(August 27th, 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.

Note: As an Insider, you can read all prior Insider newsletters here.

Quick Tips for our Insider friends!

Hey Insiders,

I hope you enjoyed the last month of summer while we took our usual break from newsletters!

This newsletter is coming to you from Redmond, WA where we've recovered from jet lag from our dive trip. Check out this video of a whale shark I took (here) and Kimberly's awesome whale shark selfie (here).

Now we're busy preparing for our London classes that begin in just two weeks. And this coming week, we've got Glenn's live, online class on upgrading to 2017. ***TODAY is the last day to register as the class runs Tuesday (tomorrow!) through Thursday.***

Additionally, we still have a few seats remaining in our London classes in September; they're our last, in-person, Immersion Events to be delivered this calendar year. We hope to see you in London!

SQLskills News

It's time to start thinking about attending a conference in the Fall, and for the first time in four years, **our own awesome SQLintersection Fall 2018 show doesn't clash with the PASS Summit**. It's in the first week of December with 18 top-notch speakers delivering 40 sessions and 9 full-day workshops! Check out all the details here.

Live, online classes: there are three new classes available for registration:

- August 28-30: ***IEPUM2017****: Immersion Event on Planning and Implementing an Upgrade/Migration to SQL Server 2017* (taught by Glenn)
- October 9-11: ***IETLB****: Immersion Event on Transactions, Locking, Blocking, Isolation, and Versioning* (taught by Kimberly)
- October 23-25: ***IEQUERY****: Immersion Event on Fixing Slow Queries, Inefficient Code, and Caching/Statistics Problems* (taught by Erin, Jonathan, and Kimberly)

These classes will be delivered live via WebEx 10am-3pm PST, Tuesday-Thursday (roughly 12-13 hours of content including open Q&As; similar to two, full, workshop days without leaving the comfort of your home/office!) and you also get access to the class recordings. By dedicating

only 3 half-days of your time you still have time to get some work done during the day and with **lifetime** access to the recordings, you get amazing ROI!

Each of these classes are priced at US$699 and we're offering a combo package of all three for US$1,749, saving US$350. Click on the class links above for all the details.

In-person London classes: We're bringing four of our Immersion Events to London in September: IEPTO1 and IEPTO2, plus our new classes: **IEAzure** and **IECAG** (both of these are sold out!) See here for all the details.

Finally, even if you can't join us in person, I've put out a call for second-half 2018 remote user group sessions and we've done 59 this year already! If you'd like one of us to present for your user group, check out my blog post here.

Book Review

I've read a bunch of books (actually 20!) since the last newsletter and here are three classics that stand out to me.

The first book is Ernest Hemingway's *The Sun Also Rises*. Another great Hemingway book! This one follows ex-pats Jake and Lady Brett in the 190s from Paris nightlife to fishing in the mountains of Span and finally to the bull fighting fiesta in Pamplona. Brett and Jake have been together in the past, but Brett is now engaged to someone else and has a series of flings with other men, always relying on Jake for support. They and their group of friends seem to drink and eat enormous amounts and lounge around life without much of a care. I suspect this work is semi-autobiographical as Hemmingway lived in Paris in the 1920s and was a bull-fighting aficionado. Well-written and enjoyable!

The second book is F. Scott Fitzgerald's *The Great Gatsby*. The writing is excellent, and it's the first Fitzgerald book I've read. It's another book I've always wanted to read and it finally bubbled up my list. Gatsby suddenly appears on the scene on Long Island in the 1920s, with a fabulous house across the bay from his old girlfriend Daisy, who he was too poor to wed five years previously, and her philandering husband. Cleverly narrated by Gatsby's accidental neighbor, we see how Gatsby wheedles his way back into Daisy's life, with catastrophic consequences. Great stuff!

The final book is Edith Wharton's *The Age of Innocence*. Another great book! This book won Wharton the Pulitzer Prize in 1920 and is about three people (a young man, the woman he eventually marries, and the woman who he really should have married) whose lives are tangled up and deeply affected by the strict social code of 1870s New York society. Very well written and really enjoyable, as I love period books!

All three books are 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.

I was sent an email question last week by someone who'd run into problems with an automated backup-copy-restore-consistency-check process.

They have hundreds of servers and have a new process which cycles through them all taking backups and then running consistency checks on the restored copies. This is great because it validates the backups and offloads the consistency checks from the production servers.

The issue they ran into was that they had to restore the *master* database as if it's a user database. That works fine but the subsequent consistency checks throw errors on that restored database.

