



CONSTRUCT OPTIMIZED IT SOLUTIONS WITH THE SUPERMICRO X12 TWIN FAMILY OF MULTI-NODE SERVERS

Select From the Twin Family of Multi-Node Servers to Exactly Match Workload Requirements with Superior Functionality and Efficiency









TwinPro®

BigTwin®

FatTwin®

GrandTwin™

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SUPERMICRO

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.

Executive Summary

The Supermicro Twin family of products has been designed for the most demanding applications while also reducing OPEX through innovative design that reduces electricity usage and Ewaste. The Twin family consists of three product families that all offer the benefits of shared power and cooling systems and utilize the 3rd Gen Intel® Xeon® Scalable processors.

Supermicro Twin Family

Multi-node systems are designed so that all servers (nodes) are located within a single chassis with shared power supplies and fans. Supermicro has developed a product family that takes advantage of the latest available computing, storage, and networking technologies in the Twin product family. These systems are available in the TwinPro®, BigTwin®, FatTwin®, and GrandTwin™ product lines. These product lines offer the latest CPU technology in various form factors and offer a significantly increased computing power and memory capacity density compared to traditional rackmount servers while reducing

power consumption. For example, a Supermicro BigTwin with four nodes and dual processors in each node results in 8 CPUs in just 2U. This increased density compares to a typical 1U rackmount server with 2 CPUs in 1U, a 100% increase in computing density. In addition, a single chassis containing multiple compute nodes reduces the amount of sheet metal used and allows for upgrading the nodes as needed. This also lowers possible E-waste as only one node needs to be updated or upgraded at a time.

The airflow over a hot surface (CPU) needs to be removed so that the CPU does not overheat. Since shared fans can be larger in size (diameter), they can run at lower speeds to produce the same airflow CFM (cubic feet per minute) needed to cool the processors. Larger fans running at lower speeds use less electricity than smaller fans do. The CFM required can be calculated and fan speed adjusted accordingly.

Building blocks enable IT administrators to create environments from multiple components that match their specific workloads. The Twin product lines with flexible computing, storage, and networking capabilities allow an entire IT environment to be constructed and deployed to match specific workloads and the physical design of a data center.

The Twin family consists of three product lines, the TwinPro®, BigTwin®, and FatTwin®. All are configured with the 3rd Gen Intel Xeon Scalable processors, with a maximum thermal design profile (TDP) of 270 Watts supported in specific configurations. The nodes in the BigTwin series can also be liquid-cooled for environments where maximum cooling is needed and data center cooling systems cannot maintain proper operating temperatures.

Supermicro TwinPro

The Supermicro TwinPro is the entry point into the Twin family. Four nodes, each containing two CPUs, can be configured in the TwinPro. Each node has 16 DIMMs, which give each node up to 4TB of high speed memory. On the motherboard are dual 10GbE network interfaces, ideal for OS access and cluster management. TwinPro systems can also be configured with two redundant 2200W Titanium Level (96%) power supplies. Up to 6 hot-swappable SAS or SATA drives and two internal M.2 NVMe SSDs per node can be used for direct attached storage. Expansion slots for each node include two low-profile PCI-E 4.0 slots x16, ideal for hand-bandwidth network adapters or FPGAs. Both a 1U 2-Node and 2U 4-Node (pictured here) are available.



Figure 1 - TwinPro Servers

Supermicro BigTwin

The Supermicro BigTwin continues to lead the industry with systems designed for low OPEX and high performance. The BigTwin is available in a 2U form factor, with either two or four nodes available. Each node can accommodate up to two 3rd Gen Intel Xeon Scalable processors. The 2-Node system includes custom heat pipes to optimize airflow to support dual-processors up to 270W TDP, the maximum available in the Intel product lineup. The 4-Node system has a vapor chamber heatsink with an air channel to accommodate dual processors, up to 205W TDP, a significant thermal design feature optimized for hyper-converged and high-performance storage solutions. Various storage options are available for the nodes, including up to twelve 2.5" hotswap NVMe/SAS/SATA or six 3.5" drives, including Helium HDDs to maximize storage capacities for scale-out storage solutions.

Additionally, two M.2 SATA or NVMe drives are supported with optional NVMe HW RAID 1 for boot redundancy, based on Marvell® 88NR2241 intelligent NVMe switch. Each compute-optimized node contains two PCI-E 4.0 slots and SAS support with Broadcom SAS3808/SAS3908 controllers. Each storage-optimized node has three PCI-E 4.0 slots and SAS support with Broadcom

SAS3808/SAS3816 and an optional SAS3916, supporting up to 12 SAS/SATA drives. In addition, the BigTwin family includes up to 16 DIMM slots per server, accommodating up to 6TB per node when using Intel® Optane™ Persistent Memory 200 series. Onboard networking options for BigTwin nodes are highly flexible with AIOM PCI-E 4.0 add-on cards, compliant with OCP (Open Compute Project) 3.0 SFF standards.

