ThinkSystem SR860 V2 is the New 4S Performance Leader

Article (withdrawn product)

The Lenovo ThinkSystem SR860 V2 is designed for your most demanding, mission-critical workloads, such as in-memory databases, artificial intelligence, scientific/ engineering applications, real-time analytics, ERP, CRM, and virtualized server workloads.

Figure 1. Lenovo ThinkSystem SR860 V2

The performance of the 4S SR860 V2 is unmatched in the industry. Industry standard benchmark results are the way to judge and compare the performance of a given server.

The SR860 V2 has 81 world record performance benchmark results as of August 1, 2021:

- 4 SAP HANA world records
- 6 SPEC CPU 2017 world records
- 41 STAC-M3 world records
- 2 TPC-E world records
- 4 SPECjbb2015 world record
- 1 SPEC Power world record
- 6 SPEC ACCEL world records
- 16 SPEC MPI world record
- 1 SPEC OMP world record

Lets take a further look at these benchmarks and the SR860 V2 results.

SAP BW on HANA Benchmark

The SR860 V2 achieved 3 SAP BW SAP HANA single-node benchmark world records:

1.3 Billion records – All 3 KPI phases (Data Load, Query throughput and Query runtime). Link to Performance Benchmark Result

Summary Config:

- 4x 8380HL CPUs
- 1.5TB DRAM memory

5.2 Billion records – 2 KPI phases (Data Load and Query runtime). Link to Performance Benchmark Result
Summary Config:

- 4x 8380HL CPUs
- 3TB DRAM memory

7.8 Billion records – 2 KPI phases (Data Load and Query throughput). Link to Performance Benchmark Result
Summary Config:

- 4x 8380HL CPUs
- 4.5TB DRAM memory

About this Benchmark

SAP Business Warehouse (BW) powered by SAP HANA refers to using BW software suite on top of HANA database. This functionality explores all the key features of HANA database technologies and uses BW as a modeling tool for data modeling and analytical reporting.

It utilizes the capabilities of SAP HANA to process the benchmark workload. Allowed data volumes are a multiple of 1.3 billion initial records and can be run in single-node and multi-node setups.

The benchmark scenario represents typical mid-size customer scenario and volumes for SAP BW running on SAP HANA. The benchmark simulates a variety of users with different analytical requirements and measures the key performance indicator (KPI) relevant to each of the three benchmark phases.

The three benchmark phases are as follows:

- Phase 1 - Data load phase, testing data latency and load performance
- Phase 2 - Query throughput phase, testing query throughput with moderate complex queries
- Phase 3 - Query runtime phase, testing the performance of running very complex queries

SAP Sales and Distribution Benchmark

The SR860 V2 achieved 1 SAP Sales and Distribution benchmark world record:

SR860 V2 4S “Number of SAP SD benchmark users”. Link to Performance Benchmark Result

About this benchmark:
SAP Sales and Distribution (SD) Standard Application Benchmarks test the hardware and database performance of SAP applications and components. SAP Application Performance Standard (SAPS) is a hardware-independent unit of measurement that describes the performance of a system in creating the order, creating a delivery note for the order, displaying the order, changing the delivery, posting a goods issue, listing orders, and creating an invoice.

SPEC CPU 2017 Benchmark

The SR860 V2 achieved 6 SPEC CPU 2017 benchmark world records:

- **SR860 V2 4S SPECspeed_int_base2017** - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24274.html
- **SR860 V2 4S SPECspeed_int_base_energy2017** - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24300.html
- **SR860 V2 4S SPECspeed_fp_base2017** - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24276.html
- **SR860 V2 4S SPECspeed_fp_base_energy2017** - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24299.html
- **SR860 V2 4S SPECrate_int_base_energy2017** - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24302.html
- **SR860 V2 4S SPECrate_fp_base_energy2017** - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24303.html

About this Benchmark

SPEC CPU 2017 contains SPEC's next-generation, industry-standardized, CPU intensive suites for measuring and comparing compute intensive-performance, stressing a system's processor, memory subsystem and compiler. CPU 2017 has 43 sub-benchmarks, organized into four suites. SPEC designed these suites to provide a comparative measure of compute-intensive performance across the widest practical range of hardware using workloads developed from real user applications.

