

MICROSOFT® SQL SERVER 2022 OLTP AND DECISION SUPPORT UPLIFTS RELATIONAL DATABASE MANAGEMENT SYSTEM

Powered by 4th Gen AMD EPYC™ Processors

June 2024

AT A GLANCE

A 2P 64-core AMD EPYC™ 9554 server shows solid published Microsoft® SQL Server 2022 Enterprise Edition uplifts for both TPC Benchmark™ E (TPC-E) and TPC Benchmark™ H (TPC-H) versus a 2P 64-core Intel® Xeon® Platinum 8592Y+ server.

PERFORMANCE HIGHLIGHTS

A 2P system powered by dual 64-core 4th Gen AMD EPYC 9554 CPUs processor delivers both performance and price-performance uplifts versus a 2P system powered by dual 64-core Intel Xeon Platinum 8592+ CPUs running the TPC-E (~1.07x performance and ~1.03x price-performance with 8M customers) and TPC-H (~1.14x performance and ~1.28x price-performance at SF10000) benchmarks on Microsoft SQL Server 2022 Enterprise Edition.

TPC-E PERFORMANCE & PRICE-PERFORMANCE WITH 8M CUSTOMERS



TPC-H PERFORMANCE AND PRICE-PERFORMANCE @ SF 10000



KEY TAKEAWAYS

Microsoft SQL Server 2022 Enterprise Edition 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. TPC-E and TPC-H are widely used on-line transaction processing (OLTP) and decision support benchmarks, respectively. A server powered by dual 64-core AMD EPYC 9554 processors delivers solid TPC-E and TPC-H price (~1.07x and ~1.14x, respectively) and price-performance (~1.03x and ~1.22x respectively) versus a server powered by dual 64-core Intel Xeon Platinum 8592+ processors. Please see Page 2 for detailed benchmark information and links to published benchmark results.

General purpose 4th Gen AMD EPYC CPUs are available in 1P and 2P configurations and feature:

- Up to 96 cores (192 threads) per processor.
- Up to 384 MB L3 cache.
- Up to 4 Gen 3 Infinity Fabric™ links at up to 32 Gbps.
- Up to 12 memory channels per socket that support up to 6 TB of DDR5-4800 memory.
- Support for up to 128 (1P) and up to 160 (2P) PCIe® Gen 5 with up to 32 Gbps bandwidth.
- AVX-512 instruction support for enhanced HPC and ML performance.
- AMD Infinity Guard technology to defend your data.¹

IN THIS BRIEF

- Test Methodology..... **Page 2**
- Conclusion **Page 2**
- For Additional Information **Page 2**
- References **Page 2**

TEST METHODOLOGY

TPC Benchmark™ E (TPC-E) is an OLTP benchmark that is more complex than previous OLTP benchmarks such as TPC-C because it includes varied transaction types and a more complex database and overall execution structure. It mixes twelve concurrent transactions of various types and complexity. Transactions can execute on-line or when triggered by price or time criteria. The database consists of thirty-three tables with diverse columns, cardinality, and scaling properties. This benchmark simulates a stock brokerage firm but is not limited to a particular business segment; it represents how many industries execute and reports financial transactions.

Testing used a TPC-E workload with 8,000,000 customers. The 2P 64C AMD EPYC 9654 system delivers 7% more per core performance on Microsoft SQL Server® 2022 Enterprise compared to a 2P 640C Intel Xeon Platinum 8592+ system. AMD results (15,885.04 tpsE or 124.1 tpsE/core, \$80.77/tpsE, available 4/30/2024). Intel results (14,779.27 tpsE or 115.7 tpsE/core, \$83.18/tpsE, available 02/09/2024). Published results are available from:

- **AMD:** https://www.tpc.org/results/individual_results/Lenovo/lenovo~tpce~lenovo_thinksystem_sr665_v3~es~2024-04-30~v01.pdf*
- **Intel:** https://www.tpc.org/results/individual_results/Lenovo/lenovo~tpce~lenovo_thinksystem_sr650_v3~es~2024-02-09~v01.pdf*

TPC Benchmark™ H (TPC-H) is a decision support benchmark that evaluates the performance of systems that address complex business inquiries by executing intricate queries across extensive datasets. The queries and data manipulations contained in this benchmark are relevant to diverse industries. TPC-H presents results using the TPC-H Composite Query-per-Hour Performance Metric (QphH@Size), which gauges the system's efficiency in processing queries. This metric considers database sizes, computational capabilities for handling query streams, and query throughput when managing concurrent user requests.

