intel.

Data Centric Leadership Performance

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Contents

Overview

The Intel® Optane™ persistent memory (PMem) 200 series provides customers up to 4.5TB of memory per socket to manage data intensive workloads, such as in-memory databases like SAP* HANA*, dense virtualization, analytics, and high-powered computing.

Intel Optane technology is a whole new technology built on a unique architecture that allows memory cells to be individually addressed in a dense, transistor-less, stackable design. This innovation establishes new tiers in the memory and storage hierarchy, providing persistent memory, volatile memory, and persistent storage in multiple form factors. Intel Optane persistent memory technology delivers high-performance intelligence, is byte-addressable, offers higher capacity than DRAM at lower-cost, and can retain its data even when power is off, unlike DRAM.

In April, 2021, Intel introduced new 3rd Gen Intel® Xeon® Scalable processors (code-named: "Ice Lake") supporting one and two-socket platforms. Optimized for cloud, artificial intelligence (AI), enterprise, HPC, network, security and IoT workloads, 3rd Gen Intel Xeon Scalable processors come with 8 to 40 cores and a wide range of frequencies, features and power-consumption requirements. New benefits include PCIe-Gen4 support, increased memory bandwidth, memory capacity per processor up to 6TB per processor/socket and additional AVX-512 instructions. 3rd Gen Intel Xeon Scalable processors are the only data center CPU with built-in AI acceleration supported by end-to-end data science tools, and a vast ecosystem of smart solutions. Intel Crypto Acceleration increases the performance of encryption-intensive workloads including SSL web serving, 5G infrastructure, VPN/firewalls and reduces the performance impact of pervasive encryption.

In June, 2020, Intel introduced its 3rd Gen Intel Xeon Scalable processors (code-named: "Cooper Lake") evolving 4- and 8-socket processor offerings. This processor is designed for deep learning, virtual machine (VM) density, in-memory database, mission-critical applications and analytics-intensive workloads. enabling customers to accelerate the development and use of AI and analytics workloads running in the data center.

New 3rd Gen Intel Xeon Scalable processors (H/HL SKUs) continue Intel's leadership in built-in AI acceleration, and are the first general-purpose server CPUs with built-in bfloat16 (BF16) and Int8 support. Developed by some of the industry's most innovative minds and rapidly ramping in the AI hardware and software ecosystem, bfloat16 is a compact numeric format that uses half the bits as today's FP32 format but achieves comparable model accuracy with minimal software changes. Using bfloat16, the 3rd Gen Intel Xeon Scalable processors with Intel DL Boost can process two instructions per cycle compared with one FP32, accelerating both AI training and inference performance. Increased training performance accelerates time-to-deployment of AI models and makes more frequent re-training practical so AI systems can be kept up-to-date, while increased inference performance delivers higher throughput in the same compute footprint for greater insights.

New 3rd Gen Intel Xeon Scalable processors supported on one or two-socket platforms, along with connectivity, storage,

software and oneAPI cross-architectural tools, can further enhance workload optimized solutions designed to move more, store more and process everything.

Highlights include:

- Up to 1.53x higher geomean HPC performance on 3rd Gen Intel® Xeon® Scalable platform vs. prior gen featuring Intel® AVX-512 and 8 channels of DDR4-3200 across a broad set of HPC codes.[1]

- 1.56x improvement in AI inference for image classification with 3rd Gen Intel Xeon Scalable processor supporting Intel DL Boost vs. prior gen. [2]

- 1.74x higher INT8 batch inference of natural language processing (NLP) throughput on BERT-Large SQuAD with 3rd Gen Intel Xeon Scalable processor compared to prior gen.[3]

- Up to 1.64x better relational database performance with MySQL* on the new 3rd Gen Intel Xeon Scalable platform compared to prior generation.[4]

- Support your growing business needs with the new 3rd Gen Intel Xeon Scalable platform and realize up to 1.53x more OLTP database transactions on Microsoft* SQL Server* compared to prior gen. [5]

- Process up to 1.55x higher transactions per minute with Oracle* DB using the 3rd Gen Intel Xeon Platinum 8380 processor and Intel Optane SSD P5800X series vs prior gen.[6]

- With 3rd gen Intel Xeon Scalable processors, you can support up to 1.94x more secure networking connections and achieve significantly faster speeds to support cloud, edge and work-from-home use cases.[7]

- Up to 1.72x higher virtualization performance with 3rd Gen Intel® Xeon® Scalable processor with Intel® SSD D5-P5510 Series and Intel® Ethernet Network Adapter E810 vs. prior generation platform.[8]

Customers are delivering leading edge solutions on the 3rd Gen Intel Xeon Scalable 4- and 8-socket platforms for your next modern datacenter, as shown on the following partner pages highlighting their leadership performance. Highlights include:

- The industry's first mainstream server processor with built-in bfloat16 support and acceleration for AI, including software optimizations and socket scalability up to 8 sockets

- Up to 1.93x higher AI training performance with 3rd Gen Intel® Xeon® Scalable processor supporting Intel® DL Boost with BF16 vs. prior generation on ResNet50 throughput for image classification. [9]

- Up to 1.87x higher AI Inference performance with 3rd Gen Intel® Xeon® Scalable processor supporting Intel® DL Boost with BF16 vs. prior generation using FP32 on ResNet50 throughput for image classification. [10]

- 225X faster access to data with Intel® Optane™ persistent memory 200 series vs. NVMe SSD. [11]

- Customers refreshing aging infrastructure can expect an average estimated gain of 1.9 times on popular workloads and up to 2.2 times more VMs compared with 5-year-old 4-socket platform equivalents. [12]

In 2019, Intel introduced its 2nd Gen Intel Xeon Scalable processors (code-named: "Cascade Lake"). This processor provides the foundation for a powerful data centric solution that creates an evolutionary leap in agility and scalability. Disruptive by design, this innovative processor sets a new level of platform convergence and capabilities across compute, storage, memory, network, and security. Enterprises and cloud and communications service providers can now drive forward their most ambitious digital initiatives with a feature-rich, highly versatile platform.

- Up to 30x improvement in inference performance on Intel Xeon Platinum 9282 processor (56 cores) w/ Intel® Deep Learning Boost (Intel DL Boost) for ResNet-50 (image classification workload) using Intel® Optimization for Caffe vs. Intel Xeon Platinum 8180 processor at launch. [13]

- Up to 2x system memory capacity and support up to 36TB on 8-socket systems with Intel Optane persistent memory [14]

- Up to 2x average generational gains on 2-socket servers with new Intel Xeon Platinum 9200 processor. [15]
- Up to 1.33x average generational gains on Intel Xeon Gold processor. [16]

Partners

Learn more about leadership performance from Intel Xeon Scalable Family partners.

Partner		

Disclaimers

Performance varies by use, configuration and other factors. For more information go to www.Intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy.

SPEC* and the benchmark names SPEC CPU*, SPECint*, SPECfp*, SPECrate*, SPECjbb*, SPECjEnterprise*, SPECstorage*, SPECvirt_sc*, SPECpower_ssj*, SPECompG*, and SPECmpi* are registered trademarks of the Standard Performance Evaluation Corporation.

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[1] See (108) at www.intel.com/3gen-xeon-config. Results may vary.

[2] See (121) at www.intel.com/3gen-xeon-config. Results may vary.

[3] See (123) at www.intel.com/3gen-xeon-config. Results may vary.

[4] See (81) at www.intel.com/3gen-xeon-config. Results may vary.

[5] See (82) at www.intel.com/3gen-xeon-config. Results may vary.

[6] See (83) at www.intel.com/3gen-xeon-config. Results may vary.

[7] See (91) at www.intel.com/3gen-xeon-config. Results may vary.

[8] See (84) at www.intel.com/3gen-xeon-config. Results may vary.

[9] See (9) at www.intel.com/3gen-xeon-config. Results may vary.

[10] See (2) at www.intel.com/3gen-xeon-config. Results may vary.

[11] See (7) at www.intel.com/3gen-xeon-config. Results may vary.

[12] See (11), (4) at www.intel.com/3gen-xeon-config. Results may vary.

[13]

[14] 2x system memory capacity determined by 50% of the memory channels populated with Intel Optane persistent memory using products that add up to twice the maximum capacity of all of the DRAM capacity. Example for 8S system that provides 96 memory slots: 36TB capacity = 48 slots populated with 512GB modules of Intel Optane persistent memory, and 48 slots populated with 256GB DRAM DIMMs.

[15] Up to 2x average gains - see www.Intel.com/PerformanceIndex for configuration details.

[16] Up to 1.33x average gains - see www.Intel.com/PerformanceIndex for configuration details.

ASUS

	ASUS Leadership Performance ASUS is a multinational company offering high-quality servers and workstations with more than 5,000 R&D professionals globally. Inspired by the In Search of Incredible brand spirit, ASUS is driven by the core values of high performance, energy efficiency and intuitive management for data-center, AI, enterprise and cloud solutions. Visit ASUS to learn more.

ASUS High-performance Servers ASUS RS720-E10 and RS700-E10 series are PCIe 4.0 ready dual-socket servers powered by 3rd Gen Intel® Xeon® Scalable processors in 2U and 1U that support a diverse array of networking, storage and graphics and feature ASUS CPU-balanced architecture and flexible onboard LAN-module design for optimal system efficiency - enabling flexible scalability for HPC, virtualization, HCI and cloud. **ASUS Multi-node Servers** ASUS RS720Q-E10 is a 2U4N high-density server powered by 3rd Gen Intel Xeon Scalable processors with great scalability for compute-intensive workloads. Featuring a modular 2U chassis containing four server nodes that handle four times the workload per 2U rack unit, this server delivers incredible performance with reduced space requirement and operating costs.
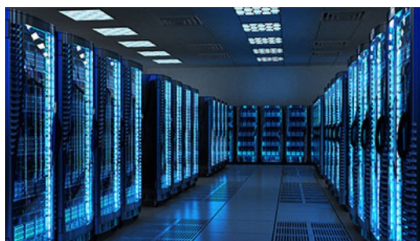
Overview of Performance Leadership

- ASUS sets the best Intel Xeon processor-based 2-socket energy-efficient 2U result in SPECpower_ssj® 2008 on Linux.
- ASUS holds three best Intel Xeon processor-based 2-socket results on SPECjbb® 2015 (MultiJVM critical-jOPS, Composite max-jOPS and Composite critical-jOPS) featuring 3rd Gen Intel Xeon Scalable processors.
- ASUS achieves best Intel Xeon processor-based 2-socket SPECspeed®2017_int_base result.

Industry Performance Leadership

5G Telecom ASUS Collaborates with Silicom and Intel for 5G Open RAN Acceleration and ASUS dual-socket servers deliver networked-optimized solution fueled by 3rd Gen Intel Xeon Scalable processors. Learn more

Cloud Services ASUS helped leading-online gaming company Boosteroid to enable its own customer to optimize the both hardware performance and the performance of its proprietary video-capture module - enabling the provision of superb cloud-gaming experiences. Learn more

Enterprise and Government ASUS Control Center is a centralized IT-management software tool that has been implemented by enterprises and governments around the world to deliver improved IT automation and better public-service efficiency. Learn more

Overall Performance Leadership

Segment / Benchmark	Platform	Importance

Compute-Intensive General Purpose: SPEC CPU2017*	ASUS RS700-E10(Z12PP-D32) Server System	Leadership Intel Xeon performance on ASUS platforms: • #1 2-socket Intel Xeon processor result on SPECspeed®2017_int_base as of 18 June 2021
Server-side Java*: SPECjbb*2015	ASUS RS700-E10-RS12U	Leadership Intel Xeon performance on ASUS platforms: • #1 2-socket Intel Xeon processor result on Linux SPECjbb2015 MultiJVM critical-jOPS as of 18 June 2021 • #1 2-socket Intel Xeon processor result on Linux SPECjbb2015 Composite max-jOPS as of 18 June 2021 • #1 2-socket Intel Xeon processor result on Linux SPECjbb2015 Composite critical-jOPS as of 18 June 2021
Energy Efficiency: SPECpower*_ssj2008	ASUS RS720-E9-RS8	Leadership Intel Xeon performance on ASUS 2U platforms: • #1 energy-efficient 2-socket Intel Xeon processor-based 2U server on Linux as of 18 June 2021

Results and configurations as of 18 June 2021 or as noted **Compute-Intensive General Purpose:**

SPEC CPU2017 Claim based on best-Intel-published 2-processor SPECspeed2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210524-26365.html, SPECrate2017_int_base score: 13.   **Server-side Java: SPECjbb2015** Claim based on best-Intel-published 2-processor SPECjbb2015-Composite results on Linux published at http://www.spec.org/jbb2015/results/jbb2015.html as of 18 June 2021. Source: https://www.spec.org/jbb2015/results/res2021q2/jbb2015-20210601-00656.html , SPECjbb2015-Composite scores: 252973 max-jOPS and 215468 critical-jOPS.   Claim based on best-Intel-published 2-processor SPECjbb2015-MultJVM results on Linux published at http://www.spec.org/jbb2015/results/jbb2015.html as of 18 June 2021. Source: https://www.spec.org/jbb2015/results/res2021q2/jbb2015-20210601-00655.html , SPECjbb2015-Composite scores: 282719 max-jOPS and 148229 critical-jOPS. **Energy Efficiency: SPECpower_ssj2008** Claim based on best-Intel-published 2-processor (2U) Linux SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 18 June 2021. Source: https://www.spec.org/power_ssj2008/results/res2019q3/power_ssj2008-20190618-00975.html. ASUS score: 14,066 overall ssj_ops/watt.

Disclaimers Performance varies by use, configuration and other factors. For more information go to www.Intel.com/PerformanceIndex. Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.   Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy.   SPEC* and the benchmark names SPEC CPU*, SPECint*, SPECfp*, SPECrate*, SPECjbb*, SPECjEnterprise*, SPECstorage*, SPECvirt_sc*, SPECpower_ssj*, SPECompG*, and SPECmpi* are registered trademarks of the Standard Performance Evaluation Corporation.   VMmark® is a product of VMware, Inc.

Fujitsu

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<td>Fujitsu Leadership Performance Fujitsu's x86 servers provide a solid foundation for today's hybrid IT reality, with powerful and flexible solutions for companies of all sizes, across all industries and for any type of workload. This includes the industry-standard x86 PRIMERGY servers as well as the PRIMEQUEST systems ideally suited for business and mission-critical environments. The broad PRIMERGY server portfolio features user-inspired innovations that help improve overall performance reliably and provide a level of efficiency that leads to lower total cost of ownership.</td>
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FUJITSU Server PRIMERGY systems FUJITSU Server PRIMERGY systems deliver workload-optimized x86 industry standard servers for any workload and business demand. Since there is no single server solution to meet all these needs, Fujitsu offers a broad server portfolio consisting of expandable tower servers, versatile rack-mount servers, density-optimized multi-node servers. While all these systems are designed to handle multiple workloads, each server is optimized for specific use cases. To help our customers move, store and process massive amounts of data, Fujitsu has introduced a new foundational building block for data-driven transformation. The new PRIMERGY M6 systems are powered by the 3rd Gen. Intel Xeon Scalable processors, Intel Optane persistent memory 200 series, faster I/O with PCI Express 4.0, Enterprise and Datacenter SSD Form Factor (EDSFF) devices, and many more new features and innovations. Visit Fujitsu to learn more.