STAC-M3

The SR860 V2 achieved 41 total STAC-M3 benchmark world records (one node and two node):

22 1 Node STAC-M3 World Records

- **4-Socket** (14 Antuco suite)
- **4-Socket** (8 Kanaga suite, with a two-year data set size)

SR860 V2 4S - (Antuco 14 records, Kanaga 8 records) Link to Performance Result

19 Two Node STAC-M3 World Records

- **4-Socket** (10 Antuco suite)
- **4-Socket** (9 Kanaga suite, with a three-year data set size)

SR860 V2 4S (Antuco 14 records, Kanaga 9 records) Link to Performance Report

About this Benchmark

The STAC-M3 Benchmark suite is the industry standard for testing solutions that enable high-speed analytics on time series data. The STAC-M3 benchmarks measures challenging areas such as time-series analytics, risk simulations, and processing of very-high-speed data. The key metric is query response time. In particular, STAC benchmarks test high-speed analytics on time-series data — tick-by-tick market data. The benchmark is used by large global banks, brokerage houses, exchanges, hedge funds, proprietary trading shops, and other market participants.

TPC-E

The SR860 V2 achieved 2 TPC-E benchmark world records:

- **TPC-E Performance** (1 current 4S world records):
- **TPC-E Price/Performance** (1 current 4S world record):

SR860 V2 4S -- http://tpc.org/4087 (2 records - performance and price/performance world records)

About this Benchmark

The TPC-E benchmark is designed to enable users to more objectively measure and compare the performance and price of various OLTP systems. The TPC-E benchmark uses a database to model a brokerage firm with customers who generate transactions related to trades, account inquiries, and market research. Although the underlying business model of TPC-E is that of a brokerage firm, the database schema, data population, transactions, and implementation rules have been designed to be broadly representative of modern OLTP systems in general.

SPECjbb2015

The SR860 V2 achieved 4 SPECjbb2015 benchmark world records:

- **4-Socket** – 4 current world record (Windows)

SR860 V2 4S MultiJVM Max-JOPS: **https://www.spec.org/jbb2015/results/res2020q4/jbb2015-20201202-00584.html**
SR860 V2 4S MultiJVM Critical-JOPS: **https://www.spec.org/jbb2015/results/res2021q1/jbb2015-20201216-00586.html**
SR860 V2 4S Distributed Max-JOPS: **https://www.spec.org/jbb2015/results/res2021q1/jbb2015-20201216-00587.html**
SR860 V2 4S Distributed Critical JOPS: **https://www.spec.org/jbb2015/results/res2021q1/jbb2015-20201216-00585.html**

About this Benchmark

The SPECjbb 2015 benchmark has been developed from the ground up to measure performance based on the latest Java application features. It is relevant to all audiences interested in Java server performance, including JVM vendors, hardware developers, Java application developers, researchers and members of the academic community.

SPEC Power

The SR860 V2 achieved 1 SPEC Power benchmark world record:

- **4-Socket Linux world record**

SR860 V2 4S https://spec.org/power_ssj2008/results/res2020q4/power_ssj2008-20201201-01059.html (Linux) 4S4U

About this Benchmark

The SPECpower_ssj 2008 benchmark suite measures the power and performance characteristics of server-class computer equipment. It is used to compare power and performance among different servers and serves as a tool set for use in improving server efficiency.

SPEC ACCEL Benchmark

The SR860 V2 achieved 6 SPEC ACCEL single node, 4 socket benchmark world records.

2 WR for SPEC ACCEL OpenACC (based on Open Accelerators) – both Base and Peak performance. Link to Performance Benchmark Result

- **SR860 V2 4S OpenACC** -- https://www.spec.org/accel/results/res2020q4/accel-20200917-00147.html (base)
- **SR860 V2 4S OpenACC** -- https://www.spec.org/accel/results/res2020q4/accel-20200917-00147.html (peak)

2 WR for SPEC ACCEL OpenMP (based on Multi-Processing) – both Base and Peak performance. Link to Performance Benchmark Result

- **SR860 V2 4S OpenMP** -- https://www.spec.org/accel/results/res2020q4/accel-20200917-00149.html (base)
- **SR860 V2 4S OpenMP** -- https://www.spec.org/accel/results/res2020q4/accel-20200917-00149.html (peak)

2 WR for SPEC ACCEL OpenCL (based on Open Computing Language) – both Base and Peak performance. Link to Performance Benchmark Result

