

Fasten your Seatbelt - Troubleshooting the most difficult SQL Server Problems



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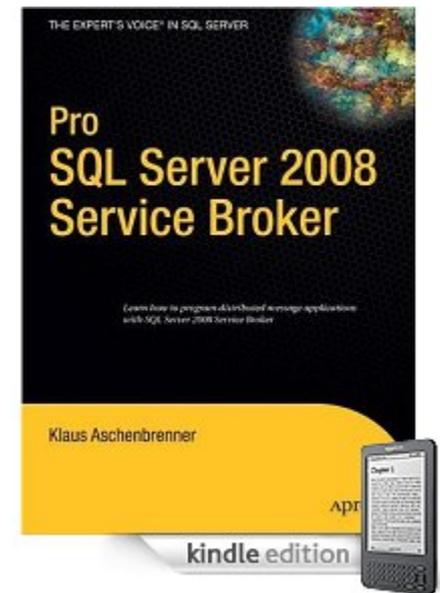
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About me

- Independent SQL Server Consultant
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Agenda

- Hold Locks with Read Committed
- ThreadPool Starvation
- TempDb Latch Contention

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- **Hold Locks with Read Committed**
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Hold Locks with Read Committed

- Read Uncommitted
 - No Shared Lock is acquired during reading
- Read Committed
 - Shared Lock is acquired during reading
 - Shared Lock is released after resource reading
 - There should be almost no blocking
- Repeatable Read
 - Shared Lock is acquired during reading
 - Shared Lock is held until the end of the transactions

Read Committed

- Shared/Update Locks can be held longer
- Blocking Operator between Scan/Seek and the Update
 - Like a Sort Operator
 - Prevents Halloween Protection
 - <http://blogs.msdn.com/b/craigfr/archive/2007/05/22/read-committed-and-updates.aspx>
- Referencing LOB data types in your SELECT queries
 - Plan includes Blocking Operator (like Sort)
 - Data can't be copied (up to 2 GB)
 - Shared Locks are held until the end of the transaction
 - <http://blogs.msdn.com/b/craigfr/archive/2007/05/31/read-committed-and-large-objects.aspx>

Demo

Hold Locks with Read Committed

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- **ThreadPool Starvation**
- TempDb Latch Contention

ThreadPool Starvation

- Every query needs at least one thread in SQL Server
- “max worker threads” option defines how many threads are available
 - [http://msdn.microsoft.com/en-us/library/ms187024\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/ms187024(SQL.105).aspx)
- When no threads are available anymore
 - THREADPOOL wait type
 - Debugging can be only done through the DAC
 - <http://www.SQLpassion.at/blog/PermaLink,guid,8cf856fa-21b6-4525-8d30-4d6714011ab0.aspx>

Demo

ThreadPool Starvation

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Latch Contention

- Latch
 - Short term synchronization object used to protect physical pages
 - Every time when a page is accessed, a latch is needed
 - Other threads can't access the page in the mean time
- Big amount of creation and destruction of many objects
 - Temp Tables
 - Table Variables
- Can lead to Latch Contention
 - PFS Page
 - GAM/SGAM Page

Creating a temp table means...

1. Reading the SGAM page (2:1:3) to find a mixed extent with free space
 - SQL Server uses an exclusive latch on the SGAM page while updating the page
2. Reading the PFS page (2:1:1) to find a free page within the extent
 - SQL Server also uses an exclusive latch on the PFS page while updating the page
3. SQL Server will report a PAGELATCH wait type with the appropriate resource description
 - 2:1:3 for SGAM page
 - 2:1:1 for PFS page

Resolving Latch Contention 1/2

- Multiple TempDB data files
 - $\frac{1}{4}$ to $\frac{1}{2}$ data files of the CPU cores you have (HT cores should be included in the calculation!)
 - Allocation of new objects is done round-robin between the data files
 - All data files must have the same size to be effective
- Don't use the Microsoft recommendation – 1:1 mapping between data files and CPU cores!
 - [http://www.sqlskills.com/blogs/paul/post/A-SQL-Server-DBA-myth-a-day-\(1230\)-tempdb-should-always-have-one-data-file-per-processor-core.aspx](http://www.sqlskills.com/blogs/paul/post/A-SQL-Server-DBA-myth-a-day-(1230)-tempdb-should-always-have-one-data-file-per-processor-core.aspx)

Resolving Latch Contention 2/2

- Temporary Object Reuse
 - SQL Server can cache temporary objects instead of recreating them again and again
 - 1 IAM page and 1 Extent are cached
- Caching is possible when
 - Named constraints are not created
 - DDL statements are not used that effect the object like
 - CREATE INDEX
 - CREATE STATISTICS
 - Object is not created dynamically, e.g. through `sp_executesql`
 - Object is created inside another object
 - Stored Procedure, Trigger, UDF

Demo

Resolving Latch Contention

Summary

- Hold Locks with Read Committed
- ThreadPool Starvation
- TempDb Latch Contention