Lenovo ThinkSystem Servers Continue to Lead the Industry in Performance and Customer Value
Article

Lenovo ThinkSystem servers currently hold an incredib le **196 world records** for performance. This total consists of **77** #1 results set on systems equipped with second-generation Intel Scalable processors, **75** more using second-generation AMD EPYC processors, another **42** using *first*-generation Xeon Scalable processors, and **2** using the Intel Xeon E processor. **This is more than 2.9X as many #1 results as any other server vendor** (as of July 1, 2020).

These results were achieved on a wide variety of workloads that include Applications, Data Management, Application Development and Testing, Infrastructure, and Engineering/Technical computing. Lenovo achieved these world-records across multiple ThinkSystem platforms ranging from single-socket to 8-socket, spanning Intel and AMD architectures. This demonstrates Lenovo's ability to design systems that create value for customers across architectures, workloads, and industries.

Many of the latest world record benchmark results were set by ThinkSystem SR950 and SR650 rack servers that incorporate the new second-generation Intel Xeon Scalable processors. They offer increased performance over the first generation processors, as well as support for faster 2933 MHz TruDDR4 memory. These servers also support Intel Optane DC persistent memory, which is designed specifically for data center workloads. Optane DC offers a new, flexible tier of memory that creates an unprecedented combination of high-capacity, affordability, and persistence.

Other #1 benchmark results were achieved by ThinkSystem SR665, SR655, SR645, and SR635 rack servers using second-generation AMD EPYC processors. The SR665 (2-socket) and SR655 (1-socket) are Lenovo's newest 2U rack servers. The SR645 (2S) and the SR635 (1S) are the newest 1U rack servers. AMD EPYC 7002 Series processors offer up to 64 cores each and 128 PCIe Gen 4 lanes, making them ideal for compute-intensive and I/O-intensive applications.

Additional #1 results were achieved using Lenovo SR860, SR850, SN850, SN550, and SD530 servers equipped with second-generation Intel Xeon Scalable Family processors, as well as the SR250, which uses the Intel Xeon E processor.

While specific ThinkSystem models were used for these benchmark tests, much of the same technology and attention to detail is prevalent throughout the ThinkSystem product line, providing exceptional performance and reliability across the product line.

This article summarizes the outstanding performance of the world record ThinkSystem servers.

Applications — 39 Current World Records

Lenovo ThinkSystem SR950, SR860, SR665, SR655, SR650, SR645, and SR250 servers achieved **39** current world records in benchmarks designed to test system performance across ai range of application workload types. Application types include Collaboration, Enterprise Resource Management, Supply Chain, Customer Resource Management, and other typical data center applications.

SAP Sales and Distribution (SAP SD 2T) Benchmark

The **2** ThinkSystem world record results on the SAP Sales and Distribution Benchmark are:

Performance

ThinkSystem SR950 (**1** current world record):

- 4-Socket (Windows)

ThinkSystem SR665 (**1** current world record):

- 2-Socket (Windows)

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.

Why it matters: If you are running SAP Business Suite applications, a leadership benchmark score means this system is the highest-performing server in the industry for processing your business transaction workflows in an SAP environment.

SPEC CPU 2017 & CPU 2006 Benchmarks

The **37** ThinkSystem world record results on the SPEC CPU 2017 and SPEC CPU 2006* benchmarks include:

SPEC CPU 2017 Performance

ThinkSystem SR950:

- 8-Socket — **2** current world records
- 6-Socket — **1** current world record
- 4-Socket — **1** current world record
- 3-Socket — **4** current world records

ThinkSystem SR860:

- 4-Socket — **1** current world record

ThinkSystem SR665:

- 2-Socket — **7** current world records

ThinkSystem SR645:

- 2-Socket — **6** current world records

ThinkSystem SR655:

- 1-Socket — **8** current world records

ThinkSystem SR650:

- 1-Socket — **1** current world record

ThinkSystem SR250:

- 1-Socket — **2** current world records

SPEC CPU 2006* Performance

ThinkSystem SR950:

- 8-Socket — **2** current world records
- 4-Socket — **1** current world record

ThinkSystem SR650:

- 1-Socket — **1** current world record

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.

