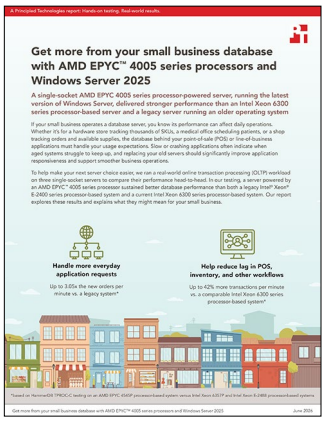

The science behind the report:

Get more from your small business database with AMD EPYC™ 4005 series processors and Windows Server 2025

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report **Get more from your small business database with AMD EPYC™ 4005 series processors and Windows Server 2025**.

We concluded our hands-on testing on May 22, 2026. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on May 8, 2026 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears. We based performance comparisons on our tested configurations, which may vary in core counts, memory configuration, storage, and software environments.

Our results

To learn more about how we have calculated the wins in this report, go to **https://facts.pt/calculating-and-highlighting-wins**. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: Results of our optimized user count benchmark testing.

	AMD EPYC 4545P	Intel Xeon 6357P	AMD % Win	Intel Xeon E-2488	AMD % Win
Virtual Users	64VU	64VU	-	24VU	-
NOPM	349,534	247,374	41.30%	186,352	87.57%
TPM	820,901	574,647	42.85%	432,860	89.65%
CPU%	51.45	90.54	-	46.84	-
Free Memory (GB)	4.57	7.52	-	9.15	-
Read IOPS	231.96	168.43	-	132.4	-
Read throughput (MB)	10.94	9.16	-	8.26	-
Read latency (ms)	1	0.1	-	29	-
Write IOPS	23634.81	13493.95	-	13742.9	-
Write throughput (MB)	759.85	589.21	-	370.5	-
Write latency (ms)	36	1	-	50	-

Table 2: Results of our 64 virtual user benchmark testing.

	AMD EPYC 4545P	Intel Xeon 6357P	AMD % Win	Intel Xeon E-2488	AMD % Win
Virtual Users	64VU	64VU	-	64VU	-
NOPM	349,534	247,374	41.30%	114,244	205.95%
TPM	820,901	574,647	42.85%	276,656	196.72%
CPU%	51.45	90.54	-	27.14	-
Free Memory (GB)	4.57	7.52	-	9.08	-
Read IOPS	231.96	168.43	-	122.03	-
Read throughput (MB)	10.94	9.16	-	7.61	-
Read latency (ms)	1	0.1	-	47	-
Write IOPS	23634.81	13493.95	-	15727.53	-
Write throughput (MB)	759.85	589.21	-	293.44	-
Write latency (ms)	36	1	-	73	-

System configuration information

Table 3: Detailed information on the systems we tested.

System configuration information	Lenovo ThinkSystem ST250 V3	Lenovo ThinkSystem ST250 V3	Lenovo ThinkSystem ST45 V3
BIOS name and version	CTE126E 8.30	CTE126E 8.30	QIE106F 2.10
Non-default BIOS settings	None	None	AMD Memory Guard – Disabled C State Support – Disabled
Operating system name and version/build number*	Windows Server 2022 Datacenter	Windows Server 2025 Datacenter	Windows Server 2025 Datacenter
Date of last OS updates/patches applied	04/24/2026	04/24/2026	04/24/2026
Power management policy	High Performance	High Performance	High Performance
Processor			
Number of processors	1	1	1
Vendor and model	Intel® Xeon® E-2488	Intel Xeon 6357P	AMD EPYC 4545P
Core count (per processor)	8	8	16
Core frequency (GHz)	3.20	3.00	3.00
Stepping	B0	B0	0
Memory module(s)			
Total memory in system (GB)	64	64	64
Number of memory modules	2	4	2
Vendor and model	Micron® MTC20C2085S1EC56BD1	Samsung® M324R2GA3DB0-CWMOL	Hynix® HMCG88AGBEA081N
Size (GB)	32	16	32
Type	PC5-5600	PC5-5600	PC5-5600B
Speed (MHz)	5,600	5,600	5,600
Speed running in the server (MHz)†	4,000	4,000	5,600
Local storage			
Number of drives	2	2	2
Drive vendor and model	Micron MTFDDAK3T8TGB	Micron MTFDDAK3T8TGB	Toshiba® MG04ACA100N
Drive size (TB)	3.84	3.84	1
Drive information (speed, interface, type)	6Gb SATA, SSD	6Gb SATA, SSD	6Gb SATA, 7.2K RPM HDD
Local storage			
Number of drive	-	2	2
Drive vendor and model	-	Intel P5600	Samsung SSD 9100 PRO
Drive size (TB)	-	3.2	1
Drive information (speed, interface, type)	-	NVMe U.2 SSD	NVMe M.2 SSD