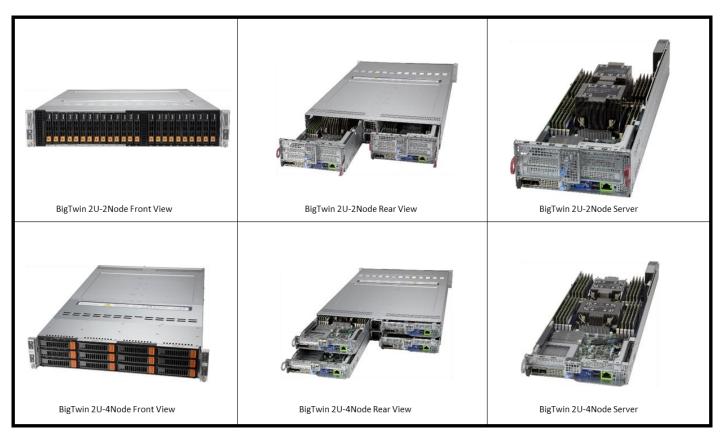


Figure 2 - BigTwin Servers



Figure 3 - BigTwin Server with Liquid Cooling

Supermicro FatTwin

Supermicro's FatTwin product family is a 4U multi-node system containing eight or four nodes. A true workhorse, the FatTwin is a battle tested platform deployed in some of the largest cloud datacenters. In addition, its flexibility allows customers to standardize on one platform for both their storage and compute needs in today's infrastructure environments.

Each node can contain up to two 3rd Gen Intel Xeon Scalable processors, and each node is designed to run with only a single CPU installed on the dual-CPU motherboard. These systems are designed with front facing nodes for easy serviceability. In a hotaisle, cold-aisle data center, the ability to service these systems from the front (cold aisle) makes servicing more accessible and

faster than working in a hot-aisle containment setup. The hot-swappable drive bays can accommodate NVMe, SAS, or SATA storage devices. A single GPU can also be installed for HPC and AI/ML applications. Additionally, 16 DIMM slots are available on each node, accommodating up to 4TB of DRAM or 6TB when using Intel Optane™ Persistent Memory. Network connectivity is through AIOM support.

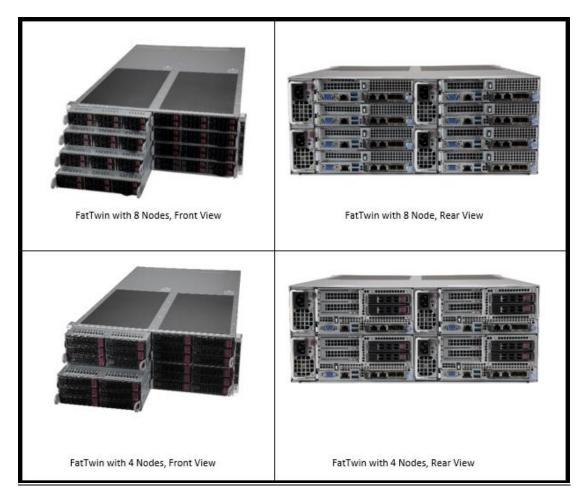


Figure 4 - FatTwin Servers

Supermicro GrandTwin

The new Supermicro GrandTwin family of multi-node rackmount building block systems has been designed to maximize front I/O and serviceability and features the latest 3rd Gen Intel® Xeon® Scalable processors. Designed explicitly for space-constrained installations with limited or no hot-aisle access, GrandTwin provides front access to all networking ports and node trays.

Many telcos and public/private cloud providers have limited access to the hot aisle due to space or OPEX constraints, complicating the serviceability of networking and storage systems. While most servers today require installation and service from the back of the system, the Supermicro GrandTwin gives IT administrators the option to access all I/O from the system's

front. This feature reduces the difficulty of implementing and maintaining systems in space-constrained environments or more environmentally friendly data center designs where cold air aisles are separated from hot air aisles.

