(October 24th, 2016)

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,

This newsletter is coming to you from Las Vegas, where we're presenting at our bi-annual SQLintersection conference. At some point in the week we'll be playing our first games of craps, after being cajoled into it by some of our SQL-speaker friends – with a strict limit on how much we're willing to lose before giving up!

You've only got two weeks left to register for one of our three classes running in Chicago in November, including our cool **IEPDS class on using R and Azure Machine Learning**.

And we've announced the first half of our 2017 class lineup: nine classes in three weeks, including a **brand new, 3-day course on PowerShell**. All courses have a discount (US$120 for 3-day courses; US$200 for 5-day courses) for registrations and payments received before January 1st, 2017.

Check out all the dates and details on our class schedule page.

One more thing to let you know about is I've put out our annual call to user groups to get remote sessions scheduled for 2017. This year we'll end up having done 94 user groups and PASS Virtual Chapter presentations across the team, up from 86 in 2015, which I think is a tremendous achievement. If you'd like one of us to present for your user group, check out my blog post here.

The latest book I've finished isn't really a book per se; it's Thomas Pavitte's *1000 Dot-to-Dot: Cities*. I've always loved doing dot-to-dots but hadn't found any more-complicated, non-childish versions of them. Pavitte has several books of really cool puzzles that I'm guessing some of you (or maybe your family) would enjoy doing. Check them out!

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

The Curious Case of…

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

(Note: there was a typo in the previous newsletter, where the fix should have stated the input parameter was changed to a varchar.)

Last week I was helping a prior class student with an index fragmentation issue they were having. The student had a heavily-used, nonclustered index that was almost completely fragmented, and when rebuilding it, the fragmentation didn't go away.

After investigating the before-and-after levels of fragmentation using the DMV *sys.dm_db_index_physical_stats*, we looked at the index schema and the method of removing fragmentation.

It turns out that the index had *ALLOW_PAGE_LOCKS* set to *OFF*, and they were using online index rebuild to remove the fragmentation. After some digging online, I found an article on the CSS blog explaining that this combination can lead to excessive fragmentation because of the way allocations are done for online index rebuild operations. While setting *ALLOW_PAGE_LOCKS* to *OFF* can be very beneficial for removing deadlocks, doing so can have this secondary negative side-effect.

The fix, for this specific set of conditions, is to use *MAXDOP* of 1 for the online index rebuild. That changes the way the allocations are done and allows the fragmentation to be removed correctly. You can read the article here, and beware of this combination so you don't spend a bunch of time trying to figure out the never-decreasing fragmentation.

Paul's Ponderings

It's pretty well known these days that you have to be careful with the combination of processor cores, SQL Server Edition, and licensing, but what about *Windows* Server licensing?

Following on from the licensing discussion in the last newsletter, this time we're continuing with some information about Windows Server 2016 licensing and some of the potential pitfalls. All the details below were written by Glenn, who is passionate about the nitty-gritty around processors and server hardware.

Windows Server 2016 uses core-based licensing. It requires a minimum of eight core licenses per physical processor, and sixteen core licenses per server. This may encourage well-meaning server/infrastructure admins to buy higher core-count processors than they really need (since they are paying for sixteen core licenses whether they need them or not). It may discourage them from considering the very fastest four-core and six-core processors that are very well suited to some SQL Server workloads.

The cost of sixteen Windows Server 2016 Standard Edition core licenses is only US$882.00, so that is not the issue. The issue is that the server admin may be biased to "get their money's worth" from their Windows Server 2016 core licenses, by getting more processor cores than they need for SQL Server. They also might decide to save money on the hardware by choosing an Intel Xeon E5-2620 v4 or Intel Xeon E5-2609 v4 processor (both of which are particularly bad choices for SQL server), rather than an Intel Xeon E5-2667 v4.

