Lenovo ThinkSystem SD650 V3

Liquid cooling innovation for a highly efficient data center

Innovative Design

The Lenovo ThinkSystem SD650 V3 dual-node tray is designed for High Performance Computing (HPC), large-scale cloud, heavy simulations, and modeling.

It contains Lenovo Neptune™ Direct Water Cooling (DWC) technology which is designed to handle technical computing, grid deployments, and analytics workloads in the research, life sciences, energy, simulation, and engineering fields.

The unique design of ThinkSystem SD650 V3 provides the optimal balance of serviceability, performance, and efficiency. By using a standard rack with the ThinkSystem DW612S enclosure equipped with patented stainless steel dripless quick connectors, the SD650 V3 provides easy serviceability and extreme density that is well suited for clusters ranging from departmental/workgroup to the world's largest supercomputers.

Lenovo Neptune™ 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™ 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 V3's direct water cooling:

- 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

Savings and Energy Efficiency

With up to 100% heat removal, the ThinkSystem SD650 V3 provides up to a 40% savings in data center energy expense 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.

intel. XEON® PLATINUM

intel. XEON® MAX SERIES

Maximum Performance, Simplified Management

Designed to run the highest core-count 5th Gen Intel® Xeon® Platinum processor, the SD650 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 5th Gen Intel® Xeon® Platinum processors excel in HPC applications and workloads that are compute sensitive, highly vectorized and have the added advantage of heavily relying on AVX-512 instruction sets used within biology and chemistry verticals like NAMD, GROMACS, LAMMPS, CP2K, and Quantum ESPRESSO.

For even greater system performance, the SD650 V3 uses 5600 MHz DDR5 memory and supports NVMe storage, high-speed NDR InfiniBand adapters.

The Lenovo ThinkSystem SD650 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.

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.

Extreme Density

One 6U ThinkSystem DW612S enclosure accommodates up to 12 ThinkSystem SD650 V3 compute nodes. With up to six chassis in a traditional 42U rack, the enclosure houses up to 144 processors, 144TB of DDR5 Memory, and up to 144x PCIe Gen5 x16 adapters on just two data center floor tiles. The ThinkSystem SD650 V3 offers up to 50% more cores per U than the previous generation SD650 V2 server.
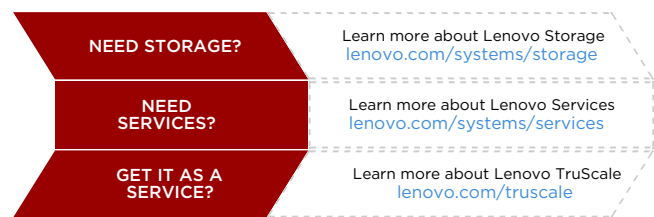
Specifications

Form Factor	Full-wide 1U tray (two SD650 V3 nodes per tray, six per DW612S Enclosure)
Chassis	DW612S Enclosure (6U)
Processors	Two 5th Gen Intel® Xeon® Scalable processors per node, or 2x Intel® Xeon® CPU Max Series processors with HBM per node; 2x nodes per 1U tray
Memory	Up to 2.0TB using 16x 128GB 5600 MHz per node
I/O Expansion	Up to 2x PCIe Gen5 x16 low-profile adapter slots (2x supported without internal storage) per node for NDR InfiniBand. Shared I/O and SocketDirect supported.
Internal Storage	Up to 4x 2.5″ SATA/NVMe SSDs (7mm height) or 2x 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	Onboard SATA controller with SW RAID or Intel VROC
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 air CFF v4 (2400W PT, 2600W TT) / Up to 3x Direct Water Cooled Power Supply (7200W) 80+ Titanium N+1 redundancy (only air-cooled / without acceleration on DWC)
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 V3, contact your Lenovo representative or Business Partner or visit www.lenovo.com/thinksystem. For detailed specifications, consult the SD650 V3 product guide.

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