* The SPEC CPU 2006 benchmark has been replaced by the SPEC CPU 2017 benchmark and new CPU 2006 results are no longer accepted by SPEC. (Existing results are still valid.)

Why it matters: If you are running compute-intensive workloads, a world-record benchmark score means this server is the highest performing server in its class in terms of how fast a server completes a CPU-intensive task (speed) and/or how much a server can accomplish in a certain amount of time (throughput or rate measurement).

Data Management — 65 Current World Records

Lenovo ThinkSystem SR950 and SR650 servers delivered **65** current world records on benchmarks designed to test the performance of servers performing Structured Data Management analysis, Structured Data Analytics, and Unstructured Data Analytics.

SAP HANA (BWoH) Benchmark

The 9 ThinkSystem world record results on the HANA BWoH benchmark in a single-node setup include:

Performance

ThinkSystem SR950:

- 4-Socket (1.3B and 2.6B Records v1*) — **6** current world records
- 4-Socket (10.4B Records v3) — **3** current world records

About this benchmark: The SAP BW Edition for SAP HANA (BW/4HANA) Standard Application Benchmark is the latest addition to the list of SAP BW benchmarks and goes well beyond the scope and features used in the BW-AML benchmark. The benchmark is designed to fully utilize the new capabilities of SAP HANA to process the benchmark workload. The benchmark consists of three phases: data load, query throughput, and query runtime.

* The current SAP BW edition for SAP HANA benchmark is version 3. Existing v1 and v2 results are still valid; however, SAP will no longer accept new benchmark results for versions v1 and v2.

Why it matters: If you are running SAP HANA, a #1 benchmark score means this server is the highest performing server in its class for processing SAP HANA memory-intensive database and analytics workloads.

STAC-M3 and STAC-T0 Benchmarks

The **49** ThinkSystem world record results on the STAC-M3 and STAC-T0 benchmarks include:

STAC-M3

ThinkSystem SR950 (**33** current world records):

- 4-Socket (9 Antuco suite)
- 4-Socket (16 Shasta suite)
- 4-Socket (8 Kanaga suite, with a two-year data set size)

ThinkSystem SR650 (**15** current world records):

- 2-Socket (Antuco suite)

STAC-T0

ThinkSystem SR665 (**1** current world record):

- 2-Socket

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.

Why it matters: If you are running high-speed financial services or securities workloads, a #1 benchmark score means this server is the highest performing server in its class for processing high-speed analytics and financial transactions.

TPC-E Benchmark

The **5** ThinkSystem world record results on the TPC-E benchmark include:

TPC-E Performance

ThinkSystem SR950 (**1** current world record):

- 4-Socket

ThinkSystem SR650 (**1** current world record):

- 2-Socket

ThinkSystem SR655 (**1** current world record):

- 1-Socket

TPC-E Price/Performance

ThinkSystem SR950 (**1** current world record):

- 4-Socket

ThinkSystem SR655 (**1** current world record):

- 1-Socket

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.

Why it matters: If you are running On-Line Transaction Processing (OLTP) or decision-support workloads and databases, a #1 benchmark score means this server is the highest-performing server in its class for data-intensive OLTP transactions and data-intensive queries.

TPC-x BB

The **2** ThinkSystem world record results on the TPC-x BB benchmark:

Performance

ThinkSystem SR650 (**2** current world records at SF30000):

- 2-Socket (36+3 nodes)

About this benchmark: The TPCx-BB Express Benchmark BB (TPCx-BB) measures the hardware and software performance of systems running Hadoop. It runs 30 frequently performed analytical queries in the manner of retailers with physical and online store presences. It uses machine learning algorithms for semi-structured and unstructured data queries, and SQL queries for structured data.

Why it matters: If your data center runs Hadoop, a world-record benchmark score means the system is the highest performing server in its class for complex Big Data processing needs.

Application Development & Testing — 42 Current World Records

Lenovo ThinkSystem SR950, SR665, and SR655, and SR645 servers hold **42** current world records in benchmarks designed to test server performance in a Java development and testing environment.

