

# Common SQL Server Mistakes and How to Avoid Them





- Email [paul@SQLskills.com](mailto: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 188+ hours of SQLskills content on Pluralsight**
- **For example:**
  - <https://app.pluralsight.com/library/courses/sqlserver-logging/table-of-contents>
    - 7 hours on logging, recovery, and the transaction log (Paul)
  - <https://app.pluralsight.com/library/courses/sqlserver-indexing-for-performance>
    - 7 hours on indexing (Kimberly)
  - <https://www.pluralsight.com/courses/sqlserver-understanding-using-azure-sql-database>
    - 2 hours on Azure SQL Database (Tim)

# Speaker: Tim Radney

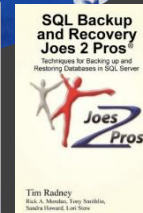
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## Key technology areas:

- Azure SQL Virtual Machine and storage
- SQL Server performance, tuning and optimization
- Azure Data Services Security
- Disaster Recovery
- Azure SQL DB / Managed Instance

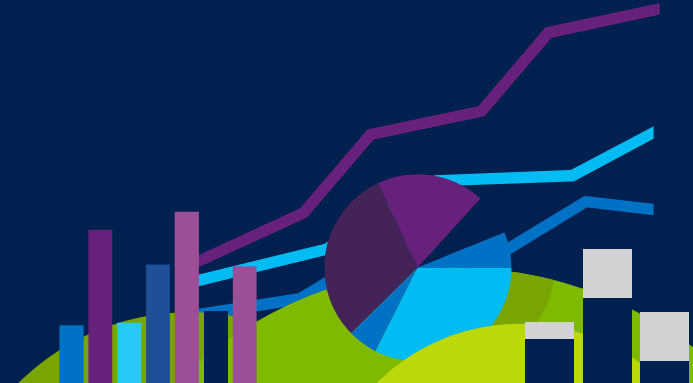


@TRADNEY



# SQL in Azure PaaS, IaaS, and Private Cloud

Best Practices for the Hybrid DBA



# Overview

- Backups and Consistency checks
- Log cleanup
- Statistics
- Index maintenance
- Memory settings
- MAXDOP and cost threshold for parallelism
- tempdb
- SQL Server alerts
- Power savings

Applies to:

SQL DB

SQL DBMI

SQL IaaS

SQL  
On-Prem

# Not Having Proper Backups

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- **Do you have recent backups?**
  - The backups need to be adequate
    - Plan your restore strategy to meet your service level agreements
    - Your RPO (recovery point objective) and RTO (recovery time objective) will determine your backup strategy
    - You will need the correct recovery model
- **Do you validate your backups?**
  - The absolute best method to validate backups are good is by restoring them
  - A dedicated environment, close to production specs will give you a good sense of how long a production restore may take
  - Regulators, auditors, and examiners love to see restore validations
- **Script to check for frequency of backups - <http://www.timradney.com/backups>**

# No Consistency Checks

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- **Corruption happens**
  - I/O subsystem 99.98%
  - Local hardware 0.01%
  - SQL Server bug 0.01%
- **Finding corruption**
  - DBCC CHECKDB
  - DBCC CHECKALLOC
  - DBCC CHECKCATALOG
  - DBCC CHECKFILEGROUP
- **Have a scheduled job to run DBCC CHECKDB**
  - When DBCC CHECKDB fails, take immediate action
  - Many times the fix is a restore operation, so take action before backups are deleted and data is lost

# Not Purging Logs

- **msdb stores all backup and restore history**
  - History is not automatically purged
    - `sp_delete_backuphistory`
      - Clears backup and restore history older than date given
      - This will delete all backup and restore history prior to '01/01/2022'
- **SQL Server log maintenance**
  - By default the log only rolls over at service restart
  - EXEC `sp_cycle_errorlog` – starts a new error log, execute daily
  - Increase default value from 6 to some other number up to 99
  - Recommend keeping at least 30 days of logs for troubleshooting



# Deleting Backup History

```
▪USE msdb;  
GO  
EXEC sp_delete_backuphistory '01/01/2022';  
▪GO
```

# Having Out of Date Statistics

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- **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

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- **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
  - <https://technet.microsoft.com/en-us/library/cc966523.aspx>
- **Controlling fragmentation**
  - Rebuild, reorganize or disable-and-rebuild (in a transaction) the index
  - Schedule rebuilds or reorganizations in a maintenance plan < 2016
  - Use a custom script in a SQL Agent job such as Ola Hallengren's Index Optimize script
  - Use third-party tools
- **Fragmentation with SSDs**
  - <https://www.sqlskills.com/blogs/jonathan/does-index-fragmentation-matter-with-ssds/>

# Default Memory Settings In Use

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- **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
  
  - How much memory does SQL Server need? - <http://bit.ly/1bSVDAu>

# MAXDOP

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- **It is recommended to specify a value other than 0**

- Some applications may recommend a value of 1 (e.g. SharePoint)
- SQL Server 2008 – 2014
  - NUMA node(s) with less than 8 logical processors
    - Keep MAXDOP at or below number of logical processors
  - NUMA node(s) with more than 8 logical processors
    - Set MAXDOP to 8
- <http://support.microsoft.com/kb/2806535>
- <https://sqlperformance.com/2019/06/sql-performance/common-sql-server-mishaps>

# MAXDOP

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## ■ SQL Server 2016+ utilizes soft-NUMA

- During startup, Database Engine detects number of logical processors
  - If more than 8 physical cores per NUMA node or socket, soft-NUMA nodes are created automatically.
  - The engine handles placement of logical processors from the same physical core into different soft-NUMA nodes
- NUMA node(s) with less than 16 logical processors
  - Keep MAXDOP at or below number of logical processors
- Single NUMA node with more than 16 logical processors
  - Set MAXDOP to 16
- Multiple NUMA nodes with more than 16 logical processors
  - Set MAXDOP to half the number of logical processors per NUMA node with a MAX of 16

# Cost Threshold For Parallelism

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- **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>

# Improperly Sized tempdb

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- **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>
  - Enable trace flag 1118 always – on by default in 2016+
  - Place data files on separate disk with fast I/O, if needed
  - Enable Instant File Initialization `



# Using SQL Server Agent Alerts

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- **Provides proactive monitoring**

- Requires database mail
  - Configure a mail operator to send alerts to a distribution group
- Agent alerts
  - Severity 19 – 25 errors which are fatal errors
  - Error 823 and 824 – I/O issues
  - Error 825 which is related to an I/O operation retry
  - Agents can be created using the GUI or a T-SQL script
- Have this as part of your standard server build
- Step by step process <http://bit.ly/16nABr6>

# Using Balanced Power Savings

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- **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

# Summary

- **SQL Server is great, but a “next, next, next, finish” install is not good**
  - Have proper backups
  - Run regular consistency checks
  - Perform log cleanups
  - Update your statistics
  - Have proper index maintenance
  - Have proper memory settings
  - Configure MAXDOP and cost threshold for parallelism
  - Configure tempdb for your instance
  - Configure SQL Server Agent alerts
  - Turn off any power savings

**Thank you!**

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