How to Get Started Tuning SQL Server Performance

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  - IEPTO1/2: Immersion Events on Performance Tuning – Parts 1 and 2
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  - IECAG: Immersion Event on Clustering and Availability Groups
  - IEUpgrade: Immersion Event on Upgrading and New Features
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Email paul@SQLskills.com with the subject line: User Group Pluralsight code to get a FREE (no catches, no credit card) 30-day trial of our 175+ hours of SQLskills content on Pluralsight

For example:

  - 7 hours on logging, recovery, and the transaction log (Paul)
  - 7 hours on indexing (Kimberly)
  - 2 hours on Azure SQL Database (Tim)
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- Chapter Leader “Columbus GA SQL Users Group”
- PASS Regional Mentor “South East USA”
- Outstanding PASS Volunteer
- Regular presenter at worldwide conferences on administration, disaster recovery, performance tuning, and Azure
- Friend of Red Gate
- (I also like electronics, aquaponics, farming chickens, crops, and tilapia)
Overview

- Statistics
- Index maintenance
- Memory settings
- MAXDOP and cost threshold for parallelism
- Adhoc Workloads
- tempdb
- Power savings
Having Out of Date Statistics

- **Are your statistics up to date?**
  - You need a process to manually update statistics
  - Ola Hallengren – excellent process for updating statistics
  - `sp_updatestats`
  - “Auto Update Statistics”
    - Updates after approximately 20% + 500 rows change

- **Impacts of statistics to the Query Optimizer**
  - The Query Optimizer uses statistics to build the execution plan
  - Out of date statistics can negatively impact the Query Optimizer from determining a “good enough” execution plan
Not Having Index Maintenance

- **Fragmentation**
  - Data modifications (Insert, Update, Deletes)

- **Impact of fragmentation on query performance**
  - A whitepaper from Microsoft stated fragmentation can slow down systems from 13% to 460% based on the size of the environment and fragmentation level

- **Controlling fragmentation**
  - Rebuild, reorganize or disable-and-rebuild (in a transaction) the index
  - Schedule rebuilds or reorganizations in a maintenance plan ≤ 2014
  - Use a custom script in a SQL Agent job such as Ola Hallengren’s Index Optimize script
  - Use third-party tools
Default Memory Settings In Use

- **Max and Min values for SQL Server 2008R2 and below**
  - Maximum default is 2147483647 MB or 2 PB
  - Minimum default is set to 0
  - Potential for SQL Server to starve the OS and OS to starve SQL Server
  - Max memory applies to the buffer pool only

- **SQL Server 2012 +**
  - Maximum default is 2147483647 MB or 2 PB
  - Minimum default is set to 0
  - Memory Manager redesign
  - Max memory applies to all memory manager allocations
  - Can consider letting SQL Server dynamically manage memory
Default MAXDOP and Cost Threshold For Parallelism

- **MAXDOP** = max degree of parallelism
  - Default is set to zero
  - Default means ‘unlimited’ number of CPUs could be used to execute a parallel region of a query
  - Microsoft recommendation states if more than 8 CPUs start with 8 and modify from there
  - For 8 or fewer processors use 0 to N
  - [http://support.microsoft.com/kb/2806535](http://support.microsoft.com/kb/2806535)

- Cost threshold for parallelism
  - Query cost/subtree cost
  - Default value is 5
  - This should be adjusted up to 25 – 50 based on your environment - [http://bit.ly/1rTs9UX](http://bit.ly/1rTs9UX)
Adhoc Workloads

- Enable Optimize for Adhoc Workloads
  - Eliminates single use queries from wasting space in the plan cache
Improperly Sized tempdb

- **Special characteristics for tempdb**
  - Recreated at startup
  - Only one tempdb database per instance
  - Modeled after the model database
  - Cannot be backed up

- **Considerations**
  - With 8 cores or less, create equal-size data files per the number of cores
  - With more than 8 cores, start with 8 equal size data files and increase by 4 files based on contention
  - [http://support.microsoft.com/kb/2154845](http://support.microsoft.com/kb/2154845)
  - Enable trace flag 1118 always – On by default in SQL Server 2016
  - Place data files on separate disk with fast I/O, if needed
  - SQL Server 2016 attempts to handle this
Using Balanced Power Savings

- Power savings has a negative impact for SQL Server
  - Can under-clock your CPU
  - Not conducive to SQL Server CPU behavior
  - Set power setting to “High Performance” rather than “Balanced Power”
  - Disable power savings in BIOS
  - Free tool CPUz can show clock speed in use
    - [www.cpuid.com](http://www.cpuid.com)
  - Other power settings can be bad such as putting a NIC to sleep
DEMO

Instance settings, slow log file, and workload tuning
Resources

- Glenn Berry DMVs
  - https://www.sqlskills.com/blogs/glenn/category/dmv-queries/

- Paul Randal
  - https://www.sqlskills.com/blogs/paul/wait-statistics-or-please-tell-me-where-it-hurts/
Summary

- What we discussed
  - Update your statistics
  - Have proper index maintenance
  - Have proper memory settings
  - Configure MAXDOP and cost threshold for parallelism
  - Adhoc Workloads
  - Configure tempdb for your instance
  - Turn off any power savings
Thank you!