



Microsoft SQL Server 2025 on Lenovo ThinkSystem SR650 V4 with DG Series iSCSI Storage

Solution Brief

Organizations generate data at a rate and volume that keeps rising, and they depend on that data for both daily operations and strategic decisions. Transaction systems, customer applications, IoT sensors, and analytics pipelines all feed the same database estate, and every one of them expects fast, consistent response times. The database platform underneath those decisions has to keep pace, delivering predictable performance today and room to grow tomorrow.

At the same time, expectations of the database itself are changing. Business users want reporting on live operational data rather than yesterday's extracts, and developers want to build AI features such as semantic search and retrieval augmented generation directly on the data they already manage. Selecting a database platform that aligns with these requirements is essential for achieving the right balance of performance, scalability, and efficiency.

Two platform shifts make this a good moment to modernize. Microsoft SQL Server 2025 extends the engine improvements of SQL Server 2022 with optimized locking, further Intelligent Query Processing, and native vector and JSON data types for AI and application workloads. On the hardware side, Intel Xeon 6 processors, DDR5 6400 MHz memory, and PCIe 5.0 I/O raise the ceiling on what a single two-socket server can deliver, while modern all-flash SAN storage brings enterprise data services to database volumes without tying capacity to individual servers.

Together, these advances give IT leaders an opportunity to consolidate aging SQL Server infrastructure, reduce operating cost, and prepare the data platform for AI, all on a validated Lenovo foundation.

Business Challenge

SQL Server remains the system of record for a large share of enterprise applications, from ERP and order processing to customer portals and line of business reporting. Many of these deployments were sized years ago for a fraction of today's data and user load, and they have grown through a series of incremental additions rather than deliberate design. The result is an estate that is expensive to run, difficult to scale, and poorly positioned for new demands.

Database teams face pressure from several directions at once:

- **Growing data volume and velocity:** more and larger databases must be served without degrading response times for transactional users, and peak loads are less predictable than they once were.
- **Mixed workloads:** operational reporting and analytics increasingly run against the same data as OLTP, competing for CPU, memory, and I/O and causing contention that users feel as slow screens and timeouts.
- **Aging infrastructure:** legacy SQL Server estates on older servers carry high licensing, power, cooling, and support costs relative to the work they deliver, and they may be approaching end of support.
- **Coupled compute and storage:** when database capacity lives only on local drives, growing storage or adding data protection means buying more servers, and each server becomes its own

island to back up and manage.

- **Data protection and availability:** businesses expect near-continuous access to transactional data, yet snapshots, replication, and recovery are often bolted on inconsistently across servers.
- **Time to value:** designing, configuring, and tuning a database platform from scratch can take months before it serves production traffic, tying up scarce database and infrastructure skills.
- **New application demands:** developers want AI features such as semantic search, which traditionally required a separate specialized database with its own operations, security, and cost.

Addressing these issues one at a time leads to more complexity. Organizations need a platform that raises performance, separates capacity from compute, and supports new data types without adding new silos.

Solution

Lenovo combines a validated server platform, shared SAN storage, and Microsoft SQL Server 2025 into a single solution that is tested and tuned to save months of configuration, setup, and testing. Each layer addresses a specific part of the challenge: the server delivers the compute and memory needed for dense, mixed workloads; the SAN array decouples capacity and data protection from compute; and SQL Server 2025 adds engine efficiency and native AI capabilities. Lenovo validates the combination so that customers start from a known, well performing configuration rather than a blank page.

Lenovo ThinkSystem SR650 V4

The ThinkSystem SR650 V4 is a dual-socket 2U rack server built for demanding database workloads. It is powered by Intel Xeon 6 processors with Performance-cores (P-cores), offering up to 86 cores per processor, and supports DDR5 RDIMMs at up to 6400 MHz, MRDIMMs at up to 8000 MHz, PCIe 5.0 slots, and CXL 2.0 memory for future growth. Higher performance per core matters for SQL Server, because SQL Server is licensed per core.

The server supports up to 40 drive bays and up to 36 NVMe drives without PCIe lane oversubscription, plus M.2 drives for mirrored boot volumes. In this solution, its PCIe Gen5 infrastructure provides high-throughput iSCSI connectivity to external storage. The added density lets one host serve more and larger databases, which helps consolidate legacy estates and reduce per-core licensing sprawl.



