

7 things you need to know about TempDB

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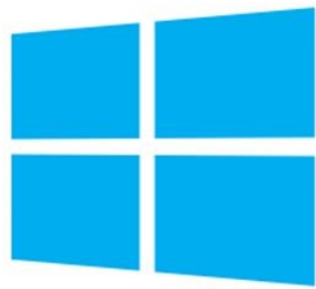
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Agenda

- What is TempDB?
- Why do we need TempDB?
- 7 things you need to know about TempDB
- Demo
- Q&A

What is TempDB?

“The **tempdb** system database is a global resource that is available to all users connected to the instance of SQL Server” **Source:**

<https://msdn.microsoft.com/en-us/library/ms190768.aspx>



Why do we need TempDB?

- “Temporary user objects that are explicitly created, such as: global or local temporary tables, temporary stored procedures, table variables, or cursors.
- Internal objects that are created by the SQL Server Database Engine, for example, work tables to store intermediate results for spools or sorting.
- Row versions that are generated by data modification transactions in a database that uses read-committed using row versioning isolation or snapshot isolation transactions.
- Row versions that are generated by data modification transactions for features, such as: online index operations, Multiple Active Result Sets (MARS), and AFTER triggers.”

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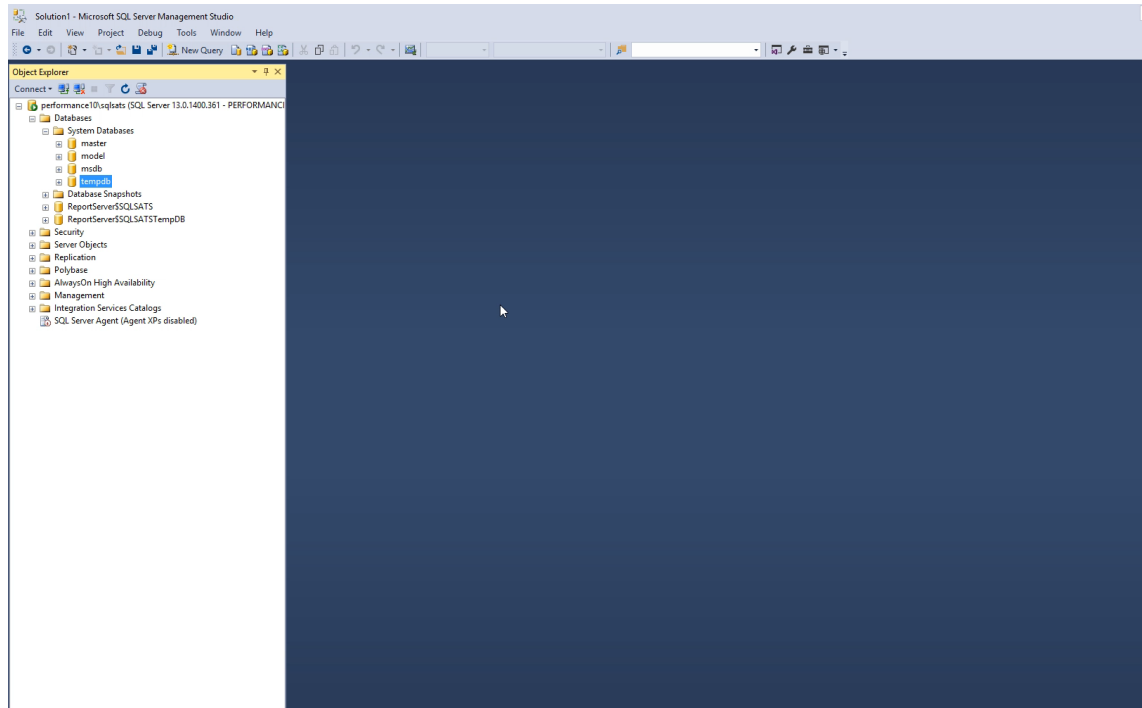
Fact #1(1)

- It is not possible to execute backup or restore operations on **tempdb**, that is why its recovery model is ... *(Who knows the answer?)*
- **Demo** how to change the recovery model of TempDB ... *(Who knows how to do it?)*

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Fact #1 (2)

