



Get better MySQL online transaction processing performance with new Microsoft Azure VMs featuring 3rd Generation Intel Xeon Scalable processors

Compared to older VMs with 2nd Generation Intel Xeon Scalable processors, the new offerings handled a higher rate of transactions per minute (TPM)

Quantifying the online transaction processing (OLTP) performance advantage you can gain by choosing newer cloud VMs over older ones can be challenging.

That's why, at Principled Technologies, we compared the MySQL™ OLTP performance of two series of general-purpose Microsoft Azure VMs: new Dds_v5 series VMs featuring 3rd Generation Intel® Xeon® Scalable processors, and older Dds_v4 series VMs with 2nd Generation Intel Xeon Scalable processors. In our tests, we found that the newer series VMs handled more transactions per minute than the older VMs—up to 1.39 times the rate. This greater performance could enable companies to better handle unexpected spikes in activity or plan for future growth.



Small businesses

Support up to 1.39x the average TPM on a 22GB database



Medium organizations

Support up to 1.34x the average TPM on a 45GB database



Large enterprises

Support up to 1.20x the transactions per minute on a 180GB database

How we tested

We purchased instances from two general-purpose series of Microsoft Azure VMs:

- **New Dds_v5 VMs**
featuring Intel Xeon Platinum
8370C processors
(Ice Lake)
- **Older Dds_v4 VMs**
featuring Intel Xeon Platinum
8272CL processors
(Cascade Lake)

We ran all VMs in the East US 2 Availability Zone 2 region.

VM sizes

Figure 1 presents high-level details on the instances we tested. (For full information, see the [Science behind this report](#).) To represent a range of organizational needs, we tested three sizes of VMs from each series: small VMs with 8 vCPUs and a 22GB database, medium VMs with 16 vCPUs and a 45GB database, and large VMs with 64 vCPUs and a 180GB database.

We used two criteria to determine database size. We wanted to represent a realistic workload for each compute level, but we also wanted to ensure that each VM's processors bore a heavier load than the storage drives. To accomplish this, we ensured each database could fit within the allocated RAM for each VM. Though this is not always possible, we typically find that sizing a database to fit within RAM can ensure good performance while lowering the cost of cloud storage.

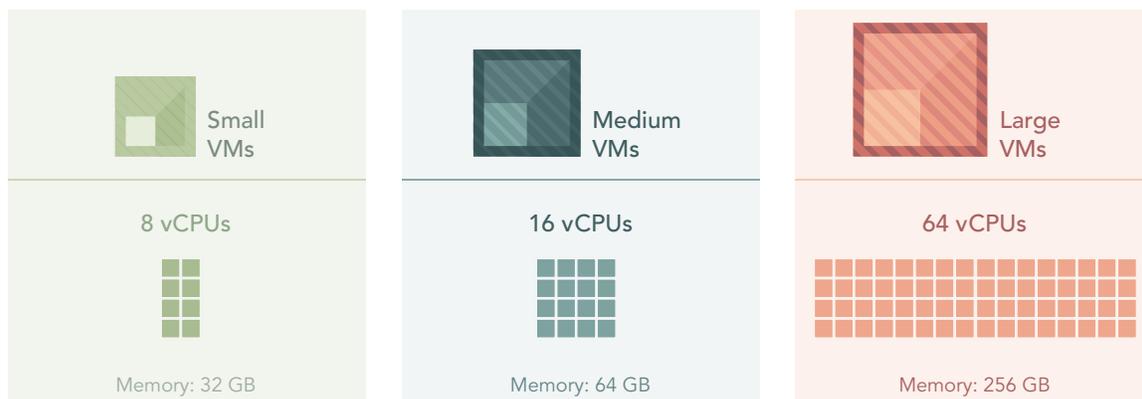


Figure 1: Specifications for the VM size categories we chose to test. Source: Principled Technologies.

OLTP workload

To test the VMs, we used an OLTP workload from the HammerDB benchmarking suite called TPROC-C. Online business services such as grocery stores, parcel delivery services, and retail all rely on OLTP databases. The HammerDB developers derived their TPROC-C workload from the TPC-C standard. However, it is not a full implementation of TPC-C specifications. As such, the results we cite in this paper are not directly comparable to those officially published by TPC.

About MySQL

MySQL is an open-source relational database management system. According to Stackshare, more than 5,000 organizations, companies, and businesses on the Stackshare website use MySQL in their tech stacks, including Netflix, Twitter, and Amazon.¹ The MySQL organization reports customers in dozens of countries and in industries ranging from aerospace to education to finance.²

Our results

Businesses use OLTP databases to handle financial transactions, customer relationship management (CRM) systems, online retail, and more. If your business relies on this kind of database work, it'll pay to have a cloud solution that can keep up with demand.

Small VMs (8 vCPUs, 22GB database)

Smaller organizations are in particularly risky waters if their websites can't handle an unexpected influx of new orders. To keep users on the path to checkout, you need a cloud solution that can handle user demand. Figure 2 shows that the new D8ds_v5 VMs with 3rd Generation Intel Xeon Scalable processors handled 1.39 times the average transactions per minute as the D8ds_v4 VMs that used 2nd Generation Intel Xeon Scalable processors.

