

Lenovo Database Configuration

for Microsoft SQL Server Standard OLTP on SR650

Reduce time to value with a pretested hardware configuration

OLTP problem and a solution

The rapid growth of technology means that the amount of available data and the ability to transact on that data increased to a level unthinkable as little as five years ago. As the volume and velocity of data increased, compute, memory and storage requirements to process that data have increased significantly. Therefore, servers are running at high utilization and transaction response times have multiplied. To compete, businesses in the 21st century are demanding the tools to process their data.

This Microsoft Online Transaction Processing (OLTP) configuration for SQL Server 2017 improves time-to-value for transactional needs with a new scalable architecture. This high performance solution in the Lenovo portfolio uses the Lenovo ThinkSystem SR650 server combined with Intel Optane P4800X NVMe PCI storage to solve SQL database transactional needs of up to 6 TB in size and 2.4 million transactions per minute (TPM) based on HammerDB TPC-C testing results.

Enterprise data warehouse with faster time-to-value

OLTP for SQL Server 2017 for Lenovo solution offerings are methodically tested and tuned to save you months of configuration, setup, testing, and tuning. With this offerings from Lenovo, you can now complete the following tasks:

- Buy all the hardware that you need from only one vendor including servers, storage, and networking
- Pre-optimized system tuned, tested with Microsoft SQL Server Standard Edition and SUSE Linux SLES 12 SP3 so you can deploy with confidence for your demanding transactional database performance needs
- Run mission critical transactional workloads with small random IOPs with low latency requirements
- Eliminate bottlenecks with optimized rapid data reads and query aggregations

Highlights

- Reduce time to value with pretested hardware configurations
- Reduce TCO through better performance, rapid deployment and advanced hardware
- Optimize performance with pretested ThinkSystem SR650 hardware configurations



MICROSOFT SQL SERVER 2017

SQL Server 2017 represents a major step towards making SQL Server a platform that gives you choices of development languages, data types, on-premises or cloud, and operating systems by bringing the power of SQL Server to Linux, Linux-based Docker containers, and Windows.

SQL Server 2017 includes many new Database Engine features, enhancements, and performance improvements:

- Resumable online index rebuild resumes an online index rebuild operation from where it stopped after a failure (such as a failover to a replica or insufficient disk space), or pauses and later resumes an online index rebuild operation.
- The IDENTITY_CACHE option for ALTER DATABASE SCOPED CONFIGURATION allows you to avoid gaps in the values of identity columns if a server restarts unexpectedly or fails over to a secondary server.

- A new generation of query processing improvements that will adapt optimization strategies to your application workload's runtime conditions. For this first version of the adaptive query processing feature family, we have three new improvements: batch mode adaptive joins, batch mode memory grant feedback, and interleaved execution for multi-statement table valued functions.
- Automatic database tuning provides insight into potential query performance problems, recommends solutions, and can automatically fix identified problems.

This configuration features the following main components:

- Server: Lenovo ThinkSystem SR650
- Processor: Intel Xeon Gold 6136 12 core, 3.0GHz
- Memory: 128 GB of TRUDDR4 memory
- Storage: Four 750G Intel Optane P4800X NVMe PCIe Flash Adapters for data and tempdb (RAID 5)
- OS Storage: Two 480 GB SATA SSDs for the operating system (RAID 1)
- Logging: Two 750G Intel Optane P4800X NVMe PCIe Flash Adapters for log (RAID 1)
- Software:
- Operating System: SUSE Linux SLES12 SP3
- Database: Microsoft SQL Server 2017 Standard Edition

This OLTP solution with Microsoft SQL Server 2017 Standard Edition features Intel NVMe PCIe Flash Adapters. These flash adapters improve productivity through data consolidation, availability performance, and scalability. Solid-state adapters simplify OLTP storage configuration and maintenance versus the use of SAN which has more parts to maintain and manage.

