

Mitsubishi Electric Gives High Marks to Wind River VxWorks

Global Electronics Leader Cuts Development Time and Costs, Improves Quality and Reliability of Next-Generation C Controller



Mitsubishi Electric Corporation has more than 80 years of experience providing electrical and electronic equipment to corporate clients and general customers around the world. This global leader provides equipment for information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation, and building equipment.

When the company embarked on developing the Q12DCCPU-V, a new C controller to enable C programs for microcontroller boards, it needed a real-time operating system (RTOS) that would measure up to the design challenge. The general-purpose sequencer product had stringent requirements for supporting high-quality, high-speed sequence control and a flexible system architecture.

The Q12DCCPU-V would inherit the features of previous versions, while also greatly improving basic performance through enhanced central processing unit (CPU) specifications and expanded memory capacity. It needed to enable more precise factory automation control, and the concept attracted great interest from semiconductor, liquid crystal, optical device, and other high-tech industries.

“We developed the new C controller to meet user and market needs,” says Tadashi Ueki, head of the Controller Development Group. “This included our standard ease of use, safety, and long-term stability—then added more speed and stronger cooperation with upper-level servers.”

When Mitsubishi Electric evaluated which RTOS and integrated development environment to use for the Q12DCCPU-V, it decided upon Wind River’s VxWorks 6.4. Part of this decision was based on the company’s use of VxWorks for the robust user system architecture in the previous highly rated version of the C controller. This past experience with Wind River’s

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Company Profile: Mitsubishi Electric Corporation

- Global leader in electrical and electronic equipment
- Headquarters in Tokyo, Japan

Industry

- Industrial

Solutions

- Wind River’s VxWorks 6.4
- Wind River Workbench
- Wind River Professional Services
- Renesas Technology Corporation SH7780

Results

- Shortened debugging work and cut engineering costs by 50%
- Improved system development reliability as well as quality and reliability of devices
- Improved the efficiency of the system development cycle, from editing to compiling, debugging, code analysis, and testing
- Introduced product within a very aggressive time frame

performance and stability translated into minimal risk. In addition, the memory protection functions based on the VxWorks 6.4 memory management unit (MMU) would greatly improve system development reliability.

Meanwhile, the company also decided to use Wind River Workbench 2.6.1 as the integrated development environment.

“Since Wind River Workbench is based on the Eclipse framework, the next-generation integrated development environment standard, we can easily include a variety of plug-ins developed by third parties, open source, or in-house,” says Kōji Amano, a manager in the Controller Development Group. “The ability to easily expand the included system is an advantage for our users.”

In addition, Wind River Workbench dramatically improved the efficiency of the system development cycle, from editing to compiling, debugging, code analysis, and testing.

Mitsubishi Electric leveraged the expertise and best practices of Wind River Professional Services to accelerate the product development. Development progressed smoothly and quickly, and the product was introduced to the market within a very aggressive time frame.

Compressed Development Cycle, Reduced Costs

According to Ueki, having VxWorks and Wind River Workbench built into the Q12DCCPU-V has greatly benefited users.

“Wind River Workbench integrates development tools for supervision, analysis, and debugging at every stage of development,” he says. “When there are defects in a control device, Wind River Workbench identifies them and makes them highly visible. The user can detect latent defects in a program early in the debugging stage, greatly improving the quality and reliability of the device.”

Wind River Workbench’s easy-to-use run-time analysis tools, based on a graphical user interface (GUI), allow the user to shorten debugging work from two weeks to one week. This adds efficiency to all processes from hardware startup through middleware integration and application development. It also cuts engineering costs by 50%—another major added value.

Wind River Supports iQ Platform Concept

Mitsubishi Electric uses VxWorks and Wind River Workbench for its next-generation integrated iQ platform, which supports the new Q12DCCPU-V C controller.

iQ is the world’s first automation platform combining all key automation types on one controller. Users can avoid wasting valuable engineering resources trying to make different vendors’ systems work together. With iQ, Mitsubishi Electric takes care of system integration. It offers an extensive array of controller types that seamlessly operate together on the same backplane. Now engineering staff can concentrate on the demands of the application itself, rather than the platform.

As a result of this focus on the application, the new C controller has greatly improved CPU performance and inter-CPU bus performance compared to previous C controllers, achieving higher-capacity data transfer. Specifically, the motion CPU and sequencer CPU are linked with a specialized high-speed bus that synchronizes high-capacity data with words of up to 14K in 0.88 ms cycles, enabling high-speed transfer.

Users can separate networks for a variety of applications because two Ethernet channels are built in, increasing the flexibility of network structures. They can connect from the Ethernet ports to a manufacturing execution system (MES), equipment engineering system (EES), or other upper-level server and perform communication processing in real-time, improving system operation rates and productivity.

“If the upper-level communication network and the control device internal network are separated, communication errors between systems will not affect the overall system,” Amano says. “Also, this helps strengthen security, since it is possible to prevent improper access of the device internal network from the upper-level network.”

“No other company can imitate the core technology and architecture used to handle iQ,” Ueki adds. “Wind River’s technology has been key during the realization of this concept—and will continue to be key as we continue to develop next-generation C controllers to meet market needs.”

For additional information about the products mentioned in this case study, visit

www.windriver.com

www.mitsubishielectric.com