MySQL TPROC-C performance with 8 vCPUs (transactions per minute)

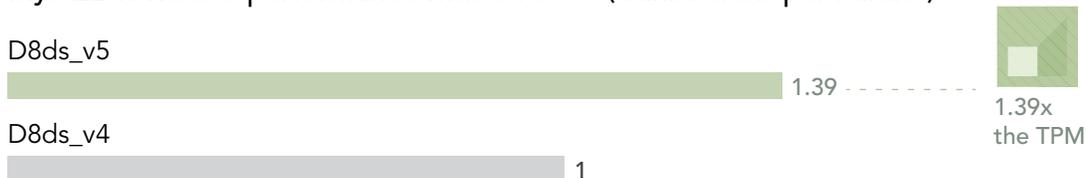


Figure 2: Average transactions per minute each Microsoft Azure VM processed, normalized to the rate of the D8ds_v4 VM. More transactions are better. Source: Principled Technologies.

Medium VMs (16 vCPUs, 45GB database)

When a mid-sized company, such as a popular local business, invests in cloud infrastructure that enables them to handle more online transactions, it may pave the way to accept a larger customer base as the company grows and expands its services. As Figure 3 shows, new D16ds_v5 VMs featuring 3rd Generation Intel Xeon Scalable processors handled 1.34 times the average transactions per minute as the older D16ds_v4 VMs with 2nd Generation Intel Xeon Scalable processors.

MySQL TPROC-C performance with 16 vCPUs (transactions per minute)

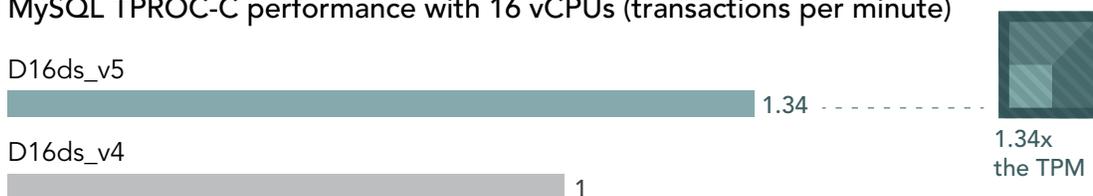


Figure 3: Average transactions per minute each Microsoft Azure VM processed, normalized to the rate of the D16ds_v4 VM. More transactions are better. Source: Principled Technologies.



Large VMs (64 vCPUs, 180GB database)

Competition is fierce when it comes to large companies, and the drive to stay ahead is fiercer still. Therefore, choosing the right VM can help you maintain your edge. Figure 4 shows that in our tests, the new D64ds_v5 VMs with 3rd Generation Intel Xeon Scalable processors handled 1.20 times the average transactions per second compared to the older D64ds_v4 VMs that used 2nd Generation Intel Xeon Scalable processors.

MySQL TPROC-C performance with 64 vCPUs (transactions per minute)

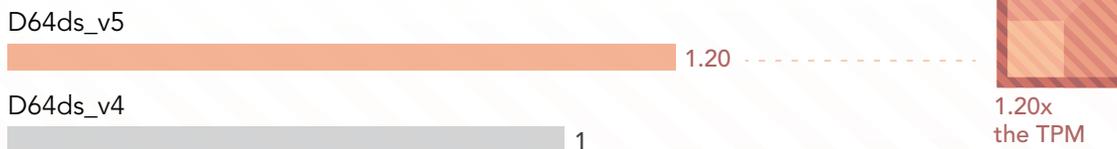


Figure 4: Average transactions per minute each Microsoft Azure VM processed, normalized to the rate of the D64ds_v4 VM. More transactions are better. Source: Principled Technologies.

Microsoft Azure Dds_v5 series VMs

In April 2021, Microsoft previewed the new Dv5 series of Azure virtual machines based on 3rd Generation Intel Xeon Scalable processors in hyperthreaded configurations. According to Microsoft, the new series features the following:³

- Up to 96 vCPUs and up to 394 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/blog/upgrade-your-infrastructure-with-the-latest-dv5ev5-azure-vms-in-preview/>.



Conclusion

If your company is looking for on a set of Microsoft Azure VMs to host your MySQL OLTP workloads, the results of our hands-on testing have quantified why you should consider new general-purpose Dds_v5 series VMs featuring 3rd Generation Intel Xeon Scalable processors. When running an OLTP workload from the HammerDB benchmark suite, the Dds_v5 series VMs handled up to 1.39 times the transactions per minute as older VMs that used 2nd Generation Intel Xeon Scalable processors. Choosing VMs with better performance for your business-critical workloads could enable you to better handle peak times and unexpected user spikes or to plan for your organization's steady growth.

- 1 "MySQL - Reviews, Pros & Cons | Companies using MySQL," accessed June 15, 2021, <https://stackshare.io/mysql>.
- 2 "MySQL Customers," accessed June 15, 2021, <https://www.mysql.com/customers/>.
- 3 Paul Nash, "Upgrade your infrastructure with the latest Dv5/Ev5 VMs in preview," accessed June 15, 2021, <https://azure.microsoft.com/en-us/updates/new-azure-vm-for-general-purpose-and-memory-intensive-workloads-now-in-public-preview/>.

Read the science behind this report at <http://facts.pt/sZZxp5x> ►



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