

(August 3<sup>rd</sup>, 2015)

If you know someone who you think 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, where we've been sweltering in unusually high temperatures for the last two weeks – there have definitely been some climate changes in Western WA in the 16 years I've been here.

We've got a busy Fall with our classes running in London, Dublin, and Chicago and another great week at SQLIntersection (in Las Vegas this October). We might further tweak our line-up for SQLIntersection but we've already posted a lot of the great sessions that will be presented; it's going to be a fantastic week for database architects and developers! If you're going to PASS, consider sending your developers to SQLIntersection – then, everyone can return and cross train each other on what you've learned and you all win! Check out more information online at [www.SQLIntersection.com](http://www.SQLIntersection.com) and don't forget to register with the discount code of SQLskills to save \$50 off your registration.

The latest books I've read are the four-part Singularity Series by William Hertling ([Avogadro Corp](#), [A.I. Apocalypse](#), [The Last Firewall](#), and [The Turing Exception](#)). I enjoyed them so much that I do something I very rarely do – read them all back-to-back. The series deals with the rise of true A.I. and the conflicts that arise with humans. The first A.I. arises from an email rewriting program, and then subsequent ones from a virus created to include evolutionary biology algorithms. Lots of interesting technology, plenty of battles, and all four are total page turners and quick reads. Recommended!

Note: you can get all the prior Insider newsletters [here](#).

### **Glenn's Ponderings**

*(This time around Glenn had a great idea for the editorial so I invited him to write it for a change – so in this newsletter it's Glenn's Ponderings!)*

As I've been watching what's been going on recently in the Windows and SQL Server world, I have come to the conclusion that it's a particularly exciting time to be a database professional working with SQL Server because of all of the recent and upcoming advances in technology. There are useful and valuable advances both in hardware and storage and in the Microsoft Windows/SQL Server ecosystem.

## Processors

Right now, you can get extremely capable, high performance server processors with physical core counts between four and eighteen cores per processor. I am referring to the current 22nm [Intel Xeon E5-2600 v3](#) (Haswell-EP) and [Intel Xeon E7-8800 v3](#) (Haswell-EX) families that both use much higher bandwidth DDR4 memory.

You also have the flexibility to choose a particular processor based on its physical core count and clock speeds to balance your SQL Server core license costs with your performance and scalability needs. Figures 1 and 2 show the best processor choices for a given core count for these two families.

Model	Cores/L3 Cache	Base Speed	Turbo Speed	Price
E5-2699 v3	18/45 MB	2.3 GHz	3.6 GHz	\$ N/A
E5-2698 v3	16/40 MB	2.3 GHz	3.6 GHz	\$ N/A
E5-2697 v3	14/35 MB	2.6 GHz	3.6 GHz	\$2,702.00
E5-2690 v3	12/30 MB	2.6 GHz	3.5 GHz	\$2,094.00
E5-2660 v3	10/15 MB	2.6 GHz	3.3 GHz	\$1,449.00
E5-2667 v3	8/20 MB	3.2 GHz	3.6 GHz	\$2,057.00
E5-2643 v3	6/20 MB	3.4 GHz	3.7 GHz	\$1,552.00
E5-2637 v3	4/15 MB	3.5 GHz	3.7 GHz	\$996.00

