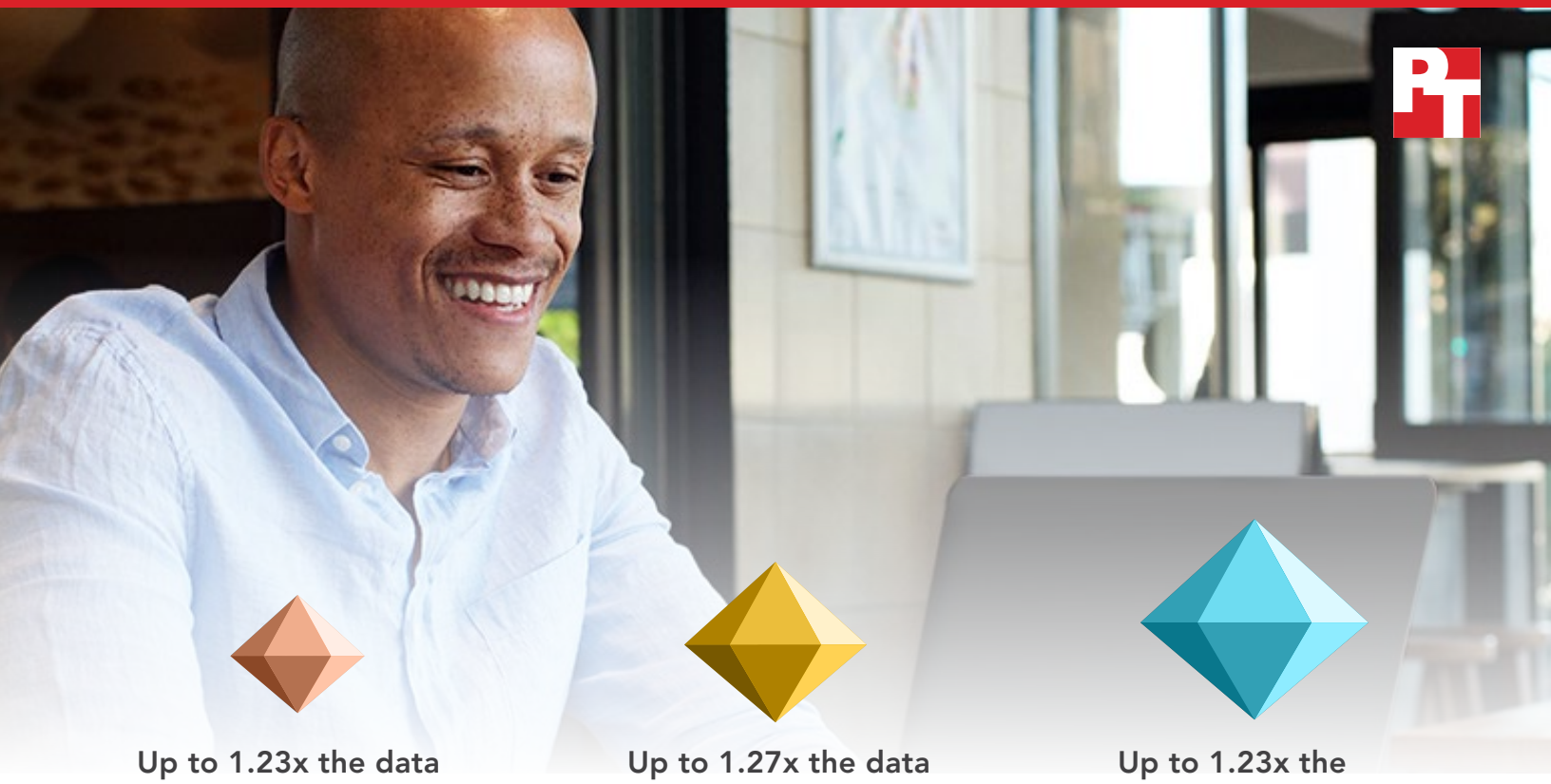

Up to 1.23x the data processing speed*

For businesses using small, 8vCPU VMs running a 30GB database

Up to 1.27x the data processing speed

For businesses using mid-sized VMs with 16 vCPUs and a 100GB database

Up to 1.23x the data processing speed

For businesses using large VMs with 64 vCPUs and a 300GB database

Get better data warehouse performance in Microsoft SQL Server 2019 with new Microsoft Azure Eds_v5 VMs featuring 3rd Generation Intel Xeon Scalable processors

Compared to older Eds_v4 VMs with 2nd Gen Intel Xeon Scalable processors, the new VMs completed data queries in less time

If your organization needs to support cloud workloads for data analytics, decision support systems, data warehousing, or business intelligence, you may be wondering what a brand-new series of Microsoft Azure virtual machines could do for you that the previous version can't. How much difference could one version make?

