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HOW SUPERMICRO IS MAKING THE INTELLIGENT EDGE A REALITY

In this interview with Michael Clegg, Supermicro's vice president and general manager for 5G, Embedded and IoT, we discuss the advantages of edge computing and the role it plays in making applications such as augmented reality, industrial automation, and autonomous vehicles possible.

MICHAEL CLEGG

Vice president and general manager for 5G, Embedded and IoT
Supermicro

Question: What roles does edge computing play in the industrial IoT?

Answer: Computer usage in industrial Internet of Things (IoT) has been around for many years, from computerised manufacturing and machining (CMM), computer numerical control (CNC), and process control, etc. However, often these systems were deployed separately from each other, with each one being an island. While they may be computer controlled, they are usually not networked and use proprietary protocols. Because of this, each machine operates in isolation.

To achieve full automation, intelligent operations and integration in business support systems such as finance, supply chain, logistics, quality and safety, situational awareness of the entire industrial environment is required. All machines need to be networked and their condition monitored continuously.

Edge computing helps resolve this issue by adding unified measurement and real-time communication and control. It enables the digital transformation and cloudification of industrial IoT systems. Digital twins mirror the industrial applications to enable systems to be simulated and optimised.

But the increase in sensors, measurement devices and real-time control also causes a dramatic increase in data. Because edge computing sits between the devices and the cloud, it can process and filter the raw data, and send only pertinent information to the cloud. This reduces the bandwidth on the wide area network. In addition, priority applications are processed locally reducing latency and improving reliability and resiliency.

Question: Why should companies consider edge computing for their manufacturing sites?

Answer: All companies need to increase productivity, improve safety and enhance quality. Just-in-time inventory requires highly adaptive and agile production processes from source to destination. Smart cities and field operations applications require local processing for autonomous operation.

But the reasons to consider edge computing are numerous. For example, it will deliver faster real-time operation through reduced latency because real-time control requires local processing. This is important for the control of things like autonomous vehicles, which require very short millisecond control loops.

Edge computing also enhances artificial intelligence (AI) and machine learning (ML) because it reduces the raw data making ML and AI training more effective and reducing traffic on the wide area network.

Edge computing can also provide an adaptation layer connection to legacy machine protocols creating a common information bus for systemwide operation. And it provides resiliency and standalone operation, even with loss of the cloud connection. This is vital for mission-critical applications.

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Question: What types of partnerships is Supermicro forming with other companies to make edge-computing platforms a reality?

Answer: As a server manufacturer, Supermicro is collaborating with software companies that enable edge applications and provide the applications. Some of the companies we have partnered with include virtualisation and hypervisor partners like NodeWeaver, ENEA and VMware; software-defined wide area networking (SD-WAN) partners like NetFoundry and ADVA; analytics firms such as SAS; smart manufacturing data collection companies like Litmus Automation; and industrial networking companies like TTTech. We also are collaborating with leading AI/ML companies including Intel® for cost-effective AI processors and software to bring affordable AI to the edge.

Question: How should enterprises think about edge computing – in other words, why is this more than just a hardware or software purchase?

Answer: Edge compute is a variant of hyper-converged infrastructure (HCI). A single HCI server or cluster includes compute, storage and networking as well as a virtualization layer abstracting the applications software from the hardware. HCI runs on standard x86 servers replacing expensive propriety industrial computers. For Edge applications, dedicated GPU or custom AI processing technologies supplement the main general purpose x86 processor.

The compact and powerful HCI platform completes processing at the edge. Supermicro servers include high performance, high capacity all-flash NVMe and Intel® Optane memory for very high throughput transaction processing, and advanced GPU/AI processors for high performance inferencing.

Question: What types of low latency applications are made possible through the intelligent edge?

Answer: Some examples of low latency applications include any motion control applications including automated guided vehicles, drones, autonomous driving and robotics. Augmented reality and virtual reality are two other low latency applications that the edge makes possible because it can ensure that the environment image is presented in real-time to synchronise with movement.

Industrial automation is another area that benefits from the intelligent edge because factory-wide real-time process control requires low latency, and time sensitive networking (TSN) is best served with edge computing. Plus, edge computing coupled with private 5G networks, provides flexible ultra-reliable low latency (URLLC) wireless networking that can support mobile endpoints.

And finally, video analytics and surveillance is a very important low latency application made possible through intelligent edge because video and image information can be analysed and processed in real-time to generate local alerts and actions. Also, AI-enabled video will use local inferencing to reduce response time while passing preprocessed and filtered data to the cloud for training and machine learning.

Question: How can enterprises save money with edge computing?

Answer: As I mentioned above, edge computing is an HCI/AI instance. Using general-purpose commercial off-the-shelf (COTS) hardware is cheaper than proprietary hardware as it benefits from industrywide scale. Running multiple workloads on the same system amortises the hardware and power cost over multiple applications. There is also a statistical gain in that not all workloads need to run all the time, minimizing idle processing and reducing the amount of required hardware. Modern processing, storage and networking have higher capacities than any one application typically requires, by running multiple workloads on one system the resources are fully utilised and unit costs reduced.

A related and concurrent trend to edge computing is virtualisation of physical products. This occurs by transitioning embedded firmware and custom logic to software on virtualised hardware. Applications providers now become software companies. This lowers financial risk from not having to develop and inventory hardware, and reduces barriers to entry that opens up the supply chain to more innovation.

The end customer also benefits by reduced risk of product obsolescence. They can benefit from the rapid enhancement of COTS servers and ability to switch applications providers with a software change.