NEW LEVELS OF OPTIMIZATION ARE NOW AVAILABLE WITH SUPERMICRO X14 SERVERS FOR AI, HPC, ENTERPRISE, AND EDGE WORKLOADS, INCORPORATING INTEL® XEON® 6 SERIES PROCESSORS

Supermicro X14 Servers Give Users the Flexibility to Match Systems and Processors to Workloads

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Executive Summary

The Supermicro X14 range of servers is the highest performing and most flexible ever, based on platforms proven over several generations that have been completely re-architected to integrate new and next-gen technologies. From large-scale AI Training and Generative AI to scale-out data centers and the intelligent edge, Supermicro X14 systems are based on modular Building Block Architectures with hybrid support for the entire range of Intel® Xeon® 6 processors, offering complete customization and optimization for any workload. With Supermicro's complete rack-scale integration services, liquid cooling solutions, and industry-leading global manufacturing

capacity, X14 serves as the foundation for total IT solutions at any scale, from a single system to a multi-rack cluster.

Supermicro Plug-and-Play Deployment at Scale

Supermicro, with worldwide manufacturing facilities, is a leader in supplying enterprises and cloud service providers with the latest server technology. Racks and clusters are delivered ready to operate with a Plug-and-Play design, requiring the user to simply uncrate and plug into power and networking infrastructures. This concept consists of several integration services:

- Consultation—Once a project has been identified, a dedicated project manager is assigned to work with the customer through delivery and beyond.

- Design: Expert product managers work with the customer to identify the most optimized systems, storage, software, and networking to ensure a reduced TCO once installed in a data center.

- Assembly—The entire cluster is assembled in one of Supermicro's worldwide facilities, including liquid cooling if needed.

- Testing—According to industry standards, the entire cluster is tested at the L12 level, with additional testing as specified by the customer.

- Deployment—Dedicated and experienced Supermicro and partner employees can assist with the deployment of the clusters at the customer site, including networking and complete application testing.

- Support – Ongoing maintenance and support are offered to ensure the entire data center operates smoothly and as specified, with agreed upon SLAs.
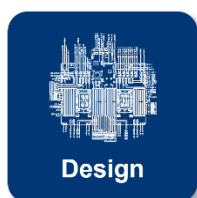
With the new Intel Xeon 6 Processors, further optimization is now possible, incorporating specially architected CPUs for different workloads.

There are two main product lines for the Intel Xeon 6 processors. Briefly, this includes:

- Intel Xeon 6 processors with E-cores – Efficient Cores: These CPUs are designed with significant performance per watt improvement over previous generations of Intel Xeon processors. The primary workloads for this processor can be categorized as cloud-native and scale-out workloads, where the high core count and low energy usage are critical. Performance per watt is the primary goal of these CPUs. Intel Xeon 6 processors with E-cores are designed to excel at single-threaded applications.

- Intel Xeon 6 processors with P-cores – Performance Cores: The P-core products refer to CPUs with performance per core as the primary goal of the CPU. P-cores are designed for the highest performance in a core and excel when an application is required to perform very well. HPC, AI, and Analytics will excel with the Intel Xeon 6 processors with P-cores.

     SUPERMICRO

Optimized for Maximum Performance
Intel® Xeon® 6900 series processors with P-cores (GNR-AP)

X14 Max Performance

SXM GPU

PCIe GPU

Hyper (HA)

SuperBlade® (BA)
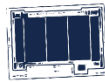
GrandTwin®

FlexTwin™

Edge GPU

Optimized for Performance and Efficiency
Intel Xeon 6700/6500 series processors with P-cores (GNR-SP)
Intel® Xeon® 6700 series processors with E-cores (SRF-SP)

X14 Hybrid Performance/Efficiency Optimized

Hyper (H)

CloudDC with DC-MHS

WIO

MP

SuperBlade® (B)

BigTwin®

GrandTwin®

Petascale Storage

Top-Loading

Hyper-E

Telco/Edge

What's New with Supermicro X14 Products?

New Intel® Xeon® 6 Processors	Up to 288 cores per node	Up to 12ch DDR5-6400, MRDIMM 8800, and CXL 2.0	EDSFF E1.S and E3.S NVMe drives	Data Center Modular Hardware System (DC-MHS)
Workload-optimized & pin compatible between E-core and future P-core CPUs	Increased computing density	More memory, faster bandwidth. New capabilities to extend capacity	supported on more families High throughput, higher density	Reduces complexity and simplifies maintenance
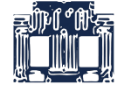
Supermicro X14 systems are designed for a range of workloads and take advantage of the latest system-level technologies, including new memory and storage technologies and interoperability.

Supermicro's X14 portfolio includes servers with Intel Xeon 6 processors with E-cores or P-cores optimized for different workloads. Supermicro can offer a wide range of servers designed for various applications using a building block architecture.

Product	Number of CPUs	6900P	6700P	6500P	6700E
GPU Optimized	2	✓			
GPU PCIe	2	✓			
Gaudi® 3	2	✓			
SuperBlade® – 6U	1 or 2	✓	✓	✓	✓
SuperBlade® – 8U	2		✓	✓	✓
FlexTwin™	2	✓			
BigTwin®	2		✓	✓	✓
GrandTwin®	1	✓	✓	✓	✓
Hyper	1 or 2	✓			
CloudDC	1 or 2		✓	✓	✓
WIO	1		✓	✓	✓
PetaScale All-Flash	2		✓	✓	✓
Top-Loading Storage	1 or 2		✓	✓	✓
Hyper-E	2		✓	✓	✓
Telco/Edge	1		✓	✓	✓
Multi-Processor	4		✓		

GPU-Optimized Servers (Dual Intel® Xeon® 6900 series processors with P-cores)

Today's AI factories need the power and flexibility the Supermicro GPU optimized offers. The range of GPU-optimized servers allows IT administrators to choose the level of performance and the scalability needed, from a single rack to multiple entire clusters. For applications that require the high performance of Intel Xeon 6 processors with P-cores, the Supermicro line of GPU-optimized servers will excel.