At Principled Technologies, we resolved to answer that question by comparing the Microsoft SQL Server 2019 data warehouse performance of two memory-optimized series of Azure VMs: new Eds_v5 series VMs with 3rd Generation Intel® Xeon® Scalable processors, and older Eds_v4 series VMs with 2nd Generation Intel Xeon Scalable processors. In our tests, the new VMs processed the SQL Server workload significantly faster than the older VMs. This benefit could enable you to find data insights in less time and start using them to improve your business sooner.

How we tested

We compared the following series of memory-optimized VMs:

- **Eds_v5 VMs** featuring Intel Xeon Platinum 8370C processors (Ice Lake)
- **Eds_v4 VMs** featuring Intel Xeon Platinum 8272CL processors (Cascade Lake)

We tested each VM in the East US 2 region.

VM sizing

Microsoft Azure scales each VM's memory to better fit its compute power. We also chose to scale database size to represent a likely use case at each compute level. To demonstrate the performance of the new Eds_v5 series VMs in a variety of use cases, we chose to test three VM sizes:

- **Small VMs:** 8 vCPUs, a 30GB database, and up to 64 GB of RAM
- **Medium VMs:** 16 vCPUs, a 100GB database, and up to 128 GB of RAM
- **Large instances:** 64 vCPUs, a 300GB database, and up to 512 GB of RAM

We also sized each database to ensure the databases fit within each VM's allocated RAM, which consequently meant that in each VM, the CPU was under a heavier load than the storage drives.

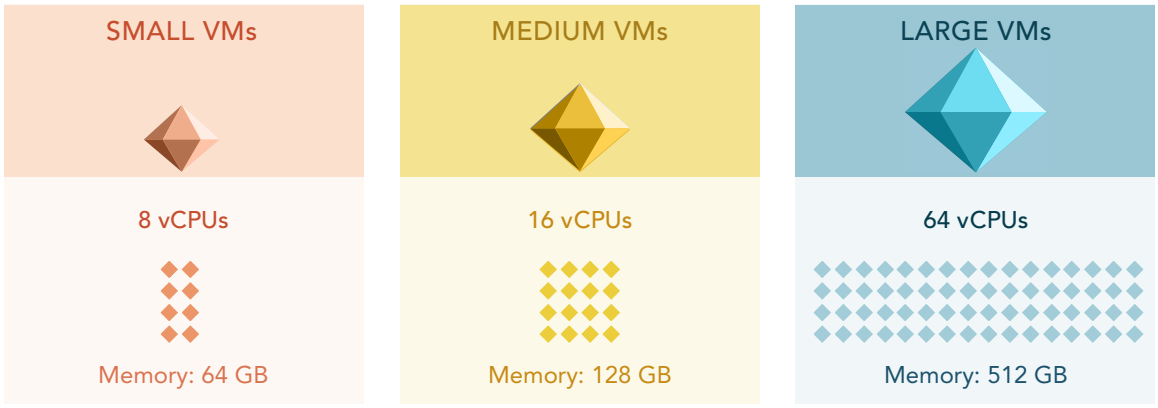

Figure 1: Specifications of the VMs we tested. Source: Principled Technologies.

Data warehouse workload

To test each memory-optimized VM, we used a data warehouse workload (TPROC-H) from the HammerDB benchmarking suite. The workload measures the time required for a VM to complete a "stream" of 22 business-related queries. We tested VMs running a single stream as well as multiple streams concurrently. Though the HammerDB developers derived the TPROC-H workload from TPC-H benchmark specifications, because it is not a full implementation of TPC-H, our results are not directly comparable to published TPC-H results.

Our results

To determine how the increasing amounts of work affected each VM's performance, we began our tests with a single stream of data warehouse queries and scaled up to the maximum number of concurrent streams that workload specifications recommend for each database size.

Our results in Figures 2 through 4 demonstrate that new Eds_v5 VMs with 3rd Generation Intel Xeon Scalable processors achieved faster query times than the older Eds_v4 VMs with 2nd Generation Intel Xeon Scalable processors, regardless of VM and database size. Being able to support more data streams means analyzing more data simultaneously, which could in turn mean using the results of data analysis sooner to improve your business.

