PRODUCT BRIEF

SUPERMICRO RACK-SCALE HPC SYSTEMS WITH FLEXTWIN™ ACCELERATE APPLICATION PERFORMANCE

New Supermicro High Density Rack-Scale Solution for HPC at Scale

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Executive Summary

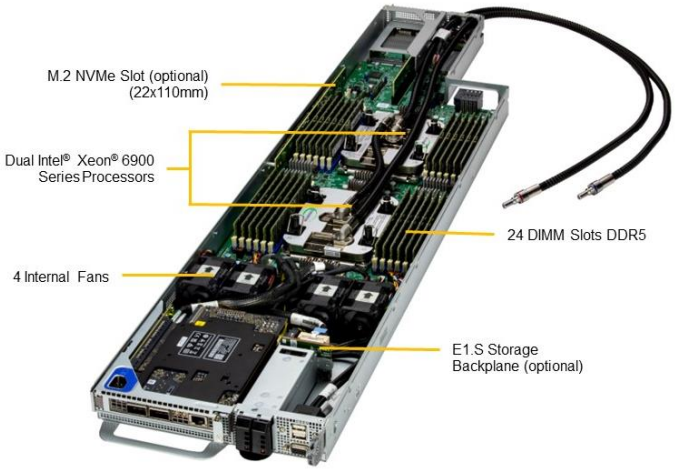
Supermicro's new purpose-built HPC servers are designed to tackle the most demanding high-performance computing applications. These servers incorporate liquid cooling and can accommodate the latest and highest performing CPUs. With an extreme density of tens of thousands of cores in a single rack, these new dense computing systems do not give up performance as other solutions may. The system is optimized for HPC, yielding a compelling performance per dollar. The rack-scale Supermicro FlexTwin servers deliver high-end performance using the latest Intel CPUs. The new Supermicro FlexTwin server is powered by Intel Xeon 6 series processors with P-cores at up to 500W TDP per socket.

The latest HPC applications are highly distributable at the CPU level with multiple cores, within the same servers with dual socket motherboards, and across systems. Certain applications have been designed to use thousands of cores concurrently and will greatly benefit from the Supermicro FlexTwin design. The 12 memory channels per socket deliver the highest bandwidth for memory bandwidth sensitive applications. FlexTwin's Liquid cooling approach is optimized for these latest generation dense configurations, and the Supermicro FlexTwin is optimized for this cooling method.

Supermicro FlexTwin System Basics

The new Supermicro FlexTwin is a multi-node system that accommodates today's highest-performing CPUs. The Supermicro FlexTwin contains four independent nodes in just 2U of server height. Liquid cooling is standard on the Supermicro FlexTwin to cool these top bin processors. The Supermicro FlexTwin SuperServer SYS-222FT-HEA-LCC supports:

- 4 Nodes in a 2U high chassis
- CPUs: Dual top bin processors consisting of Intel Xeon 6 series with P-Cores (https://www.supermicro.com/en/products/system/flextwin/2u/sys-222ft-hea-lcc?utm=smclpp)
- Memory: 24 DIMM slots (per server)
    - Max Memory (1DPC): Up to 6TB 6400MT/s ECC DDR5 RDIMM
    - Max Memory (1DPC): Up to 3TB 8800MT/s ECC DDR5 MRDIMM
- Networking
    - Standard: 1 OCP 3.0 Compatible AIOM x16 Gen5
    - Standard: 1 LP PCIe x16 Gen5
    - Optional: 1 FHHL PCIe x16 Gen5



The Supermicro FlexTwin is a front serviceable design that significantly simplifies maintenance and servicing procedures. Hot-swappable nodes, I/O, and storage can all be installed and serviced from the cold aisle without operating in the back with the higher-density cabling. Supermicro FlexTwin's nodes are designed to accommodate larger CPU sockets and twelve memory channels, which today's high-performance CPUs require. Yet, the front service drastically reduces instances of adjacent node interference caused by clearing a path of critical fabric cables, cooling hoses, and power cords to remove a node from the rear of the rack.

Rack-Scale High-Performance Computing

High-performance computing requires the fastest computing resources available. Previously, in earlier versions of the Supermicro Twin families, the compute density was impacted when high core count and high GHz CPUs were used. With the new Supermicro FlexTwin, users can now use a system with the highest-performance CPUs available while increasing the density of cores per rack. The total processing power and memory is 2X compared to a rack mounted 1U server with the same processing power.

