Process MySQL database transactions in Amazon Web Services faster with newer instances powered by 2nd Generation Intel Xeon Scalable processors – Cascade Lake

These newer instances processed more transactions per second than older instances based on Intel Xeon (E5-2686 v4) Broadwell processors

Businesses that planning to run some operations to the cloud have many options to consider even after deciding on a cloud service provider. The type and size of instance running your cloud-based database workloads has a big effect on how smoothly you'll be able to conduct business.

At Principled Technologies, we tested a MySQL online transaction processing (OLTP) database workload on two general-purpose series of instances for Amazon Elastic Cloud Compute (Amazon EC2): newer M5n instances powered by 2nd Generation Intel® Xeon® Scalable (8259CL) Cascade Lake processors and older M4 instances powered by Intel Xeon (E5-2686 v4) Broadwell processors. In our tests, the newer M5n instances processed transactions more quickly than the older M4 instances. This advantage could enable your company to serve more users simultaneously and potentially improve user experience during peak hours.

Small instances: Support 1.50x the transactions per minute

Medium instances: Support 1.48x the transactions per minute

Large instances: Support 1.69x the transactions per minute

How we tested

We used an OLTP workload from the HammerDB suite based on the TPC-C benchmark to test the following MySQL database instances for Amazon EC2:

- Newer M5n instances powered by 2nd Generation Intel Xeon Scalable Processors (8259CL) Cascade Lake
- Older M4 instances powered by Intel Xeon (E5-2686 v4) processors Broadwell (M4 instances are available in a variety of processor configurations; however, we chose to test with these.)

The HammerDB developers derived their OLTP workload from TPC-C benchmark specifications. However, because the HammerDB test is not a full implementation of the official TPC-C benchmark, our results are not directly comparable to published TPC-C results.

We compared the M5n and M4 instances across three sizes to demonstrate business value at different workload and performance levels. Like other cloud service providers, Amazon defines an instance's size by its vCPU count. We chose to test instances with 8, 16, and 64 vCPUs.

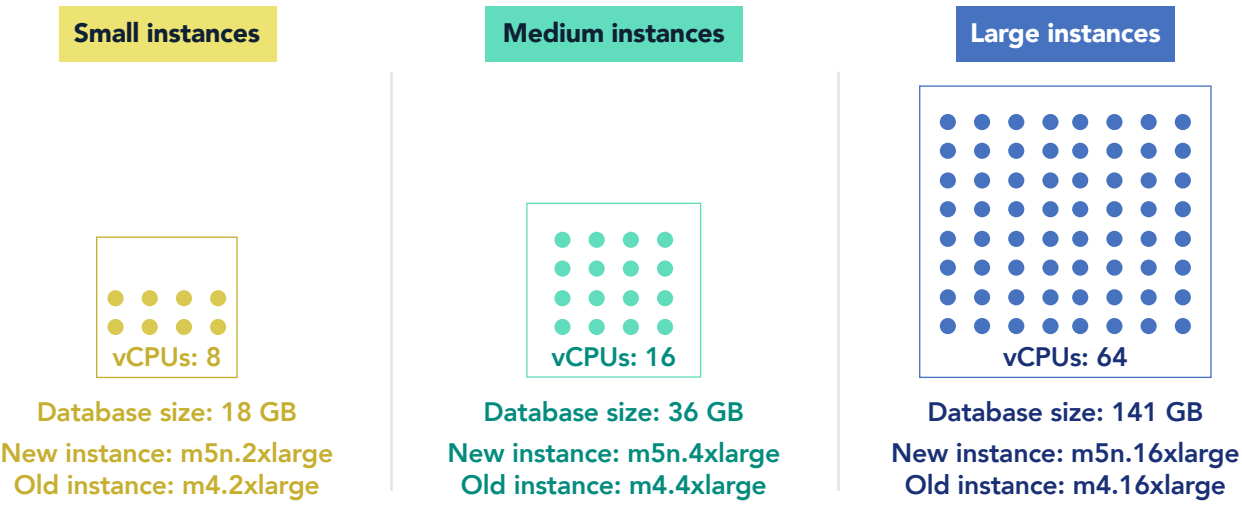

Figure 1: Specifications for the Amazon EC2 instances we used. We tested each instance in the us-east-1f region. Source: Principled Technologies.