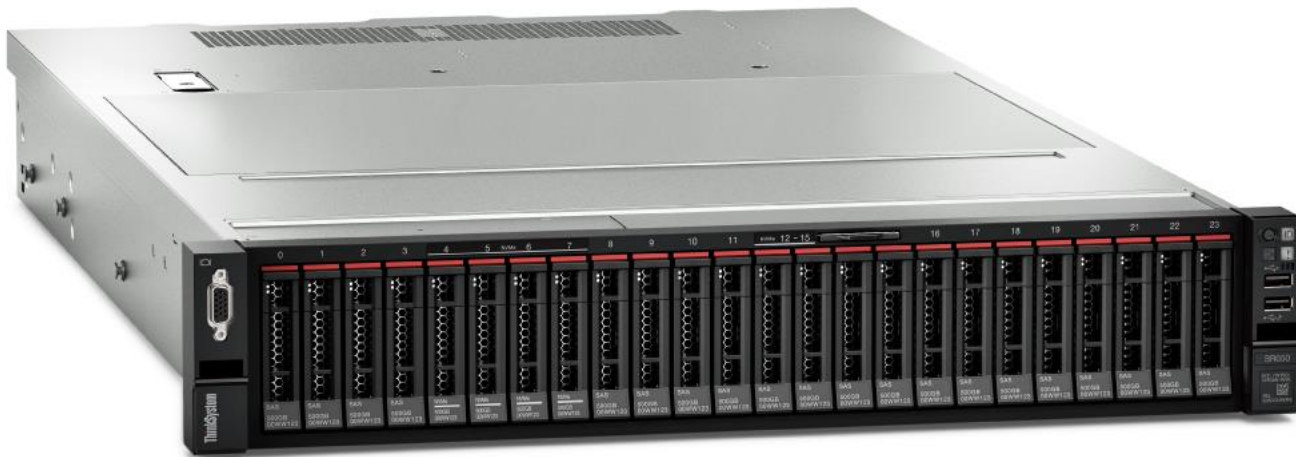


Intel Optane P4800X 750GB NVMe PCIe flash adapters are engineered for demanding IOPs and endurance in high-performance applications

Best practices for MS SQL OLTP solutions from Lenovo

For a balanced and optimized OLTP configuration:

- Update to latest firmware & driver levels on servers and all components
- Configure UEFI settings to set Operating mode to Maximum performance
- Configure high availability for the OS with 2-disk Raid-1
- Configure high availability for the log drive with 2-disk Raid-1 or Raid-10 with more disks based on performance needs
- Configure high availability for data files using Raid10 or Raid5 volumes based on capacity or performance needs
- Spread data and tempdb files evenly across all data drives for optimal performance
- Set the power plan to high performance
- Disable soft numa in SQL with: ALTER SERVER CONFIGURATION SET SOFTNUMA OFF
- - Disable numa balancing in OS: echo 0 > /proc/sys/kernel/numa_balancing
- Enable Multi-Queue Block IO Queueing Mechanism - scsi_mod.use_blk_mq=y, dm_mod.use_blk_mq=y
- If the server is dedicated to current workload:
 - Set processor affinity for SQL Server to use all the processors in the system
 - On large memory systems, experiment with SQL Server Maximum Server Memory to 90% of total memory available using [mssql-conf](#) configuration script. Default is 80%.



Lenovo ThinkSystem SR650

Solution Benefits

- 6TB SQL OLTP solution from Lenovo
- Balanced and optimized configuration
- Features High performance Intel Optane P4800X NVMe PCI storage
- Reduced time to value

High performance solution with the Lenovo ThinkSystem SR650 server and Intel NVMe PCIe Flash Adapters

Why Lenovo

Lenovo is a leading provider of x86 servers for the data center. Featuring rack, tower, blade, dense and converged systems, the Lenovo server portfolio provides excellent performance, reliability and security. Lenovo also offers a full range of networking, storage, software, solutions, and comprehensive services supporting business needs throughout the IT lifecycle. With options for planning, deployment, and support, Lenovo offers expertise and services needed to deliver better service-level agreements and generate greater end-user satisfaction.



For More Information

To learn more about the Lenovo Database Configuration for Microsoft SQL Server Standard OLTP on SR650, contact your Lenovo Business Partner or visit:

www.lenovo.com/systems/solutions



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