For SQL Server, a fairly common, smart scenario for smaller customers (or smaller workloads) is to buy a two-socket server, but only populate one socket with a low core count (but high base clock speed) "frequency-optimized" processor to minimize their SQL Server licensing costs. For example, they might decide to get a Dell PowerEdge R730 with one Intel Xeon E5-2643 v4 processor. This frequency optimized processor has six physical cores that would need SQL Server 2016 core licenses, which would cost U$11,151.00 for Standard Edition and U$42,768.00 for Enterprise Edition.

If the misguided server admin decided to get two Intel Xeon E5-2609 v4 processors for the new server, the SQL Server 2016 core licenses would cost US$29,728.00 for Standard Edition and US$114,048.00 for Enterprise Edition. The table below shows what a big mistake this would be.

Processor	Est. TPCE Score	Score/Core	SQL Licenses (Standard Ed.)	SQL Licenses (Enterprise Ed.)
Xeon E5-2643 v4	1040.68	173.45	US$11,151.00	US$42,768.00
Xeon E5-2609 v4	693.79	43.36	US$29,728.00	US$114,048.00

(The TPCE score values are from an internal spreadsheet Glenn uses to help clients with hardware purchases.)

The good choice would give you over 4x the single-threaded performance, and nearly 50% more CPU capacity than the bad choice, with a huge reduction in SQL Server 2016 licensing costs.

You can read more about all of this at these links:

- Pricing and licensing for Windows Server 2016
- Download the Windows Server 2016 licensing datasheet (PDF)
- SQL Server 2016 Licensing Costs
- Practical Processor Selection for SQL Server 2014/2016 OLTP Workloads

Call to action:

If your company is provisioning new hardware for a move to Windows Server 2016, make sure that whoever is responsible for deciding what to purchase takes into account the information above when choosing which processors to buy. Making the wrong choice could cost tens of thousands of dollars!

Video Demo

The details you can find in query plans just keep getting better. In the SP2 release for SQL Server 2014 additional information about query execution statistics was added. Specifically, information about I/O and CPU were added for ***each*** operator. In this Insider Video Erin looks at exactly what information was added and how to find it in a plan.

The video is just under 16 minutes long and you can get it:

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

The demo code is available here.

Enjoy!

SQLskills Offerings

We've just announced the first half of our 2017 class lineup, with discounts available on all classes for registrations/payments received before January 1st, 2017. And, don't forget we still have three classes coming up in Chicago in November this year; do you have year-end budget that you might lose? It's time to check and use your budget to improve your server's performance! And, if the timing works, we look forward to seeing you somewhere 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
- Community blog posts about our classes
- Immersion Event FAQ

Upcoming Immersion Events

Chicago, IL, November 2016

- **IE0**: Immersion Event for Junior/Accidental DBAs
  - November 7-9
- **IEPTO1**: Immersion Event on Performance Tuning and Optimization – Part 1
  - November 7-11
- **IEPDS**: Immersion Event on Practical Data Science
  - November 7-11

Chicago, IL, April/May 2017

- **IE0**: Immersion Event for Junior/Accidental DBAs
  - April 24-26 **US$120 discount for registering in 2016!!**

- **IEPTO1**: Immersion Event on Performance Tuning and Optimization – Part 1
  - April 24-28 **US$200 discount for registering in 2016!!**
- **IESSIS1**: Immersion Event on Learning SQL Server Integration Services
  - April 24-28 **US$200 discount for registering in 2016!!**
- **IEBI**: Immersion Event on Business Intelligence
  - May 1-5 **US$200 discount for registering in 2016!!**
- **IEPTO2**: Immersion Event on Performance Tuning and Optimization – Part 2
  - May 1-5 **US$200 discount for registering in 2016!!**
- **IESSIS2**: Immersion Event on Advanced SQL Server Integration Services
  - May 1-5 **US$200 discount for registering in 2016!!**
- **IEPS**: Immersion Event on Powershell
  - May 8-10 **New class, US$120 discount for registering in 2016!!**
- **IEPDS**: Immersion Event on Practical Data Science
  - May 8-12 **US$120 discount for registering in 2016!!**
- **IEHADR**: Immersion Event on High Availability and Disaster Recovery
  - May 8-12 **US$200 discount for registering in 2016!!**

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