Make sense of important data faster with AWS EC2 M6i instances

Featuring 3rd Gen Intel Xeon Scalable processors, M6i instances sped up data analysis over M5 instances with older processors

With each day, the amount of data organizations amass continues to grow. This leaves businesses with a big data problem to solve: how to leverage big data and business analytics solutions to make sense of that data and make decisions faster. For organizations running analytics on Microsoft SQL Server databases in the cloud, selecting new AWS EC2 M6i instances featuring the latest 3rd Gen Intel® Xeon® Scalable processors can further the goal of analyzing data streams in less time.

At Principled Technologies, we used a TPROC-H workload from the HammerDB benchmark to compare data analysis speeds of SQL Server databases across two instance types: new M6i instances with 3rd Gen Intel Xeon Scalable processors and M5 instances with older Intel Xeon processors.

For small, medium, and large-sized instances, we found that M6i instances with 3rd Gen Intel Xeon Scalable processors offered consistently faster database analysis performance than the older instances. When data analysis runs faster, organizations can put the data they've collected into the proper context even sooner—improving their ability to deftly respond to the fluctuating business landscape.

Analyze data up to
1.33x as fast
on 8vCPU instances with a 10GB database

Analyze data up to
1.37x as fast
on 16vCPU instances with a 30GB database

Analyze data up to
1.13x as fast
on 64vCPU instances with a 100GB database

How we tested

We purchased three sets of instances from two general-purpose AWS EC2 series:

- • Newer M6i instances featuring 3rd Generation Intel Xeon Platinum 8375C processors (Ice Lake)
- • Older M5 instances featuring Intel Xeon Platinum 8175M processors (Skylake)

We ran each instance in the US East 1 region.

Figure 1 shows the specifications for the instances that we chose. To show how businesses of various sizes with different analytics demands can benefit from choosing M6i instances, we tested small (8vCPUs), medium (16vCPUs), and large (64vCPUs) instance sizes. We tested the instances with different numbers of data streams because the TPROC-H workload sets the maximum number of streams for each database size.
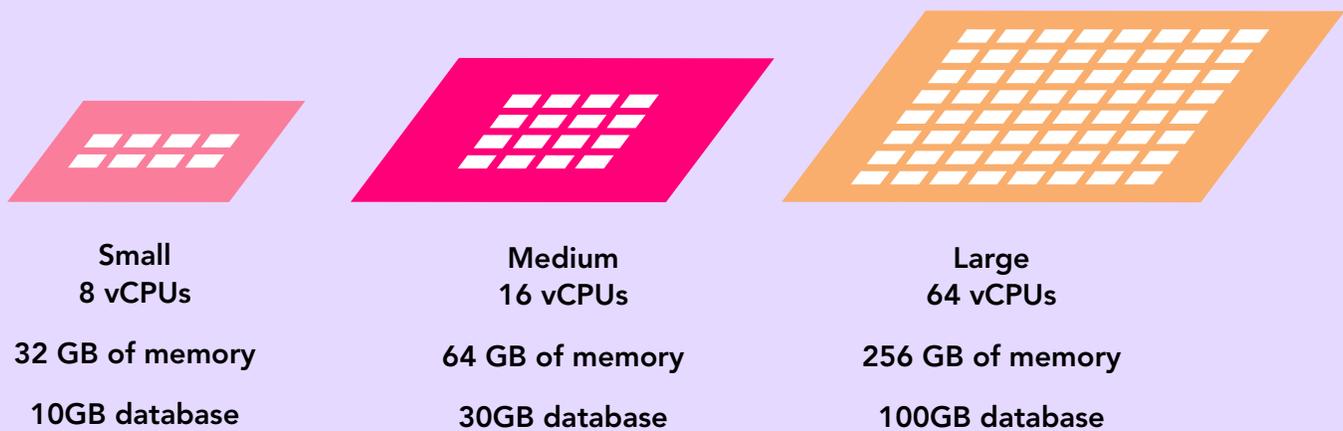
Small
8 vCPUs

32 GB of memory

10GB database

Medium
16 vCPUs

64 GB of memory

30GB database

Large
64 vCPUs

256 GB of memory

100GB database

Figure 1: Key specifications for each instance size we tested. Source: Principled Technologies.

