(March 2nd, 2021)

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!

This newsletter comes to you from Redmond, where I decided over the weekend to engage in a new hobby – learning about biology. See the book review below for more details. And last week we celebrated Jonathan's ten year (!) anniversary of working at SQLskills – see here for some photos from over the years.

Our live IEPTO1 class is coming up in two weeks – details below!

Take care and stay safe out there!

SQLskills News

Live, ONLINE classes in 2021: our classes this year will be live-streamed online, as it's not feasible to run in-person classes for the foreseeable future. Just like our last deliveries, we'll be running them as a series of half-day sessions. Students loved the split training days, from the comfort of watching in sweatpants to the ability to still get some of their regular duties accomplished. We had rave reviews for the format. And, all attendees of a live class receive lifetime streaming access to the recording of the entire class – something we'd never done before this year!

Our upcoming live, online classes for spring 2021 are as follows:

- **IEAzure**: Immersion Event on Azure SQL Database, Azure VMs, and Azure Managed Instance
  - Currently running…
- **IEPTO1**: Immersion Event on Performance Tuning and Optimization – Part 1
  - Ten half-days: March 15-16-17-18-19 and March 22-23-24-25-26, 2021
- **IEPTO2**: Immersion Event on Performance Tuning and Optimization – Part 2
  - Ten half-days: April 12-13-14-15-16 and April 19-20-21-22-23, 2021
- **IEQS**: Immersion Event on Solving Common Performance Problems with Query Store
  - Three half-days: May 4-5-6, 2021
- **IEVLT**: Immersion Event on Very Large Tables: Optimizing Performance and Availability through Partitioning
  - Four half-days: May 17-18-19-20, 2021

These classes are available for registration individually or as part of a discounted bundle. You can get all the details on our training options page or just go directly to our new shop. However, before you buy, be sure to review all of the new options and discounts; we're very excited to offer our new Blackbelt Badge and Bundles**!**

Streaming recordings of all classes: we've built a new system that allows you to buy streaming access to all our 2019 and 2020 class recordings. All classes are available for a complete year of access and a few heavily discounted courses for 90 days of access, plus you can purchase them individually or as part of a discounted bundle. You can get all the details in our training options page or just go directly to our new shop.

Kandio job candidate assessments: we've teamed up with Kandio to produce technical assessments to help companies screen candidates for job recruitment. If you want to make sure someone really knows what they say they know, check out the assessments here.

Book Review

The latest book I've read is Jack Challoner's *The Cell: A Visual Tour of the Building Block of Life*. This is a fascinating and extremely well-written introduction to cell biology, with lots of stunning photos and very clear explanations. I learned a huge amount very quickly, and had great fun chatting with my younger daughter (studying Environmental Biology at college, from home) about the concepts and fascinating insights. It's not too basic and not too advanced, perfect for the intelligent layman with a good grounding in and passion for science. I'm now moving on to his similar book on galaxies. Highly recommended!

I enjoyed the book so much that I've decided to do a Daddy-daughter hobby of learning biology this year. So I bought a 1,500-page biology textbook, a trinocular, lab-grade microscope with an 18MP camera, and several hundred specimen slides. I only did a year of biology in school, back in 1984, so this is a whole new field to learn about and geek out on!

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.

Several times last week I was in discussions around how much transaction log is generated when a table is dropped. You can read about the answer in my blog post here…

Ponderings…

The Ponderings this time is inspired by a battle Jonathan, Kimberly, and I fought in the last few weeks of December and early January.

As you know, we revamped our website completely last year, and were forced to move all our classes online because of the ongoing pandemic. After the classes finished in late October, we planned to then revamp our class registration system and online shop. We celebrated Jonathan moving our WordPress back-end from a Windows Server VM to an Ubuntu Linux VM, as that made things a lot more stable.

With the change to Linux, we decided to throw out the old ASP.NET code-based registration and shop system and move to WooCommerce, with all the attendant plugins for user management, calculating world-wide sales tax where applicable, linking in to our credit-card processor, and so on. Jon also came up with a nifty DRM'd solution for letting users stream class recordings.

Everything was going great, until the website began to have an increase in attacks against WordPress trying to exploit documented risks. The largest set of attacks were brute force hacking attempts at the admin account in WordPress (pointless as we use a random 32-character password) as well as against Jonathan and my personal accounts with admin privileges (also pointless, as they're set up for 2FA). Subsequent to the uptick in these attacks, another type of attack began to attempt to utilize a security hole in one of the plugins to brute force try stolen credit card numbers through our payment processor.

