



Optimizing Microsoft SQL Server 2022 Standard Edition on Lenovo ThinkSystem SR630 V4

Solution Brief

Data growth challenge and a solution

Businesses are required today to handle an ever-increasing volume of data. Every solution in optimizing certain business activities generates an increased data volume and it this data needs to be managed. Finding the best database solution is mandatory for having an efficient outcome.

Lenovo Solutions for Microsoft SQL Server on ThinkSystem SR630 V4 are optimized for both Online Transaction Processing (OLTP) and Data Warehouse (DW). This technical brief features Microsoft SQL Server 2022 Standard running on a high-performance Lenovo dual-socket 1U rack mount enterprise server. The server is configured with 6th Generation Intel® Xeon® Scalable processors, DDR5 6400MT/s (1 DIMM per channel) or 5200 MT/s (2 DIMM's per channel) memory and high performance NVMe drives among a variety of storage options, including support for the PCIe 5.0 standard devices for I/O. These new processors from Intel offer also support for MRDIMMs and CXL 2.0 memory

The SR630 V4 server is a storage dense offering, with up to 12 2.5-inch NVMe hot-swap drive bays, by using combinations of front-accessible (up to 10 bays) and rear-accessible (2 bays), 16x E3.S 1T NVMe drives or SAS drives using a variety of 12Gb RAID controllers and SAS HBAs. The server also supports M.2 drives for convenient operating system boot functions or data storage. They: can be internally mounted or can be mounted at the front or rear of the server as hot-swap drives. Optional RAID-0 or RAID-1.

Business database solutions with faster time-to-value

Lenovo SR630 V4 systems are rigorously tested and tuned to save you months of configuration, setup, testing, and tuning. With these new servers, you get the following advantages:

- The new Intel Xeon 6 arrives with architectural improvements that improve performance over the previous generations and lower operational costs
- By using high priority cores and low priority cores a better a better optimization of the power consumption is being made during peak and off-peak hours
- To support high performance SQL server instances, the Lenovo SR630V4 systems support DDR5 memory operating at speeds up to 6400 MHz
- Improve density and support more and larger databases per host

Microsoft SQL Server 2022

SQL Server 2022 includes updates to existing features like Intelligent Query Processing in addition to management, platform or language.

Starting with SQL 2022, runtimes for R, Python, and Java are no longer installed with SQL Setup. Instead, install any desired custom runtime(s) and packages.

Here are some performance enhancements in SQL Server 2022:

- Improvements have been made to all columnstore indexes that benefit from enhanced segment elimination by data type.
- Concurrent updates to global allocation map pages reduce page latch contention
- Improvements in buffer pool scan operations on large-memory systems by using multiple CPU cores for parallel scans
- Improvements to Clustered ColumnStore Indices to sort existing data in memory before index builder compresses the data
- Support for Intel QuickAssist Technology (QAT) backup compression with software or hardware acceleration (only software compression is available in SQL Standard)
- TempDB performance enhancements for scalability
- Shrink database uses low priority processing to minimize impact on performance In-memory OLTP enhancements

Here are some management improvements:

- Additional Azure integration
- Link to Azure SQL Managed Instance
- Accelerated Database Recovery (ADR)
- Always On Availability Group enhancements

SQL Server Standard Edition capabilities

The SQL Server Standard Edition is an offering optimized for smaller businesses that don't have requirements for certain features. This is why the Standard Edition has a few hardware limitations like a maximum of 128GB of memory and 4 sockets or 24 cores. On the features side, the Standard edition it lacks features like *Always On availability groups*, but it does offer *Basic availability groups*. For a complete list of the scale limits and features between SQL Server Standard and SQL Server Enterprise the following link can be accessed: [Editions and Supported Features of SQL Server 2022 - SQL Server | Microsoft Learn](#)

Lenovo ThinkSystem SR630 V4 offerings are ideal for modernizing your legacy SQL Server applications because of their low cost and high-performance capabilities. They are industry standard x86 servers providing cost effective computing and fast high-density local storage.

Lenovo ThinkSystem SR630 V4 servers offer the necessary performance for bare metal or virtualized SQL Servers. High performance can be achieved using Hyper-V and Storage Spaces Direct technology which are built into Windows Server. Several technologies like NVMe storage and Remote Direct Memory Access (RDMA) networking are natively supported in Windows Server to enable the highest levels of performance.

In this testing we've installed Windows Server 2025 to mirror a typical small business deployment.

This configuration features the following main components:

- **Server:** Lenovo ThinkSystem SR630 V4
- **Processor:** 2x 6th Gen Intel Xeon 6505P up to 3.9Ghz (2.2 Ghz base) with 12 cores and 24 threads
- **Memory:** 128GB of DDR5 6400 MT/s memory
- **Storage pool:** 6x ThinkSystem 7450 PRO NVMe drives 3.8TB NVMe SSDs PCIe 4.0
- **OS Storage:** 2x 960GB M.2 NVMe SSDs PCIe 4.0 for the operating system (RAID 1)
- **Software:**
 - Microsoft Windows Server 2025
 - Microsoft SQL Server 2022 Standard Edition

ThinkSystem SR630 V4 software configuration

In our testing we have configured the server with a bare metal installation of Windows Server 2025. On it we've deployed SQL Server Standard 2022 alongside the updates available at that time for it and the operating system

For a high-performance SQL Server solution, implement the following best practices on the host:

- Configure UEFI (BIOS) settings to set Operating mode to Maximum performance.
- Enable Hyper-threading in the BIOS
- Configure power profile in Windows Server 2025 to 'High performance'.



