

Lenovo ThinkSystem SC750 V4 Neptune

Empowering Exascale to Everscale™: Your Lenovo Neptune Supercomputer featuring Intel® Xeon® 6 processor.



Revolutionary Lenovo Neptune® Design

Engineered for large-scale cloud infrastructures and High Performance Computing (HPC), the Lenovo ThinkSystem SC750 V4 Neptune excels in intensive simulations and complex modeling. 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.

At its core, Lenovo Neptune applies 100% direct warm-water cooling, maximizing performance and energy efficiency without sacrificing accessibility or serviceability. The SC750 V4 integrates seamlessly into a standard 19" rack cabinet with the ThinkSystem N1380 Neptune enclosure, featuring a patented blind-mate stainless steel driplless quick connection.

This design ensures easy serviceability and extreme performance density, making the SC750 V4 the go-to choice for compute clusters of all sizes - from departmental/workgroup levels to the world's most powerful supercomputers - from Exascale to Everscale®.

Optimal Performance for HPC Workloads

Supporting the Intel® Xeon® 6900P-series and Intel® Xeon® 6900E-series (planned for Q1/2025), the ThinkSystem SC750 V4 Neptune stands as a powerhouse for demanding HPC workloads. Its industry-leading direct water-cooling system ensures steady heat dissipation, allowing CPUs to maintain accelerated operation and achieve up to a 10% performance enhancement.

The 6900P-series, boasting up to 128 Performance-cores, offers superior single-thread performance, AI acceleration in every core and native AVX512 matrix math instructions. This makes it an ideal fit for vectorized workloads in fields like biology and chemistry, including applications such as NAMD, GROMACS, LAMMPS, CP2K, and Quantum ESPRESSO, and boost performance for machine and deep learning workloads as well.

In addition, Intel® AMX BF16 and FP16 acceleration is integrated in every core for increased generative AI performance. With up to 128 AMX instances of AI accelerators per socket, Intel® Xeon® 6 processor gains up to 2x higher Llama-13B (BF16) gen to gen performance.

With 12 channels of high-speed DDR5 RDIMM or an impressive 8800MHz high-bandwidth MRDIMM capability, it excels in memory bandwidth-bound workloads, positioning it as a preferred choice for meteorology and engineering applications like WRF, ICON, OpenFOAM, and Fluent.

The 6900E-series, designed for maximum throughput, shines in managing highly parallelized HPC workloads. It's the go-to choice for applications such as High Frequency Trading, Genomics like BLAST or samtools, and Media & Entertainment workloads like Moonray and other rendering applications.

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Completing the package with support for high-performance NVMe and high-speed, low latency networking with the latest Infiniband, Omnipath, and Ethernet choices, the SC750 V4 is your all-in-one solution for HPC workloads.

Simplifying System Management and Operation

The Lenovo ThinkSystem SC750 V4 Neptune is equipped with the new XClarity Controller 3 (XCC3). Leveraging the power of OpenBMC, XCC3 combines the flexibility of open-source with Lenovo's advanced capabilities, offering an unprecedented level of efficiency and control in system management. It features advanced energy monitoring and management capabilities and a user-friendly interface, simplifying the management of complex HPC environments.

For higher level management and orchestration, the Lenovo HPC & AI Software Stack provides a fully tested and supported open-source software environment. It enables your administrators and users to utilize Lenovo's supercomputing capabilities in the most effective and environmentally sustainable manner.

Our Confluent management system and Lenovo Intelligent Computing Orchestration (LiCO) web portal offer an interface designed to shield users from the complexities of HPC cluster orchestration and AI workloads management. This makes open-source HPC software accessible and consumable for all customers.

Lenovo Neptune® Technology

Since 2012, Lenovo's direct water-cooling has consistently led the industry with advanced cooling innovations. The dedication to quality-engineering and performance-design is demonstrated by over a decade of delivering reliable water-cooled solutions worldwide.

Lenovo Neptune utilizes 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. N1380 features an integrated manifold that offers a patented blind-mate mechanism with aerospace-grade drip-less connectors to the compute trays, ensuring safe and seamless operation.

Neptune is designed to operate at water inlet temperatures as low as the dew point allows, up to 45°C. This design eliminates the need for additional chilling and allows for efficient reuse of the generated heat energy in building heating or adsorption cold water generation. It uses treated de-ionized water as a coolant, a much safer and more efficient alternative to the commonly used PG25 Glycol liquid, reflecting our commitment to environmental responsibility.