SPECjbb2015

The **42** ThinkSystem world record results on the SPECjbb2015 benchmark include:

Performance

ThinkSystem SR950:

- 8-Socket — **6** current world records (4 Linux / 2 Windows)
- 6-Socket — **6** current world records (4 Linux / 2 Windows)
- 4-Socket — **4** current world records (Linux)
- 3-Socket — **6** current world records (Linux)

ThinkSystem SR665:

- 2-Socket — **7** current world record (4 Linux / 3 Windows)

ThinkSystem SR655:

- 1-Socket — **12** current world record (6 Linux / 6 Windows)

ThinkSystem SR645:

- 2-Socket — **1** current world record (Windows)

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.

Why it matters: If you are interested Java server performance, a world-record benchmark score means this server is the highest performing server in its class for Java application response time and throughput needs.

Infrastructure — 24 Current World Records

Lenovo ThinkSystem SR950, SR850, SR655, SR650, SR635, SN850, SN550, and SD530 servers earned **24** current world records on benchmarks designed to test the performance of servers utilized in an IT/Web infrastructure role. Workload types include Networking, Systems Management, Virtual Desktop, File & Print, Media Streaming, and Web Serving.

SPEC Power

The **13** ThinkSystem world record results on the SPECpower_ssj2008 benchmark include:

Performance

ThinkSystem SR950 (**2** current world records):

- 8-Socket (1 Linux / 1 Windows)

ThinkSystem SR850 (**1** current world record):

- 4-Socket (Linux)

ThinkSystem SN850 (**2** current world records):

- 4-Socket/7-node (4S/7N, 1 Linux, 1 Windows)

ThinkSystem SN550 (**1** current world record):

- 14-node (14N, Windows)

ThinkSystem SD530 (**2** current world records):

- 2-Socket/4-node (2S/4N, 1 Linux / 1 Windows)

ThinkSystem SR665 (**2** current world records):

- 2-Socket/2U (1 Linux / 1 Windows)

ThinkSystem SR645 (**2** current world records):

- 2-Socket/1U (1 Linux / 1 Windows)

ThinkSystem SR655 (**1** current world record):

- 1-Socket (Linux)

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.

Why it matters: The IT industry, computer manufacturers, and governments are increasingly concerned with the energy use of servers. This benchmark provides a means to measure power (at the AC input) in conjunction with a performance metric. This helps IT managers consider power characteristics along with other selection criteria to increase the efficiency of data centers. For those concerned about energy savings, a world-record benchmark score means the server provides the best performance in its class relative to power consumption.

SPEC VIRT_SC 2013

The **8** ThinkSystem world record results on the SPEC virt_sc 2013 benchmark include:

Performance

ThinkSystem SR950 (**2** current world records):

- 8-Socket
- 4-Socket

Performance-per-watt

ThinkSystem SR950 (**2** current world records):

- 8-Socket
- 4-Socket

ThinkSystem SR650 (**1** current world record):

- 2-Socket

Server Performance-per-watt

ThinkSystem SR950 (**2** current world records):

- 8-Socket
- 4-Socket

ThinkSystem SR650 (**1** current world record):

- 2-Socket

About this benchmark: The SPEC virt_sc 2013 benchmark measures the end-to-end performance of all system components including the hardware, virtualization platform, and the virtualized guest operating system and application software. SPEC virt_sc 2013 is the second-generation SPEC VIRT benchmark for evaluating the virtualization performance of datacenter server consolidation, including enterprise-class workloads.

Why it matters: If you virtualize multiple workloads, a world-record benchmark score means this system is the highest performing server in its class for memory-intensive virtualized environments.

VMmark 3.1

The **1** ThinkSystem world record result on the VMmark 3.1 benchmark:

Performance

ThinkSystem SR655 (**1** current world record):

- 1-Socket/2-node (1S/2N)

About this benchmark: The VMmark 3.1 benchmark measures the performance, scalability, and power consumption of multi-server virtualization platforms. It tests using real-world complex workloads, such as clone and deploy, virtual machine migration, storage migration operations, shared nothing migration, and snapshotting, as well as traditional application-level workloads.

Why it matters: Knowing how effectively and efficiently your servers operate is essential to maximizing performance and scalability while reducing energy costs. A world-record benchmark score means a system is the highest performing server in its class for cloud, OLTP, and other virtualization platform workloads.