* We tested representative software environments for each system generation.

† The difference in memory speeds reflects each platform's memory configuration. With 2 DIMMs in the system powered by the Intel Xeon E-2488 processor, the memory controller dropped to 4,000 MHz for stability. Similarly for the system powered by the Intel Xeon 6357P processor with 4 DIMMs, 4,000 MHz is the validated safe speed. The server powered by the AMD EPYC 4545P processor supports DDR5-5600 with 2 DIMMs.

System configuration information	Lenovo ThinkSystem ST250 V3	Lenovo ThinkSystem ST250 V3	Lenovo ThinkSystem ST45 V3
Network adapter			
Vendor and model	Broadcom® 5720	Broadcom 5720	Intel I210
Number and type of ports	3 x 1GbE	3 x 1GbE	2 x 10GbE
Driver version	-	-	9.8.09
Cooling fans			
Vendor and model	N/A	N/A	N/A
Number of cooling fans	4	4	3
Power supplies			
Vendor and model	Great Wall® GW-CRPS800N2	Great Wall GW-CRPS800N2	AcBel™ PCM013
Number of power supplies	2	2	1
Wattage of each (W)	800	800	500

How we tested

Testing with TPROC-C

We compared the online transaction processing (OLTP) performance using the HammerDB 5.0 TPROC-C workload across three single-socket servers: a current-generation system powered by an AMD EPYC 4545P processor, a current-generation system powered by an Intel Xeon 6357P processor, and a legacy system powered by an Intel Xeon E-2488 processor. Each system under test (SUT) ran Microsoft SQL Server on bare-metal Microsoft Windows Server with a dedicated NVMe storage volume (or SATA storage where NVMe was unavailable) hosting the database data and log files. HammerDB clients ran as VMs on a separate infrastructure Microsoft Hyper-V host connected to each SUT over the local network. We used a 250-warehouse database and tested with 64 virtual users.

Setting up the systems under test

Configuring Windows Server

1. Open Server Manager, and click Local Server.
2. Disable Windows Defender Firewall on Domain network, Private network, and Public network.
3. Disable IE Enhanced Security Configuration.
4. Change the time zone to your local time zone.
5. Change the name of your server, and when prompted, reboot.
6. Open Server Manager again, and click Local Server.
7. Click to run updates.
8. Run updates, rebooting when prompted, until the server shows no new updates to install.

Installing ODBC Driver 18 for SQL Server

1. In the browser of your choice, navigate to **https://learn.microsoft.com/en-us/sql/connect/odbc/download-odbc-driver-for-sql-server**.
2. Click the download link for Microsoft ODBC Driver 18 for SQL Server (x64).
3. Double-click the downloaded file, and follow the prompts in the wizard to install.

Configuring Microsoft SQL Server on the system under test (SUT)

Partitioning and formatting the NVMe data drives

Perform the following steps on each system under test that has NVMe drives for the database volume. If testing a system with only SATA storage, such as the Intel Xeon E-2488 processor-based server we tested, skip to the SQL Server installation section and place database files on the appropriate SATA volume.

1. Log into the SQL VM or SUT.
2. In Settings, open Manage Storage Spaces.
3. Click Add.
4. Enter a name for the storage pool, and select the NVMe disks.
5. Click Create, and click Yes to confirm.
6. Enter a name for the storage space, the default maximum size, and choose a resiliency. We used Two-way mirror.
7. Click Create, and click Yes to confirm.
8. Enter a name for the volume label, assign the desired drive letter for your volume, and click Next.
9. Select the file system and allocation size, and click Next. We used NTFS and 64K allocation size.
10. Verify that the settings are correct, and click Format.