About 3rd Generation Intel Xeon Scalable processors

According to Intel, 3rd Generation Intel Xeon Scalable processors are "[o]ptimized for cloud, enterprise, HPC, network, security, and IoT workloads with 8 to 40 powerful cores and a wide range of frequency, feature, and power levels."[1] Intel continues to offer many models from the Platinum, Gold, Silver, and Bronze processor lines that they "designed through decades of innovation for the most common workload requirements."[2]

For more information, visit http://intel.com/xeonscalable.

Why choose M6i instances?

Compared to older M5 instances, new M6i instances offer:

- Better value: Get up to 1.37x the data analytics performance at the same cost per instance[3]
- 3rd Gen Intel Xeon Scalable processors (all-core turbo frequency of up to 3.5 GHz) with support for Intel Total Memory Encryption (TME) and Intel Advanced Vector Extensions (AVX-512) instructions
- Support for up to 128 vCPUs per instance, a 33% increase over M5 instances[4]
- Up to 50Gbps networking (twice the bandwidth of M5 instances)[5]
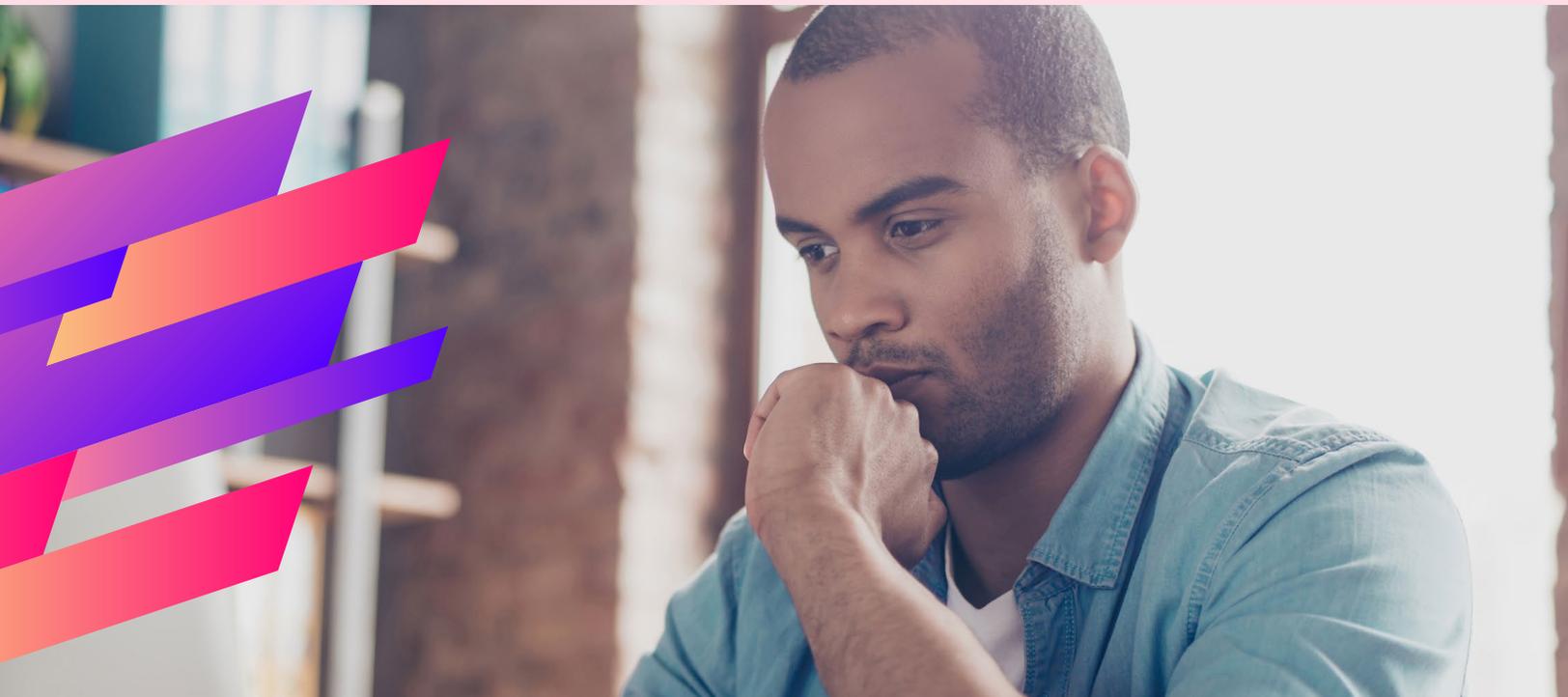
Choose the faster instance for data analysis