TPC-x IoT

The **2** ThinkSystem world record results on the TPC-x IoT benchmark include:

Performance

ThinkSystem SR655 (**1** current world record):

- 1-Socket (4+1 nodes)

Price/Performance

ThinkSystem SR655 (**1** current world record):

- 1-Socket (4+1 nodes)

About this benchmark: The TPCx-IoT benchmark enables direct comparison of different software and hardware solutions for IoT gateways. TPCx-IoT measures the performance, price/performance, and availability IoT gateway systems that receive vast quantities of data from many devices and run real-time analytic queries on that data. The benchmark workload represents typical IoT gateway systems running on standard hardware and software platforms.

Why it matters: If you gather and process massive amounts of data via IoT devices and need to perform real-time analysis of that data, a world-record benchmark score means the system is the highest performing server in its class for performing analytic queries on IoT data.

Engineering/Technical — 26 Current World Records

Lenovo ThinkSystem SR950, SR665, SR655, SR650, and SR645 servers earned **26** current world records in benchmarks designed to test a system's performance running various Engineering/Technical/HPC workloads.

SPEC OMP 2012

The **3** ThinkSystem world record results on the SPEC OMP 2012 benchmark include:

Performance

ThinkSystem SR950 (**1** current world record):

- 3-Socket

ThinkSystem SR665 (**1** current world record):

- 2-Socket

ThinkSystem SR655 (**1** current world record):

- 1-Socket

About this benchmark: The SPECompG 2012 benchmark is designed for measuring performance using applications based on the OpenMP 3.1 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.

Why it matters: If you are running scientific or engineering applications, a leadership benchmark score means this system is the highest performing server in its class for these workloads.

SPECmpiM 2007

The **17** ThinkSystem world record results on the SPECmpiM 2007 benchmark include:

Performance

ThinkSystem SR950 (**3** current world records):

- 8-Socket (Medium Metric 1-node)
- 6-Socket (Medium Metric 1-node)
- 3-Socket (Medium Metric 1-node)

ThinkSystem SR665 (**11** current world records):

- 2-Socket (Large Metric 6-node 33.1)
- 2-Socket (Large Metric 5-node 29.1)
- 2-Socket (Large Metric 4-node 24.8)
- 2-Socket (Large Metric 3-node 18.9)
- 2-Socket (Large Metric 2-node 13.6)
- 2-Socket (Large Metric 1-node 6.02)
- 2-Socket (Medium Metric 6-node 74.0)
- 2-Socket (Medium Metric 5-node 71.4)
- 2-Socket (Medium Metric 3-node 60.4)
- 2-Socket (Medium Metric 2-node 52.1)
- 2-Socket (Medium Metric 1-node 34.1)

ThinkSystem SR655 (**3** current world records):

- 1-Socket (Large Metric 2-node)
- 1-Socket (Large Metric 1-node)
- 1-Socket (Medium Metric 1 node)

About this benchmark: The SPECmpiM 2007 benchmark suite is used to evaluate MPI-parallel, floating point, compute-intensive performance across a wide range of cluster and SMP hardware. This suite gives users the most objective and representative benchmark suite for measuring and comparing high-performance computer systems.

Why it matters: If you are running compute-intensive technical workloads, a leadership benchmark score means this server is the highest performing server in its class, taking into account the CPUs, MPI library, communication interconnect, memory architecture, compilers, and file system performance.

SPEC ACCEL

The **6** ThinkSystem world record results on the SPEC ACCEL benchmark include:

ThinkSystem SR665 (**5** current world records):

- 2-Socket/1-Node (2S/1N) 3 records
- 1-Socket/1-Node (1S/1N) 2 records

ThinkSystem SR655 (**1** current world record):

- 1-Socket/1-Node (1S/1N)

About this benchmark: The SPEC ACCEL benchmark suite tests performance with computationally intensive parallel applications running under the OpenCL, OpenACC, and OpenMP 4 target offloading APIs. The suite exercises the performance of the accelerator, host CPU, memory transfer between host and accelerator, support libraries and drivers, and compilers.

Why it matters: If you are running servers with accelerators (GPUs, coprocessors), a #1 benchmark score means a solution incorporating this server (equipped with a specific accelerator and supporting software) is the highest performing solution in its class.

