the automatic recovery option, and start the restoration by clicking **restore**.

   After a few moments of initialisation, the restoration starts. When the status is **"Finished"**, the database is once again accessible.

Restoration of an incremental backup or transaction logs

This is the most frequent restoration scenario. When the restoration requires logs, proceed as follows:

1 Select the two Database and Logs objects, and click **restore**.

2 The cart must only contain the two Database and Logs database objects you want to restore. Click **restore**.

3 Choose the automatic recovery option, and start the restoration by clicking **restore**.

4 After a few moments of initialisation, the restoration starts. Two restoration jobs are started successively: the first restores the entire database and the second retrieves the logs and performs the recovery.

5 When the status is **Finished**, the database is accessible again.

Database restoration to another server

To restore an MS SQL application to another system, the SQL Server application of the new server must be declared in the StoreWay DPA. (For more information, see "Installation" page 15).

The user who performs this restoration must also be authorized to perform cross restorations. To enable these rights, the administrator must go to the menu **settings/ Users** in the StoreWay DPA interface.

1   Open the source MS SQL server restoration interface.

2   Select the objects to restore (refer to the previous steps).

3   The cross-restoration is configured in the restoration option window as described below:

  • The destination restoration is the SQL Server application on which data must be restored. The list of possible restoration applications groups the MS SQL applications declared in the StoreWay DPA.

  • If the MS SQL application is configured in the same way as the server containing the data to back up (Instance Name, database and log file paths), the destination path does not need to be entered. If not, the syntax is as follows: **/<instance_name>/<database_name>**. If the MS SQL instance is the default, enter (Default Inst.).

  • If the user wants to rename the database or move it to another instance, it is not necessary to create an empty database which has the destination name in the MS SQL Enterprise Manager.

  • The full restoration of an MS SQL application to a new SQL server is performed in the same way as for a restoration on the original server: first restore the ",master.mdf" database, then the other databases (see sections: "Restoration" page 20).

Chapter 6. Troubleshooting

This chapter examines the most frequent error messages and helps you in the event of difficulties when you use the StoreWay DPA for SQL Server Module. Solutions are also provided to solve certain errors.

See:

Frequent configuration problems

See:

Impossible to open the restoration interface file tree

> Check that the StoreWay DPA Backup service is started on the SQL Server host machine.

> Check that the login and the password you use to access the SQL Server are correct: you can test the log on for the Password Manager programme, accessible from the **Start** menu.

Impossible to open a database during the backup

You may find that the StoreWay DPA for SQL Server Module cannot open the database because it needs the user .id file if the user has encrypted his database. Normally, the server .id file enables you to open databases, but cannot open an encrypted database for its owner. Because the user .id file is not on the server, it is impossible to open the database. Perform the following steps to solve the problem:

> Open the SQL client.

> Select the database in question.

> Select the **Database Properties** menu.

> Deactivate the encryption.

If this manoeuvre does not work, deactivate the encryption for the user in question.

A backup remains blocked or times out

This problem can be due to how the database is organized, perform a purge and an optimization of the database in question.

It is recommended to purge and optimize server databases. This will enhance SQL Server and StoreWay DPA for SQL Server Module performances.

Chapter 7. Appendix

This appendix regroups a certain number of Frequently Asked Questions (FAQ) concerning the backup and the restoration using the StoreWay DPA for SQL Server Module.

See:

FAQ

Can you back up databases of another server via the network?

No. You need a StoreWay DPA for SQL Server Module agent.

Can you restore a full backup followed by an incremental backup?

Yes. You must first restore the Database object by choosing to not perform an automatic recovery. Secondly, restore the Logs object this time activating the automatic recovery option.

WARNING: **In this case, do not attempt to open the database between two restorations: the restoration of logs may not conclude satisfactorily**.

Is there a size limit for backed up databases?

No. There is no limitation for the StoreWay DPA for SQL Server Module.

Can you perform backups at any time?

Yes. Full or incremental backups can be performed without restriction. However, it is impossible to perform two backups on the same database at the same time.

Is an application block possible for an SQL Server or StoreWay DPA for SQL Server Module which could cause an application shutdown on the same machine?

Yes. It is essential to close all the programmes using the kill command BEFORE restarting the SQL server.

What should you do when the restoration fails and the message "replication in progress" appears?

The restoration fails because the database is in the process of being replicated or if a prior backup was unsuccessful.

If the replication is still in progress, you need to wait for it to end.

If the previous backup stopped in error, you must stop all programmes linked to the SQL Server (StoreWay DPA for SQL Server Module, etc.) before restoring data again.

What happens when the restored database appears in "Loading" state after the restoration?

You may experience during a restoration, a database which appears in "Loading" state in the SQL Server Enterprise Manager. Perform the following operations to get it back on line:

> Start the **Query Analyzer (Start/Programs/Microsoft SQL Server/Query Analyzer)**.
> Enter the following query:
> RESTORE DATABASE <name_database> WITH RECOVERY
> Execute the query. The database should once again be accessible.

Index

U

user database
    restoration 24

W

Windows Events observer 13

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