The only thing that's standing between your organization and a wealth of potential insights at your fingertips is the speed in which your systems can make sense of the data you've collected. By using cloud instances harnessing faster processing power, you can figure out which way to direct your sail before the winds have changed. For all three instance sizes we tested, Amazon EC2 M6i instances featuring 3rd Gen Intel Xeon Scalable processors completed query streams faster than M5 instances with older processors.
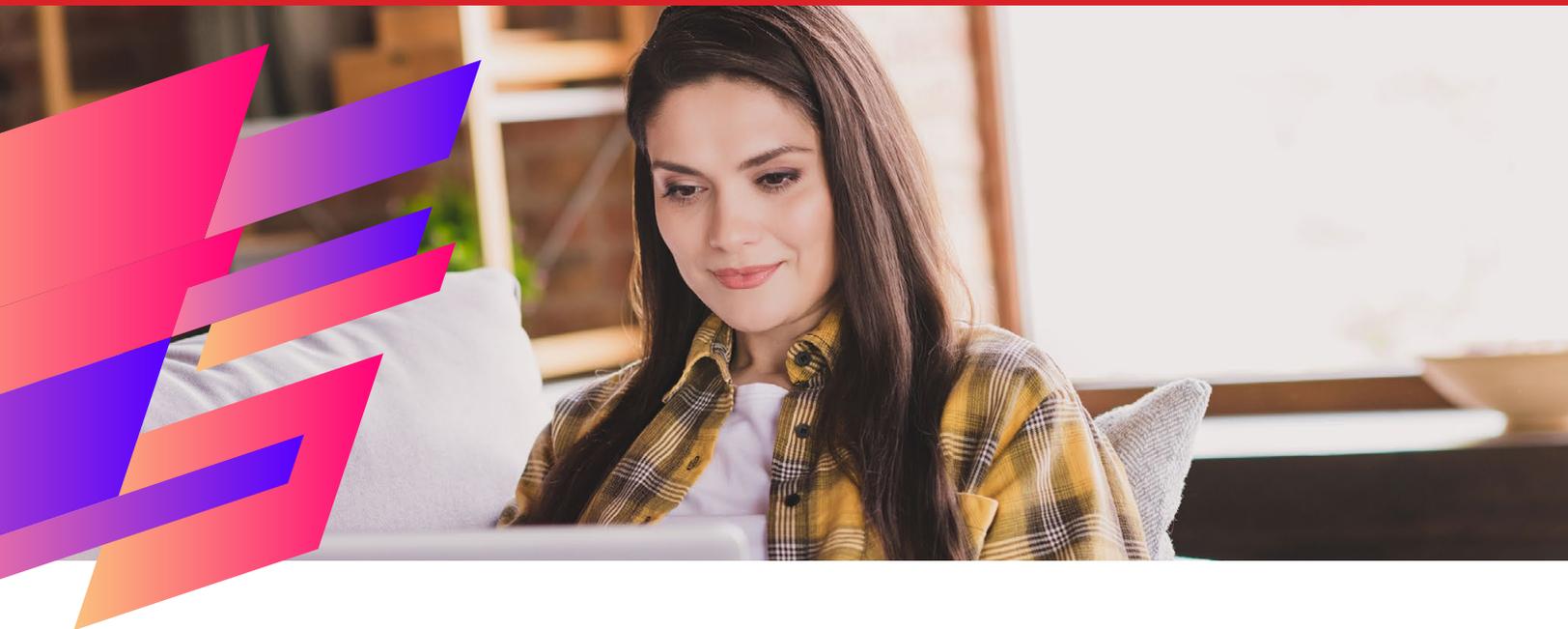
Small instances

