PERFORMANCE BRIEF

AMD EPYC™ 7Fx2 Processors Deliver Superior Performance with Microsoft SQL Server® 2019

APRIL 2020

Expanded Portfolio with High Frequency Processors

Built on 7nm technology, the latest addition to the AMD EPYC™ 7002 Series of processors are optimal for both per core performance and system level performance

Innovative Architecture

The AMD EPYC™ 7Fx2 high frequency processors feature the 2nd Gen EPYC series' highest base and boost frequencies[2], along with very high cache per core enabling exceptional performance.

Cost effective for Critical Workloads

AMD EPYC™ 7Fx2 Processors can enable low TCO for software licensed per core – such as relational databases, hyperconverged infrastructures, commercial HPC and others

Leadership Security

Based on AMD Infinity Guard, the new AMD EPYC™ 7Fx2 Processors feature the same advanced security features as all 2nd Gen EPYC series processors, including Secure Memory Encryption and Secure Encrypted Virtualization.

No Compromise on Features

Continuing AMD's philosophy of choice without restriction, all processor features, including up to 4 TB of memory per socket and 128 PCIe® 4 lanes, are enabled on all high-frequency processors.

AMD EPYC™ 7Fx2 Processors Demonstrate Superior Performance on Transaction Processing Workloads

Microsoft SQL Server® is a popular relational database management system (RDBMS) that supports a wide variety of transaction processing, business intelligence and analytics applications for both on on-premise and cloud environments. AMD's internal tests results show that AMD EPYC based systems deliver high performance for Online Transaction Processing (OLTP) performance with Microsoft SQL Server 2019.

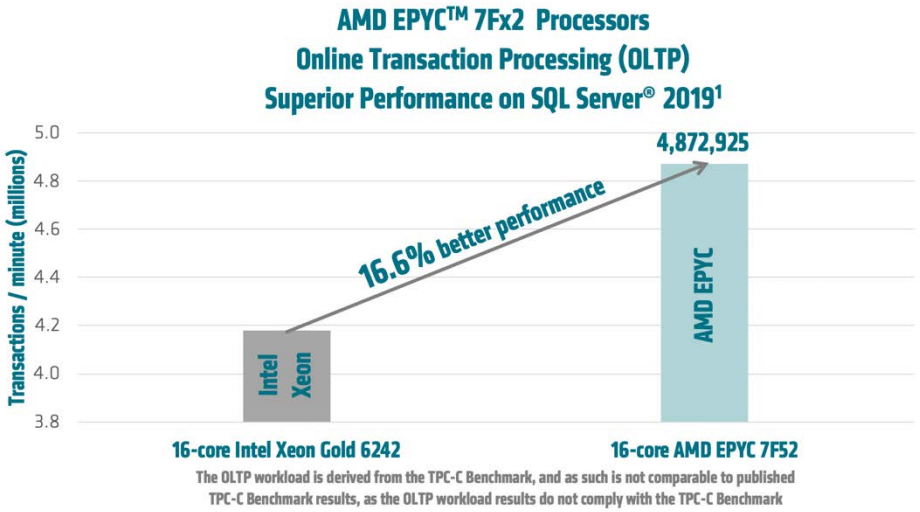

Figure 1: Online Transaction Processing: 16-Core AMD EPYC 7F52 vs. Intel Xeon Gold 6242

The AMD EPYC™ 7F52 performed up to an average of 16.6% better than the Xeon® Gold® 6242, both featuring 16 cores. The AMD EPYC™ 7F32 performed up to an average of 10.0% better than the Xeon Gold 6252, both featuring 8 cores. Table 2 lists all the AMD EPYC high frequency processors and features.