The long story short is that all the nefarious activity was drastically slowing down our website. Jon installed WordFence Pro to automatically block dodgy activity against WordPress and further tighten the security of the installation. While WordFence was successful at blocking the attempts, it didn't actually reduce the volume of activity that the server had to handle. However, it did log the blocked attempts to a table inside of the MySQL database which allowed Jon to create a cron job (timer task, for the non-Unix-savvy) that would add new rules to the Ubuntu firewall ever five minutes for anyone blocked by WordFence. Additionally another cron job was scheduled to read the web server access logs using a pattern match I won't explain to identify to prevent the credit card scamming attempts.

With all these fixes, and preventing unwanted website activity as early as possible in the stack, we reduced the average CPU on our server from around 30-40% to around 5%, and the website is super-fast now.

You may be thinking that's all very interesting Paul, but how is this relevant to SQL Server?

Well, quite often we see performance issues with new clients that are similar. By that I mean that SQL Server is heavily loaded and performing a review of the activity against the server reveals that it doesn't need to be.

There are obvious server-side CPU hogs like inefficient plans (e.g. because of missing indexes, implicit conversions, cardinality estimate issues), misuse of temp tables (where not needed, or not scoping down the data pulled into them), and other things.

There are also less obvious things to consider such as how the application is making use of SQL Server, and I don't mean the query plans and so on – I mean from the application's perspective, what is it asking SQL Server to do, and is it all appropriate?

One example of inappropriate use of SQL Server is the application asking for a large result set, possibly from a costly query, and then drastically filtering the data returned from SQL Server and only using a small portion of it. Rather than having SQL Server marshal and send all that data to the application, it's usually far more efficient to push the data filters into the query and let SQL Server do the filtering at the relational level. By filtering data as early as possible in the query plan, that reduces the amount of processing that SQL Server has to do, the amount of data sent back to the application, and the amount of processing the application has to do. And, of course, it lets the application return results to the user far faster!

Another example of inappropriate use of SQL Server is making repeated calls from the application to return exactly the same data. It would be much more efficient to cache static data rather than making excessive round-trips to SQL Server, wasting server resources. There could also be issues caused by what's known as the N+1 query pattern; where for each row returned by a single query, another query is then executed in a loop with a filtering key provided by the original result row. It's much more efficient to perform a join operation inside the database engine to retrieve the additional data in a single call than to have to make a separate call for each record in the first result.

Think about the cost trade-offs: on the one side you've got the cost of working out efficient full-stack architecture, including something like a Redis or Memcached cache for static data, up against leaving in the inefficiencies and having to scale up SQL Server with attendant licensing costs. Although you might be able to throw hardware at the problem, that's usually not the best choice in the long run. Keep in mind that as the number of sockets increases in the server, the single threaded performance (which matters for query response time) is reduced by as much as 20% due to inter-socket coherence checking and communications.

For us, cutting off the bad traffic by leveraging firewall rules was the smarter way to go than just increasing the number of available PHP threads and beefing up the capabilities of the Ubuntu VM. For you, evaluating how the application is using SQL Server could lead to big cost savings, especially if you're on Azure and you're able to drop to a lower-cost performance tier by making some smart changes in your architecture.

Call to action: Don't just focus on optimizing what SQL Server is being asked to do – make sure that what it's being asked to do are the *right* things!

#TBT

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

The theme for #TBT is communication skills so here are some resources for you:

- My Pluralsight course on *Communications: How to Talk, Write, Present, and Get Ahead!* that has 2.5 hours covering skills for communicating, running and attending meetings, all forms of writing from emails to articles, and how to write and deliver presentations
- And a bunch of blog posts:
  - *Public Speaking: A Primer*
  - *Ignorance is not stupidity*
  - *It depends. It really, really does.*
  - *RTFM. No seriously, R.T.F.M. Then ask your question.*
  - *Learning to listen*
  - *How to ask questions politely and correctly*
  - *How to answer questions politely and correctly*

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

- Paul: *Jonathan's ten year anniversary!*
- Jon: *Bitten by SSD Bit Rot*

I hope you find these useful and interesting!

Video Demo

In this video this time, Jon takes a look at and demonstrates some of the nuances of configuring Availability Group Listeners and Read-Only Routing when one or more of the Availability Replicas is a named instance of SQL Server instead of the default instance.

The video is just over 12 minutes long and you can get it in WMV format here.

Enjoy!

Upcoming SQLskills Events

Our 2021 classes will be entirely online in the spring and they're open for registration!

With our new streaming system, you can now choose to attend a live, online event or purchase a recording to watch at your leisure, either individually or as part of a bundle. And all attendees of live events get lifetime access to the class recordings too!

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

LIVE, Online Immersion Events:

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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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