CASE STUDY

OMRON
AUTOMATION & SAFETY

Using SQL to speed up data logging and create a more secure and integrated environment

Data logging is a critical part of any automated manufacturing process. Capturing data from motion, safety, vision, sensors, inverters, servo drives, input/output, and other logic devices allows manufacturers to trace products, monitor production, and improve processes.

Systems for collecting data traditionally have used supervisory control and data acquisition (SCADA) systems. But over the last 15 to 20 years, many manufacturers have standardized their corporate databases, enterprise resource management, and manufacturing execution systems on structured query language (SQL).

While it is possible to use middleware to integrate SCADA with SQL databases, this architecture is not an ideal data-logging solution for three reasons. First, SCADA middleware is complicated to implement, maintain, and repair even with assistance from in-house IT specialists or outside consultants. Second, because these middleware systems do not provide a direct database link, it consumes cycle time and reduces production efficiency. Last, constant maintenance is required to ensure these operating systems and hardware remains operational, current, and is not vulnerable to security threats.

Omron developed the Sysmac NJ machine automation controller (MAC) with SQL client functionality because customers told us they wanted a simple, durable device that could save data logs directly into their SQL databases.

NJ SQL offers a simple and rugged alternative to SCADA

"SCADA is really a complex solution to a simple requirement," said John Altamirano, Strategic Account Manager for Omron Automation and Safety. "We developed the Sysmac NJ MAC with SQL because our customers wanted a simple way to log data. The NJ delivers that feature plus faster production and a seamless architecture."

The NJ series MAC uses an industrially hardened Intel® Atom™ processor and a solid-state drive to log data and simultaneously access up to three relational database systems. The processor can collect data over a wide array of industrial networks including Ethernet (socket service), EtherNet/IP, EtherCAT, PROFINET, and DeviceNet, and then send the data directly to a SQL server over Ethernet. An onboard memory supports local data spooling if the server connection is lost. The entire device is housed in an industrial grade compact enclosure that contains no spinning hard drives, or other moving parts.

"By combining industry-grade components with superior heat dissipation, Omron has created a hardware controller that will last as long as the machine it is monitoring," said Johnston Hall, Commercial Engineer for Omron Canada, Inc. "SQL allows customers to integrate the MAC with existing Oracle or Microsoft database servers and share data with standard business applications. You also don't

Business Need

Data logging is a critical part of the manufacturing process. For decades manufacturers have used SCADA or gateway systems to perform this task. However, these tend to be complex to support and vulnerable to cyber-attacks. It also requires more time to poll monitored devices.

Unique Solution

Omron's Sysmac NJ MAC with SQL client functionality is a more efficient and secure alternative. It is designed to last as long as the machine it monitors and improves production cycle times by up to 10 percent.

Customer Benefits

The SQL programming language is designed to work with industry-standard relational databases. This makes the NJ MAC with SQL much easier to implement, maintain, and secure than traditional gateway data acquisition systems.

need a SCADA programmer to write reports."

SQL helps to speed up production

While SCADA is supposed to enable real-time data communication, it introduces significant delay into the production process as the system polls monitored devices.

"Most production machines have a total cycle time of 10 seconds," said Hall. "SCADA consumes 500 to 1,000 milliseconds of the cycle as it polls the PLC. With the SQL programming language, logging takes just 10 to 100 milliseconds."

Shaving milliseconds off the total cycle time might seem like a minor achievement, but these small improvements can have a tremendous impact on overall efficiency. If you reduce polling time from 1,000 milliseconds to 30 milliseconds, you can potentially produce 10 percent more product with the same equipment, on a 10 second cycle time, for example.

"Improving efficiency is normally engineering intensive," said Hall. "The SQL version of the NJ MAC gives manufacturers a cost-effective way to produce more product with the same equipment."

SQL maximizes security in ways that SCADA cannot match

SQL also provides a much more secure path for creating greater visibility into the production process. It is deeply embedded in corporate environments and, consequently, actively supported by technology providers and in-house IT departments.

SCADA and similar PC based systems, on the other hand, are often ignored until they malfunction or are compromised. This very lack of attention leaves them vulnerable to attack. While some proponents attribute such attacks to outdated products, a 2012 NSS Labs' Vulnerability Threat Report disclosed that 73 percent of known vulnerabilities were found in new SCADA systems. In fact, ongoing security research suggests that SCADA protocols and development software remain vulnerable.

"Data logging is a top priority for most companies," said Altamirano. "Using SQL is much easier for engineers and much more secure for their companies."

Set up for the NJ MAC with SQL usually minutes as opposed to hours for comparable gateway systems. Moreover, Omron's Sysmac Studio software suite is designed to facilitate this process. It includes an integrated development environment (IDE) for writing and inserting structured text directly into ladder programs. It also offers advanced functions such as name confirmation, serial ID matching, administrator access rights, controller write protections, and 32-digit security passwords to help prevent unauthorized connections to the system.

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Omron Automation and Safety is a leading global provider of machine safety and automation solutions, with more than 80 years of service experience in the controls and sensing business. Our customers can rest assured the automation strategy developed will meet the needs of today and include pathways for practical expansion and modification to address the many challenges of the future.

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