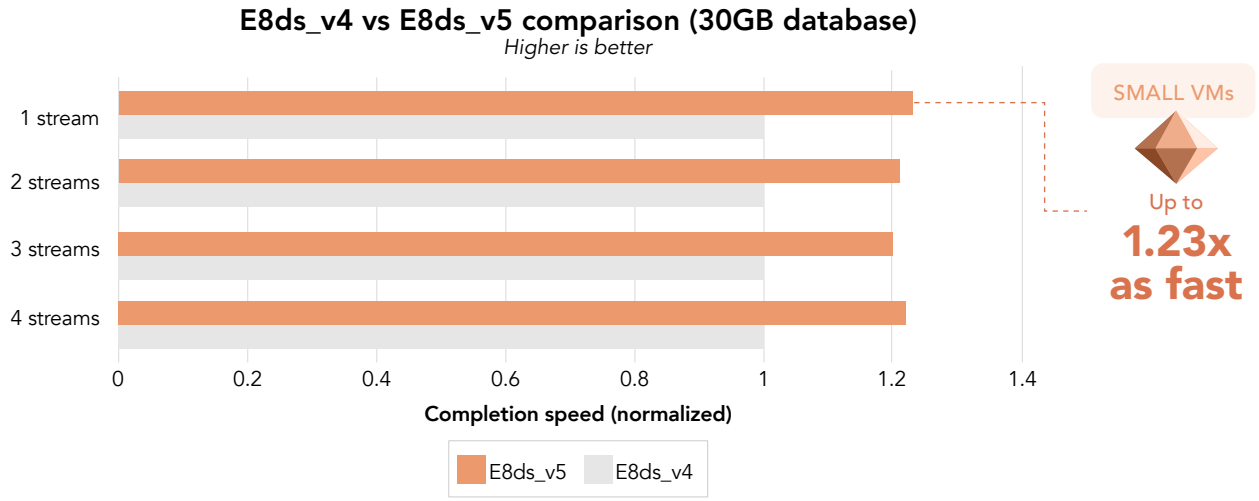

Figure 2: Time required to complete the HammerDB data warehouse workload, normalized to the E8ds_v4 VM's time in each category. Source: Principled Technologies.

Microsoft Azure Ev5 VMs

Earlier this year, Microsoft began a preview period for the version 5 of its general-purpose and memory-optimized VMs, which feature 3rd Generation Intel Xeon Scalable processors in hyperthreaded configurations. Paul Nash of Microsoft notes that the new VMs have the following features:[1]

- Up to 96 vCPUs and up to 672 GiB of RAM
- All-core Turbo clock speed of up to 3.5GHz
- Intel Turbo Boost Technology 2.0
- Intel Advanced Vector Extensions 512 (Intel AVX-512)
- Intel Deep Learning Boost

To learn more, visit https://azure.microsoft.com/en-us/updates/new-azure-vms-for-general-purpose-and-memory-intensive-workloads-now-in-public-preview/.

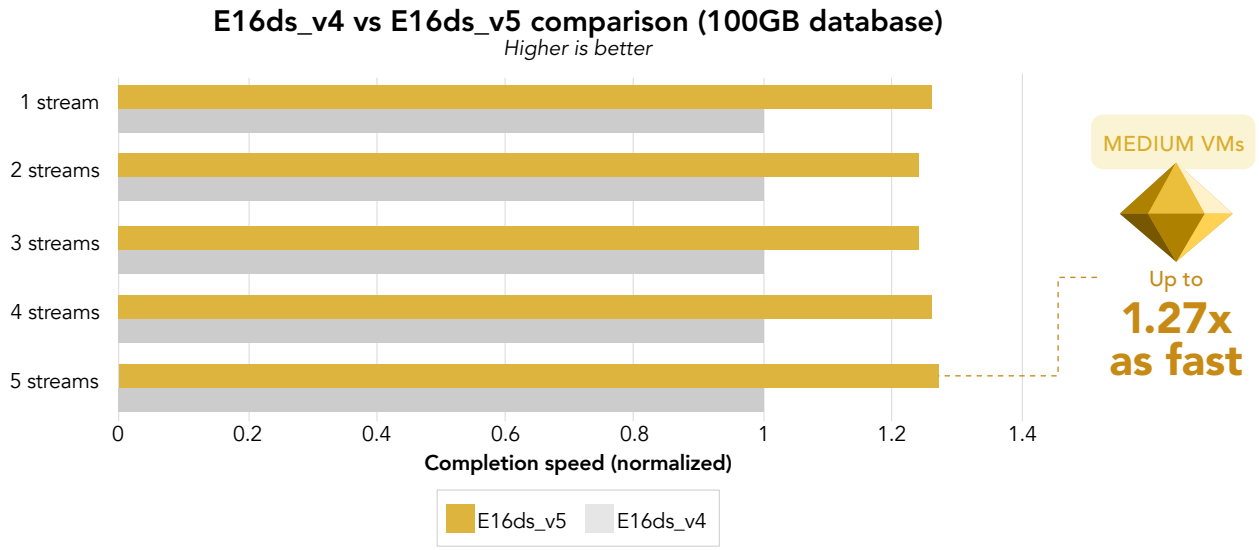

Figure 3: Time required to complete the HammerDB data warehouse workload, normalized to the E16ds_v4 VM's time in each category. Source: Principled Technologies.

