(January 29th, 2018)

If you know someone who would benefit from being an Insider, feel free to forward this PDF to them so they can sign up here.

Quick Tips for our Insider friends!

Hey Insiders,

We're presenting another live, online Immersion Event! Due to the popularity of Kimberly's delivery of the new *IEVLT: Immersion Event on Very Large Tables: Optimizing Performance and Availability through Partitioning* in January, and the fact that many of you told us that you didn't have a chance to attend, we're running it again in March!

This will be delivered live via WebEx on March 20-22 (roughly 12-13 hours of content plus open Q&As; about the same as two full workshop days!). It's priced at only US$895, but as a newsletter subscriber, you can use the discount code 'newsletter' when you register **before** 2/12/18 to save US$100. **Move fast to claim your seat!** See here for all the details, including the incredible feedback from the January class on how much they loved it. And, for all of our future, live, online events YOU – our newsletter subscribers – will always get an exclusive discount!

Note: you can get all the prior Insider newsletters here.

SQLskills News

Erin's latest Pluralsight course has been published! It's called *SQL Server: Automatic Tuning in SQL Server 2017 and Azure SQL Database*. Check out the details here.

The first batch of 2018 US classes are open for registration! In 2018, we're offering our usual Immersion Events on Performance Tuning (IEPTO1 and IEPTO2) and for the Accidental DBA (IE0), as well as PowerShell, Azure, Clustering and Availability Groups, BI strategies, BI security, and Practical Machine Learning. See here for our 2018 Immersion Event class schedule.

And we're also coming back to Europe in 2018! We're bringing four of our Immersion Events to London in September: IEPTO1 and IEPTO2, plus our new classes: **IEAzure** (on Azure and Azure VMs) and **IECAG** (on clustering and availability groups). See here for details.

Also for our European friends, Erin will be presenting a pre-con workshop at SQLBits in the UK in February – see here for details and check soon as it's almost sold out.

Our Spring SQLintersection conference is also fast approaching at the end of March, and we have a phenomenal line up of workshops, sessions, and speakers. Check out this blog post for all the details, and use the discount code 'sqlskills' when you register to save $50.

Finally, even if you can't join us in person, I've put out a call for 2018 remote user group sessions. In 2017, we did more than 100 of these around the world and we have set up more than 40 for 2018 already! If you'd like one of us to present for your user group, check out my blog post here.

Book Review

The most recent book I've read is Admiral James Stavridis' *Sea Power: The History and Geopolitics of the World's Oceans*. This book is an excellent tour of the world's oceans and major seas, with some history of the discovery, use, and naval engagements in each, and reminiscences of his naval service through them. It shows how sea power has really shaped a lot of the history of the world, and why sea power is so important still for the future. There's particular emphasis on where the U.S. must focus - the South China Sea (also see the book Asia's Cauldron), the Arctic Ocean, and the Eastern Mediterranean - and how naval strategy should develop. Great book – highly recommended!

The Curious Case of…

This section of the newsletter explains recent problems we've helped with on client systems; they might be something you're experiencing too.

Tim was working with a client recently where they had a corrupt database and were facing data loss. They also had no backups, even though they thought they had a comprehensive backup storage and archival strategy.

The corruption itself is another story, but the lacks of backups was very worrying. Tim investigated their homegrown solution and found the mistake that they'd made…

They had a multi-step process for taking and managing their backups. Step 1 performed the backup. Step 2 deleted the oldest back, as long as step 1 succeeded. Unfortunately, there was a bug in step 2, so that it would *always* delete the oldest backup, no matter what. Furthermore, the notification that step 1 had failed didn't work, so no-one noticed and all the good backups were deleted before they finally had a production failure from the corruption.

Bottom line: It's imperative that job logic is tested to make sure it works, especially around something as critical as backup retention and notification of backup failures.

Paul's Ponderings

The Curious Case above highlighted an issue that crops up time and again: something wrong with one or more SQL Agent jobs.

It's very common to have SQL Agent jobs that perform critical tasks in your environment, such as:

- Running consistency checks
- Performing data and log backups of all databases
- Log shipping
- Maintaining a 'sliding-window' of retained backups
- Statistics maintenance
- Index maintenance
- Replication tasks
- Performing Change Data Capture and purging old captured data
- Periodically cycling the error log
- Non-replication ETL

And other custom functionality you need for your business tasks.

When we're called in to help with corruption, the majority of the time it's because the consistency checking job wasn't running or the notifications were broken, and either the backups worked but weren't specifying *WITH CHECKSUM* or the backup job had failed in some way. The result being that the client has a badly corrupt database with no usable good backup.