Supermicro X14 GPU-optimized systems feature a modular, standards-based architecture designed for maximum performance and flexibility. These systems support the latest generation NVIDIA SXM5 and SXM6 GPUs, including H200 and B200, allowing organizations to use a standard server architecture to take advantage of the industry's most powerful GPU configurations. Designed for serviceability with hot-swappable, tool-less components in a modular construction, chassis designs are optimized for thermal capacity, with configurations also designed for direct-to-chip CPU and GPU liquid cooling to further maximize performance and efficiency.

SXM-Based Servers—AI training requires a system with powerful CPUs and integrated and fast GPUs. Within the Supermicro portfolio, these servers offer top-line performance for applications requiring the highest-performing CPUs, including the Intel Xeon 6 processor with P-cores combined with high-performance GPUs communicating with each other at impressive speeds.

Key Applications: Large-scale AI Training / Large Language Models / AI/Deep Learning Training / Industrial Automation / Conversational AI / Drug Discovery / Climate and Weather Modeling / Finance & Economics

- **Key Specs (May vary by specific product):** Next-generation architecture for the most intensive AI workloads, dual Intel Xeon 6900 series processors with P-cores, up to 8 NVIDIA SXM6 GPUs, up to 10 PCIe 5.0 slots, support for DDR5-6400 and 8800MT/s MRDIMMs, up to 10 hot-swap 2.5" NVMe drives, direct-to-chip CPU and GPU liquid cooling for the SYS-422GA-NBRT-LCC.

PCIe Based Servers - Optimized for the next generation of HPC, action-oriented AI, 3D simulation, and advanced graphic design and rendering, Supermicro X14 PCIe accelerated solutions empower the creation of 3D worlds, digital twins, and 3D simulation models.

These systems support next-generation accelerators based on the industry-standard PCIe form factor, with up to 10 double-width GPUs in a 5U chassis. Additional networking slots provide connectivity of up to 400Gb/s to create high performance clusters of up to 32 nodes. Optional direct-to-chip liquid cooling delivers superior efficiency for the most demanding performance.

Key Applications: AI Model Training / Digital Twins / 3D Simulation / Real-time Ray-tracing / Animation and Modeling / Cloud Gaming / Design & Visualization / 3D Rendering / VDI / Media and Video Streaming / Diagnostic Imaging

Key Specs: Up to double-width 10 PCIe GPUs, Up to 13 PCIe 5.0 slots, Support for DDR5-6400 and MRDIMMs, up to 24 NVMe drives + 8 SATA drives, Direct-to-chip CPU and GPU liquid cooling options

Intel® Gaudi® 3 System (Dual Intel® Xeon® 6900 series processors with P-cores)

The Intel Gaudi 3 is a powerful AI accelerator designed to handle demanding training and inference workloads. It's part of Intel's Gaudi platform, which aims to provide a high-efficiency solution for enterprise AI applications. The key features and benefits of the Gaudi 3: 1) Exceptional performance: Delivers impressive performance for training and inference of large language models (LLMs) and other AI models. 2) Scalability: Supports flexible networking based on open, industry-standard Ethernet, allowing for efficient scaling of systems to meet the needs of demanding AI workloads. 3) Ease of use: Provides a user-friendly development platform and is supported by Intel Developer Cloud, simplifying the process of building and deploying AI applications and reducing costs associated with open-source software.   4) Networking capabilities: Features integrated 6 onboard OSFP 800GbE ports for massive scale-out networking. The Supermicro Gaudi 3 server is the only one in the industry powered by Intel Xeon 6900 series processors with P-cores.

SYS-822GA-NGR3

Key Specs: 8 Gaudi 3 HL-325L (air-cooled) or HL-335 (liquid-cooled) accelerators on OAM 2.0 baseboard Support for DDR5-6400 DIMMs Up to 8 hot-swap PCIe 5.0 NVMe drives, 8 high efficiency 3000W fully redundant (4+4) Titanium Level power supplies, 6 onboard OSFP 800GbE ports for massive scale-out networking, 2 PCIe 5.0 x16 (FHHL) + 2 PCIe 5.0 x8 (FHHL) expansion slots.

Key Applications: AI/Deep Learning Training / Business Intelligence & Analytics / Climate and Weather Modeling /Conversational AI / Drug Discovery / Finance & Economics / Healthcare / High-Performance Computing / Industrial Automation, Retail

Multi-Node Servers (Single or Dual Intel® Xeon® 6900 series processors with P-cores and Single or Dual Intel® Xeon® 6700 series processors with E-cores)

Multi-Node servers from Supermicro give customers several benefits, including a very high core density per rack and up to 34,560 cores of Intel Xeon 6 processors with E-cores. These multi-node systems have shared power, and specific models share cooling fans, which can help reduce the PUE in a data center. These product families are available with increased storage performance and density using the latest E1.S and E3.S NVMe storage devices.

February 2025

Supermicro SuperBlade® - Family of high density servers with built-in switches:

The Supermicro SuperBlade® family incorporates the Intel Xeon 6900 series processors and the Intel Xeon 6700 series processors, with single and dual socket configurations available. The Supermicro SuperBlade is available in a number of configurations, including various enclosures to fit a wide range of needs where dense computing is required.

SuperBlade – 8U: Future-proof, Resource-saving Architecture (Dual Intel® Xeon® 6700 series processors with E-cores)

Supermicro's high-performance, density-optimized, and energy-efficient SuperBlade can significantly reduce initial capital and operational expenses for enterprises and data centers. SuperBlade® utilizes shared, redundant components, including power supplies, cooling fans, chassis management modules (CMMs), integrated switches, or pass-thru modules to deliver the most cost-effective, green computing solutions. The X14 8U SuperBlade® architecture maximizes rack density, with up to 120 dual-processor servers in a 48U rack. The number of cables is reduced by up to 95% compared to rackmount servers.