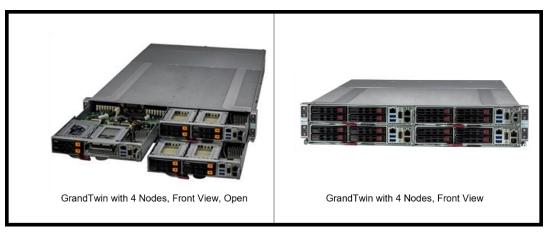


Figure 5 - GrandTwin Server

	X 1	12 TwinPro	X12 BigTwin		X12 FatTwin				X12 GrandTwin
Height	1 U	2U	2	U	4		łU		2U
Number of Nodes	2	4	2	4	4		8		4
Max CPUs Per Node	2	2	2	2	2		2		1
Max TDP Watts	185	185	270	205	UP	DP	UP	DP	UP
Per Node					250	205	250	185	270
Max DIMMS/Socket (Including PMem)	16	16	20	20	16		16		16
NVMe Support	No		Yes		Yes			Yes (Modular Kit)	
Intel® Optane™ PMem Support	No		Yes		Yes			Yes	
Max PCI-E Cards per Node	2 1 LP GPU	2 1 LP GPU	3 1 DW GPU	2 2 LP GPU	1 LP	L GPU	1 1 LP GPU		1 1 LPGPU
Max. Number of Drives/Node	4	6	12	6	6	5	8		4
Onboard Networking	D	ual-10GbE	AIOM*		AIOM*				I/O Module**

^{*}AIOM: The Supermicro® Advanced I/O Module (AIOM) is the latest form factor designed to provide a wide range of networking options and other I/O technologies for server, storage, and IoT systems. The Supermicro AIOM card contains many options for networking. See more at: https://www.supermicro.com/en/support/resources/aoc/aiom

Table 1 - High-Level Comparison of TwinPro, BigTwin, FatTwin, GrandTwin

^{**} I/O Module: Proprietary I/O Module designed for GrandTwin to support Front I/O with BMC, dual 10GbE or dual 25GbE, USB, and VGA ports

Example Use Cases

TwinPro:

- Data Center Cloud Computing: The Supermicro TwinPro is an economical choice when a lower cost multi-node solution is required. With lower cost CPUs than other systems, the Supermicro TwinPro can be used for various data center and cloud computing workloads, where high-density servers are required. The TwinPro reduces E-waste with up to four nodes in a compact 2U chassis, as each node can be replaced or upgraded without replacing an entire chassis. Raw materials are also reduced compared to standard 1U rackmount servers.
- **Virtualization:** For workloads that require advanced virtualization implementation for standard workloads, the Supermicro TwinPro is an ideal solution. With up to 4 nodes in a 2U chassis, these systems can easily satisfy the SLAs of many organizations that require fast responses with economic CPU choices.

BigTwin:

- Hyperconverged Infrastructure: The Supermicro BigTwin is an excellent server for Hyperconverged Infrastructure (HCI) deployments. Many workloads in various industries benefit from the BigTwin, including Big Data Analytics, DevOps & IT Operations, Cloud-Native Applications, High-Performance Databases, and Mission-Critical Applications. With a range of configurations of CPUs and very flexible I/O options, the Supermicro BigTwin allows mission critical applications to be run with the highest performance available. Many Nutanix customers have chosen to use the for their demanding enterprise Supermicro BigTwin most applications. See more (https://www.supermicro.com/en/pressreleases/supermicro-expands-total-solution-portfolio-offering-nutanix-nxplatforms-hybrid). These environments require flexible storage options addressed with NVMe/SAS/SATA support and multiple network connectivity options that are easily satisfied using AIOM options and high-bandwidth low-profile cards.
- **Distributed Storage & Database Solutions:** With various configurations supporting the latest, highest performing CPUs and NVMe technologies, the BigTwin is an ideal building block for organizations creating and building their own scale-out storage and distributed databases, whether on-prem or a publicly available service. With the compute & storage density available in a 2U 4-Node and 2-Node setup with dual sockets per node, the BigTwin can provide industry-leading storage performance for modern AI workloads and support Big Data Analytics with popular software-defined solutions, such as MongoDB, Cassandra, and Ceph.
- **HPC:** The Supermicro BigTwin, with its ability to house the most powerful CPUs, high-speed memory modules, and cache coherent host channel adapters available, is an ideal choice for energy-efficient, scale-out High-Performance Computing environments. With a high number of CPUs available in a dense package, support for up to 3kW of Titanium-level power supplies, and a range of I/O performance options, the BigTwin accelerates time to solution. So whether running more parallel workloads or enlarging datasets, or supporting more physics engines for data modeling & simulations, organizations can bring products to market faster and reduce costs in various industries.
- Other Applications: Other applications that the Supermicro BigTwin is ideal for include: Back-up & Recovery, All-Flash Object Storage (https://www.supermicro.com/white_paper/white_paper_Ceph_Cluster_BigTwin.pdf), High-Density RAID storage, and Big Data Analytics.