Figure 2 compares the relative speed at which both instance types analyzed varying numbers of simultaneous data streams when using a 10GB SQL Server database on small, 8vCPU configurations. The M6i instances enabled by 3rd Gen Intel Xeon Scalable processors completed data analysis up to 1.33 times as fast as the older M5 instances.

m5.2xlarge vs m6i.2xlarge comparision (10GB database)
Higher is better

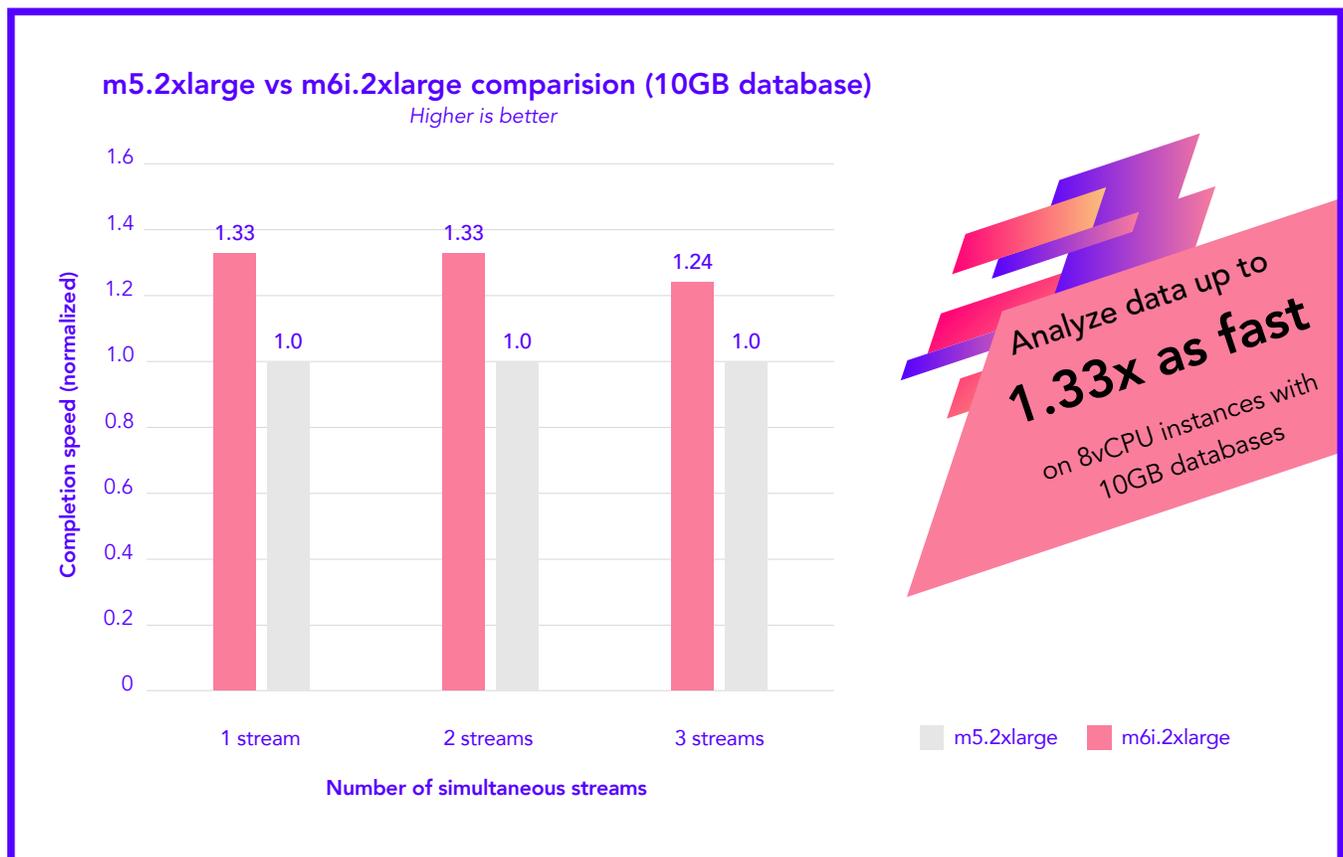Analyze data up to **1.33x as fast** on 8vCPU instances with 10GB databases