Optional direct liquid cooling (DLC) can support the highest Intel Xeon 6 TDP CPU SKUs to achieve the lowest PUE with the optimal TCO in the data center.
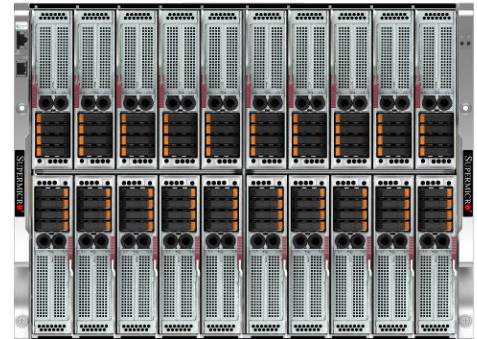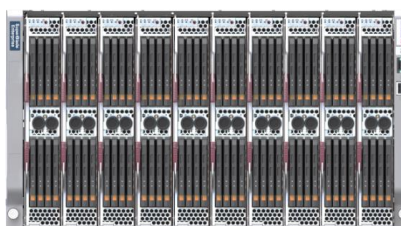
Key Applications: AI Inferencing / Hybrid and Private Cloud / Cloud Computing / Big Data Analytics / Financial Services / HPC / CDN / vSAN

Key Specs: Up to 120 servers per rack (Up to 34,560 CPU cores), 8U enclosure with 20 single-wide or 10 double-wide servers, sharing power supplies, cooling fans, CMMs, Ethernet, and InfiniBand switches, Dual Intel® Xeon® 6700 series processors with E-cores - up to 288 cores per node, Support for DDR5-6400 with up to 16 DIMMs (up to 4TB memory), 5 NVMe SSDs (4 E1.S and 1 M.2), 400G IB or Ethernet (OCP 3.0), 200G integrated IB switch, and up to 4x 25G Ethernet switches, Reusable enclosure, power supplies, cooling fans, CMMs, and switches for future generation servers, 96% efficiency, (N+N / N+1) redundant power supplies, Direct liquid cooling option.

SuperBlade – 6U: Future-proof, Resource-saving Architecture (Single Intel® Xeon 6900 series processors with P-cores and single and dual Intel® Xeon® 6700 series processors with E-cores)

Supermicro's X14 6U high-performance, density and memory-optimized, and energy-efficient SuperBlade can significantly reduce customers' initial capital and operational expenses. SuperBlade® utilizes shared, redundant components, including power supplies, cooling fans, chassis management modules (CMMs), switches, or pass-thru modules to deliver the most cost-effective, green computing solutions. The X14 6U SuperBlade architecture provides a high density of up to 100 servers per rack. Optional direct liquid cooling (DLC) can support servers with the highest power CPUs to achieve the lowest Power Usage Effectiveness (PUE) with the best TCO. Supermicro's X14 6U SuperBlade architecture is optimized for performance with maximum memory capacity (32 DIMMs – DP, 16 DIMMs - UP). Up to 20 GPUs can be installed in 6U enclosures for AI/ML, acceleration, graphics, and 3D rendering. It has

the ability to house up to 10 NVMe SSDs per server, which can be ideal for vSAN, EDA, big data analytics, and financial services applications.

Key Applications**:** AI/ML/ Hybrid and Private Cloud / Cloud Computing / Big Data Analytics / Financial Services / HPC / CDN / vSAN / EDA

FlexTwin™: Purpose-Built HPC at scale Solution with Liquid-Cooling (Dual Processor Multi-Node Architecture using Intel® Xeon 6900 series processors with P-cores)

The new Supermicro FlexTwin is purposely built for compute-intensive applications like those in HPC environments. FlexTwin is an entirely new platform designed for maximum performance, density, and serviceability in a liquid-cooled multi-node architecture, featuring support for the latest CPU, memory, storage, and cooling technologies. Purpose-built to support demanding HPC workloads at scale, including financial services, manufacturing, scientific research, and complex modeling, FlexTwin™ is cost-optimized for performance per dollar and can be customized to suit specific HPC applications and customer requirements thanks to Supermicro's modular Building Block architecture. Each hot-swappable FlexTwin node features direct-to-chip liquid cooling technology, removing up to 90% of the heat generated by the CPUs and reducing data center cooling costs compared to traditional air cooling, which ensures maximum compute performance by reducing instances of thermal throttling due to overheating. The Cooling Distribution Units (CDU) feature redundant pumps and power supplies, minimizing failure points and potential downtime.

Key Applications: HPC Data Centers / Financial Services / Manufacturing Organizations / Climate and Weather Modelling / Oil and Gas Exploration / Scientific Research

BigTwin®: Highly Modular Multi-Node Systems with Tool-Less Design (Dual Intel Xeon 6700/6500 series processors with P-cores, or Intel Xeon 6700 series processors with E-cores)

Supermicro X14 BigTwin® systems provide superior performance and serviceability with dual Intel Xeon 6 processors per node and hot-swappable tool-less design. Optimized for density (2U4N) or storage (2U2N), BigTwin architectures can be more cost-effective than standard 1U servers thanks to shared power and cooling while also increasing compute density and reducing overall TCO. The modular mid-plane design provides NVMe Gen 5 storage controller options with support for E3.S devices, and a new riser card design can support up to 4 M.2 drives for boot/OS or metadata/caching.

