Executive Summary

As connected devices grow exponentially in numbers, processing at the local Edge is becoming critical to managing and processing large amounts of generated data to support demanding applications. As a result, Supermicro is leveraging advanced product designs to provide expandable, power-optimized, ultra-reliable computing with forward-thinking software platform partners, building application-ready solutions for multiple vertical markets.

Environmental conditions are much more challenging at the Edge than in a climate-controlled data center. Yet, Edge servers and IoT devices still need to perform as required while operating in these diverse conditions. Of course, as the processing power increases, the heat that needs to be also removed increases, requiring adequate cooling technologies. The systems are highly configurable and allow expansion with the necessary accelerator technology to enable AI/ML applications at the Edge.
Edge Scenarios

Edge systems are showing up everywhere -- data collection and processing are moving away from large centralized installations like enterprise data centers. In addition, new technologies are moving quickly into everyday operations – in stores and factories, hospitals, the street corner, or train stations.

Some of the more exciting areas where Edge computing is becoming part of day-to-day living are:

- Intelligent Retail
  - Improving customer experience using AI, augmented/virtual reality, digital signage, kiosks, and analytics
  - Providing disruptive AI-based solutions to help retailers and restaurants navigate technological and societal challenges
  - Enabling diverse use cases with an Edge architecture that supports many workloads on a single platform
  - Support for highly secure, Zero Trust, high availability systems to provide complete, optimized solutions – ensuring 100% uptime

Examples of Supermicro systems ideal for Edge computing in Intelligent Retail include:

- SYS-E50 Compact Fanless
- SYS-E100 Compact Fanless
- E302 Fanless Intel® Xeon-D
- E403 compact Intel® Xeon-D/ Intel Xeon-SP
  - With 3 expansion slots
• Industry 4.0 / IoT
  ○ Supporting AI- and computer vision-based controls to improve quality, guard worker safety, and increase overall equipment efficiency
  ○ Solutions for device connectivity and intelligence at the Edge, enabling streamlined operation and increased automation
  ○ Supporting real-time soft programmable logic control (PLC) capabilities in a highly secure software-defined environment
  ○ Reliable operation of a wide range of optimized compute architectures in extreme environments for AI at the Edge

Selected Supermicro servers that excel in Industry 4.0 environments:

![Supermicro servers](image)

• Smart Cities and Spaces
  ○ Edge computing is distributed across multiple locations supporting transportation, security, venues, cities, and buildings
  ○ Fully outdoor capable (IP65) high performance compute, with Intel® Xeon D or 3rd Gen Intel® Xeon® Scalable processors and accelerator expansion options
  ○ Solutions to improve community safety and quality of experience (QoE) with innovative connected applications
  ○ AI inferencing and visual computing in outdoor Edge locations, enabling intelligent surveillance and accurate incident reporting for faster response times
  ○ Supporting V2X for parking, traffic, and pedestrian safety, autonomous vehicle support, and public transportation improvements
A selection of Supermicro servers that contribute toward smart cities and spaces:

![Supermicro servers](image)

**Sizing**

Intelligent IoT devices at various Edge points require different CPUs, GPUs, and cooling technologies and face physical size limitations. Therefore, the right-sizing of an Edge system is guided by the environment, dimensions, connectivity, and compute needs defined by the various workloads.

- **Intelligent IoT Gateways for The Extreme Edge**
  - Ultra-small systems for space-constrained locations include convenience stores, restaurants, factory automation, etc.
  - Fanless enclosure with a variety of I/O and networking options, highest reliability, and maintenance-free
  - Ideal for running workloads such as point-of-sale (PoS), inventory management, soft-PLC, or user-facing applications

- **Compact Servers for Mainstream Installations**
  - Small physical footprint and highly configurable for demanding locations
  - Processor options ranging up to the Intel® Xeon® D, plus networking I/O options, and PCI-E expansion slots
  - Capable of running a variety of intelligent Edge, SD-WAN, and security workloads

- **High-Performance Rackmount**
  - Short-depth rackmount systems in small spaces
  - Data center-class performance with up to dual 3\textsuperscript{rd} Gen Intel® Xeon® Scalable processors, plus rich storage and full-size PCI-E expansion slots
  - Support for GPUs and other hardware accelerators to drive AI/ML applications and other demanding Edge workloads

The range of servers available for deployment at the intelligent Edge contains different CPUs in different form factors with varying amounts of I/O capacity, expansion slots, fans, and size. Below is a comparison of the most popular Supermicro Intelligent Edge servers with a sampling of their capabilities and design envelopes.
## Comparison of Features of Supermicro Edge Systems