Compared to an equivalent air-cooled system, the ThinkSystem SC750 V4 Neptune provides:

- Up to 10% performance increase through continuous turbo mode
- Up to 40% data center energy use reduction from server and infrastructure
- Up to 100% heat removal by water directly on the heat sources
- Up to 100% noise reduction by server fans in the data center

Streamlined Infrastructure for Every Scale

Each 13U Lenovo ThinkSystem N1380 Neptune enclosure houses eight Lenovo ThinkSystem SC750 V4 Neptune trays. Up to three N1380 enclosures fit into a standard 19" rack cabinet, packing 24 trays, 48 nodes, 96 processors, and 148TB of DDR5 Memory into just two 60x60 datacenter floor tiles.



Beyond the Neptune water-cooling infrastructure, the N1380 enclosure houses up to four ThinkSystem 15kW Titanium Power Conversion Stations (PCS), supplying internal system power to a 48V busbar. This innovative design merges power conversion, rectification, and distribution into a single PCS, a departure from traditional setups that demand separate units, resulting in best-in-class efficiency.

The Lenovo ThinkSystem N1380 Neptune design simplifies complex infrastructure management by integrating key components such as power routing with a busbar and water distribution through internal manifold. This means efficient power distribution, seamless hose connections, and orderly cable routing within your datacenter.

Specifications

Form Factor	2 nodes in one vertical 21" compute tray 16 nodes per enclosure (N1380)
Chassis	8 compute trays per 13U Enclosure (N1380) for 19" rack cabinets Up to 3 enclosures per rack
Processors	2x Intel® Xeon® 6900-series with P-cores, up to 128 cores
Memory	12 memory channels per CPU Up to 3.0TB using 24x 128GB 6400MHz RDIMMs per node or Up to 1.5TB using 24x 64G 8800MHz MRDIMMs per node
I/O Expansion	Up to 2x PCIe Gen5 x16 low-profile adapter slots per node for NVIDIA NDR InfiniBand with support for Shared I/O and SocketDirect
Internal Storage	Up to 6x E3.S SSDs per node; two in place of low-profile adapter each, two on CPU coldplate
RAID Support	OS level 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	Advanced power monitoring, management, and power capping capabilities via Lenovo XClarity Energy Manager (LXEM) or Confluent open-source software, paired with Energy Aware Runtime (EAR) for energy optimization
Systems Management	1x DC-SCM with XClarity Controller (XCC) 3 based on OpenBMC with support for TPM 2.0 for advanced cryptographic functionality. Embedded chip for Root of Trust (RoT) - the server can only be booted with Lenovo trusted firmware. 1x System Management Module (SMM) 3 in the enclosure connected directly to server BMCs. Orchestration and Management using Lenovo HPC & AI Software stack with Lenovo Intelligent Computing Orchestration (LiCO) webportal and Confluent open-source cluster management software.
Front access	All adapters and drives are accessible from the front of the server. Front ports include: Network interfaces, Power button, USB-C DisplayPort and External Diagnostics Handset port, as well as on the DC-SCM 2x USB 3.0, 1x VGA, 1x RJ45 and Location, Error & RoT LEDs. Servers are inserted to the N1380 enclosure from the front.
Rear access	Water connection, Power and System Management Module (SMM3) are accessible from the rear of the enclosure populated by the server tray. Rear ports include: 2x RJ45 on the SMM for XCC with daisy chain support and an USB-A for SMM FFDC log collection.
Power Supply	Up to 4x HS 15kW Titanium Power Conversion Stations (PCS) with fully balanced phases, N+1 redundancy. Each PCS providing a 32A 380-480V - or two PCS sharing a 63A 380-480V, 3-Phase IEC 60309 3P+N+E IP67 connection to Datacenter power.
Cooling Design	Direct water cooling at the heat source with treated clean water supporting inlet temperature from dew point to up to 45°C. Servers connected through blind mate quick disconnect to manifold in enclosure. Each enclosure providing an inlet and an outlet connection with dual-interlock FD83 ball valve.
OS Support	Red Hat, SUSE (Supported & Certified), Ubuntu (Partial Support & Certified) and Rocky Linux (Tested); Visit lenovopress.com/osig for more information.
Limited Warranty	3-year customer replaceable unit and onsite limited warranty Next business day 9 to 5 Service extensions and upgrades available

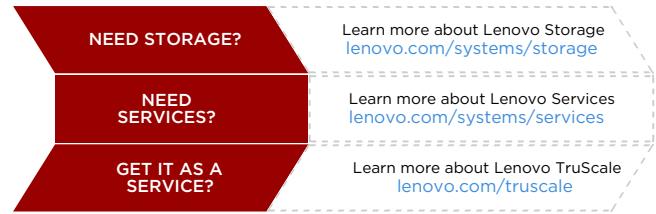


About Lenovo

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 SC750 V4, contact your Lenovo representative or Business Partner or visit www.lenovo.com/thinksystem. For detailed specifications, consult the [SC750 V4 product guide](#).



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