Key Applications: HCI / HPC / CDN / Hybrid Cloud Container-as-a-Service / Cloud Computing / Big Data Analytics / Back-up and Recovery / Scale-Out Storage

GrandTwin®: Highly Configurable Single Processor Systems with Front or Rear I/O (Single Intel Xeon 6900/6700/6500 series processor with P-cores or Single Intel Xeon 6700 series processors with E-cores)

The GrandTwin® architecture is purpose-built for single-processor performance. The design maximizes compute, memory and efficiency to deliver maximum density. Powered by Intel Xeon 6 processors, GrandTwin's flexible modular design can be easily adapted for a wide range of applications, with the ability to add or remove components as required, reducing cost. For front configurations, all I/O and node trays are fully accessible from the cold aisle, simplifying installation and servicing in space-constrained environments. Flexible storage with up to eight E1.S storage devices, a significant density increase over Supermicro X13 systems, and networking options are available via front AIOM modules, allowing countless custom configurations.

Key Applications: MEC (Multi-Access Edge Computing) / HPC / Cloud Gaming / Multi-Purpose CDN / High-Availability Cache Cluster / Telco Edge Cloud / EDA (Electronic Design Automation) / Mission-Critical Web Applications

Rackmount Optimized Servers

Supermicro's X14 Rackmount servers offer customers several choices, including single or dual processor configurations, significant memory capacity, and PCIe expansion slots. In addition, the new DC-MHS (Data Center Modular Hardware System) servers are designed to be installed when designing and implementing a multi-vendor rack scale facility.

	X14 Hyper	X14 CloudDC	X14 WIO
Positioning	Flagship Enterprise	CSP/Scale-out	Entry-level, Efficiency
Segments	HPC, Enterprise, Cloud Service Providers, Storage, Virtualization, Networking	Cloud Service Providers, Hyperscale Data Centers, Enterprise	Virtualization, Cloud Computing, Data Center
Sockets	2/1	2/1	1
DIMMs	32/16	32/16	8
PCIe	Up to 3 slots (1U) Up to 8 slots (2U)	Up to 3 slots (1U) Up to 6 slots (2U)	Up to 3 slots (1U) Up to 5 slots (2U)
Drives	Up to 24 hot-swap 2.5"	Up to 24 hot-swap 2.5"	10 hot-swap 2.5"/8 hot-swap 3.5"
Key Feature	Maximum I/O flexibility	DC-MHS	UP platform

Hyper: Flagship Performance and Flexibility for Enterprise Data Centers (Single or Dual Intel Xeon 6900 series processors with P-cores)

The new X14 Hyper series brings next-generation performance to Supermicro's range of rackmount servers, built to take on the most demanding workloads in the most proven 1U and 2U form factors. Supermicro's modular design allows customization of storage, expansion slots, network, and power supplies to meet the application requirements. The Supermicro Hyper server balances compute, storage, and expansion in a tool-less rackmount design for optimization, flexibility, and serviceability. The X14 Hyper lineup includes the best-selling dual-socket configurations designed for maximum power and compute density and new single-socket architectures to provide balanced performance with only one processor.

Hyper server lineup:

	Intel Xeon 6900P			
Chassis Height	1U (Liquid Cooled)	2U	1U	2U
Number of Sockets Per Server	2	2	1	1
Model	SYS-122HA-TN-LCC	SYS-222HA-TN	SYS-112HA-TN	SYS-212HA-TN

	Intel Xeon 6700P/6500P or 6700E			
Chassis Height	1U	2U	1U	2U
Number of Sockets Per Server	2	2	1	1
Model	SYS-122H-TN	SYS-222H-TN	SYS-112H-TN	SYS-212H-TN

Key Applications: Enterprise Server / Cloud Computing / Big Data Analytics / Hyperconverged Storage / AI Inference and Machine Learning / Network Function / Virtualization

CloudDC with DC-MHS: High-density, Tool-less Mechanical Design for Rapid Cloud Deployment and Easy Maintenance (Single and Dual Intel® Xeon 6700/6500 series processors with P-cores or Intel Xeon 6700 series processors with E-cores)
The new Supermicro X14 CloudDC with DC-MHS delivers ultimate flexibility on I/O and storage to support a range of cloud and data center workloads. The systems are designed to meet OCP DC-MHS specifications, improving modularity and flexibility for large-scale enterprises and cloud service providers to simplify data center management with DC-SCM modules. X14 CloudDC also features tool-less brackets, hot-swap drive trays, and redundant power supplies that ensure rapid deployment and more efficient maintenance in data centers. High-efficiency Titanium Level, redundant power supplies provide resiliency and a low carbon footprint. Rich security features include Intel® SGX, TPM 2.0, signed firmware, Silicon Root of Trust, Secure Boot, System Erase, Runtime FW protection, FIPS Compliance, and Trusted Execution Environment.

Key Applications: Private, Public, Hybrid Cloud / Big Data Analytics / AI Inferencing / Machine Learning / Network Appliance / Virtualization / Open BMC

WIO (UP): Wide-Ranging Flexibility for any Enterprise Workload (Single Intel® Xeon 6700/6500 series processors with P-cores or Intel Xeon 6700 series processors with E-cores)

Supermicro WIO systems offer a wide range of I/O options to deliver truly optimized systems for specific requirements. Users can optimize the storage and networking alternatives to accelerate performance, increase efficiency, and find the perfect fit for their applications. In addition to enabling customizable configurations and optimization for multiple application requirements, Supermicro WIO SuperServers also provide attractive cost advantages and investment protection.

Key Applications: Enterprise / Firewall / Security Appliances / Cloud / Network Appliance / General Purpose Computing

Storage Servers – Petascale All-Flash EDSFF (Dual Intel Xeon 6700/6500 series processors with P-cores or 6700 series processors with E-cores)

Supermicro's Petascale storage systems are ideal for deployments where storage throughput and latency are paramount, including generative AI, mission-critical databases, virtualization, next-gen big data, HPC, media & entertainment, and hot-tier caching. Supermicro's open architectures are designed to work with the broadest range of software partners to create a solution to drive every application. The symmetrical dual-CPU architecture balances resources and reduces latency by minimizing the length of data paths and maximizing airflow over critical components for optimal thermal performance.