Testing used a scale factor of 10000 GB (SF10000). TPC Benchmark™ H @ 1000GB SF comparison based on published scores at tpc.org. The 2P AMD EPYC 9554 results: 2,720,098.1 QphH@1000GB, \$489.82/QphH@1000GB, available 03/20/2024, 128 total cores) are ~1.14x the QphH performance and ~1.22x better price/QphH versus a 2P Xeon Platinum 8592+ (2,391,511 QphH@1000GB, \$625.77/QphH@1000GB, available 01/26/2024, 128 total cores). Published results are available from:

- **AMD:** https://www.tpc.org/results/individual_results/Dell/dell~tpch~10000~dell_poweredge_r7625~es~2024-03-20~v01.pdf*
- **Intel:** https://www.tpc.org/results/individual_results/HPE/hpe~tpch~10000~hpe_proliant_dl380_gen11~es~2024-01-25~v02.pdf*

CONCLUSION

Servers powered by 4th Gen AMD EPYC processors deliver performance and price-performance benefits versus comparable servers powered by 4th Gen Intel Xeon Platinum processors running the TPC-E and TPC-H benchmarks on Microsoft SQL Server 2022 Enterprise Edition. Businesses running Microsoft SQL Server 2022 Enterprise Edition on premises should consider servers powered by 4th AMD EPYC processors to maximize performance while containing costs.

FOR ADDITIONAL INFORMATION

Please see the following additional resources for more about 4th Gen AMD EPYC features, architecture, and available models:

- [AMD EPYC™ 9004 Series Processors](#)
- [AMD Documentation Hub](#)

REFERENCES

1. GD-183A: AMD Infinity Guard features vary by EPYC™ Processor generations and/or series. Infinity Guard security features must be enabled by server OEMs and/or Cloud Service Providers to operate. Check with your OEM or provider to confirm support of these features. Learn more about Infinity Guard at <https://www.amd.com/en/technologies/infinity-guard>.

AUTHORS

Shiva Gurumurthy and Bryon Georgson

RELATED LINKS

- [Microsoft® SQL Server® 2022 Enterprise Edition*](#)
- [AMD EPYC Processors](#)
- [AMD Documentation Hub](#)

**Links to third party sites are provided for convenience and unless explicitly stated, AMD is not responsible for the contents of such linked sites and no endorsement is implied.*

SUPERB DATA ANALYTICS
PERFORMANCE

Enterprises of all sizes rely on ever-growing datasets to query and analyze data to derive mission-critical business insights that support key decisions. Systems powered 4th Gen AMD EPYC™ 9xx4 processors deliver superb data analytics performance across even the most demanding workloads and dataset.

“ZEN 4” CORE & SECURITY
FEATURES

General-purpose support for up to:

- 96 physical cores, 192 threads
- 384 MB of L3 cache per CPU
- 32 MB of L3 cache per CCD
- 6 TB of DDR5-4800 memory
- Up to 128 1P, up to 160 2P PCIe® Gen 5 lanes

Infinity Guard security features¹

- Secure Boot
- Encrypted memory with SME

MICROSOFT® SQL SERVER®
2022 ENTERPRISE EDITION

Microsoft SQL Server 2022 Enterprise Edition is a popular relational database management system (RDBMS) that supports a wide variety of transaction processing, business intelligence and analytics applications for both on-premise and cloud environments.

DISCLAIMERS

The information contained herein is for informational purposes only and is subject to change without notice. While every precaution has been taken in the preparation of this document, it may contain technical inaccuracies, omissions and typographical errors, and AMD is under no obligation to update or otherwise correct this information. Advanced Micro Devices, Inc. makes no representations or warranties with respect to the accuracy or completeness of the contents of this document, and assumes no liability of any kind, including the implied warranties of noninfringement, merchantability or fitness for purposes, with respect to the operation or use of AMD hardware, software or other products described herein. No license, including implied or arising by estoppel, to any intellectual property rights is granted by this document. Terms and limitations applicable to the purchase or use of AMD's products are as set forth in a signed agreement between the parties or in AMD's Standard Terms and Conditions of Sale.

COPYRIGHT NOTICE

©2024 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, EPYC, Infinity Fabric, and combinations thereof are trademarks of Advanced Micro Devices, Inc. Microsoft and SQL Server are trademarks or registered trademarks of Microsoft Corporation in the US or other countries. TPC, TPC Benchmark, TPC-E, and TPC-H are trademarks of the Transaction Processing Performance Council. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.