M5n series instances for Amazon EC2

In 2019, Amazon introduced M5n instances to their EC2 offerings, extending 100Gbps networking and adding improved packet-processing performance capabilities to its general-purpose M family.[1] In addition to adding 2nd Generation Intel Xeon Scalable processors to the M-series options, M5n instances support the following:

- Higher CPU core frequency (3.1 GHz vs 2.3 GHz)
- Intel DL Boost Vector Neural Network Instructions, which Intel claims can "deliver a significant performance improvement" for deep learning applications[2]
- 25 Gbps of peak bandwidth for small and medium instances, 75Gbps for large instances
- AWS Nitro System, which provides better security and performance compared to older AWS hypervisors[3]

Our results

Across each instance size, new 2nd Generation Intel Xeon Scalable (8259CL) Cascade Lake processor-powered M5n instances processed more TPC-C-like transactions per minute than the older Intel Xeon (E5-2686 v4) Broadwell processor-powered M4 instances. Being able to handle more online transactions with your MySQL database could mean supporting more concurrent ecommerce customers and a smoother user experience.

Small instances

Small businesses need to ensure their customers have a good experience with their ecommerce website, as long load times and hanging pages can result in lost sales and negative perceptions of their offerings. Figure 2 shows that, on average, the newer m5n.2xlarge MySQL database instances processed 1.50x the workload transactions per minute compared to the older m4.2xlarge instances.

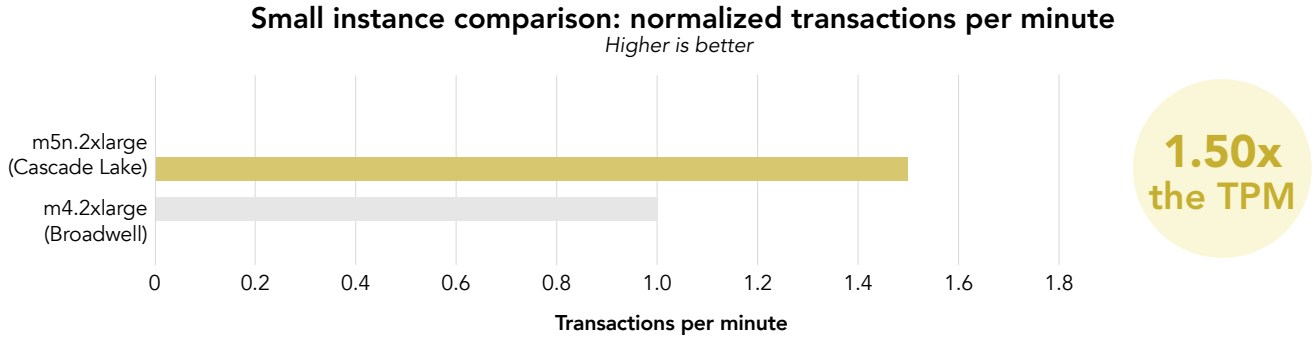

Figure 2: Normalized comparison of the average number of TPC-C-like transactions per minute each small MySQL database instance achieved during the HammerDB workload. A higher rate is better. Source: Principled Technologies.

Medium instances

We found that the new 2nd Generation Intel Xeon Scalable (8259CL) Cascade Lake processor-powered m5n.4xlarge instances completed 1.48 times the average transactions per second compared to the older Intel Xeon E5-2686 v4 processor-powered m4.4xlarge instances.

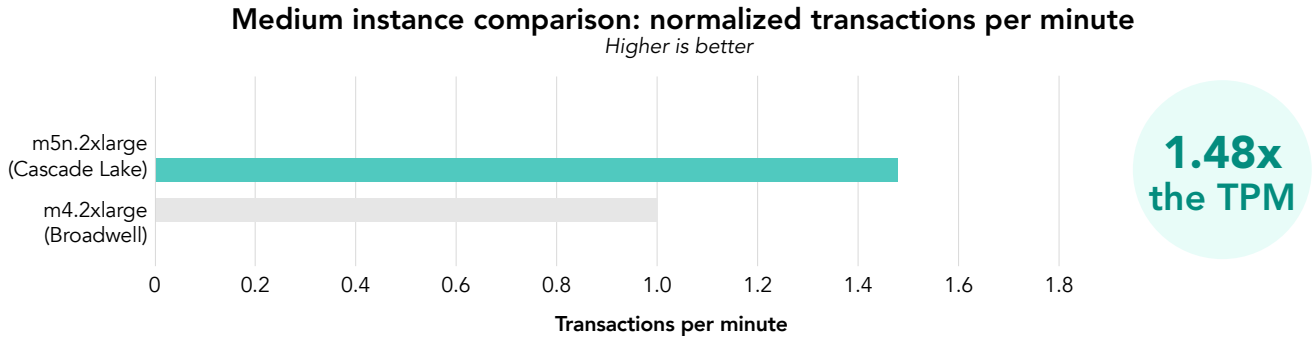

Figure 3: Normalized comparison of the average number of TPC-C-like transactions per minute each medium MySQL database instance achieved during the HammerDB workload. A higher rate is better. Source: Principled Technologies.

