

Case Study: How MontaVista Linux helped Yamaha developers make a great product greater



For the MOTIF XS family of devices, the Yamaha team decided to replace its RTOS with MontaVista Linux

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—Mr. Yukihiro Kawaguchi, Manager, Product Development, Software Group, Yamaha Corporation

Yamaha music production synthesizer MOTIF XS

The Yamaha MOTIF design team faced one of the biggest challenges for developers: When your product design is an outstanding success, how can you make your next generation an even bigger leap forward?

Reviewer Oscar Sommers summed up the MOTIF team’s situation in *Musician’s Friend*: “If you’re Yamaha and responsible for one of the all-time classic workstations of our generation—a keyboard just as capable onstage as it is in the studio—how do you top it?”

The problem facing Yamaha’s MOTIF development team

Yamaha music devices have earned a reputation as the industry’s highest-quality and most advanced technology. Yamaha digital keyboards and music production devices are used by Beyonce Knowles, Justin Timberlake, Green Day, Norah Jones, David Bryan (of Bon Jovi), Rufus Wainwright, Usher, Michael McDonald, Jon Anderson (of Yes), and thousands more of the world’s top musicians.

Designed to unleash musicians’ creativity, the Yamaha MOTIF series is the best-selling line of workstation synthesizers in the U.S.,* and one of the most popular in the world. Launched in 2001, the original MOTIF became the worldwide standard in music synthesizer workstations, and with the launch of the MOTIF ES in 2003, Yamaha pushed its capabilities even further, more than doubling the devices’ memory and preset programs.

The previous generations of MOTIF had been developed based on the open source μ TRON real-time operating system. Yamaha designers appreciated the the basic functionality of μ TRON as a real-time OS. However, when they determined the requirements for Yamaha’s next-generation MOTIF XS, the development team realized that achieving their vision for the products would not be possible with μ TRON.

* As of January 2007. Source: SalesTrak.

The MOTIF XS developers needed to:

- provide compatibility with PC and Mac platforms,
- support a wide array of peripheral technologies,
- support sophisticated networking,
- and give designers greater flexibility in selecting hardware components, processors, and integrated circuits.

The Yamaha designers realized that achieving their goals would require an entirely new software architecture.

Why Yamaha developers chose MontaVista Linux

Having made the decision to move to a different software architecture, Yamaha sought a development platform that would provide it with the open source control it had come to expect, combined with the robustness and functionality of a commercial-grade system.

After evaluating different technology platforms, the Yamaha team chose MontaVista Professional Edition (Pro), using it as the foundation on which the developers could build their next-generation software architecture. Yamaha selected MontaVista real-time Linux because it offered developers the flexibility and scalability to support any future development requirements.

“MontaVista is now the de facto standard for embedded Linux,” said Mr. Yukihiro Kawaguchi, Manager, Product Development, Software Group, Yamaha Corporation, “with the broadest hardware, board, middleware, and peripheral support of any commercial Linux vendor.”

MontaVista leverages the strengths of open source Linux

Choosing to build their next-generation software platform on open source MontaVista Linux let Yamaha designers tap into the broad ecosystem of networking devices, peripherals, middleware, and drivers compatible with Linux. Of particular importance to Yamaha was processor support. Because MontaVista Linux provides compatibility with a wide selection of chipsets, the Yamaha team was able to select a MIPS RISC microprocessor with some of the highest performance benchmarks available.

Because MontaVista delivers real-time performance with 100% native Linux, Yamaha was able to use a broad range of available off-the-shelf Linux utilities and filesystems such as BusyBox, ext3, JFFS2, and Cramfs without concern that they would be incompatible.

In addition, because the MontaVista Linux platform is open source, Yamaha developers have complete control over their software, with the ability to modify or extend it in any way required, and to investigate and address any problems should they occur.

MontaVista provides commercial-grade software and services

In addition to open source advantages, working with MontaVista gave Yamaha developers the benefits of commercial-grade software and services.

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Product Development, Software
Group, Yamaha Corporation

Perhaps the most important benefits came from MontaVista's commitment to extending the functionality of Linux with real-time technology and other features, combined with its policy of conforming to open source requirements.

Yamaha sees value in MontaVista's commitment to creating proprietary development toolkits, such as its integrated development environment (IDE).

Yamaha believes a good IDE is a must to expand embedded Linux development and gives high marks to MontaVista for working to improve the quality of developer tools beyond what is available through open source today.

Another critical advantage was MontaVista's technical support services. On several occasions during the development process Yamaha developers ran into technical issues. They were quickly resolved with patches provided by the MontaVista technical support organization.

MontaVista enables developers to build advanced device features

Developing on MontaVista Linux, the Yamaha development team created the most technologically advanced, innovative synthesizer workstation yet released in the MOTIF series. Yamaha credits the performance, flexibility, and open standards of MontaVista Linux as enabling it to achieve capabilities for MOTIF XS that it would not have been able to with its previous generation development platform.

Yamaha's new software platform enables a number of advanced features found in the MOTIF XS:

- File-sharing with PC and Mac platforms
- An integrated sampling sequencer that combines audio/MIDI recordings
- An easy-to-use interface with large, full-color LCD screen and physical controls
- Full computer integration with diverse I/O connections (Ethernet, IEEE1394, USB, etc.)
- Compatibility with a wide variety of software
- Studio-grade mixing functionality

In the MOTIF XS series, the Yamaha team developed a line of music production synthesizers that can provide near-perfect reproduction of the musical nuances of a full orchestral ensemble or an acoustic guitar, that can be used to compose and record musical creations, and that can provide a wide variety of backing styles.



MontaVista Linux adds functionality and connectivity to the Yamaha MOTIF XS product family

The market responds to Yamaha's new products

Reviewers enthused about the new MOTIF XS series. "Consider this a fair warning, readers: whatever I say about the MOTIF XS during this review, it's actually much, much better," wrote Oscar Sommers in *Musician's Friend*.

MontaVista Linux shared some credit, as Athan wrote in *Motifator.com*: "So what's new? Just about everything... Perhaps most significant is that the core OS is completely different. This has a lot of advantages."

Further, Yamaha believes that its new platform will enable it to achieve greater software development efficiencies moving forward, and that it has just begun to scratch the surface of the capabilities afforded by its new software architecture.

"Developing on MontaVista Linux provides us with enormous future potential, explained Mr. Yukihiro Kawaguchi. "Even with the innovative features in the MOTIF XS, we have not yet begun to tap into the capabilities our new software foundation has to offer."

About MontaVista Software

MontaVista Software, Inc. is the leading provider of Linux for intelligent devices and telecommunications infrastructure. MontaVista delivers a commercial-quality Linux operating system, time-saving development tools, expert support, and design and migration services. MontaVista has more than 400 partners, and thousands of companies use MontaVista embedded Linux to add functionality, increase reliability, reduce costs, and accelerate product development. MontaVista has offices in 15 countries. For more information, please visit www.mvista.com



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