Overview of Performance Leadership

- FUJITSU Server PRIMERGY systems provide the perfect basis for virtualization projects where the right performance, reliability and efficiency are essential. The VMware VMmark V3.1 benchmark results set 7 virtualization platform world records in a matched pair configuration. Recently, the PRIMERGY RX2540 M6 2-socket systems, each with 2x 3rd Gen Intel Xeon Platinum 8380 Scalable processors and the PRIMERGY RX4770 M6 systems, each with 4x 3rd Gen Intel Xeon Platinum 8380HL Scalable processors, achieved world records in VMmark V3.1 (Performance Only), VMmark V3.1 (Server Power-Performance) and VMmark V3.1 (Server and Storage Power-Performance) benchmarks.

- Six world records on SAP BW edition for SAP HANA Benchmark: FUJITSU PRIMERGY RX4770 M6 has set two important world records (6.5 billion records overall and 7.8 billion records - total runtime of data load) utilizing 3rd Gen Intel Xeon Platinum 8380HL processors and Intel Optane PMem Series 200, three overall world records (9.1 billion, 15.6 billion, and 31.2 billion records) utilizing 2nd Gen Intel Xeon Platinum 8280L processors and Intel Optane PMem Series 100, one overall world record (5.2 billion records) thus demonstrating outstanding performance, as well as FUJITSU PRIMERGY RX2540 M5 setting one world record on SAP Sales and Distribution (SD) standard application benchmark two-tier utilizing 2nd Gen Intel Xeon Platinum 8280 Scalable processors.

- One SPECspeed2017_int_base world record on FUJITSU Server PRIMERGY RX4770 M6 with 4x 3rd Gen Intel Xeon Platinum 8356H Scalable processors.

- Gadi is one of the first Intel® Optane™ persistent memory deployments in a supercomputer cluster in Australia and is housed at the National Computational Infrastructure campus at the Australian National University. The cluster of PRIMERGY CX2570 M5 servers utilize 2nd Gen Intel Xeon Platinum scalable processors including 50 nodes of Intel Optane PMem Series 100.

Industry Performance Leadership

Artificial Intelligence and Analytics The HIKARI Artificial Intelligence solution establishes predictive analysis models at the San Carlos Clinical Hospital Madrid. The incorporation of many different types of data is revolutionizing the healthcare sector. The ability to apply semantic and analytic technologies to this heterogeneous mass of data, as well as traditional healthcare data, to discover hidden correlations, identify care patterns and support clinical decision-making is paving the way for a new generation of improved healthcare services. The solution has halved the time for the preliminary assessment of patient records. Learn more.

Enterprise & Government Gadi is one of the first Intel® Optane™ persistent memory deployments in a supercomputer cluster in Australia and is housed at the National Computational Infrastructure campus at the Australian National University. The cluster includes 3,074 PRIMERGY CX2570 M5 servers using Intel Xeon Platinum 8268 scalable processors including 50 nodes each offering 1.5 Terabytes of Intel Optane PMem Series 100. Learn more

Comms Services and Network Edge PRIMEFLEX for Microsoft Azure Stack HCI which is based on PRIMERGY servers that utilize 2nd Gen Intel Xeon Scalable processors, doubles system performance and reduces investments and data center footprint drastically at Enter Doo. Learn more.

Overall Performance Leadership

Segment / Benchmark	Platform	Importance
Data Analytics: SAP* BW for SAP HANA* V3	FUJITSU Server PRIMERGY RX4770 M6	Overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 7.8 billion records as of 10 Nov 2020 Overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 6.5 billion records as of 10 Nov 2020

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	FUJITSU Server PRIMERGY RX4770 M5	Overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 9.1 billion records as of 10 Nov 2020
	FUJITSU Server PRIMEQUEST 3800B2	Overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 31.2 billion records as of 14 May 2020 Overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 15.6 billion records as of 14 Nov 2019 Overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 5.2 billion records as of 16 Oct 2019
Enterprise Resource Planning: SAP Sales and Distribution, two-tier	FUJITSU Server PRIMERGY RX4770 M6	Leadership Intel Xeon performance on Fujitsu platforms as of 18 Jun 2021: • 4-socket Intel Xeon processor result on Windows* with SQL Server
	FUJITSU Server PRIMERGY RX2540 M6	Leadership Intel Xeon performance on Fujitsu platforms as of 18 Jun 2021: • 2-socket Intel Xeon processor result on Windows* with SQL Server
	FUJITSU Server PRIMERGY RX2540 M5	2-socket world record as of 2 Apr 2019: • 2-socket 56-core result on Windows*
Infrastructure/Virtualization: VMware VMmark* V3.1	FUJITSU Server PRIMERGY RX4770 M6	Matched pair 4-socket world records in VMmark V3.1 as of 22 Oct 2020: • Performance Only • Server Power-Performance • Server and Storage Power-Performance
	FUJITSU Server PRIMERGY RX2540 M5	Matched pair 2-socket world record in VMmark V3.1 Server Power-Performance as of 10 Nov 2020

	FUJITSU Server PRIMERGY RX2540 M6	Matched pair 2-socket world records in VMmark V3.1 as of 18 Jun 2021: • 2-node 160-core Performance Only • Server Power-Performance • Server and Storage Power-Performance
Server-side Java*: SPECjbb*2015	FUJITSU Server PRIMERGY RX2540 M5	2-socket world records as of 12 Apr 2019 • SPECjbb2015-Composite max-jOPS on Windows • SPECjbb2015-Composite critical_jOPS on Windows
General Computing: SPEC CPU2017*	FUJITSU Server PRIMERGY RX4770 M6	4-socket world record (tie) in SPECspeed2017_int_base
Energy Efficiency: SPECpower*_ ssj2008	FUJITSU Server PRIMERGY RX2530 M6	Leadership Intel Xeon energy-efficient performance on Fujitsu 1U platforms as of 18 June, 2021: • 2-socket 3rd Gen Intel Xeon processor 1U server on Linux • 2-socket 3rd Gen Intel Xeon processor 1U server on Windows

Results and configurations as of 18 June 2021 or as noted Data Analytics: SAP* BW edition

for SAP HANA* The SAP BW edition for SAP HANA Standard Application Benchmark Version 3 performed on October 13, 2020, by Fujitsu in Kawasaki, Japan, with a total of 6.5 billion initial records, was certified by SAP on behalf of the SAP Benchmark Council on October 23, 2020. Certification 2020039: FUJITSU Server PRIMERGY RX4770 M6 (4 processors / 112 cores / 224 threads), Intel Xeon Platinum 8380HL processor, 768 GB DRAM and 3,072 GB Persistent Memory), SAP NetWeaver 7.50, SAP HANA 2.0, SUSE Linux Enterprise 15. For more details see https://www.sap.com/dmc/benchmark/2020/Cert20039.pdf, as of November 10, 2020. The SAP BW edition for SAP HANA Standard Application Benchmark Version 3 performed on October 27, 2020, by Fujitsu in Kawasaki, Japan, with a total of 7.8 billion initial records, was certified by SAP on behalf of the SAP Benchmark Council on October 28, 2020. Certification 2020040: FUJITSU Server PRIMERGY RX4770 M6, (4 processors / 112 cores / 224 threads), Intel Xeon Platinum 8380HL processor, 1,536 GB DRAM and 3,072 GB Intel Optane persistent memory Series 200. For more details see https://www.sap.com/dmc/benchmark/2020/Cert20040.pdf, as of November 10, 2020. The SAP BW edition for SAP HANA Standard Application Benchmark Version 3 performed on March 24, 2019, by Fujitsu in Kawasaki, Japan, with a total of 9.1 billion initial records, was certified by SAP on behalf of the SAP Benchmark Council on April 2, 2019. Certification 2020012: FUJITSU Server PRIMERGY RX4770 M5 (4 processors / 112 cores / 224 threads), Intel Xeon Platinum 8280L processor, 1,536 GB DRAM and 3,072 GB Intel Optane persistent memory Series 100, SAP NetWeaver 7.50, SAP HANA 2.0, SUSE Linux Enterprise 12. For more details see https://www.sap.com/dmc/benchmark/2019/Cert19012.pdf, as of November 10, 2020. The SAP BW edition for SAP HANA Standard Application Benchmark Version 3 performed on June 16, 2020, by Fujitsu in Kawasaki, Japan, with a total of 31.2 billion initial records, was certified by SAP on behalf of the SAP Benchmark Council on May 14, 2020. Certification 2020016: FUJITSU Server PRIMEQUEST 3800B2 (8 processors / 224 cores / 448 threads), Intel Xeon Platinum 8280L processor, 6,144 GB DRAM and 12,288 GB Intel Optane persistent memory, SAP NetWeaver 7.50, SAP HANA 2.0, SUSE Linux Enterprise 12. For more details see

https://www.sap.com/dmc/benchmark/2020/Cert20016.pdf, as of November 10, 2020. The SAP BW edition for SAP HANA Standard Application Benchmark Version 3 performed on 24 Oct 2019, by Fujitsu in Walldorf, Germany, with a total of 15.6 billion initial records, was certified by SAP on behalf of the SAP Benchmark Council on Nov 14, 2019. Certification 2019058: FUJITSU Server PRIMEQUEST 3800B2 (8 processors / 224 cores / 448 threads), Intel Xeon Platinum 8280L processor, 3,072 GB DRAM and 6,144 GB Intel Optane persistent memory, SAP NetWeaver 7.50, SAP HANA 2.0, SUSE Linux Enterprise 12. For more details see https://www.sap.com/dmc/benchmark/2019/Cert19058.pdf, as of November 14, 2019. The SAP BW edition for SAP HANA Standard Application Benchmark Version 3 performed on 16 Oct, 2019, by Fujitsu in Kawasaki, Japan, with a total of 5.2 billion initial records, was certified by SAP on behalf of the SAP Benchmark Council on Oct 16, 2019. Certification 2019052: FUJITSU Server PRIMEQUEST 3800B2 (8 processors / 224 cores / 448 threads), Intel Xeon Platinum 8280L processor, 3,072 GB DRAM, SAP NetWeaver 7.50, SAP HANA 2.0, SUSE Linux Enterprise 12. For more details see https://www.sap.com/dmc/benchmark/2019/Cert19052.pdf, as of October 16, 2019.   **Enterprise Resource Planning: SAP Sales and Distribution, two-tier** Claim base on best Fujitsu-published 4-socket SAP* SD 2-Tier on Windows result published at http://global.sap.com/solutions/benchmark/sd2tier.epx as of 18 June 2021. New Configuration: 2-tier, 4x Intel® Xeon® Platinum 8380H processor (112 cores/224 threads) on FUJITSU Server PRIMERGY RX4770 M6 with 1536GB total memory running Microsoft® Windows® Server 2016 Datacenter and Microsoft SQL Server 2012. Source: https://www.sap.com/dmc/benchmark/2020/Cert20051.pdf. Benchmark: SAP Sales and Distribution (SD) Standard Application Benchmark, Two-Tier score: 60,700 benchmark users. Tested by Fujitsu on 16 Dec 2020. Claim base on best Fujitsu-published 2-socket SAP* SD 2-Tier on Windows result published at http://global.sap.com/solutions/benchmark/sd2tier.epx as of 18 June 2021. New Configuration: 2-tier, 2x Intel® Xeon® Platinum 8380 processor (80 cores/160 threads) on FUJITSU Server PRIMERGY RX2540 M6 with 1024GB total memory running Microsoft® Windows® Server 2016 Datacenter and Microsoft SQL Server 2012. Source: https://www.sap.com/dmc/benchmark/2021/Cert21024.pdf. Benchmark: SAP Sales and Distribution (SD) Standard Application Benchmark, Two-Tier score: 42,750 benchmark users. Tested by Fujitsu on 31 Mar 2021. Claim base on best published 2-socket 56-core SAP* SD 2-Tier on Windows result published at http://global.sap.com/solutions/benchmark/sd2tier.epx as of 18 June 2021. New Configuration: 2-tier, 2x Intel® Xeon® Platinum 8280 processor (56 cores/112 threads) on FUJITSU Server PRIMERGY RX2540 M5 with 1024GB total memory running Microsoft® Windows® Server 2016 Datacenter and Microsoft SQL Server 2012. Source: https://www.sap.com/dmc/benchmark/2019/Cert19010.pdf. Benchmark: SAP Sales and Distribution (SD) Standard Application Benchmark, Two-Tier score: 30,500 benchmark users. Tested by Fujitsu on 18 Feb 2019.
Infrastructure/Virtualization: VMware VMmark 3.1 Claim based on best-published matched pair 2-node 2-socket 112 total cores VMmark 3.1.x result published at www.vmware.com/products/vmmark/results3x.html as of April 02, 2019. Source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2019-04-02-Fujitsu-RX2540M5-serverPPKW.pdf, with a score of 6.3290 @ 9 tiles (Server Power-Performance).   Claim based on best-published matched pair 4-socket VMmark 3.1.x result published at www.vmware.com/products/vmmark/results3x.html as of November 10, 2020. Source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2020-10-22-Fujitsu-RX4770M6.pdf with a score of 19.72 @ 20 tiles (Performance Only), source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2020-10-22-Fujitsu-RX4770M6-serverPPKW.pdf with a score of 6.3410 @ 20 tiles (Server Power-Performance), and source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2020-10-22-Fujitsu-RX4770M6-serverstoragePPKW.pdf with a score of 3.7609 @ 20 tiles (Server and Storage Power-Performance).   Claim based on best-published matched pair 2-socket VMmark 3.1.x result published at www.vmware.com/products/vmmark/results3x.html as of June 18 2021. Source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2021-04-20-Fujitsu-PRIMERGY-RX2540M6.pdf with a score of 14.19 @ 14 tiles (2-socket 160 total cores Performance Only), source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2021-04-20-Fujitsu-PRIMERGY-RX2540M6-serverPPKW.pdf with a score of 7.1922 @ 14 tiles (Server Power-Performance), and source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2021-04-20-Fujitsu-PRIMERGY-RX2540M6-serverstoragePPKW.pdf with a score of 4.1138 @ 14 tiles (Server and Storage Power-Performance).   **Server-side Java: SPECjbb2015** Claim based on best-published 2-processor SPECjbb2015-Composite results on Windows published at http://www.spec.org/jbb2015/results/jbb2015.html as of April 12, 2019. Source: https://www.spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00431.html , SPECjbb2015-Composite scores: 101742 max-jOPS and 67948 critical-jOPS. Claim based on best-published 2-processor SPECjbb2015-Composite results on Windows published at http://www.spec.org/jbb2015/results/jbb2015.html as of April 12, 2019. Source: https://www.spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00432.html , SPECjbb2015-Composite scores: 98065 max-jOPS and 71031 critical-jOPS.   **General Computing: SPEC CPU2017** Claim based on best-published 4-processor SPEC CPU2017 speed results published at https://www.spec.org/cpu2017/results/ as of October 13, 2020. Source: https://www.spec.org/cpu2017/results/res2020q4/cpu2017-20201013-24202.html **Energy Efficiency: SPECpower_ssj2008** Claim based on best-Intel-published 2-processor (1U) Windows SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 18 June 2021. Source: https://www.spec.org/power_ssj2008/results/res2021q2/power_ssj2008-20210407-01093.html. Fujitsu score: 12,066 overall ssj_ops/watt. Claim based on best-Intel-published 2-processor (1U) Linux SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 18 June 2021. Source: https://www.spec.org/power_ssj2008/results/res2021q2/power_ssj2008-20210407-01092.html. Fujitsu score: 11,533 overall ssj_ops/watt.

