Lenovo Pushing the Boundaries of Scientific Discovery for High-Performance Computing at SC24 Using NVIDIA Accelerated Computing
Article

As the world's #1 supercomputing provider, Lenovo is at the forefront of high-performance computing and AI innovation. At Supercomputing 2024, we're highlighting powerful, energy-efficient platforms to help scientists, engineers, and researchers push the boundaries of scientific discovery.

Let's dive deeper into the technology behind these revolutionary accelerated computing platforms, developed in collaboration with NVIDIA, to deliver powerful performance, flexibility, and efficiency to meet a wide variety of HPC needs.

Lenovo ThinkSystem SC777 V4 Neptune

Featuring the NVIDIA GB200 Grace Blackwell NVL4 Superchip

Engineered specifically for high performance computing (HPC), the Lenovo ThinkSystem SC777 V4 Neptune excels in accelerated computing for intensive simulations and hybrid AI. It's designed to handle technical computing, grid deployments, and analytics workloads in various fields such as research, life sciences, energy, engineering, and financial simulation.
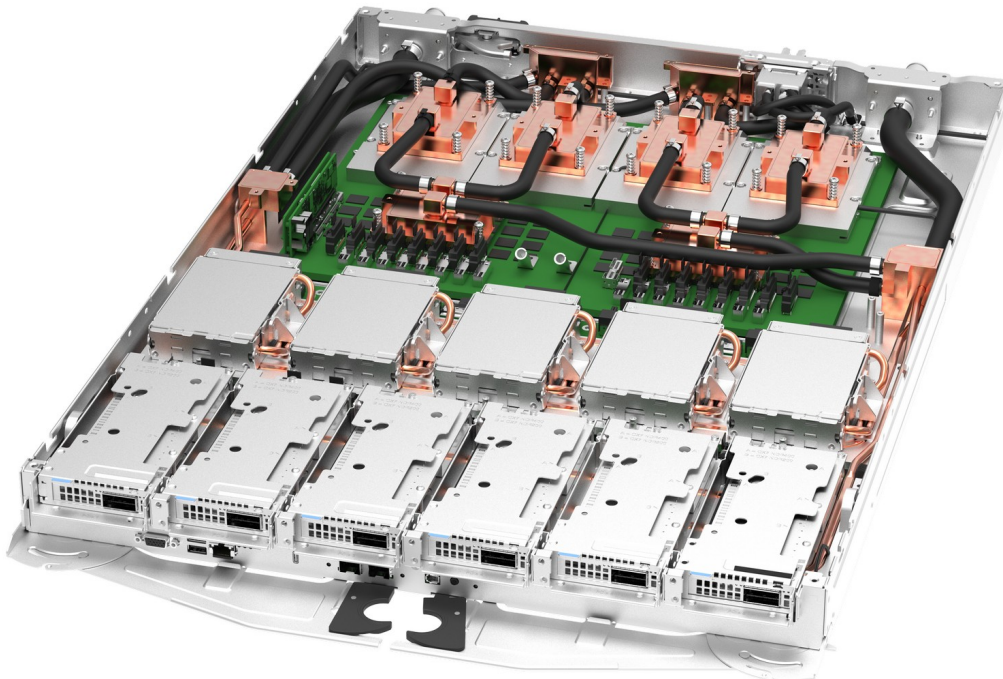

Figure 1. Lenovo ThinkSystem SC777 V4

The ThinkSystem SC777 V4 integrates seamlessly into a standard 19'' rack cabinet with the ThinkSystem N1380 Neptune 13U enclosure, which hold up to eight of the SC777 V4 compute trays, with three enclosures in a rack, for a total of 24 ultra-high-powered NVIDIA GB200 NVL4 compute nodes per rack. For those doing the math, that's 48 processors and 96 GPUs in a standard rack footprint.

Lenovo Neptune liquid cooling technologies utilize superior materials, including custom copper water loops and patented CPU cold plates, for full system water-cooling. Unlike systems that use low-quality FEP plastic, Neptune features durable stainless steel and reliable EPDM hoses. Water cooling delivers up to 10% performance increase by running continuous turbo mode and reduces data center energy consumption by up to 40%. As an added benefit, the fanless system virtually eliminates noise emitted from the rack. We throw that in for free.

The ThinkSystem SC777's flexible design supports a variety of system configurations and networking options, ensuring seamless integration of accelerated computing into existing data center infrastructures. Completing the package with support for high-performance NVMe and high-speed, low latency networking with the latest NVIDIA Quantum InfiniBand and NVIDIA Spectrum-X Ethernet platforms, the SC777 V4 is your all-in-one solution for HPC and its hybrid AI workloads.

It's pretty simple: Lenovo will fit through your doors and won't crush your floors.

NVIDIA Grace Blackwell GB200 NVL4 Superchip

The NVIDIA GB200 Grace Blackwell NVL4 Superchip at the core of the ThinkSystem SC777 V4 Neptune delivers revolutionary performance for converged HPC workloads by combining four NVLink connected Blackwell GPUs and two Grace CPUs over NVLink-C2C.