Here are some of the problems we've seen with SQL Agent jobs, that you can check for:

- A job failing to run because either the job, the operator, or the job schedule was disabled, or the job was accidentally deleted (I've seen a repair of *msdb* delete a critical job from the *sysjobs* table)
- Notification of job failure not set up or broken in some way
- Incorrect job schedule (e.g. setting a log backup to run every 30 hours instead of every 30 minutes)
- Broken T-SQL logic in the job (like in the Curious Case above)
- Multiple jobs running at the same time and causing performance issues

Another problem we've seen is where there are multiple maintenance jobs that need to be run periodically in a busy environment where there's a relatively small maintenance window at night. Jonathan's implemented solutions for several of our remote DBA clients that will allow certain jobs (e.g. fine-grained consistency checking) to run for only a set amount of time before being stopped to allow other jobs to run (e.g. fine-grained index maintenance). And Kimberly's implemented jobs that 'domino', where one job raises a custom error (using *RAISERROR*) and a subsequent job is fired upon that error message being raised (and so on).

Quite often SQL Agent jobs are implemented without adequate testing and left to run without someone paying attention to whether they're doing what they're supposed to do, but given the usual criticality of their purpose, this is dangerous and can lead to dramatic problems and business implications like major data loss.

Call to action: Make sure you have a good handle on your SQL Agent jobs – that they're running correctly and doing what they're supposed to. The most important thing is to make sure that a group of people are notified of all job failures, and the success of critical jobs. Your data and business can often depend on it.

Glenn's Tech Insights

This section of the newsletter highlights recent news and views from the hardware and Windows worlds that we think will be interesting to SQL Server community members.

Performance Impact of Spectre/Meltdown Patching on Server Workloads

Intel has released the results of some internal testing of the performance impact of patching for the Spectre/Meltdown vulnerability on a two-socket server with Intel Xeon Platinum processors for a number of different types of workloads.

The most relevant workloads (for SQL Server) from these test results are the "OLTP Brokerage" database benchmark and the "FlexibleIO (FIO) 4K random" storage benchmark results.

The OLTP benchmark used a two-socket system with two Intel Xeon Platinum 8160 processors, running on "Windows Datacenter RS1 x64" (meaning Windows Server 2016) with and without Microsoft KB4056890 along with the required CPU microcode update (from a BIOS update) to enable the OS patch for the Meltdown vulnerability.

Intel describes the OLTP benchmark workload and test results like this: "An online transaction processing (OLTP) benchmark simulating modeling a brokerage firm's customer-broker-stock exchange interaction showed a 4% impact." This means that the fully patched system's score was 96% as high as the unpatched system.

Here is how Intel describes the FlexibleIO (FIO) test and results:

"For FlexibleIO, a benchmark simulating different types of I/O loads, results depend on many factors, including read/write mix, block size, drives and CPU utilization. When we conducted testing to stress the CPU (100% write case), we saw an 18% decrease in throughput performance because there was not CPU utilization headroom. When we used a 70/30 read/write model, we saw a 2% decrease in throughput performance. When CPU utilization was low (100% read case), as is the case with common storage provisioning, we saw an increase in CPU utilization, but no throughput performance impact."

The FIO testing was done on a two-socket system with two Intel Xeon Platinum 8180 processors, running on Red Hat Enterprise Linux 7.4. The test results show the before/after impact of patching both the operating system and applying a CPU microcode update.

Server Reboots after Intel CPU Microcode Updates

On January 22, Intel released some updated information about the root cause (for the Broadwell and Haswell platforms) of the more frequent reboot issues that have been reported on some servers after applying the CPU microcode update that is part of the complete patching process for the Meltdown/Spectre vulnerability.

Intel has developed and begun rolling out an updated version of the CPU microcode update to the various server vendors for testing. In the meantime, here is Intel's updated guidance:

"We recommend that OEMs, cloud service providers, system manufacturers, software vendors and end users stop deployment of current versions, as they may introduce higher than expected reboots and other unpredictable system behavior."

You can get more information about what types of Intel processors are affected, along with Intel's updated recommendations from this post: Speculative Execution and Indirect Branch Prediction Side Channel Analysis Method. Even more gory details about this Intel Microcode Revision Guidance are available here.

#TBT

(Turn Back Time…) This section highlights some older resources we've referred to recently that you may find useful, plus blog posts we've published since the previous newsletter.