Disclaimers Performance varies by use, configuration and other factors. For more information go to www.Intel.com/PerformanceIndex.

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Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure. Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy. SPEC* and the benchmark names SPEC CPU*, SPECint*, SPECfp*, SPECrate*, SPECjbb*, SPECjEnterprise*, SPECstorage*, SPECvirt_sc*, SPECpower_ssj*, SPECompG*, and SPECmpi* are registered trademarks of the Standard Performance Evaluation Corporation. TPC, TPC Benchmark, TPC-C, TPC-E, TPC-H, TPC-DS and TPC-VMS are trademarks of the Transaction Processing Performance Council. VMmark® is a product of VMware, Inc.

H3C

H3C Leadership Performance H3C is an industry leader in the provision of Digital Solution, and is committed to becoming the most trusted partner of its customers in their quest for business innovation and digital transformation. We offer a full portfolio of Digital Infrastructure products, spanning across compute, storage, networking, 5G, security and related domains, and provide a comprehensive one-stop digital platform that includes cloud computing, big data, artificial intelligence (AI), industrial internet, information security, intelligent connectivity, new safety, and edge computing, as well as end-to-end technical services. We are also the exclusive provider of HPE® servers, storage and associated technical services in China. Visit H3C to learn more.

H3C is a leading provider of servers and services and has been a top 3 vendor in China market[1] for many years. Around the world, H3C also works with hundreds of partners and clients. H3C offers industry-standard servers with the latest technology for all scenarios as well as application-driven solutions. We provide a comprehensive portfolio including Rack server as well as Blade systems. We provide innovative designs for diverse workloads and applications through processing, memory, I/O, and storage capacity. **H3C UniServer R4900 G5** New generation H3C UniServer R4900 G5 provides outstanding scalable capacity supporting up to 28 NVMe drives to enhance configuration flexibility for modern data centers . The R4900 G5 server is an H3C self-developed mainstream 2U rack server that utilizes the most recent 3rd Gen Intel® Xeon® Scalable processors and 8 channel DDR4 memory with 3200MT/s speed to strongly lift the bandwidth up to 60%[2] compared with previous platform. With 14x PCIe 3.0 I/O slots and 2x OCP 3.0 to reach excellent IO scalability. Maximum 96% power efficiency[2] and 5°-45ºC operating temperature provide users with TCO returns in a greener data center. **H3C UniServer R4700 G5** New generation H3C UniServer R4700 G5 provides outstanding performance within 1U rack by adopting the latest Intel Xeon platform as well as several optimizations for modern data center. Industrial-leading manufacturing process and system design enable customers to easily and reliably manage their IT infrastructure. The R4700 G5 server is an H3C self-developed mainstream 1U rack server that utilizes the most recent 3rd Gen Intel® Xeon® Scalable processors and 8 channel DDR4 memory with 3200MT/s speed to strongly lift the performance up to 52%[3] compared with previous platform. Data Center Level GPU and NVMe SSD also equip with excellent IO scalability. Maximum 96% power efficiency[3] and 5°-45ºC operating temperature provide users with TCO returns in a greener data center. **H3C UniServer R6900 G5** New generation H3C UniServer R6900 G5 adopts a modular architecture to provide outstanding scalable capacity supporting up to 50 SFF drives include optional 24 NVMe SSD drives. R6900 G5 server features Enterprise-grade RAS make it a decent choice for core workload, virtualization, database, data-processing and high-density computing application. The R6900 G5 utilizes up to four 3rd Gen Intel Xeon Scalable processors (codename Cooper Lake), 6 UPI Bus interconnection and DDR4 memory with 3200MT/s speed as well as Intel Optane PMem 200 series persistent memory to strongly lift the performance up to 40%[4] compared with previous platform. With 18x PCIe 3.0 I/O slots to reach excellent IO scalability. 94%/96% power efficiency[4] and 5°-45ºC operating temperature provide users with TCO returns in a greener data center. **H3C UniServer R4900 G3** With up to 24 NVMe SSDs and SATA M.2 SSDs, the R4900 G3 provides super expandability and configuration agility required by modern data centers. As an indigenous mainstream dual-processor 2U rack server, the R4900 G3 adopts the most recent Intel Xeon Scalable processors (codename Cascade Lake), which improves processing performance by 71%[5] and increases the number of cores by 27%[5] compared to Intel Xeon E5 v4 processors. The use of 2933MT/s DDR4 DIMMs improves data transfer rate by 50% and extraordinary expandability is provided through up to 10 PCIe 3.0 slots and a maximum of 31 drives. The R4900 G3 supports power supplies with 96% efficiency[5] and an operation temperature range of 5°-50°C, creating high return on investment. **H3C UniServer R4700 G3** The R4700 G3 provides enhanced performance in high-density scenarios and delivers extraordinary computing performance with 2nd Gen Intel Xeon processors in a 1U space. Its industry-leading system design brings ease of use, enhanced security, and high availability. **H3C UniServer R4300 G3** The R4300 G3 realize the comprehensive needs of high storage capacity, efficient data calculation, and linear expansion with 2nd Gen Intel Xeon processors within a 4U rack. This model is suitable for multiple industries such as government, public security, operator, and the Internet. **H3C UniServer R6700 G3** The R6700 G3 adopts a high-density architecture to provide outstanding performance with 4 sockets and achieve high reliability and flexibility within a 2U rack. This model supports up to 26 SFF drives include optional 18 NVMe SSD drives. R6700 G3 server features enterprise-grade RAS that makes it a decent choice for core workload , virtualization, database, data-processing and high-density computing applications. **H3C XG310 GPU** The H3C XG310 GPU Card, based on Intel® Server GPU, gives service providers the ability to take advantage of these trends while keeping total cost of ownership (TCO) low. In conjunction with Intel Xeon Scalable processors, this discrete graphics solution is purpose-built for the needs of differentiating services in the visual cloud era that will help providers rapidly scale out new offerings to meet new and escalating customer demands.

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[1] Source: IDC, China Quarterly Server Tracker, 2021Q4 (Preliminary Results) [2] Source: H3C UnivServer R4900 G5 Server [3] Source: H3C UnivServer R4700 G5 Server [4] Source: H3C UnivServer R6900 G5 Server [5] Source: H3C R4900 G3 2U Rackmount 8Lff Cto Server

Overview of Performance Leadership

- H3C UniServer R6900 G5, 4-socket server featuring the latest 3rd Gen Intel Xeon Scalable processors achieves - one world record in SPEC CPU*2017 SPECspeed2017_fp_base benchmark   - leadership ranking in top 2 SPECspeed2017_int_base results   - leadership ranking among top 3 for SPECrate2017_fp_base results

- H3C UniServer R4900 G5, 2-socket server featuring the latest 3rd Gen Intel Xeon Scalable processors achieves - leadership ranking in SPECvirt_sc2013 results

- H3C UniServer R6900 G3, featuring the 3rd Gen Intel Xeon Scalable processors achieves leadership ranking among top 3 results in 4-socket 4U energy efficiency SPECpower_ssj2008 benchmark with 3rd Gen Intel Xeon processors as of Dec 10, 2021.

- H3C UniServer R4900 G3, featuring 2nd Gen Intel Xeon Scalable processors, achieves leadership ranking among top 3 in 2-socket TPC Benchmark™ DS @10,000 GB, clustered as of Dec 23, 2020.

Industry Performance Leadership

	Government H3C has maintained a leading position in the market in the field of government informatization for many years, and it has successively undertaken nine golden projects among the "twelve golden projects". Its share exceeds 70% of the applications in the central ministries and commissions. H3C has been proactive and forward-looking, continuing to implement its new IT strategy, exerting its excellent innovation, R&D and operations and maintenance capabilities, firmly devoting itself to global government informatization, and contributing its own strengths to the practice of government service innovation and the construction of a service-oriented government. Government solutions page
	Education A leader in New IT solutions, H3C is constantly seeking to create new value for users. In addition to wired and wireless networking, H3C collaborates with partners to provide converged solutions in areas including security, computing, storage, and upper-layer applications. In addition, the New IT trend has changed user application delivery needs, shifting attention of users away from products' features and functions, and towards the impacts of IT on their businesses. Responding to this, H3C's focus is the construction of a New IT ecosystem for the future. In collaboration with application partners, H3C plans to create a higher-value, smarter educational information system via consolidation of all the operational and investment resources at its disposable. Education solutions page
	Finance Since H3C served in China's financial industry more than 30 years ago, its customer portfolio has grown to cover over 90% of the sector. As a key provider in industry-leading Financial Technology, H3C has played a critical role in the digitalization of financial Institutions. H3C 's financial solution covers four main areas - financial all-scenario clouds, financial cloud-network-convergence infrastructure, financial Interconnectivity and financial information security - and has been adopted by hundreds of customers in the banking, insurance, securities and capital markets. Finance solutions page

	Energy H3C's leading information technology helps energy industries upgrade their levels of commercialization and automation. With its comprehensive product line and solutions for networking, security, servers, storage, cloud computing, big data, IoT and intelligent management centers, H3C helps energy companies improve their production and management capabilities and increase the speed at which they can assimilate information. Energy solutions page
	Transportation H3C's ICT solution, enabled by innovative information technology and leading IT products, consists of a combination of cloud computing and other innovative solutions from areas including Big Data, Security and Networking. Designed to meet the needs of traditional public transportation industries such as metro, railway, airport, road and harbor operators, it enables the digitalization of these industries, permitting transportation in turn to create greater value and provide more intelligent transportation services. Transportation solutions page
	Manufacturing H3C, a leader in smart manufacturing with cutting-edge innovative technologies and deep industry experience, is assisting Chinese manufacturing enterprises to accelerate the integration of industrial and information technology, thereby improving manufacturing quality and production efficiency, reinventing themselves as smart manufacturers, and converting China from a manufacturing base into a true manufacturing powerhouse. By assuming a leading role in the development of smart manufacturing and planning for a digital future, H3C has not only become a leader in smart manufacturing innovation technology, but also a pioneer in industrial practice, and a crucial participant in a key national strategy. Manufacturing solutions page
	Internet H3C has been actively participating in Internet infrastructure construction since the 1990s, closely monitoring the industry's needs and technological trends over the years. By constantly innovating and overcoming technological barriers, H3C has grown alongside its Internet customers – its brands withstanding the most rigorous tests the Internet has to offer – and become the main infrastructure supplier to the Chinese Internet industry. Internet solutions page

Healthcare With leading technology and rich experience accumulated over many years, H3C has ranked first in the medical and healthcare market for seven consecutive years, with market share exceeding 60%, applying New IT solutions in over 300 A-grade hospitals across China. Alongside this, H3C has also assisted in the construction of dozens of provincial-level health information platforms and regional medical and health platforms, creating an outstanding record of achievement. Learn more Healthcare solutions page

Hotel & Properties H3C's Hotel Integrated Business Solution integrates IP voice/video, wireless communications, and storage technology with basic network technologies to effectively improve hotel network management, reduce operating costs, and provide guests with diversified services, improving hotel occupancy and profitability. This solution also allows hotels to diversify their income sources and reduce expenditures, improving profitability as well as customer satisfaction. Hotel & Properties solutions page

Overall Performance Leadership

Segment / Benchmark	Platform	Importance
Decision Support: TPC Benchmark* DS (TPC-DS) @10,000 GB, clustered	H3C UniServer R4900 G3	2- socket Intel Xeon performance leadership TPC-DS @ 10,000GB (among top 3) as of 10 Dec 2021
General Computing: SPEC CPU2017*	H3C UniServer R6900 G5 H3C UniServer R4900 G5	4-socket Intel Xeon performance leadership on H3C platform as of 10 Dec 2021: • SPECspeed2017_int_base result (2 results tied (among top 2) • World Record SPECspeed2017_fp_base result • SPECrate2017_fp_base result (among top 3)
Energy Efficiency: SPECpower*_ssj2008	H3C UniServer R6900 G5 H3C UniServer R6700 G3	4-socket Intel Xeon performance leadership on H3C platform as of 10 Dec 2021: • Among top 3 energy efficient 2U server • Among top 3 energy efficient 4U server
Infrastructure/Virtualization: SPECvirt_sc*2013	H3C UniServer R4900 G5	Leadership Intel Xeon performance on H3C 2-socket platform as of 30 April 2022: • #1 Intel Xeon processor performance SPECvirt_sc2013 result

Configuration Details Results and configurations as of 10 Dec 2021 or as noted **Decision Support: TPC Benchmark DS (TPC-DS), clustered** Claim based on best-published two-socket TPC Benchmark* DS V3 @ 10,000GB cluster results published at http://tpc.org/tpcds/results/tpcds_perf_results5.asp?resulttype=CLUSTER&version=3%&currencyID=0 as of 23 Dec 2020. Source:

http://tpc.org/5012 . Score: 8,944,478 QphDS@10000GB, 423.13 CNY per kQphDS@10000GB available 23 Dec 2020. Tested by New H3C Technologies Co., Ltd. on 22 Dec 2020. **Compute-Intensive General Purpose: SPEC CPU2017** Claim based on best-published 4-processor SPECrate2017_fp_base results published at https://www.spec.org/cpu2017/results/cpu2017.html as of 22 Jun 2021. Source: https://spec.org/cpu2017/results/res2021q2/cpu2017-20210602-26861.html, SPECrate2017_fp_base score: 669. Claim based on best-published 4-processor SPECspeed2017_int_base results published at https://www.spec.org/cpu2017/results/cpu2017.html as of 10 Dec 2021. Source: https://spec.org/cpu2017/results/res2021q1/cpu2017-20210310-25209.html , SPECspeed2017_int_base score: 12.4. Claim based on best-published 4-processor SPECspeed2017_int_base results published at https://www.spec.org/cpu2017/results/cpu2017.html as of 10 Dec 2021. Source: https://spec.org/cpu2017/results/res2021q2/cpu2017-20210420-25651.html , SPECspeed2017_int_base score: 12.4. Claim based on best-published 4-processor SPECspeed2017_fp_base results published at https://www.spec.org/cpu2017/results/cpu2017.html as of 10 Nov 2021. Source: https://spec.org/cpu2017/results/res2021q2/cpu2017-20210602-26863.html , SPECspeed2017_fp_base score: 265. **Energy Efficiency: SPECpower_ssj2008** Claim based on best-published SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ Top 3 4-processor (2U) H 3C UniServer R6700 G3 as of 10 Dec 2021. Source: https://www.spec.org/power_ssj2008/results/res2019q2/power_ssj2008-20190521-00972.html . Score 13107. **Infrastructure/Virtualization: SPECvirt_sc2013 Performance** Claim based on best-Intel-published 2-processor SPECvirt_sc2013 results published at https://spec.org/virt_sc2013/results/specvirt_sc2013_perf.html as of 30 April 2022. Source: https://spec.org/virt_sc2013/results/res2022q2/virt_sc2013-20220317-00130-perf.html, SPECvirt_sc2013 score 4725@263 VMs.