- **SR860 V2 4S OpenCL** -- https://www.spec.org/accel/results/res2020q4/accel-20200917-00148.html (base)
- **SR860 V2 4S OpenCL** -- https://www.spec.org/accel/results/res2020q4/accel-20200917-00148.html (peak)

About this Benchmark:

SPEC ACCEL provides a comparative measure the performance of hardware Accelerator devices and their supporting software tool chains using computationally-intensive parallel applications. The suite is comprised of scientific applications used in High Performance Computing (HPC). The suite has been ported using several Accelerator programming models each of which will be released as separate benchmark components. The product consists of source code benchmarks that are developed from real user applications.

The suite has been ported using several accelerator programming models each of which has been released as separate benchmark components:

- SPEC ACCEL OpenCL -- based on the Open Computing Language (OpenCL) 1.1 framework
- SPEC ACCEL OpenACC -- based on the Open Accelerators (OpenACC) 1.0 programming standard for parallel computing
- SPEC ACCEL OpenMP -- based on the Open Multi-Processing (OpenMP) 4.5 application programming interface

Example Applications:

- Astrophysics
- Thermodynamics
- Fluid Dynamics
- Molecular Dynamics
- Seismic Wave Modeling
- Weather Modeling

SPEC MPI Benchmark

The SR860 V2 achieved 16 SPEC MPI single node, 4-socket benchmark world records.

- **SR860 V2 4S (Medium Metric 1-Node)** -- https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20200917-00662.html (base)
- **SR860 V2 4S (Medium Metric 1-Node)** -- https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20200917-00662.html (peak)
- **SR860 V2 4S (Medium Metric 2-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00670.html (base)
- **SR860 V2 4S (Medium Metric 2-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00670.html (peak)
- **SR860 V2 4S (Medium Metric 3-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00665.html (base)
- **SR860 V2 4S (Medium Metric 3-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00665.html (peak)
- **SR860 V2 4S (Medium Metric 4-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00669.html (base)
- **SR860 V2 4S (Medium Metric 4-Node)** -- https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00669.html (peak)
- **SR860 V2 4S (Large Metric 1-Node)** -- https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20200917-00657.html (base)
- **SR860 V2 4S (Large Metric 1-Node)** -- https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20200917-00657.html (peak)
- **SR860 V2 4S (Large Metric 2-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00667.html (base)
- **SR860 V2 4S (Large Metric 2-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00667.html (peak)
- **SR860 V2 4S (Large Metric 3-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00668.html (base)
- **SR860 V2 4S (Large Metric 3-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00668.html (peak)
- **SR860 V2 4S (Large Metric 4-Node)** – https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00671.html (base)
- **SR860 V2 4S (Large Metric 4-Node)** -- https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00671.html (peak)

About this Benchmark:

The SPEC MPI benchmark suite measures performance of compute-intensive applications using the Message-Passing Interface (MPI) across a wide range of cluster and SMP hardware. This suite continues the SPEC tradition of giving users the most objective and representative benchmark suite for measuring and comparing high-performance computer systems. The suite includes the initial MPIM2007 suite, which contains medium-sized working sets and run times, and the newer MPIL2007 suite, which contains larger working sets and longer run times.

SPEC MPI2007 focuses on performance of compute intensive applications using the Message-Passing Interface (MPI), which means this benchmark emphasizes the performance of:

- the type of computer processor (CPU),

- the number of computer processors,
- the MPI Library,
- the communication interconnect,
- the memory architecture,
- the compilers, and
- the shared file system.

Example Applications:

- Ocean Modeling
- DNA Matching
- Molecular Dynamics Simulation
- Heat Transfer
- 3D Hydrodynamics
- Computational Electromagnetics

SPEC OMP Benchmark

The SR860 V2 achieved 1 SPEC OMP, 4 socket benchmark world record.

SR860 V2 4S - https://www.spec.org/omp2012/results/res2020q4/omp2012-20200917-00194.html

About this Benchmark

The SPEC OMP benchmark suite for measuring performance and energy efficiency using applications based on the OpenMP standard for shared-memory parallel processing. The benchmark includes 14 scientific and engineering application codes, covering everything from computational fluid dynamics (CFD) to molecular modeling to image manipulation. It focuses on the performance of – the processors and the interconnect between the processor – the memory architecture – the parallel support libraries – the compilers.

