SQLskills
Calgary SQL PASS
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# Common SQL Server Mistakes and How to Avoid Them

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immerse yourself in sql server

- **Team of world-renowned SQL Server experts:**
  - Paul S. Randal (@PaulRandal)
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  - Glenn Berry (@GlennAlanBerry)
  - Erin Stellato (@ErinStellato)
  - Jonathan Kehayias (@SQLPoolBoy)
  - Tim Radney (@TRadney)
- **Instructor-led training: Immersion Events (US, UK, and Australia)**
- **Online training:** pluralsight [http://pluralsight.com/](http://pluralsight.com/)
- **Consulting: health checks, hardware, performance, upgrades**
- **Remote DBA: system monitoring and troubleshooting**
- **Conferences: PASS Summit, SQLintersection**
- **Become a SQLskills Insider**
  - https://www.sqlskills.com/Insider


SQL intersection

# 2015 Immersion Events

- **Classes in Chicago, Bellevue (WA), London, Dublin, Sydney (Australia)**
  - IE0: Immersion Event for Junior/Accidental DBA
  - IEPTO1/2: Immersion Events on Performance Tuning – Parts 1 and 2
  - IEHADR: Immersion Event on High Availability and Disaster Recovery
  - IEBI: Immersion Event on Business Intelligence
- **In-depth, instructor-led, technical training for SQL Server**
- **Here's our topic list for IEPTO2: Immersion Event on Performance Tuning, Part 2**

| | | |
|---|---|---|
| SQL Server I/O | I/O Concepts for DBAs | SANs for DBAs |
| SQLOS Scheduling and CPU Performance Tuning | SQLOS Memory Management and Memory Performance Tuning | Data Collection and Baselining |
| Wait and Latch Statistics | Query Plan Analysis | Extended Events |
| Performance Issue Patterns | Statement Execution, Stored Procedures, and the Plan Cache | |
| Deadlock Analysis | Advanced Extended Events | |

- **For more information: https://www.sqlskills.com/training/**

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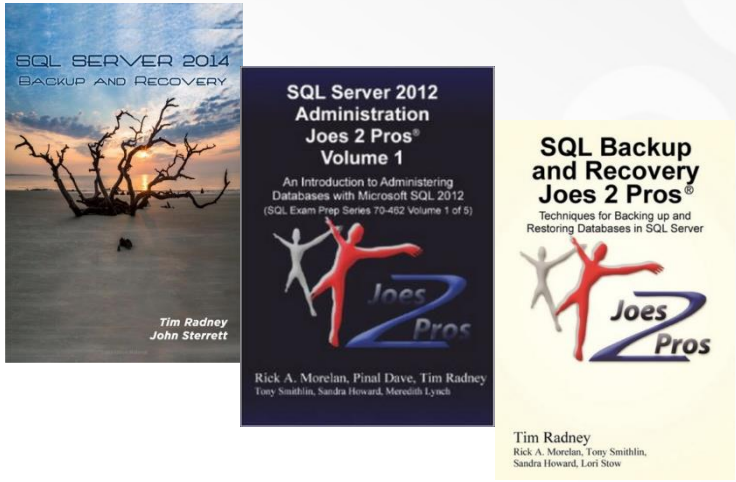


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- SQL Server MVP
- Chapter Leader "Columbus GA SQL Users Group"
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- Outstanding PASS Volunteer
- Regular presenter at worldwide conferences on administration, disaster recovery and performance tuning.
- Friend of Red Gate
- (I also like electronics, aquaponics, farming chickens and tilapia)

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pluralsight

- **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 120+ hours of SQLskills content on Pluralsight**
- **For example:**
  - http://www.pluralsight.com/training/Courses/TableOfContents/sqlserver-waits
    - 4.5 hours on waits, latches, spinlocks
  - http://www.pluralsight.com/courses/sqlserver-optimizing-stored-procedure-performance
    - 7 hours on stored procedure performance tuning
  - http://www.pluralsight.com/courses/sql-server-2014-dmv-diagnostic-queries-part1
    - Part one of a three part course on using DMVs for performance tuning

# Overview

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

# Not Having Proper Backups

- **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

- **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

```
USE msdb;
GO
EXEC sp_delete_backuphistory '01/01/2015';
GO
```

    - This will delete all backup and restore history prior to '01/01/2015'
- **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

# 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
  - 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
  - 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

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

# 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
- **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

- **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
  - Place data files on separate disk with fast I/O, if needed

# Not Using SQL Server Agent Alerts

- **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 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

- **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
  - 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!