

(October 10<sup>th</sup>, 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 Redmond, WA where we've just returned home from a great trip to Ireland. We had a lot of fun teaching our IEPTO1 class in Dublin, and we arrived a few days early and spent every day doing a road trip somewhere interesting. There's so much excellent scenery in Ireland, and most of it is within a (sometimes long) day trip from Dublin.

SQLintersection is now just two weeks away! We have an exciting line-up of speakers scheduled for our show and we're also running our fantastically fun evening event: SQLafterDark! If your team needs architectural advice and sessions from speakers who not only know their technology but know how to convey it – this is the place to be! Be sure to use the 'SQLskills' discount code to save \$50 on registration. Check it out [here](#).

**We've just 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](#).

I haven't finished any books since the last newsletter so I'll tell you about a few I read earlier in the year that I didn't include in a newsletter: Mervyn King's [\*The End of Alchemy: Money, Banking, and the Future of the Global Economy\*](#) and John Steinbeck's [\*Travels with Charley: In Search of America\*](#).

Mervyn King was the Governor of the Bank of England from 2003 to 2013, so had a ringside seat of the financial crisis in 2008-9. Rather than being self-aggrandizing or trying to deflect blame, his book dispassionately analyzes what he believes led to the crisis: an unwillingness to look beyond liquidity problems to solvency problems, coupled with the alchemy of creating supposed liquid assets (e.g. derivatives based on slices of mortgage loans) from illiquid assets (e.g. sub-prime mortgages). He also explains why the world economy is still in disequilibrium rather than rebounding and presents some interesting ideas for how to change; basically a major reform of the banking sector, including how central banks respond to monetary crises. Unfortunately, it'll require a multi-country effort to fix the financial problems the world faces – which at present seems unlikely to happen. Along the way King explains a lot about macro- and micro-economic theory and the history of finance over the last 100 years, which in itself makes

for a fascinating read. Highly recommended! (side note: I also recommend the movie *The Big Short* if you want a fairly short and very entertaining version of the housing crisis.)

Steinbeck's book is an engaging travelogue from 1961 when Steinbeck drove from NY to CA through the northern states and back through the southern states. He tries to get back in touch with "America", with limited success, especially when he encounters racial hatred in New Orleans. His writing is insightful and engaging, so as this was the first Steinbeck I've ever read (I was schooled in the UK, remember) I'll definitely be reading more. Recommended.

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.*

Glenn was helping a long-term client recently who had sudden degradation in workload performance after deploying some new code into one of their production systems. Their main application was much slower, so users were complaining, and their server's CPU utilization had jumped to 40%.

Glenn figured out which queries were using the most CPU time using one of his popular set of DMV troubleshooting queries (see [here](#) for the latest version) that examines the plan cache. He found two queries that were using the most total worker time, with one being an order of magnitude more expensive than anything else.

Looking at the queries, he found that the code was comparing an nvarchar input parameter to a varchar table column. This was forcing an implicit conversion which resulted in a table scan being used instead of a nonclustered index seek. Changing the input parameter to an nvarchar fixed the problem and let the query run in around 25ms rather than 2.5s, which dropped the CPU utilization down below 10%.

Implicit conversions can really cripple a workload by forcing a scan to be used. Erin blogged about an Extended Event session you can use to find when these occur (and other plan warnings) – see [here](#).

### **Paul's Ponderings**

(The Paul's Ponderings this time was written by Erin and Jon.)

One of the items that we've seen in multiple client engagements with virtual machines has been "best practice" configurations that result in CPU limitations for SQL Server. Erin first encountered this issue a few years ago while working with a client that was running on SQL Server 2008 R2 Standard Edition on a VMware VM with 8 vCPUs.

During the health audit, Erin noticed that only 4 of the CPUs were being used in the Performance Monitor data that was collected. Reviewing the information in `sys.dm_os_schedulers` showed that the first 4 schedulers were ONLINE and the remaining 4 were set OFFLINE by SQLOS. The startup entries in the error log for the instance revealed the cause of the OFFLINE schedulers:

*2014-06-12 08:53:47.08 Server SQL Server detected 8 sockets with 1 cores per socket and 1 logical processors per socket, 8 total logical processors; using 4 logical processors based on SQL Server licensing. This is an informational message; no user action is required.*

The problem here is in how the virtual machine was configured in VMware, with 8 sockets and only 1 core per socket, which is the VMware recommended best practice for configuration in their Performance Best Practices for VMware vSphere® 6.0 whitepaper (see <http://bit.ly/2cVhxZr>). On page 48, there's the following paragraph:

*“When creating a virtual machine you have the option to specify the number of virtual sockets and the number of cores per virtual socket. In general, we recommend leaving this at the default value of 1 core per socket (with the number of virtual sockets therefore equal to the number of vCPUs). In some cases, though, you might have non-technical reasons to set cores per virtual socket to a value other than 1. For example, software is sometimes licensed on a per-socket basis, making it desirable to have multiple cores per virtual socket.”*

Notice the last two sentences. This problem isn't specific to VMware, the same problem can occur on any hypervisor and we've seen this same situation on Hyper-V VMs as well. SQL Server Standard Edition is limited to either four sockets or 16 cores (whichever is the lesser), for SQL Server 2008 R2, 2012, and 2014 (see <http://bit.ly/2dyaQKQ>). SQL Server 2016 increased the core limit to 24 cores (see <http://bit.ly/2dOuJvg>).

When the underlying VM configuration presents more than 4 sockets to the guest VM, Standard Edition can only use the first four sockets. The fix is to change the VM configuration to limit the number of sockets to no more than 4 and then increase the cores per socket for the VM from 1 which will allow SQL Server Standard Edition to use up to the version core limit for query execution.

During our recent IEPT02 class in Bellevue, this topic was discussed as a part of the CPU Performance Tuning module and at least one student in the class found multiple SQL Server virtual machines that were only using 4 of the allocated vCPUs due to Standard Edition licensing limitations. At the same time, Tim was performing a health audit for a new customer where the virtual machine guest was allocated 16 vCPUs but only 4 were being used by Standard Edition, which explained why the client saw no improvements when they increased the vCPU count from 8 to 16 for the virtual machine.

## **Call to action:**

If you have SQL Server virtual machines that run Standard Edition, check the startup error log messages and `sys.dm_os_schedulers` to verify that the VM configuration is not limiting the number schedulers that SQL Server can actually use.

## **Video Demo**

In this week's video, Jonathan shows how to add the SSISDB Integration Services Catalog database into an existing Availability Group in SQL Server 2016, and then enable AlwaysOn support for Integration Services in Management Studio.

The video is just over 4 minutes long and you can get it:

- In WMV format [here](#).
- In MOV format [here](#).

No demo code this time.

Enjoy!

## **SQLskills Offerings**

We've just announced the first half of our 2017 class lineup, with discounts available on all classes for payments received before January 1st, 2017. And, don't forget we still have three classes coming up in Chicago in November this year, plus SQLintersection in Las Vegas in a couple of weeks. We hope to see you at a class or a conference 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](mailto:Paul@SQLskills.com) and [Kimberly@SQLskills.com](mailto:Kimberly@SQLskills.com)