Disclaimers Performance varies by use, configuration and other factors. For more information go to www.intel.com/benchmarks . Intel optimizations, for Intel compilers or other products, may not optimize to the same degree for non-Intel products. SPEC* and the benchmark names SPECint*, SPECfp*, SPECjbb*, SPECjEnterprise*, SPECvirt_sc*, SPECpower_ssj*, SPECompG*, and SPECmpi* are registered trademarks of the Standard Performance Evaluation Corporation. VMmark® is a product of VMware.

HPE

	HPE Leadership Performance HPE is a global, edge-to-cloud Platform-as-a-Service company built to transform your business. How? By helping you connect, protect, analyze, and act on all your data and applications wherever they live, from edge to cloud, so you can turn insights into outcomes at the speed required to thrive in today's complex world. Visit HPE to learn more.

HPE delivers a comprehensive portfolio of compute solutions powered by Intel® technology. Platforms with world performance records include: HPE Superdome Flex Servers Modular compute platforms that power critical applications, accelerate analytics, and tackle HPC and AI workloads holistically. HPE ProLiant Servers The intelligent compute foundation for hybrid cloud that delivers unmatched workload optimization, security, and automation, all available as a service. HPE Synergy Modern, software-defined, composable infrastructure built to serve both as an ideal platform for private cloud and as the next generation of blade technology. HPE Apollo Servers Purpose-built, density optimized compute for demanding High Performance Computing and Artificial Intelligence applications. HPE Cray Supercomputers HPE Cray supercomputers are an entirely new design, created from the ground up to handle today's new massive converged modeling, simulation, AI and analytics workloads. HPE SGI 8600 Offers petaflop speed and scalability to thousands of nodes in an efficient, dense, and easy to manage proven architecture. Other HPE platforms powered by Intel include HPE NonStop, HPE Edgeline and more.

Overview of Performance Leadership

- **HPE achieves 39 performance and energy-efficiency benchmark world records**

- HPE Superdome Flex 280, featuring the latest 3rd Generation Intel® Xeon® Scalable processors achieves **28 world records** across a variety of benchmarks including SAP® Business Warehouse (SAP BW) edition for SAP HANA® standard application benchmark, SAP® Sales and Distribution (SD) standard application benchmark two-tier, TPC Benchmark™ H @ 30,000GB (30TB) and 100,000GB (100TB) scale factor non-clustered performance and price/performance, SPECjbb® 2015, SPEC CPU® 2017, SPECpower_ssj® 2008, SPEC® OMPG2012, and VMmark 3.1. These records are proof points of the capability of the platform to deliver the performance required by the most demanding workloads.
- HPE ProLiant DL380 Gen 10 Plus, featuring the latest 3rd Generation Intel Xeon Scalable processors, achieves one world record in TPC Benchmark H @ 10,000GB non-clustered price/performance and two world records in VMmark 3.1.
- Platforms featuring 2nd Generation Intel® Xeon® Scalable processors achieve 8 world records including:
  - HPE Superdome Flex, three world records on SAP BW edition for SAP HANA standard application benchmark, one with 32 processors and two with 16 processors. One world record on SAP Sales and Distribution (SD) standard application benchmark two-tier with 16 processors.
  - HPE Synergy 660 Gen10 Compute Module, two world records in SPECpower_ssj2008.
  - HPE Synergy 480 Gen10 Compute Module, two world records in VMmark 3.1.
- **7 supercomputing cluster systems recognized** in the November 2020 Top500 powered by 2nd Gen Intel Xeon Scalable Processors. Platforms featured include HPE SGI 8600 with 5 systems, HPE Apollo 2000 with one system and HPE Cray CS500 with one system.

Industry Performance Leadership

	SAP Workloads More than 25,000 customers[1] run SAP applications on HPE infrastructure, and we are the undisputed infrastructure leader for SAP HANA with over 34,000 servers[1] deployed in this space. We understand SAP, and what SAP HANA requires from your server and storage environment, keeping mission-critical applications protected, available, and ultimately modernizing your prior SAP landscape. Learn more[1] Source: Why HPE for SAP HANA Infographic, November 2020
	High Performance Computing HPE and our global partners have created a high performance computing (HPC) ecosystem to help solve the world's most complex problems. We continuously collaborate, build, validate, and deliver secure, innovative, production-level HPC solutions with leading-edge technologies and services. Solutions page
	Artificial Intelligence AI has the unique ability to extract meaning from data when you can define what the answer looks like but not how to get there. AI can amplify human capabilities and turn exponentially growing data into insight, action, and value. Navigate this fast-changing field and realize the promise of enterprise AI, machine learning, deep learning, and data analytics everywhere, from IoT to cloud to data center with HPE as your trusted AI partner. Solutions page

Decision Support & Data Analytics Data is growing at an exponentially increasing rate, from an explosion of data sources. But the amount of time you have available to do something with that data is shrinking. Develop a data strategy to realize fast business outcomes - our experts, partners, and technology can help you succeed in a data-driven world. Solutions page

Overall Performance Leadership

Segment / Benchmark	Platform	Importance
Data Analytics: SAP* BW for SAP HANA* V3	HPE Superdome Flex 280	8-processor overall world records (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase): • #1 8-processor result with 11.7 billion initial records as of 23 Feb 2021 • #1 8-processor result with 20.8 billion initial records as of 30 Oct 2020
	HPE Superdome Flex	16- and 32-processor overall world records (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) as of 5 Jun 2020: • #1 16-processor result with 20.8 billion initial records • #1 32-processor result with 41.6 billion initial records 16-processor world record (Query Executions Per Hour) • #1 16-processor result with 41.6 billion initial records
Enterprise Resource Planning: SAP Sales and Distribution, two-tier	HPE Superdome Flex 280	8-processor world record as of 25 Jan 2021: • #1 result on Windows
	HPE Superdome Flex	16-processor world record as of 25 July 2020: #1 bare-metal result on Windows

Decision Support TPC Benchmark* H (TPC-H) @ 3,000GB, 10,000GB, 30,000GB, and 100,000GB non-clustered	HPE Superdome Flex 280	4-processor world records as of 26 March 2021: • #1 performance @ 30,000GB, non-clustered • #1 price/performance @ 30,000GB, non-clustered 8-processor world records as of 30 April 2022: • #1 performance @ 100,000GB, non-clustered • #1 price/performance @ 100,000GB, non-clustered
	HPE ProLiant DL380 Gen10	Leadership Intel Xeon performance on HPE platform as of 2 Apr 2019: • #1 2P Intel Xeon processor performance @ 3,000GB, non-clustered
	HPE ProLiant DL380 Gen10 Plus	2-processor world record as of 18 Jun 2021: • #1 price/performance @ 10,000GB, non-clustered
Server-side Java*: SPECjbb*2015	HPE Superdome Flex 280	4-processor world records as of 25 Feb 2021: • #1 SPECjbb2015-MultiJVM critical-jOPS • #1 SPECjbb2015-Composite max-jOPS • #1 SPECjbb2015-Composite critical-jOPS • #1 SPECjbb2015-Distributed max-jOPS • #1 SPECjbb2015-Distributed critical-jOPS 8-processor world records as of 25 Feb 2021: • #1 SPECjbb2015-MultiJVM max-jOPS • #1 SPECjbb2015-MultiJVM critical-jOPS Leadership Intel Xeon performance on HPE platform: • #1 8P SPECjbb2015-Distributed max-jOPS • #1 8P SPECjbb2015-Distributed critical-jOPS
	HPE Synergy 480 Gen10	Leadership Intel Xeon performance on HPE platform: • #1 2P Intel Xeon processor result on Linux* SPECjbb2015-Distributed max-jOPS • #1 1P Intel Xeon processor result on Linux SPECjbb2015-MultiJVM max-jOPS • #1 2P Intel Xeon processor result on Linux SPECjbb2015-MultiJVM max-jOPS

	HPE ProLiant DL360 Gen10	Leadership Intel Xeon performance on HPE platform: • 1P Intel Xeon processor result on Windows* SPECjbb2015-MultiJVM max-jOPS • 1P Intel Xeon processor result on Windows SPECjbb2015-MultiJVM critical-jOPS
Compute-Intensive General Purpose: SPEC CPU* 2017	HPE Superdome Flex 280	8-processor world records as of 25 Feb 2021: • #1 SPECspeed*2017_int_base result • #1 SPECspeed2017_fp_base result • #1 SPECrate2017_fp_base result Leadership Intel Xeon performance on HPE platform as of 25 Feb 2021: • #1 8P Intel Xeon SPECrate*2017_int_base result
Compute-Intensive Technical Computing: SPEC* OMP2012	HPE Superdome Flex 280	8-processor world record as of 18 Jun 2021: • #1 SPEC OMPG2012 result
Infrastructure/Virtualization: VMware VMmark* 3.1	HPE Superdome Flex 280	4-processor world record, uniform hosts, as of 30 Apr 2022 • #1 2-node 224 cores Performance Only
	HPE Synergy 480 Gen10	#1 and first 6-node VMmark 3.1.x result #1 and first 6-node composable infrastructure VMmark 3.1.x result
	HPE ProLiant DL380 Gen10 Plus	2-processor world records, uniform hosts, as of 18 Jun 2021: • #1 4-node 320 cores Performance Only • #1 3-node 240 cores Performance Only
Energy Efficiency: SPECpower*_ ssj2008	HPE Superdome Flex 280	4-processor world records as of 10 Nov 2020: • #1 energy-efficient 5U server • #1 energy-efficient 5U server on Linux • #1 energy-efficient 5U server on Windows 8-processor world records as of 10 Nov 2020: • #1 energy-efficient 10U server • #1 energy-efficient 10U server on Linux • #1 energy-efficient 10U server on Windows
	HPE Synergy 660 Gen10 Compute Module	4-processor world records as of 2 Apr 2019: • #1 energy-efficient Blade server on Windows • #1 energy-efficient Blade server on Linux

Results and configurations as of 18 June 2021 or as noted

Data Analytics: SAP* BW edition for SAP HANA* Claim based on best-published 8-processor SAP BW, edition for SAP HANA on SUSE Linux Enterprise Server 15 SP 2; SAP HANA 2.0, SAP NetWeaver® 7.50 result published at https://www.sap.com/dmc/exp/2018-benchmark-directory/#/bwh, Certification # 2020045 as of 10 Nov 2020. New Configuration: 8 x Intel Xeon Platinum 8380H processors (224 cores/448 threads) on HPE Superdome Flex 280, 12 TB memory; Source: https://www.sap.com/dmc/benchmark/2021/Cert20045.pdf. Benchmark: SAP BW, edition for SAP HANA standard application benchmark with 20.8 billion initial records. Scores: Runtime of last data set 15,161 seconds; Query executions per hour 4,569; Runtime of complex query 131 seconds. Tested by HPE on 30 Oct 2020.   Claim based on best-published 8-processor SAP BW, edition for SAP HANA on SUSE Linux Enterprise Server 15 SP 2; SAP HANA 2.0, SAP NetWeaver 7.50 result published at https://www.sap.com/dmc/exp/2018-benchmark-directory/#/bwh, Certification # 2021018 as of 23 Feb 2021. New Configuration: 8 x Intel Xeon Platinum 8380H processors (224 cores/448 threads) on HPE Superdome Flex 280, 6 TB memory; Source: https://www.sap.com/dmc/benchmark/2021/Cert2021018.pdf. Benchmark: SAP BW, edition for SAP HANA standard application benchmark with 11.7 billion initial records. Scores: Runtime of last data set 11,567 seconds; Query executions per hour 7610; Runtime of complex query 101 seconds. Tested by HPE on 23 Feb 2021. Claim based on best-published 32-processor SAP BW, edition for SAP HANA on SUSE Linux Enterprise Server 12; SAP HANA 2.0, SAP NetWeaver 7.50 result published at https://www.sap.com/dmc/exp/2018-benchmark-directory/#/bwh, Certification # 2020019 as of 10 Nov 2020. New Configuration: 32 x Intel Xeon Platinum 8280L processors (896 cores/1792 threads) on HPE Superdome Flex, 24 TB memory; Source: https://www.sap.com/dmc/benchmark/2020/Cert20019.pdf. Benchmark: SAP BW, edition for SAP HANA standard application benchmark with 41.6 billion initial records. Scores: Runtime of last data set 24,663 seconds; Query executions per hour 6,383; Runtime of complex query 235 seconds. Tested by HPE on 28 May 2020. Claim based on best-published 16-processor SAP BW, edition for SAP HANA on SUSE Linux Enterprise Server 12; SAP HANA 2.0, SAP NetWeaver 7.50 result published at https://www.sap.com/dmc/exp/2018-benchmark-directory/#/bwh, Certification # 2020008 as of 10 Nov 2020. New Configuration: 16 x Intel Xeon Platinum 8280L processors (448 cores/896 threads) on HPE Superdome Flex, 12 TB DRAM and 12 TB Persistent Memory; Source: https://www.sap.com/dmc/benchmark/2020/Cert20008.pdf. Benchmark: SAP BW, edition for SAP HANA standard application benchmark with 41.6 billion initial records. Scores: Runtime of last data set 31,870 seconds; Query executions per hour 3,412; Runtime of complex query 262 seconds. Tested by HPE on 25 February 2020. Claim based on best-published 16-processor SAP BW, edition for SAP HANA on SUSE Linux Enterprise Server 12; SAP HANA 2.0, SAP NetWeaver 7.50 result published at https://www.sap.com/dmc/exp/2018-benchmark-directory/#/bwh. Certification # 2019050 as of 10 Nov 2020. New Configuration: 16 x Intel Xeon Platinum 8280L processors (448 cores/896 threads) on HPE Superdome Flex, 12 TB memory; Source: https://www.sap.com/dmc/benchmark/2019/Cert19050.pdf. Benchmark: SAP BW, edition for SAP HANA standard application benchmark with 20.8 billion initial records. Scores: Runtime of last data set 19,816 seconds; Query executions per hour 7,158; Runtime of complex query 161 seconds. Tested by HPE on 28 September 2019.   **Enterprise Resource Planning: SAP Sales and Distribution two-tier** Claim based on best-published 8-processor SAP SD two-tier on Windows Server 2016 result published at https://www.sap.com/dmc/exp/2018-benchmark-directory/#/sd, Certification # 2021006 as of 25 February 2021. New Configuration: two-tier, 8x Intel Xeon Platinum 8380H processors (224 cores/448 threads) on HPE Superdome Flex 280 with 3072 GB total memory running Windows Server 2016 Datacenter Edition; Microsoft SQL Server 2012, SAP enhancement package 5 for SAP ERP 6.0 PL216. Source: https://www.sap.com/dmc/benchmark/2021/Cert21006.pdf. Benchmark: SAP SD standard application benchmark, two-tier score: 122,300 benchmark users. Tested by HPE on 18 January 2021. Claim based on best-published 16-processor SAP SD two-tier on Windows Server 2019 Enterprise Edition result published at https://www.sap.com/dmc/exp/2018-benchmark-directory/#/sd, Certification # 2020029 as of 10 Nov 2020. New Configuration: two-tier, 16x Intel Xeon Platinum 8280L processors (448 cores/896 threads) on HPE Superdome Flex with 6144 GB total memory running Microsoft® Windows® Server 2019, Microsoft SQL Server 2019, and SAP enhancement package 5 for SAP ERP 6.0. Source: https://www.sap.com/dmc/benchmark/2020/Cert20029.pdf. Benchmark: SAP SD standard application benchmark, two-tier score: 152,508 benchmark users. Tested by HPE on 25 July 2020.   **Decision Support: TPC Benchmark H (TPC-H), non-clustered** Claim based on best-published four-socket TPC Benchmark* H V3 @ 30,000GB non-cluster results published at http://tpc.org/tpch/results/tpch_perf_results5.asp?resulttype=all as of 26 March 2021. Source: http://www.tpc.org/3354. Score: 1,446,701.4 QphH* @30,000GB, $744.13/kQphH @30,000GB available 26 March 2021. Tested by HPE on 10 February 2021. Claim based on best-published eight-socket TPC Benchmark* H V3 @ 100,000GB non-cluster results published at https://www.tpc.org/tpch/results/tpch_perf_results5.asp?resulttype=all&version=3 as of 30 April 2022. Source: http://www.tpc.org/3382. Score: 1,147,031 QphH* @100,000GB, $2,186.10/kQphH @100,000GB available 21 March 2022. Tested by HPE on 08 February 2022. Claim based on best-published two-socket TPC Benchmark* H V2 @ 3,000GB non-cluster results published at http://www.tpc.org/tpch/results/tpch_perf_results5.asp?resulttype=noncluster&version=2 as of 2 April 2019. Source: http://www.tpc.org/3336. Score: 1,244,450.6 QphH* @3,000GB, $0.38/kQphH @3,000GB available 2 April 2019. Tested by HPE on 1 April 2019. Claim based on best-published two-socket TPC Benchmark* H V3 @ 10,000GB non-cluster results published at http://tpc.org/tpch/results/tpch_perf_results5.asp?resulttype=all as of 18 June 2021. Source: http://www.tpc.org/3379. Score: 956,701 QphH* @10,000GB, $438.11/kQphH @10,000GB available 31 August 2021. Tested by HPE on 29 May 2021. **Server-side Java: SPECjbb2015** Claim based on best-published 4-processor SPECjbb2015-MultiJVM results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 25 Feb 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210210-00595.html, SPECjbb2015- MultiJVM scores: 359,630 max-jOPS and 310,694 critical-jOPS. Claim based on best-published 4-processor SPECjbb2015-Composite results published at