Conclusion

The portfolio of Lenovo ThinkSystem servers continues its dominance of data center performance, with **195** world record benchmarks (as of June 1, 2020). This outstanding performance was achieved across multiple configurations and a variety of workloads and industry benchmarks.

To learn more about ThinkSystem servers, see https://www.lenovo.com/servers.

Performance Benchmark Reports

Each ThinkSystem benchmark has a Lenovo Performance Benchmark Report. These Performance Benchmark Reports detail the specific benchmark, benchmark result, and hardware/software configuration used for that benchmark result. The reports also provide a link to the specific benchmark results page (e.g., SPEC, TPC, SAP, etc.). View all Performance Benchmark Reports .

The following Lenovo ThinkSystem benchmark world records are current as of Jun 1, 2020.

SAP SD 2T

- SR950 4S - https://www.sap.com/dmc/benchmark/2019/Cert19015.pdf
- SR665 2S - https://www.sap.com/dmc/benchmark/2020/cert20014.pdf

SAP BWoH

- SR950 4S 1.3B Records v1 - https://www.sap.com/dmc/benchmark/2017/Cert17045.pdf [1] (3 records)
- SR950 4S 2.6B Records v1 - https://www.sap.com/dmc/benchmark/2017/Cert17046.pdf [1] (3 records)
- SR950 4S 10.4B Records v3 - https://www.sap.com/dmc/benchmark/2019/Cert19014.pdf (3 records)
- SR950 4S 11.7B records V3 - https://www.sap.com/dmc/benchmark/2019/Cert19048.pdf (2 records)

[1] The current SAP BW edition for SAP HANA benchmark is version 3. SAP will no longer accept new benchmark results for versions 1 and 2.

TPC-E

- SR950 4S - http://www.tpc.org/4081 (2 records - performance and price/performance world records
- SR650 2S - http://www.tpc.org/4084 (1 record - performance world record)
- SR655 1S - http://www.tpc.org/4085 (2 records - performance and price/performance world records)

SPECvirt_sc2013

Performance

- SR950 4S - http://www.spec.org/virt_sc2013/results/res2019q2/virt_sc2013-20190312-00118-perf.html
- SR950 8S - http://www.spec.org/virt_sc2013/results/res2019q2/virt_sc2013-20190611-00119-

perf.html

Performance Per Watt

- SR650 2S - http://www.spec.org/virt_sc2013/results/res2017q4/virt_sc2013-20171018-00102-ppw.html
- SR950 4S - http://spec.org/virt_sc2013/results/res2019q2/virt_sc2013-20190312-00118-ppw.html
- SR950 8S - http://www.spec.org/virt_sc2013/results/res2019q2/virt_sc2013-20190611-00119-ppw.html

Server Performance Per Watt

- SR650 2S - http://www.spec.org/virt_sc2013/results/res2017q4/virt_sc2013-20171018-00102-ppws.html
- SR950 4S - http://www.spec.org/virt_sc2013/results/res2019q2/virt_sc2013-20190312-00118-ppws.html
- SR950 8S - http://www.spec.org/virt_sc2013/results/res2019q2/virt_sc2013-20190611-00119-ppws.html

VMmark 3.1

- SR655 1S 2-node - https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2019-09-17-Lenovo-ThinkSystem-SR655.pdf

SPEC CPU 2006

- SR950 8S SPECint_base2006 - https://www.spec.org/cpu2006/results/res2017q3/cpu2006-20170626-47361.html[2]
- SR950 8S SPECfp_base2006 - https://www.spec.org/cpu2006/results/res2017q4/cpu2006-20170917-49366.html[2]
- SR950 4S SPECfp_rate_base2006 - https://www.spec.org/cpu2006/results/res2017q3/cpu2006-20170626-47358.html[2]
- SR650 1S SPECint_rate_base2006 - https://www.spec.org/cpu2006/results/res2017q3/cpu2006-20170627-47383.html[2]

[2] The SPEC CPU 2006 benchmark is retired and new results are no longer accepted by SPEC.