- Form Factor: 4 Blackwell GPUs + 2 Grace CPUs
- 4-GPU NVLink Domain
- Large Coherent Memory: Up to 768GB
- 2X Scientific Computing Performance vs previous generation

Lenovo ThinkSystem SR675 V3

Featuring NVIDIA H200 NVL

The Lenovo ThinkSystem SR675 V3 is a versatile GPU-rich 3U rack system that supports up to eight double-wide and single-wide GPUs including the new NVIDIA H200 NVL and L40S Tensor Core GPUs, or the NVIDIA HGX H200 4-GPU offering with NVLink and Lenovo Neptune Air hybrid liquid-to-air cooling. The server is based on the AMD EPYC 9004 Series processors and on the new 5th Gen AMD EPYC 9005 Series processors.
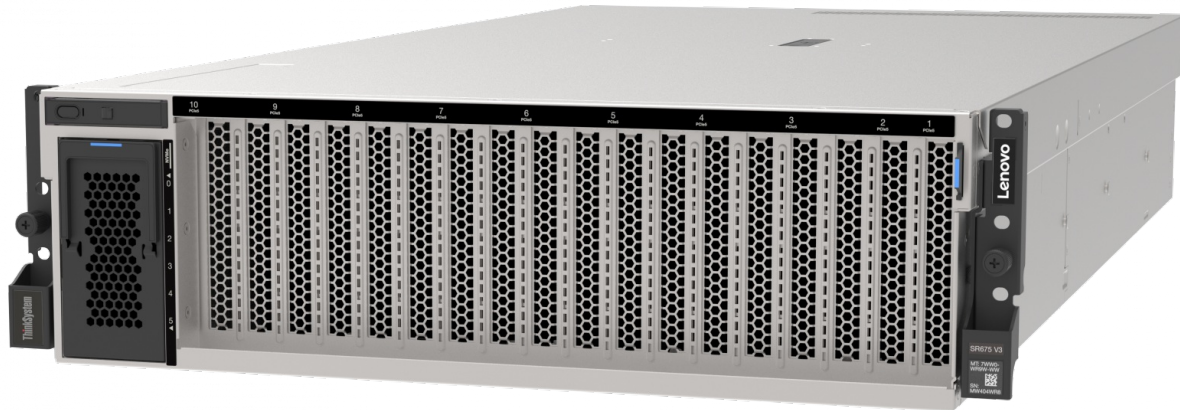

Figure 2. Lenovo configured to support eight double-wide H200 NVL GPUs

The Lenovo SR675 V3 is a cutting-edge server solution designed for enterprises and data centers aiming to maximize AI and deep learning performance. The SR675 V3 offers unmatched scalability by housing up to 8 NVIDIA GPUs within a streamlined 3U chassis, enabling organizations to handle the most demanding AI workloads without compromising on speed or accuracy while conserving space. This combination of space efficiency and power is especially beneficial for enterprises looking to expand their computational capabilities while optimizing valuable rack space.

Engineered as a future-ready platform, the SR675 V3 is built to support the evolving needs of AI, machine learning, and big data analytics. Its GPU-optimized architecture is designed with high bandwidth and efficiency, ensuring that enterprises are prepared to tackle increasingly complex and computationally intensive AI tasks.

Lenovo's integration of 8 x 600W NVIDIA GPUs within a single 3U system provides organizations with the flexibility and capacity to adapt as AI technologies advance, making it a valuable long-term investment for businesses that require robust, scalable infrastructure for their digital transformation.

For mainstream scientific computing applications across higher-ed, health care and life sciences, energy, and financial services the ThinkSystem SR675 V3 with 8x NVIDIA H200 NVL and accelerated CUDA software delivers powerful performance and efficient scaling while enabling flexibility in configuration choice to meet the needs of a broad set of HPC workloads.

NVIDIA H200 NVL

H200 NVL is optimized for air-cooled, flexible solutions in HPC with a 4-GPU NVLink domain in a PCIe form factor. With up to four GPUs NVLink connected, a 1.5X memory increase and a 1.2X bandwidth increase over the previous generation H100, H200 NVL delivers up to 1.3X the HPC performance.

- Up to four GPUs NVLink connected
- 141GB HBM3e
- 5X memory increase and 1.2X bandwidth increase over H100 NVL
- 2X faster 4th generation NVLink speed at 900 GB/s with new multi-node scalability up to 256 GPUs for 57.6 TB/s bandwidth
- Includes a 5-year subscription to NVIDIA AI Enterprise

Conclusion

Lenovo's pioneering innovations, combined with NVIDIA GB200 Grace Blackwell NVL4 and H200 NVL platforms, represent a significant leap forward in high-performance computing and AI capabilities, pushing the boundaries of scientific computing.

Be sure to stop by Lenovo booth #2201 to learn how "Smarter creates cooler HPC" with Lenovo and NVIDIA and to see the full portfolio of products.

Author

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