Lenovo ThinkSystem N1380 Neptune Chassis

Empowering Exascale to Everyscale™: Your Foundation for a Lenovo Neptune HPC or AI Supercomputer.

Exascale technology, industry standard footprint

As the demand for more powerful applications like AI has skyrocketed, data centers have grown more crowded, hotter and consume more energy. Lenovo's next generation of Neptune liquid cooling technologies was designed to address those challenges. The ThinkSystem N1380 Neptune chassis is the core building block, built to enable exascale-level performance while maintaining a standard 19-inch rack footprint. The ThinkSystem N1380 Neptune chassis uses liquid cooling to remove heat and increase performance and is engineered for the next decade of computational technology.

Lenovo Neptune® is the foundation of the Lenovo N1380 Neptune® introducing a new generation of the longest proven, most advanced, direct and warm water cooling available in the industry. An innovative Power delivery and distribution design around a patented integrated Power Conversion Station enables broadest data center compatibility. And finally, the formfactor itself was engineered from ground up to provide the additional space needed without breaking the data center standards while maintaining the scalability for customers of every size.

The next cool era of Lenovo Neptune

Since 2012, Lenovo's direct water-cooling has consistently led the industry with advanced cooling innovations. Our 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 lower reliability 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 water as a coolant, a much safer and more efficient alternative to the commonly used PG25 Glycol liquid, reflecting our commitment to environmental responsibility.

The unique design of the N1380 eliminates the need for internal airflow and power-consuming fans. As a result, it achieves a reduction in typical data center power consumption by up to 40% compared to similar air-cooled systems.

With great power comes great performance

Today, processors are drawing several hundred Watts of power and accelerators are surpassing a Kilowatt. The Lenovo ThinkSystem N1380 features a cutting-edge power subsystem designed to support the most power-demanding compute and acceleration platforms for the next decade.

This newly developed feature incorporates up to four ThinkSystem 15kW Titanium Power Conversion Stations (PCS). These stations supply power to an internal 48V busbar, which in turn powers the compute trays. The PCS design is a game-changer, merging power conversion, rectification, and distribution into a single package. This is a significant transformation from traditional setups that require separate rack PDUs, additional cables and server power supplies, resulting in best-in-class efficiency.

With four PCS units supporting N+1 operation and 120% oversubscription, the total power capacity for the enclosure reaches 54kW DC. Given a 96% peak AC/DC conversion efficiency and an almost perfect Power Factor at 99% above 50% load, the total apparent power is 58 kVA. When you place three enclosures in a Rack Cabinet, you achieve a total power density of 162kW DC or ~175kVA. This configuration enables the highest performing technologies in a compact package.

The 48V busbar enhances system-level efficiency, reducing efficiency loss by up to 7% through streamlined power delivery. Also, for a given power level, operating at 48V reduces power losses by 16x compared for state-of-the-art high-performance components that operate natively at 48V to delivering the same power at 12V, while still efficiently transforming down to 12V.

The advanced design of the N1380 power subsystem promises a decade of top-tier performance in a streamlined package.

A scalable championing of industry standards

The escalating power capacity, cooling demands, and the growing size of server components present a unique challenge in packaging solutions. The Lenovo ThinkSystem N1380 Neptune turns these challenges into opportunities. Instead of resorting to specialized rack-level form factors, the N1380 is ingeniously designed to conform to industry and data center standards. This design philosophy ensures it supports customers of every scale, across the globe, in their unique environments.

The design of the Lenovo ThinkSystem N1380 Neptune streamlines complex infrastructure management by integrating key components such as power routing with a busbar and water distribution through an internal manifold. It can seamlessly connect to standard data center CDUs – whether they are in-rack, row-level, or data center-level – without necessitating customization.

It also includes a System Management Module (SMM3) that connects directly to every server Base Management Chip (BMC) for out of band system management. That reduces massively the cable requirements for a management network, with a single or redundant connection to the N1380 serving all the servers within.

Each 13U Lenovo ThinkSystem N1380 Neptune houses up to eight Lenovo ThinkSystem SC-Series Neptune trays, strategically positioned vertically. This configuration translates the height of the N1380 into a 21' width for the compute trays, aligning closely with the Open Compute (OCP) form factor. This design not only optimizes space but also ensures compatibility for a future steered by HyperScale and Cloud Service Provider direction.

Up to three N1380 enclosures can fit into a standard 19' rack cabinet, packing 24 SC-Series trays into just two 60x60 data center floor tiles or – including rack extensions – on less than a square-meter / ten square-feet. From there, you can scale multiple racks, full rack rows, or data center level ExaScale deployments. The N1380 offers a truly modular and scalable solution for Supercomputing, from ExaScale to EveryScale™.
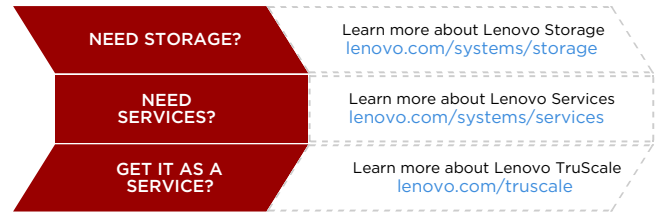
Specifications

Form Factor	13U Enclosure (N1380) designed for 19" rack cabinets Up to 3 enclosures per rack
Technologies	Compatible with ThinkSystem SC-Series Supports general purpose and acceleration compute technologies from Intel, AMD, & NVIDIA
Current Available Compute Types	Lenovo ThinkSystem SC750 V4 SC750 V4 datasheet
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	Features System Management Module (SMM3) in the enclosure, supports daisy chaining and BMC pass-through, integrates with Lenovo XClarity and Confluent.
Front access	Compute trays Cable Management
Rear access	Water connection, Power and System Management Module (SMM3) 2x RJ45 on the SMM for XCC with daisy chain support, USB Type A for SMM FFDC log collection
Power Supply	Accommodates 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 data center 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.
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 N1380 Enclosure, contact your Lenovo representative or Business Partner or visit www.lenovo.com/thinksystem. For detailed specifications, consult the N1380 Enclosure product guide.

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