**PRODUCT BRIEF** 



# SUPERMICRO RACK-SCALE HPC SYSTEMS WITH FLEXTWIN<sup>™</sup> 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 rackscale Supermicro FlexTwin servers deliver high-end performance using the latest AMD CPUs, specifically the new 5<sup>th</sup> Gen AMD EYPC<sup>™</sup> processors, with a TDP of up to 500W.



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 those applications that are memory bandwidth sensitive. The FlexTwin liquid cooling approach is optimized for the latest generation of dense CPU configurations.

## 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 AS-2126FT-HE-LCC supports:

- 4 Nodes in a 2U high chassis
- CPUs: Dual top bin processors consisting of 5<sup>th</sup> Gen AMD EPYC processors (<u>https://www.supermicro.com/en/products/system/flextwin/2u/as-2126ft-he-lcc?utm=smclpp</u>)
- Memory: 24 DIMM slots (per server)
  - Max Memory (1DPC): Up to 9TB DDR5-6400
- Networking
  - Standard: 1 OCP 3.0 Compatible AIOM Slot
  - Standard: 1 LP PCIe x16 Gen5
  - o 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 needing to operate in the back with the higher density cabling . Supermicro FlexTwin's nodes are designed to accommodate AMD's highest performing CPUs and twelve memory channels per socket to deliver high memory bandwidth for memory hungry applications. With the complexity and density of rear-cabled HPC solutions, the front serviceable nodes drastically reduce 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.



## **FlexTwin Performance**

The FlexTwin, containing the AMD EPYC 9005 Series processor, performs amazingly well when running the SPEC Floating Point Rate benchmark suite. The leading performer for the AMD EPYC 9005 series processor among IDC Top 5 server vendors (Q1 CY2024) is Supermicro, with a Result rating of 2530 for a dual-socket server using the AMD EPYC 9965 processor. With increased cores per node, memory bandwidth has become critical for most HPC applications. AMD has led the industry with 12 memory channels per socket, and the AMD EPYC 9005 continues to support 12 memory channels per CPU and DDR5 DIMMs.

## **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	AMD EPYC 9965
CPUs Per Server	2
CPUs per 2U Height	8
CPUs per 48U Rack	8*20 = 160
Cores Per 48U Rack	30,720
Maximum Memory Per Rack	720 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.



8 Racks x 24 Chassis Per Rack x 4 Servers Per Chassis = 768 Servers



SUPERMICR

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. Liquidcooling 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, the 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.

Liquid cooling is designed into the system, not forced in as an afterthought. Using the latest CPUs from AMD, 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: <u>https://www.supermicro.com/en/products/flextwin</u> Supermicro H14: <u>www.supermicro/aplus</u> Supermicro H14 Whitepaper: <u>https://www.supermicro.com/white\_paper/white\_paper\_H14\_Servers.pdf</u> Supermicro FlexTwin Page: <u>https://www.supermicro.com/en/products/system/flextwin/2u/as-2126ft-he-lcc</u>



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As a global leader in high performance, high efficiency server technology and innovation, we develop and provide end-to-end green computing solutions to the data center, cloud computing, enterprise IT, big data, HPC, and embedded markets. Our Building Block Solutions® approach allows us to provide a broad range of SKUs, and enables us to build and deliver application-optimized solutions based upon your requirements. Visit www.supermicro.com

#### AMD

AMD is the high performance and adaptive computing leader, powering the products and services that help solve the world's most important challenges. Our technologies advance the future of the data center, embedded, gaming and PC markets. Founded in 1969 as a Silicon Valley start-up, the AMD journey began with dozens of employees who were about passionate creating leading-edge semiconductor products. AMD has grown into a global company setting the standard for modern computing, with many important industry firsts and major technological achievements along the way. Visit <u>www.amd.com</u>