http://www.spec.org/jbb2015/results/jbb2015.html as of 25 Feb 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210210-00594.html, SPECjbb2015-Composite scores: 303,534 max-jOPS and 141,014 critical-jOPS. Claim based on best-published 4-processor SPECjbb2015-Composite results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 25 Feb 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210210-00593.html, SPECjbb2015-Composite scores: 278,827 max-jOPS and 259,596 critical-jOPS. Claim based on best-published 4-processor SPECjbb2015-Distributed results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 25 Feb 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210210-00596.html, SPECjbb2015-Distributed scores: 411,801 max-jOPS and 206,667 critical-jOPS. Claim based on best-published 4-processor SPECjbb2015-Distributed results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 25 Feb 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210210-00597.html, SPECjbb2015-Distributed scores: 363,716 max-jOPS and 318,084 critical-jOPS. Claim based on best-published 8-processor SPECjbb2015-MultiJVM results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 25 Feb 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210210-00598.html, SPECjbb2015-MultiJVM scores: 795,203 max-jOPS and 411,180 critical-jOPS. Claim based on best-published 8-processor SPECjbb2015-MultiJVM results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 25 Feb 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210210-00599.html, SPECjbb2015-MultiJVM scores: 662,046 max-jOPS and 549,657 critical-jOPS. Claim based on best-published 8-processor SPECjbb-2015-Distributed results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 25 Feb 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210210-00600.html, SPECjbb2015-Distributed scores: 804,669 max-jOPS and 418,976 critical-jOPS.   Claim based on best-published 8-processor SPECjbb2015-Distributed results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 25 Feb 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210210-00601.html, SPECjbb2015-Distributed scores: 662,046 max_jOPS and 579,234 critical_jOPS. Claim based on Intel Xeon processor best-published HPE leadership performance of 1-processor SPECjbb2015-MultiJVM results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 2 Apr 2019. Source: http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00359.html, SPECjbb2015-MultiJVM scores: 84,835 max-jOPS and 23,895 critical-jOPS. Claim based on Intel Xeon processor best-published HPE performance of 1-processor SPECjbb2015-MultiJVM results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 2 Apr 2019. Source: http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00358.html, SPECjbb2015-MultiJVM scores: 81,734 max-jOPS and 49,374 critical-jOPS. Claim based on Intel Xeon processor best-published HPE performance of 2-processor SPECjbb2015-Distributed max-jOPS tie results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 2 Apr 2019. Source: http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00354.html, SPECjbb2015-Distributed scores: 194,068 max-jOPS and 69,521 critical-jOPS. Claim based on Intel Xeon processor best-published HPE performance of 1-processor SPECjbb2015-MultiJVM results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 2 Apr 2019. Source: http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00372.html, SPECjbb2015-MultiJVM scores: 93,484 max-jOPS and 25,413 critical-jOPS. Claim based on Intel Xeon processor best-published HPE performance of 2-processor SPECjbb015-MultiJVM results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 2 Apr 2019. Source: http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00374.html, SPECjbb2015-MultiJVM scores: 194,068 max-jOPS and 53,616 critical-jOPS. **Compute-Intensive General Purpose: SPEC CPU2017** Claim based on best-published 8-processor SPECspeed2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 10 Nov 2020. Source: https://spec.org/cpu2017/results/res2020q4/cpu2017-20201012-24160.html, SPECspeed2017_int_base score: 12.3. Claim based on best-published 8-processor SPECspeed2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 10 Nov 2020. Source: https://spec.org/cpu2017/results/res2020q4/cpu2017-20201012-24153.html, SPECspeed2017_fp_base score: 279. Claim based on best-Intel-published 8-processor SPECrate2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 25 Feb 2021. Source: https://www.spec.org/cpu2017/results/res2021q1/cpu2017-20210118-24814.html, SPECrate2017_int_base score: 1,570. Claim based on best-published 8-processor SPECrate2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 25 Feb 2021. Source: https://www.spec.org/cpu2017/results/res2021q1/cpu2017-20210118-24816.html, SPECrate2017_fp_base score: 1,290. **Compute-Intensive Technical Computing: SPEC OMP2012** Claim based on best-published 8-processor SPEC ompG2012_base2012 results published at https://spec.org/omp2012/results/ompg2012.html as of 18 June 2021. Source: https://www.spec.org/omp2012/results/res2021q2/omp2012-20210406-00199.pdf, SPECompG_base2012 score: 79.2.

Infrastructure/Virtualization: VMware VMmark 3.1 Claim based on being the #1 6-node VMmark 3.1.x result and #1 6-node composable infrastructure VMmark 3.1.x result as of June 7, 2019 with a score of 16.91 @ 18 tiles. All benchmark results published at https://www.vmware.com/products/vmmark/results3x.html. Claim based on best-published 2-node 4-processor, 224 total core VMmark 3.x uniform host results, published at http://www.vmware.com/products/vmmark/results3x.html as of 30 April 2022. Source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2021-11-30-HPE-Superdome-Flex280.pdf, VMmark V3.1.1 Performance Only score of 20.03 @ 20 tiles. Claim based on best-published 4-node 2-processor, 320 total core VMmark 3.x uniform host results, published at http://www.vmware.com/products/vmmark/results3x.html as of 18 June 2021. Source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2021-06-08-HPE-ProLiant-DL380Gen10Plus.pdf, VMmark V3.1.1 Performance Only score of 24.26 @ 26 tiles. Claim based on best-published 3-node 2-processor, 240 total core VMmark 3.x uniform host results, published at http://www.vmware.com/products/vmmark/results3x.html as of 18 June 2021. Source: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/vmmark/2021-06-15-HPE-ProLiant-DL380Gen10Plus.pdf, VMmark

V3.1.1 Performance Only score of 18.31 @ 20 tiles. **Energy Efficiency: SPECpower_ssj2008** Claim based on best-published and first 4-processor (5U) SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 10 Nov 2020. Source: https://www.spec.org/power_ssj2008/results/res2020q4/power_ssj2008-20201020-01050.html. HPE score: 7,550 overall ssj_ops/watt. Claim based on best-published 4-processor (5U) Linux SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 10 Nov 2020. Source: https://www.spec.org/power_ssj2008/results/res2020q4/power_ssj2008-20201020-01052.html. HPE score: 7446 overall ssj_ops/watt. Claim based on best-published and first 8-processor (10U) SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 10 Nov 2020. Source: https://www.spec.org/power_ssj2008/results/res2020q4/power_ssj2008-20201020-01051.html. HPE score: 7,628 overall ssj_ops/watt. Claim based on best-published 8-processor (10U) Linux SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 10 Nov 2020. Source: https://www.spec.org/power_ssj2008/results/res2020q4/power_ssj2008-20201020-01053.html. HPE core: 7,369 overall ssj_ops/watt. Claim based on best-published 4-processor (blade) Windows SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 02 Apr 2019. Source: https://www.spec.org/power_ssj2008/results/res2019q2/power_ssj2008-20190311-00885.html. HPE score: 12,042 overall ssj_ops/watt. Claim based on best-published 4-processor (blade) Linux SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 02 Apr 2019. Source: https://www.spec.org/power_ssj2008/results/res2019q2/power_ssj2008-20190311-00891.html. HPE score: 11,179 overall ssj_ops/watt.

Disclaimers Performance varies by use, configuration and other factors. For more information go to www.Intel.com/PerformanceIndex. Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure. Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy. SPEC* and the benchmark names SPEC CPU*, SPECint*, SPECfp*, SPECrate*, SPECjbb*, SPECjEnterprise*, SPECstorage*, SPECvirt_sc*, SPECpower_ssj*, SPECompG*, and SPECmpi* are registered trademarks of the Standard Performance Evaluation Corporation. TPC, TPC Benchmark, TPC-C, TPC-E, TPC-H, TPC-DS and TPC-VMS are trademarks of the Transaction Processing Performance Council. VMmark® is a product of VMware, Inc.
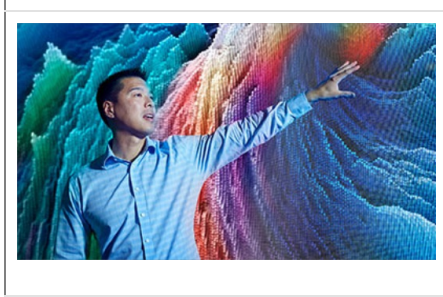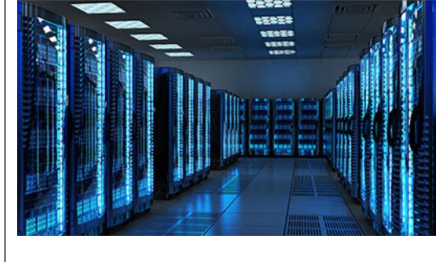
Inspur

Inspur Leadership Performance Inspur is the 3rd largest server provider in the world and No.1 in China[1]. It dominated the ERP market for 16 consecutive years, and e-government cloud service market for five years in a row. Inspur is one of the eight national secure and reliable computer information system integration key enterprises, and independently developed China's first mission critical server - K1, making Inspur the fifth company and China, after the United States and Japan, the third country that masters core technologies of high-end servers. K1 also won the National Science and Technology Progress Award in 2014. Visit https://www.inspur.com/ to learn more. [1] Source: Inspur Information Launches M6 Server Family Based on 3rd Gen Intel Xeon Scalable Processors, Business Wire, 2021

Inspur NF5280M6 Inspur NF5280M6 is a 2U dual-socket high-end flagship rackmount server, featured with robust computing performance and ultimate compatibility and scalability. Meeting the configuration requirements of various industries, it is suitable for data analysis and processing, distributed storage in deep learning training, etc. Inspur NF8260M6 Inspur NF8260M6 is a 2U 4-socket rackmount server built on the 3rd generation of the Intel® Xeon® Scalable processor. In a compact 2U space, NF8260M6 delivers uncompromising density, reliability and intelligence to satisfy the higher-density deployment needs of the customer. NF8260M6 is an ideal solution for customers to reduce the TCO of the cloud computing data center by saving data center resources, improving energy efficiency, and reducing the deployment cost. NF8260M6 is designed for HPC, cloud applications, distributed infrastructures, hyper-converged infrastructures of large and medium-sized enterprises and Internet enterprises. Inspur NF8480M6 Inspur NF8480M6 is a high-end 4-socket rackmount server built on the 3rd generation of the Intel® Xeon® Scalable processor. With extraordinary computing performance, flexible modular design, excellent scalability, optimized reliability and stability, Inspur NF8480M6 is the ideal solution for data-intensive and critical applications. It is designed for large transaction databases, memory databases, virtualization integration, HPC, deep learning, ERP, etc.

Overview of Performance Leadership

- Inspur achieves two performance and energy-efficiency benchmark world records.

- Inspur NF8480M6, featuring the latest 3rd Gen Intel® Xeon® Scalable processors achieves **one world record** in SPECjbb® 2015 MultiJVM benchmark.

- Inspur NF8480M6, Inspur NF8260M6, and Inspur NF5280M6, featuring the latest 3rd Gen Intel Xeon Scalable processors achieves Intel Xeon processor-based leadership across a variety of benchmarks including SPECjbb® 2015 and SPEC CPU® 2017.

- Inspur Yingxin NF8480M5 featuring 4-socket 2nd Gen Intel Xeon Scalable processors achieves **one world record** in SPECpower_ssj® 2008 for single node 4U form factor.

- Inspur has two Top500 results - Tsinghua University, with 900 Inspur-built servers using 2nd Gen Intel Xeon Gold 6258R processors, and Shanghai Jiao Tong University, which uses 658 Inspur-built servers using 2nd Gen Intel Xeon Gold 6248 processors, Intel SSD DC Series for NVMe storage, with Intel® Omni-Path Architecture (Cornelis Networks) for communications.