Installing Microsoft SQL Server

Perform the following steps on each system under test. For our testing, the servers with AMD EPYC 4545P and Intel Xeon 6357P processors used SQL Server 2025, and the server with the Intel Xeon E-2488 processor used SQL Server 2022. The installation procedure is identical for both versions except where noted.

1. Download and run the latest release of the appropriate SQL Server version + GDR installer from **https://learn.microsoft.com/en-us/troubleshoot/sql/releases/download-and-install-latest-updates**.
2. In the left pane, click Installation.
3. Click New SQL Server stand-alone installation or add features to an existing installation.
4. Accept the license terms, and click Next.
5. Click Use Microsoft Update to check for updates, and click Next.
6. To install the setup support files, click Install.
7. If the installer doesn't display any failures, click Next.
8. At the Setup Role screen, choose SQL Server Feature Installation, and click Next.
9. At the Feature Selection screen, select Database Engine Services and Full-Text and Semantic Extractions for Search.
10. Click Next.
11. At the Instance Configuration screen, leave the instance default selection, and click Next.
12. At the Database Engine Configuration screen, select the authentication method you prefer. We selected Mixed Mode.
13. For the system administrator account, enter and confirm a password.
14. Click Add Current user. This may take several seconds.
15. Click TempDB.
16. Change the number of files to eight.
17. Change the initial file size to 1,024 MB.
18. Change the initial size of the log to 1,024 MB.
19. Click Next.
20. At the Error and usage reporting screen, click Next.
21. At the Installation Configuration Rules screen, check that there are no failures or relevant warnings, and click Next.
22. At the Ready to Install screen, click Install.
23. Once the installation finishes, navigate to the Installation tab in the Installation Center, and click Install SQL Server Management Tools.
24. In the browser that opens, click Download SQL Server Management Studio 20.X.
25. To open the installer, click the download.
26. Click Run.
27. Click Install.
28. Once the installation completes, close the installation window.

Configuring Windows policies

1. In the Start menu, click Run. In the Open box, type `gpedit.msc`.
2. On the Local Group Policy Editor console, expand Computer Configuration, and expand Windows Settings.
3. Expand Security Settings, and expand Local Policies.
4. Select the User Rights Assignment folder.
5. In the details pane, double-click Lock pages in memory.
6. In the dialog box for Local Security Setting - Lock pages in memory, click Add User or Group.
7. In the dialog box for Select Users, Service Accounts, or Groups, select the SQL Server Service account, and click OK.
8. In the details pane, double-click Perform volume maintenance tasks.
9. In the dialog box for Local Security Setting - Lock pages in memory, click Add User or Group.
10. In the dialog box for Select Users, Service Accounts, or Groups, select the SQL Server Service account, and click OK.
11. For these settings to take effect, restart the SQL Server Service.

Configuring SQL Server global options

1. In SQL Server Management Studio, connect to the desired SQL Server database engine, right-click the desired instance, and click Properties.
2. From the left-side list in the Server Properties dialog box, select Memory.
3. In the Maximum server memory (in MB) option, input a value equal to 90 percent of the VM memory capacity in MB.
4. From the left-side list in the Server Properties dialog box, select Advanced.
5. Set Max Degree of Parallelism to 8.
6. Set Cost Threshold for Parallelism to 50.
7. `Click OK.`