With the latest industry-standard EDSFF E3.S form factors explicitly designed for high-performance solid-state media, these storage drives facilitate maximum performance from PCIe 5.0 interconnects, which ensures compatibility with future iterations of the PCIe protocol. These storage systems support all major vendors' new Gen 5 drives, allowing customers to choose the best components for their specific applications. Supermicro Petascale systems also support the industry's first CXL expansion modules, adding up to 1TB of DDR memory to the already powerful 32-DIMM solution. This emerging CXL technology is now available to add capacity and bandwidth for memory-bound applications.

Key Applications: Data Intensive HPC and AI / Private & Hybrid Cloud / Software-Defined Storage / NVMe Over Fabrics Solution / In-Memory Computing / Composable Infrastructure Platform

Multi-Processor Servers (Quad Intel Xeon 6700 series processor with P-cores)

Supermicro's multi-processor systems are available with four processors, designed for applications where direct access to many TB of memory and hundreds of cores in the same server are required. Realizing value from the vast quantities of data available to modern organizations requires significant compute power and memory density not available in traditional server architectures. Supermicro X14 Multi-Processor systems feature four Intel® Xeon® 6700 series processors with P-cores in a single compute node for an unprecedented number of compute cores, DDR5 DIMM slots, and PCIe lanes in a standard rackmount form factor. These systems are available in multiple configurations optimized for various storage, thermal, or acceleration requirements and scale effortlessly to support growing workload requirements.

Quad-processor systems featuring Intel® Xeon® 6700 series processors with P-cores64 DDR5 DIMM slots for maximum memory density, supporting DDR5 up to 6400MT/s and MRDIMMS up to 8000MT/s. Support for up to 2 double-width accelerators in 2U and up to 6 in 4U with air cooling. Configurations are optimized for compute, storage, and acceleration.

Key Application: AI, Business Intelligence, ERP, CRM, Scientific Simulations, In-Memory Databases, HCI, SAP/HANA

Edge/Telco

These systems are designed to be installed outside of a traditional data center. These compact systems can accommodate up to 3 GPUs and, with the new Intel Xeon 6 processors with E-cores, have 2.2X more cores and improved performance per watt, ideal for edge locations where power may be limited. Additionally, these systems feature DC power NEBS compliance and are available in rack mount and wall mounting options.

Hyper-E: Data Center Performance at the Edge (Dual Intel Xeon 6700/6500 series processors with P-cores or Intel Xeon 6700 series processors with E-cores)

Hyper-E delivers the performance and flexibility of Supermicro's flagship rackmount server family in a compact form factor optimized for telco and micro data center deployments. A mid-depth chassis and front I/O make incorporating Hyper-E into existing edge and telco infrastructure easier, while carrier grade (NEBS Level 3) design and optional DC power options further enhance flexibility in non-traditional data center environments. Storage and expansion configurations can be adjusted depending on the application, while maintenance-friendly design innovations eliminate the need for tools when servicing the system to simplify rollout and installation.

Key Applications: 5G Core and Edge / Telco Micro Data Center

Telco/Edge: Optimized Designs for 5G, Edge Computing, and Emerging IoT Systems (**Single Intel Xeon 6700/6500 series processors with P-cores or Intel Xeon 6700 series processors with E-cores)**

Supermicro provides innovative and first-to-market technologies that are the building blocks for today's computing platforms. Rapid growth in embedded markets and open standards are driving the need for higher levels of product integration and optimization through virtualization, AI inferencing, network connectivity, remote management, mobile communication, expanded I/O, and device-to-device communications using space and power-efficient configurations. Supermicro's family of high-performance embedded products is optimized for a wide range of applications and solutions. Supermicro offers many flexible and customized solutions for critical OEM projects, as well as advanced designs for stringent environments, firmware customization, BOM enhancements, and a wide range of legacy IO support.

Key Applications: Multi-Access Edge Computing / Flex-RAN / Open RAN / Edge AI Outdoor 5G

Supermicro System Advantages

Supermicro works closely with Intel to bring the latest Intel CPUs and GPUs to market. Supermicro delivers rack and cluster-level solutions to many industries with a range of server products and configurations. In addition, Supermicro offers a range of services and solutions to address the requirements of CSPs, Enterprise, and SMB customers.

Supermicro Total IT Solutions

- Industry's broadest portfolio of systems based on Intel® Xeon® 6 processors
- Rack Scale plug-and-play service to deliver complete, validated solutions within weeks, not months
- Production capacity of up to 5,000 racks per month worldwide and 1,500 liquid-cooled racks per month
- Made in the USA program with manufacturing in San Jose headquarters
- Industry standard compliance for hardware and silicon Root of Trust (RoT) and cryptographical attestation of components throughout the entire supply chain
- Supermicro liquid cooling, including CPU/GPU cold plate, Cooling Distribution Unit, and Cooling Distribution Manifolds for a complete integrated solution

Optimized, Open Architectures
- More than 15 families of systems optimized for AI, Cloud, 5G Edge, and more
- Modular Building Block architecture enables customization for specific workloads and configurations.
- Resource saving architecture to reduce materials and energy usage
- Enhanced thermal capacity to support next-gen CPUs, GPUs, and other components
- Flexible networking with Advanced I/O Modules (AIOM) up to 400G per card
- High ambient temperature operation up to 40°C with liquid cooling options
- Support for open and industry standards, including OCP 3.0, DC-MHS, OAM, ORV2, OSF, Open BMC, and EDSFF

Supermicro DC-MHS Advantages

Developed by the Open Compute Project (OCP), Supermicro X14 systems with DC-MHS are ideal for large CSPs & hyperscalers with multi-vendor hardware platforms. This provides consistent interfaces and form factors among modular building blocks for large-scale data centers. The Host Processor Module (HPM) is similar to motherboards, but without BMC/Security. Standardized form-factors and supporting ingredients allow interoperability of HPMs and platforms. The data center ready Secure Control Module (DC-SCM) enables common management and security infrastructure across platforms.