Industry Performance Leadership

	Artificial Intelligence As leading AI solution provider, Inspur has the industry's most comprehensive AI portfolio. We strive to push forward the frontier of AI computing, accelerating the development of AI industry with customers across the globe. Learn more
	Enterprise and Government Inspur has two Top500 results used for academic research. Tsinghua University, with 900 Inspur-built servers using 2nd Gen Intel Xeon Gold 6258R processors, and Shanghai Jiao Tong University, which uses 658 Inspur-built servers using 2nd Gen Intel Xeon Gold 6248 processors, with Intel® Omni-Path Architecture for communications. Learn more about the Shanghai Jiao Tong University cluster.
	Cloud Inspur InCloud Platform is based on the concepts of openness, convergence, security, and intelligent implementation. The platform integrates cloud computing, big data infrastructure, and capabilities through an integrated and flexible IaaS + PaaS delivery model. It helps customers to rapidly build smart, highly efficient, user-friendly, and stable digital infrastructures for increasingly complex business environments. Learn more
	Computing Intensive Design Converged architecture delivers higher stability and energy efficiency, suitable for hyper-scale data centers Learn more

Overall Performance Leadership

Segment / Benchmark	Platform	Importance
Compute-Intensive General Purpose: SPEC CPU2017 Integer Rate	Inspur NF8480M6	Leadership Intel Xeon performance on Inspur platform: • #1 4-socket Intel Xeon SPECrate2017_int_base result as of 18 June 2021
	Inspur NF5280M6	Leadership Intel Xeon performance on Inspur platform: • 2-socket Intel Xeon SPECrate2017_int_base result as of 18 June 2021
Server-side Java*: SPECjbb*2015	Inspur NF8480M6	4-processor world record: • #1 SPECjbb2015-MultiJVM max-jOPS as of 18 June 2021
	Inspur NF8260M6	Leadership Intel Xeon performance on Inspur platform: • #1 2-socket Intel Xeon on Linux SPECjbb2015-MultiJVM max-jOPs result as of 18 June 2021
Energy Efficiency: SPECpower*_ssj2008	Yingxin NF8480M5	4-processor 4U world record: • #1 energy-efficient single-node 4U server on Windows as of 18 June 2021

Results and Configuration Details as of 18 June 2021 or as noted (URLs last accessed 18 June 2021)

General Computing: SPEC CPU2017 Claim based on best-Intel-published 4-processor SPECrate2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://spec.org/cpu2017/results/res2021q1/cpu2017-20210128-24857.html, SPECrate2017_int_base score: 814. Claim based on best-Intel-published 2-processor SPECrate2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: http://spec.org/cpu2017/results/res2021q2/cpu2017-20210510-26021.html, SPECrate2017_int_base score: 565. **Server-Side Java: SPECjbb2015** Claim based on best-Intel-published 2-socket SPECjbb*2015 MultiJVM results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 18 June 2021. Source: https://spec.org/jbb2015/results/res2021q2/jbb2015-20210519-00650.html, SPECjbb2015-MultiJVM scores: 286125 max-jOPS and 143969 critical-jOPS. Claim based on best-published 4-processor SPECjbb2015-MultiJVM results published at http://www.spec.org/jbb2015/results/jbb2015.html as of 18 June 2021. Source: https://spec.org/jbb2015/results/res2021q1/jbb2015-20210127-00590.html, SPECjbb2015-MultiJVM scores: 421268 max-jOPS and 208197 critical-jOPS. **Energy Efficiency: SPECpower_ssj2008** Claim based on best-published 4-processor (4U) SPECpower_ssj 2008 results, published at http://www.spec.org/power_ssj2008/results/ as of 18 June 2021. Source: https://spec.org/power_ssj2008/results/res2021q1/power_ssj2008-20210113-01061.html.

Disclaimers Performance varies by use, configuration and other factors. For more information go to www.intel.com/benchmarks . Intel optimizations, for Intel compilers or other products, may not optimize to the same degree for non-Intel products. SPEC* and the benchmark names SPEC CPU*, SPECint*, SPECfp*, SPECrate*, SPECjbb*, SPECjEnterprise*, SPECstorage*, SPECvirt_sc*, SPECpower_ssj*, SPECompG*, and SPECmpi* are registered trademarks of the Standard Performance Evaluation Corporation. VMmark® is a product of VMware, Inc.

Lenovo

	Lenovo Leadership Performance Through ongoing innovation, Lenovo is a leading data center provider, transforming businesses with solutions that deliver performance, reliability, flexibility, and security to address customers' ever-increasing infrastructure needs and solve humanity's greatest challenges. Enterprise customers of all sizes can get fast, efficient insights at everyscale by adopting HPC Innovation and exascale technology from Lenovo and Intel. The performance of servers is paramount for our customers, and as a result, Lenovo strives to design its systems to maximize it. We produce systems that cater across all workloads that our customers require, achieving #1 benchmarks across a broad range of application types. Visit Lenovo to learn more.

Lenovo ThinkSystem Servers Lenovo designs ThinkSystem servers to deliver the capabilities you need to exceed today's needs while preparing you for the next wave of innovation: Cloud, Software-Defined Environments, Artificial Intelligence, and Analytics & Decision Support. These servers incorporate Intel® Xeon® Scalable Family processors to enable critical business workloads and applications and are offered in rack, blade, edge, and high-density configurations. Intel Xeon Scalable processors' design provides a significant improvement in performance, advanced reliability, scalability, and hardware-enhanced security. Enhancements include higher per-core performance, greater memory bandwidth, expanded I/O, and improved security. The **Lenovo ThinkSystem SR860 V2** is the latest 4-socket server that offers technology advances, including a third-generation Intel Xeon Scalable processor with support for Intel® Optane™ Persistent Memory 200 Series. This server 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. The powerful 4U **Lenovo ThinkSystem SR950** can grow from two to eight second-generation Intel Xeon Processor Scalable family CPUs. Lenovo designed this server for your most demanding, mission-critical workloads, such as in-memory databases, large transactional databases, batch, real-time analytics, ERP, CRM, and virtualized server workloads. The high CPU dense **ThinkSystem SR850 V2** featuring up to four 3rd Generation Intel® Xeon® Scalable CPUs in just 2U of rack space provides efficient use of data center space. Additionally, numerous configuration options including the ability to expand internal storage capabilities, varied I/O connectivity options, and support for Intel® Optane™ Persistent Memory 200 Series suits a wide range of enterprise applications. The Lenovo **ThinkSystem SR650 V2** server is a 2U, two-socket multi-purpose server with the right balance of reliability, performance, and scalability optimized for data-intensive workload acceleration. Expand and optimize application performance with support for two 3rd generation Intel Xeon Scalable processors, Intel Optane persistent memory 200 series modules, up to 8 high-powered GPUs, and up to 32 NVMe drives. The **Lenovo ThinkSystem SR650** is the optimum 2U, two-socket server that supports up to two 2nd Gen Intel Xeon Processor Scalable family CPUs with Intel Optane persistent memory 100 Series, is the ideal platform for hyper-converged infrastructure (HCI) or software-defined storage (SDS). The **Lenovo ThinkSystem SR630 V2** is the versatile, highly reliable 1U, two-socket server that supports up to two 3rd Gen Intel Xeon Processor Scalable family CPUs with Intel Optane persistent memory 200 Series, rack server designed to handle hybrid data center workloads, from IT infrastructure and HPC to cloud and hyperconverged. The **Lenovo ThinkSystem SN850** has four processors and incorporates the powerful second-generation Intel Xeon Processor Scalable family CPUs. This server offers a massively increased memory capacity and bandwidth, more processor cores, faster and larger storage capacity, plus enhanced RAS and security features. Further, it provides support for Intel Optane DC persistent memory 100 Series. This server is powerful enough for even your most demanding memory-intensive workloads. The **Lenovo ThinkSystem SN550** is a two-processor blade server with second-generation Intel Xeon Processor Scalable family CPUs. This server is powerful enough for most key data center workloads, such as cloud, server virtualization, departmental databases, and virtual desktop infrastructure (VDI), consolidating older servers onto a single blade, and offering support for Intel Optane DC Persistent Memory. Built for standard workloads like general business applications and server consolidation is the **Lenovo ThinkSystem SR850** . This server can scale from two to four powerful second-generation Intel Xeon Processor Scalable family CPUs and can also accommodate high-growth areas such as databases and virtualization. The **Lenovo ThinkSystem SD530** is a single platform designed to excel not only at critical enterprise workload environments (such as virtualization, hyper-converged infrastructure, and cloud) but also at High Performance Computing (HPC) and Artificial Intelligence (AI). Combining the efficiency and density of blades with the value and simplicity of rack-based servers, SD530 could very well be the most adaptable server on Earth. It consists of a modular 2U Lenovo D2 Enclosure containing up to four front-access SD530 servers (nodes). Each node incorporates two second-generation Intel Xeon Processor Scalable family CPUs.

Overview of Performance Leadership

- Lenovo ThinkSystem servers continue to dominate the benchmarks for data center performance with 60+ current world record benchmark results based on 2nd and 3rd Gen Intel Xeon Scalable processors spanning a wide range of industry benchmarks.

- ThinkSystem SR950 sets 31 World Records on SAP SD 2T, SAP HANA (BWoH), STAC-M3, SPEC CPU*2017, SPECjbb2015, SPEC POWER, SPEC VIRT_SC 2013, SPEC OMP 2012 and SPECmpiM 2007 benchmarks.

- ThinkSystem SR860 V2 sets 24 World Records with SAP HANA (BWoH), TPC-E Performance, TPC-E Price/Performance, SPEC OMP 2012, SPEC CPU2017, ACCEL, SPECmpiM, and SPECompG Benchmarks.*
- ThinkSystem SR650 V2 set 2 World Records with STAC-M3 and SAP HANA (BWoH).
- ThinkSystem SR650 sets 3 World Records with STAC-M3, TPC*-E (Performance), TPC-x BB and SPEC VIRT_SC 2013 (Performance-per-watt).*
- Eleven supercomputing cluster systems recognized in the November 2020 Top500 powered by 2nd Gen Intel Xeon Scalable processors, Lenovo is the Number-one Supercomputer provider in the world according to Top500.org, and is trusted by 17 of the world's top 25 research universities to provide scalable, high-performance solutions.
- Lenovo holds World Records (10.4B initial records) with SAP BW Edition for SAP HANA and outstanding on 4-socket configuration of ThinkSystem SR950 platforms for SAP SD Two-Tier Benchmarks. The SR860 V2 also holds a World Record (1.3B records) with SAP BW Edition for SAP HANA.
- At Lenovo, we take a customer-centric approach, which is why ThinkSystem servers consistently rank #1 in reliability.
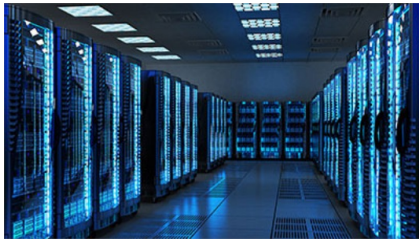
Industry Performance Leadership

	Analytics & Artificial Intelligence Make more informed business decisions, delight customers, and outpace competitors with industry-leading analytics that bring critical insights into focus. We design and deliver solutions that are pre-configured and ready to deploy. And with modular high-performance computing (HPC) solutions, we'll make sure compute is the least of your concerns. Learn More
	Big Data & Analytics: To gain better business insights, you need to take control of the growing volume, variety, and velocity of data. Lenovo-engineered big data validated designs on Lenovo servers provide highly reliable and flexible foundations for your business analytics solutions so you can unlock the value of your data and deliver insights faster. The Lenovo advantage for all of these technologies is crystal clear. We provide outstanding scalability, so you can grow as your workloads grow. Our solutions enable industry-leading transaction processing, so you can make better, faster business decisions. High throughput capacity enables you to respond more quickly, helping you to make informed business decisions, delight customers, and stay competitive. It's all included with our optimized systems and validated designs - an offering proven to deliver faster time to value. Learn more
	Business Applications: Leverage industry-leading business applications on fast, reliable Lenovo infrastructure to gain efficiencies, enable innovation, and drive profitable growth. Lenovo solutions for your mission critical SAP Business Suite and SAP S/4HANA® allow you to run core business processes efficiently and effectively. Lenovo solutions for SAP Business One enable smaller businesses and subsidiaries streamline end-to-end processes to accelerate profitable growth. Learn more

	Client Virtualization & Infrastructure: Since migrating its VDI environment from a traditional infrastructure, financial services firm Leonteq has seen performance rise and costs fall with our ThinkAgile hyperconverged solution. Fully tested across applications, software, hardware, and services, our solutions help streamline IT administration and simplify implementation. Learn more
	Cloud Computing Learn how T-Systems is providing their customers the Cloud infrastructure of the future-today. Also see how Miami Jewish Health that improved patient care with a hyperconverged infrastructure built for just them. Our solutions are open, proven, and ready to deploy. Learn more
	Database Solutions Harness rapid technology growth to collect rising amounts of data, extract insights and support high rate online transactions. Lenovo database solutions are optimized for Microsoft, SAP, Oracle and IBM applications. Learn more
	Dev Ops Address rapid growth and customer demand for your digital assets by empowering your organization to more efficiently produce and deliver code and applications. Establish a complete engineering operational process to deliver IT governance, security and infrastructure automation. Learn more
	Edge Computing The Data-Centered break barriers with Lenovo edge computing, powered by Intel®. The world is more connected than ever, and most data is now being generated outside of the data center. Lenovo is here to help you speed things up by defining your IoT strategy and bringing compute capabilities wherever you need them. We also bring AI to the edge for faster processing with purpose-built solutions that use high-performance GPUs and your choice of integrated storage and data management. Learn more

High Performance Computing We're using supercomputers everywhere - from car and airplane design, oil field exploration, financial risk assessment, genome mapping to weather forecasting and essential research. Lenovo is the world leader[1] in building supercomputers for use in some of the most demanding settings. This includes one of the world's highest performance supercomputers in the Munich-based Leibniz Supercomputer Centre - a research-focused HPC system architected around Lenovo's ThinkSystem SD650 servers with Lenovo Neptune™ liquid cooling - harnessing 13000 CPUs, 311,000 cores, 700 TB of memory, 70 PB of disk storage and containing over 60km of cabling - and delivers over 26.7 petaFLOPS of processing capacity.[1] Source: TOP500 statistics, November 2020

Overall Performance Leadership as of 18 June 2021 or as noted

Segment/Benchmark	Platform	Importance
Big Data Analytics: SAP* BW Edition on SAP HANA* V3	Lenovo ThinkSystem SR860 V2	4-socket overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 1.3 billion initial records as of 21 Feb 2021
	Lenovo ThinkSystem SR950	4-socket overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 10.4 billion initial records as of 21 Feb 2021 4-socket #2 (Query Executions Per Hour) 1.3 billion initial records as of 21 Feb 2021
	Lenovo ThinkSystem SR650 V2	2-socket overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 1.3 billion initial records as of 18 June 2021
	Lenovo ThinkAgile HX7821	4-socket overall world record (Total Runtime of Data Load/Transformation, Query Executions Per Hour, Total Runtime of Complex Query Phase) 24.7 billion initial records as of 21 Feb 2021
Big Data Analytics: STAC-M3	Lenovo ThinkSystem SR860 V2	4-socket world record on the Kanaga Suite (8/10 benchmarks) with 2 year data set also on Antuco Suite (14/17 benchmarks)