Figure 1: Preferred Haswell-EP Processors for SQL Server Usage

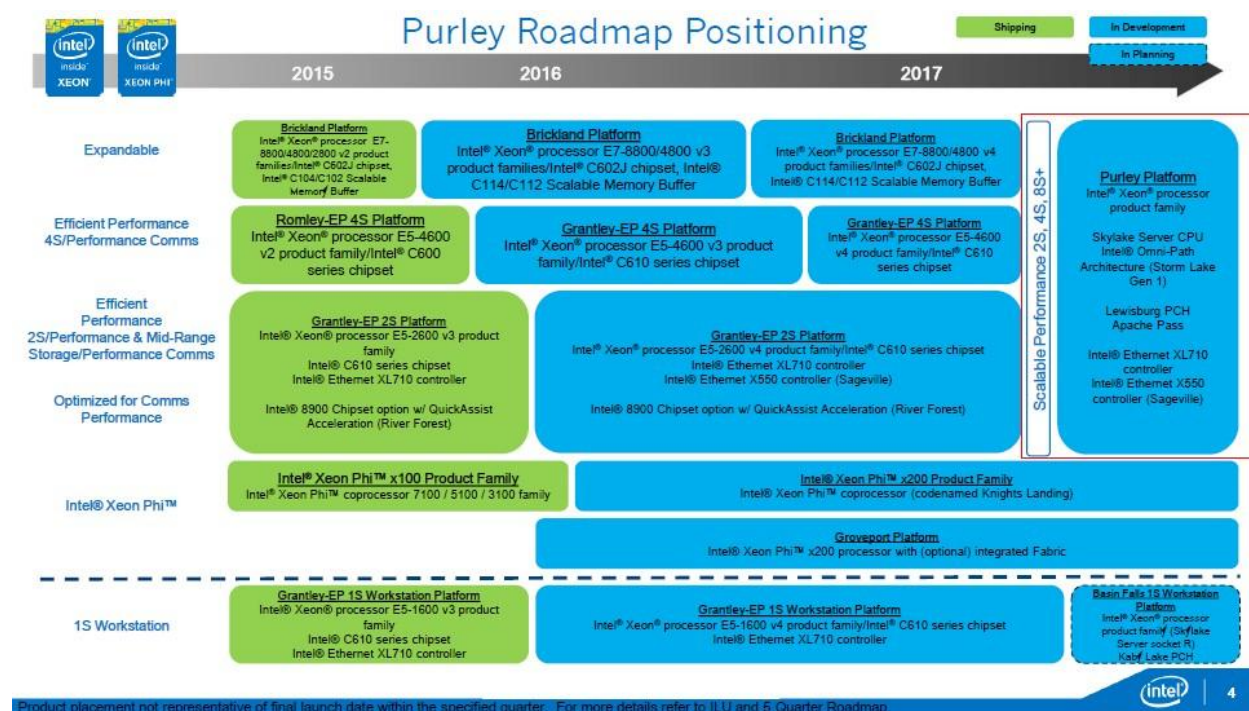
Model	Cores/L3 Cache	Base Speed	Turbo Speed	Price
E7-8890 v3	18/45MB	2.5GHz	3.3GHz	\$7,175.00
E7-8867 v3	16/45MB	2.5GHz	3.3GHz	\$4,672.00
E7-8891 v3	10/45MB	2.8GHz	3.5GHz	\$6,841.00
E7-8893 v3	4/45MB	3.2GHz	3.5GHz	\$6,841.00

Figure 2: Preferred Haswell-EX Processors for SQL Server Usage

On the near horizon, we will soon see the 14nm Xeon E5-2600 v4 family (Broadwell-EP) for two-socket servers, which will probably show up in Q1 or Q2 of 2016. This will be a Tick release, building on the current Haswell microarchitecture that will have up to 22 physical cores and DDR4 2400 support. This processor will work in existing model servers such as the Dell

PowerEdge R730. Later in 2016, we should see the 14nm Xeon E7-4800/8800 v4 family (Broadwell-EX) for four and eight-socket servers that will have up to 24 physical cores.

Finally, in 2017, we should see a new 14nm Skylake server CPU that may merge the Intel Xeon E5 and E7 lines into a single family, with up to 28 physical cores that will be part of the Purley platform which [is detailed here](#) and in Figure 3.



**Figure 3: Intel Server Purley Platform Roadmap**

As these new processor families show up, with ever higher physical core counts, hopefully Intel will continue to offer lower core count, “frequency-optimized” SKUs, which offer higher clock speeds and much lower SQL Server license costs than their highest core count models.

With 64GB DDR4 DIMMs, you can have 6TB of RAM in a commodity, four-socket server, which is actually more memory than is supported by Windows Server 2012 R2. Luckily, Windows Server 2016 raises the memory limit to 12TB. With increasing memory density and better memory controllers in the latest processors, it is increasingly feasible to have enough RAM in your database server to have your entire workload in the SQL Server Buffer Pool.

## Storage

We also have much less expensive, higher performing flash storage from vendors such as SanDisk and Intel. For example you have the latest [SanDisk Fusion ioMemory SX350 PCIe](#)

[Application Accelerator](#) product line, with capacities from 1.25TB to 6.4TB. Intel has [PCIe enterprise flash storage products](#) with capacities from 400GB to 2TB.

Enterprise flash storage is much more affordable than it was even a year ago, so it is worthwhile to reconsider using it if it seemed unaffordable in the past. The next 6-12 months should really see the more widespread adoption of PCIe NVMe flash storage devices from multiple storage vendors.

## Microsoft

Microsoft is on a rapid and aggressive release cadence for CTP builds of [SQL Server 2016](#), with [SQL Server 2016 CTP 2.2 being released on July 28, 2015](#). They have also separated SQL Server Management Studio (SSMS) into a separate product that can be updated independently from the rest of the product, and can also automatically check for product updates.