Processor	Base Frequency	Memory*	Storage (NVMe)	Cores / Proc	Total Cores	Transactions / Minute (TPM)	% Better Performance
AMD EPYC 7F52	3.5 GHz	2 TB (DDR4-3200)	5 x 1.6 TB	16	32	4,872,975	**~16.61%**
Intel Xeon Gold 6242	2.8 GHz	1.5 TB (DDR4-2933)	5 x 1.6 TB	16	32	4,178,693	
AMD EPYC 7F32	3.7 GHz	2 TB (DDR4-3200)	5 x 1.6 TB	8	16	2,692,958	**~10.0%**
Intel Xeon Gold 6244	3.6 GHz	1.5 TB (DDR4-2933)	5 x 1.6 TB	8	16	2,446,340	

*Intel Xeon Gold processors support six channels of memory at a maximum of 2933 MHz. AMD EPYC processors support eight channels of memory at a max of 3200 MHz. Further, AMD EPYC processors support up to 4 TB of memory per socket at no extra cost.

AMD EPYC 7Fx2 Processor Family

Table 2 shows the products and features in AMD's EPYC 7Fx2 family of high frequency processors.

Processor	Base Frequency	Boost Frequency[2] (up to)	Cores / Processor	Cache / Core	Maximum Memory / Socket (DDR4-3200)	PCIe® Gen4 Lanes / System
AMD EPYC™ 7F32	3.7 GHz	3.9 GHz	8	128 MB	4 TB	128
AMD EPYC™ 7F52	3.5 GHz	3.9 GHz	16	256 MB	4 TB	128
AMD EPYC™ 7F72	3.2 GHz	3.7 GHz	24	192 MB	4 TB	128

Table 2: AMD EPYC 7Fx2 Processor Family

Benchmarking SQL Server 2019 with AMD EPYC 7Fx2 Processors

AMD engineers ran benchmarks derived from industry standard benchmarks on an internal reference platform using 8-core AMD EPYC 7F32 and 16-core AMD EPYC 7F52 processors[1]. They also ran the same benchmark on a server platform using 8-core Intel Xeon Gold 6244 and 16-core Intel Xeon Gold 6242 processors[1]. See the Benchmark Configuration tables.

For each benchmark result, a total of five benchmark runs were completed; the high and low values were removed and the average of the remaining three runs was calculated to obtain the final result. These results, shown in Figure 1 and Figure 2, demonstrate the superiority of the AMD EPYC processor over the Intel Xeon processor for an online transaction processing workload using Microsoft SQL Server 2019.

Figure 1 and Figure 2 show an online transaction processing (OLTP) benchmark workload derived from the TPC-C® Benchmark. The OLTP workload is derived from the TPC-C Benchmark, and as such is not comparable to published TPC-C Benchmark results, as the OLTP workload results do not comply with the TPC-C benchmark.

The workload models an order fulfillment system where the database receives requests for data, adds new data and makes multiple changes to the data from a large number of users. The results show sustained transaction throughput and linear scaling across 8-core and 16-core processors allowing one to right-size the compute power to the application needs and optimize total cost of ownership by only paying for cores actually needed in order to optimize core-based software licensing models.