	Lenovo ThinkSystem SR950	4-socket world record on the Kanaga Suite with 2 year data set also on Antuco Suite (4/15 benchmarks). 2-socket world record Antuco Suite (1/17 benchmarks)
	Lenovo ThinkSystem SR650 V2	2-socket world record Antuco Suite (14/17 benchmarks)
Big Data Analytics & Enterprise Transaction Processing: TPC Benchmark* E (TPC-E)	Lenovo ThinkSystem SR860 V2	Two 4-socket world records (Performance and Price/tpsE)
	Lenovo ThinkSystem SR650	2-socket world record (Performance)
Big Data Analytics: TPCx-BB Express Benchmark BB	Lenovo ThinkSystem SR650	2-socket world record, BBQpm@SF30000 (36+3 nodes)
Enterprise Resource Management: SAP Sales and Distribution (SAP SD 2T)	Lenovo ThinkSystem SR950	4-socket world record (benchmark users)
General Computing: SPEC CPU2017*	Lenovo ThinkSystem SR860 V2	Six 4-socket world records (SPECspeed2017_int_base (tie), SPECspeed2017_int_base_energy, SPECspeed2017_fp_base, SPECspeed2017_fp_base_energy, SPECrate2017_int_base_energy, SPECrate2017_fp_base_energy)
	Lenovo ThinkSystem SR850 V2	Two 4-socket world records (tie) (SPECspeed2017_int_base)
	Lenovo ThinkSystem SR950	6-socket world record (SPECspeed2017_int_base) Four 3-socket world records (SPECspeed2017_int_base, SPECspeed2017_fp_base, SPECrate2017_int_base, SPECrate2017_fp_base)
Infrastructure/Virtualization: SPECvirt_sc*2013, SPECvirt_ sc*2013_PPW, SPECvirt_sc*2013_ ServerPPW	Lenovo ThinkSystem SR950	Two world records (Performance) 8-Socket and 4-Socket Two world records (Performance-per-watt) 8-Socket and 4-Socket Two world records (Server Performance-per-watt) 8-Socket and 4-Socket
Energy Efficiency: SPECpower*_ ssj2008	Lenovo ThinkSystem SR860 V2	4-socket energy-efficient world record (4U 1-node on Linux)
	Lenovo ThinkSystem SR950	8-socket energy-efficient world record (4U 1-node on Linux)

	Lenovo ThinkSystem SR850	4-socket energy-efficient world record (2U 1-node on Linux)
	Lenovo ThinkSystem SN850	4-socket energy-efficient world record (10U 7-node on Linux)
	Lenovo ThinkSystem SD530	2-socket energy-efficient world record (2U 4-node on Linux)
Server-Side Java*: SPECjbb*2015	Lenovo ThinkSystem SR860 V2	Four 4-socket world record on Windows (SPECjbb2015-MultiJVM Max-jOPS, MultiJVM Critical-jOPS, Distributed Max-jOPS, Distributed Critical-jOPS)
	Lenovo ThinkSystem SR950	Four 3-socket world records on Linux (SPECjbb2015-Distributed critical-jOPS, MultiJVM Max-jOPS, MultiJVM Critical-jOPS, Composite Max-jOPS) Two 6-socket world records on Linux (SPECjbb2015-MultiJVM Max-jOPS, MultiJVM Critical-jOPS) Two 6-socket world records on Windows (SPECjbb2015-MultiJVM Max-jOPS, MultiJVM Critical-jOPS) Two 8-socket world records on Windows (SPECjbb2015-MultiJVM Max-jOPS, Critical-jOPS)
Technical Computing: SPEC* ACCEL* OMP, SPEC* MPI 2007, SPEC* OMPG 2012	Lenovo ThinkSystem SR860 V2	4-socket SPEC ACCEL OMP world record (SPECaccel_omp_base) 4-socket SPEC OMPG2012 world record (SPECompG_base2012) Four 4-socket SPEC MPI 2007 world records (1-node, 2-node, 3-node, 4-node SPECmpiM_base2007) Four 4-socket SPEC MPI 2007 world records (1-node, 2-node, 3-node, 4-node SPECmpiL_base2007)
	Lenovo ThinkSystem SR950	3-socket SPEC OMPG2012 world record (SPECompG_base2012) 3-socket SPEC MPI 2007 world record (SPECmpiM_base2007) 6-socket SPEC MPI 2007 world record (SPECmpiM_base2007) 8-socket SPEC MPI 2007 world record (SPECmpiM_base2007)

Results and configurations as of 18 June 2021 or as noted (URLs last accessed 18 June 2021) **Big**

Data Analytics: SAP* BW Edition on SAP HANA* V3 SR950 4S 10.4B Records v3 - https://www.sap.com/dmc/benchmark/2019/Cert19014.pdf SR950 4S 1.3B Records v3 - https://www.sap.com/dmc/benchmark/2021/Cert21010.pdf SR860 V2 4S 1.3B Records v3 - https://www.sap.com/dmc/benchmark/2020/Cert20036.pdf SR650 V2 2S 1.3B Records v3 - https://www.sap.com/dmc/benchmark/2021/Cert21035.pdf ThinkAgile HX7821 4S 24.7B Records v3 - https://www.sap.com/dmc/benchmark/2020/Cert20026.pdf (Scale-out) **Big Data Analytics: STAC-M3** SR950 4S - https://www.stacresearch.com/KDB190322b (4 records) SR950 2S - https://stacresearch.com/KDB190322a (Antuco Suite 1 record) SR860 V2 4S - https://stacresearch.com/KDB201109 (Antuco 14 records, 2 yr Kanaga 8 records) SR650 V2 2S - https://www.stacresearch.com/KDB210317 (14 records) **Big Data Analytics & Enterprise Transaction Processing: TPC-E** SR860 V2 4S -- http://www.tpc.org/4087 (2 records - performance and price/performance world records) SR650 2S - http://www.tpc.org/4084 (1 record - performance world record) **Infrastructure/Virtualization: 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 **Infrastructure/Virtualization: SPECvirt_sc2013 Performance Per Watt** 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 **Infrastructure/Virtualization: SPECvirt_sc2013 Server Performance Per Watt** 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 **General Computing: SPEC CPU2017** SR950 6S SPEC_speed2017_int_base - http://spec.org/cpu2017/results/res2019q2/cpu2017-20190401-11612.html SR950 3S SPEC_speed2017_int_base - http://spec.org/cpu2017/results/res2019q2/cpu2017-20190401-11610.html SR950 3S SPEC_speed2017_fp_base - https://www.spec.org/cpu2017/results/res2019q2/cpu2017-20190319-11383.html SR950 3S SPEC_rate2017_int_base - https://www.spec.org/cpu2017/results/res2019q2/cpu2017-20190319-11385.html SR950 3S SPEC_rate2017_fp_base - https://www.spec.org/cpu2017/results/res2019q2/cpu2017-20190319-11381.html SR860 V2 4S SPECspeed2017_int_base - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24274.html SR860 V2 4S SPECspeed2017_int_base_energy - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24300.html SR860 V2 4S SPECspeed2017_fp_base - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24276.html SR860 V2 4S SPECspeed2017_fp_base_energy - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24299.html SR860 V2 4S SPECrate2017_int_base_energy - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24302.html SR860 V2 4S SPECrate2017_fp_base_energy - https://spec.org/cpu2017/results/res2020q4/cpu2017-20201026-24303.html SR850 V2 4S SPECspeed2017_int_base- https://spec.org/cpu2017/results/res2020q4/cpu2017-20201207-24526.html (Tie) SR850 V2 4S SPECspeed2017_int_base https://www.spec.org/cpu2017/results/res2021q1/cpu2017-20210104-24683.html (Tie) SR250 1S SPECspeed2017_int_base_energy - http://spec.org/cpu2017/results/res2020q1/cpu2017-20200217-20920.html SR250 1S SPECspeed2017_int_base - http://spec.org/cpu2017/results/res2020q2/cpu2017-20200608-22814.html ST250 1S SPECspeed2017_int_base - http://spec.org/cpu2017/results/res2020q3/cpu2017-20200622-23130.html **Energy Efficiency: SPECpower_ssj2008** 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/res2019q3/power_ssj2008-20190731-00999.html (Linux) SR860 V2 4S https://spec.org/power_ssj2008/results/res2020q4/power_ssj2008-20201201-01059.html (Linux) 4S4U 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/res2019q2/power_ssj2008-20190312-00928.html (Linux) **Big Data Analytics: 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) **Enterprise Resource Management: SAP Sales and Distribution (SAP SD 2T)** SR860 V2 - https://www.sap.com/dmc/benchmark/2020/Cert20050.pdf **Server-Side Java*: SPECjbb2015 (Linux)** SR950 3S Distributed Critical-jOPS - 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-jOPS - 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 6S MultiJVM Max-jOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00421.html SR950 6S MultiJVM Critical-jOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190314-00405.html **Server-Side Java*: SPECjbb2015 (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 SR950 6S MultiJVM Max-jOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00379.html SR950 6S MultiJVM Critical-jOPS - 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-jOPS - http://spec.org/jbb2015/results/res2019q2/jbb2015-20190313-00380.html **Technical Computing: SPEC ACCEL** SR860 V2 4S OpenMP - https://www.spec.org/accel/results/res2020q4/accel-20200917-00149.html (base) **Technical Computing: SPEC OMPG2012** SR950 3S - http://spec.org/omp2012/results/res2019q2/omp2012-20190312-00163.html SR860 V2 4S -

https://www.spec.org/omp2012/results/res2020q4/omp2012-20200917-00194.html   **Technical Computing: 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 SR860 V2 4S (Medium Metric 1-Node) -https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20200917-00662.html (base) SR860 V2 4S (Medium Metric 2-Node) - https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00670.html (base) SR860 V2 4S (Medium Metric 3-Node) - https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00665.html (base) SR860 V2 4S (Medium Metric 4-Node) - https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00669.html (base) SR860 V2 4S (Large Metric 1-Node) -- https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20200917-00657.html (base) SR860 V2 4S (Large Metric 2-Node) - https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00667.html (base) SR860 V2 4S (Large Metric 3-Node) - https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00668.html (base) SR860 V2 4S (Large Metric 4-Node) - https://www.spec.org/mpi2007/results/res2020q4/mpi2007-20201020-00671.html (base)

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QCT

QCT Performance Leadership QCT is Quanta Computer's cloud computing division and a global data center solution provider. We have been an enabler and a disruptor in the market, understanding how important it is to help businesses solve next generation data center design and operational challenges for 5G, AI, and Clouds. From fulfilling unique data center requirements to streamlining the digital transformation journey, QCT has proven its ability to provide end-to-end solutions to global data centers and clouds from a single node to an entire rack. Quanta has been recognized as one of the Clarivate Top 100 Global Innovators. Quanta and QCT's commitment to innovation has resulted in hundreds of patents filed in cloud computing since 2012. Quanta's patent success rate and global reach were identified as outstanding, marking the recognition in consecutive years since 2018. Quanta has also been named among Fortune Magazine's World's Most Admired Companies 2021[1] . Visit http://www.qct.io/ to learn more. [1] Source: https://fortune.com/company/quanta-computer/
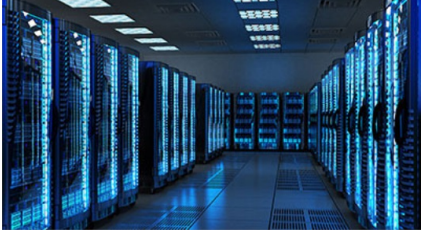
QCT drives innovations for a broad range of workloads with QCT 3rd Generation Server Systems powered by 3rd Gen Intel® Xeon® Scalable processors family. These systems fully support the new innovations that Intel pioneers for the most demanding workload requirements, and are optimized for AI, cloud, enterprise, HPC, IoT and network workloads.
QuantaGrid Series QCT offers a comprehensive line of high-performance, rack mount, single-node servers, ideal for granularity and capable of tackling a variety of modern data center workloads. From enterprises to cloud service providers, the QuantaGrid series delivers optimized performance and astonishing user experience with the most advanced industrial technologies and thoughtful engineering designs. **QuantaPlex Series** The QCT QuantaPlex series is a highly sophisticated, multi-node design that delivers extremely high density and computing performance. The shared infrastructure solution provides the flexibility to set up different workloads while maximizing space savings and augmenting cooling and energy efficiency to reduce TCO. **QuantaMicro Series** Dedicated to attaining the best space, energy, and cost efficiency, the high-density and low-power QuantaMicro is QCT's first complete micro-server line best suited for the growing number of hyperscaler workloads found inside modern data centers.

Overview of Performance Leadership

- QCT, a global data center solution provider - in collaboration with the National Center for High Performance Computing (NCHC) of the National Applied Research Laboratories (NARLabs) in Taiwan - announced that its **Taiwania 3 ranked No. 227 among the newly issued list of the world's TOP500** fastest supercomputers and **No. 80 on the Green500 list of the world's most efficient systems** with QuantaPlex T42D-2U/4N servers powered by 2nd Gen Intel Xeon Scalable processors, providing more immediate and convenient computing services to various industries, and also for academia and research communities.

- Built on that success, QCT 3rd Generation server systems are powered by 3rd Gen Intel Xeon Scalable processors to realize up to 50% performance improvement compared with previous generation server platforms, which allowed QCT to set new performance benchmarks on spec.org. Our dual-socket 2U Intel general purpose server ranks No. 1 Intel Xeon leadership on SPECjbb2015 MultiJVM Critical-jOPS and No.4 on SPECjbb2015 Max-jOPS as of July 2021.

Industry Performance Leadership

	HPC/DL QCT HPC/DL solution integrates with open source software to offer a best-in-class software stack that includes resource management for a fully end-to-end integrated HPC/DL solution. This solution also features a modularized architecture that can be easily tailored to meet customer demands, simplifying the implementation journey and accelerating time-to-market. Learn more
	Data Analytic Platform QCT Data Analytic Platforms offer breakthrough performance and efficiency to enable organizations to meet the most demanding business intelligence needs. These economical solutions provide enterprises with the unprecedented analytical power and storage capacity required to manage and analyze Big Data while maximizing operational economy. Learn more
	Software Defined Storage QCT offers high-performance and high-capacity virtualized storage environments to help enterprises effectively process an ever-increasing volume of data and manage the complex workloads of analytics. QCT offers scalable, software-defined storage platforms equipped to address file, object and block storage requirements across the board and power the most demanding cloud computing solutions in the industry. Learn more

Overall Performance Leadership

Segment / Benchmark	Platform	Importance

intel.