Figure 2: Relative speed to complete Microsoft SQL Server database query streams for small instances (8 vCPU), normalized to the speed of the m5.2xlarge instance. Higher numbers are better. Source: Principled Technologies.

Medium instances

Figure 3 compares the relative speed at which both instance types analyzed varying numbers of simultaneous data streams when using a 30GB SQL Server database on medium-sized, 16 vCPU configurations. Again, the newer M6i instances with 3rd Gen Intel Xeon Scalable processors outperformed the older M5 instances, completing data analysis up to 1.37 times as fast (at a single stream).

m5.4xlarge vs m6i.4xlarge comparision (30GB database)

Higher is better

Completion speed (normalized)

	1 stream	2 streams	3 streams	4 streams
m6i.4xlarge	1.37	1.29	1.27	1.28
m5.4xlarge	1.0	1.0	1.0	1.0

Number of simultaneous streams

m5.4xlarge ▢ m6i.4xlarge ▮

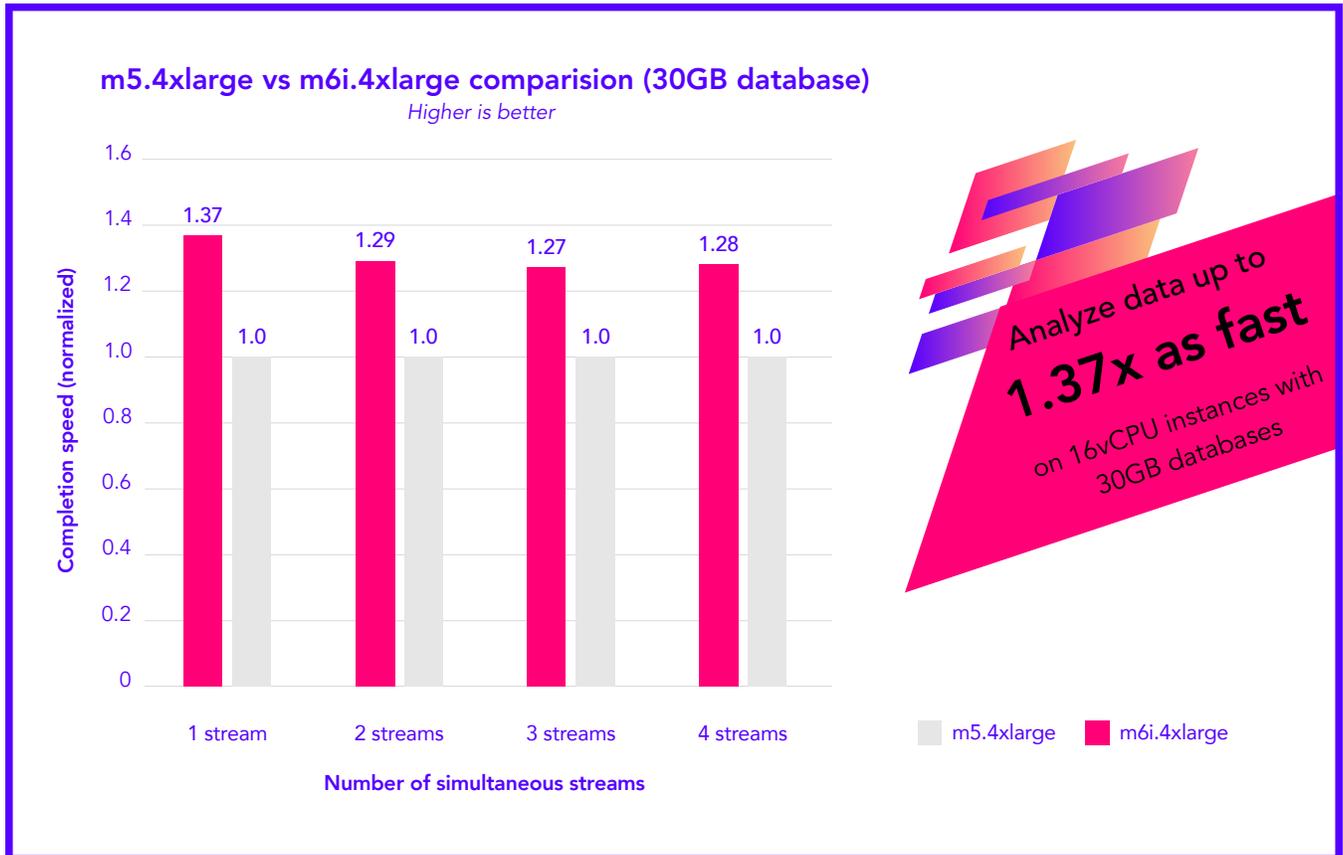Analyze data up to **1.37x as fast** on 16vCPU instances with 30GB databases