This is because there are structures that are only present in the *master* database and *DBCC CHECKDB* has special code to check and allow them to exist when the database ID is equal to 1. When *master* is restored as a user database, it's database ID is not 1, so *DBCC CHECKDB* throws errors, and unfortunately there's no way to tell *DBCC CHECKDB* that it's checking a copy of *master*.

Bottom line: Backup-copy-restore-consistency-check is a great way to make sure all the databases are being consistency checked and the backups work, but I understand it might not be possible if your databases are truly huge. If you are doing it, I would personally skip the consistency checks on the restored *master* and instead run them on the production server (but still do the backup-copy-restore for *master*).

Paul's Ponderings

Another question I received last week was *'What are latches and how are they different from locks?'* I was sure I'd written a blog post about that but you can imagine my surprise when I found I hadn't covered the answer to that question anywhere online that I could find! I promised the sender that I'd cover it in the newsletter and then turn the answer into a blog post later.

So here goes…

Locks and latches are not the same thing at all, but they're both essentially used for synchronization purposes so they're often confused.

A lock allows a transaction to protect something in a database, such as a table row, or an index page, or even a whole table. Locks exist for relational and transactional consistency.

A latch allows a thread inside SQL Server to access a data structure, such as the copy of a data file page in the buffer pool (*PAGELATCH_EX/_SH/_UP* latches), or the data structure

controlling a file group (an *FGCB_ADDREMOVE* latch), or the page ID of the root page of an index (an *ACCESS_METHOD_HOBT_VIRTUAL_ROOT* latch). Latches exist to protect access to data. A thread that holds a lock on a page cannot read or change the page – it must also acquire the necessary latch.

Locks might be held until the transaction commits. For example, the table and page intent-exclusive (IX) locks and the row exclusive (X) lock protecting an update to a table row must be held until the transaction commits or rolls back, under all isolation levels.

A latch is only held while the data structure is being accessed, so latches are lot more lightweight than locks. However, latches have a similar queueing mechanism to locks, so they might still be too heavyweight for some uses, which is where spinlocks come in (see this post for an explanation).

We can influence some lock types and their duration by specifying isolation levels and locking hints; latches cannot be controlled by us at all.

Locks and latches have similar modes, such as exclusive (X lock, EX latch) and share (S lock, SH latch). Locks and latches are both tracked by SQL Server and can be investigated using various DMVs. SQL Server also checks for deadlocks (e.g. thread one X locks resource A and wants an S lock on resource B, and thread two does the opposite) but it can't check for deadlatches.

I guess if I had to summarize the difference in a single sentence it would be something like: Locks synchronize access to data at the relational level and latches synchronize access to data structures between threads.

You can read more about latches and investigating them in the Microsoft whitepaper *Diagnosing and Resolving Latch Contention on SQL Server* that I helped put together back in 2011.

Call to action: No real action item – just another example of information that'll help you go further in your SQL Server career.

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.

2nd-Generation AMD Ryzen Threadripper HEDT Processors

On August 13, 2018, AMD released their 12nm 2nd-generation Ryzen Threadripper processor family of high-end desktop processors (HEDT). These processors will work in existing AMD X399 chipset motherboards (after a BIOS update).

Initially, there will be four SKUs in this family. The top-end part is the 2990WX which has 32 cores/64 threads for $1,799 and is available immediately. Next will be the 2950X with 16 core/32 threads for $899 which will be available on August 31, 2018. Following up in October will be the 2970WX for $1299 with 24 cores/48 threads, along with the 2920X for $649 with 12 cores/24 threads.

The early benchmarks that were available on launch day show the top-end Ryzen Threadripper 2990WX with extremely good performance on some highly-threaded workloads, but less impressive performance on some lightly threaded workloads (including games).

The Ryzen Threadripper 2950X appears to be the most interesting new model for many workloads, with significant performance gains compared to the 1950X that it replaces. The 2950X has higher base and turbo clock speeds than the 1950X, along with several architectural improvements such as Precision Boost 2 and eXtreme Frequency Range (XFR2) that work together to more aggressively raise the clock speed of more cores, depending on the thermal headroom. Investing in a high-quality CPU cooler will give you up to an additional 10% better compute performance according to AMD.