<table>
<thead>
<tr>
<th>Product Family Name</th>
<th>Example System</th>
<th>CPUs</th>
<th>Max. Memory</th>
<th>Network</th>
<th>Expansion</th>
<th>Fan/Fan-less</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>E50</td>
<td>E50-9AP</td>
<td>Intel® Atom® processor E3940</td>
<td>8GB</td>
<td>2 x GbE LAN</td>
<td>2x mini-PCI-E</td>
<td>Fanless</td>
<td>5.82” x 1.72” x 4.64”</td>
</tr>
<tr>
<td>E100</td>
<td>SYS-E100-12T-E</td>
<td>11th Generation Intel® Core™ i5-1145GRE Processor</td>
<td>64GB</td>
<td>2 x 2.5 GbE LAN</td>
<td>3x M.2 slots</td>
<td>Fanless</td>
<td>7.68” x 1.73” x 5.94”</td>
</tr>
<tr>
<td>E302</td>
<td>SYS-E302-9D</td>
<td>Intel® Xeon® processor D-2123IT, 4-Core, 8 Threads, 60W</td>
<td>256GB</td>
<td>Quad 1GbE with Intel I350-AM4 Dual 10GBase-T with Intel X557 Dual 10G SFP+ via SoC</td>
<td>2x M.2 slots</td>
<td>Fanless</td>
<td>11.6” x 3.00” x 8.1”</td>
</tr>
<tr>
<td>E403</td>
<td>SYS-E403-12P-FN2T</td>
<td>3rd Gen Intel® Xeon® Scalable processors</td>
<td>2TB</td>
<td>2 x 10GbE</td>
<td>3 slots, 2x16 or 1x16+2x8</td>
<td>Fans</td>
<td>10.5” x 4.3” x 16.0”</td>
</tr>
<tr>
<td>510D</td>
<td>SYS-510D-10C-FN6P</td>
<td>Intel® Xeon® Processor D-1747NTE</td>
<td>256GB</td>
<td>4x 1GbE GbE 2x 25GbE SFP28</td>
<td>1xPCI-E 4.0 x 16, 2 x M.2 slots</td>
<td>Fans</td>
<td>17.2” x 1.7” x 9.8”</td>
</tr>
<tr>
<td>Ultra - Short Depth</td>
<td>SYS-210P-FRDN6T</td>
<td>3rd Generation Intel® Xeon® Scalable Processors</td>
<td>2TB</td>
<td>2x 10GbE ports &amp; 4x 1GbE ports</td>
<td>Up to 3 PCI-E 4.0 FHHL &amp; 2 HHHL slots for accelerator add-on cards, 1x M.2 slot</td>
<td>Fans</td>
<td>17.2” x 3.5” x 11.8”</td>
</tr>
<tr>
<td>Hyper-E</td>
<td>SYS-220HE-FTNR</td>
<td>2x 3rd Gen Intel® Xeon® Scalable Processors</td>
<td>8TB (12TB with Intel Optane PMem)</td>
<td>Up to 4 x 25GbE</td>
<td>Up to 6 slots</td>
<td>Fans</td>
<td>17.2” x 3.5” x 22.6”</td>
</tr>
<tr>
<td>SuperEdge</td>
<td>SYS-210SE-31A (3 nodes)</td>
<td>3rd Gen Intel® Xeon® Scalable processor (per node)</td>
<td>2TB (per node)</td>
<td>1x 1GbE (per node)</td>
<td>1x16 FHHL slots per node</td>
<td>Fans</td>
<td>17.7” x 3.5” x 16.9”</td>
</tr>
<tr>
<td>IP65</td>
<td>E403-9D-16C-IPD2</td>
<td>Intel® Xeon® D-2183IT processor</td>
<td>512GB</td>
<td>4 10G SFP+ LAN ports 9 RJ45 Gigabit Ethernet LAN ports 1 RJ45 Dedicated IPMI LAN port</td>
<td>1 PCI-E 3.0 x16 (FH3/4L) slots or 2 PCI-E 3.0 x8, 1 PCI-E 3.0x16 (FH3/4L) slots, 3 M.2 slots</td>
<td>Fans</td>
<td>12.56” x 32.21” x 10.16”</td>
</tr>
</tbody>
</table>
Supermicro Family for IoT/Edge Deployments

Summary

Supermicro Edge solutions are designed for a wide range of environments and workloads. From small and fanless servers to multi-CPU servers, Supermicro delivers application-optimized systems that can be installed and maintained in various environments where the systems need to reside close to the data.

Additional Information

