OMRON

Using the Omron NY industrial computer at the network edge for local decision-making and SQL communication

A success story

Industry 4.0 is underway and manufacturers are focusing on using smart automation, robots, and sensors to build the Industrial Internet of Things (IIoT). IIoT offers a conceptual framework for using interoperability, contextual information, and decentralized decision-making as strategies for increasing quality and efficiency.

Because IIoT is data-intensive, plant operators are considering technologies for moving more of the processing workload closer to the network edge where this information is being created and consumed. Edge computing can make highly connected production environments more responsive and flexible by allowing automated systems to operate with greater autonomy and less latency.

Traditional industrial PCs configured with more powerful processors and larger hard drives are sometimes suggested as solutions for the challenges of edge computing. But inserting these devices into networked environments raises security concerns.

Recent ransomware attacks forced several companies to shut down production for several hours or days. In these attacks, hackers encrypted important data and attempted to extort payments in exchange for unlocking the locked files. Whether the hackers collected their ransoms is unknown, but it is likely the attacks cost the victims anywhere from a few million dollars to several hundreds of million dollars in lost production.

"The architecture of traditional industrial PCs makes them more vulnerable to attack," says Omron automation engineer Allen Keshishian. "Manufacturers want to move forward with edge computing for IIoT, but they need a secure industrial computer that will be hard to compromise."

Omron NY enhances security by isolating the production environment

To make IIoT more secure, Omron has developed a new industrial PC that limits the potential for intrusion in connected production environments. Unlike traditional industrial PCs, the Omron NY industrial computer uses a multicore architecture that isolates its machine control QNX Neutrino OS from guest operating systems such as Microsoft Windows or Linux. The two OSs operate simultaneously but separately.

"With multiple cores, the Omron NY can have independent operating systems for the enterprise and production workloads," says Omron product manager Clark Kromenaker. "Even if hackers exploit a known weakness in the enterprise-facing operating system, it cannot affect the QNX production network."

The operating systems are partitioned down to the hardware layer. This separation establishes a virtual firewall between the production and enterprise networks, which prevents attackers from using a vulnerability in Windows or Linux to infiltrate manufacturing processes. The processor architecture allows the computer to continue processing and storing data locally if communication with the enterprise backend or cloud-based systems is disrupted.

The QNX Neutrino OS is incredibly stable and should not require updating or patching over the computer's expected lifespan. All drivers, protocols, and system files run in a memory-protected space. In the unlikely event that a memory volume on the QNX OS is compromised, the Omron NY industrial computer automatically reboots from a backup shadow volume. User access to the computer's settings is controlled by a trusted platform module (TPM).

Business Need

The Industrial Internet of Things (IIoT) benefits from processing at the network edge. But delivering this capability without compromising security is challenging.

Unique Solution

The Omron NY industrial computer delivers outstanding compute and bi-directional communication capabilities. Its multicore architecture isolates machine control from the guest operating systems and provides a virtual bridge for effectively isolating production infrastructure from intrusion and attack.

Customer Benefits

The Omron NY industrial computer enables manufacturers to move compute tasks to the network edge while enhancing security. It also allows companies to capture the vast amounts of data they need to improve real-time visibility and optimize production processes.

Omron NY provides direct communication with SQL databases

Manufacturers with processing power at the edge often want to transfer data from motion, safety, and vision sensors and other devices to backend systems. This data is used for tracking assets throughout the lifecycle, monitoring production, ensuring compliance, and improving processes. While middleware can be used for data collection, these devices frequently use the supervisory control and data acquisition (SCADA) system.

"SCADA is a legacy standard that lacks the flexibility or broad industry adoption enjoyed by SQL," says Omron application engineer Scott Heil. "It is also more vulnerable to security threats."

The Omron NY industrial computer offers a stand-alone latch for the Structured Query Language (SQL). The latch is programmed in Visual Basic and customizable. Using the latch allows the production environment to communicate with the enterprise network without putting the NY's virtual firewall at risk. SQL is ideal for storing and managing massive data volumes for big data strategies such as data exploration, decision science, performance management, and social analytics

Omron NY offers advanced machine control in a single enclosure

The Omron NY industrial computer supports the same control, data collection, and monitoring functions as Omron's well-regarded NJ Series machine automation controller (MAC). A single NY can function as a network gateway between multiple NJ and NX series controllers and processes running on the enterprise or the cloud.

"The machine control functionality is being transferred from a proven product," says Omron regional sales manager Russ Rehak. "And the NY is able to fully synchronize programmable logic and numerical control."

Synchronization allows PLC and NC

programs to execute in the same task period, which reduces interlock time and increases the efficiency of multi-purpose machines. Like Omron's existing MAC products, the NY industrial computer is designed to last as long as the machine it is supporting. It uses an industrially hardened processor and Ethernet or EtherCAT networking to control up to 192 peripherals, including servos, input/output modules, vision sensors, and inverters. The entire device is housed in a compact enclosure that provides superior heat dissipation and vibration resistance.

Omron NY supports the Sysmac Studio IDE

The Omron NY is powerful enough to run the Sysmac Studio integrated development environment (IDE). The IDE provides a library of PLCopen function blocks and an intuitive graphical interface for creating and editing ladder programs.

The Sysmac Studio IDE allows operators to test, debug, and simulate programs before production hardware is in place. Operators also can write code and insert function blocks into ladder programs remotely or from the plant floor using an Omron industrial monitor.

"The Sysmac platform standardizes automation," Kromenaker says. "Customers can eliminate applications and middleware while using a single IEC 61131-3 compliant software suite to improve efficiency across multiple lines and locations."

Sysmac includes a wide range of third-party automation products, multiple databases, and remote-access systems. It meets industry audit and verification requirements and includes tools for adhering to FDA 21 CFR Part 11, EU Annex 11, and Good Automated Manufacturing Practice (GAMP) guidelines.

Omron Automation is a global automation partner that creates, manufactures and services fully integrated automation solutions. We provide controls, vision, safety, motion and robotics for the automotive, semiconductor, food/beverage, packaging, pharmaceutical and infrastructure industries.

For over 80 years, Omron has helped industrial businesses maximize potential by solving problems creatively. Currently headed by President Yoshihito Yamada, our company is 36,000 employees strong—providing products and services in more than 110 countries worldwide.

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