Configuring the test database

Creating and pre-sizing the TPROC-C database

1. On the SUT, open SQL Server Management Studio.
2. Run the following query:

```
CREATE DATABASE [tpcc]   ON PRIMARY     (NAME='tpcc',     FILENAME='E:\db\tpcc.mdf',
SIZE=10240MB, FILEGROWTH=0),     (NAME='tpcc2',    FILENAME='E:\db\tpcc2.ndf',     SIZE=10240MB,
FILEGROWTH=0),     (NAME='tpcc3',    FILENAME='E:\db\tpcc3.ndf',     SIZE=10240MB, FILEGROWTH=0),
(NAME='tpcc4',    FILENAME='E:\db\tpcc4.ndf',     SIZE=10240MB, FILEGROWTH=0),     (NAME='tpcc5',
FILENAME='E:\db\tpcc5.ndf',     SIZE=10240MB, FILEGROWTH=0),     (NAME='tpcc6',    FILENAME='E:\
db\tpcc6.ndf',     SIZE=10240MB, FILEGROWTH=0),     (NAME='tpcc7',    FILENAME='E:\db\tpcc7.
ndf',     SIZE=10240MB, FILEGROWTH=0),     (NAME='tpcc8',    FILENAME='E:\db\tpcc8.ndf',
SIZE=10240MB, FILEGROWTH=0)   LOG ON     (NAME='tpcc_log', FILENAME='E:\log\tpcc_log.ldf',
SIZE=32768MB, FILEGROWTH=0);
```

Note: For a server that relies on SATA storage, such as the Intel Xeon E-2488 system we tested, adjust the file paths to match the appropriate drive letter.

3. Once finished, in the Object Explorer, right-click the database, click Properties, and click Options.
4. Set the Recovery model to Simple.
5. Set the Compatibility level to 160.
6. Click OK.

Installing HammerDB on the client system

1. Download the latest version of HammerDB from **www.hammerdb.com/download.html**. We used version 5.0.
2. Double-click the .EXE file, choose English, and click OK.
3. Click Yes.
4. Click Next.
5. Choose a destination location, and click Next.
6. Click Next.
7. Click Finish.

Loading the TPROC-C schema

1. Open HammerDB, and click Options→Benchmark.
2. Choose MSSQL Server and TPROC-C.
3. Expand SQL Server→TPROC-C→Schema Build.
4. Double-click Options.
5. In the SQL Server field, input the IP address of the SUT.
6. Select 250 warehouses and 16 virtual users.
7. Click OK.
8. Double-click Build.

Configuring SQL Server database options

1. On the SUT, open SQL Server Management Studio.
2. In the Object Explorer, right-click the database, click Properties, and click Options.
3. Set Target Recovery Time (Seconds) to 120.
4. Set Delayed Durability to Forced.
5. Set Is Read Committed Snapshot Isolation On to True.
6. Set Accelerated Database Recovery to True.
7. Set Optimized Locking to True.
8. Click OK.

Backing up the database

1. On the SUT, open SQL Server Management Studio.
2. Right-click the database to be backed up, and click Tasks→Back up….
3. Choose a location to store the backup, and click OK.

Performing the TPROC-C test

1. On the client system, start HammerDB.
2. Set the database server to SQL Server, and set the workload to TPROC-C.
3. Open the Options panel for the Driver Script: SQL Server→TPROC-C→Driver Script→Options.
4. In the SQL Server field, enter the IP address of the system under test.
5. Change the ODBC Driver to ODBC Driver 18 for SQL Server.
6. Choose SQL Server Authentication, and change the SQL Server user password to the password you chose during SQL Server setup.
7. Choose Timed Driver Script.
8. Enter values for the Ramp-up Time and the Test Duration. We used 20 and 15 minutes, respectively.
9. Click OK.
10. Open the Options panel for the Virtual Users: SQL Server→TPROC-C→Virtual User→Options.
11. Enter a value for number of virtual users. We used 64.
12. Select the following: Show Output, Log Output to Temp, and Use Unique Log Name.
13. Click OK.
14. To capture CPU, RAM, and disk performance counters, start a custom Perfmon data collector set.
15. Click the green arrow.
16. Note the name of the log file. To start the run, click OK.
17. When the run finishes, stop Perfmon.
18. Save the HammerDB results text file and Perfmon output.
19. Drop and restore the database from the system under test, reboot the system.
20. Complete steps 1 through 20 three times, and identify the median run.

This project was commissioned by AMD.

Read the report ▶

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How we created this report

A PT team, which includes the contributors we've listed and others, created this report and performed the technical work behind it. We used AI to create the initial draft of the report and aid in research.

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