Figure 3: Relative speed to complete Microsoft SQL Server database query streams for medium instances (16 vCPU), normalized to the speed of the m5.4xlarge instance. Higher numbers are better. Source: Principled Technologies.

Large instances

Figure 4 compares the relative speed at which both instance types analyzed varying numbers of simultaneous data streams when using a 100GB SQL Server database on large, 64 vCPU configurations. Though the performance gains were slightly lower than we saw in the small-and medium-sized configurations, the M6i instances featuring 3rd Gen Intel Xeon Scalable processors once again improved upon the older M5 instances, completing all database query streams as much as 1.13 times as fast (at two and five simultaneous streams).

While the TPROC-H workload sets the maximum number of streams for each database size—five simultaneous streams for the 100GB database —we also wanted to see how m6i.16xlarge instance handled increased load, so we increased the number of simultaneous streams to 8, 16, and 32. Here, again, the m6i.16xlarge instance delivered consistently stronger performance than the m5.16xlarge instance. For additional testing results, see the science behind the report.

m5.16xlarge vs m6i.16xlarge comparision (100GB database)
Higher is better

Completion speed (normalized)

Number of simultaneous streams	m5.16xlarge	m6i.16xlarge
1 stream	1.0	1.08
2 streams	1.0	1.13
3 streams	1.0	1.05
4 streams	1.0	1.08
5 streams	1.0	1.13

