

SQLskills Immersion Event IE2: Performance Tuning

Module 0: Overview



Immersion Events IE1 & IE2

- **IE1 – Internals and Performance**
 - About solving problems through design, indexing and maintenance
 - Heavily tied to internals
 - Generally requires three things:
 - Know your data
 - Know your workload
 - Know how SQL Server works
- **IE2 – Performance Tuning**
 - About finding problems and understanding the MANY different angles from which you need look
 - No single topic will solve all of your problems
 - Some topics will be more immediately valuable
 - Over time, you'll probably tackle all of them...



Instructors

- **Why do we need multiple?**
 - Different perspectives
 - Different areas of expertise
 - Different problem solving skillsets
 - No one knows everything...
- **This class is about knowing:**
 - Where to look
 - What tools are available
 - All sorts of tips/tricks/best practices along the way!

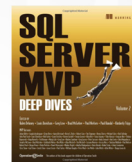
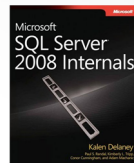


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- Author of several SQL Server Whitepapers on MSDN/TechNet: Partitioning, Snapshot Isolation, Manageability, SQLCLR for DBAs
- Author/Presenter for more than 25 online webcasts on MSDN and TechNet
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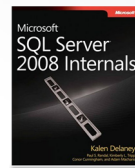


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- 5 years at DEC responsible for the VMS file-system and chkdsk equivalent
- Almost 9 years as developer/manager in the SQL Storage Engine team through August 2007, ultimately responsible for Core Storage Engine
 - Wrote DBCC component, other Storage Engine code, DBCC CHECKDB/repair for SQL 2005
- Regular presenter at worldwide conferences on HA/DR, administration, performance, and internals
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- SQL MCM program manager from 2009 - 2011
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M1: SQL Server IO – Storage Needs

- Files, filegroups, and physical DB layout
- Data: writing, logging, reading, restoring
- Always a special case: tempdb
- Basic monitoring



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M2: IO for DBAs

- Defining storage terminology
 - IOPS, MB/sec, Latency
- Magnetic vs. Solid-State Drives (SSDs)
- RAID configurations
- Mount points
- Partition alignment
- Testing with SQLIO and IOMeter
- Direct-attached storage
 - Traditional vs. PCI-Express drives

M3: IO – SANs for DBAs

- SAN components
- Multipathing
- iSCSI vs. fibre channel (FC)
- Shared vs. dedicated arrays
- Cache (on the drives, SAN controller, RAID controller, and Windows)
- Clustering
- Appendix: snapshot backups (SAN, not SQL)

M4: SQLOS

- Understanding Windows scheduling
- Server hardware and NUMA
- The purpose of SQLOS
 - CPU Scheduling
 - Memory allocation
- Edge cases for tweaking
- DMV monitoring and troubleshooting (basics)

M5: Waits and Queues

- Introduction
- Thread lifecycle
- DMVs
- Common wait types
- Demos

M6: Extended Events

- Extended Events core concepts
- Execution lifecycle and dispatching
- DDL and event session basics
- Event targets
- Usage scenario demos
- Appendix

M7: Query Plan Analysis

- Why look at query plans?
- How to capture query plans
- How to analyze query plans
- Understanding common operators
- Common query plan patterns to watch for and investigate further

M8: CPU Performance Tuning

- Defining CPU performance issues
- SQL Server vs. external CPU issues
- Kernel vs. User time
- Where to find the SQL Server CPU consumers
- What to look for and how to remediate
- Controlling CPU with Resource Governor (overview and application)

M9: Plan Cache & Index Analysis

- Part I: Understanding/analyzing plan cache
- Part II: What's in the plan cache?
- Part III: Understanding/optimizing stored procedures
- Part IV: A cautionary tale about scalar functions
- Part V: Index analysis

M10: Memory Performance Tuning

- How to identify memory issues
- Internal memory pressure
- External memory pressure
- Virtual address space issues
- Resource semaphores
- DBCC commands

M11: Deadlock Analysis

- Review of locking in SQL Server
- What is a deadlock (reminder)
- Collecting deadlock graphs
- Anatomy of a deadlock
- Reading deadlock graphs
- Resolving deadlocks

M12: Data Collection and Baselineing

- Benchmark vs. baseline
- Data collection methods and tools
- Native tools:
 - Collector Sets and Counter Logs
 - PAL Tool (Performance Analysis of Logs)
 - SQL Trace
 - Introduction Distributed Replay Utility (DRU)

M13: Performance Issue Patterns

- 11 common performance issue patterns
- Interactive investigation into each pattern
 - Pulling together much of what we've discussed this week

M14: Advanced Extended Events

- SQL Server 2012 Extended Events UI
- Extended Events advanced troubleshooting

Reference: Performance Problems Solved!

- Sample stories and problem solving strategies that worked