FatTwin:

- Cloud and Web Applications: For organizations that need to provide services to millions to billions of users, the Supermicro FatTwin is an ideal solution, built with the highest density available. The front-facing (cold aisle) serviceability and ease of maintenance reduce OPEX and allow faster replacement than a server with rear-facing (hot aisle) access. With the design capability of running the nodes with only a single CPU, infrastructure executives can optimize exactly the best amount of computing cores for extremely dense data center environments
- EDA and Semiconductor Simulation: With the increasing demand for accurate simulations of multi-billion transistor CPUs and other microprocessors, a system with high speed CPUs and large memory access is required. The Supermicro FatTwin, optimized for high density computing, is an ideal server for simulations that require access to significant amounts of memory. In addition, the Supermicro FatTwin includes Titanium level redundant power supplies, ensuring that simulations do not abort when there is a slight power loss to the critical computing components.
- **Data Warehousing:** With up to eight high-capacity HDDs and single-socket support per node in multi-node chassis, the FatTwin is one of the industry's most power-efficient, distributed storage solutions. This system is a purpose-built platform for Big Data Analytics and is still used today for data warehousing to deliver business intelligence at scale.
- Other Applications: Other applications that the Supermicro FatTwin excels at include: Cloud Optimized Servers,
 Data Center Enterprise Applications, and Virtualization Servers.

Read more about how a public company uses the Supermicro FatTwin to handle trillions of messages daily. https://www.supermicro.com/CaseStudies/CaseStudy Fortune100FatTwin.pdf

GrandTwin

- **Multi-Purpose Content Delivery Network:** The GrandTwin's compact enclosure and front I/O options allow operators to easily onboard new infrastructure or deploy into brownfield environments from a global logistics and integration standpoint.
- **Distributed Caching Services:** Reliable cache clusters are required to reduce the round trip time by bringing the content closer to consumers. With each node supporting one 3rd Gen Intel Xeon Scalable Processor, 16 DIMM slots, and Intel PMem 200 Series, GrandTwin allows customers to cost-effectively deploy clusters with large memory pools without dealing with the complexity of NUMA-awareness and managing process affinities.
- **Streaming Data Services:** To optimize performance without increasing the costs of streaming data infrastructure, large broadcasting and telecommunications companies have adopted a hybrid cloud approach. There may be several transcoding steps to manage multiplexing, packaging, and encryption from content ingestion to distribution at strategic CDN PoPs (Points of Presence), which requires a tremendous amount of aggregated computing power and network bandwidth. With support for GPU acceleration, GrandTwin can provide optimal bitrate and low-latency streaming solutions with flexible I/O options.
- **Telco Edge Cloud:** In the 5G era, CSPs need a simple and easy way to operate hybrid cloud building blocks that can automatically scale and optimize latency-sensitive back-end applications while managing & monitoring other IoT/embedded systems at the edge. The GrandTwin is optimized to meet these requirements by complying with

CNCF (Cloud-Native Computing Foundation) and ODIM (Open Distributed Infrastructure Management) standards, plus supporting FPGA acceleration devices, certified to support open RAN (Radio Access Networks) standards.

Summary of Supermicro Twin Product Families

The Supermicro Twin Product Family consists of three product lines designed to use the 3rd Gen Intel Scalable processors. The Twin family starts with the TwinPro systems. This flexible 1U and 2U systems offer a range of I/O expansion options and are designed to reduce CAPEX and OPEX costs. Next up is the 2U 2-Node and 2U 4-Node BigTwin®, a breakthrough multi-node server system with many innovations and industry firsts, designed to support the highest performance CPUs, maximum memory capacity, flexible networking, all-flash NVMe support, and supports hardware acceleration for content delivery. These systems are optimized for answering challenging business, finance, or scientific research requirements. Finally, the 4U FatTwin series is configurable for up to 8 nodes and is built for advanced deployment scenarios with single-socket support, flexible storage options, and industry-leading PUE, which is ideal for scale-out deployments. With a new edition to the Twin family, Supermicro is first to market with a modular Twin design with Front I/O, single-socket support, 16 DIMMs, and optional hardware acceleration to deliver cost-optimized caching and streaming platforms to bridge the gap between far edge computing and cloud resources.

Additional Information

https://www.supermicro.com/en/products/twin https://www.supermicro.com/en/products/twinpro https://www.supermicro.com/en/products/bigtwin https://www.supermicro.com/en/products/fattwin https://www.supermicro.com/en/products/grandtwin