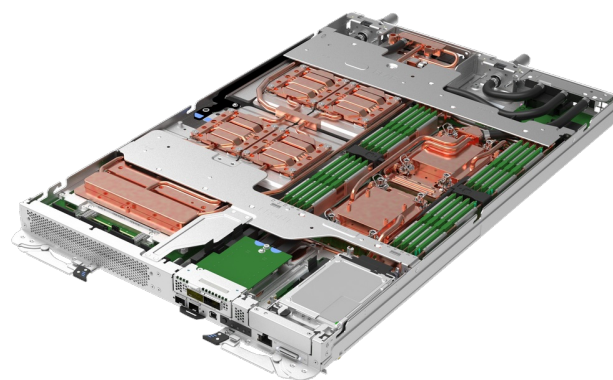


Lenovo ThinkSystem SD650-N V3

Liquid cooling innovation for a highly efficient data center



Lenovo Neptune™ accelerated, water-cooling technology

Lenovo has been a pioneer of liquid cooled technologies since 2012 and continues to be an industry leader in cooling innovation. Instead of retrofitting plastic piping, Lenovo Neptune™ direct water-cooling (DWC) technology uses custom designed copper water loops to extract heat from systems with high thermal output. You can have peace of mind implementing a platform designed with liquid cooling from the start.

Compared to other technology, the ThinkSystem SD650-N V3's DWC:

- Can reduce data center energy costs by up to 40%
- Increases system performance by up to 10%
- Can deliver up to 100% heat removal efficiency (depending on environment)
- Creates a quieter data center with its fan-less design
- Enables data center growth without adding computer room air conditioning

Lenovo ThinkSystem SD650-N V3 is based on our 5th generation Lenovo Neptune™ direct water-cooling platform and based on two 5th Gen Intel® Xeon® Scalable processors with NVIDIA HGX™ H100 4-GPU acceleration and NVIDIA NDR InfiniBand networking.

The combination of the latest Intel® processor technology and NVIDIA acceleration technology with our water-cooling solution results in extreme performance in a dense form factor. A single rack of Lenovo ThinkSystem SD650-N V3 is more than doubling performance to the predecessor generation with up to 5.8 PetaFLOPS High Performance Computing (HPC) or almost 200 PetaFLOPS Artificial Intelligence (AI) peak performance on just 0.72m² - less than 8 ft² - footprint.

The SD650-N V3 leverages copper and brazed connections guaranteeing leak-free operations at extreme scale, even at high pressures.

Another important differentiation is the superior water loop design, which enables up to 45 °C inlet temperatures for the highest energy reuse efficiency. The new water loop design optimizes performance with increased frequency while ensuring temperature uniformity, preventing thermal jitter for consistent application performance.

Water-cooling is an end-to-end process that starts at manufacturing. Through helium and nitrogen pressure tests from the node to the completed rack, the SD650-N V3 provides consistent quality at the highest standards. This approach also allows Lenovo to ship the systems pressurized without needing to send hazardous antifreeze components to our customers.

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Savings and energy efficiency

With up to 100% heat removal, the ThinkSystem SD650-N V3 provides up to a 40% savings in data center energy expenses including:

- 25% reduction in annual air conditioning use
- 5% energy savings by running cooler CPUs
- 5% savings by eliminating fans in the compute nodes
- 5% optimization from Energy Aware Runtime

A large high performance computing center reusing hot water from direct water cooling can save an estimated 45% in electricity costs.

Accelerating your applications

On the SD650-N V3 four NVIDIA H100 Tensor Core GPU are interconnected through NVLink delivering substantial performance improvements for HPC, AI training, and inference workloads. The H100 supports the Lenovo HPC philosophy to enable customers from Exascale to Everscale™. Together with NVIDIA InfiniBand networking it scales efficiently to thousands of GPUs or, with NVIDIA Multi-Instance GPU (MIG) technology, can be partitioned into seven GPU instances to accelerate smaller workloads.

With NVIDIA® CUDA® the most widely used parallel computing platform and programming model for GPUs is available free of charge to help you accelerate the more than 700 supported HPC applications and every major deep learning framework, for example:

- Chemistry like Gaussian and GROMACS
- Finite Elements like LS-DYNA and Simulia Abaqus
- Fluid Dynamics like OpenFOAM and ANSYS Fluent
- Molecular Dynamics like NAMD and AMBER
- Weather and Climate like WRF and ICON

The Lenovo ThinkSystem SD650-N V3 also supports NVIDIA® NGC™ providing pre-trained models, training scripts, optimized framework containers and inference engines for popular deep learning models.