Upcoming Intel Mainstream Desktop Processors

Intel is getting closer (the rumored release date is October 1, 2018) to releasing a new family of 14nm mainstream desktop processors. These will include SKUs that range from four cores/four threads up to eight cores/sixteen threads. The various product lines in this family will have these core counts:

- Intel Core i9 eight cores/sixteen threads
- Intel Core i7 eight cores/eight threads
- Intel Core i5 six cores/six threads
- Intel Core i3 four cores/four threads (no turbo boost)

The branding and product segmentation will be changing somewhat, with only the high-end Core i9-9900K processor having hyper-threading. The Core i7, i5, and i3 models **will not** have hyper-threading. These new processors will use a slightly improved 14nm ++ manufacturing process that lets them increase the base and turbo clock speeds slightly over the previous generation of processors. Early leaked specifications show that the turbo clock speeds with six to eight cores loaded will be noticeably higher than the existing six-core Intel Core i7-8700K processor.

These new processors will work in existing 300 series motherboards (such as the Z370 series) with a BIOS update. Intel is also releasing a new Z390 series chipset at the same time, with very minor improvements over the current Z370 chipset.

Intel Launches Bean Canyon NUCs

Intel has launched a new generation of NUCs that use Intel Coffee-Lake processors. The top-end machine will be the NUC8i7BEH, which will feature the 28W TDP, 14nm Intel Core i7-8559U processor that has four cores/eight threads with a base clock speed of 2.7 GHz and a Turbo clock speed of 4.5 GHz. These processors also feature Iris Plus Graphics 655 and 128 MB of eDRAM processor cache.

The NUC8i7BEH will have an M.2 PCIe 3.0 x4 NVMe slot and a SATA III port, along with an external Thunderbolt 3 Type-C (40 Gbps) port, which means you can have pretty decent I/O performance and capacity. There are two SO-DIMM memory slots that support up to 32GB of DDR4-2400 memory.

A small form factor system like this can be very useful as an everyday desktop system or as a home lab machine.

#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 query plan analysis:

- Erin's Pluralsight course: *SQL Server: Analyzing Query Performance for Developers*
- Joe's Pluralsight course: *SQL Server: Query Plan Analysis*
- Erin's Pluralsight course: *SQL Server: Introduction to Query Store*
- Joe's Pluralsight course: *SQL Server: Troubleshooting Query Plan Quality Issues*
- My blog post: *Query plan analysis first steps*
- Joe's whitepaper: *Optimizing Your Query Plans with the SQL Server 2014 Cardinality Estimator*

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

- Paul: *SQLintersection Fall 2018 (no clash with PASS this year!)*
- Glenn: *SQL Server Diagnostic Information Queries for August 2018*
- Glenn: *Azure SQL Database Performance and Service Tiers Explained*
- Erin: *Mining Plans : Not just for the plan cache*
- Jonathan: *Showplan Enhancements for UDFs*

I hope you find these useful and interesting!

Video Demo

In this insider video, Tim shows you how to recover your SQL Server instance if the path to your tempdb database disappears. This is done by starting SQL Server in minimal configuration mode to alter tempdb to be created in another location so that you can quickly get the SQL Server service back up and running. It's really important that you know how to do this so you can quickly and easily restore services to your users if this happens in your environment.

The video is about 5 minutes long and you can get it in WMV format here.

The demo code is here.

Enjoy!

Upcoming SQLskills Events

We have events coming up in 2018 – from our ***new, live, online*** courses to our own live, in-person Immersion Events to our own conference: SQLintersection; all of our Fall events are open for registration.

Each and every event has a different focus as well as different benefits – from deep-technical training in our Immersion Events to wide-ranging topics at SQLintersection where you can learn more effectively how to keep moving forward in both your environment and your career! And, of course, one benefit you'll always get from in-person events is networking; we hope to meet/see you at an event soon!

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

LIVE, ONLINE Immersion Events:

- **IEPUM2017**: Immersion Event on Planning and Implementing an Upgrade/Migration to SQL Server 2017
  - August 28-30 **(** THIS WEEK**)**
- **IETLB**: Immersion Event on Transactions, Locking, Blocking, Isolation, and Versioning
  - October 9-11 **(** NEW **)**

- **IEQUERY**: Immersion Event on Fixing Slow Queries, Inefficient Code, and Caching/Statistics Problems
    - October 23-25 **(** NEW **)**

LIVE, IN-PERSON Immersion Events remaining for 2018:

London, UK:

- **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 **(** SOLD OUT **)**
- **IECAG**: Immersion Event on Clustering and Availability Groups
    - September 12-13 **(** SOLD OUT **)**
- **IEPTO2**: Immersion Event on Performance Tuning and Optimization – Part 2
    - 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

Paul@SQLskills.com and Kimberly@SQLskills.com