The theme for the TBT this time is tempdb:

- Joe's Pluralsight course: *SQL Server: Temporary Objects*
- Whitepaper: *Working with tempdb in SQL Server 2005* (still relevant today)
- Paul's blog posts:
    - *SQLskills SQL101: Temporary table misuse*
    - *Correctly adding data files to tempdb*
    - *The Accidental DBA (Day 27 of 30): Troubleshooting: Tempdb Contention*
    - *Tempdb configuration survey results and advice*
    - *A SQL Server DBA myth a day: (12/30) tempdb should always have one data file per processor core*
    - *Misconceptions around TF 1118*

Here are a few of the blog posts we've published since the last newsletter:

- Paul: *SQLskills SQL101: Why does my heap have a bunch of empty pages?*
- Glenn: *Checking Your SQL Server Instance for Spectre/Meltdown Patches*

I hope you find these useful and interesting!

Video Demo

In this video Glenn demonstrates several different ways to check on your Spectre/Meltdown patch status from a hardware, operating system, and SQL Server perspective. His relevant blog posts with details of where to get the tools he demos are:

- *Checking Your SQL Server Instance for Spectre/Meltdown Patches*
- *Checking Your Intel Processor Features Regarding the Meltdown Exploit*
- *Checking Your Meltdown and Spectre Mitigation Status in Windows*

The video is just over five minutes long and you can get it:

- In WMV format here.
- In MOV format here.

And the demo code is here.

Enjoy!

Upcoming SQLskills Events

We have lots of events coming up in 2018 – from our online IEVLT course AND SQLintersection in March to our own LIVE, in-person Immersion Events in both the U.S. and London; all events are open for registration. Every event has a different focus and different benefits – from deep-technical training in our online courses and in-person IEs to wide-ranging topics at SQLintersection where you can learn more effectively how to keep moving forward in both your database and your career! And, of course, one benefit all our in-person events provide is networking!

To help your boss understand the importance of focused, technical training, we've also added a few items to help you justify spending your training dollars with us:

- Letter to your boss explaining why SQLskills training is worthwhile
- So why do you want to come to our training? And the winners are…
- Community blog posts about our classes
- Immersion Event FAQ

Online, March 2018 **(discounted until 2/12/18, 12am PST)**

- **IEVLT**: Immersion Event on Very Large Tables: Optimizing Performance and Availability through Partitioning **(Final planned delivery in 2018)**
  - March 20-22
  - You must use the discount code 'newsletter' to get the US$795 discount price!

Orlando, FL, March 25-28, 2018

- [SQLintersection](#) co-located with the [DEVintersection](#) conferences (register with the 'sqlskills' discount to get save $50 on registration). See [here](#) for details.

Chicago, IL, April/May 2018

- **IEPTO1**: Immersion Event on Performance Tuning and Optimization – Part 1
    - April 23-27
- **IE0**: Immersion Event for the Junior/Accidental DBA
    - April 23-25
- **IEUpgrade**: Immersion Event on Upgrading SQL Server
    - April 23-25
- **IECAG**: Immersion Event on Clustering and Availability Groups
    - April 26-27
- **IEAzure**: Immersion Event on Azure SQL Database and Azure VMs
    - April 26-27
- **IEPTO2**: Immersion Event on Performance Tuning and Optimization – Part 2
    - April 30-May 4
- **IEBIStrat**: Immersion Event on Developing a BI and Analytics Strategy **(** NEW **)**
    - April 30-May 2
- **IEBISec**: Immersion Event on Securing Your BI Platform **(** NEW **)**
    - May 3-4
- **IEPS**: Immersion Event on PowerShell for SQL Server DBAs
    - April 30-May 2
- **IESSIS1**: Immersion Event on Learning SQL Server Integration Services
    - May 7-11
- **IEPML**: Immersion Event on Practical Machine Learning
    - May 7-11 **(** NEW **)**

Bellevue, WA, June 2018

- **IEPTO1**: Immersion Event on Performance Tuning and Optimization – Part 1
    - June 18-22

London, UK, September 2018

- **IEPTO1**: Immersion Event on Performance Tuning and Optimization – Part 1
    - September 10-14
- **IEAzure**: Immersion Event on Azure SQL Database and Azure VMs
    - September 10-11
- **IECAG**: Immersion Event on Clustering and Availability Groups

- o September 12-13
- **IEPTO2**: Immersion Event on Performance Tuning and Optimization – Part 2
  - o September 17-21

Click here for the main Immersion Event Calendar page that allows you to drill through to each class for more details and registration links.

Summary

We hope you've enjoyed this issue - we really enjoy putting these together.

If there is anything else you're interested in, we'd love to hear from you - drop us a line.

Thanks,
Paul and Kimberly

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