- **Demo** how to change the recovery model of TempDB



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Fact #2

Performance Improvements in tempdb

In SQL Server, **tempdb** performance is improved in the following ways:

- Temporary tables and table variables may be cached. Caching allows operations that drop and create the temporary objects to execute very quickly and reduces page allocation contention. **(Since SQL 2005)**
- Allocation page latching protocol is improved. This reduces the number of UP (update) latches that are used. **(Since SQL 2005)**
- Logging overhead for **tempdb** is reduced. This reduces disk I/O bandwidth consumption on the **tempdb** log file. **(Since SQL 2005)**
- **(SQL2016)** Setup adds multiple tempdb data files during a new instance installation. This task can be accomplished with the new UI input control on the **Database Engine Configuration** section and a command line parameter /SQLTEMPDBFILECOUNT. By default, setup will add as many tempdb files as the CPU count or 8, whichever is lower.
- **(SQL2016)** When there are multiple **tempdb** data files, all files will autogrow at same time and by the same amount depending on growth settings. Trace flag 1117 is no longer required.
- **(SQL2016)** All allocations in **tempdb** use uniform extents. Trace flag 1118 is no longer required.
- **(SQL2016)** For the primary filegroup, the AUTOGROW_ALL_FILES property is turned on and the property cannot be modified.

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Fact #3

Restrictions

- The following operations cannot be performed on the **tempdb** database:
- Adding filegroups.
- Backing up or restoring the database.
- Changing collation. The default collation is the server collation.
- Changing the database owner. **tempdb** is owned by **sa**.
- Creating a database snapshot.
- Dropping the database.
- Dropping the **guest** user from the database.
- Enabling change data capture.
- Participating in database mirroring.
- Removing the primary filegroup, primary data file, or log file.
- Renaming the database or primary filegroup.
- Running DBCC CHECKALLOC.
- Running DBCC CHECKCATALOG.
- Setting the database to OFFLINE.
- Setting the database or primary filegroup to READ_ONLY.

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Fact #4

Permissions

- Any user can create temporary objects in tempdb.
- Users can only access their own objects, unless they receive additional permissions.
- It is possible to revoke the connect permission to tempdb to prevent a user from using tempdb, but this is not recommended as some routine operations require the use of tempdb.

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Fact #5

- The initial configuration values of the **tempdb** data and log files were changed in SQL2016 **Source:**
[https://msdn.microsoft.com/en-us/library/ms190768\(v=sql.130\).aspx](https://msdn.microsoft.com/en-us/library/ms190768(v=sql.130).aspx)

From 2005 - 2014	File	Logical name	Physical name	File growth
	Primary data	tempdev	tempdb.mdf	Autogrow by 10 percent until the disk is full
	Log	templog	templog.ldf	Autogrow by 10 percent to a maximum of 2 terabytes

From 2016	File	Logical name	Physical name	Initial size	File growth
	Primary data	tempdev	tempdb.mdf	8 megabytes	Autogrow by 64 MB until the disk is full
	Secondary data files*	temp#	tempdb_mssql_#.ndf	8 megabytes	Autogrow by 64 MB until the disk is full
	Log	templog	templog.ldf	8 megabytes	Autogrow by 64 megabytes to a maximum of 2 terabytes

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Fact #6

- SORT_IN_TEMPDB Option For Indexes (it is available in all supported versions of SQL Server). ***This is only useful when TEMPDB is on a physically separate drive!!***

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Fact #7

- **From SQL Server 2012 Microsoft officially started supporting to keep TempDB on Local drives in SQL Server Cluster Configurations.**

Demo



Q&A



Useful Links

- <https://msdn.microsoft.com/en-us/library/ms190768.aspx>
- http://www.powershow.com/view/22599a-MGM1Y/SQL_Server_Storage_and_Index_Structures_power_point_ppt_presentation
- <http://dba.stackexchange.com/questions/108704/when-to-use-sort-in-tempdb-when-rebuilding-indexes>
- <https://www.mssqltips.com/sqlservertip/2817/sql-server-2012-cluster-with-tempdb-on-local-disk/>
- <https://www.brentozar.com/sql/tempdb-performance-and-configuration/>