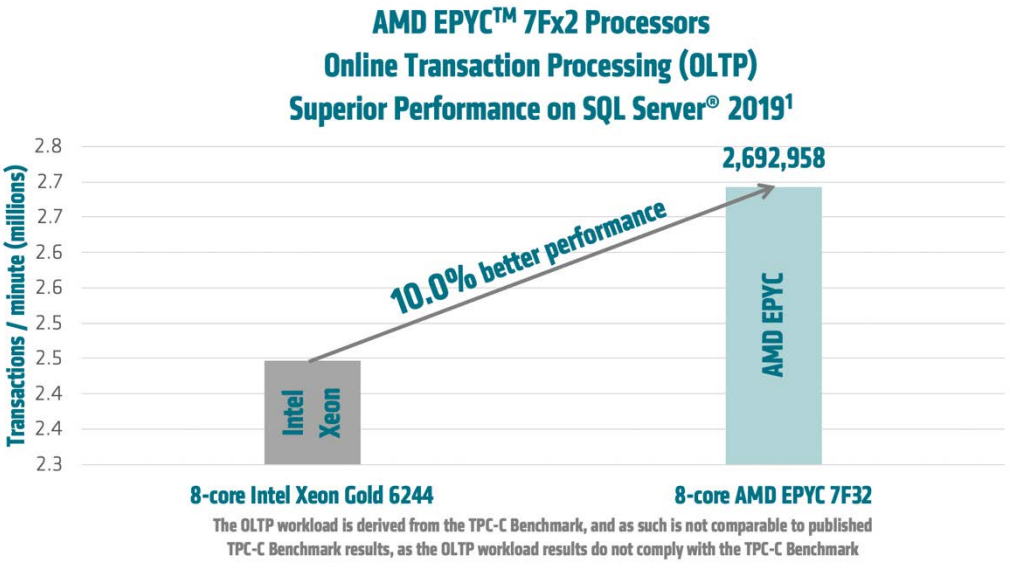

Figure 2:Online Transaction Processing: 8-Core AMD EPYC 7F32 vs. Intel Xeon Gold 6244

Innovation Drives Advancement

The AMD EPYC processor represents a completely new approach to supporting the massive processing requirements of the modern datacenter. The second generation of the AMD EPYC™ processor extends AMD's innovation leadership while continuing the philosophy of choice without restriction.

BENCHMARK CONFIGURATION – AMD EPYC	
Hardware	1 x AMD Internal Reference platform, with • 2 x AMD EPYC 7F32 SOC (2x8 Cores) or 2 x AMD EPYC 7F52 SOC (2x16 Cores) • 2 TB DDR4-3200 MHz DR 2DPC (32 x 64 GB) • 5 x 3.2 TB NVMe for storage
Software	SQL Server 2019 version 15.0.4003.23-3 HammerDB 3.1
Operating System	RHEL 7.7 (3.10.0-1061)

Unmatched Flexibility

Match core count with application needs without compromising processor features. Built with leading-edge 7nm technology, the AMD EPYC™ SoC offers a consistent set of features across a range of choices from 8 to 64 cores, including 128 lanes of PCIe® Gen 4 and 8 memory channels with access to up to 4 TB of high-speed memory. EPYC processors' balanced set of resources means more freedom to right-size the server configuration to the workload.

Innovation, Joint Engineering and a Commitment to Open Standards

AMD is proud to continue its long tradition of innovation and commitment to open standards. Coupled with joint engineering with our OEM and software partners, we're proud to demonstrate outstanding performance often at significant cost savings.

LEARN MORE at amd.com/epyc

BENCHMARK CONFIGURATION – INTEL XEON	
Hardware	1 x HPE DL380, with • 2 x Xeon 6244 (2x8 Cores) or. 2 x Xeon 6242 (2x16 Cores) • 1.5 TB DDR4-2933 MHz DR 2DPC (24 x 64 GB) • 5 x 3.2 TB NVMe for storage
Software	SQL Server 2019 version 15.0.4003.23-3 HammerDB 3.1
Operating System	RHEL 7.7 (3.10.0-1061)

2nd Gen AMD EPYC Processors: Built with leading-edge 7nm technology, the AMD EPYC™ SoC offers a consistent set of features across a range of choices from 8 to 64 cores, including 128 lanes of PCIe® Gen 4[4] and 8 memory channels with access to up to 4 TB of high-speed memory.

FOOTNOTES

1. Performance measured with SQL Server 2019 version 15.0.4003.23-3 on RHEL 7.7 (3.10.0-1061) using HammerDB version 3.1.
   AMD EPYC Processor-based System - CPUs: 2x 7F32, 2x 7F52, 32x 64GB DDR4-3200 DR 2DPC, 5x 3.2 TB NVMe.
   Intel Xeon Scalable Processor-based System - CPUs: 2x Gold 6242, 2x Gold 6244, 24x 64GB DDR4-2933 DR 2DPC, 5x 3.2 TB NVMe.
2. Max boost for AMD EPYC processors is the maximum frequency achievable by any single core on the processor under normal operating conditions for server systems. EPYC-18