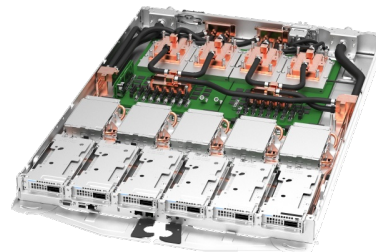# Lenovo ThinkSystem SC777 V4 Neptune

Empowering Exascale to Everyscale™: Transforming HPC with Hybrid AI featuring NVIDIA GB200

Revolutionary Lenovo Neptune® Design

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.

At its core, Lenovo Neptune applies 100% direct water cooling, maximizing performance and energy efficiency without sacrificing accessibility or serviceability. The SC777 V4 integrates seamlessly into a standard 19'' rack cabinet with the ThinkSystem N1380 Neptune enclosure, featuring a patented blind-mate stainless steel dripless quick connection.

This design ensures easy serviceability and extreme performance density, making the SC777 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 Everyscale™.

Optimal Performance for HPC and its Hybrid AI Workloads

The NVIDIA GB200 platform heralds a new era in data center computing, delivering outstanding performance for HPC, vector database searches, and data processing. Equipped with 2 Grace CPUs and 4 Blackwell GPUs, this platform features a NVIDIA architecture.

Its 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 Infiniband and Ethernet choices, the SC777 V4 is your all-in-one solution for HPC and its hybrid AI workloads.

Simplifying System Management and Operation

The Lenovo ThinkSystem SC777 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.

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.

nVIDIA

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, from 18°C 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 SC777 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 up to eight Lenovo ThinkSystem SC777 V4 Neptune trays. Up to three N1380 enclosures can fit into a standard 19'' rack cabinet, packing 24 trays, 48 processors and 96 GPUs 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.
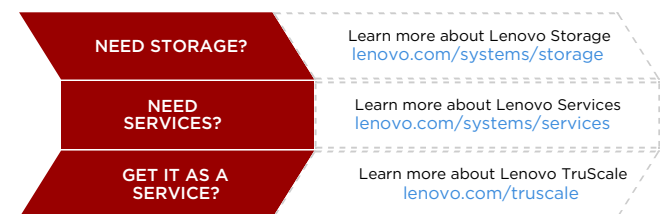
Specifications

Form Factor	NVIDIA GB200 base system 2x Grace processors and 4x Blackwell GPUs in one vertical 21" compute tray, eight trays per Enclosure (N1380)
Chassis	Eight compute trays per 13U Enclosure (N1380) for 19" rack cabinets, up to 3 enclosures per rack
Processors	Two Grace processors, 72 Arm® Neoverse V2 cores each processor
CPU Memory / Bandwidth	Up to 480GB LPDDR5X / Up to 512GB/s each processor
GPU Memory / Bandwidth	Up to 384GB HBM3e / Up to 16TB/s each GPU
I/O Expansion	Support up to 6x NVIDIA NDR or 3x XDR LP InfiniBand Adapters
Internal Storage	Up to 10x E3.S NVMe SSDs per tray
RAID Support	OS level RAID
Network Interfaces	Two onboard Ethernet interfaces: 2x 25GbE SFP28 LOM (1Gb, 10Gb or 25Gb capable; 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 are accessible from the front of the server. Front ports include the Network Interfaces, Power Button, a 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- and 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 Type 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, 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 9x5, 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 SC777 V4, contact your Lenovo representative or Business Partner or visit www.lenovo.com/thinksystem. For detailed specifications, consult the SC777 V4 product guide .

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