Figure 1. Lenovo ThinkSystem SR650 V4

Lenovo ThinkSystem DG5200/DG7200 SAN storage

The ThinkSystem DG Series are unified all-flash and hybrid arrays supporting iSCSI and Fibre Channel, with snapshots, replication, thin provisioning, deduplication, and compression. In this solution the array presents two iSCSI volumes to the server: one for data files and TempDB, and one for the transaction log. Separating the log isolates its sequential, latency-sensitive writes from random data I/O.

Because database volumes live on shared storage, capacity, data protection, and data services scale and are managed independently of the compute tier. Administrators can grow a volume, take an application consistent snapshot, or replicate data to another site without touching the server, and iSCSI allows the solution to run over standard Ethernet networking.



Figure 2. Lenovo ThinkSystem DG5200 Storage Array

Microsoft SQL Server 2025

SQL Server 2025 adds optimized locking, which reduces lock memory and escalation; optional parameter plan optimization; persisted Query Store plan forcing; TempDB scalability improvements; and batch mode and columnstore refinements that benefit analytics running alongside OLTP. In-memory OLTP and Accelerated Database Recovery are also enhanced.

For developers and data teams, SQL Server 2025 introduces native vector and JSON data types, regular expression functions in T-SQL, change event streaming for near real-time downstream consumption, and Microsoft Fabric mirroring for analytics on operational data, alongside continued Azure integration, Always On availability group, and security enhancements.

Management and support

Lenovo XClarity Controller 3 (XCC3) provides out-of-band management, firmware updates, and lifecycle control for the server, helping administrators keep the platform current and secure. The solution runs on Microsoft Windows Server 2025 and is backed by Lenovo worldwide support.

Use Cases

The combination of dense compute, shared SAN storage, and SQL Server 2025 fits a range of database scenarios. The following use cases show how organizations apply the solution to modernize existing estates and support new application demands.

- **Consolidating legacy SQL Server estates**

IT teams running SQL Server on several older servers can consolidate onto fewer SR650 V4 hosts. The tested configuration delivers more than one million TPM from a single 16-core processor, and the SR650 V4 can scale to two processors with up to 86 cores each, so one host supports more and larger databases, while the DG5200/DG7200 array centralizes capacity and adds snapshots and replication without extra servers. The result is fewer systems to license, power, and manage.

- **OLTP with operational analytics**

Businesses that need reporting on current data without slowing transactions benefit from SQL Server 2025 batch mode and columnstore refinements together with the SR650 V4 core count and memory bandwidth. Separate iSCSI volumes for data and log keep reporting I/O away from the commit path, and Microsoft Fabric mirroring can feed heavier analytics downstream.

- **AI-enabled applications and semantic search**

Application teams adding semantic search or retrieval features can use the native vector data type and vector indexes in SQL Server 2025 instead of deploying a separate vector database. Embeddings live alongside the operational data they describe, protected by the same array snapshots and replication, and served by the same high-memory SR650 V4 host.

Market Verticals

Nearly every industry runs critical applications on SQL Server. The solution is well suited to verticals where transaction volume, data growth, and data protection requirements are high:

- **Financial services:** core banking, payments, and trading systems that need high transaction throughput, consistent latency, and replicated, recoverable data for regulatory compliance.
- **Healthcare and life sciences:** electronic health records, claims processing, and clinical systems that must stay available while protecting sensitive patient data.
- **Retail and ecommerce:** order processing, inventory, and loyalty platforms that face seasonal peaks, plus product search and recommendation features that can use native vector search.
- **Manufacturing:** ERP, manufacturing execution, and supply chain systems that combine transactional data with operational analytics on the plant floor.
- **Public sector and education:** citizen services, student information, and case management systems that need to modernize aging infrastructure within tight budgets.
- **Telecommunications:** billing, subscriber management, and network operations databases that process large volumes of records continuously.

Business Outcomes

The solution turns validated performance into measurable business value. In Lenovo testing, the ThinkSystem SR650 V4 configuration delivered **1,028,426 transactions per minute (TPM)** on a HammerDB OLTP workload derived from TPC-C, as detailed later in Performance Testing Details and Results. That is more than 17,000 transactions every second from a single 2U server with one 16-core processor, or more than 64,000 TPM per core.

- **Performance and consolidation**

High throughput per host gives organizations headroom to consolidate several legacy SQL Server instances onto fewer servers. Fewer servers mean less rack space, power, and cooling, and fewer operating system and hardware platforms to patch and support. Because SQL Server is licensed per core, getting more work from each core helps organizations control one of the largest costs in the database estate; the tested configuration required only 16 cores of SQL Server Enterprise Edition licensing.