Maximum performance, simplified management

Designed to run the highest core-count 5th Gen Intel® Xeon® Platinum processor, the SD650-N V3 powers through demanding HPC workloads. Because water-cooling constantly removes more heat, the CPUs can run in accelerated mode nonstop, getting up to 10% greater performance from the CPUs.

The 5th Gen Intel® Xeon® Platinum processors combine great memory bandwidth capacity, large core-counts, and strong cores for a balanced approach capable of increasing performance across all HPC workloads.

The Lenovo ThinkSystem SD650-N V3 is enabled with Lenovo HPC & AI Software Stack so, you can support multiple users and scale within a single cluster environment.

Lenovo HPC & AI Software Stack provides you with a fully tested and supported open-source software stack to enable your administrators and users with the most effective and environmentally sustainable consumption of Lenovo supercomputing capabilities.

Our Confluent management system and Lenovo Intelligent Computing Orchestration (LiCO) web portal provides an interface designed to abstract the users from the complexity of HPC cluster orchestration and AI workloads management, making open-source HPC software consumable for every customer.

The LiCO web portal provides workflows for both AI and HPC, and supports multiple AI frameworks, allowing you to leverage a single cluster for diverse workload requirements.



Specifications SD650-N V3

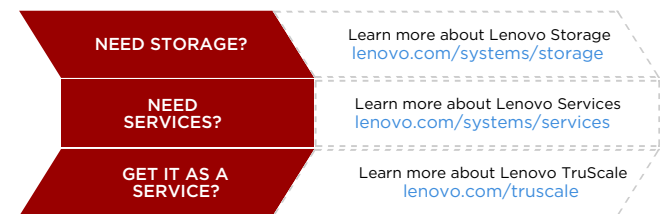
Form Factor	Full-wide 1U tray; 1 node+GPUs per tray
Chassis	DW612S Enclosure (6U)
Processor	Two 5th Gen Intel® Xeon® Scalable processors per tray, or 2x Intel® Xeon® CPU Max Series processors per tray
Memory	Up to 2TB using 16x 128GB 5600MHz TruDDR5 RDIMM slots per tray
I/O Expansion	NVIDIA ConnectX-7 4-chip VPI PCIe Gen5 Mezz Board for GPUDirect I/O
Acceleration	NVIDIA HGX™ H100 4-GPU with 4x NVLink connected SXM5 GPUs
Storage	Up to 2x 2.5" NVMe SSDs (7mm height) or 1x 2.5" NVMe SSDs (15mm height) per node Up to 1x liquid cooled M.2 NVMe SSD for both operating system boot and storage functions
RAID Support	OS Software RAID
Network Interfaces	Two onboard Ethernet interfaces: 2x 25GbE SFP28 LOM (1Gb, 10Gb or 25Gb capable; supports NC-SI) and 1x 1GbE RJ45 (supports NC-SI)
Power Management	Rack-level power capping and management via open-source management software Confluent and application-level energy optimization through Energy Aware Runtime (EAR)
Systems Management	Systems management using Lenovo HPC&AI Software stack with Lenovo Intelligent Computing Orchestration (LiCO) portal and XClarity Controller (XCC). Supports TPM 2.0 for advanced cryptographic functionality. SMM management module in the enclosure, supports daisy chaining to reduce cabling requirements
Front access	All adapters and drives are accessible from the front of the server. Front ports include KVM breakout connector and External Diagnostics Handset port for local management.
Rear access	2x RJ45 on the SMM management module in the enclosure for XCC with daisy chain support; USB 2.0 for SMM FFDC log collection
Power Supply	Up to 9x hot-swap air-cooled power supplies (2400W Platinum, 2600W Titanium), or Up to 3x hot-swap direct-water-cooled power supplies (7200W Titanium) Supports up to N+1 redundancy
Cooling Design	Direct Water Cooling at the heat source with up to 45°C inlet water temperature
OS Support	Red Hat, SUSE, Rocky Linux (with LeSI support); Visit: lenovopress.com/osig for more information.
Limited Warranty	3-year customer replaceable unit and onsite limited warranty, next business day 9x5, service upgrades available

About Lenovo

Lenovo (HKSE: 992) (ADR: LNVGY) is a US\$62 billion revenue global technology powerhouse, ranked #171 in the Fortune Global 500, employing 77,000 people around the world, and serving millions of customers every day in 180 markets. Focused on a bold vision to deliver smarter technology for all, Lenovo is expanding into new growth areas of infrastructure, mobile, solutions and services. This transformation is building a more inclusive, trustworthy, and sustainable digital society for everyone, everywhere.

For More Information

To learn more about the ThinkSystem SD650-N V3, contact your Lenovo representative or Business Partner or visit www.lenovo.com/thinksystem. For detailed specifications, consult the [SD650-N V3 product guide](#).



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