SPEC CPU 2017

- SR950 8S SPEC_speed_int_base2017 - http://spec.org/cpu2017/results/res2019q2/cpu2017-20190401-11644.html
- SR950 8S SPEC_speed_fp_base2017 - http://spec.org/cpu2017/results/res2019q2/cpu2017-20190610-14909.html
- SR950 6S SPEC_speed_int_base2017 - http://spec.org/cpu2017/results/res2019q2/cpu2017-20190401-11612.html
- SR950 4S SPECspeed_fp_base2017 - http://spec.org/cpu2017/results/res2019q3/cpu2017-20190819-16953.html
- SR860 4S SPECspeed_int_base2017- http://spec.org/cpu2017/results/res2019q3/cpu2017-20190722-16226.html
- SR950 3S SPEC_speed_int_base2017 - http://spec.org/cpu2017/results/res2019q2/cpu2017-20190401-11610.html
- SR950 3S SPEC_speed_fp_base2017 -

https://www.spec.org/cpu2017/results/res2019q2/cpu2017-20190319-11383.html

- SR950 3S SPEC_rate_int_base2017 - https://www.spec.org/cpu2017/results/res2019q2/cpu2017-20190319-11385.html
- SR950 3S SPEC_rate_fp_base2017 - https://www.spec.org/cpu2017/results/res2019q2/cpu2017-20190319-11381.html
- SR665 2S SPEC_rate_Int_base_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200525-22554.html
- SR665 2S SPEC_rate_fp_peak_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21920.html
- SR665 2S SPEC_speed_fp_base_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21921.html
- SR665 2S SPEC_speed_fp_peak_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200525-22553.html
- SR665 2S SPEC_speed_fp_peak_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21921.html
- SR665 2S SPEC_speed_fp_base_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21921.html
- SR665 2S SPEC_rate_int_peak_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200525-22554.html
- SR650 2S SPECspeed_int_base2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200608-22830.html
- SR645 2S SPEC_speed_int_base_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21925.html
- SR645 2S SPEC_speed_int_fp_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21925.html
- SR645 2S SPEC_rate_int_base_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21924.html
- SR645 2S SPEC_rate_int_peak_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21924.html
- SR645 2S SPEC_rate_fp_base_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21926.html
- SR645 2S SPEC_rate_fp_peak_energy_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200413-21926.html
- SR655 1S SPEC_rate_int_peak_2017 - http://spec.org/cpu2017/results/res2020q1/cpu2017-20200217-20914.html
- SR655 1S SPEC_rate_int_base_energy_2017 - http://spec.org/cpu2017/results/res2019q4/cpu2017-20190926-18527.html
- SR655 1S SPEC_rate_int_peak_energy_2017 - http://spec.org/cpu2017/results/res2019q4/cpu2017-20190926-18527.html
- SR655 1S SPEC_rate_fp_base_energy_2017 - http://spec.org/cpu2017/results/res2019q4/cpu2017-20190926-18529.html
- SR655 1S SPEC_rate_fp_peak_energy_2017 - http://spec.org/cpu2017/results/res2019q4/cpu2017-20190926-18529.html
- SR655 1S SPEC_speed_int_peak_energy_2017 - http://spec.org/cpu2017/results/res2019q4/cpu2017-20190926-18526.html
- SR655 1S SPEC_speed_fp_base_energy_2017 - http://spec.org/cpu2017/results/res2019q4/cpu2017-20190926-18528.html

- SR655 1S SPEC_speed_fp_peak_energy_2017 - http://spec.org/cpu2017/results/res2019q4/cpu2017-20190926-18528.html
- SR250 1S SPECspeed_int_base_energy_2017 - http://spec.org/cpu2017/results/res2020q1/cpu2017-20200217-20920.html
- SR250 1S SPECspeed_int_base_2017 - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200608-22814.html

SPECpower_ssj2008

- SD530 2S 4-node - https://www.spec.org/power_ssj2008/results/res2018q3/power_ssj2008-20180828-00857.html (Windows)
- SD530 2S 4-Node - https://www.spec.org/power_ssj2008/results/res2019q3/power_ssj2008-20190623-00977.html (Linux)
- SN850 4S 7-node - https://www.spec.org/power_ssj2008/results/res2018q3/power_ssj2008-20180828-00852.html (Windows)
- SN850 4S 7-node - https://www.spec.org/power_ssj2008/results/res2019q3/power_ssj2008-20190731-00999.html (Linux)
- SN550 14 nodes - https://www.spec.org/power_ssj2008/results/res2017q4/power_ssj2008-20171011-00794.html (Windows)
- SR655 1S - https://www.spec.org/power_ssj2008/results/res2019q3/power_ssj2008-20190717-00987.html (Linux Jv 1.7.0_80)
- SR850 4S - https://www.spec.org/power_ssj2008/results/res2019q3/power_ssj2008-20190626-00978.html (Linux)
- SR950 8S - https://www.spec.org/power_ssj2008/results/res2018q3/power_ssj2008-20180828-00853.html (Windows)
- SR950 8S - https://www.spec.org/power_ssj2008/results/res2019q2/power_ssj2008-20190312-00928.html (Linux)