Large instances

Figure 4 shows that new m5n.16xlarge instances processed 1.69 times the transactions per second on average compared to the older m4.16xlarge instances.

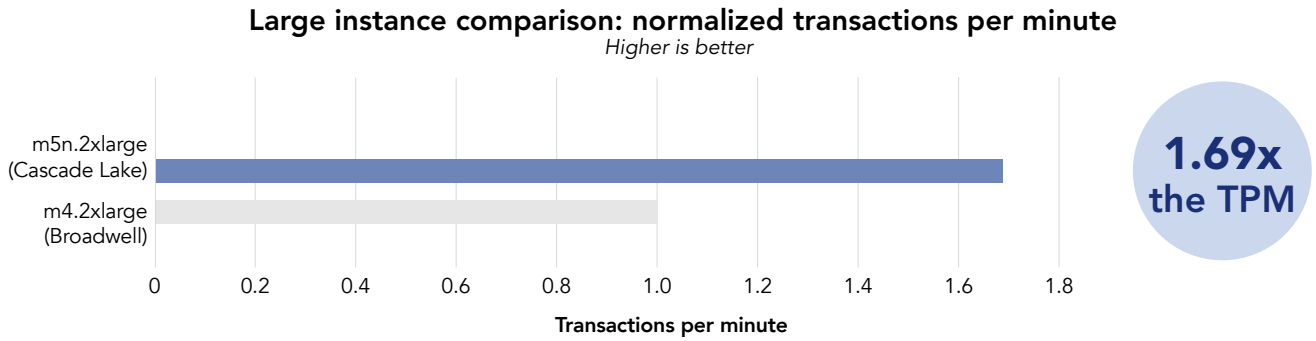

Figure 4: Normalized comparison of the average number of TPC-C-like transactions per minute each large MySQL database instance achieved during the HammerDB workload. A higher rate is better. Source: Principled Technologies.

Better performance with larger instances

In our tests, the performance margin between the M5n and M4 series instances grew from around 1.50x for 8 and 16vCPU instances to 1.69x for large 64vCPU instances. This suggests a scaling effect with larger instance sizes, where you may experience better performance when you use more resources.

1.50 times the TPM
for small instances

1.48 times the TPM
for small instances

1.69 times the TPM
for small instances

Better performance, better investment

Our performance findings suggest the M5n instances can sustain anywhere from 1.48 to 1.69 times the rate of transactions per second as the M4 instances. At the time of this writing, however, all sizes and specifications of the M5n instances cost just 1.19 times as much as their M4 counterparts.[4] By investing in M5n instances as opposed to M4 instances, you would be getting better performance for your money.

Conclusion

There's a great deal to consider when searching for the right instance to power your online database work. For companies that run ecommerce workloads, instances that can quickly process online transactions can be instrumental to achieving good customer satisfaction.

In our MySQL database tests, newer 2nd Generation Intel Xeon Scalable (8259CL) Cascade Lake processor-powered M5n-series instances for Amazon EC2 processed more TPC-C-like transactions per minute compared to older M4-series instances powered by Intel Xeon (E5-2686 v4) Broadwell processors. We assessed transaction processing speed across three instance sizes and recorded significant advantages for the newer instances across the board. We also determined that the newer instances would provide stronger performance for your money.

As your company explores its options for transitioning database applications to the cloud, consider the performance and price benefits of new M5n-series instances for Amazon EC2 powered by Intel Xeon Platinum 8259CL processors.

---

1 Julien Simon, "New M5n and R5n EC2 Instances, with up to 100Gbps networking," accessed November 3, 2020, https://aws.amazon.com/blogs/aws/new-m5n-and-r5n-instances-with-up-to-100-gbps-networking/.

2 "AWS Nitro System," accessed November 16, 2020, https://aws.amazon.com/ec2/nitro/.

3 "Introduction to Intel Deep Learning Boost on Second Generation Intel Xeon Scalable Processors," accessed November 3, 2020, https://software.intel.com/content/www/us/en/develop/articles/introduction-to-intel-deep-learning-boost-on-second-generation-intel-xeon-scalable.html.

4 "Amazon EC2 On-Demand Pricing," accessed October 28, 2020, https://aws.amazon.com/ec2/pricing/on-demand/.

Read the science behind this report at http://facts.pt/cTvUFqi ►

Principled Technologies®

Facts matter.®

This project was commissioned by Intel.