Example Applications:

- Computational Fluid Dynamics
- Molecular Modeling
- Protein Alignment
- Weather Prediction
- Mechanical Response Simulation
- Optimal Pattern Matching

About SR860 V2

The Lenovo ThinkSystem SR860 V2 server provides the speed and reliability you require today, with the scalability and workload versatility to you'll need to manage the explosive growth of data; its design offers considerable adaptability in order to match system configurations to projected workloads.

The ThinkSystem SR860 V2 is purpose-built to deliver affordable scalability in an industry-standard x86 platform, ideal for mission critical workloads such as SAP HANA in-memory computing, transactional databases, analytics, big data, and enterprise resource planning tasks.

Up to four 250W third-generation Intel® Xeon® Scalable CPUs configured with a mesh topology pair with

up to four enterprise-class GPUs position the SR860 V2 to tackle compute-intensive applications, leveraging thousands of GPU processor cores and parallel architecture in combination with additional storage and networking that's both high-performing and flexible.

Key features:

- Up to four 250W 3rd Generation Intel Xeon Scalable CPUs configured with a mesh topology combines with up to 48 2.5" HDD or SSDs, of which 24 can be direct-connect NVMe SSDs to speed database response times, reducing latency and eliminating storage as the throughput bottleneck in I/O-intensive applications such as transactional processing, HPC, and Big data applications.
- Capability to handle four double-width GPUs or eight single-width GPUs to accelerate AI inference and deep learning proficiencies.
- Support for 12TB of 3200 MHz DDR4 memory and Intel Optane™ Persistent Memory 200 Series accelerates performance for in-memory databases and applications, reducing downtime and increasing application availability.
- High I/O bandwidth coupled with a generous number of PCIe expansion slots provides the additional connectivity scalability as your business and workload demands increase.
- Full Lenovo XClarity and ThinkShield system support for seamless infrastructure management and improved data security.

Read Five Highlights of the Lenovo ThinkSystem SR860 V2 article

Read Unique Intel Features Available with the ThinkSystems SR850 V2 and SR860 V2 article

Conclusion

The SR860 V2 is an industry leader in performance as demonstrated by these 61 World Record benchmarks. The SR860 V2 performance supports your most demanding, mission-critical workloads, such as in-memory databases, artificial intelligence, scientific/ engineering applications, real-time analytics, ERP, CRM, and virtualized server workloads.

About the Author

Randall Lundin is a Senior Product Manager in the Lenovo Infrastructure Solution Group. He is responsible for planning and managing ThinkSystem servers. Randall has also authored and contributed to numerous Lenovo Press publications on ThinkSystem products.

This article is one in a series on the ThinkSystem SR850 V2 and SR860 V2 servers:

- Five Highlights of the Lenovo ThinkSystem SR850 V2
- Five Highlights of the Lenovo ThinkSystem SR860 V2
- Why Scale-Up With 4S and 8S Servers?
- Unique Intel Features Available with ThinkSystem SR850 V2 and SR860 V2
- **ThinkSystem SR860 V2 is the New 4S Performance Leader**
- The Value of Refreshing Your 4-Socket Servers with the ThinkSystem SR860 V2 and SR850 V2
- The Perfect 4-Socket and 8-Socket Servers for SAP HANA
- Total Cost of Ownership Comparison of Running SAP HANA on Lenovo ThinkSystem Servers

Related product families

Product families related to this document are the following:

- ThinkSystem SR860 V2 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, LP1386, was created or updated on August 23, 2021.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
  https://lenovopress.lenovo.com/LP1386
- Send your comments in an e-mail to:
  comments@lenovopress.com

This document is available online at https://lenovopress.lenovo.com/LP1386.

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®
ThinkShield®
ThinkSystem®
XClarity®

The following terms are trademarks of other companies:

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

Linux® is the trademark of Linus Torvalds in the U.S. and other countries.

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

TPC® is a trademark of Transaction Processing Performance Council.

SPEC®, SPEC ACCEL®, SPEC CPU®, SPEC MPI®, SPEC OMP®, SPECjbb®, and SPECpower_ssj® are trademarks of the Standard Performance Evaluation Corporation (SPEC).

OpenACC® is a trademark of NVIDIA Corporation.

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