Intel Xeon 6 Processor Details

The latest Intel Xeon family of CPUs, the Intel Xeon 6 processors with E-cores, is designed to bring maximum performance per watt to the market for cloud-native and scale-out applications. The high core counts enable large numbers of applications or existing multi-core applications to run on a single CPU and even more in dual processor systems. Intel Xeon 6 processors are designed to be socket compatible within the same platform.

X14 Featuring Intel® Xeon® 6900 Series Processors Maximum Compute Density and Core Count	X14 Featuring Intel® Xeon® 6700 Series Processors Balanced Performance and Features	X14 Featuring Intel® Xeon® 6500 Series Processors Balanced Performance and Features	X14 Featuring Intel® Xeon® 6700 Series Processors Balanced Performance and Features
Intel Xeon 6900 with P-cores • Up to 128 cores/256 threads per CPU • Up to 500W per CPU • 1 or 2 socket servers • 12 memory channels • Up to 6400 MT/s DDR5 • 8800 MT/s MRDIMMs available • Up to 96 PCIe 5.0 lanes	**Intel Xeon 6700 with P-cores** • Up to 86 cores/172 threads per CPU • Up to 350W per CPU • 1,2,4,8 socket support • 8 memory channels • Up to 6400 MT/s DDR5 • 8000 MT/s MRDIMMs available • Up to 88 PCIe 5.0 lanes and up to 136 lane for 1 socket systems	**Intel Xeon 6500 with P-cores** • Up to 32 cores/60 threads per CPU • Up to 255W per CPU • 1 or 2 socket systems • 8 memory channels • Up to 6400 MT/s DDDR5 • Up to 88 PCIe 5.0 lanes	**Intel Xeon 6700 with E-cores** • Up to 144 cores/144 threads per CPU • Up to 330W per CPU • 1 or 2 socket servers • 8 memory channels • Up to 6400 MT/s DDR5 • Up to 88 PCIe 5.0 lanes

         SUPERMICRO

Performance Leadership

Supermicro systems demonstrate continued leadership among the Tier 1 server vendors with the top performance for a range of SPEC benchmarks. Below is a snapshot of the SPEC integer and floating-point benchmarks both for rate and speed.

Benchmark	System	CPU	Result	Rank (Tier 1)	System	CPU	Result	Rank (Tier 1)
Floating Point	**2-Socket**				**1-Socket**			
Rate	SYS-122HA-NRT	Intel Xeon 6980P	2680	#1	SYS-212HA-TN	Intel Xeon 6980P	1360	#1
Speed	SYS-822GA-NGR3	Intel Xeon 6980P	496	#1	SYS-212HA-TN	Intel Xeon 6980P	432	#1
Integer	**2-Socket**				**1-Socket**			
Rate	SYS-122HA-TN-LCC	Intel Xeon 6980P	2520	#1	SYS-212HA-TN	Intel Xeon 6980P	1270	#1
Speed	SYS-122HA-TN-LCC	Intel Xeon 6980P	13.6	#1	SYS-212HA-TN	Intel Xeon 6980P	13.4	#1

Technical Details

Intel Xeon 6 processors with E-cores: Technical Details
- 8 channels of DDR5-6400 memory
- Up to 24 GT/s and 6 links of UPI (1.8x gen-over-gen increase)
- Support for secure UPI/PCIe/CXL link encryption
- Support for Intel® Accelerator Engines including Intel® DLB, Intel® QAT, Intel® DSA and Intel® IAA
- Maximum performance-per-watt and core density for cloud, networking, analytics, and scale-out workloads
- CPUs with up to 144 cores
- Up to 2.7x better 5G core performance per rack vs 2nd Gen Intel® Xeon® processors (Intel internal measurements)
- 3.2x rack level performance improvement vs 2nd Gen Intel Xeon processors (Intel internal measurements)
- 2.6x performance-per-watt improvement vs 2nd Gen Intel Xeon processors (Intel internal measurements)
- 1 and 2 Socket scalability
- TDP starting at 205W

Intel Xeon 6 processors with P-cores: Technical Details
- 8 or 12 channels of DDR5-6400 memory
- Support for MRDIMMs up to 8800 MT/s (6900P), 8000 MT/s (6700P)
- Maximum performance-per-core for AI, HPC, storage, and Edge workloads
- General Compute - up to 6.4x higher floating point and up to 5.9x higher integer throughput vs. 2nd Gen Xeon (Intel internal measurements)
- HPC - up to 6.1x higher HPC performance based on the industry-standard HPCG benchmark vs 2nd Gen Xeon (Intel Internal measurements)
- Leading SPEC performance for Tier 1 vendors
- 1/2/4 Socket scalability
- Support for Intel® Accelerator Engines including Intel® AMX, Intel® DLB, Intel® QAT, Intel® DSA and Intel® IAA
- New FP16 support added to Intel® AMX accelerator

	P-Core			E-Core
Series	6500	6700	6900	6700
Socket Type	LGA-4710	LGA-4710	LGA-7529	LGA-4710
Socket Support	1,2	1,2,4,8	1,2	1,2
Memory Channels	8	8	12	8
Max TDP	255W	350W	500W	500W
DDR5/MRDIMM	6400	6400/8000	6400/8800	6400
Max Cores	32	86	128	144
Max PCIe	88	88 136 (R1S)	96	88

Memory support on the Intel Xeon 6 series processors differs depending on the specific CPU. For the first time, MRDIMMs are supported by these new processors.