Analyze data up to 1.13x as fast on 64vCPU instances with 100GB databases
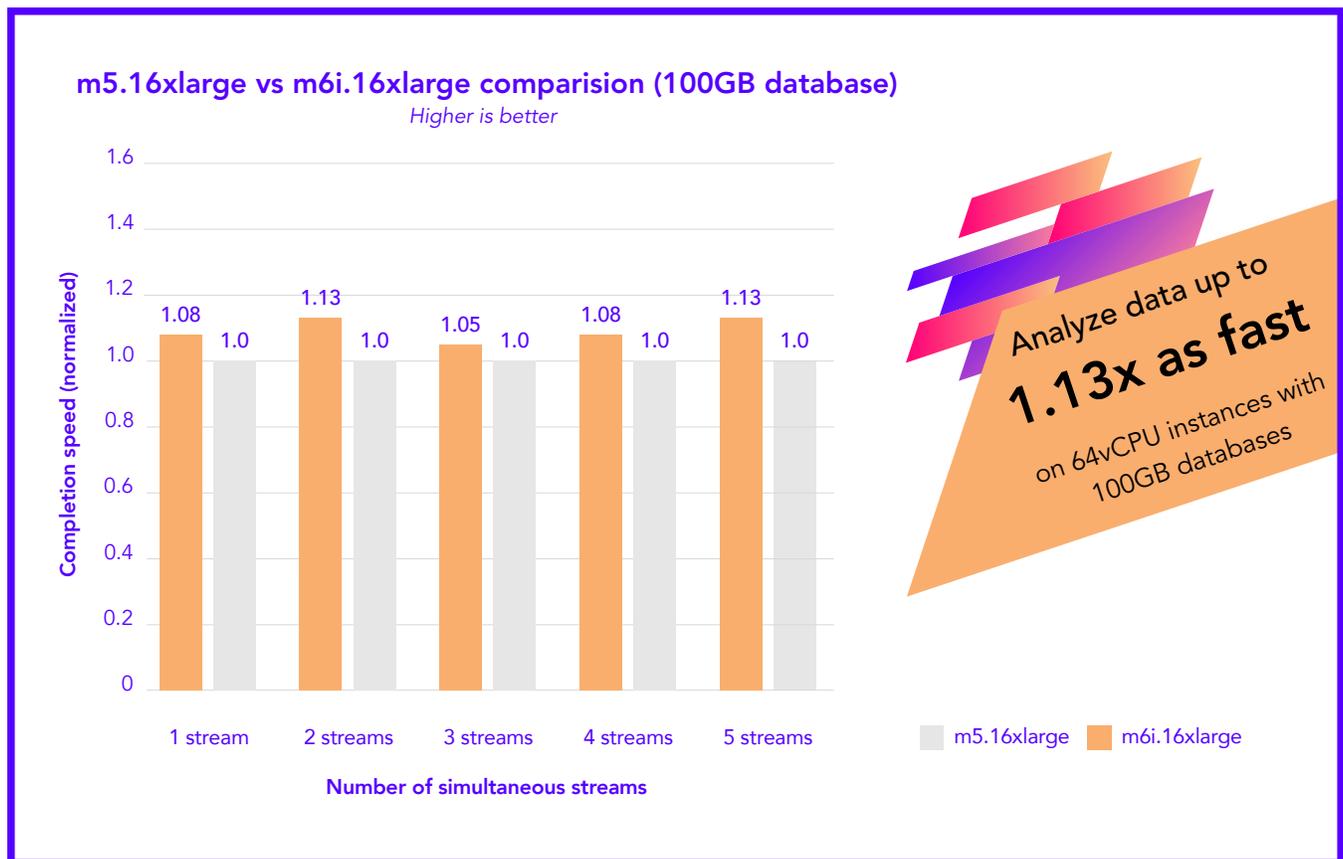
Figure 4: Relative speed to complete Microsoft SQL Server database query streams for large instances (64 vCPU), normalized to the speed of the m5.16xlarge instance. Higher numbers are better. Source: Principled Technologies.

About HammerDB

HammerDB is an open-source tool that tests the database performance of many leading databases, including Oracle® Database, Microsoft SQL Server, PostgreSQL®, and MySQL™. The benchmark includes two built-in workloads derived from industry standards: a transactional (TPROC-C) workload and an analytics (TPROC-H) workload. For this study, we used the analytics workload. Our test results do not represent official TPC results and are not comparable in any manner to the official TPC-audited results.