STAC-M3

- SR950 4S - https://stacresearch.com/KDB171024 combined with https://stacresearch.com/KDB170629 (**16** records)
- SR950 4S - www.stacresearch.com/KDB190322b (**17** records)
- SR650 2S - https://stacresearch.com/KDB170703 (**4** records)
- SR650 2S - https://stacresearch.com/KDB190320b (**11** records)

STAC-T0

- SR665 2S - https://stacresearch.com/XLX200514 (**1** world record)

TPCx-IOT

- SR655 1S 4+1 nodes- http://www.tpc.org/5756 (**2** world records - performance and price/performance)

TPCx-BB

- SR650 2S 36+3 nodes - http://www.tpc.org/3512 (**2** world records for performance @ SF30000; fence claim by Software = Cloudera and 78 CPUs)

SPEC ACCEL

- SR665 2S OpenMP - https://www.spec.org/accel/results/res2020q2/accel-20200416-00138.html
- SR665 2S OpenACC - https://www.spec.org/accel/results/res2020q2/accel-20200416-00137.html
- SR665 2S OpenCL - https://www.spec.org/accel/results/res2020q2/accel-20200505-00141.html
- SR665 1S OpenACC - https://www.spec.org/accel/results/res2020q2/accel-20200416-00139.html
- SR665 1S OpenCL - https://www.spec.org/accel/results/res2020q2/accel-20200505-00140.html
- SR655 1S OpenMP - https://www.spec.org/accel/results/res2019q3/accel-20190813-00129.html

SPEC OMP2012

- SR950 3S - http://spec.org/omp2012/results/res2019q2/omp2012-20190312-00163.html
- SR665 2S - https://www.spec.org/omp2012/results/res2020q2/omp2012-20200421-00193.html
- SR655 1S - https://www.spec.org/omp2012/results/res2020q1/omp2012-20200219-00192.html

SPEC MPI2007

- SR950 (Medium Metric) 8S - https://www.spec.org/mpi2007/results/res2019q2/mpi2007-20190312-00619.html
- SR950 (Medium Metric) 6S - https://www.spec.org/mpi2007/results/res2019q2/mpi2007-20190312-00618.html
- SR950 (Medium Metric) 3S - https://www.spec.org/mpi2007/results/res2019q2/mpi2007-20190312-00616.html
- SR665 2S (Large Metric 6-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00641.html
- SR665 2S (Large Metric 5-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00646.html
- SR665 2S (Large Metric 4-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00645.html
- SR665 2S (Large Metric 3-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00644.html
- SR665 2S (Large Metric 2-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00643.html
- SR665 2S (Large Metric 1-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00642.html
- SR665 2S (Medium Metric 6-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00650.html
- SR665 2S (Medium Metric 5-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00649.html
- SR665 2S (Medium Metric 3-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00647.html
- SR665 2S (Medium Metric 2-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00654.html
- SR665 2S (Medium Metric 1-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200416-00653.html
- SR655 1S (Large Metric 2-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200324-00640.html
- SR655 1S (Large Metric 1-Node) - https://www.spec.org/mpi2007/results/res2020q2/mpi2007-20200324-00639.html

- SR655 1S (Medium Metric 1-Node) - https://www.spec.org/mpi2007/results/res2020q1/mpi2007-20200218-00638.html

SPECjbb2015 (Linux)