	Supermicro FlexTwin
CPU Processor Used	Intel Xeon 6 6980P
CPUs Per Server	2
CPUs per 2U Height	8
CPUs per 48U Rack	8*20 = 160
Cores Per 48U Rack	20,480
Maximum Memory Per Rack	480 TB

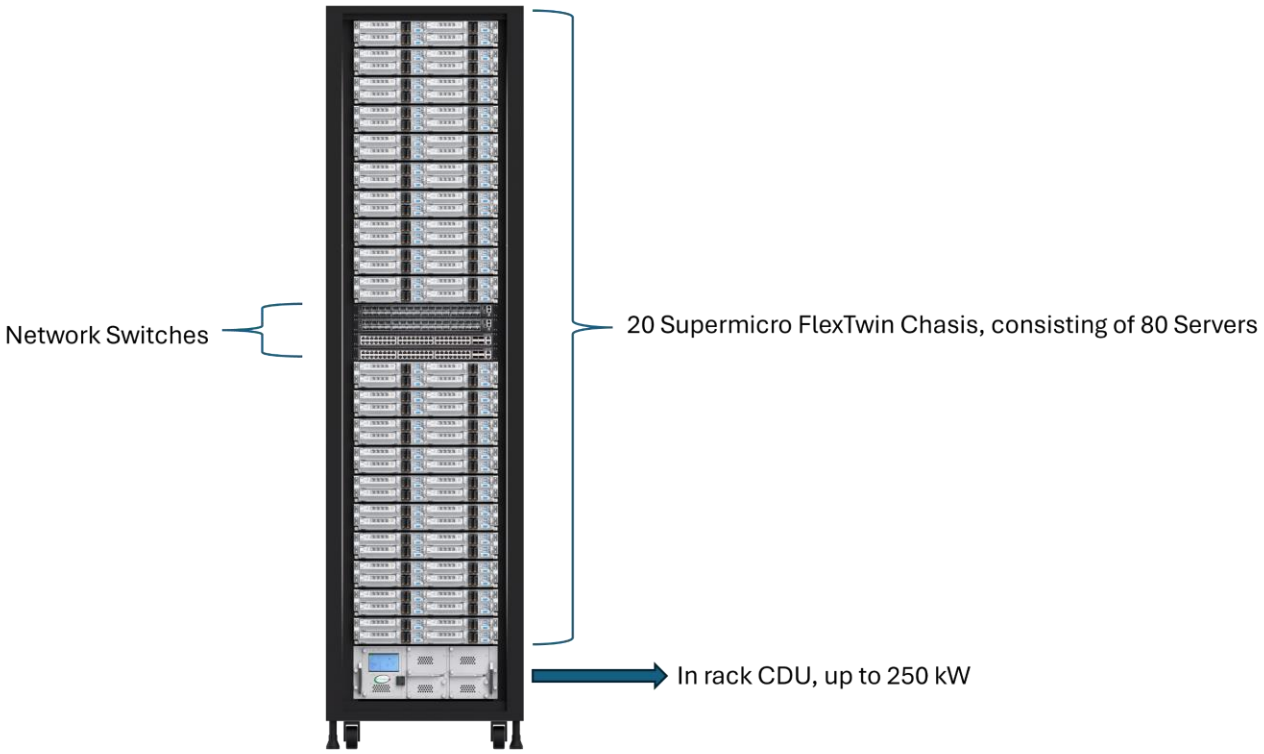
While simply inserting servers into a rack is certainly possible, the eventual outcome may not be satisfactory. Supermicro's expertise when working on complex data center installations means that rack-scale design considers more than just the servers; it includes network architecture, cooling demands, and real-estate requirements.

Benefits of Rack-Scale HPC Design:

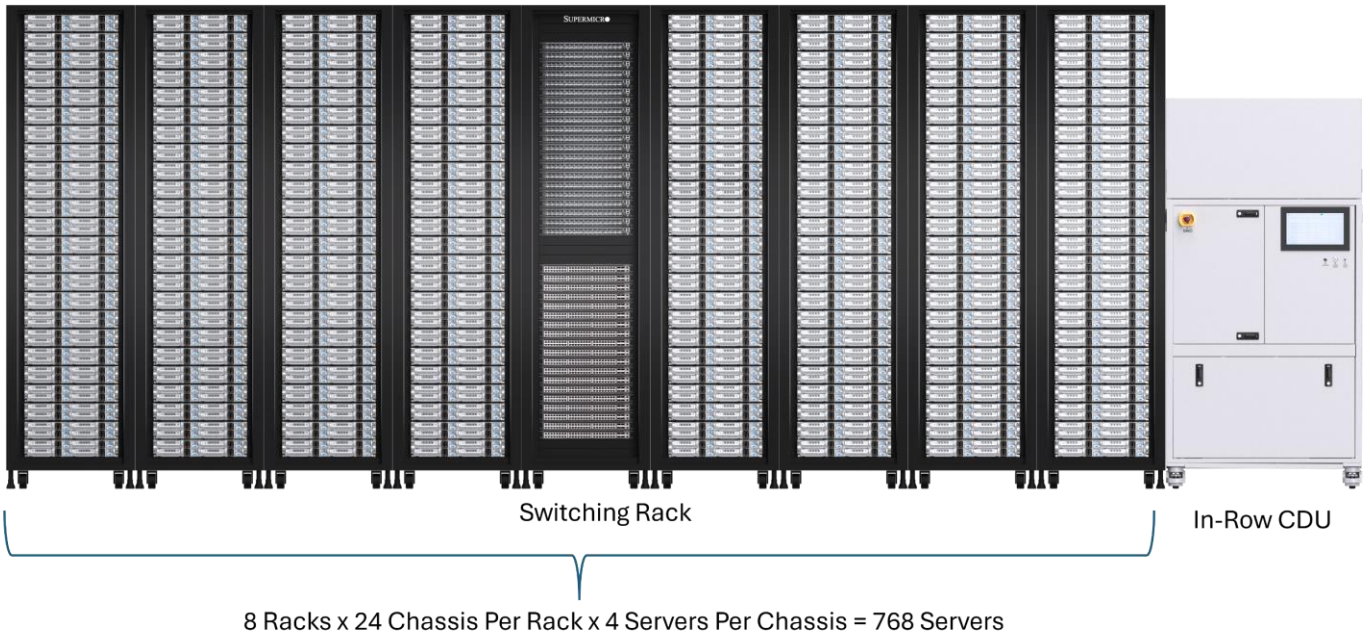
Many organizations set up clusters of similar systems to run a service for an organization, such as the design or engineering department. In this case, a rack or multi-rack installation could be shared by multiple users, with each granted the required resources (# of cores or CPUs) based on the requirements and licensing of the application that will be run. An entire rack contains up to 22 Supermicro H14 FlexTwin systems in addition to the Supermicro liquid cooling solution. To maintain Supermicro's high quality standards, the cluster is built in our factory and is stress tested and pressure checked before delivery to the customer.

The Rack-Scale optimized Supermicro FlexTwin is available in two defined rack configurations.

- Single Rack consists of 20 Supermicro FlexTwin servers, required networking, a Coolant Distribution Unit (CDU), Coolant Distribution Manifolds (CDM), and all the necessary hoses to connect to an external cooling source.



- Multi-Rack Configuration with 768 Supermicro FlexTwin servers, required networking switches, and an in-row cooler that contains the necessary cooling capacity for the 768 servers.



The Supermicro FlexTwin is specifically designed to handle highly scalable workloads or significant numbers of independent jobs. The Supermicro FlexTwin will excel, with the high number of high-performance cores in domains such as:

- Manufacturing is ideal for FEA, CFD, and EDA applications with high floating-point performance.
- Financial Technology – Determining securities' optimal buy or sell based on many historical factors.
- Scientific Research – Simulating cosmic events, nuclear reactions, and other phenomena that require massive amounts of data.
- Energy Exploration – Identifying where to drill or extract more energy from existing wells.
- Health Care and Life Sciences – Develop new drugs and find treatments for many diseases.

Open Management

Our approach to management enables you to deliver the scale your organization requires. SuperCloud Composer software helps you configure, maintain, and monitor all of your systems using single-pane-of-glass management. If your DevOps teams prefer to use their own tools, our accessible Redfish-compliant API provides access to higher-level tools and scripting languages. Regardless of your data center's management approach, our open management APIs and tools are ready to support you.

Supermicro's Liquid Cooling and Benefits

Supermicro has the experience and expertise to deliver complete data centers with liquid-cooled racks and servers. Liquid-cooling at the server level moves 90% of the server heat generation to the liquid, which can lower electricity bills by up to 40% at the data center level.

With the capacity to deliver thousands of racks per month from multiple manufacturing facilities, Supermicro's time-to-delivery is one of the fastest in the industry. Supermicro can design workload-optimized systems that address many customers' requirements by working closely with leading CPU and GPU manufacturers.

Summary

The Supermicro FlexTwin is designed specifically for HPC workloads, with its high core capacity and the highest performing cores per server, chassis, and rack. HPC applications typically require significant memory bandwidth, and the Supermicro FlexTwin offers the latest memory technology, including MRDIMMs at 8800MT/s.

Liquid cooling is designed into the system, not forced in as an afterthought. Using the latest CPUs from Intel, the Supermicro FlexTwin will handle the most demanding floating point workloads, reducing time to solution or enabling additional parameters or physics to be included in the simulations.

For more information:

Supermicro FlexTwin Product Family: https://www.supermicro.com/en/products/flextwin
Supermicro X14: www.supermicro.com/x14
Supermicro X14 Whitepaper: https://www.supermicro.com/white_paper/white_paper_X14_Servers.pdf
Supermicro FlexTwin Page: https://www.supermicro.com/en/products/system/flextwin/2u/sys-222ft-hea-lcc

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