	Xeon 6700 series					Xeon 6900 series				
	Max DIMM Count/Socket	Memory Channels	Memory Speed (1 DPC)	Memory Speed (2 DPC)	Max Memory/Socket	Max DIMM Count/Socket	Memory Channels	Memory Speed (1 DPC)	Memory Speed (2 DPC)	Max Memory/Socket
E-core	16	8	6400	5200	2TB (2DPC) 1TB (1DPC)					
P-core	16	8	6400 8000 (MRDIMM)	5200		12	12	6400 8800(MRDIMM)	-	3TB

Below is a summary of the Intel Xeon 6900P series processors:

SKU	Cores	Base	All Core Turbo (GHz)	Max Turbo	TDP (Watts)	Cache	Maximum Scalability	DDR5 Memory Speed	MRDIMM Memory Speed	UPI Links Enabled	Default DSA Devices	Default IAA Devices	Default QAT Devices	Default DLB Devices	Intel On Demand Capable	Intel Speed Select Technology (SST) Capable
2S Performance Per Core Optimized																
6980P	128	2.0	3.2	3.9	500	504	2S	6400	8800	6	4	4	4	4	N	N
6979P	120	2.1	3.2	3.9	500	504	2S	6400	8800	6	4	4	4	4	N	N
6972P	96	2.4	3.5	3.9	500	480	2S	6400	8800	6	4	4	4	4	N	Y
6952P	96	2.1	3.2	3.9	400	480	2S	6400	8800	6	4	4	4	4	N	Y
6960P	72	2.7	3.8	3.9	500	432	2S	6400	8800	6	4	4	4	4	N	Y

Below is a summary of the Intel Xeon 6700P series processors

SKU	Cores	Base (GHz)	All Core Turbo (GHz)	Max Core Turbo (GHz)	TDP (Watts)	Cache	Maximum Scalability	DDR5 Memory Speed	MRDIMM Memory Speed	UPI Links Enabled	Default DSA Devices	Default IAA Devices	Default QAT Devices	Default DLB Devices	Intel SGX Capacity (Per CPU)
6700P 2S Performance Per Watt Optimized															
6787P	86	2.0	3.2	3.8	350	336	2S	6400	8000	6	4	4	4	4	512GB
6767P	64	2.4	3.6	3.9	350	336	2S	6400	8000	6	4	4	4	4	512GB
6747P	48	2.7	3.8	3.9	330	288	2S	6400	8000	6	4	4	4	4	512GB
6760P	64	2.2	3.4	3.8	330	320	2S	6400	N	6	2	2	2	2	128GB
6740P	48	2.1	3.3	3.8	270	288	2S	6400	N	6	2	2	2	2	128GB
6730P	32	2.5	3.6	3.8	250	288	2S	6400	N	6	2	2	2	2	512GB
6736P	36	2.0	3.4	4.1	205	144	2S	6400	N	6	4	4	4	4	512GB
6737P	32	2.9	4.0	4.0	270	144	2S	6400	N	6	4	4	4	4	512GB
6700P 1S Performance Per Watt Optimized															
6781P	80	2.0	3.2	3.8	350	336	1S	6400	8000	6	3	3	3	3	125GB
6761P	64	2.5	3.6	3.9	350	336	1S	6400	8000	6	3	3	3	3	125GB
6741P	48	2.5	3.7	3.8	300	288	1S	6400	N	6	3	3	3	3	128GB
6731P	32	2.5	3.9	4.1	245	144	1S	6400	N	6	3	3	3	3	128GB
6700P 8S, xNC Performance Per Watt Optimized															
6788P	86	2.0	3.2	3.8	350	336	8S, xNC	6400	N	6	4	4	4	4	512GB
6768P	64	2.4	3.6	3.9	330	336	8S, xNC	6400	N	6	4	4	4	4	512GB
6700P 4S/8S Performance Per Watt Optimized															
6748P	48	2.5	3.8	4.1	300	192	4s_8S	6400	N	6	4	4	4	4	512GB
6738P	32	2.9	4.1	4.2	270	144	4s_8S	6400	N	6	4	4	4	4	512GB
6728P	24	2.7	3.9	4.1	210	144	4s_8S	6400	N	6	4	4	4	4	512GB
6700P 8S Performance Per Watt Optimized															
6724P	16	3.6	4.2	4.3	210	72	8S	6400	N	6	2	2	2	2	512GB
6714P	8	4.0	4.3	4.3	165	48	8S	6400	N	6	2	2	2	2	512GB

Below is a summary of the Intel Xeon 6500P series processors

SKU	Cores	Base (GHz)	All Core Turbo (GHz)	Max Core Turbo (GHz)	TDP (Watts)	Cache	Maximum Scalability	DDR5 Memory Speed	MRDIMM Memory Speed	UPI Links Enabled	Default DSA Devices	Default IAA Devices	Default QAT Devices	Default DLB Devices	Intel SGX Capacity (Per CPU)
6500P 2S Performance Per Watt Optimized															
6530P	32	2.3	3.7	4.1	225	144	2S	6400	N	6	2	2	2	2	128GB
6520P	24	2.4	3.4	4.0	210	144	2S	6400	N	6	2	2	2	2	128GB
6527P	24	3.0	4.2	4.2	255	144	2S	6400	N	6	4	4	4	4	512GB
6517P	16	3.2	4.0	4.2	190	72	2S	6400	N	6	2	2	2	2	512GB
6507P	8	3.5	4.3	4.3	150	48	2S	6400	N	6	2	2	2	2	512GB
6515P	16	2.4	3.8	3.8	150	72	2S	6400	N	6	2	2	2	2	128GB
6505P	12	2.2	3.9	4.1	150	48	2S	6400	N	6	2	2	2	2	128GB
6500P 1S Performance Per Watt Optimized															
6521P	24	2.6	4.1	4.1	225	144	1S	6400	N	6	3	3	3	3	128GB
6511P	16	2.5	4.2	4.3	150	72	1S	6400	N	6	2	2	2	2	128GB