- **Independent scaling and data protection**

With database and log volumes hosted on ThinkSystem DG5200/DG7200 storage, capacity grows on the array without adding compute, and compute can be refreshed without migrating data. Array snapshots, replication, thin provisioning, deduplication, and compression apply consistently across database volumes, simplifying backup and recovery and improving storage efficiency.

- **Faster time to value**

Starting from a configuration that Lenovo has already tested and tuned shortens design and deployment, freeing database and infrastructure teams to focus on applications rather than platform integration. Lenovo XClarity management simplifies ongoing firmware and lifecycle tasks after deployment.

- **A platform ready for what comes next**

Native vector search, JSON support, and Microsoft Fabric mirroring in SQL Server 2025 let organizations add AI and analytics capabilities on the same infrastructure that runs core transactions, avoiding the cost and operational overhead of separate specialized databases. Support for PCIe 5.0, MRDIMM, and CXL 2.0 memory on the SR650 V4 leaves room to grow as requirements change.

These results were obtained in a controlled environment; actual results vary with workload and configuration. Contact your Lenovo representative to size the solution for your environment.

Workloads

The solution is validated for OLTP workloads, which Lenovo measured with HammerDB TPROC-C. The same platform can also host operational reporting and analytics alongside OLTP; analytics performance was not measured in this testing and should be sized with your Lenovo representative. Lenovo tested the following configuration:

- **Server:** Lenovo ThinkSystem SR650 V4
- **Processor:** 1x Intel Xeon 6724P, 16 cores, 3.6 GHz, 210 W
- **Memory:** 256 GB (8x 32 GB TruDDR5 6400 MHz RDIMMs, one DIMM per channel)
- **Local storage:** 2x 960 GB M.2 NVMe in RAID 1 for the OS
- **SAN storage:** ThinkSystem DG5200 QLC All Flash Array with dual controllers (64 GB each), 24x 15.36 TB QLC NVMe self-encrypting drives, and ONTAP 9.17 with software encryption, presenting two iSCSI volumes (data and TempDB; transaction log)
- **Network:** 100 Gb Ethernet iSCSI connectivity to the storage array
- **Software:** Microsoft Windows Server 2025 and Microsoft SQL Server 2025 Enterprise Edition

Performance Testing Details and Results

Lenovo measured OLTP performance with HammerDB, an open-source load testing and benchmarking tool for databases (<https://www.hammerdb.com>). HammerDB provides an OLTP workload, TPROC-C, derived from the TPC-C benchmark, and an analytics workload, TPROC-H, derived from TPC-H (<https://www.tpc.org>). HammerDB ran on a separate load generation server so that driver CPU consumption did not distort the results measured on the system under test. The following table summarizes the test configuration and results.

Table 1. Performance testing details and results

Parameter	Value
Configuration	
Server and processor	ThinkSystem SR650 V4 with Intel Xeon 6 processor
Hardware configuration	• ThinkSystem SR650 V4, 1x Intel Xeon 6724P (16 cores, 3.6 GHz), 256 GB memory, Micron 3.84 TB NVMe drives • ThinkSystem DG5200 QLC All Flash Array over iSCSI
Database tested	Microsoft SQL Server 2025 Enterprise Edition
Benchmark simulated	HammerDB TPROC-C (derived from TPC-C), bare metal
Result	
Virtual users	150
User delay	1 ms
TPROC-C result	1,028,426 transactions per minute (TPM)

Conclusion

Microsoft SQL Server 2025 on the Lenovo ThinkSystem SR650 V4 with ThinkSystem DG5200 and DG7200 iSCSI SAN storage gives organizations a tested foundation for growing transactional, analytical, and AI-enabled database workloads. Dense Intel Xeon 6 compute, fast DDR5 memory, and shared all-flash SAN storage combine to deliver more than one million transactions per minute in Lenovo testing, while letting compute and storage scale on their own schedules. It is a practical path to modernize legacy SQL Server estates and prepare for what comes next.

For More Information

To learn more about Microsoft SQL Server 2025 on Lenovo ThinkSystem SR650 V4, with ThinkSystem DG5200 and DG7200 storage, contact your Lenovo representative or Lenovo Business Partner, or visit the resources below.