Compute-Intensive General Purpose: SPEC CPU*2017	QuantaGrid D53XQ-2U	Leadership Intel Xeon performance on dual-socket QCT platforms: • for integer and floating point throughput as of 31 Aug 2021 • for integer and floating point speed as of 31 Aug 2021
Server-side Java*: SPECjbb*2015	QuantaGrid D53XQ-2U	Leadership Intel Xeon performance on dual-socket QCT platforms: • for max-jOPS and critical-jOPS as of 31 Aug 2021
Energy Efficiency: SPECpower*_ssj2008	QuantaGrid D53XQ-2U	Leadership Intel Xeon performance on dual-socket QCT platforms: • for 2U energy efficiency as of 31 Aug 2021
Web Microservices: CloudXPRT	QuantaGrid D53XQ-2U	#1 leadership performance as of 31 Aug 2021
Data Analytics: CloudXPRT	QuantaGrid D53XQ-2U	#1 leadership performance as of 31 Aug 2021

Results and Configuration Details as of 31 August 2021 or as noted Compute-Intensive

General Purpose: SPEC CPU2017   Claim based on best Quanta published 2-socket SPECspeed*2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 31 Aug 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210608-27004.html . Claim based on best Quanta published 2-socket SPECspeed*2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 31 Aug 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210608-27001.html . Claim based on best Quanta published 2-socket SPECrate*2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 31 Aug 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210608-27003.html . Claim based on best Quanta published 2-socket SPECrate*2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 31 Aug 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210608-27002.html . **Server-side Java: SPECjbb*2015:** Claims based on best Quanta published 2-socket SPECjbb2015 MultiJVM results published at published at http://www.spec.org/jbb2015/results/jbb2015.html as of 31 Aug 2021. Sources: https://www.spec.org/jbb2015/results/res2021q3/jbb2015-20210610-00676.html SPECjbb2015- MultiJVM scores: 255,529 max-jOPS and 203,894 critical-jOPS, https://www.spec.org/jbb2015/results/res2021q3/jbb2015-20210610-00677.html SPECjbb2015- MultiJVM scores: 272,500 max-jOPS and 140,362 critical-jOPS. **Energy Efficiency: SPECpower*_ssj2008**   Claim based on best Quanta published 2-socket SPECPower results on Windows published at http://www.spec.org/power_ssj2008/results as of 31 Aug 2021. Source: https://www.spec.org/power_ssj2008/results/res2021q3/power_ssj2008-20210603-01107.html. Score: 12,217 overall ssj_ops/watt. **Web Microservices: CloudXPRT**   Claim based on best published 2-socket CloudXPRT Data Analytics results published at: https://www.principledtechnologies.com/benchmarkxprt/cloudxprt/2020/results as of 31 August 2021. Source: https://www.principledtechnologies.com/benchmarkxprt/cloudxprt/2020/details.php?id=90, Quanta score: 41.13 successful requests per second. **Data Analytics: CloudXPRT**   Claim based on best published 2-socket CloudXPRT Data Analytics results published at: https://www.principledtechnologies.com/benchmarkxprt/cloudxprt/2020/results as of 31 August 2021. Source: https://www.principledtechnologies.com/benchmarkxprt/cloudxprt/2020/details.php?id=91, Quanta score: 4.04 jobs per minute.

Disclaimers Performance varies by use, configuration and other factors. For more information go to www.Intel.com/PerformanceIndex.
Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.   Intel does not control or audit third-party data. You should consult

other sources to evaluate accuracy.   Intel contributes to the development of benchmarks by participating in, sponsoring, and/or contributing technical support to various benchmarking groups, including the BenchmarkXPRT Development Community administered by Principled Technologies.   SPEC* and the benchmark names SPEC CPU*, SPECint*, SPECfp*, SPECrate*, SPECjbb*, SPECjEnterprise*, SPECstorage*, SPECvirt_sc*, SPECpower_ssj*, SPECompG*, and SPECmpi* are registered trademarks of the Standard Performance Evaluation Corporation. TPC, TPC Benchmark, TPC-C, TPC-E, TPC-H, TPC-DS and TPC-VMS are trademarks of the Transaction Processing Performance Council. VMmark® is a product of VMware, Inc.

Supermicro

Supermicro Leadership Performance As a global leader in high performance, high efficiency server technology and innovation, we develop and provide end-to-end green computing solutions to the data center, cloud computing, enterprise IT, big data, HPC, and embedded markets. Visit Supermicro to learn more.

Over 100 Server Platforms Optimized for 3rd Gen Intel Xeon Scalable processors. The industry's broadest portfolio of performance optimized servers to match your specific workloads. See more at www.supermicro.com/x12 **Supermicro X12 BigTwin**" - These systems provide superior performance and serviceability with dual 3rd Gen Intel Xeon Scalable processors per node and hot swappable toolless design. **Supermicro SuperBlade®** - A shared cooling, power and networking infrastructure is key to the high density and server efficiency offered by blade solutions. **Supermicro Ultra / Ultra-E** - Supermicro X12 Ultra system are designed to deliver the highest performance, flexibility, scalability and serviceability to demanding IT environments, and to power mission-critical Enterprise workloads, including support for 3rd Gen Intel Xeon Scalable processors. **Supermicro FatTwin®** - The FatTwin architecture provides flexibility and system accessibility for unique data center requirements. **Supermicro TwinPro®** - TwinPro systems are designed for simplified deployment and maintenance, and are assembled with the highest quality to ensure continuous operation even at maximum capacity. **Supermicro CloudDC** - Featuring flexible I/O and storage with 2 or 4 PCI-E 4.0 x16 slots and dual AIOM (OCP 3.0 compliant) slots for maximum data throughput, X12 CloudDC is designed for easy serviceability. **Supermicro WIO** - Supermicro WIO systems offer a wide range of I/O options to deliver truly optimized systems for specific requirements. **Supermicro GPU Servers** - Supermicro offers a comprehensive range of GPU servers featuring NVMe for lower latency with higher throughput and 3rd Gen Intel® Xeon® Scalable processors. **Supermicro Hyper / Hyper-E** - The Hyper series represents the latest generation of Supermicro rackmount servers built with the highest performance features to take on the most demanding workloads along with the storage & I/O flexibility. **Supermicro Mainstream** - The X12 Mainstream Application Optimized product family from Supermicro is a series of servers designed for entry level or volume selections. **Supermicro MP 4-Way Server** - This 2U server delivers new levels of compute performance and flexibility with support for 3rd Gen Intel® Xeon® Scalable processors. **X12 4-socket 2U Server Platform** - Highest single node compute performance with up to 224 cores, 6 UPI links per socket, and 36TB of memory with Intel® Optane™ PMem Series 200. Learn more.

Overview of Performance Leadership

- SPECspeed2017_int_base 2-socket #1 Intel Xeon leadership among top 5 server vendors per IDC with 3rd Gen Intel Xeon Scalable processors on SuperServer SYS-420GP-TNR.
- SPECspeed2017_fp_base 2-socket #1 Intel Xeon leadership among top 5 server vendors per IDC with 3rd Gen Intel Xeon Scalable processors on SuperServer SYS-420GP-TNR.
- SPECrate2017_int_base 2-socket #1 Intel Xeon leadership among top 5 server vendors per IDC with 3rd Gen Intel Xeon Scalable

processors on SuperServer SYS-420GP-TNR.

- SPECrate2017_fp_base 2-socket #1 Intel Xeon leadership among top 5 server vendor per IDC with 3rd Gen Intel Xeon Scalable processors on SuperServer SYS-420GP-TNR.

- Supermicro receives SAP HANA certification for SYS-240P-TNRT with 3rd Gen Intel Xeon Scalable processors and Intel® Optane™ persistent memory Series 200.

- SPECspeed2017_int_base world record on 4-socket SuperServer SYS-240P-TNRT (X12QCH+) achieved with 3rd Gen Intel Xeon Platinum 8376H Scalable processors.

- Five SPECstorage Solutions 2020 world records on 2-socket SuperServer SYS-220-220U-TNR with 22 NVMe Storage Node with 3rd Gen Intel Xeon Platinum Scalable processors.

- Supermicro supercomputing cluster system ranks 79th in the November 2020 Top500 powered by more than 1500 nodes outfitted with 2nd Gen Intel Xeon Platinum 8276L Scalable processors.

Industry Performance Leadership

	Enterprise and Big Data Supermicro's SuperServer SYS-240P-TNRT received SAP HANA TDI certification for 3rd Gen Intel Xeon Scalable processors and Intel Optane PMem Series 200. Learn more
	Health and Life Sciences Supermicro scalable Liquid-Cooled supercomputing cluster deployed at Lawrence Livermore National Laboratory for COVID-19 research. Supermicro's TwinPro 2U 4-node servers leverage advanced 2nd Gen Intel Xeon Scalable Platinum processors with built-in AI acceleration and interconnected using Intel® Omni-Path Fabric for this "Ruby" cluster. Learn more
	Cloud Services Fortune 100 technology company uses Supermicro Servers to handle trillions of events and messages, without any data loss. Modular design of Supermicro's FatTwin Servers, featuring Intel Xeon Scalable processors, allows company to rapidly scale to support growing business needs. Learn more

Overall Performance Leadership

Segment / Benchmark	Platform	Importance

Compute-Intensive: General Purpose and Technical SPEC CPU* 2017	SuperServer SYS-420GP-TNR (X12DPG-OA6)	Leadership among Top 5 Server Vendors per IDC on 2-socket 3rd Gen Intel Xeon Scalable Processors - SPECspeed2017*_fp_base - SPECspeed2017_int_base - SPECrate2017_fp_base - SPECrate2017_int_base
	SuperServer 240P-TNRT (Motherboard: X12QCH+)	4-socket world record (tie) in SPECspeed2017_int_base as of 18 June 2021 Leadership Intel Xeon performance on Supermicro platforms as of 18 June 2021: 4-socket 3rd Gen Intel Xeon processor - SPECspeed2017*_fp_base - SPECrate2017_int_base - SPECrate2017_fp_base
	SuperServer 6029U-TR4 (Motherboard: X11DPU)	Leadership Intel Xeon performance on Supermicro platforms as of 18 June 2021: 2-socket 2nd Gen Intel Xeon processor - SPECrate2017*_fp_base - SPECrate2017*_int_base
	SuperServer 4029GP-TRT (Motherboard: X11DPG-OT)	Leadership Intel Xeon performance on Supermicro platforms as of 18 June 2021: - SPECspeed2017*_fp_base
	SuperStorage 6029P-E1CR24H (Motherboard: X11DSC+)	Leadership Intel Xeon performance on Supermicro platform as of 18 June 2021: 2-socket 2nd Gen Intel Xeon processor - SPECspeed2017*_int_base
Enterprise and Database: Storage Processing	SuperServer SYS-220U-TNR	2-socket world records in SPECstorage™ Solution 2020 as of 18 Jun 2021: - SPECstorage Solution 2020_eda_blended - SPECstorage Solution 2020_ai_image - SPECstorage Solution 2020_genomics - SPECstorage Solution 2020_swbuild - SPECstorage Solution 2020_vda result

Energy Efficiency: SPECpower*_ ssj2008	SuperServer 6029P-WTR (Motherboard: X11DDW-L)	Leadership Intel Xeon performance on Supermicro platform as of 18 June 2021: 2-socket 2nd Gen Intel Xeon processor 2U server

Results and configurations as of 18 June 2021 or as noted Compute-Intensive General

Purpose: SPEC CPU2017 Claim based on best-published 2S 3rd Gen Intel Xeon Supermicro performance SPECspeed*2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210525-26844.html achieved 09 Jun, 2021. Claim based on best-published 2S 3rd Gen Intel Xeon Supermicro performance SPECspeed*2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210525-26842.html achieved 09 Jun, 2021. Claim based on best-published 2S 3rd Gen Intel Xeon Supermicro performance SPECrate*2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210525-26839.html achieved 09 Jun, 2021. Claim based on best-published 2S 3rd Gen Intel Xeon Supermicro performance SPECrate*2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210525-26843.html achieved 09 Jun, 2021. Claim based on Intel Xeon processor best-published 4S Supermicro performance of SPECspeed*2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2020q4/cpu2017-20200929-24137.html achieved 10 Nov, 2020. Claim based on Intel Xeon processor best-published 4S Supermicro performance of SPECspeed*2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2020q4/cpu2017-20200929-24136.html achieved 10 Nov, 2020. Claim based on Intel Xeon processor best-published 4S Supermicro performance of SPECrate*2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2020q4/cpu2017-20200929-24138.html achieved 10 Nov, 2020. Claim based on Intel Xeon processor best-published 4S Supermicro performance of SPECrate*2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2020q4/cpu2017-20200929-24139.html achieved 10 Nov, 2020. Claim based on best-published 2S 2nd Gen Intel Xeon Supermicro performance SPECrate*2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2020q2/cpu2017-20200608-22736.html achieved 10 Nov, 2020. Claim based on best-published 2S 2nd Gen Intel Xeon Supermicro leadership performance SPECrate*2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2020q2/cpu2017-20200608-22737.html achieved 10 Nov, 2020. Claim based on best-published 2S 2nd Gen Intel Xeon Supermicro leadership performance SPECspeed*2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2020q3/cpu2017-20200915-24003.html achieved 10 Nov, 2020. Claim based on best-published 4S SPECspeed*2017_int_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 Jun 2021. Source: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210525-26831.html. Claim based on best-published 2S 2nd Gen Intel Xeon Supermicro leadership performance SPECspeed*2017_fp_base results published at http://www.spec.org/cpu2017/results/cpu2017.html as of 18 June 2021. Source: https://www.spec.org/cpu2017/results/res2019q2/cpu2017-20190319-11294.html achieved 10 Nov, 2020. **Enterprise and Database: Storage Processing** Claim based on best-published 2S SPECstorage* 2020_ ai_image results published at https://spec.org/storage2020/results/ as of 18 June 2021. Source: https://spec.org/storage2020/results/res2021q2/storage2020-20210403-00018.html. Claim based on best-published 2S SPECstorage* 2020_eda_blended results published at https://spec.org/storage2020/results/ as of 18 June 2021. Source: https://spec.org/storage2020/results/res2021q2/storage2020-20210403-00019.html. Claim based on best-published 2S SPECstorage* 2020_ genomics results published at https://spec.org/storage2020/results/ as of 18 June 2021. Source: https://spec.org/storage2020/results/res2021q2/storage2020-20210403-00020.html. Claim based on best-published 2S SPECstorage* 2020_ swbuild results published at https://spec.org/storage2020/results/ as of 18 June 2021. Source: https://spec.org/storage2020/results/res2021q2/storage2020-20210403-00021.html. Claim based on best-published 2S SPECstorage* 2020_ vda results published at https://spec.org/storage2020/results/ as of 18 June 2021. Source: https://spec.org/storage2020/results/res2021q2/storage2020-20210403-00017.html. **Energy Efficiency: SPECpower_ssj2008** Claim based on best-published 2S (2U) 2nd Gen Intel Xeon Supermicro performance SPECpower*_ssj2008 results published at http://www.spec.org/power_ssj2008/results/ as of 18 June 2021. Source: https://spec.org/power_ssj2008/results/res2019q3/power_ssj2008-20190424-00960.html achieved 10 Nov, 2020.

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