- SR655 1S MultiJVM Critical-jOPS - http://spec.org/jbb2015/results/res2020q1/jbb2015-20200227-00513.html
- SR655 1S Distributed Critical-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200325-00529.html
- SR655 1S MultiJVM Max-jOPS - http://spec.org/jbb2015/results/res2020q1/jbb2015-20200227-00512.html
- SR655 1S Distributed Max-jOPS - http://spec.org/jbb2015/results/res2020q1/jbb2015-20200227-00514.html
- SR655 1S Composite Max-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200416-00540.html
- SR655 1S Composite Critical-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200416-00539.html
- SR665 2S Distributed Max-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200408-00534.html
- SR665 2S Distributed Critical-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200423-00551.html
- SR665 2S MultiJVM Critical-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200423-00549.html
- SR665 2S Composite Max-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200416-00541.html
- SR950 3S Distributed Max-JOPS - http://spec.org/jbb2015/results/res2018q3/jbb2015-20180829-00315.html
- SR950 3S Distributed Critical - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00401.html
- SR950 3S MultiJVM Max-JOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00415.html
- SR950 3S MultiJVM Critical - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00429.html
- SR950 3S Composite Max-JOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00442.html
- SR950 3S Composite Critical - http://spec.org/jbb2015/results/res2018q3/jbb2015-20180829-00318.html
- SR950 4S Distributed Max-JOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00416.html
- SR950 4S Distributed Critical - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00402.html
- SR950 4S MultiJVM Max-JOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00418.html
- SR950 4S MultiJVM Critical - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00403.html
- SR950 6S Distributed Max-JOPS - http://spec.org/jbb2015/results/res2018q3/jbb2015-20180829-00311.html
- SR950 6S Distributed Critical - http://spec.org/jbb2015/results/res2018q3/jbb2015-20180829-

00312.html

- SR950 6S MultiJVM Max-JOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00421.html
- SR950 6S MultiJVM Critical - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00405.html
- SR950 8S Distributed Max-JOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00420.html
- SR950 8S Distributed Critical - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00406.html
- SR950 8S MultiJVM Max-JOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00419.html
- SR950 8S MultiJVM Critical - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00407.html

SPECjbb2015 (Windows)

- SR655 1S MultiJVM Max-jOPS - https://www.spec.org/jbb2015/results/res2020q1/jbb2015-20200227-00511.html
- SR655 1S MultiJVM Critical-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200326-00532.html
- SR655 1S Composite Max-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200325-00530.html
- SR655 1S Composite Critical-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200325-00530.html
- SR655 1S Distributed Max-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200506-00553.html
- SR655 1S Distributed Critical-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200506-00554.html
- SR645 2S MultiJVM Critical-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200408-00537.html
- SR665 2S Distributed Max-jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200408-00536.html
- SR665 2S MultiJVM MaxjOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200408-00538.html
- SR665 2S Distributed Critical jOPS - http://spec.org/jbb2015/results/res2020q2/jbb2015-20200408-00535.html
- SR950 6S MultiJVM Max-JOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00379.html
- SR950 6S MultiJVM Critical - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00379.html
- SR950 8S MultiJVM Max-JOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00440.html
- SR950 8S MultiJVM Critical - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00380.html

About the Author

Mark T. Chapman is the Senior Technical Writer/Editor for the Lenovo Data Center Group Marketing Communications organization. He has more than 40 years experience in the industry and has written numerous papers and books about servers, operating systems, and other IT and non-IT topics.

Related product families

Product families related to this document are the following:

- ThinkSystem SR950 Server
- ThinkSystem SR860 Server
- ThinkSystem SR850 Server
- ThinkSystem SR665 Server
- ThinkSystem SR655 Server
- ThinkSystem SR650 Server
- ThinkSystem SR645 Server
- ThinkSystem SR635 Server
- ThinkSystem SR250 Server
- ThinkSystem SD530 Server
- ThinkSystem SN850 Server
- ThinkSystem SN550 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.
1009 Think Place - Building One
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 2020. All rights reserved.

This document, LP1145, was created or updated on September 3, 2020.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
  http://lenovopress.com/LP1145
- Send your comments in an e-mail to:
  comments@lenovopress.com

This document is available online at http://lenovopress.com/LP1145.

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
TruDDR4

The following terms are trademarks of other companies:

Intel®, Optane™, and Xeon® are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

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

Windows® is a trademark of Microsoft Corporation in the United States, other countries, or both.

TPC and TPC-E are trademarks of Transaction Processing Performance Council.

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

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