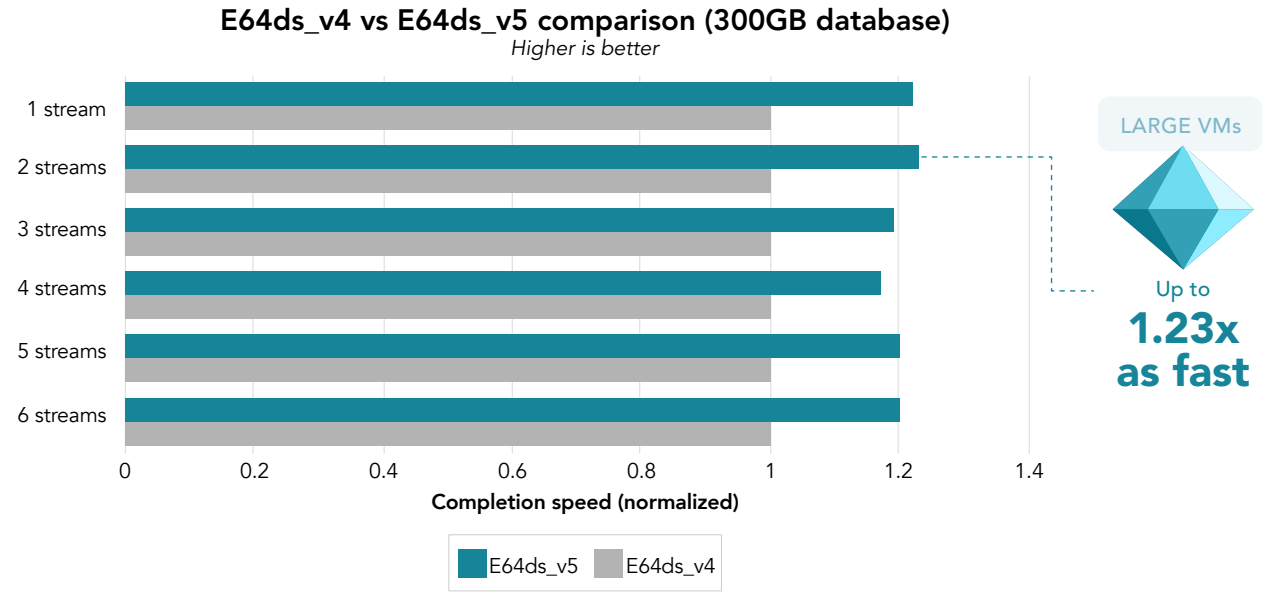

Figure 4: Time required to complete the HammerDB data warehouse workload, normalized to the E64ds_v4 VM's time in each category. Source: Principled Technologies.

To get a better sense of what these data warehouse results could mean for your business, consider the following hypothetical scenario:

Each night, a medium business has a four-hour window in which to analyze a 100GB database. The company uses this analysis to generate reports for team leaders each morning and to drive other business processes throughout the day. Based on the timed results of our single-stream tests (which you can find in the Science behind this report), we calculate that a new E16ds_v5 VM would enable this hypothetical company to run 313 query sets within their analysis window each night. By contrast, the E16s_v4 VM would complete just 248 query sets in the same time frame (26% fewer). If this company needed to complete only 248 query sets each night, the new E16ds_v5 VM would enable them to finish their work in just 3 hours 10 minutes, shrinking the required analysis window by nearly an hour compared to the E16s_v4 VM. Over the course of a year, this hypothetical company would save 304 hours of analysis time per year while maintaining the same rate of analysis they could get with the E64s_v4 VM, enabling them to save money on VM uptime.

Conclusion

In general, you can expect that newer technologies will enable better performance for cloud workloads, but how can you be certain that the generational divide between iterations of cloud VMs is worth using the latest tech? In our tests, new memory-optimized Microsoft Azure Eds_v5 VMs featuring 3rd Generation Intel Xeon Scalable processors completed a Microsoft SQL Server 2019 data warehouse workload up to 1.27 times as fast as older Eds_v4 VMs that used 2nd Generation Intel Xeon Scalable processors. Being able to accomplish analytics work quickly can enable your organization to reach conclusions sooner and to implement key business solutions might yield a competitive advantage.

1 Paul Nash, "Upgrade your infrastructure with the latest Dv5/Ev5 VMs in preview," accessed June 15, 2021, https://azure.microsoft.com/en-us/blog/upgrade-your-infrastructure-with-the-latest-dv5ev5-azure-vms-in-preview/.

Read the science behind this report at http://facts.pt/Dh7Y228 ▶

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