References:

- Lenovo ThinkSystem SR650 V4 Server Product Guide:
<https://lenovopress.lenovo.com/lp2127-thinksystem-sr650-v4-server>
- Lenovo ThinkSystem DG5200 and DG7200 Unified Storage Arrays Product Guide:
<https://lenovopress.lenovo.com/lp2074-lenovo-thinksystem-dg5200-and-dg7200-unified-storage-arrays>
- What's new in SQL Server 2025, Microsoft Learn:
<https://learn.microsoft.com/en-us/sql/sql-server/what-s-new-in-sql-server-2025>
- HammerDB:
<https://www.hammerdb.com>

Bill of Materials

The table below lists the Lenovo ThinkSystem SR650 V4 server configuration used in testing.

Table 2. SR650 V4 bill of materials

Part number	Description	Quantity
7DJSCTO1WW	Server: ThinkSystem SR650 V4, 3yr Base Warranty	1
C3QK	ThinkSystem SR650 V4 24x2.5" Chassis	1
C5R5	Intel Xeon 6724P 16C 210W 3.6GHz Processor	1
BPDR	ThinkSystem V4 2U Standard Heatsink	1
C0U9	ThinkSystem 32GB TruDDR5 6400MHz (1Rx4) RDIMM	8
CC7G	ThinkSystem M.2 RAID B550i-2i SATA/NVMe Enablement Kit	1
C287	ThinkSystem M.2 VA 960GB Read Intensive NVMe NHS SSD	2
C0U5	ThinkSystem 1300W 230V/115V Platinum CRPS Hot-Swap Power Supply v2.4	2
B8PP	ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter	2
C3RQ	ThinkSystem 2U 6038 24K Standard Fan Module	5
SCY0	Lenovo XClarity XCC3 Premier, FOD	1

The table below lists the Lenovo ThinkSystem DG5200 storage array configuration.

Table 3. DG5200 bill of materials

Part number	Description	Quantity
7DHYCTO1WW	Lenovo ThinkSystem DG5200 QLC All Flash Array	1
BF3C	Lenovo ThinkSystem Storage 2U NVMe Chassis	1
BWU9	Storage Essential Bundle Offering	1
C4A5	Lenovo ThinkSystem DM/DG5200 Series Controller, 64GB	2
C5RG	Lenovo ThinkSystem 30.7TB (2x 15.36TB QLC NVMe SED) Drive Pack	12
CCWL	Lenovo ThinkSystem Storage ONTAP 9.17 Software Encryption	1
BFH1	Lenovo 100Gb SR4 QSFP28 Ethernet Transceiver	8

Authors

Victor Talpeanu is a Microsoft Solutions Engineer with over 8 years of experience in the IT industry, specializing in Azure Local deployments and Azure Local cluster testing. He contributes to Lenovo's MX portfolio through Software Builder Extension (SBE) validation, ensuring seamless integration and performance across hybrid and edge infrastructures. Victor focuses on delivering secure, modern, and reliable solutions built on Azure Local and enterprise cloud technologies.

Chris Honoré is a Solutions Product Manager at Lenovo with deep expertise in datacenter products and solution offerings. He has a strong background in consulting and solution development, helping customers design and support on-premises and hybrid environments. Chris has spent the past 15 years with IBM and Lenovo, specializing in x86 server and data center solutions. Prior to that, he built two decades of experience in the telecommunications industry, serving in both technical and business leadership roles.

Related product families

Product families related to this document are the following:

- [DG Series Storage](#)
- [Intel Alliance](#)
- [Microsoft Alliance](#)
- [Microsoft SQL Server](#)
- [ThinkSystem SR650 V4 Server](#)

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

© Copyright Lenovo 2026. All rights reserved.

This document, LP2545, was created or updated on September 30, 2026.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
<https://lenovopress.lenovo.com/LP2545>
- Send your comments in an e-mail to:
comments@lenovopress.com

This document is available online at <https://lenovopress.lenovo.com/LP2545>.

Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <https://www.lenovo.com/us/en/legal/copytrade/>.

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Lenovo®

ThinkSystem®

XClarity®

The following terms are trademarks of other companies:

Intel®, the Intel logo and Xeon® are trademarks of Intel Corporation or its subsidiaries.

Microsoft®, Azure®, SQL Server®, Windows Server®, and Windows® are trademarks of Microsoft Corporation in the United States, other countries, or both.

TPC® and TPC-C® are trademarks of Transaction Processing Performance Council.

Other company, product, or service names may be trademarks or service marks of others.