SQL Server 2016 has a number of [interesting improvements](#) over SQL Server 2014. One of the most exciting is a feature called QueryStore, which gives you a much deeper level of visibility and insight about query plan choice and performance for any database where you have enabled [QueryStore](#) with an ALTER DATABASE command.

It automatically captures a history of queries, plans, and runtime statistics, and retains these for your review. Unlike DMV/DMOs, QueryStore information survives restarts of the SQL Server service. Perhaps the most useful feature in QueryStore is the ability to “force” a particular query plan with a simple system stored procedure, which will work much better than the old plan guide functionality.

One new development with SQL Server 2016 that may surprise some people is that it requires Windows Server 2012 (or Windows 8) or newer.

Windows Server 2016 is likely to be released in early 2016, and it will have a number of important improvements compared to previous versions of Windows Server, such as a higher 12TB memory limit, better clustering and virtualization support, and a new version of Server Message Block ([SMB 3.1.1](#)) with better support for scale-out file servers.

## Future developments

Intel and Micron jointly unveiled a new kind of [non-volatile data storage device](#) called 3D XPoint (pronounced cross-point) during a press conference on July 28, 2015. According to Intel and Micron, it is 1,000 times faster and has 1,000 times more endurance than current conventional NAND flash and is ten times denser than DRAM. It's also non-volatile, which means there's no need to power it at all times. 3D XPoint has already entered production at their joint factory in Utah, and they claim that it will be sampled "later this year with select customers", with volume production in 2016.

Initially, we'll probably see some sort of hybrid memory devices, such as sticks of memory that have both DRAM and 3D XPoint soldered on, or hybrid drives with NAND flash for mass storage and 3D XPoint providing a faster cache for the NAND. All of this will require hardware support from the server vendors and operating system support from Microsoft before we see the full benefits of the technology, but it is exciting nonetheless.

## **Call to Action**

As a database professional, I think it makes a lot of sense to pay attention to relevant industry trends and product release cycles so you can do a better job planning for future upgrades. For example, if you are aware that a new version of SQL Server, a new version of Windows Server, a new family of Intel server processors, and a new generation of PCIe NVMe storage devices are due to be released by early-mid 2016, that might have a significant impact on your infrastructure budget and planning process.

Staying current with technology is also good for your career, both from a personal and professional perspective. Personally, I find that your job is much more enjoyable if you are actually passionate about it. Getting excited about new technology is a good thing if you are going to be working with technology! Professionally, staying up to date with new technology helps you do your job better and it also makes you a more valuable employee.

## **Video Demo**

Back in June my latest Pluralsight course was released: [\*SQL Server: Index Fragmentation Internals, Analysis, and Solutions\*](#). In Module 5 I explain the details of detecting index fragmentation and discuss the problems with tracking page splits happening. In this demo, I should how to track page splits using Extended Events and using transaction log analysis.

The video is about 5.5 minutes long and you can get it in WMV format [here](#).

And the demo code is [here](#).

Enjoy!

## **SQLskills Offerings**

We've released all of our classes for 2015, listed below. We'll release the first portion of our 2016 schedule around September/October.

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**

London, UK

- August 24-28, 2015: **IEPTO1**: Immersion Event on Performance Tuning and Optimization – Part 1 (formerly IE1) **SOLD OUT!**

Dublin, Ireland

- October 12-16, 2015: **IEPTO2**: Immersion Event on Performance Tuning and Optimization – Part 2 (formerly IE2) **Only a few seats (<5) available!**
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Chicago, IL

- November 16-18, 2015: **IE0**: Immersion Event for the Accidental/Junior DBA
- November 16-19, 2015: **IEPDS**: Immersion Event on Practical Data Science
- November 16-20, 2015: **IEPTO1**: Immersion Event on Performance Tuning and Optimization – Part 1 (formerly IE1) **Over 60% booked already; register early to avoid disappointment!**

See [here](#) for the main Immersion Event Calendar page that allows you to drill through to each class for more details and registration links.

### **SQLintersection**

We're looking forward to another great SQLintersection event! This Fall SQLintersection is running the week of October 26, 2015 back in Las Vegas. Yes, it's the same week as PASS. No, that's not really a problem! We don't have a lot of folks that attend both PASS and SQLintersection so the overlapping week isn't a big problem. And, it's a great way to get different perspectives on the tech and have everyone come back and do knowledge-transfer.

Check it out online at [www.SQLintersection.com](http://www.SQLintersection.com). When you register, don't forget to use the discount code "SQLskills" (without the quotes and it isn't case-sensitive) and you can save \$50 off registration. We hope to see you there!

### **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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