For more information about HammerDB, visit www.hammerdb.com.
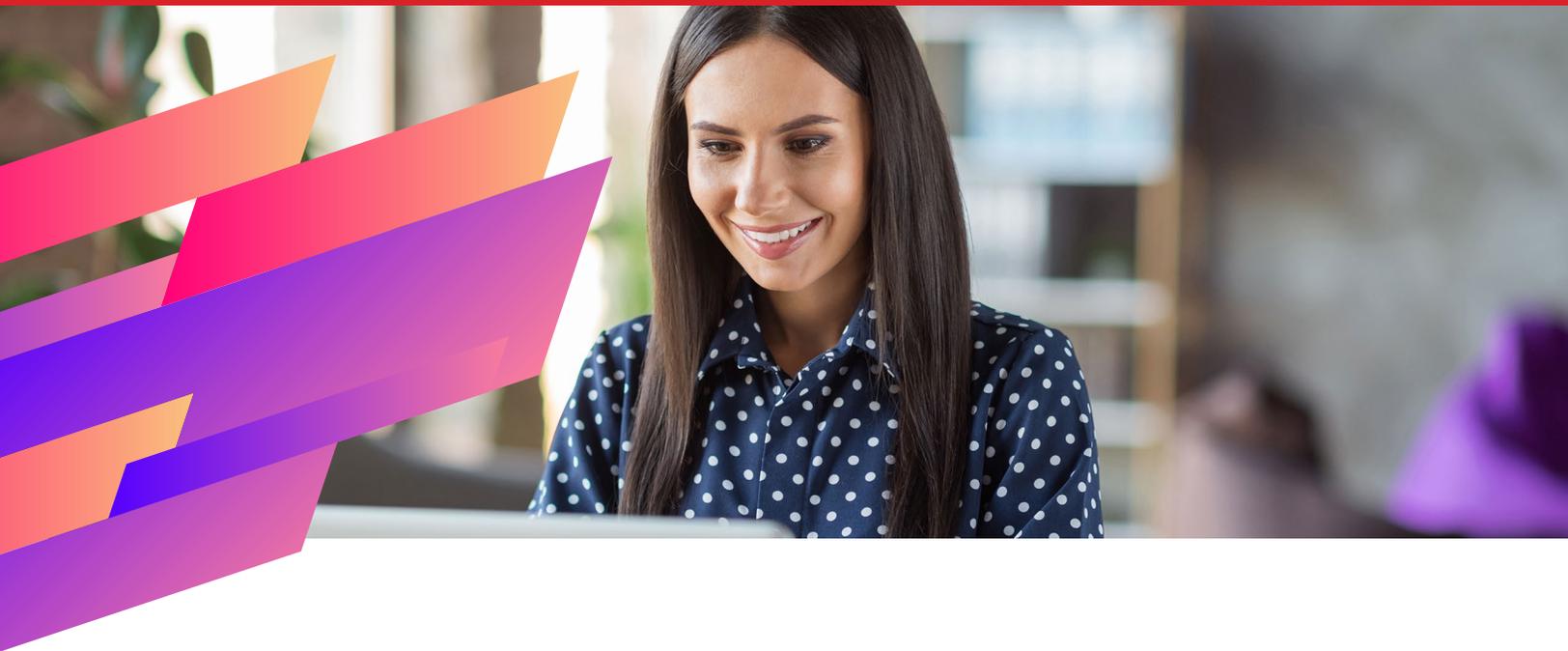
Conclusion

Whether your business needs to analyze small, medium, or large SQL Server databases, faster analysis is better. In HammerDB TPROC-H tests at varying simultaneous data stream counts, AWS M6i instances enabled by 3rd Gen Intel Xeon Scalable processors analyzed data up to 1.37 times as fast as M5 instances with older processors. Making sense of data sooner offers real benefits to businesses; in some cases this can mean making real-time purchasing recommendations to customers that can increase your bottom line. In others, faster data analysis can give your executives the information they need to launch new initiatives based on what users actually want. By selecting new AWS M6i instances, organizations can get those actionable insights faster, and without any increase in cost over M5 instances.

1. Intel, "3rd Gen Intel® Xeon® Scalable Processors," accessed October 18, 2021, https://www.intel.com/content/www/us/en/products/docs/processors/xeon/3rd-gen-xeon-scalable-processors-brief.html.

2. Intel, "3rd Gen Intel® Xeon® Scalable Processors," accessed October 18, 2021, https://www.intel.com/content/www/us/en/products/docs/processors/xeon/3rd-gen-xeon-scalable-processors-brief.html.

3. Amazon, "Amazon EC2 On-Demand Pricing," accessed October 18, 2021, https://aws.amazon.com/ec2/pricing/on-demand/.

4. Amazon, "Amazon EC2 M6i Instances," accessed October 18, 2021, https://aws.amazon.com/ec2/instance-types/m6i/.

5. Amazon, "Amazon EC2 M6i Instances," accessed October 18, 2021, https://aws.amazon.com/ec2/instance-types/m6i/.

Read the science behind this report at http://facts.pt/yq23spB ▶

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