Figure 1. Lenovo ThinkSystem SR630 V4

Performance Testing Details and Results

HammerDB Configuration

HammerDB is an open-source load testing / benchmarking tool for databases available at: <http://www.hammerdb.com>. It offers tools for testing performance on OLTP and Analytics workloads. The OLTP workload is based on TPC-C benchmark from <http://www.tpc.org> and the Analytics workload is based on TPC-H benchmark from [tpc.org](http://www.tpc.org). Hammerdb was run on a separate load server. Below are details of the testing and results.

Table 1. TPC-C performance testing details and results

Database tested	MS SQL Server 2022 Standard Edition
Processor Generation	SR630 V4 - 6th Gen Intel Xeon
Hardware Configuration	ThinkSystem SR630 V4, 2x Intel Xeon 6505P 12 core (24threads) 2.2 Ghz processors, 128GB memory, ThinkSystem 7450 PRO NVMe drives
Benchmarks simulated	TPC-C and TPC-H
Database size: TPC-C	100 GB, 800 warehouse, distributed over 6 NVMe drives (4 DB, 2 Log)
Database size: TPC-H	1000GB Scale Factor
Run time parameters: TPC-C	
Virtual users	150
User delay	1 ms
Run time parameters: TPC-H	
Virtual users	7
TPC-C Results	
Transactions Per Minute (million)	4.4
TPC-H results	
Queries per Hour	925

The Lenovo ThinkSystem SR630 V4, featuring the 6th Gen Intel Xeon 6505P processor, delivers superior performance and efficiency. It surpasses the performance with previous generation ThinkSystem SR630 V3 with 5th Gen Intel Xeon similar SKU CPU using the TPC-C workload. With a lower TDP, the CPU leads to better performance per watt and also reduces operational costs with power and datacenter cooling.

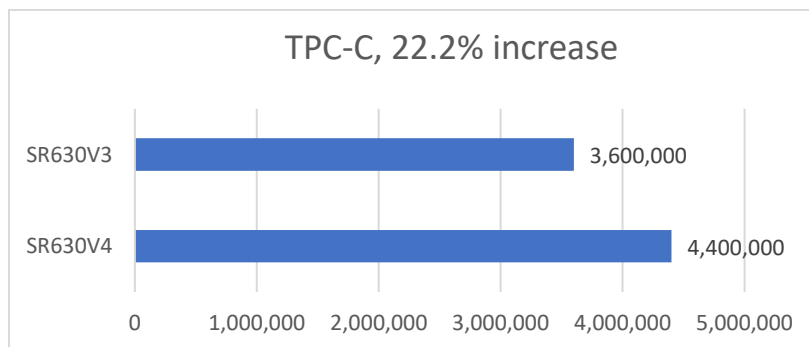


Figure 2 TPC-C results

Bill of Materials

Part Number	Product Description	Qty
7DG9CTO1WW	Server : ThinkSystem SR630 V4 - 3yr Warranty	1
C1XE	ThinkSystem 1U V4 10x2.5" Chassis	1
C5QQ	Intel Xeon 6505P 12C 150W 2.2GHz Processor	2
C1XJ	ThinkSystem 1U V4 Performance Heatsink	2
C0U2	ThinkSystem 16GB TruDDR5 6400MHz (1Rx8) RDIMM	8
C21X	ThinkSystem 1U V4 10x2.5" NVMe Gen5 Backplane	1
C26V	ThinkSystem M.2 RAID B545i-2i SATA/NVMe Adapter	1
BKSR	ThinkSystem M.2 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	2
C1ZB	ThinkSystem SR630 V4 x16 PCIe Gen5 Riser 1 or 2	1
BE4T	ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-port OCP Ethernet Adapter	1
C2BS	ThinkSystem 2.5" U.3 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	6
C0U4	ThinkSystem 1300W 230V/115V Titanium CRPS Premium Hot-Swap Power Supply	2
C1YT	ThinkSystem 1U V4 Performance Fan Module	4
C2DH	ThinkSystem Toolless Slide Rail Kit V4	1
C1XX	ThinkSystem Power Cable, 2x3+6 P-MTK PWR, 240mm	1
C1Y2	ThinkSystem PCIe GEN5 Cable, MCIOX8-MTK74pin, 280mm	1
C1YA	ThinkSystem M.2 Signal&Power Cable, ULP 82P-SLX4/2X10 SB, 540/680mm	1
C1XN	ThinkSystem PCIe 5.0 Cable, MCIO 8X STR TO MCIO 8X STR, 350mm	2
C1XM	ThinkSystem PCIe 5.0 Cable, MCIO 8X STR TO MCIO 8X STR, 250mm	3
C1XL	ThinkSystem Power Cable, PIC Power 2x3+6P to PIC Power 2x3+6P, 480mm	1
5641PX3	XClarity Pro, Per Endpoint w/3 Yr SW S&S	1

Table 2. Bill of Materials

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For More Information

To learn more about this Lenovo solution contact your Lenovo Business Partner or visit:

<https://www.lenovo.com/us/en/servers-storage/solutions/database/>

References:

Lenovo ThinkSystem SR630 V4: <https://lenovopress.lenovo.com/lp1971-thinksystem-sr630-v4-server>

Microsoft SQL Server 2022: <https://learn.microsoft.com/en-us/sql/sql-server/what-s-new-in-sql-server-2022?view=sql-server-ver16>

Related product families

Product families related to this document are the following:

- [Microsoft Alliance](#)
- [Microsoft SQL Server](#)
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