Below is a summary of the Intel Xeon 6500 E series processors

SKU	Cores	Base	All Core Turbo (GHz)	TDP (Watts)	Cache(MB)	Maximum Scalability	DDR5 Memory Speed	UPI Links Enabled	Default DSA Devices	Default IAA Devices	Default QAT Devices	Default DLB Devices	Intel® On Demand Capable
2S Performance Per Watt Optimized													
6780E	144	2.2	3.0	330	108	2S	6400	4	2	2	2	2	N
6766E	144	1.9	2.7	250	108	2S	6400	4	2	2	2	2	N
6756E	128	1.8	2.6	225	96	2S	6400	4	2	2	2	2	N
6746E	112	2.0	2.7	250	96	2S	5600	4	2	2	2	2	N
6740E	96	2.4	3.2	250	96	2S	6400	4	2	2	4	4	N
6710E	64	2.4	3.2	205	96	2S	5600	4	2	2	4	4	N
1S Performance Per Watt Optimized*													
6731E	96	2.2	3.1	250	96	1S	5600	0	2	2	2	2	N

Generation to Generation Comparisons

Each generation of CPUs from Intel improves a number of essential features. The improvement over multiple generations of CPUs is quite impressive and can be viewed below.

	X12	X14	Benefit
CPU	3rd Gen Intel Xeon	Intel Xeon 6	
Memory	DDR4-3200 MT/s	DDR5-6400 MT/s MRDIMM 8800 MT/s	2x memory bandwidth 2.7x memory bandwidth
PCIe	PCIe 4.0	PCIe 5.0	2x throughput increase
Storage	U.2	E1.S, E3.S	Increased density, throughput and better thermals
Cores/socket	Up to 40	Up to 144	3.6x increase
CXL	-	CXL 2.0 (all device types)	Increased shared memory pool

The Intel Xeon 6700E series processors, compared to the Intel Xeon 6900P series processors:

Over many generations, progress has been made regarding the amount of work per watt. The significant improvement over several generations of Intel processors demonstrates how leading-edge technology can significantly improve server performance and enable new types of computing at lower costs.
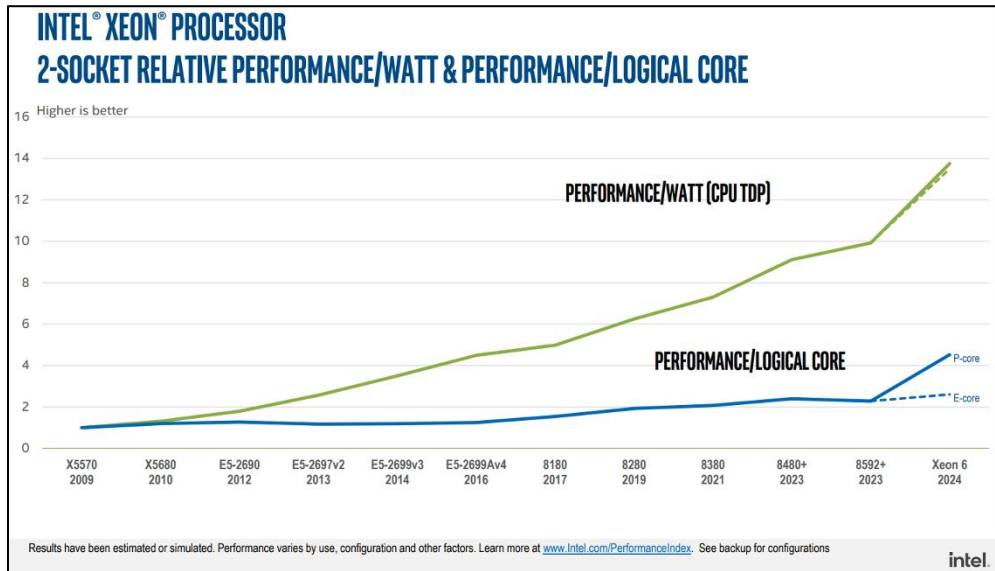
Image Courtesy of Intel

Summary

The new Supermicro X14 product lines are designed for a range of workloads. With the latest Intel Xeon 6 processors, specific workloads will show increased performance per core and a better performance/watt compared to previous generations. The Supermicro X14 products are positioned to take advantage of the latest CPU and GPU technologies.

For More Information:

Supermicro X14 Summary: www.supermicro.com/x14

Supermicro Product Brief: P-Cores and E-Cores: https://www.supermicro.com/products/brief/product-brief-X14-Servers-Xeon-6.pdf

Supermicro X14 Complete Brochure: https://www.supermicro.com/manuals/brochure/Brochure_X14_Servers.pdf

Supermicro FlexTwin: www.supermicro.com/flextwin

SuperBlade: https://www.supermicro.com/en/products/superblade?pro=generation_new%3DX14

Hyper: https://www.supermicro.com/en/products/hyper?pro=generation_new%3DX14

Hyper-E: https://www.supermicro.com/en/products/embedded/5g-telecom-systems

BigTwin: https://www.supermicro.com/en/products/bigtwin?pro=generation_new%3DX14

GrandTwin: v https://www.supermicro.com/en/products/grandtwin?pro=generation_new%3DX14

WIO: https://www.supermicro.com/en/products/wio?pro=generation_new%3DX14

CloudDC with DC-MHS: https://www.supermicro.com/en/products/clouddc?pro=generation_new%3DX14

Telco/Edge: https://www.supermicro.com/en/products/embedded/5g-telecom-systems

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